



24 July 2009

The Secretary  
Senate Economics Legislation Committee  
PO Box 6100  
Parliament House  
CANBERRA ACT 2600

**BY EMAIL to [economics.sen@aph.gov.au](mailto:economics.sen@aph.gov.au)**

Dear Sir / Madam

## **Inquiry into the Renewable Energy (Electricity) Amendment Bill 2009 (“Inquiry”)**

Ceramic Fuel Cells Limited appreciates the opportunity to provide a submission to the Inquiry.

This letter introduces Ceramic Fuel Cells Limited and then sets out our comments on the current policy landscape for renewable and low emission power sources.

### **Background - About Ceramic Fuel Cells**

Ceramic Fuel Cells is a global leader in fuel cell development. 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 Victoria’s current brown coal power stations. The company has achieved electrical efficiency of 60% whilst exporting power to the grid – higher than any other technology in the world using hydrocarbon fuel, and about three times as efficient as Victoria’s current brown coal fired generators.

In May 2009 Victorian Premier the Hon. John Brumby launched our “BlueGen” product, which generates low emission power and heat. We have signed a Memorandum of Understanding with the Victorian Government’s sustainable urban development agency VicUrban to deploy BlueGen units in demonstration homes. The first unit will be installed in November 2009.

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 and extensive infrastructure upgrades and creates no adverse local amenity issues.

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 early 2010. More details about the BlueGen product are available at [www.cfcl.com.au/BlueGen](http://www.cfcl.com.au/BlueGen).

Ceramic Fuel Cells was formed in 1992 and has invested more than \$230 million in developing its technology. Headquartered in Melbourne, the Company employs 90 people and is listed on the Australian Securities Exchange and London’s AIM market (code: CFU).

The Company is 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](http://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.

### 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 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.

The 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.<sup>1</sup> 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

Put simply, distributed generation means generating electricity close to where it is used.

It is widely recognised that distributed generation offers many benefits over the current paradigm of large power stations located far away from where power is used. Benefits include higher efficiency, lower emissions, reduced environmental impact, and significant savings for the electricity grid.<sup>2</sup>

The Garnaut Review *Issues Paper 4, Research and Development: Low Emissions Energy Technologies* (**Garnaut Issues Paper**) noted that:

**“The stationary energy sector is expected to provide the greatest and the earliest reductions in emissions through a dramatic technological transition. The decarbonisation of electricity supply through technological change will be central to a successful mitigation story. The development and commercialisation of new energy technologies could have the added effect of spurring technological progress in other sectors.”**<sup>3</sup>

Solar, wind and geothermal are necessary but cannot provide the whole answer.

It will be years before we know if “clean coal” works – and the costs are likely to be excessive. A study from Harvard University's Belfer Centre for Science and International Affairs released

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<sup>1</sup> Victorian Climate Change Green Paper, page 30

<sup>2</sup> There are many studies on the benefits of distributed generation. Good starting points are the World Alliance for Decentralized Energy (<http://www.localpower.org>) and the IEA *International Combined Heat and Power (CHP) Collaborative* (<http://www.iea.org/G8/CHP/chp.asp>).

<sup>3</sup> Available at <http://www.garnautreview.org.au/CA25734E0016A131/pages/all-reports--resources>. Quote from page 3.

in July 2009 calculates that an early carbon capture and storage (CCS) plant would operate at a cost of about A\$183 per tonne of carbon dioxide emissions avoided.<sup>4</sup>

Fuel cells using natural gas can provide low emission **baseload** power to reduce our reliance on 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.

### Emissions Reductions

With very high electrical efficiency, a home with a fuel cell co-generation unit can actually deliver **greater carbon savings** than a home with a similar sized solar PV installation:

- The average home in Melbourne uses about 7,000 kWh of electricity a year. CFCL's 2kW BlueGen product can produce up to 17,000 kWh of power a year – ie more than twice what the average home needs.
- In Melbourne an entry level solar PV system (1 kW) will generate about 1,500 kilowatt hours of electricity a year, ie about a quarter of what the average home needs. Even a 2kW PV system will produce less than half of what the average home needs. The rest of the home's power has to come from the grid – which means brown coal.
- The entry level solar system will save about 1.6 tonnes of carbon a year. The 2kW version will save about **3 tonnes**<sup>5</sup>.
- If the same home installed a 2kW BlueGen unit then it would save up to **18 tonnes** of carbon each year.
- Even though the BlueGen uses natural gas, the carbon savings are much higher because it provides all the power the home needs (and more). There are also no nitrous oxide or sulphur dioxide emissions.

### Renewable Energy (Electricity) Amendment Bill

The objects of the Renewable Energy (Electricity) Act (the **Act**) include to “*reduce emissions of greenhouse gases in the electricity sector*”.

