Productivity Commission

Submission

Waste Generation and Resource Efficiency Inquiry

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Carbon Partners Pty Ltd wishes to make the following submission to aid the Commission in the examination of Waste Generation and Resource Efficiency in Australia pursuant to a directive from the Federal Treasurer dated the 20th of October 2005.

The Background of this Submission.

Carbon Partners Pty Ltd (CP) was formed in 2001 with the primary focus of establishing large scale European Anaerobic Digestion technology in Australia. Carbon Partners is part of the Szencorp group of companies. To date, CP has focussed on the identification of suitable locations for large scale biogas renewable energy plants, the "Australianisation" of the highly successful European technology and the licensing and permitting of the first three sites at Dandenong Victoria, Wodonga Victoria and Griffith NSW.

At this time, a typical CP plant would process about 100,000 tonnes per year of organic wastes, produce about 4.5 to 5.5 MW of baseload electricity, about 15 thousand tonnes per year of high quality granulated or pelletised organic fertiliser and about 55Ml of recovered water. The plants are constructed as long term Infrastructure Investments and a number of the plants (such as Griffith NSW) will be located towards the end of the electricity network. CP has already identified up to 30 possible plant locations across Australia.

The Dandenong plant is likely to receive a building permit from Dandenong City Council and a Victorian EPA works authority during the period February/ March 2006. A image of the proposed Dandenong facility is provided as *Attachment #1* to this document.

The Scope of the Commissions Inquiry.

On pages 7 and 8 of the Issue Paper, the Commission has identified 5 key areas of interest for the inquiry plus three areas of supplementary reporting:

Item 1.

The economic, environmental and social benefits and costs of optimal approaches for resource recovery and efficiency and waste management, taking into account different waste streams and waste related activities;

Item 2.

Institutional, regulatory and other factors which impede optimal resource efficiency and recovery, and optimal approaches to waste management, including barriers to the development of market for recovered resources;

Item 3.

The adequacy of current data on material flows, and relevant economic activity, and how data might be more efficiently collected and used to progress optimal approaches for waste management and resource efficiency and recovery;

Item 4.
The impact of international trade and trade agreements on the level and disposal of waste in Australia; and

Item 5.

Strategies that could be adopted by Government and Industry to encourage optimal resource efficiency and recovery.

Item 6 (Supplementary Reporting).

The effectiveness of performance indicators to measure efficiency of resource recovery practices;

Item 7.

The effect of government and commercial procurement practices on optimal resource recovery;

Item 8.

The impacts of government support to production and recovery industries.

The Commission has then moved to simplify these 8 items into three central issues of the terms of reference:

Issue 1.

What are the economic, environmental and social costs and benefits of waste and waste related activities?

Issue 2.

What are the market failures (including externalities) associated with the generation and disposal of waste?

Issue 3.

What strategies should be adopted by Government and industry to improve economic, environmental and social outcomes in regard to waste and its management?

In the Issues Paper, starting in Section 3, the Commission poses 68 questions. For clarity I have numbered these questions according to the Section that they appear in. There are 6 questions in Section 3, 8 in Section 4, 13 in Section 5, and 41 in Section 6. For the sake of clarity, I will refer to these questions according to their Section number and order in the Section within my comments of the three core issues.

FORMAL RESPONSE.

1. Issue 1.

What are the economic, environmental and social costs and benefits of waste and waste related activities?

1.1 *Economic costs and benefits of waste and waste related activities.*

In the 1960's, waste management consisted of simple collection and disposal of the entire waste stream in landfill. This collection was labour intensive and used collection vehicles that were basically tip trucks with sliding roofs. Landfills were very simple in nature with minimal (if any) daily cover, no landfill liner, no leachate re-circulation or recovery and very low levels of compaction. The system basically worked on a cost recovery basis and had no dominant players due to the low cost of entry.

As the costs of landfill space escalated during the mid 1970's, specialist landfill compactors were introduced and rudimentary efforts were made to cover all material daily and to make sure that there was some limited control over leachate especially in the landfills that were located in the south eastern sand belt zone of Melbourne. By this time a few more dominant players started to emerge in the industry due to the increasing complexity and cost of equipment. Specialist equipment manufacturers started to emerge and the industry started to come under regulatory control from recently formed Environment Protection Authorities (EPA'S).

During the late 1970's it became apparent that there were significant environmental problems emerging with landfills especially in the operational area and the legacy issues surrounding closure. A number of major landfills were closed during this period and the ownership of these landfills post-closure was often difficult to identify. In this way the less responsible operators of some of the landfills capped any further contingent liabilities for closed facilities. Responsibility for these abandoned landfills eventually devolved back to local Government and hence the long-term legacy issues became a cost to the whole community.

