Submission No 7

COGENERATION AND TRIGENERATION IN NEW SOUTH WALES

Name: Name Suppressed

Date Received: 3/09/2013

[redacted]

September 2013

Submission to Inquiry into Cogeneration and Trigeneration in NSW

Summary

[redacted] makes the following comments and recommendations, focusing on policies to promote cogeneration in NSW:

1. That the Inquiry acknowledges that cogeneration can significantly improve fuel use efficiency in energy delivery. This, and the fact that Australia lags many of our competitor nations in cogeneration promotion, points to the need for the NSW Government to facilitate its wider adoption here.
2. That NSW recognises renewable heat energy alongside electrical energy in any renewable energy certificate scheme, including MRET.
3. That assessments for support for cogeneration systems should include their value in introducing *distributed generation*; relieving infrastructure costs and delivery constraints within the electricity and gas grids.
4. That priority for support for cogeneration be given to projects that can deliver stable, low-risk energy supplies from proven energy sources.
5. That the Committee recognises the promotion of heat energy utilisation as a means to improve the overall competitiveness and contribution of manufacturing and industry to the economy.
6. That particular priority be given to cogeneration support where there is capacity to deliver continuous energy, and/or to supplement the capacity for delivery of energy through the State's power grid.
7. That governments recognise the full costs of suppling continuous energy when evaluating the merits of support for competing types of alternative energy**.**
8. That any targets for heat recovery / cogeneration be linked to the prevailing demand for energy and regularly reviewed, rather than remaining a fixed percentage.

The submission concludes with a list of principles that [redacted] believes should be considered when designing cogeneration support mechanisms.

[redacted]

Introduction

[redacted] welcomes the Inquiry by the NSW Public Accounts Committee because Visy strongly endorses the need to develop means of better capturing and utilising heat energy in manufacturing and industrial processes within Australia.

As an energy-intensive manufacturing business, with major facilities in Australia and the USA, [redacted] has developed and operated cogeneration plants in some of its sites, including two operating in NSW.

[redacted] has also been a participant in governed regulatory schemes to encourage energy efficiency and alternative energy developments. These include the former NSW Greenhouse Gas Certificate Scheme (GGAS), the Commonwealth Mandatory Renewable Energy Target Scheme (MRET), the NSW Energy Efficiency Scheme, and similar schemes in other States.

Following a brief overview of [redacted] business, this submission provides a series comments on this issue, focussing on cogeneration.

About [redacted]

[redacted] is a leading Australian privately-owned packaging and resource recovery company, with more than 120 sites across Australia, New Zealand, Thailand, Vietnam and Malaysia, and trading offices in Singapore and China. With its U.S. sister company, Pratt Industries, [redacted] employs around 10,000 people.

In the late 1970s [redacted] pioneered, in Australia, the capture of waste paper, cardboard and other recyclable fibre from domestic and commercial waste streams. Until then, virtually all this waste was landfilled. [redacted] has progressively built six recycled paper machines in eastern State capitals to manufacture recycled paper for the domestic and export packaging market. It is now doing the same with plastic packaging and other recyclable wastes.

Some of [redacted] manufacturing processes, especially our recycled paper machines, use significant amounts of energy (electricity and thermal) for their processes. Energy represents a large part of the Company's manufacturing costs. Visy has invested heavily in energy efficiency in all its plants. We have also constructed four energy generation facilities (three in Australia and one in the U.S.A) all utilising various forms of renewable solid fuels and black liquor[1]. In Australia we currently generate approximately 300 GWh per year of electricity in these facilities.

[redacted] is also currently undertaking a major feasibility study toward construction of a 52 MW_e power station, at a capital cost exceeding $350m, based on clean solid recovered fuels (SRF) from municipal and commercial waste streams. The project will provide base-load electricity to supply the equivalent of all of Visy's NSW manufacturing power demand. While not primarily directed at cogeneration *per se*, this

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[1] To date, [redacted] Brisbane generation plant has utilised a combination of coal, fibrous mail residues and WWTP biogas. The fluidised bed gasifier generation facility there is currently being transitioned to utilise a majority of cleaner fuels.

plant would benefit from targeted heat-utilisation measures because it will generate significant amounts of waste heat.

