Submission for the Victorian Government Climate Change Green Paper from the Association for Climate Technology Solutions

The aim of our association is to develop and implement technology that does not pollute the environment and enables human beings to be as independent as possible from the corporate domination of our energy and fuel supply. We focus on developing practical, grass roots solutions to a range of environmental issues. Our membership consists of people from a variety of fields, including Engineers (Chemical, Civil, Electrical, etc.), Inventors, Mechanics, Physicists, Scientists and Corporate Managers. As such, we have a wide range of views, and are able to find synergies across a large range of technologies. Unlike many "think tanks" we are not controlled by current and former CEOs of oil companies, coal mines, etc., nor do we have a vested interest in any particular technology.

Key Points:

1. Energy efficiency in existing transport and stationary energy systems is extremely poor.
2. Technologies already exist that can dramatically improve the efficiency of production of electricity in power stations, and fuel efficiency in vehicles, which in Australia are responsible for two-thirds of our production of greenhouse gases.
3. If implemented these technologies would easily allow Australia (and the World) to meet Kyoto Greenhouse Gas Emission targets, plus improve the standard of living of all Australians, with reduced health impacts, less environmental impacts, improved energy security, etc.
4. Technologies have not been implemented as they conflict with business models of established corporations and governments.
5. Policy changes will be required in order to encourage changes in business models of both corporations and governments, and to support large changes in employment. Now is the perfect time to implement this in the vehicle industry; there have already been massive layoffs locally in Geelong with Ford, and in the USA internationally with GM, for example. With the impending introduction of the CPRS improvements in the stationary energy arena are also ripe.
6. Investment in education, research and development will also be required; conventional education has often ignored the possibilities of new technologies and scientific learnings. Many Engineers and Scientists have been incorrectly taught that some technologies are impossible, and even in the most prestigious Universities are still being taught theories proven to be incorrect over a century ago with the advent of quantum mechanics.

1 – Current Poor Efficiencies

1.1 Vehicles

Despite electricity being the preferred method of powering "horseless carriages" for over 50 years before the Ford Model T and similar fossil fuel powered vehicles came along, there have been few improvements in electric vehicle technology throughout most of the 1900s. "In-wheel motors", which existed a century ago, are still not available on commercial vehicles, nor "drive by wire" that allows the removal of the steering column, various shafts, pumps, hoses, fluids, belts, coolers and brake boosters, along with corresponding losses in friction. Nor are the vehicles shaped more like a teardrop (to reduce air friction at high speed), nor conventionally fitted with low rolling resistance tyres.

Even so, a conventional vehicle converted to run on an electric motor requires only 130 Wh/km to travel in urban environments (i.e. at an average of 60kph) according to the AEVA (Australian Electric Vehicle Association). According to ABARE, 1 litre of Australian ULP petrol contains the energy equivalent of approximately 9500 Wh. With a 100% conversion efficiency, this means that a car should be able to get 73 km/L – i.e. 172 mpg. Standard Australian V6 family sedans average only 11 L/100km (21 mpg), so this means that conventional Australian family cars are only 12% efficient at best at converting fuel energy into motive power.

Despite billions of dollars being spent in the automotive industry, the average fuel efficiency of cars in Australia has actually worsened slightly over the last 30 years, thanks to the heavy marketing of larger vehicles. In the same amount of time the power of cars has improved so much that the average modern four-wheel drive (SUV) vehicle can outrace the Ferrari driven around by Tom Selleck in Magnum P.I.; hardly a necessary improvement for city driving.

1.2 Stationary Power Generation

Australia's Ceramic Fuel Cells Limited BlueGen fuel cell generator is 60% efficient at converting natural gas into electricity, and weighs less than 200 kg; when using 'waste heat' to provide hot water it is 85% efficient. Larger systems should be even more efficient, but the primary brown coal power stations in Victoria are under 30% efficient; other black coal and natural gas generators are under 40% efficient. There have also been dramatic improvements in technology over the last decade for converting 'waste heat' into electricity.

As such in Australian power stations massive amounts of energy which are currently being wasted as heat released into the atmosphere could instead be used to allow them to produce 2-3 times the amount of electricity currently being supplied to the grid with available technology and no increase in fuel requirements.

2 – Example Technologies

In addition to the technologies already mentioned above, there are several major advancements that are currently being ignored by industry and government.

2.1 Paul Pantone's GEET (Global Environmental Energy Technology)

Designed for use in vehicles, this system used the waste heat of the exhaust to compress fuel and turn it into plasma, dramatically improving the combustion efficiency. It can also be used in diesel/gas electrical generators ("gensets"). Although virtually unknown in its country of invention (the USA), it has been installed in hundreds of vehicles in Europe (primarily agricultural tractors in France). The technology is also not entirely new; similar systems were developed in the 1980s by famous US mechanic "Smokey" Yunick and Australia's Steve Parker independently of each other. Despite approaches to numerous vehicle manufacturers, none have chosen to take it up. The GEET system was "borrowed" by the prestigious Massachusetts Institute of Technology and renamed the "Plasmatron", and ironically awarded the 1999 Discover Magazine Award for Technological Innovation.