In the early 1980's, the first of the "engineered" landfills were licensed and these took an ever expanding range of waste. Initially, some of these "engineered" landfills were allowed to take all wastes that were at least of a "spadeable" consistency. This policy was quickly embraced by the waste industry as they set up special plants that mixed sometimes hazardous liquid waste with saw dust and rice hulls to make a product that could be placed in the engineered landfills at a much lower disposal rate than that which would normally be charged for the disposal of these liquid wastes. This activity caused a boom in transport of sawdust and rice hulls and eventually sawdust became a major revenue earner for sawmills.

At the same time, the Victorian EPA permitted a major facility to be developed at Tullamarine. This facility took both liquid waste and municipal and commercial waste. As this facility is now very close to closure, it has forced the Victorian Government to look to establish a major long-term hazardous waste containment facility in the north west of the state. The need for this facility indicates that large volumes of hazardous wastes have, up to this time, been disposed of at Tullamarine.

It may well be that the massive legacy issues from some of these facilities will be borne by the community for at least the next millennium.

It would probably be fair to say that, up until this time, Industry in Victoria and indeed the rest of Australia has not carried the full cost of disposal of its waste. A large proportion of the actual disposal cost has been transferred to the general community[1] into the future as a long-term liability. Apart from the employment and investment created by the waste collection and disposal operators in the day-to-day conduct of their business there has been little real benefit to the community other than low (below) cost disposal options.

There is a strong argument that says that to this time the full economic costs of waste and waste related activities have been very low due to the waste industry's failure to fully price legacy issues. It is interesting to note that only a small number of the 800+ companies that generated waste that was entombed at the Cleanaway Tullamarine facility in the early 1980's are still in business, yet the full cost of the legacy issues from their wastes are only now starting to be understood

1.2 *Environmental costs and benefits of waste and waste related activities.*

It is only in the last 10 years that any benefits of recycled waste and waste related activities have started to emerge and this has been driven by the need for Government to lessen the amounts of waste going to landfill to extend the life of the suitable landfilling sites.

[1] This transfer of the true disposal cost should actually be referred to as an Intergenerational Liability to better reflect the un-costed expenses that will need to be met by future generations of residents.

Waste recovery and recycling is now a well established industry sector that has basically grown from the limited glass, metal and paper recycling operations that started in the late 1970's and early 1980's. Diversion from landfill has now reached the point where the organics part of the waste stream is the major component that still requires removal from the metropolitan landfill cycle.

However, all the States are really struggling with the handling of hazardous and prescribed wastes and this has led to the proposed establishment of several long-term containment facilities for this type of waste. In the meantime, this mainly liquid waste stream is being tipped into conventional, specially permitted landfill facilities. It is the legacy environmental costs of these facilities that is the real financial risk for the Australian community and the Australian and Regional environment.

1.3 *Social costs and benefits of waste and waste related activities.*

The Waste Industry that operates today is, a significantly different industry to that which operated 20 years ago. The recycling sector today is a major employer of semi-skilled labour in the various forms of recycling facilities (MRF'S), however this labour is often simply just labour that has been redeployed from the back of collection trucks to the sorting lines in the MRF'S.

This redeployment has been driven by the introduction of the "wheelie bin" in the late 1970's and the development of the "one-armed bandit" type of collection truck that has replaced the rear loading garbage truck and its runner's that used to hang off the back of the truck and empty the garbage bins into the truck. The social change has seen an emergence of a greater number of women in the industry compared to the former predominance of men who used to 'run' behind the collection trucks.

The Industrial waste sector has changed little in the last 30 years. The dominant collection truck is still the front loading compactor and this generally precludes any type of recycling once the waste has been collected. Industry however is recycling the more abundant materials at source and this has led to the introduction of separate services that collect paper, cardboard, glass and metals from the source.

The waste and recycling sectors in Europe are much more developed than in Australia with full spectrum recycling right down to electrical appliances, clothing etc. The price paid in the EU for renewable electricity is about 4 times that which is offered for the same product in the Australian East Coast electricity price pool. Landfill disposal costs, if available, are likely to be up to 5 times the cost of similar disposal in Melbourne.

This pricing has driven the development of Anaerobic digestion plants right down to the farm level and certain organic waste disposal practices - such as the spreading of manure on land have now been banned. By moving these plants right down to farm level, the EU has started a process of recycling nutrients on individual farms and this is leading to improved stream water and groundwater quality.

An example of a small farm scale farm bio-digestion system that has operated at a single site in Victoria for the past ten years see:
www.seav.vic.gov.au/ftp/advice/business/case_studies/BerrybankPiggeryCase0_a.pdf#sear20Farm

In summary, there is now greater employment in the waste recycling industry and there is certainly less waste going to landfill, but the major issues surrounding the recycling of the organic waste streams have yet to be fully addressed and it is this sector that will drive the rapid increase in social benefits.