There are many other examples in [redacted] manufacturing network, and those of [redacted] array of customers and supplies, where proactive heat capture and utilisation could make a major contribution to overall energy efficiency and competitiveness.

[redacted] comments and recommendations

The following paragraphs outline [redacted] comments and recommendations.

1. Australia lags behind other developed nations in heat utilisation and our national energy task suffers as a result

Unlike most other developed nations, Australia has not, to date, leveraged the significant benefits available to its national energy task from heat.

The serious under-exploitation of heat energy in Australia contrasts with the situation with our major overseas competitors, for example:

- Last year, the U.S. Obama administration made an executive order[2] to recognise and promote combined heat and power (CHP) in Government-sponsored clean energy policy. The announcement is focussed on the U.S. manufacturing sector and seeks to enhance energy efficiency efforts with measures to expand the use of CHP. Programs cited for augmentation to implement this order include "providing incentives for the deployment of CHP and other types of clean energy, such as set asides under emissions allowance trading program state implementation plans, grants, and loans..."
- Europe passed a formal cogeneration directive in 2006, binding member states to specific action. According to COGEN Europe, CHP provides 11% of the EU27's total electricity production today, placing cogeneration ahead of wind, solar and biomass combined, in terms of the amounts of electricity generated.
- This year, the German Government has strengthened its support policies for CHP, encouraging construction of flexible CHP plants as a mechanism to better balance non-continuous power supply from wind and solar generators. Plant operators can obtain tax relief provided their plants achieve efficiency levels of at least 70%, encouraging innovation and continuous improvement in CHP technology.
- The UK Government actively supports CHP capture as part of its goal of achieving a 60% reduction in carbon dioxide emissions by 2050. It has set progressive targets to source its government electricity use from CHP systems. Other UK measures to encourage CHP growth are financial incentives, grant support, a greater regulatory framework, and government leadership and partnership. In particular, the UK exempts companies that invest in CHP from its Climate Change Levy, and expects this single incentive will deliver around 7

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[2] The White House. 2012. *Executive Order - Accelerating Investment in Industrial Energy Efficiency* (http://www.whitehouse.gov/the-press-office/2012/08/30/executive-order-accelerating-investment-industrial-energy-efficiency). Washington.

GW of new generation capacity, and reduce emissions by 3.2 million tonnes of carbon dioxide.

- The International Energy Agency believes that expansion of cogeneration in France, Germany, Italy and the UK alone will effectively double the existing primary fuel savings by 2030, dramatically cutting greenhouse gas emissions.
- The US is actively encouraging heat capture through CHP investments. McKinsey reports[3] that "... NPV-positive deployment of combined heat and power systems could increase from 85 GW in 2008 to 135 GW in 2020, representing a substantial opportunity to increase efficiency in primary energy and drive 1,390 trillion BTUs of primary energy savings, reduce facility-level energy costs by $77 billion, and abate greenhouse gas emissions by 100 megatons of CO_2e."

By comparison with these overseas examples, there has been very little interest and attention given to heat energy in national or State energy policies in Australia to date. Rather, Australian energy policies and programs have been dominated by *electrical* energy, mainly because mandated renewables schemes have been mediated via electricity retailers.

A notable exception was the NSW GGAS, which ceased operation with the introduction of the Carbon Pricing Mechanism. [redacted] strongly supported key aspects of the GGAS because it enabled energy efficiency investments to be incentivised under certain of the scheme's rules. The closure of NSW GGAS means some of those measures are no longer available to [redacted].

[redacted] has previously suggested that the RET policy be modified to incentivise heat capture when it occurs as part of an industrial cogeneration circuit. This will enable our manufacturing sector to grasp this heat opportunity.

