Garnaut Review –- Submission by Solectair Pty Ltd to Issues Paper 4

2 Context

New technologies will play a substantial role in both the mitigation of, and adaptation to, climate change. On the mitigation side, new technologies will be needed in energy production, new manufacturing techniques and the development of new product lines.

Stern Review

"There have also been impressive gains in the efficiency with which energy is utilised for heating, lighting, refrigeration and motive power for industry and transport, with the invention of the fluorescent light bulb, the substitution of gas for coal for heat, the invention of double glazing, the use of 'natural' systems for lighting, heating and cooling, the development of heat pumps, the use of loft and cavity-wall insulation, and many other innovations."

The above excerpt from the Stern Review captures the essence of our submission – which is that **Natural*: "Solar Air Heating" and Night Air Cooling or Ventilation*** are amazingly efficient and low cost mitigation technologies that need support and promotion by reviews such as this one.

Please Ponder this:

If one was to turn the clock back about 30 years and this review was done then; maybe a similar submission such as ours could have been on **Solar Hot Water.** We suggest that ***"Solar Air Heating" and Night Air Cooling or Ventilation*** are in the same league and if not identified and **"Unearthed"** in your review; could remain buried for years – with the benefits not being achieved. Do we have those years to wait? Climate Change is what this is all about – not just government policy.

There are several competing companies providing their own solar air heating and night air cooling system versions; mainly stand-alone systems, some are glazed like a solar hot water system.

Solectair Pty Ltd (www.solectair.com) is an Australian company based in Perth that has developed and patented a series of **"natural systems"** for heating and cooling that have significant proven savings in heating energy costs and in GHG emissions. (Applicable in temperate climates)

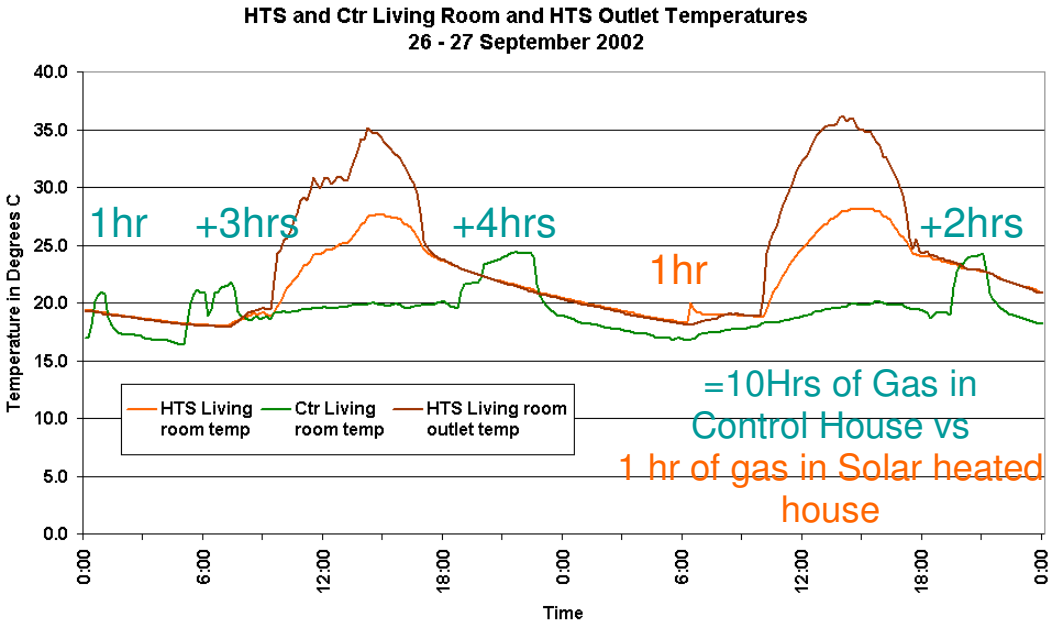
The main Solectair system is a **low cost** solar home heating system that utilises the roof of a building as a solar collector and a unique microprocessor based controller that measures the temperature in the living space and also in the roof space.

