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The challenge of renewable energy policy in Australia: Insights from Australian sugar industry experience

Malcolm Wegener, The University of Queensland

Presidential Address

Invited paper prepared for presentation at the
57th AARES Annual Conference, Sydney,
New South Wales, 5th-8th February, 2013



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Introduction

Cane sugar industries around the world have depended on renewable fuel for as long as sugar has been made from cane.

There has been interest from within and from outside the sugar industry in contributing more renewable energy to the mix of fuels consumed in Australia since the first Arab oil crisis quadrupled crude oil prices in the mid-1970s. This was partly an attempt to copy what was being done in Brazil where ethanol from sugarcane is widely used as a gasoline extender (up to 25%) or used as a transport fuel in its own right, but most attempts to raise the level of renewable energy in the mix in Australia have been ineffective, largely because of the abundance of energy resources in Australia. Until relatively recently, Australia was self-sufficient in petroleum products, even a substantial exporter, as well as being the world's second largest exporter of coal (by volume, after Indonesia). In the future we could become one of the world's largest exporters of natural gas, and in addition, we have almost unlimited solar energy, one quarter of the world's reserves of uranium, limited hydro-electricity resources, and substantial geo-thermal, wind, and tidal possibilities.

Australia was a delayed signatory to the Kyoto Protocol, waiting until the change of government in 2007 to do so.

More recently, Australia agreed to sign on to extend the Kyoto Protocol until 2020, and introduced the Clean Energy Future legislative package which put an initially fixed price on carbon emissions which will convert to an emissions trading scheme in 2015 and link to the European trading scheme.

The policy attention has switched over the time I've been interested in this topic from primarily concern about rising cost and availability of transport fuels, to reducing our overall level of greenhouse gas emissions, essentially focussing on replacing a substantial part of Australia's electricity output with less emissions intensive renewable energy. Specifically, Australia's obligation under the second commitment period of the Kyoto Protocol requires our emissions to be reduced by 5 percent below 2000 levels by 2020. Since such a high proportion of Australia's greenhouse gas emissions arise from electricity generation and transport, two logical options available to the sugar industry are producing ethanol as a transport fuel, and generating electricity from renewable fuel sources in place of coal fired electricity to make a significant reduction in greenhouse gas emissions.

Early reports suggested a substantial part of the renewable electricity required in Australia could be generated from biomass, specifically sugarcane bagasse but sugar milling companies that tried to capitalise on the opportunity by making substantial investment in new generation capacity, have

found operating conditions difficult, largely due to the falling wholesale electricity prices and the low value of Renewable Energy Certificates.

Extensive policy changes have been introduced since 2007 with the change of government and signing onto the Kyoto Protocol. While the underlying intention of the policies introduced to encourage greater adoption of renewable fuels in Australia has been commendable, there have been many unintended consequences. Clearly, our attempts in Australia to raise the amount of renewable energy in the energy mix have not been as successful as we might have hoped or expected. Exploring the reasons why this is so is a fascinating topic and some guidelines for better policy in regard to renewable energy, largely drawing on sugar industry experience, are suggested.

Conclusions

A modest target of 350 million litres of renewable transport fuel to be produced by 2010 was one of the earliest targets set as part of our renewable energy policy. That created considerable enthusiasm in the grains industry and several ethanol distilleries were proposed, but only a couple of new facilities, including one in Dalby Queensland, was erected which operated for a short time before closing due to high grain prices and financial difficulties. Several bio-diesel plants were set up, mostly to process waste fat trimmings from the meat industry and waste cooking oil. Many of those also closed due to high energy costs and low fuel prices. In the sugar industry, there was less enthusiasm to produce ethanol and only one small new distillery was established at the Rocky Point sugar mill. It was planned to use mainly grain as its feedstock.

It has been widely stated by the sugar industry that a mandate specifying a set amount of ethanol in gasoline would be necessary before the industry was prepared to commit to substantial production of ethanol. There was more interest in generating electricity from surplus bagasse but the policy of allocating Renewable Energy Certificates to domestic solar hot water systems and rooftop solar panels, in direct competition with commercial scale renewable electricity generation, reduced the price of RECs, helping to create financial difficulties for those companies in the sugar industry that did take that initiative.

More recent policy developments introduced as part of the Clean Energy Future package have not benefitted the sugar industry to any significant degree. The industry has continued to make a modest but increasing contribution to the renewable energy supply in Australia but no methodologies under the Carbon Farming Initiative applying specifically to the sugar industry have yet been approved. Farm forestry, the most likely option among the CFI suite to be attractive to farmers generally, competes directly for sugarcane growing land and is unlikely to be adopted by many canegrowers. The carbon tax introduced on 1 July 2012 has contributed to increased cost of electricity, used extensively for irrigation in the industry, and next year heavy transport will start to lose its fuel tax concession for on-road vehicle use, making cane and sugar transport more expensive.