Heat capture and utilisation is relevant in several major industrial sectors in Australia, such as sugar, refining and pulp and paper. [redacted] has most experience in the pulp and paper industry. These facilities can play a major role in harnessing heat from combustion processes, particularly those involving renewable fuels. Some mills have already invested in a certain level of cogeneration, which [redacted] defines as the simultaneous or serial production of electricity and heat.

Cogeneration involves the utilisation of the waste heat from primary electricity generation as an energy source for industrial processes - which may include further electricity generation via combined cycle, which can achieve *up to 45% higher energy conversion efficiencies* than conventional grid power generation (see Table 1)

However such investments are costly compared with conventional power systems, and it is unsurprising that, in the absence of targeted Government facilitation, Australia lags behind other jurisdictions in this aspect of modern energy development.

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[3] Granade, H.C., Creyts, J., Derkach, A., Farese, P., Nyquist, S., and Ostrowski, K. 2010. *Unlocking energy efficiency in the U.S. economy*. McKinsey & Company

Table 1 – Comparative fuel efficiency of various forms of electrical generation

Type of Generation	Nominal fuel efficiency	Fossil-fuel offset potential (C-intensity)	Current relative unit cost of generation
Brown coal conventional	25% - 35%	Nil (1.3 t/MWh)	Low
Black coal conventional	30% - 40%	Nil (1.0 t/MWh)	Low
Gas-fired Open Cycle	**30% - 40%**	Nil (0.7 t/MWh)	High (peak power only)
Gas-fired Combined Cycle	45% - 55%	Low (0.5 t/MWh)	Medium
Cogeneration (Natural Gas)	70% - 85%	Med (0.3 t/MWh)	High (i.e. needs initial investment incentive)
Cogeneration (Renewable)	**70% - 85%**	Max (0 t/MWh_e) (0 t/MWh_{th})	Very high (i.e. needs initial investment incentive)

Table 1, which compares the nominal fuel efficiency of various forms of electrical generation technologies, shows that natural gas or renewable-fuelled *cogeneration* can capture up to *twice the useful energy* as systems that don't invest in heat capture.

Recommendation #1: That the Inquiry acknowledges that cogeneration can significantly improve fuel use efficiency in energy delivery. This, and the fact that Australia lags many of our competitor nations in cogeneration promotion, points to the need for the NSW Government to facilitate its wider adoption here.

2. Heat energy should be recognised alongside electricity in any mandated or supported energy conservation or emission-reduction schemes

Governments should consider heat as a national energy resource when designing energy policies and when setting up mechanisms to change consumer behaviours.

[redacted] has made numerous representations to government regarding the need for Australian energy policy to encourage the greater utilisation of heat as a valuable energy resource. For example, [redacted] believes the MRET should be widened to include support for renewable heat energy.

[redacted] proposals to government to include heat in the RET mechanism include limiting its application to cogenerated heat from renewable electricity generation in industrial processes. Heat capture could be rewarded by crediting it through Renewable Energy Certificates on the same basis as renewable electricity, that is: 1 $MWh_{thermal}$ = 1 $MWh_{electrical}$.

Recommendation #2: That NSW recognises renewable heat energy alongside electrical energy in any renewable energy certificate scheme, including MRET.

[redacted]

3. Encouragement of industrial cogeneration can assist the wider deployment of distributed generation in Australia, relieving pressure and costs within established electricity and gas transmission networks

There is widespread and growing concern in Australia about the costs of maintaining the national electricity and gas grids, and the impacts on power prices of large capital demands for grid upgrades.

Cogeneration investments can help shift some of the burden away from the networks and onto local, distributed generation systems. That is, the introduction of greater distributed generation, especially within larger industrial and manufacturing facilities, can greatly assist in relieving pressure (cost and delivery) in the electricity and gas grids.

A problem in Australia that militates against greater adoption of distributed generation is that the central power utilities and network operators are not incentivised in that direction, with most of the potential benefits being captured by customers.

This situation calls for greater government leadership in promoting and facilitating cogeneration uptake here, such as occurs, for example, in the United States[4].

Recommendation #3: That assessments for support for cogeneration systems should include their value in introducing distributed generation; relieving infrastructure costs and delivery constraints within the electricity and gas grids.

