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Car Industry and Graphene Production

It is our view that there is a future for Australian built high tech components for the global car industry, particularly so if Australia can have production of low cost graphene. We, Docklands Science Park P/L (DSP) hold the right to use the patents to produce the finest quality at a cost that should equate to at least an 80% price discount on current prices.

Without a supply of the lowest cost, highest quality graphene there is no future for the car industry in Australia, inter alia.
The future of the graphene industry in Australia is far more important, economically and strategically, than that of the car industry. See attachment for graphene details.

We ask that the Government gives consideration to 100% loan funding of the graphene production after examining the laboratory production at the University in Melbourne.

Our approach to the problems of the automotive industry in Australia, after agreeing to graphene production, is:-

1. **Build the twin cylinder Environmental Engine (EE) 650cc for hybrid use**, particularly (see attachments). Investigate the use of the Australian Axiflux generator (www.axiflux.com) and motor for use with the EE 650 twin as power source, charging supercapacitors for hybrids. Use graphene in light weight windings and casings. Improved flux is expected.

Intention is to develop high volume exports of a power source for hybrid vehicles, being a engine/generator combined unit together with our very, very fast electronic control system (EMS) which gets the best from the EE 650 cc engine. This EMS is now working.

Fuelled with LPG, this engine would provide minimum emissions, lower than can be obtained by using the electric power grid to provide power to the batteries.

To license production in countries where we are priced out of the market. Talks are underway with Chinese interests. From the current position, it will cost $2 M to produce the EE 650 cc prototypes.

2. **Batteries and particularly supercapacitors to compliment the above generator.** Supercapacitors are replacing batteries in automotive engineering. See the latest research at the Volvo Car Group which suggests that carbon fiber sheets, laminated onto lithium-based thin films, may solve the weight and cost penalties associated with hybrid and electric car batteries. These energy storage materials, they say, could be integrated directly into the vehicle's infrastructure.

We believe that graphene fibre sheets will be 10 times stronger and store far more electrical power. Weight reduction in all aspects of the vehicle will give longer range and weight carrying potential for commercial vehicles.

3. **Build the EE 4 cylinder, in line engine for Audi and others.** Our collaboration with Audi has had a hiatus with the collapse of Mayflower Corporation who were funding the development of the EE engine. We need to accumulate $7 to $10 M to finish the development of the 2.0 litre engine which Audi are keen to have. The arrangement is not exclusive to Audi, they did not want it so.

4. **Convert 4.0 litre Falcon engine to EE, to use diesel and all available fuels.**
The two "holy grails" of combustion engineering are:-

(i) dwell of the piston at top dead centre to give combustion at constant pressure and ;
(ii) variable compression ratio to ensure that the highest possible compression is used in all circumstances, so maximising combustion efficiency.

Not foreseen by all, but the computer at Esso, was the cooling effect of dwell of the piston at bottom dead centre, so giving as much as 67% reduction in emissions of oxides of nitrogen (NOx).

We have conservatively estimated that 100,000 converted Falcon engines can be sold annually. See "GCIF Application Form and Guide of 22 April 2009", attached. The back up documents can be produced upon request.

Ford have not produced 100,000 of the 4.0 litre engines for many years. We would like the opportunity to move into their engine plant as they move out and **not** have it demolished.

5. **Move to larger EE engines, 8 to 20 litres** as they will be much lighter than existing engines, able to use fuels of varying quality and can be built in Australia for the world.
We firmly believe that this is a market area where Australia with highly skilled labour can compete.
Here the market is heavy vehicles, both on and off road, plus light marine.

6. **Assess the future of pulse combustion** to generate electricity for motor vehicles, or gas driven rotor blades for helicopters, or propulsion units for very fast ships to 100 knots.
External combustion can provide lower levels of emissions than internal combustion (IC). See "Pulse combustion" attachment. Funds spent on pulse combustion will not be wasted as heating via this method is possibly two orders of magnitude more efficient than conventional means. Heating is a huge market and fuel is becoming expensive.

7. **Investigate the building of graphene reinforced geopolymer car bodies**, design in Australia and build in best places, such as Indonesia. Or helicopter bodies and blades. Specialised bodies can be hand built in Indonesia and easily cured using heat bags which leads to economical products.
Advanced metallurgical products such as engine casings, pistons and connecting rods might best be made initially in Australia prior to production being shifted to Asia.

8. **Australian advanced suspensions, such as the height adjustable Robertson suspension,** are ideal for a delivery van, truck, as fitted to Kenworth trucks, or off road vehicles, also for bicycles. An off road vehicle can be driven off the back of a semi-trailer, land on the road and drive off. The suspension has the same degree of ride comfort and travel, at maximum or minimum height. See www.roboshock.com.au. Using the Robertson suspension the vehicle is equally at home on the farm or in the city. This is a great advantage with multiple configurations possible on the basic chassis or frame.
   The degree of hands on labour in vehicle body and frame production favours Asian production. Assemble in Indonesia or Asia generally, export to the world.

9. **Fast ship hulls, hovercraft type skirts and propulsion unit per our David Proctor or Israel.**
   The USA has one turbine powered water jet driven ship able to travel at 100 knots (200 Km/hr) on water.
   Whilst such speeds on water are fraught with danger the ability to travel at high speeds in appropriate and uncongested seas is important for Australian trade in transporting perishable goods and limiting finance required in the trading of such goods and in expensive goods, such as motor vehicles.

   Fast ships, say to 10,000 tonnes can be built as roll on/roll off ships carrying commercial cargoes, or armaments as in defence packages. Hence they offer an economy provided that the defence forces can be made pliable enough.
   Current designs are rigid sidewall hovercraft with front and rear skirts. In the Australian design we are exposed to, the driving force is by water jet driven by pulse combustion. Any fuel, from powdered coal to hydrogen can be used.

   As in all armaments there is an enormous trade offering, backed up by realism in the trade aspects.

FINANCE NEEDED

For Graphene production we ask for loan funds covering 100% of costs. The production process is proven and can be observed at the University.
A larger pilot plant can be built for some $300,000, plus a design fee, producing 11-12 Kg p.a. and a full sized plant for a maximum of $10 M, producing 88 tonnes p.a. worth some $88 M annually.
These plants will be modular and simple to replicate, after the first.
Australia does have this opportunity to dominate world graphene production.

Products listed above, excluding graphene, can be produced on a $ for $ basis. It would be of great assistance if the Government were to indicate their willingness to so fund these particular items, removing that area of doubt.

We stand ready to progress the above matters and look forward to contact for discussion.

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