Policies in regard to renewable energy have not yet encouraged much successful change towards

more renewable energy in the national mix, some suggestions for better policy development as a result of sugar industry experience can be spelled out.

We need to take a holistic approach, understand the full range of energy alternatives available, consider the potential size and cost of their contributions to renewable energy supply, and the likely impact of developing selected options on competing industries. This inevitably slows the process and introduces enormous complexity into the decision-making process, but is more likely to achieve acceptable outcomes.

An incremental approach to policy implementation seems highly desirable, rather than the politically attractive "big bang" approach with grand announcements made by senior politicians with little appreciation for the details of how the proposed policy will actually work.

We need to recognise the idiosyncrasies of human behaviour, the existence of emotional investing and irrational exuberance among consumers and decision makers. There will always be a small number of early adopters for any new technology, who will try and test it if it appears to solve some problem which they identify or create an opportunity for a beneficial service. The traditional S-shaped curve describing technology adoption is expected to apply to renewable fuels if the technology has either or preferably both economic and environmental benefits. A proportion of the population, surprisingly high in the case of some innovations, will at least test new technologies even when the benefit/cost ratio is doubtful or unattractive. Thus there appears little need to offer incentives, unless there is genuine concern that the rate of adoption will be less than required to meet some particular target or objective.

The whole process of policy formation and government decision-making in complex areas such as renewable fuels make need rethinking and reform. While the underlying intention of the policies introduced in Australia to encourage greater adoption of renewable fuels was commendable, there have been many unintended consequences.

This talk reviews some of the features of the international and Australian energy situation, actions by some major international players in regard to renewable fuels, and Australia's role on the international scene.

Reminder why we need to Act

Australia recently hosted a meeting of scientists involved in the Intergovernmental Panel on Climate Change (in Hobart in January). There were 13 Australians among 255 scientists from 39 countries in Hobart to write a key chapter on evidence from the physical sciences to confirm global warming is happening and detail its consequences. One of the Bureau of Meteorology staff (Scott Power) was reported as saying that Australia has experienced 0.9 deg C warming since 1910 and that rate of increase is expected to rise if emissions are not reduced (AFR 16 Jan 2013, p 5. Dr Power noted that global climate change does increase the likelihood of extreme weather events, such as Australia's recent period of record temperatures. At the same time, he admitted that there could still be days when new cold records were set because of natural climate variability.

Backing up these observations, last year was the warmest on record in the United States where records for the 48 states go back to 1895. It was also the second worst for weather extremes including drought, hurricanes, and wildfires, according to a report from the National Oceanic and Atmospheric Administration's Climate Data Centre (cited in the Australian Financial Review, 10 Jan, 2013, p 11).

The American Meteorological Society uses a measure, *cooling-degree days* as an indication of weather-related demand for electricity. The 30-year average for cooling-degree days for months of June, July, and August in the US is 1156. The average for the past 10 years is 1208, and five year average 1246, a trend that indicates that summers have been getting warmer.

I have not seen similar data for Australia although I recall anecdotal evidence of similar trends here. During the recent heatwave, which fanned bushfires in four states, the national average temperature calculated by the Bureau of Meteorology was at or above 39 degrees for seven days in a row, beating the previous record set in 1973. Part of the difficulty of dealing with climate change is that we are trying to deal with a phenomenon that is really difficult to quantify, to measure objectively. With climate change, we are dealing with changes in the frequency of extreme weather events – which fortunately only occur on a fairly infrequent basis, as well as changes in more easily understandable concepts such as mean maximum of minimum temperatures. Scientists and the Bureau of Meteorology consistently tell us that extreme individual events, such as heatwaves or extremely cold days, should not be attributed to any single source. Nevertheless, among the scientists who are trained to be objective about this, climate change is already an accepted fact.