4. Regulatory support for cogeneration should be directed at achieving lowest cost energy supply

Regulatory arrangements for encouraging/facilitating cogeneration and/or trigeneration should be aimed at supporting lowest cost energy generation and delivery. As a major Australian manufacturing company, [redacted] is concerned that the government-mandated alternative energy schemes can inadvertently stimulate the installation of comparatively high-cost electricity generation capacity that may damage the overall cost competitiveness of Australia's manufacturing base.

For example, the MRET has led to a skewing of renewable generation towards risky, intermittent and comparatively high-cost renewable generation. The same mistakes should be avoided if cogeneration is to be incentivised.

Incentives for heat utilisation should be configured to deliver stable, low-risk energy supplies from sources such as biomass, including solid recovered fuels from waste. The focus should be on the quality and continuity of energy delivered, with less focus put on particular technologies.

Recommendation #4: That priority for support for cogeneration be given to projects that can deliver stable, low-risk energy supplies from proven energy sources.

[redacted]

[4] For example, the US *Energy Policy Act (2005)* requires the Secretary of Energy to conduct a regular study of the potential benefits of cogeneration and distributed generation development for the nation's overall energy task

5. Encouragement of heat energy utilisation within Australian industry can have wide, flow-on benefits for the economy

Encouraging heat utilisation should not be seen as simply an 'energy sector' reform. Rather, NSW and national energy policies should be targeted at assisting economy sectors that produce wealth. The manufacturing sector is a key one because Australian manufacturing provides significant social, economic and environmental benefits, but the sector is under considerable pressure from external influences.

Strong, targeted support for heat energy utilisation within Australia's manufacturing sector can play an important role in transforming the whole manufacturing sector, and thereby deliver on other State and national priorities at the same time as advancing energy expansion and uptake. These collateral priorities include: sustainable jobs, domestic resource value-adding, regional development, upstream and downstream R&D, local servicing and support industries.

Recommendation #5: That the Committee recognises the promotion of heat energy utilisation as a means to improve the overall competitiveness and contribution of manufacturing and industry to the economy.

6. Encouragement of cogeneration should be directed at producing baseload-style electricity generation

In view of the growing prominence of alternative energy supply from non-baseload sources, stronger attention and support should be focussed on procuring continuous energy supply via cogeneration.

Currently, schemes such as the MRET encourage generation technologies that provide part-time supply – especially wind and solar, and also tidal power. It has become clear that electricity purchasers pay an unreasonably high premium to compensate for the interruptible nature of the majority of Australia's current renewable electricity supply.

[redacted] believes that government support for heat recovery and utilisation should be directed non-interruptible base load supply of low emissions generation. [redacted] current and proposed SRF (energy from waste) plants provide a good example of this type of supply.

Recommendation #6: That particular priority be given to cogeneration support where there is capacity to deliver continuous energy, and/or to supplement the capacity for delivery of energy through the State's power grid.

7. The full cost of generation should be assessed when evaluating support

Governments should adopt a "full cost" approach when assessing the relative merits of types of cogeneration and/or trigeneration support.

This is not typically the case with current energy conservation or emissions-reduction schemes. Here, estimates of the levellised cost of electricity generation don't include the costs of distribution or the costs of network redundancy to cater for supply interruptions. For example, there is little or no recognition of the true cost of providing gas peaking or other rapid response generation to offset downtimes in supply from intermittent sources. Such "externality" costs are smeared across the entire market, and

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the particular interruptible renewable supply entity tends to escape having these costs attributed to it.

The same principle applies to the benefit assessment of cogeneration as a means of improving distributed energy supply, thereby providing cost-reduction and other relief to the wider electricity grid (see Recommendation #3 above).

Recommendation #7: That governments recognise the full costs of suppling continuous energy when evaluating the merits of support for competing types of alternative energy.

8. Targets for heat utilisation, if mandated, should be set in line with the prevailing electricity market demand

Should a State/national cogeneration target scheme be considered, any target should be regularly re-set to achieve the target percentage of the prevailing national electricity demand in the target year.

