27 February 2006

The Commissioner
Waste Generation & Resource Efficiency Inquiry
Productivity Commission
LB2 Collins Street East
MELBOURNE VIC 8003

Dear Commissioner,

Inquiry into Waste Generation and Resource Efficiency

The Chamber of Commerce and Industry WA (CCIWA) appreciates the opportunity to make a submission to the Waste Generation and Resource Efficiency inquiry.

Waste generation and resource efficiency are key issues for Western Australian industry to which industry takes a very proactive approach. There are a range of projects and research that have been recently implemented and / or are currently underway in Western Australia to address waste and resource efficiency. Almost all of these projects, discussed below have been "kick started" or facilitated through partnerships with or support by State and / or Federal agencies.

The key project that facilitated much of the more recent work in the Kwinana Industrial Area was the *Kwinana Industrial Area Economic Impact Study* in April 2002. This project was supported by the Kwinana Industries Council, CCIWA, Western Australian Planning Commission, Landcorp, Department of Mineral and Petroleum Resources and Environment Australia and is discussed further below. It has formed the basis for a range of additional projects and collaboration between companies, other organizations and the contributions of government agencies were key in the success of this project.

CCI has also been involved with several projects targeting waste generation in small to medium enterprises. This is a particularly difficult sector to reach and requires carefully thought out programs which in general, are intensive in terms of human resources. Small to medium enterprises are often challenged on a range of fronts including financial, time, knowledge and skills. In order to influence this sector not only are appropriate information and practical resources required but also skilled people to work closely with SME's to assist them to understand and implement waste management, cleaner production and environmental programs. This is a key area for collaboration with and support by government.

Summaries and key contacts for several of the projects and research that have occurred or are currently underway are provided below to inform the Commission of the breadth and importance of this work and how it can be facilitated by government.

CASE STUDIES

Kwinana Industrial Area Economic Impact Study – April 2002

The Kwinana Industrial Area (KIA), 35 km south of Perth is WA's premier industrial area and one of the best examples of industrial symbiosis or "industrial synergy" globally. Established in the 1950's Kwinana now boasts some 40 heavy process, utility and service industries. These include a range of refineries, smelters and chemical producers, power stations cogeneration plants, port facilities and a waste treatment plant.

The Kwinana Industrial Area Economic Impact Study (April 2002) was supported by the Kwinana Industries Council, Chamber of Commerce and Industry WA, Western Australian Planning Commission, Landcorp, Department of Mineral and Petroleum Resources and Environment Australia. It examined financial, social, material and energy data to provide a realistic and conservative view of Kwinana Industries. It found that the Kwinana Industrial Area:

- Is a major source of revenue for the State and Australian economies,
- Is the State's largest industrial area,
- Had an annual output worth $8.7B,
- Employed 3,636 people directly,
- Represents a unique blend of connecting heavy, support and infrastructure industries. The study identified 106 customer/supplier relationships between pairs of industries and a further 104 possible interactions.

The study showed that the environmental performance, and in particular cleaner production, waste minimization, energy efficiency and water conservation efforts of companies operating in the KIA have substantially reduced waste generation and increased resource efficiency.

A copy of the full report of the 2002 study is enclosed with this submission.

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Kwinana Industrial Area – Current Waste Management and Resource Efficiency Activities

The Kwinana Industries Council is comprised of members from 14 major industries in the KIA and associate members from 25 other medium sized industries and service providers.

The KIC has established an Eco – Efficiency committee to identify and investigate opportunities for KIA industries where, environmental, public health or financial benefits can be realized through:

- Improved materials and energy efficiency
- Reduced waste and emissions through recycling, adoption of new technologies and practices and identification of synergies
- Enhanced value creation
- Promotion of sustainable development principles, leading to improved sustainability.

There are 47 industrial synergies now in place – 32 byproduct synergies, involving the reuse of solids, liquids or gasses, and 15 involving the shared use of utility infrastructure.