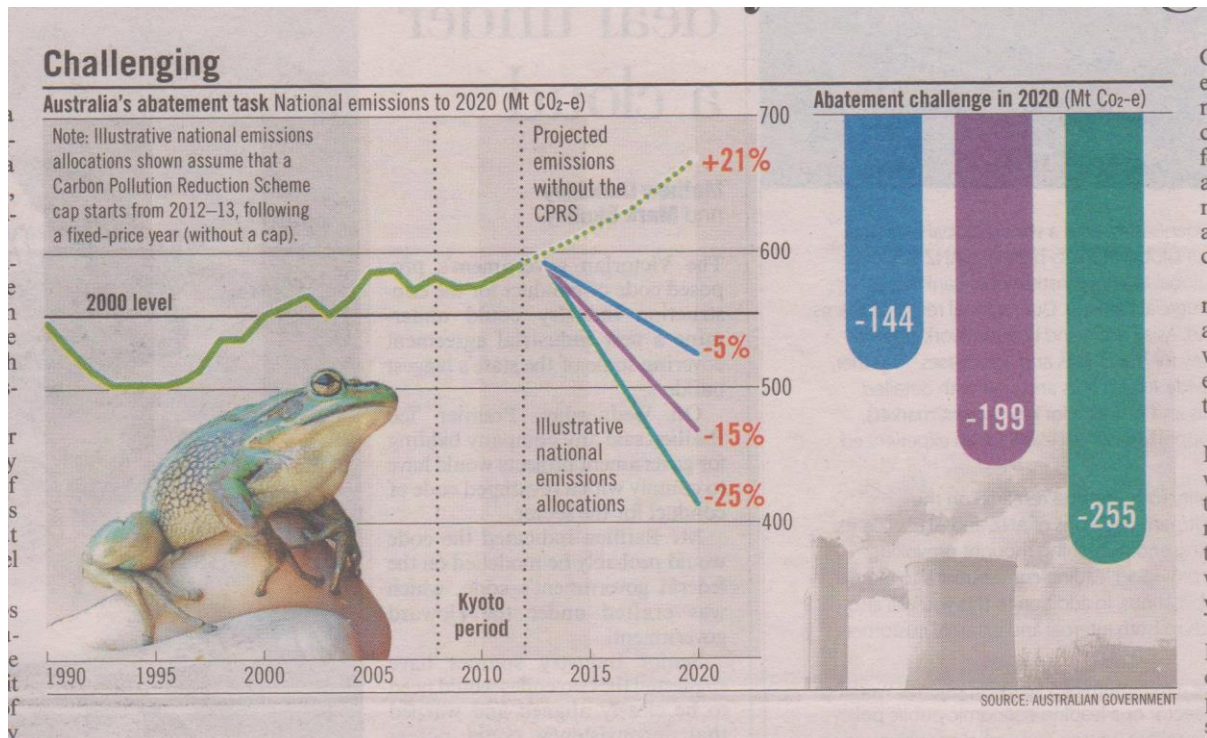
Australia's carbon emissions

Until relatively recently, it seemed as though Australia's greenhouse gas emissions were on an inevitably upward trajectory. In 2007, Australia's greenhouse gas emissions were 597.2 million tonnes carbon dioxide equivalent. That amounts to 23.8 tonnes CO₂ per person, among the highest in the world, along with the USA, Canada, and Luxemburg. A chart showing per capita emissions for many of the countries in the world is included in the presentation.

Because of the nature of our economy, Australia has much more intense emissions per \$ of real output than the OECD average (reasons)

One third of our emissions come from electricity generation, 11% from road transport, and 10% from livestock, leaving all other sources to contribute less than half total emissions (46%). The majority of our electricity (80%) is generated from coal and only 8.3% was from renewable sources in 2007.

A couple of years ago, Australia's task to reduce GHG emissions seems like an impossible task (see chart)



In the absence of a carbon emissions trading scheme, it was expected that Australia's carbon emissions would rise to about 660 M tonnes by 2020. Out of total emissions of nearly 600 M tonnes in 2007, a 5% reduction on 2000 levels (as required to meet the Kyoto Protocol target, represented a reduction of 144 M tonnes. More optimistic reduction that had been discussed, eg 15 or 25% below 2000 levels would have required enormous reductions, of 200 and 250 M tonnes respectively.

Australia's greenhouse history was that around 1990, the original starting point for Kyoto, Australia's GHG emissions were just below 550 Mt. The limits on landclearing imposed by various state governments meant that Australia's emissions declined for a few years enabling us to claim that we could meet the Kyoto target even without an emissions trading scheme, but expanding economic activity from the late 1990s, particularly from increased coal and mineral exports, caused emissions to rebound. It seemed distinctly unlikely that we could meet the Kyoto target as late as recently as 2010-2011.

But our emissions have now turned around and a recent research report from a company involved in carbon and sustainability research RepuTex suggested that Australia's carbon emissions might drop by 10 Mt this year (to a level 3 percent below the figure it would have been if there was no carbon tax) (Australian Financial Review, 14 January 2013, p7.) This would be due to a 6.5% reduction in emissions from the metals industry (reduced economic activity) and increased generation of renewable power. They assumed that there would be little change in the generation mix before 2016 due to high gas prices and government assistance to the brown coal fired generators which would run out in that year. After brown coal generators are no longer supported, we might see a faster rate of change over to renewable electricity generation (from 2017-18) and a decline in emissions from electricity generation.