2.2 Cold Fusion – Pons & Fleischmann et al.

Cold Fusion was first announced 20 years ago. Despite initial fanfare, it was quickly dismissed by scientists whose expertise lay in the arena of hot fusion. Not co-incidentally, these scientists have been receiving billions of dollars in funding for over 50 years for research into fusion reactors for the production of electricity. It is a standing joke in the scientific community that during this time a working fusion reactor has been "20 years off" for each of these 50 years, and will continues to be for the foreseeable future. Despite convincing evidence of its existence, established physicists continued to denounce Cold Fusion to the extent that work in the area of cold fusion became a death sentence for one's career outside of Japan and Europe, and articles on the subject were refused publication in all established peer-reviewed journals.

At the end of March 2009 the USA's prestigious American Chemical Society and US Navy (Space and Naval Warfare Systems Center) Researchers announced that they had convincing proof that Cold Fusion was real, and replicable, although still not entirely well understood – mainly due to the dearth of funding and research that has been undertaken in the field. Although now replicable at small scale consistently in many laboratories, it requires further research for commercial grade technologies – but does offer the opportunity for small-scale, low-temperature and safe systems capable of producing as much energy as a fission reactor, with none of the problems of radiation or expensive, highly refined fuel. Despite the announcement, Cold Fusion patents continue to be rejected in the USA, stating that any system relying on this technology is a "perpetual motion machine".

2.3 Massive Yet Tiny (MYT) Engine – Raphial Morgado, Angel Labs

The MYT engine was publicly demonstrated back in 2005, and won an award from NASA in 2006. It is a complete redesign of the conventional piston-driven internal combustion engine that is a revolutionary improvement; it can replace a vehicle engine with 10 times its mass and deliver the same amount of power, has substantially less parts, and is much more efficient at converting fuel into energy. An existing small car could be retrofitted with one of these engines in a day and achieve fuel efficiency on the order of 140 mpg (1.68 L/100km).

The MYT engine is also suitable for trucks, ships, aircraft, jetpacks, and virtually every other system where power is needed from liquid fossil fuels. It also makes an extremely efficient pump. As large pumping systems are required in hydroelectric power systems, use of these engines can also lead to increases in power from existing hydroelectric systems, e.g. in Tasmania and the Snowy Mountains.

2.4 Plasma "Waste" Treatment – Prof. Ruggero Santilli, MagneGas

A number of systems using plasma to treat "wastes" have been designed over the years, including the CSIRO back in the 1990s. In addition to breaking down all forms of harmful bacteria, viruses, and prions, this plasma also breaks down molecules into their component atoms.

In the case of sewage, plastics, wood waste, etc. this results in a fuel gas (hydrogen, carbon monoxide, methane) which can be used to power vehicles, or combusted to produce electricity. This system can also be used to produce potable water from waste, and unlike conventional water treatment ensures that hormones are broken down.

MagneGas units are already operation in some islands in the Mediterranean and in Ireland; they ensure that virtually all "waste" is converted into useful fuel and energy. With some modification this system could also be converted to run on biomass, brown coal & other fossil fuels. One of our members has also used plasma to produce potable water and energy from waste water.

3 –Technological Benefits

Implementation of the above technologies to any great extent can result in the following:

- Dramatic reduction in amount of fuel required for vehicles and stationary energy
- Dramatic reduction in greenhouse gas emissions, making it easy to meet Kyoto targets
- Dramatic reduction in toxic emissions (especially in urban environments), saving hundreds of millions of dollars (or more) in reduced health costs
- Dramatic reduction in waste emissions, reduced impacts on environment

- Dramatic reduction in water requirements by business and industry, allowing us to refill dams and address issues of drought
- Dramatic improvement in Energy Security and Balance of Payments – massive reduction in reliance on overseas energy imports (especially crude and processed oil)

4 – Problems that need to be Addressed

The reason that technologies such as those described have not been welcomed with open arms by industry and government is because the current corporate business model is based on inefficiency and waste. For example:

- Vehicles with many moving parts that need constant replacement, repair and turnover to ensure a continual source of income
- Government controlled energy utilities that charge by the kWh used, hence profit from increased usage, not savings
- Energy Utilities, not councils, choose what equipment to install to provide street lighting, but councils (and hence the public) has to pay – using incredibly old, inefficient technology (e.g. sodium vapour) rather than newer fluorescent or LED technology
- Oil fields are tapped at ever-increasing rates to maximise profits, reducing overall yield, with most of product combusted rather than turned into valuable plastics, pharmaceutical products, etc

5 – Policy Changes Required

Historically large industries will only implement technological advancements if it is of obvious commercial benefit to them, or if forced to by legislation. For example, seat belts have been around since at least 1952, and it was obvious at the time that their use would save many lives, but it was not until 1964 when legislation was enacted in Victoria that they became available in vehicles – and Victoria (and South Australia) led the world in this respect. It wasn't until 1984 that seat belts became law in the USA, and then only in New York; in some states they still aren't required to be worn.