Some synergies include:

- BOC Gases receives excess refinery gas from the adjacent BP oil refinery, to separate, clean and pressurize hydrogen for the hydrogen bus trial in Perth.
- Air Liquide purifies and compresses carbon dioxide from CSBP and other industries for use in soft drinks, beer, dry ice and water treatment. This synergy reduces emissions of carbon dioxide and energy consumption.
- The Kwinana Water Reclamation Plant takes secondary treated effluent from a nearby wastewater treatment facility to produce water that is used by five industries and which replaces up to 3% of scheme water taken from the Perth metropolitan area. (See further description below)

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This research is currently being undertaken through the Centre for Sustainable Resource Processing (CSRP) CRC by the Centre of Excellence in Cleaner Production (Curtin University) in close collaboration with the Kwinana Industries Council.

The summary below is extracted from the August 2005 Status Report, prepared by Dick van Beers, Albena Bossilkov and Rene van Berkel.

> The overall objective of the project is to provide hands-on support to the companies in the Kwinana Industrial Area (KIA) to develop, evaluate and implement regional resource synergy opportunities. Such opportunities could comprise the recovery and reuse of one company's by-product (solid, liquid, or gaseous) as alternative input material, or the shared use of utility infrastructure (water, energy, etc). Regional resource synergies are pursued with the objective of reducing the net environmental impact of the Kwinana Industrial Area, while enhancing business performance and meeting community expectations.
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> Thirty members of the KIC and six other companies currently participate in the Kwinana Synergies Project. The project so far involved collection of the baseline company data, documentation of existing synergies and identification and screening of further synergy opportunities. Although collection of the baseline input and output data is ongoing, there is now general agreement that the principal flows have been well captured, after thirty one companies provided their baseline data with regard to their consumption of materials, energy and water and generation of by-products, wastes and emissions (to water, air and land).
>
> The evolution and maturity of industry collaboration in Kwinana provide testimony for the contribution regional synergies (industrial symbiosis) can make to sustainable development at the regional scale. The total number of regional synergies (or industrial symbiosis) projects already in place in Kwinana is forty seven. Thirty two of these are by-product synergies and fifteen involve the shared use of utility infrastructure. More synergies might already exist, but these have not yet been documented as such. The Kwinana Industries Council and its principal core members have made it a strategic priority to move towards the next level of resource synergies in Kwinana. This is strongly supported by the consolidated research program on the application of industrial symbiosis in heavy industrial areas, of which this research project is part.
>
> The identification, evaluation, and implementation of synergy opportunities therefore focus on five main steps: planning and organisation; preliminary assessment; assessment; feasibility studies; and implementation and continuation. The project approach was compiled by merging common elements of synergy project development into the overall framework generally used for the implementation of cleaner production in companies.

Over eighty new potential synergy opportunities have so far been identified through four mechanisms:

- the database of company input and outputs;
- review of earlier reports on synergy opportunities in Kwinana (in particular the 2001 Economic Impact Study (April 2002);
- one-on-one discussions with company representatives;
- focused opportunity identification workshops in energy, water, and inorganic by-products.

Preliminary feasibility studies are now underway for water efficiency (two distinct opportunities); non-process organic waste (one distinct opportunity); process waste heat (one broad area); and process inorganic by- products (one broad area and two smaller distinct opportunities). Additional opportunities will be reviewed on their likely feasibility upon completion of these pre-feasibility studies.

In summary, the overarching conclusions from the project so far are as follows:

1. There is widespread enthusiasm and commitment from the industries operating in the Kwinana Industrial Area to achieve greater regional synergies and thereby make a contribution to sustainable development in the area. This is most profound among the members of the Kwinana Industries Council, but extends to several other companies that have significant operations in the area. This commitment is reflected in the willingness to participate in the project, the disclosure of baseline input and output data for operations and participation in synergy development workshops.