As the sun shines on the roof cladding, the temperature builds up in the roof space (for example on a 21deg C day – the roof space temperature can exceed 30 deg C) The internal house temperature may initially be 16 deg C.

When heating is required in the living space and the roof space is warmer than the living space, the controller automatically activates a fan that **“harvests”** the free solar heated warm air and transfers it into the living space heating the building. The thermal mass of the building acts like a battery to store and “slowly release” the heat overnight.

Murdoch University (WA) did comparative performance testing between two identical homes; one fitted with a Solectair heat transfer system (HTS) and the other without solar heating as a control house (CTR).

The chart below shows two consecutive days of test results and that the solar heated house is significantly warmer as a result. In fact it only required one hour of gas use whereas the control house used ten hours of gas over the same period, just to heat one room. Both houses had a gas fire in one room and the roof space temperature during each day rose to over 35 deg C and the warm air entering the rooms was up to 35 deg C. The control house was not warmer than 20 deg C without burning gas and emitting carbon emissions. The solar heated house only had a fan running during the day to transfer the solar heated air from the roof into the house.



MURDOCH UNIVERSITY
PERTH, WESTERN AUSTRALIA

Tests of Solectair by **Murdoch University** (WA) have shown reductions in home heating energy use of 50%+ and a reduction in CO_2 emissions of 1 - 4 tonnes/annum/house.

With over 2 million homes in Australia suitable for Solectair, emission of more than 2 million tonnes of $C0_2$/annum could be avoided.

Murdoch University state in their report – ***"That Solectair is considerably better performing than any fuel or electrical (including heat pump and reverse cycle) heating system."***

Some of our Solectair solar home heating systems also incorporate night air cooling that utilises the same fan, ducting and vents with an advanced controller; to provide natural cooling during summer and warmer periods. This system brings in cool night air, overnight when the ambient temperature falls below the temperature inside the building. This cooler air removes heat from the thermal mass, eliminating or reducing the need to use conventional airconditioning during the following day.

There is a main suite of applications as follows:

- An add on heating system for most ducted evaporative airconditioners.
- An add on heating and night air cooling system that suits most:
  - Ducted gas furnace heating systems
  - Ducted reverse cycle airconditioners

- An integrated evaporative airconditioner that incorporates solar heating.
- An integrated ducted gas furnace that incorporates solar heating and night air cooling.
- Stand – alone solar heating and night air cooling system that has its own ducting and vents etc. (no other ducting or airconditioning system is necessary)
- Other variations are possible too.

Questions for consideration

What are the barriers to entry that create uncompetitive incumbency advantages in Australia?
What are the appropriate policies for minimising barriers to market entry without undermining the competitive advantage of established firms?

Stern Review – Policy Responses for Mitigation:
Examining the process of innovation and how it relates to the challenge of climate change mitigation, exploring how market failures may lead to innovation being under-delivered in the economy as a whole. Section 16.3 looks more closely at the drivers for technology development in key sectors related to climate change. It finds that clean energy technologies face particularly strong barriers – which, combined with the urgency of the challenge, supports the case for governments to set a strong technology policy framework that drives action by the private sector.

Barriers:

There are significant barriers that we have and are still facing after working on this technology for over ten years! I will endeavour to summarise them here:

- The Building Code of Australia (BCA) predominately controls the energy efficiency aspect of buildings; mainly new buildings, I might add!
  They require that buildings comply with certain things like insulation, construction materials and the like – effectively the "building envelope" There is more or less no measure or connection with the "hardware" that is used in the building when it is completed. So the occupier can install the largest and maybe inefficient heating and cooling system that will consume vast amounts of energy and of course emit similar vast quantities of GHG!

  There is some sort of review underway that we have contributed data to – that is supposed to enable energy efficient technologies to be compared with the energy guzzlers, within the software tools used by the BCA.