Ceramic Fuel Cells strongly supports this goal. However the Act currently takes a take a binary decision - is a technology "renewable" or not? We would suggest a more effective approach would be to match the policy incentive or assistance to the intended policy outcome, ie reduce emissions from power generation, as quickly as possible.

By definition, innovative and emerging technologies will not have the political or market power to get on the 'favoured' list of technologies in the face of strong incumbents and competing political interests. Policies that prescribe a closed list of technologies will not maximise the benefits of innovation.

In this respect the Garnaut Issues Paper noted that:

“Lock-in results in persistent market barriers where existing technologies benefit from incumbency advantages while new technologies face costly and inefficient barriers to entry. Barriers to entry are not by definition market failures, but in the context of climate change such barriers can reduce the important competitive pressures which stimulate and facilitate adjustment to an emissions constraint. This results in sub-optimal levels of

<sup>4</sup> <http://climateprogress.org/2009/07/22/harvard-stunner-realistic-first-generation-ccs-carbon-capture-storage-costs/>

<sup>5</sup> Source: [www.goingsolar.com.au](http://www.goingsolar.com.au)

research, development, demonstration and diffusion of carbon-saving technologies, even where environmental and economic advantages have been established.”<sup>6</sup>

To produce the lowest emission electricity, policies must be expanded from the current focus on “renewables” and “clean coal” to include other low emission distributed generation solutions.

The Parliament and the Office of the Renewable Energy Regulator has shown flexibility in applying the Act to achieve the original policy objectives. The Act now gives benefits to residential solar water heaters (which do not generate any electricity) and even to heat pumps (which actually **consume** electricity).

It would be an anomaly if an Act which was intended to reduce emissions from power generation gave financial support to technologies which do not generate any low emission electricity and in fact consume electricity – whilst excluding a technology which can generate power and heat with **significant** emissions cuts.

Ceramic Fuel Cells submits that the answer to the anomaly is to add small scale (say less than 10kW) low emission fuel cell generators to the list of technologies eligible for renewable (or ‘low emission’) energy certificates. It would be relatively straightforward to establish a baseline level of emissions savings to assess whether the technology was eligible. As we have noted above, our fuel cell units can save more emissions than a similar sized solar PV system.

We acknowledge that an emissions trading scheme and a (meaningful) carbon price will help to overcome some of these limitations, however a carbon price alone is not enough to achieve the Government’s target of quickly reducing greenhouse gas emissions and transforming Australia’s energy sector. To quote the Garnaut Issues Paper again:

“Establishing a carbon price alone will be an incomplete approach to mitigating climate change; additional measures will be required. An emissions trading scheme will address the primary market failure of uncapped greenhouse gas emissions and will encourage some research and development (R&D) activity in lower-emissions technology. However, the existence of other market failures in the innovation system means that simply establishing a price on emissions will not generate optimal levels of investment in technological change.”<sup>7</sup>

Another distinct advantage of small fuel cell generators is that they can be installed and start cutting emissions very quickly, unlike other options that still require significant development. They do not require large investments in the new infrastructure or grid connection like other renewable technologies such as large wind farms or solar arrays do.

Other countries have recognised the need to expand policy settings towards “low emission power” rather than just “renewables”. In Germany fuel cell power and heat generators receive a feed-in tariff of about 5 Euro cents per kWh (about 9 Australian cents) plus a capital subsidy of up to 3,300 Euros for a 2kW unit (about \$5,800). California in the USA is currently consulting on an appropriate design for a feed-in tariff scheme for small combined heat and power generators. And the UK Government is introducing a feed-in tariff from April 2010 for a range of low emission technologies, **including gas-fired micro combined heat and power**, such as CFCL’s BlueGen product.<sup>8</sup>

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<sup>6</sup> Garnaut Issues Paper, page 6

<sup>7</sup> Garnaut Issues Paper, page 2

<sup>8</sup> [http://www.decc.gov.uk/en/content/cms/consultations/elec\\_financial/elec\\_financial.aspx](http://www.decc.gov.uk/en/content/cms/consultations/elec_financial/elec_financial.aspx)

Thank you for taking the time to review our submission. We would be happy to discuss our submission further, provide more information, meet with committee members or appear at any inquiry hearings.. If you have any inquiries please contact me or Andrew Neilson, CFCL's Group General Manager Commercial ([andrew.neilson@cfcl.com.au](mailto:andrew.neilson@cfcl.com.au), phone 03 9554 2822).

I would also like to extend an invitation to Committee members and their advisors to attend our factory in Melbourne to see our fuel cell units in operation, exporting low-emission power to the local grid.

Yours Sincerely

A handwritten signature in black ink, appearing to read 'Brendan Dow', with a stylized flourish at the end.

Brendan Dow

Managing Director  
Ceramic Fuel Cells Limited