2. The research confirmed the tight collaboration and integration already existing in the Kwinana Industrial Area, which has historically evolved in response to perceived business opportunities and environmental and resource efficiency considerations. The number of existing regional synergy projects in Kwinana in place go well and truly beyond business as usual as they involve either exchange of by-products or shared use of water and/or energy infrastructure and utilities. These current synergy projects are more diverse and more significant than those reported for other heavy industrial areas. This in turn positions Kwinana well among the leading edge examples of regional synergy development in heavy industrial areas (Bossilkov *et al. 2005).*

Many and diverse regional synergy opportunities appear still to exist, as evidenced by this project being able to identify well over eighty new potential synergies, mostly in three broad areas: water efficiency and exchanges; energy efficiency and exchanges and industrial inorganic by-product reuse. The current development efforts focus on six priorities, with regard to water efficiency; non-process organic waste; process waste heat; and process inorganic by-products

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Kwinana Industrial Inorganic By-Product Reuse

Large volumes of inorganic by-products are produced within the Kwinana Industrial Area and are currently being disposed as wastes in designated storage facilities. This applies to bauxite residue, fly-ash, cement and lime kiln dusts, gypsum, iron making slags and other processing residues. Their utilisation as valuable by-products will significantly reduce liabilities associated with current management and storage practices and supports the goals of the Eco Efficiency Group and the KIC.

Although recovery opportunities have to some extent been evaluated for each of the main inorganic by-product streams, their realisation has not yet materialised on any significant scale, due to poor business cases primarily as a result of limited understanding of the materials opportunities and value propositions. Additionally community and government support for their widespread implementation is not yet forthcoming.

A workshop to identify potential re-use opportunities also identified the need for a parallel effort in terms of advocacy aimed at ensuring acceptance of industrial by-products. The KIC has agreed on a proposal for such advocacy, with a recommendation being that KIC engage the Department of Industry and Resources, with the view of having the department take on an overall sponsorship and governance role through their resource planning role within WA.

The implementation of a project, at present, would most likely progress through Part IV assessment (Department of Environment). No guidance note exists for reuse of inorganic by-products however NSW have recently developed Residue Waste Regulations which prohibits the application to land of certain industrial by product wastes. This is also being reviewed at a national level.

Development of further initiatives from the research through the CSRP and KIA companies may be constrained due to the lack of awareness and support from government and the community and the lack of an implementation framework.

The project aims to

- Develop a guidance note/policy direction to provide support for the reuse of industrial inorganic by-products to promote utilisation of the large volume generated in Kwinana that are currently disposed and/or stored in dedicated facilities. These include in particular bauxite residue (Alcoa), iron making slag (HIsmelt), lime and cement kiln dusts (Cockburn Cement), fly-ash (Western Power) and gypsum (CSBP).
- Continue to develop research through
    - materials opportunity assessments for key large volume inorganic by-product streams in Kwinana: the by-product streams will be characterised (volume, properties, composition), using already existing data, and opportunities for improvement of properties through separation of fractions and/or combinations with other materials will be assessed.
    - value proposition analysis for principal applications of recovered inorganic by-products (either directly or after beneficiation) in construction and engineering applications, for sustainable agriculture, for minerals and metals production or in other applications (e.g. speciality chemicals). The potential markets for recovered materials in various applications will therefore be reviewed (volumes, quality requirements, costs of competing materials, etc).
- Propose tentatively 2 to 5 icon recovery opportunities for (combinations of) inorganic by-products (with or without beneficiation) that have strong business and sustainability cases. The selection will be informed by the results of the preceding value proposition and materials opportunity assessments.
- Develop undertake the necessary research and demonstration plans to take these icon recovery opportunities to market.

This builds upon the research work already undertaken on recovery and reuse opportunities for individual by-product streams through the Regional Synergies Project.