Basix in NSW is more advanced than BCA, and is probably the efficiency model to adopt, because as I understand it; a new home or one being renovated are required to nominate for example the heating and cooling system that they are intending on installing; if none are nominated, a "penalty" of a one star heating and cooling system is added to the sums, making it much harder to comply with the standards set out.

The Basix people have advised us that new technologies such as Solar Air Heating can be accommodated by "Alternative Assessment" until there are sufficient numbers when at that stage the software tool will be expanded to include the technology.

- Of the "Built Environment" around 3% of homes are new and affected by the BCA; some 97% of homes exist already and escape any energy efficiency measures!!

  Surely using the tried and proven 80:20 rule or should I say the 97:3 rule? Measures are urgently required that affect the existing housing stock – some discussion I understand has suggested that the existing homes have standards applied to meet when they are sold (along the lines that applies in some states for motor vehicles needing immobilisors) – this at least would make some penetration into the existing homes market. Probably a greater impact is required and ways to move faster on the existing home market should be researched.

- There is little to no government support for new technologies, particularly clean technologies! It is not just R&D support that is needed.
  - E.G – We contacted the AGO (as it was in Nov 2007) regarding the Greenhouse Friendly initiative with the understanding that energy efficiency was a suitable offering to be considered to be eligible as a carbon abatement provider. This was initially apparent on the documentation we downloaded in Nov 2007 – however when speaking to a representative, they advised that a change in direction had occurred and no more "products" would be accepted. They said that this was now seen as a "product subsidy."
  - We spoke to another person regarding star ratings to be advised that solar technologies such as ours were **"TOO EFFICIENT"** and that it would be around **10 years** before they would be considered within the star rating program!! They were more interested in stamping out **Inefficient** products like Chinese Airconditioners! Most products that are measured for efficiency come under the star rating program and barriers like this need to be removed.

Questions for consideration

What criteria, processes and institutional structures are most desirable for allocating funding to public good research?

What types of reforms are needed to ensure that public funding is allocated to the most appropriate and highest-value uses?

We believe that some of the answers to this lie in the removal of barriers as alluded to above and in the Stern Review comments below and basically are as follows:

- The Building code of Australia needs overhauling to accommodate (performance standards) assessment tools that assess all renewable energy systems that contribute to heating, cooling, hot water, lighting and electricity, going further than the NSW Basix program.
- Introduce energy efficiency measures (performance standards) along the lines of the above proposed upgraded BCA and NSW Basix for existing homes (possibly at time of sale).
- Reintroduce carbon abatement approval for energy efficient products under the Greenhouse Friendly program.
- Create a more flexible and open minded approach with suitable funding for the star rating program – so that new technologies can be assessed.
- Provide incubator type support (as you say – cooperative research centres) in each state for new innovations that goes further so that the overlying commonwealth authorities such as star rating, BCA, carbon abatement etc. Have a direct connection or fostering involvement and provide support rather than the current barriers and red tape.
- Provide suitable rebates to consumers for a wider range of clean technologies to assist in take up. (Similar to solar hot water and PV rebates – for solar air heating we suggest a rebate of $1,000).

Stern Review:

Alongside carbon pricing and the further factors identified in Chapter 17, supporting the development of low-emission technologies can be seen as an important element of climate policy.

In addition to direct emissions pricing through taxes and trading and R&D support, there are strong arguments in favour of supporting deployment in some sectors when spillovers, lock-in to existing technologies, or capital market failures prevent the development of potentially low-cost alternatives. Without support the market may never select those technologies that are further from the market but may nevertheless eventually prove cheapest

Performance standards encourage uptake and innovation in efficient technologies by establishing efficiency requirements for particular goods, in particular encouraging incremental innovation. Alternatively, technology specific design standards can be targeted directly at the cleanest technologies by mandating their application or banning alternatives.

We would appreciate mandating of natural heating and cooling as possibly being one of the cleanest and cheapest method available.