These changes will be supported by various elements of the Clean Energy Futures legislation, ie the carbon price and various support packages for households and industry.

Policy changes in regard to renewable energy in Australia

At the time of the International Conference of Agricultural Economists on the Gold Coast in 2006, I organised a symposium on biofuels with speakers from Australia (ABARE), the US, Germany, and Brazil. From the Australian perspective, there was no serious policy initiative at the time, although the government had set a target of 350 million litres of biofuels to be produced by 2010

Update on policy framework

Policy change since 2007 and the election of the Rudd Government has been rapid. Australia signed the Kyoto Protocol which initially committed us to a 5 percent reduction of GHG emissions below the level of 1990. The return of the minority Gillard Government, supported by a group of independents in 2010, led the Prime Minister to commit to a price on carbon emissions and the Clean Energy Future legislation. Fixed price payments on carbon emissions began for companies emitting over 25 000 tonnes CO₂ equivalent from 1 July 2012.

More recently, against a background of increasing concern globally about climate change and rising atmospheric CO₂ levels, Australia and 36 other industrialised countries recently agreed to meet emissions reduction targets by 2020 as part of the agreement extending the life of the Kyoto Protocol established in 1997, and which expired in December 2012, until 2020. Russia, Japan, and Canada (countries that were formerly signatories to Kyoto) have withdrawn from the agreement, while China, India and the United States have never signed up to Kyoto and are not covered by the protocol.

Specifically, Australia's commitment under the second commitment period of the Kyoto protocol, signed in December 2012, requires our emissions to be reduced by 5 percent below 2000 levels by 2020. Since such a high proportion of Australia's greenhouse gas emissions arise from electricity generation, it is logical that substituting renewable sources of energy in place of coal-fired electricity generation could make a significant reduction in emissions

The International Energy Agency has estimated that better energy efficiency will play a bigger role in meeting carbon emissions reduction targets in Australia than bringing cleaner forms of energy into the mix. Some studies suggest up to 40% savings in household and commercial building energy use are possible in Australia by 2020 with existing technologies.

Applying energy efficiency to households is claimed to be relatively straightforward and we have seen much discussion about the introduction of smart meters for electricity, although they have not been adopted yet by any state in Australia. The most productive areas for households are well known, can be easily explained, and could be monitored by suppliers – although it goes against the natural instincts of energy supply companies to sell less to their customers. Perhaps this is why we have seen such a number of schemes directed at households – pink batts ceiling insulation, subsidies

for solar hot water systems and solar roof panels, feed-in tariffs for electricity, etc. All of these policy initiatives have had a bad track record. We need to ask why and learn from the experience.

In spite of the obvious action we have seen to reduce energy consumption by households, more than 80% of energy consumed in Australia is used by businesses, most of it in mining and manufacturing where specialised processes make reductions difficult to achieve. Businesses therefore may come under increased pressure to improve efficiency, something that is clearly difficult to achieve. An Australian Industry Group survey last year underlined what a challenge this could be. Two-thirds of the companies surveyed revealed that they had made no improvements in energy efficiency in the past five years despite substantial increases in electricity prices over that time.

Sugar industry case study

My long-standing interest in renewable energy arises from my association with the sugar industry. I joined the staff of the Bureau of Sugar Experiment Stations in 1977 and soon after was both preparing material for presentations by the Director and doing some presentations myself as discussion in Australia focussed on how to deal with the first Arab oil crisis that quadrupled crude oil prices. There were suggestions, mostly from outside the sugar industry, that Australia should produce ethanol as a substitute transport fuel. I was initially alerted to the sugar industry's capacity to produce renewable energy by a presentation by the Director of Sugar Experiment Stations to a conference in Canberra, about 1975, organised by the Australian Institute of Agricultural Science. Titled, Agriculture to the Year 2000: Limits to Growth.

Sturgess impressed me with the statement that the sugar industry used no fossil fuel, apart from a small amount of oil used as lubricants, to process the sugarcane crop. Instead, they use the fibrous residue left after the juice was crushed from the cane stalks as fuel – a good example of renewable energy.

Currently the Australian sugar industry produces 30-35 million tonnes cane per year with sugar output of 3.0 to 3.5 million tonnes. The sugar industry also produces about 1 million tonnes of molasses, and 8 million tonnes of bagasse, the fibrous residue that is burned, usually inefficiently, in sugar mill boilers, essentially as it is produced, generates steam for the manufacturing process. The primary use for high-pressure steam is to drive a turbine alternator to generate electricity to drive mills and pumps and other equipment (fugals, conveyors, rotary filters, etc) while low pressure steam is used to evaporate water from the cane juice, concentrate the sugar solution, and crystallise the sugar.