Adapted from a KIC briefing paper Contact Laurinda Shaw, Chairperson KIC Eco-Efficiency Committee on (08) 94118821 or laurinda.shaw@cspb.com.au

Kwinana Water Reclamation Plant

The Water Corporation's Kwinana Water Reclamation Plant (KWRP) is Australia's largest municipal wastewater reuse plant. The plant came about as a direct result of a confluence of opportunities to supply recycled water to industry, to contribute to the security of water supplies by increasing diversity of water sources, combined with the desire of BP Kwinana Refinery and CSBP to cease the discharge of treated industrial wastewater into Cockburn Sound. The $28-million plant expands Perth's water use options and helps achieve the aims of the Western Australian Government's State Water Strategy.

The project, located on leased land at BP's Kwinana refinery site, involved the construction of a highly sophisticated filtration and reverse osmosis plant capable of processing six gigalitres (million kilolitres) of wastewater a year to a quality suitable for use by major Kwinana industrial customers, which include BP, Hismelt, Tiwest, CSBP and Edison Mission Energy.

The first component of the project involved the reclamation plant treating about 24 million litres a day of secondary treated wastewater from the Woodman Point wastewater treatment plant. About 17 million litres a day of high quality industry grade water can be produced, to be supplied to industry in place of scheme water. The reclamation plant's treated water is used by industry for a number of processes, ranging from steam production to use in cooling towers. About 7 million litres a day of salty concentrate is also produced.

The second part of the project involves the receipt of treated wastewater from the industry for offshore disposal through the Sepia Depression Ocean Outlet. A pipeline takes about six million litres a day (the equivalent capacity of about two Olympic swimming pools) of treated industrial wastewater and all the salty concentrate into the Sepia Depression Ocean Outlet for discharge about four kilometres offshore.

The treated industrial wastewater was currently discharged into Cockburn Sound by industry under licences granted by the Department of Environment. The overall discharge through the Sepia Depression Ocean Outlet will decrease by about 11 million litres a day (about nine per cent). Detailed studies over the past 20 years and ongoing research indicates that the Sepia Depression has a greater capacity than Cockburn Sound to receive wastewater materials without harming the environment.

Adapted from the Water Coporation Web site. Contact Steve MacKenzie on 9420 3057 or steven.mackenzie@watercorporation.com.au

Water Conservation Western Australia – Industry Case Studies

The water conservation case studies (attached) were prepared to showcase the commitment of broader industry to waster conservation measures through selected case studies. The conservation measures were self driven by the individual organisations in order to improve site management practices, reduce reliance on existing water resources and reduce operating costs.

Water conservation measures often result from cleaner production and eco-efficiency programs. While cleaner production programs often target water conservation directly, there are generally a range of other benefits such as reduced energy use, reduction in chemical consumption, reduced discharges and reduced waste generation.

The Oil Mallee Project

The Oil Mallee Project, involving CALM, the Oil Mallee Company, Enecon and Western Power Corporation, is an industrial ecology project that is aimed at avoiding waste. It is a developing example of industrial and agricultural symbiosis in the low rainfall, salinity-affected regions of Western Australia's wheatbelt.

The project aims to remedy waterlogging and salinity through the planting of mallee trees and subsequent 'integrated processing' of the trees to produce activated carbon from the wood (using CSIRO technology), eucalyptus oil from the leaves, and electricity via combustion or gasification of the biomass.

A $6 million integrated wood processing demonstration plant that will process 20 000 tonnes of mallee a year is now nearing completion at Narrogin, 200 km south east of Perth. Designed and constructed by Western Power and Enercon, the plant will use 2 million coppiced mallee trees from nearby farms to produce eucalyptus oil and activated carbon (for use in water treatment, gold recovery and the food and beverage industry). Heat from both these processes will be used to generate electricity.