2. Issue 2.

What are the market failures (including externalities) associated with the generation and disposal of waste?

2.1 *The Market Failures.*

The waste services industry and the primary waste generators have operated under the control of the State EPA's for the last 30 or so years. There is now a very real need for the operational supervision of the waste services industry and the primary waste generators to be moved into a more arms length arrangement similar to those which operate in the Corporate Regulatory area. Some of the key failures in the system as it currently operates are:

2.1.1 Vast amounts of organic waste are disposed of in a largely unregulated environment purely because there is no alternative disposal option that is regarded as "economically viable".

2.1.2 Landfill operators are allowed to hire in their own consultants to write reports on their operations or to monitor their operations. This is potential for conflict of interest.

2.1.3 The Federal EPBC legislation does not at this time cover fauna in sub surface locations.

2.1.4 There is a view that pollution of surface and groundwater resources is allowable if there is no other "viable" disposal option available.

2.1.5 The commercial viability of industry operations takes precedent over risks to the environment.

2.1.6 Market forces drive disposal fees - the lowest cost operator gets the job despite possible hidden externalities in the management of these lower cost disposal operations.

2.1.7 There is a low cost of entry into the waste transport sector and this means that the community has limited, if any, ability to enforce accountability in the event that dangerous wastes are improperly disposed of.

2.1.8 Once a landfill has filled and been capped there is little or no recourse against the owners or shareholders of the company that operated and filled the landfill. This means that in the future, the leachate issues and the maintenance issues are likely to fall back on the general community. The full externalities of the cost of disposal are not fully covered by the disposal fee.

2.2 *The Hidden Externalities are in the Organics sector.*

In Victoria, at least, there is a Government view that landfill should only be used for solid inert wastes. This view has driven the development of alternative disposal methods for organic Municipal organic kerb side collected green waste streams.

However, the bulk of this organic waste streams is not within the control of the Councils/Municipalities and, in fact, are firmly in the control of the primary waste generators. This means that in the absence of alternative disposal options or regulatory restrictions the generators of this organic waste can basically dispose of the waste however they like, generally to the lowest cost option.

By way of example, this had led to the situation where the chicken industry is dumping huge volumes of basically unprocessed manure into low priced/ no priced markets where there is no control of the ensuing nutrient run off. The pork industry(with one notable exception of an operator that uses an anaerobic digestion plant) is allowed to dispose of manure in anaerobic/aerobic lagoons and to field spread the resultant sludges with no control of the resultant nutrient run-off. The beef feedlot industry is allowed to field spread its manure as a low cost fertiliser again without any nutrient run off controls. Only the Dairy industry is coming under control for its nutrient run off and this control is basically limited to the major operators. The organic waste that is within the control of Councils/Municipalities basically forms two streams, green waste and food waste. The food waste is co-mingled with the household waste

and usually goes to landfill, the organics waste is sent for composting and this produces an end product with limited end markets, serious pathogen issues and growing stockpiles of unsold product. The bulk of this product ends up in landfill as daily cover, usually by quite circuitous routes.

3. Issue 3.

What strategies should be adopted by Government and industry to improve economic, environmental and social outcomes in regard to waste and its management?

3.1 *The National Strategic Framework.*

Waste Management is very much linked into the National initiatives regarding a response to and mitigation of Climate Change. This linkage is driven by the emissions that are generated by wastes and the emission reductions that flow from the recycling of materials.

It is highly probable that Victoria will be at the point where it has zero emissions from new landfills by about 2010 and will then be faced with the major legacy issues from old landfills that may take as long as 50-100 years and probably billions of dollars to render them environmentally safe. It would be reasonable to say that Municipal waste management and commercial and industrial waste management are being managed in an economically sustainable manner and the target that needs to be set by Government is to move this management to a fully sustainable system that is both economically and environmentally secure.

From a National perspective, the major issue revolves around the control and recycling of organic waste streams which are far and away the largest waste stream nationally and the waste stream with the potential to cause the most environmental damage. There is a view that all organic waste should come under the control of the Federal Department of the Environment (DEH)[2] because the impact of improper disposal of these wastes is capable of having national level impacts.

Industry will not move to improve economic, environmental and social outcomes from the management of organic waste streams without regulatory intervention as to do so may lead to increased costs. There are some genuine issues with disposal costs and the importation of food products under the various free trade agreements but these issues are more about local hidden externalities than genuine competitive trade issues.

3.2 *Improving Economic, Environmental and Social Outcomes.*

As outlined in 3.1 above, the major issue is the management and control of the disposal of organic waste streams on a national basis. The improvement of economic, environmental and social outcomes will flow from the introduction of fully visible externality pricing across the interlinked industry sectors that would form a sustainable disposal system for these wastes.