Both molasses and bagasse are significant, potential sources of renewable energy. Of the molasses, about half is usually exported, while the rest is used in roughly equal proportions for livestock feeding, and fermentation (beverage alcohol, industrial alcohol, and transport fuel).

The installed generating capacity of the sugar industry in 2007 was 392 MW with the capacity to export 183 MW. By 2012, this had increased to 510 MW installed and export potential was 300 MW.

This is a pitifully small amount compared to Australia's current electricity consumption of ?????

About the time I joined BSES, some sugar mills were interested in investing in additional generating capacity to utilise their excess bagasse and export electricity to the grid. That was the era of cheap coal, generation, distribution and sale of electricity controlled by public entities (SEQEB, CREB, NorQEB in Queensland), and no concern about greenhouse gas emissions, or sustainability. Power companies were not interested in small amounts of electricity, supplied intermittently during the sugarcane crushing season. Sugar mills were paid approximately one-quarter of the price for electricity they sold to the authorities that they paid when they bought it.

This illustrates a couple of points that have become very obvious in recent years: the wholesale value of electricity is quite low, and has been falling in recent years, and the largest component of retail prices arise from distribution costs. Small intermittent parcels of electricity have low value.

As it became obvious over time that Australia needed to address a problem with greenhouse gas emissions, several companies in the sugar industry recognised the opportunity to generate electricity from biomass as a complementary activity to their existing operations. The then CSR Company, which at the time owned seven sugar mills in Queensland, made a large investment in new generation capacity at its Pioneer Mill in the Burdekin district but that was the only such investment of that size that the company made. Stanwell Power Corporation built a bagasse powered generation station adjacent to the Rocky Point sugarmill in south Queensland. They supplied green electricity to Brisbane consumers for a couple of years but pulled out of the arrangement with considerable loss of capital. The facility continues to supply renewable electricity based on a fuel supply of bagasse during the sugarcane crushing season (July to end of November) and waste timber from south east Queensland during the rest of the year. I am not confident that they have a secure financial base, and if the sugarmill closes, they will lose a large part of their fuel supply. The Rocky Point sugarmill is the smallest in Queensland, and is currently crushing half the cane it used to do. Its future depends on the Heck family remaining committed to sugarcane farming and milling in that area between Brisbane and the Gold Coast, an area under considerable pressure from urban and other developments.

The NSW Sugar Milling Cooperative made the most significant investment in generation of electricity from biomass. They entered a joint venture with Delta Electricity to generate renewable electricity at the Condong and Broadwater sugar mills near Murwillumbah and Ballina in northern New South Wales.

The sugar industry has operated in northern New South Wales for well over 100 years. Over three decades, cane production processed by NSWSMC mills increased by over 50 percent. The industry occupies approximately 34,000 hectares of the Northern Rivers Region (on the Tweed, Richmond, and Clarence River valleys) and extends from near the Queensland border in the north to around Grafton in the south. The mills in the area operated by the New South Wales Sugar Milling Cooperative at Condong, Broadwater, and Harwood produce around 270 000 tonnes of raw sugar from over 2 million tonnes of cane in a 'normal' crop year although cane production since about 2000 has been reduced due to abnormal seasonal conditions and other factors.

Around 2005, NSW Sugar Milling Co-operative and Delta Electricity formed a joint venture to construct and run 30 MW co-generation electricity plants at Condong and Broadwater mills. Construction started in December 2005 and was completed in 2008 at a total cost of \$210 million. Commercial production of electricity began in November 2008 and the installation is Australia's largest base load renewable electricity generation project, supplying electricity to 60,000 homes on the New South Wales north coast. This could result in annual savings of 400 000 tonnes of greenhouse gases released to the atmosphere due to replacement of coal used elsewhere for electricity generation.

The electricity plants were designed to run continuously using bagasse, cane trash, wood waste, and other renewable fuels. These fuels are all categorised as eligible fuels under the Renewable Electricity Act. In order to supply enough fuel for the co-generation plants, cane harvesting at both mills was changed from burnt cane to whole crop,

The early response to that initiative was very encouraging with the local population excited about the prospect of consuming mainly green power. However, the high cost and long delays in building the power stations meant that a critical part of the process, facilities to remove the trash and leaves from the cane supply before crushing, was never built and the total cane supply, direct from the harvester, was crushed. Thus cane harvesting at both these mills changed from burnt cane to whole crop, resulting in a substantial increase in biomass delivered to the mills. However, problems with sugar recovery from the whole cane supply with its increased fibre levels due to the trash forced the mills to revert to taking burnt cane for processing from mid-August 2009.

