CERAMIC FUEL CELLS LIMITED

Briefing Paper

For the

Senate Select Committee on Fuel and Energy

Background - *About Ceramic Fuel Cells*

Ceramic Fuel Cells Limited has developed a world leading clean energy technology which can help Australia meet its increasing demand for energy whilst cutting greenhouse gas emissions.

We are developing electricity generation units to be installed into homes and other buildings. The units convert natural gas into electricity and heat, through ceramic fuel cells. The process is highly efficient, cutting carbon dioxide emissions by up to 75% compared to current coal power stations. The company has achieved electrical efficiency of 60% whilst exporting power to the grid – this is the highest efficiency of any technology in the world using hydrocarbon fuel. With heat recovery the total system efficiency is up to 85%.

Importantly – and counter-intuitively – one of our fuel cell units actually saves much more carbon than a similar sized renewable system such as a solar PV unit.

In May 2009 the Victorian Premier John Brumby launched our "BlueGen" product, which generates low emission power and heat. We have signed a Memorandum of Understanding with VicUrban to deploy BlueGen units in demonstration homes. The first unit will be installed before the end of this year.

The BlueGen product will be installed in homes and other buildings, connecting directly into the existing gas, power and water infrastructure. Unlike some other low emission technologies, the product does not need expensive infrastructure upgrades and creates no adverse local amenity issues. (The product is simply an innocuous 'box' sitting next to the home's gas hot water unit: there is no adverse impact on neighbours or local wildlife.)

Since the launch, the Company has received expressions of interest from many potential partners and purchasers of BlueGen. The Company is continuing its positive discussions with potential Australian manufacturing and sales partners for the product, which we plan to have available from March 2010. More details about the BlueGen product are available at www.cfcl.com.au/BlueGen.

Ceramic Fuel Cells is also developing products with leading utility and appliance companies in Germany, France, the United Kingdom and Japan. More details are available at www.cfcl.com.au/partners. Through these partnerships, the Company has developed significant experience of the forces driving the uptake of 'distributed generation' and clean energy products – and also of the barriers and market impediments.

Ceramic Fuel Cells was formed in 1992 through a consortium of the CSIRO, the Federal and State Governments and industrial companies. Since that time the Company has invested more than $230 million in developing its technology. All the Company's technology is developed in Australia and all intellectual property is wholly-owned. Headquartered in Melbourne, the Company employs 90 people and is listed on the Australian Securities Exchange and London's AIM market (code: CFU).

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Current situation

It is now well recognised that our energy system requires a transformation. Energy use is rising, particularly summer peak demand for electricity, and the monopoly electricity network companies are spending billions to upgrade ageing infrastructure, which is passed on to the consumer through increased power bills.

Australia relies on brown coal for most of its electricity. (Victoria relies on brown coal fired generators for 95 per cent of its electricity.) These generators have an efficiency of about 28 per cent. A further 5 per cent (or more) is lost in transmission and distribution. By the time the power gets to where it is used, the efficiency has dropped to less than 25 per cent, meaning three quarters of the energy has been wasted.

Victorian and Federal Governments have set targets to reduce greenhouse gas emissions. The Victorian Government is suggesting a goal of reducing emissions by at least 80 per cent by 2050.[1] Yet from 1990 – 2006, Victoria's emissions *increased* by 12 per cent.

Australia's per capita emissions are 23 tonnes per person per year – four times the world average.

Role of distributed generation

Distributed generation using natural gas can provide low emission power and heat, baseload as well as peak load, with significant benefits to the environment and the energy network – and significant cost savings. These benefits have been recognised in many studies in Australia and internationally.[2]

Renewable energy such as solar, wave, wind and geothermal are absolutely necessary but cannot provide the whole answer.

Fuel cells using natural gas can provide low emission **baseload** power to reduce our reliance on brown coal. And the power output can be controlled and modulated – complementing solar and wind which are intermittent and not controllable. Fuel cell units can be installed in homes and other buildings without additional infrastructure costs.