4. Questions arising from the Issues Paper Sections 3-6.

We do not propose to comment on all the 68 questions posed in the issues papers in Sections 3 through to 6 as many of the can be better answered by State-based organisations like Sustainability Victoria. However a number of the questions fall directly into our area of expertise and we therefore address our comments to those issues:

Section 5 Question 1.

[2] This management would be via an amendment to the Environment Protection and Biodiversity Conservation Act 1999 (the EPBC Act). The amendment would involve the creation of a Subdivision E under the act to control the disposal of organic waste streams over a certain threshold limit (probably 50 tonnes annually). By having national control of disposal the Commonwealth could make sure that nutrients and carbon are recycled in the most environmentally efficient manner.

"How large are the external costs of properly constructed and managed landfills and other types of waste disposal in Australia. What type of costs are involved? How do these costs vary according to the type of Waste?"

5.1.1 A properly constructed solid inert landfill (which is the only type of landfill that should be allowed) taking only properly approved wastes would have low external costs that mainly relate to site upkeep and maintenance and the lost opportunity costs for alternate uses for the site (if any).

As mentioned previously, there are massive legacy costs involving many current operating and closed landfills and there is no doubt that these costs will be carried by the general community.

Costs of metropolitan landfill are held artificially low by virtue of significant tonnages of greenwaste still being disposed to landfill and used as daily cover material.

Going forward into a carbon constrained economy there should be no other landfill than those that take solid inert waste.

Section 5 Question 2.

"What externalities are associated with other waste disposal options, such as incineration and composting?"

5.2.1 Incineration / Pyrolysis.

The world is littered with failed waste incineration /pyrolysis plants (including Whytes Gully NSW). These plants have high operational costs, limited ability to control toxic emissions and high disposal costs for the ash and residual waste. There is no scope for the recycling / beneficial re-use of input streams. Incineration (and Pyrolysis) by their very nature destroy both nutrients and carbon.

5.2.2 Composting.

Australia has an extensive composting industry that is characterised by limited end markets, low product value and significant related environmental problems such as fires, odour, pathogens, weeds and leachate impacting surrounding areas. The major market for composted product in Australia is actually landfill cover and land reclamation. The Victorian Government has recently issued product handling advice due to consistent pathogen transmission issues to human users of the product.

5.2.3 Land Application of Waste.

The east coast of Australia has a vast and largely unregulated disposal practice of applying or stockpiling organic waste on farm land. The range and volumes of organic waste applied in this manner are quite large and the wastes mainly consist of; cattle feedlot waste, chicken manure, piggery waste, olive pomace and fruit processing wastes. Externalities from this practice include nutrient run-off which leads to the degradation of inland aquatic ecosystems, degradation that is exacerbated by decreasing river and stream water flows.

Section 5 Question 3.

"Do these externalities warrant a Government Policy response?"

5.3.1 No Government policy response would be required if only solid inert landfills were allowed and composting plants were permitted conditional on a full EES and EPBC approvals being in place and enforceable off-take agreements so as to avoid the massive stockpiles of unsold product so evident in both Sydney and Melbourne.

5.3.2 Federal Government Control of all organic waste streams under the EPBC Act would help to assess and address the full cost of current hidden

externalities in current organic waste disposal practices - especially in rural areas.

Section 5 Question 4.

"How large a problem is illegal dumping and littering" What types of waste cause most of the problems?"

5.4.1 Illegal dumping and littering is a consistent but small problem across the nation. It is generally handled at a local government level with State based EPA's becoming involved for major events such as oil spills.

5.4.2 However, Australia has a major issue with the dumping (legally) of animal wastes and manures and waste water treatment (including human sewerage) sludges onto farmland. This legal dumping is carried out because there is deemed to be no other low cost disposal options for these wastes.

Section 5 Question 10.

"Are institutional or regulatory barriers preventing the uptake of better waste management practices and how?"

5.10.1 In the organics waste sector, which is by far the largest waste management sector in Australia, it could be argued that the real issue is a lack of regulatory and institutional barriers.

Due to a lack of alternative disposal methods, the intensive animal industries have little option but to field spread their manures and residues. Similarly, the State based EPA's are hamstrung in preventing the resultant nutrient run off issues because of this lack of alternative disposal methods. No price signals have therefore been established as would be the case if the practises were banned.

Farmers engaged in intensive cropping, especially maize and rice burn their crop trash because this is the cheapest disposal option and they can do so.

Across the Chicken, Beef and Pork industries there is little alternative for the disposal of mortality except to landfill or render, and the same alternatives apply to the abattoir wastes and the treatment sludges which are applied (sometimes by drilling and injection) to rural land.

In the waste water treatment sector the options for the disposal of bio-solids are also basically land spreading or landfill despite the fact that these bio-solids often have a high carbon content, a good range of nutrients and therefore a sound beneficial re-use potential. Melbourne currently has over 2 million tonnes of sewerage bio-solids in stockpiles.