(The mill furnaces were burning a considerable amount of sugar that should have been sold). A decade of poor prices and bad weather in the sugarcane growing (including a very severe frost in the Broadwater area in 2007) reduced the cane supply, while the decision to returning to burning before harvest in order to reduce the sugar losses, reduced the amount of fuel available even further. Both the sugarmills and the joint venture headed for financial difficulty. The considerable reduction in the value of Renewable Energy Certificates, which were necessary to ensure the financial success of the venture, made a bad situation even worse. Delta Electricity engaged me to evaluate the potential cane supply from the region which I did in 2009-10 and then came back a year later and asked me to investigate potential sources of alternative fuels (waste timber, forestry trimmings, green garden waste, possibly part of the solid municipal waste stream) in order to keep the plants running for the designed time each year.

At the time that I wrote my first report for Delta Electricity, the first rumblings about government policy in regard to renewable energy started to emerge. I noted at the time, that "there have been unexpected problems in Australia from government decisions to stimulate the solar water heating industry that has eroded the market price for Renewable Energy Certificates (Review of the capacity of the NSW sugar industry to support co-generation plants at Condong and Broadwater sugar mills, November 2009). Much more uncertainty was to arise due to poor government policy in the renewable energy business.

In 2009, strong demand for the \$1600 solar hot water subsidy provided by the Rudd Government had cut prices for Renewable Energy Credits (J. Breusch, A Hepworth, and P Garvey, AFR 27 10 2009, p1). This was one of the unintended outcomes of the Rudd Government's economic stimulus package. Originally, the subsidy was to be \$1000, but was raised to \$1600 as part of the 2009

economic stimulus package. The subsidy was subsequently reduced to \$1000 in September 2009, and discarded altogether some time later. At the time the subsidy was introduced, the policy objective was to have 20% of Australia's electricity market supplied from renewable sources, and as part of this strategy, major energy companies (AGL, Origin Energy) were required to purchase Renewable Energy Certificates, each representing one megawatt-hour (MW-hour) of electricity, ensure the target was met.

Commercial scale operators, such as wind farms, and biomass generators like the NSW SMC-Delta Electricity joint-venture were reliant on a strong price for the RECs to make the economics of their installations viable.

As well as being subsidised, each domestic solar hot water installation created upfront the equivalent in RECs of the electricity consumed over its expected lifetime.

To encourage installation of rooftop solar power collectors, the government provided both a subsidy and granted five RECs upfront for every MW-hour of electricity generated from solar panels. The subsidy started around \$8000 per household but was reduced in 2011 to about \$6000. When the 20% renewable electricity target legislated in August 2009, it was expected that the price of RECs would rise, reflecting a growing demand for credits and providing the incentive for increased investment in large-scale projects. High feed-in tariffs (and further subsidies from state governments) further added to strong household demand for rooftop solar panels. The domestic solar hot water and rooftop panel installations accounted for nearly 9 million RECs in 2009 when the target for that year was 9.5 million. It left very little room for commercial operations. Flooded by this large number of "phantom" RECs from household sources, the price of RECs which had been steady from October 2008 till May 2009 around \$50 per MWhr, suddenly dropped in May 2009, to around \$30 by October, and continued to fall after that.

Eventually, and largely as a result of these low REC prices,, the joint venture was placed in administration, and became one of the assets to be sold under arrangements being developed by the NSW Government to sell some of the NSW power generation assets. My reports became part of the documentation available to prospective purchasers of the assets of the Condong and Broadwater co-generation joint venture. My most recent involvement with this venture was in June last year when I helped a large company with a significant portfolio of energy assets (Brookfield-Multiplex) with their preliminary investigations into buying the joint venture assets. As far as I know, they did not go ahead with plans to buy into renewable energy generation from bagasse, and sugarcane trash.

Work that one of my postgraduate students did clearly shows the environmental benefits from improving the steam economy in sugarmills, and generating additional electricity for export to the grid with the energy above what is needed to process the sugar (Renouf, PhD thesis University of Queensland).

The disappointing aspect of this story is that one of the best renewable energy facilities in Australia lies in limbo because of over-enthusiastic support for householders. One of the unfortunate aspects of poor government policy is that we cannot wind back the clock and start again. There was no need to subsidise the installation of solar hot water systems or rooftop solar panels if they were reasonable economic propositions. We know a little and are learning more about 'emotional

investing' and 'irrational exuberance' among consumers, and should take these concepts into account much more when designing policy that involves consumers. Commercial operators are much more inclined to take hard-headed economic decisions. Consumers mostly follow what is trendy, irrespective of the economics, and you hardly need to provide incentives to encourage them to do that. Further, the business sector of the economy is responsible for vastly more energy usage than households which could be the focus for politically targeted efficiency schemes.