With very high electrical efficiency, a home with a fuel cell co-generation unit can actually produce *lower* emissions than a home with a similar sized solar PV installation:

- A 2kW solar PV will generate about 2,500 kWh per year and offset about 3 tonnes of CO2 (in Victoria).

- A 2kW fuel cell unit can generate up to 17,000 kWh per year and offset just under 18 tonnes of CO2 each year (compared to Victorian brown coal: in NSW and Queensland it is about 11 tonnes per year.)

- Even though the fuel cell uses natural gas, the carbon savings are much higher because over the year it provides all the power the home needs - and more. The solar PV home still relies on coal fired power. There are also no nitrous oxide or sulphur dioxide emissions from the fuel cell.

[1] Victorian Climate Change Green Paper, page 30

[2] For example, the April 2009 draft report on Demand-Side Participation in the National Electricity Market by the Australian Energy Market Commission; the Garnaut Review Issues Paper 4, Research and Development: Low Emissions Energy Technologies.

Role for Government

To quickly cut emissions from power generation, we suggest policies should be expanded from renewables and "clean coal" to include other low emission small scale technologies.

Importantly, we are **not** seeking a capital subsidy or a premium feed in tariff.

We propose the following policy steps:

At a **State Government** level, require electricity retailers to buy back power exported to the grid from small scale, low emission technologies like fuel cell generators. We are proposing a '1 for 1' feed in tariff equal to the retail electricity price; we are not seeking a premium feed in tariff.

At a **Federal Government** level, we suggest the 'REC' scheme be expanded to recognise the benefits of small scale low emissions technologies. This is consistent with the object of the *Renewable Energy (Electricity) Act* to "reduce emissions of greenhouse gases in the electricity sector".

We have proposed two options – neither of which will crowd out existing renewable technologies – that will achieve the intended policy outcome, ie reducing emissions from power generation, as quickly as possible.

(a) The **first** option is to create a new 'low emissions target' to be added to the regime, similar to the approach recently adopted for waste coal mine gas. A new target of, for example, 5,000 GWh from small scale 'low emissions' generators by 2020 could be added to the 45,000 GWh target for renewable generators. To be eligible, a technology would need to have a set emissions intensity of, for example, 50% or less than the weighted average for all Australian generators, and be smaller than an agreed scale, for example, 50kW. (This recognises the public benefits from encouraging small scale distributed generation, particularly the significant savings on grid infrastructure costs. The UK incentive for gas fired micro combined heat and power units cuts off at 50kW.)

(b) The **second** option is to include low emission fuel cell generators in the current list of technologies, which would be eligible for RECs on a pro-rata basis according to their emissions intensity. For instance, our BlueGen unit produces about 340Kg of CO2 per MWh of power generated, so each MWh of power from a BlueGen would be entitled to two thirds of one REC. A similar approach has been used to create incentives under this legislation for other technologies such as solar water heaters and heat pumps. The notion of a pro-rata or variable REC has also been used with the 'solar PV multiplier'.

We suggest that the first option is the better one: it clearly distinguishes *renewable* from *low emissions* technologies and avoids an over-supply of new RECs which might otherwise affect the market price for RECs for existing technologies.

A carbon price alone is not enough to quickly reduce carbon emissions and transform Australia's energy sector. This was recognised by the Garnaut Review and is reflected in the MRET policy.

Other countries are supporting low emission technologies. For instance in Germany fuel cell power and heat generators receive a premium feed-in tariff of about 9 Australian cents per kWh (in addition to the retail rate) plus a capital subsidy of up to $5,800 for a 2kW unit. The UK Government is introducing a feed-in tariff from April 2010 for low emission technologies

including gas-fired generators (up to 50 kW). California is currently consulting on a similar feed in tariff for small gas generators.

There is bipartisan agreement that Australia must significantly cut emissions from power generation, quickly. To have any chance of achieving this goal, we suggest that policies must be expanded from the current focus on renewables and "clean coal" to include other low emission distributed generation technologies.

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For further information: www.cfcl.com.au

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