Also, organisations such as the Carbon Trust in the UK, Sustainable Development Technologies Canada, established by governments but independent of them to allow the application of business acumen, have proved especially successful in acting as a "stamp of approval" that spurs further venture capital investment. Finding niche markets and building these into large-scale commercialisation opportunities is a key challenge for companies with promising low carbon technologies. These organisations are at the forefront of identifying niche markets for commercialisation of new technologies and promoting public-private investment in deployment.

It is important that support is well structured to encourage innovation at low cost. A diverse portfolio of investments is required as it is uncertain which technologies will prove cheapest and constraints on individual technologies will ensure that a mix is necessary. Those technologies that are likely to be the cheapest warrant more investment and these may not be those that are the currently the lowest cost. This requires a reorientation of public support towards technologies that are further from widespread diffusion.

Policy-makers should foster the development of technology that can drive down the average costs of abatement over time.

Efficiency gains offer opportunities both to save money and to reduce emissions, but require the removal of barriers to the uptake of more efficient technologies and methods.

A range of low-carbon technologies is already available, although many are currently more expensive than fossil-fuel equivalents. Cleaner and more efficient power, heat and transport technologies are needed to make radical emission cuts in the medium to long term.

Marginal abatement option cost curve:
Reduce the demand for emissions-intensive activities include reducing over-heating of buildings, reducing the use of energy-hungry appliances.

Energy efficiency refers to the proportion of energy within a fuel that is converted into a given final output. Improving efficiency means, for example, using less electricity to heat buildings to a given temperature.

Energy Efficiency:

Energy efficiency for heating and cooling is commonly referred to as "Coefficient of Performance" (COP = ratio of energy used to energy output – e.g. an electric radiator rated at 1Kw would use 1Kw of electricity and have a COP of 1) – reverse cycle airconditioners have a COP in the range of 2.5 to 3.

This is a specific area where Solectair has been tested by Murdoch University (WA) and found to have a COP of between 9 & 17 in heating mode. I.e. for each Kw of electricity used (to drive the fan and controls) the unit delivers 9 to 17 Kw of heat. (The heat source is solar and therefore free).

Reports:

Murdoch University state in their report – ***"That Solectair is considerably better performing than any fuel or electrical (including heat pump and reverse cycle) heating system."***

We can provide on request, copies of the initial Murdoch University report on Solectair; researched and written by Dr. Martin Ander and Phil Calais and three subsequent

reports by Phil Calais. Also Phil has carried out a thermal assessment of a new style of home construction by Greengate Homes; that incorporates Solectair – this home has a calculated 9.6 star rating; mainly as a result of Solectair. This report is available on line at http://www.greengatehomes.com.au/Thermal_test_GreenGate.pdf

Please review our web site at www.solectair.com where there are some movies that depict the operation of our system and also a downloadable brochure.

I did attend the 5th Forum in Perth and briefly met Mr Ross Garnaut – I passed him some brochures and my business card.

Any queries can be made to myself; Kim Dartnall.

Here is a summary of information on Solectair:

- It is an innovative Solar Air heater system for home solar heating (some units night cool too).
- There is no requirement for solar panels as it uses the entire house roof as a collector.
- It can add to existing or new ducted air-conditioning or gas furnace systems for low cost (from approx $1500 installed) is also a stand alone version for solar heating and night air cooling.
- It saves around 50% in home heating costs. (Mainly temperate climates) (University tested)
- With night cooling can make ducted Refrigerated air conditioners about 20% more efficient.
- Reduces CO_2 emissions by around 1-4 tonnes/house/year.
- Was featured on the ABC New Inventors 2005.
- Was a finalist in the West Australian Inventor of the year awards in 2006.
- Was featured on Ecohouse Challenge National SBS TV 2007.
- Is manufactured in Perth Western Australia by Airgroup (the manufacturers of Coolbreeze evaporative air conditioners) and distributed in several states in Australia.
- Over 3000 systems installed.

Kind regards,

Kim Dartnall Cert. Refrig. & A/C - Director
Solectair Pty Ltd
www.solectair.com