In June 2011, the government separated the small-scale household and commercial scale renewable energy schemes. The large scale scheme now operates in the same way as the original renewable energy target but the small scale scheme is different, with a fixed price and electricity retailers obliged to purchase all certificates generated by panels. In 2011, retailers were required to purchase 14.8% of their total power consumption from renewable sources (on the way to 20% from that source by 2020). In 2011, a year before the Carbon Trading Scheme was due to start, 35 million Renewable Energy Certificates were probably created, seven million more than needed under the scheme.

“Politicisation” of energy decisions has become a serious problem in Australia:

Having seen such examples of poor policy making, I tried to think about and search for ideas that might offer solutions

The first thing that came to mind were comments made by Robert King in his presidential address to AAEA annual meeting in Pittsburgh, July 2011 and Distinguished Fellows Address, AARES Conference, Fremantle, WA February 2012. He suggested that policy design should become a topic of academic research and scholarship. In that address, King noted that we are being asked to design economic artifacts – institutions, markets, contractual relationships, measuring and monitoring procedures, and decision support systems – that will allow people to respond to and adapt to changing circumstances. In this section of the paper, I focus on policy design in general while keeping renewable energy policy in mind. It seems we do not understand what constitutes good design in renewable energy policy.

King used the example of climate change policy, where emissions trading schemes and carbon taxes are artifacts designed to provide incentives to reduce anthropogenic carbon emissions that contribute to the CO₂ concentration in the atmosphere. In my case, I focus on the design of renewable energy policy in Australia. The experience seems to be that renewable energy policy has been well-intentioned but plagued with many unintended consequences.

King regarded climate change policy as a nearly ideal example to exploring the challenges associated with economic design. He noted that climate change was a “wicked problem” (Rittel and Webber 1973; Batie 2008) that is ill-defined, with no universally agreed objective, an infinite solution space, and no clear-cut way to know that a “solution” has been identified. The very nature of the problem can also be defined in many ways, depending on one’s perspective. While renewable energy policy is a sub-set of the measures introduced to manage climate change, many of the same issues that arise when dealing with climate change, also affect the analysis of renewable energy policy.

A recent article on ‘emotional investing’ in the Aust Financial Review, “Emotional investing ends in tears”, 22 January 2013m p 48?) reported research that is was common for investors with low levels of emotional intelligence to make poor investment choices. This article was based on research by Americks, Wranik (University of Geneva), and Salovey (Yale University) in a report on Emotional Intelligence and Investor Behaviour. They were careful to point out that emotional intelligence is different to being emotional or being in touch with ones emotions. It is about understanding your emotions and using them productively.

The study said that there are many emotionally laden decisions in investing,including how extensively to use risky or novel strategies,

While distinctions need to be made between private and public investing, how many public decisions are made by ministers, managers and advisers who may be more or less following their own beliefs and convictions?

Other comments I have seen express concern about the undermining of the authority of the public service in government decision-making by “political gatekeepers”, often with little expertise and no responsibility. This was a view expressed by Jennifer Westacott, chief executive of the Business Council of Australia (AFR 21 September 2012, p 1-8. Ms Westacott and a former senior public servant, Director of Housing and Secretary of Education in Victoria, and Director-general of NSW Department of Infrastructure, Planning and Natural Resources, with a wide range of experience to draw on. She claimed that long-term public policy was being eroded by “short termism” and a failure to analyse the costs, benefits, and risks of public spending”. She added that “the process of policy development was poor, the architecture was wrong, the assumptions were flawed, and the consultation was “dis-ingenuous””.

The fiscal consequences of this flawed process are huge, as we have found out with the pink batts and renewable energy problems, not only in financial terms but it also squanders the community’s appetite for reform, and erodes public trust in the government.

Other relevant comments on these issues come from a series of valedictory speeches given by various heads of Australian Government Departments over the years 2004-2011 published in an e-book *With the benefit of hindsight* edited by John Wanna, Sam Vincent, and Andrew Polger, published during the past year by ANU E-press. Wanna hold a chair in public administration at ANU, and Podger is a former public service commissioner and head of several departments.

I have seen excerpts from an essay by Patricia Scott included in the book. She was a former secretary of two departments, and a commissioner with the Productivity Commission, who ran the enquiry into an national disability insurance scheme.

She argues in her paper for substantive cabinet consideration of all major policies, rigorous coordinated comments by relevant departments, public consultation, and well-written Cabinet submissions.