5.10.2 Sewerage treatment plants across Australia tend to use 1950's style treatment that involves primary, secondary and sometimes tertiary treatment of the solids. The introduction of the latest types of European anaerobic digestion technologies would result in high recoveries of methane that can be used to generate electricity and the ability to 'shandy down' any heavy metals contamination by co-digesting with other clean organic waste streams.

There are massive stockpiles of sewerage sludges across Australia, and these stockpiles often contain carbon, nutrients and heavy metals. Recently released research from America *(Attachment 2*) and Public Library of Science Biology, DOI:10.1371/journal.pbio.0040003) indicates that these sludges are also likely to hold a significant range of plant viruses.

Previous research has indicated that sewerage sludges can also hold synthetic hormones and antibiotics. The full economic risk that could arise from the disposal of these sludges has not yet been quantified but needless to say many highly productive rural areas in Australia already have restrictions on the movement of plants, manures and animals due to bio-security risks and the sooner the issue with sewerage sludges can be negated the sooner the Australian community can be assured that economic and environmental damage will not come from this

source. The treatment and disposal of sewerage wastes need to be controlled at a national level and the sludges, if processed through modern anaerobic digestion plants that can pre-treat and hydrolyse the sludges at high temperature and pressure, can be made safer for more general use in agriculture.

5.10.3 Several State Governments have set up regional waste management groups usually based on geographic grouping of local Governments. It is common for these groups to be run by people who have relationships or employment with existing waste operators with a strong vested interest in maintaining the status quo, often undermining efforts to further improve waste management practices.

These State Government supported regional waste management groups[3] suffer from an absence of a nationally consistent and readily accessible database of waste types, volumes generated, source (by industry sector or ABS code) and location (by postcode). When attempts have been made to collect this data there has been strong resistance by industry who fear that publication of this data could give valuable commercial information to competitors and green pressure groups.

Section 5 Question 11.

"Are local governments sufficiently aware of best practice approaches to waste management that would suit their circumstances? What institutional constraints are preventing the adoption of best practices?"

5.11.1 Local Government across Australia only has limited control over the domestic waste collection services and in some rural areas the disposal of waste water. Local Governments in Australia are almost universally financially constrained[4] and this constraint is further complicated by the plethora of other authorities that overlap controls in specific areas. Some of the larger Councils are very professional in their approach but this is not universally the case - particularly with smaller and some rural councils.

For instance, the Shire of Cardinia in outer eastern Melbourne has 27 other agencies and Departments that have involvement in environmental matters within the Shire. In addition there is a significant array of International, State and Regional plans and strategies that the municipality has to interface with (*See Attachment 3*). This is compounded by a very significant RAMSAR Wetland area and one of the busiest stretches of National highway in the country. The area is home to extensive high value agriculture and a significant intensive poultry production sector. The Victorian EPA controls the management of commercial waste streams in the area but lacking alternate disposal options for wastes such as chicken manure they are clearly not able to discharge their responsibilities to the RAMSAR wetlands in the most effective manner.

When the Cardinia Council has taken steps to control the further expansion of chicken broiler sheds it has been frustrated by the ability of proponents to overcome these objections through appeals to the Victorian Civil and Administrative Appeals Tribunal (VCAT).

From our experience we would say that Local Government has a reasonable understanding of best practice in waste management but lacks the funds to implement best practice and lacks complete control of their area of responsibility. It is also fair to say that Local Government will, in most cases, seek the lowest cost disposal option available.

<u>There is a real need for a single national point of control for organic waste streams.</u>

Section 5 Question 12.

"What regulatory and institutional barriers are impeding the development of markets for recovered resources? What is the case for removing these barriers?"

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[3] This lack of reliable data also impacts anyone who is seeking to work with industry to develop new or innovative waste management solutions.

[4] There are in fact a number of councils that have massive financial reserves such as Melbourne City Council (MCC) but in the main most councils, especially in rapidly developing areas and rural areas, are carrying significant debt loads.

5.12.1 The lack of controls on the disposal of organic wastes streams at a Local Government level, State level and Commonwealth level represent the biggest threat to the environment in the climate change scenario. The technology is available to reprocess these streams so that the nutrients and the carbon can be recycled and the pathogens, viruses, antibiotics, herbicide and pesticides are destroyed in the process.

The facilities to carry out this reprocessing are large scale anaerobic digestion plants that turn the wastes into methane and high quality fertiliser. These plants cost in the range of $30 million to $65 million per plant and need to be funded as long term infrastructure developments.

A typical plant in a rural area would have 5 income streams;

1. Gate fees for accepting input waste streams.
2. Sale of electricity.
3. Sale of fertiliser.
4. Sale of recycled water.
5. Sale of green credits such as emission reduction units or similar products.