Various legislated schemes, at both State and national level, set targets based on forecasts and projections of Australian energy demand/supply. However, when market demand reduced (such as is the current national trend), the burden of obligation is applied to an artificially high energy supply base.

[redacted] believes that mandated energy target schemes should provide for a more dynamic target which are regularly re-set to align with the prevailing national energy demand.

The following chart[5] derived, from successive AEMO National Electricity Forecasting Reports for NSW, demonstrates the problem with adhering to projections which may not match current market realities.

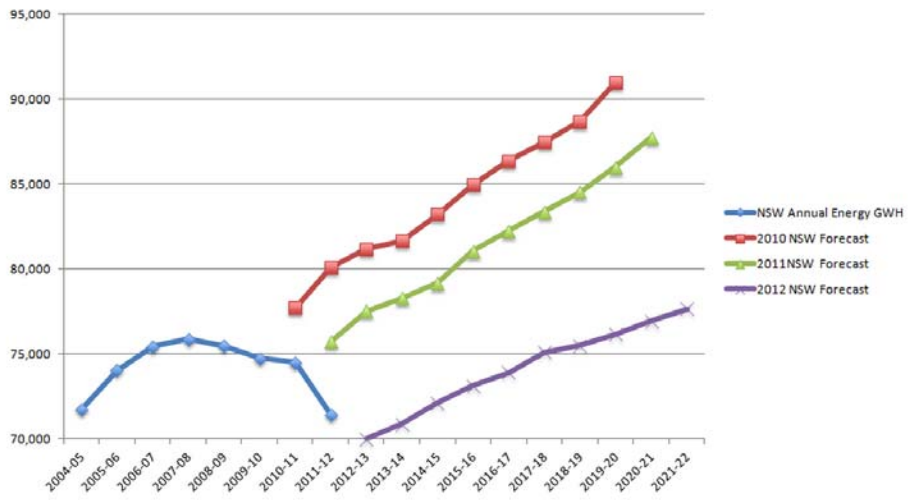

Figure 1 - NSW Energy Demand Forecasts and Actual (MW)

It shows that the 2010 forecast of the 2011/12 demand was 80,000 MW, which turned out to be some 12.7% higher than the actual demand for 2011/12.

[redacted]

[5] Graphic source: Sydney Morning Herald 20 July 2012 - http://www.smh.com.au/business/how-dodgy-forecasts-inflate-your-energy-bill-20120727-22xxf html

[redacted] acknowledges that the reverse may occur when the economy is operating at a high pace. However, the point is that targets should reflect, as closely as possible, the actual market demand at any point in time. Otherwise, serious market distortions and uncompetitive conditions may result from the operation of such schemes, especially for energy-intensive industries.

Recommendation #8: That any targets for heat recovery / cogeneration be linked to the prevailing demand for energy and regularly reviewed, rather than remaining a fixed percentage.

9. Principles for an effective cogeneration measure

While it is up to regulators and legislators to model and implement policies, [redacted] believes there are principles and learnings from other schemes that can be applied. Ten are listed below.

1. Focus on known technologies with low implementation risk
2. Support base load style energy production
3. Target measures at fuel sources that are known and readily available
4. Avoid adversely impacting grid electricity costs when introducing certificates or similar instruments
5. Assess scheme benefits from an economy-wide perspective, rather than from just the energy-sector's perspective
6. Recognise the wider cost and supply benefits of industrial cogeneration for the electricity network; in particular deferral of network capital and other constraints by facilitating distributed power
7. Focus on the uptake of cogeneration by manufacturing / industry facilities which can provide scale and continuous energy delivery
8. Encourage innovation in the use of waste heat, particularly at the lower end of the temperature range ('low grade heat')
9. Learn from and apply lessons from successful mechanisms overseas
10. Keep scheme transaction costs as low as possible

[redacted] appreciates being given the opportunity to submit these comments, and would be pleased to provide further information to the Public Accounts Committee on the above or any other relevant matters, if required.

Contact

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