She acknowledges infrequent need to make exceptions, in the case of urgent decisions, such as in times of natural emergency. However, she explains some of the worst decisions she saw made over the past 20 years were “done by dint of desperation”, with insufficient written analysis, by a “kitchen cabinet”, or a select few ministers under intense secrecy (often without the benefit of implementation considerations or the valuable advice of agencies with programs and stakeholder engagement experience”. As an outsider, it’s easy to imagine this sort of thing going on, it is really distressing to hear from someone who has been at the Cabinet table that is what happens.

She continues, “Too often, advice from ministers and departments has been undervalued by central agencies and such kitchen cabinets, resulting in disempowerment of ministers and a detrimental impact on lines of accountability and communication:.

“Policy-making is at its weakest and policies likely to be most compromised, when Cabinet is merely a rubber stamp” is another of her observations.

Contrary to Westacott, she praises the “real progress” in clarifying the role of ministerial advisers since the code of conduct was introduced in 2008. Advisers she thinks fall into four categories: zealots, policy entrepreneurs, passengers, and technicians. She suggests that the Australian Public Service might offer highly regarded senior policy officers on short-term secondments as ministerial advisers, as part of a rising career path, rather than appointing them as ‘political partisans’.

Clearly having senior people in a minister’s office who have both policy expertise and the confidence of the minister, is preferable to the all-too-common experience of the adviser who is exclusively a political operative with little policy experience, over-flowing confidence in their ability to discern policy on the basis of a quick Google search, and an unrelenting focus on the short-term political imperatives (the zealots in the typology listed above).

In my time in the public service, in the Queensland Department of Primary Industries, I know one of the main responsibilities of the department, executed through the office of the Director General was to “keep the Minister out of trouble”. The Minister in that case was VB Sullivan, and the DG, Elton Burns, a former president of this Society. Sullivan was a man who enjoyed life, a former farmer, and certainly no intellectual giant (in Burns’ words), who could have been accident prone. But Elton also claimed they had successfully kept Minister Sullivan out of trouble for the lengthy time that he was Minister for Primary Industries.

These days, Ministers in both state and Federal governments appear to be surrounded by an increasing number of “ministerial staffers” and there appears to be increasing disregard for

public service advice. To some extent, that might be expected as many heads of departments are professional managers, often shifting from department to department on their way up the promotion ladder, rather than former senior scientific or economic researchers or advisers. Perhaps in this atmosphere, senior politicians have lost sight of the role of the public service, or lost confidence in their senior advisers.

There have been many examples of problematic public policy making described in the Institute of Public Administration's recent discussion paper, *Public Policy Drift*, described as 'policy on the run' and 'policy by fiat', then overselling them by spin-doctoring, claimed to be a recipe for disaster by the Institute for both giver (the politicians) and the receiver (ordinary citizens) (AFR 11 April 2012. P 54).

The authors of the IPA report, advocate an approach that spells out the "business case" for policy initiatives, identifying the options, using rigorous benefit-cost analysis where appropriate, making the results public, and getting the public's reaction – just the sort of approach most analysts with (or without) economics training would adopt.

The NSW government is reported to be trying panels of randomly picked voters, known as "citizens juries", to give them feedback on the politically divisive issue of renewable energy policy (AFR 16 July 2012, p 10). In mid-2012, two juries, one in Sydney and one in regional NSW were working through a 10-week process of formulating recommendations to the NSW government on the use of alternative energy sources in that state. There have been business and scientific experts advising the groups.

The groups' recommendations will be incorporated into a report by the NSW Parliamentary Accounts Committee which is enquiring into the economics of energy generation at the request of the Energy Minister

The trial is being supported by the Democracy Foundation, a bipartisan research group set up by one of the owners of Transfield Corporation, Luca Beligiorno-Nettis, as a way of building consensus around issues that require more than short-term political responses. Former premiers, Nick Greiner, Liberal NSW and Geoff Gallop, Labor Western Australia, are members of the Foundation's research committee, hopefully reinforcing an objective and bipartisan approach.

There are 31 voters drawn randomly from the electoral roll on each panel, selected to mirror the demographics of the community. They appear to have a different perspective to members of parliament, with a lot less political intent in the questions they ask of the experts advising them.

Earlier I mentioned the poor consultation process recognized by Jennifer Westacott as one of the flaws of the current decision-making process. The director of Democracy Foundation noted that the success of public engagement was often measured by the level of attendance at a one-off meeting. Real engagement meant "time, information, and a clearly agreed measure of authority [granted] to a smaller random sample of the community – just as we do with criminal juries" The juries will meet for a total of 30 hours to hear presentations

from experts and formulate recommendations. One measure of their determination to access information is that there were over 1200 downloads of submissions to the enquiry – a fair reflection that the members were taking their task seriously.

I have not worked much in policy so it has been a steep learning curve for me to come to grips with setting of objectives for renewable energy and the policy development process.