A typical plant at the higher end of the size scale would produce about 5 MW of baseload power per year and about 15,000 tonnes per year of granulated fertiliser.

Our company, Carbon Partners has recently been going through the process of getting a plant permitted at Griffith in NSW. This plant, in its first stage, would process about 100,000 tonnes per year of organic wastes. A recent NSW waste audit in the area has identified over 1 million tonnes of organic wastes in the Griffith area. Some of the regulatory and institutional barriers experienced in Carbon Partners projects so far include:

Regulatory.

1. The NSW Government called in the permit application when we were 80% of the way through the permitting process with the Griffith Council. The project was declared a project of State Significance. It then took the NSW Government 4 months to tell us what their requirements were to permit this facility, and basically they required a higher level of application and a complete new set of studies.
2. There is a general lack of understanding of new technologies and processes and this has serious impacts when Departments or authorities set about determining permitting requirements. It is also clear that State level authorities from time to time engage in ‘gaming’ on permit conditions.
3. There is no standard for the plants fertiliser output to be recognised as a fertiliser and hence it has to be classed as a composted product.

Institutional.

1. IPART have issued CP a detrimental retrospective adverse amendment to the NSW NGAC rules for reasons that have not been explained.
2. Electricity. Local power retailers will not pay market pricing for power or adequately recognise line loss factors.
3. Power Network Access Issues. Distributed Generators attempting to sell power into the grid face a range of additional costs and barriers such as;

3.1 Distributed generators are expected to pay full price of grid connection and in many instances this may included paying for the rectification of existing network "problems" in the area. Existing suppliers into the grid have not had to cover these costs.

3.2 Because the distributors and retailers (sometimes the same entity) control all the network data they often use this power to withhold vital information, create stalling tactics and lower the quantum of fees paid for line losses etc.

3.3 It is clear that the regulators know that the distributors and retailers are behaving in this manner but to date the regulators seem to want to apply a light handed regulatory approach to the holders of market power.

4. Silo Structure of Government Agencies. At times, Government Agencies demonstrate an inability to understand the Triple Bottom Line (TBL) benefits that projects like our deliver the broader community.

5. Fertiliser. The fertiliser market on the east coast of Australia is basically controlled by 3 major corporations and these companies have quite massive investment in manufacturing facilities, port facilities, transport infrastructure and regional and local distribution points.

Instead of using our product to expand their own range into new markets and customers, they would prefer to truck in from coastal depots their own product.

At this time, it is very hard to build state of the art organic waste disposal systems especially in rural areas when the electricity and fertiliser outputs cannot be sold at a fair market price.

The easy fix to the fertiliser part of the equation would be to introduce an environmental levee[5] on mechanically manufactured fertilisers so that the full downstream cost of the unused and lost nutrients could be recovered by the community.

A credit scheme for carbon returned to the soil would also create significant re-use of the crop trash which is currently burned.

Section 5 Question 13

"What case is there for using waste management policies to improve the sustainability of resource use."

5.13.1 In the organic waste sector, it is the lack of a national management policy that is causing these wastes to be disposed of in an environmentally unsustainable manner. No other waste stream has the ability to impact environments thousands of kilometres from the dumping site.

The Murray Darling Basin stretches across three states, and organic waste that is inappropriately disposed off in southern Queensland has the potential to impact waterways all the way through to South Australia and the Southern Ocean.

Likewise, chicken and cow manure that is field spread in the Murrumbidgee Irrigation area can have a similar impact, as will fruit processing wastes and grape marc dumped in paddocks in the Shepparton area of Victoria.

Section 6 Question 8.

[5] Noted soil science researcher Van de Hoek (1998) estimates that more than 60% of the Nitrogen input into food production was not converted into a usable product. This surplus Nitrogen, defined as the difference between input and output, is either lost to the environment or accumulates in the soil. Excessive use of Nitrogen can lead to numerous problems directly related to human health (e.g., respiratory diseases induced by exposure to high concentrations of ozone and fine particulate matter) and ecosystem vulnerability (e.g., acidification of soils and eutrophication of coastal systems) (Cowling et al 2001, Boyer and Howarth 2002, Galloway et al 2002b, Mosier et al. 2002).

This levee would involve suppliers of nutrients purchasing nutrient reduction credits to offset those nutrients that were lost during the use of their products.

"What are the economic, environmental and social benefits and costs of recovering energy from waste?"

The bulk of the energy that can be recovered from waste will be recovered from the organics sector. Some of this energy will recovered from thermal conversion of wastes such a Building and Demolition timber waste and dry woody organics that would commonly come out of the green waste collection system run by local government. The bulk of the organics stream is what is called wet organics and this is usually best suited to treatment by anaerobic digestion.