If the demonstration plant succeeds, full-scale plants processing 20 million trees could be built. Western Power believes there is potential for at least 9 processing plants in Western Australia, with more possible in other states and overseas. The oil mallee industry in Western Australia could subsequently expand to 500 million trees over the next 25 years. This would produce 3.5 million tonnes of biomass, sufficient for 140 000 tonnes of activated carbon, 35 000 tonnes of eucalyptus oil and 75 MW electricity with the concomitant environmental improvements of lowered water tables, reducing salinity and reclaimed "wasted" agricultural land. There is also potential to use mallee wood as feedstock for panel board products such as medium density fibre board. Importantly, the technology could be applied to other native plants, in other regions.

However, the project has not been without its problems; problems such as poor investment in research and development, which will continue to affect future industrial ecology ventures.

Contact Tym Duncanson, Oil Mallee Company, (08)9319 8100, tym@oilmallee.com

CCI Eco Efficiency Agreement with Environment Australia

The State Chambers of Commerce and Industry entered into three year eco-efficiency agreements with Environment Australia in 2000. These agreements aimed to increase awareness of eco-efficiency across industry and developed projects that targeted particular sectors. In WA the food and metals sectors were targeted.

The project also developed an online Business and Environment Handbook as a resource for industry. It is located on the Curtin University Centre for Excellence in Cleaner Production Website and is updated from time to time by CCI.

This project highlighted the difficulty in connecting effectively with small to medium enterprises.

The Agreement final report is attached to show the breadth of the project.

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Swan Catchment Council Regional Delivery Program: Sustainable Production

The Swan Catchment Council Sustainable Production Program is focusing on developing a common approach to change systems and behaviours in productive activities. The Program aims to address issues of change in broad acre and intensive agriculture, forestry, aquaculture, industry and commerce leading to improved natural resource outcomes.

The program has a number of projects supporting the overall aims of the Program, several of which target waste identification and reduction and resource efficiency in intensive agriculture and small to medium enterprise in the Swan Catchment Council including:

- Data collection and analysis at targeted industrial precincts, providing a basis to develop policy and programs to deal with SME emissions.
- Linking best management practices with property planning in intensive agriculture. This project aims to value add to a current industry funded project that aims to promote greater water use efficiency in the vegetable industry through best management irrigation.
- The Bellevue Sustainable Industry Project in partnership with the City of Swan, Waste Management Board and industry, this project aims to quantify and qualify how much solid waste is produced with in the Bellevue Industrial Precinct and its disposal. The project will also research other pollutant issues such as disposal/storage of liquid waste and impact on Helena River.

CCI is represented on the Sustainable Production Program Reference Group to assist the program with CCI members in the Swan Catchment Area.

Contact: Tony Soteriou, Program Manager, Sustainable Production, Swan Catchment Council, Phone: (08) 9374 3314, Mobile: 0402 816 813, Email: tony.soteriou@environment.wa.gov.au

In Closing

The case studies provided show the wide variety work being undertaken in WA by industry on waste management and resource efficiency issues. It is a prominent and increasing aspect of business across the various industry sectors. However, in almost all cases the work has been facilitated and leveraged by support from government.

The impressive activity in the Kwinana Industrial Area was assisted initially by contributions from Environment Australia and State Government agencies. While that role of facilitation

and leverage continues through the Centre for Sustainable Resource Processing CRC, industry continues to work together to seek new opportunities as was demonstrated by the Inorganic Byproduct Use project development.

The Kwinana Water Reclamation Plant and Oil Mallee projects are aimed solving specific environmental problems, however this has triggered significant improved resource efficiency and waste management in other areas.

There are particular issues facing small to medium enterprises both in terms of waste management and resource efficiency. The ways in which government may be able to effectively support and leverage improvements in this sector needs further consideration and development.

CCI is pleased to be able to contribute to the Inquiry. Should you have any queries about any of these projects or research, please don't hesitate to contact me or the contacts provided. I can be contacted on (08) 9365 7514 or mary.askey@cciwa.com

Yours sincerely

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