Seeing as virtually all technologies that lead to a dramatic improvement in energy and fuel efficiency also result in reduced profits to the companies providing energy, fuel and the systems that use them, these technologies will continue to be ignored (if not actively discouraged) without the enactment of new policy, or at least the encouragement of new industry and new economic policies. For example:

- New Business Models
    - Treat vehicles like mobile phones; pay a large amount outright, or rent under contract – keep basic structure for decades, with changes to outer surface as with mobile phone "skins". Support from government will be required to help with the changeover in business models, or else support for entirely new companies willing to implement new system, and to help workers transition into new systems.

    - Utility companies need to charge per person, not per kWh; this ensures a fiscal imperative to reduce energy consumption and thus improve efficiency et al.
- New Taxation Systems
    - Fuel Tax replacement – there will be a need to charge according to the size of vehicle and distance travelled, not fuel consumed, in order to ensure suitable revenue flows into government coffers to allow the provision of new roads and road repairs and related industries, as people move to more efficient vehicles (and electric vehicles). New technology (tracking, wireless transmission) can make this relatively painless.
    - Remove contrary tax breaks, e.g. higher rebates for larger vehicles and more distance travelled

It also needs to be recognised that new technologies will lead to employment disruption, and plan accordingly. For example, when cars replaced horses and carriages there was a massive loss in employment in the areas of horse breeding, farriers, wheelwrights, carriage makers, etc, but entirely new industries were formed, leading to increased employment overall. This is already happening (e.g. bankruptcy of GM, job losses in Geelong car industry & related industries such as part manufacturers, etc), so now is the time to plan for these job losses and to transition unemployed people into new industries via support and education, or early retirement support where appropriate. The sooner these new technologies can be taken up, the sooner new employment opportunities will become available.

Countries such as China and India that do not have vested interests in existing car companies are already making the move to new vehicle technologies. For example, back in 1999-2000 both GM and CSIRO (in conjunction with Holden and many other Australian manufacturers) both had working models of series hybrid cars. These vehicles had small internal combustion engines running optimally (at a constant speed) in order to produce power that was then fed to a bank of batteries and supercapacitors in order to power an electric motor to drive the car. This change resulted in an immediate 50% reduction in fuel consumption, and 90% reduction in toxic emissions, and the system could be produced for pretty much the same cost as a normal car. However, GM decided to shelve the project, resulting in the vehicles being sent to a museum.

Toyota's Prius and similar vehicles instead use a parallel hybrid system, which requires a full-sized internal combustion engine, with all the costs and inefficiencies from such a system, and so still suffer in comparison with a series hybrid model. Most people are unaware that back in 2002 Toyota had a model called the ES3 (Eco Spirit cubic) that could reach 100 km with under 2.7 liters of diesel fuel (87 mpg).

Since the end of 2008 China's BYD ("Build Your Dream") company, traditionally a battery manufacturer, has been producing plug-in series-hybrid cars, similar in look to a Toyota Corolla, for only A$16000, that can go for 100km on electricity alone between charges, and a 370km total range. As such if existing car manufacturers choose not to embrace new technologies, they will be driven out of business by new entrants.

6 – Education, R&D Changes Required

Increasingly in Australia and other Western countries research in Universities and R&D organisations is being funded by government and industry in relatively narrow "business as usual" areas that offer at best evolutionary, rather than revolutionary, advancements. As with recent changes in the US, funding/education needs to be provided to

- Promote R&D into revolutionary energy technologies, both existing and new, regardless of relevance to existing industry, both to promote and explain these new technologies
- Provide funding and business support to individual inventors and small companies – those outside established companies and educational institutions are traditionally the ones that come up with the most revolutionary advancements
- The majority of revolutionary advancements can not initially be explained by conventional science – we need to ensure that scientific incredulity is not used to ignore revolutionary advancements (e.g. it took the Wright Brothers over 4 years to convince the US government that they had a working flying machine after the first Kitty Hawk flight)
- Education – 50+ year old discoveries are still not being taught in universities and technical colleges – basic electrical engineering teachings contradict quantum mechanics and ignore new understandings of magnetism. As such our best engineers and scientists are hamstrung, as they aren't provided with the latest "tools", knowledge-wise. Much electrical theory even precedes the discovery of the electron and atomic structure. A cut-down version of Maxwell's Theories of Electromagnetism is also being taught; resulting in only a small subset of what is possible with electricity and magnetism being known by our best students.

7 – Conclusion

We already have the answers to many of the "big problems" of the 21st century – climate change, health issues, water security, environmental degradation, fuel security and energy security.

Established corporate and government business models are contrary to the introduction of technologies that offer solutions, as such an extensive range of new government policies will be required to support the introduction of these technologies, the resulting transitions in employment from old to new industry sectors, and new funding models for government and industry.

Improvements in education and R&D funding are required to best explain and support these technologies.

The sooner we make these changes, the sooner Victoria and Australia can become an innovative world leader; the current period of economic unrest and industry failure is the perfect time for these introductions to be made - the public is ripe for changes that will dramatically improve the standard of living for themselves and their descendants.