There has been significant development of anaerobic digestion system over the last 20 years. The real strength of modern anaerobic digestion technology is its ability to recovery energy whilst maintaining the nutrient levels in the process end product.

Thermal conversion can produce more power per tonne of dry input material but in this process both the carbon and the nutrients in the product are destroyed and the resultant ash would normally go to landfill.

6.8.1 The Economic Costs of Recovering Energy (Thermal Plants).

Thermal conversion plants are relatively cheap to build (2-2.5 Million per MWh)[6], reasonably expensive to operate, have low thermal efficiencies (20-25%), difficult to permit, require a gate fee for the incoming wastes, a fee that can be obtained in capital cities with high landfill costs. The electricity would normally be sold on a long term PPA and the ash/residue would normally go to landfill. There a number of these plants operating in Australia, they are common in the sugar industry and less so in the paper industry. <u>These plants compete against black coal generators who are not paying export parity pricing for their coal and are operating fully depreciated facilities and hence can sell power below the real cost of production.</u>

See Attachment 4 for a schematic flow chart on the recovery of energy from waste.

6.8.2 The Economic Costs of Recovering Energy (Anaerobic Digestion).

Fifth generation (5GAD)[7] anaerobic digestion plants are expensive to build (11 to 12.5 million per MW sent out), have very high thermal efficiencies (110-125%), are relatively straightforward to permit and require a gate fee for the incoming wastes. The electricity would normally be sold on a long term PPA or over the fence to a tied customer who may also be a waste supplier. In a logical world, the fertiliser would be sold to existing fertiliser companies that would then on-sell the product to their customers as a more sustainable fertilizer option. The first of this type of digestion plants are just being permitted at this time. <u>These plants also compete against black coal generators who are not paying export parity pricing for their coal and are operating fully depreciated facilities and hence can sell power below the real cost of production.</u>

6.8.3 The Environmental and Social Benefits and costs of recovering energy.

Thermal energy recovery plants using dry renewable fuels have few environmental benefits and suffer the potential disadvantage of becoming atmospheric polluters as the chimney stack controls degrade due either to age or neglect. They do employ a few people and they do save on significant volumes of landfill space. There is an argument that they also lower long term

[6] Comparison of the various technologies on the basis of the cost of building a plant per MW of base load production is not really a true indication of the cost/delivery equation. Electricity generation for Anaerobic Digestion plants is only a small part of the construction costs, and the electricity generation not only sends out power but runs the plant and uses its waste heat to process the feed stocks and make the fertiliser.

[7] Anaerobic Digestion Plants utilise a range of technologies that are basically indicative of the sophistication of the technology employed in the plants. Basic household plants, such as those operated in China for over 2000 years are called first generation plants (1GAD). Plants that operate at a larger scale and involve stirring of the digestate in the tank and temperature control are second generation plants (2GAD). Plants that use 2GAD technology and generate electricity are called third generation plants (3GAD). Plants that pre-process the input material, are temperature controlled, self stirring and self evacuating are called fourth Generation plants (4GAD). 4GAD plants that pre-process at high temperature and pressure and produce pelletised or granulated fertiliser are called fifth generation plants (5GAD).

methane emissions that would arise in some circumstances from the decay of wood or other dry organic wastes either in landfills or in the open air. The thermal conversion process destroys all the nutrients and the carbon in the fuel. There are limited locations with suitable low cost fuel supplies in Australia.

5GAD plants have significant environmental benefits. They can destroy the pathogens, drugs and chemicals in the waste but preserve the bulk of the carbon and all the essential nutrients and water. They are capable of handling all the animal disease pathogens so they are a ready disposal path in the event of animal disease outbreaks. The fertiliser that is produced by the plant is carbon rich and contains plant available nutrient that can be applied by conventional seed drills thus allowing the application amounts to be closely controlled.

The potential to locate 5GAD plants is much greater as they can take a wide range of wet wastes such as sewerage solids, food waste, dead animals, offal, animal manures and greenwaste. Our research over the last five years has indicated the potential for a minimum of 30 plants on the east coast with further expansion limited only by the need to get a reasonable electricity price and a gate fee.

In a social context, 5GAD plants deliver significant social benefits. These benefits include but are not limited to:

6.8.3.1 Increased employment especially in rural areas.

6.8.3.2 Breaking of pathogen, antibiotic, hormonal and chemical residue pollution chains in both the food sector and the water sector.

6.8.3.3 Creating the opportunity for rural areas to demonstrate a fully sustainable production system.

6.8.3.4 Removing nutrient pollution sources from Riparian zones thus improving water quality for all downstream users in a catchment or catchment system.

6.8.3.5 By removing nutrient, pathogen, antibiotic and chemical residues from the Riparian system benthic and vernal ecosystems can be rehabilitated without the distortions caused by these human and animal byproducts. This capability delivers significant long term benefits for all residents and users of catchments that are hosting 5GAD plants.

6.8.3.6 Significant reductions in the emissions of the Greenhouse gases Methane and Nitrous Oxide.

6.8.3.7 Significant local reductions in pests associated with the break down of organic matter in an uncontrolled manner.

Section 6 Question 9.

"What is hindering the greater use of recovering energy from waste in Australia?"

The issues facing the development of thermal energy recovery plants are very different to those that are faced by anaerobic digestion plant developers. In the main the four common core issues are:

(1) Regulatory,

(2) Control of fuel supplies,

(3) The ability to obtain a Power Purchase Agreement (PPA) that reflects the true cost of alternative suppliers hidden externalities,

(4) Financial Risks.

In order that the Commission can better understand the differences in the two energy recovery process I have developed the following non-exhaustive comparison:

ISSUE	THERMAL CONVERSION	ANAEROBIC DIGESTION
Regulatory	Difficult to permit unless proponent has tight control of input stream composition	Easy to permit - basically a large factory and can be permitted in industrial zones
Control of Fuel	Gate fees dependent on landfill or alternate disposal costs which may not have fully visible externalities	Gate fees dependent on landfill or alternate disposal costs which may not have fully visible externalities. As power prices increase and fertiliser prices increase the required gate fees become lower
PPA Externalities	Difficult to get a PPA that recognises major generators externalities such as subsidised fuel, loss of water, asset replacement accruals, transmission losses, emission impacts and site cleanup issues.	Difficult to get a PPA that recognises major generators externalities such as subsidised fuel, loss of water, asset replacement accruals, transmission losses, emission impacts and site cleanup issues.
Financial Risks	Income from gate fees (if available), emission credits and power sales	Income from gate fees, power sales, emission credit sales, water sales and fertiliser sales
Replicability	Low. Most suitable resources already committed. May be some opportunity for plants co-located with large 5GAD plants to take to large diameter and dry organics	Extensive. Flexibility of technology allows plants from small farm scale to 500000+ tonnes per year. Equally capable in both the city and the country
Sustainability	Emission Control Issues. Difficulties changing fuel resource Ash disposal may be difficult if suitably permitted landfill space not available	Long term fully sustainable with no hidden externalities. Significant social benefits from recycling nutrients and removing disease and pathogen risks Some flexibility on input streams
Output	Only Electricity	Electricity Methane Gas for Fuel (or a mix) Water CO_2 for intensive agriculture Granulated/pelletised organic fertiliser

Section 6 Question 10.

"Are there particular products or locations for which recovering energy from waste would be the most efficient approach to waste management."

In the major cities, it is apparent that 5GAD plants are the rapidly emerging best practice option for wet organic wastes such as food wastes, food manufacturing wastes, animal mortality, animal manures and green wastes. By processing these wastes through 5GAD plants all the legacy issues with organics in landfill are negated and the risks from disease and pathogen from the inappropriate disposal of these wastes are also negated.

In regional areas, 5GAD plants can be located directly adjacent to large power users who in some circumstances may be large scale organic waste producers (abattoirs, dairy processors, food processors) and provide grid electricity support, avoiding the need for expensive transmission infrastructure upgrades and associated line losses.

If the major Government owned sewerage treatment plants were moved over to 5GAD type systems then not only would energy recovery be significantly improved but the resultant bio-solids may well have a better range of usage thus avoiding the current issues that arise from the long term disposal / storage of these bio-solids.
In rural areas, 4GAD plants could operate at a farm scale and provide energy for power which could then be used as a substitute for electricity or diesel currently used for pumping. Surplus gas can be used to power trucks and utility vehicles.

At a rural regional level 5GAD plants could be used to process wet organic wastes and produce high quality organic fertiliser to replace mechanically manufactured fertiliser trucked in from coastal manufacturing plants. Operating these plants in rural areas gives important back up to the power networks, and in times of crisis could provide sufficient electricity to operate essential services.

Section 6 Questions 11 - 41.

These questions generally fall outside our general day-to-day expertise and would be best answered by Regional Waste Management groups or Municipalities.

I hope that this short report is of assistance to the committee.

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SUMMARY OF ATTACHMENTS

1. Dandenong Plant Picture.
2. Article on plant pathogens, New Scientist 7/1/2006.
3. Flow chart of Legislative, Policy and Strategies for Cardinia Shire.
4. Flow Chart of Energy Recovery from waste.
5. Social and Economic Flow Chart for Existing Waste Management Systems.
6. Social and Economic Flow Chart for an Anaerobic Digestion Project.
7. Greenhouse Gas, Leachate and Air Emission Model for the Existing Waste Management Systems.
8. Top Level Greenhouse Gas Emissions - Australian Agricultural Sector (Anthropogenic).
9. Article on Nitrogen Deposition, New Scientist 21/1/2006.