Recent Initiatives and Innovations to Promote and Foster Cleaner Production: An Australian Perspective

Robert J. Pagan
Environmental Management Centre
The University of Queensland
Queensland, 4072
AUSTRALIA
E-mail: r.pagan@uq.edu.au

ABSTRACT

This paper examines and comments on some aspects of how Cleaner Production is promoted and pursued at different levels in Australia and examines some innovative approaches to the uptake of Cleaner Production. The different jurisdictions in Australia all have their own abilities to legislate for and regulate different aspects of environmental protection. Cleaner Production is an activity and a strategy that should be carried out cooperatively in a developed country like Australia. This paper shows how the provision of information and results from the different types of activities that have been pursued in different localities with different needs can help the general uptake of the concept.

1. INTRODUCTION

Promoting and fostering Cleaner Production (CP) in Australia is not a straightforward matter. Australia is a federation consisting of six states and two territories with environmental management mostly delegated to state interests. Generally, the federal government can only interfere in certain matters of national significance. Recently, states and territories have reached agreements with the federal government to try to unify environmental governance in the country and improve environmental outcomes. Every state has its own laws, regulations and policies as well as having to comply with any overriding federal laws and there are also a multiplicity of local councils that have very specific responsibilities thrust upon them. It may be said that Environment Australia is the peak body for environmental issues, concerned with national interests, trade and treaties and has an interactive role with the states to further environmental protection. The states in turn devolve some of their powers to local government, concerning themselves with policy, strategy, heritage and impacts. Local government has responsibility for local planning issues and nuisance areas such as noise as well as the specific devolved areas of environmental protection. Strategies to invoke and promote Cleaner Production are carried out within this complex system.

This paper documents what some of the different groups in Australia are doing in terms of innovative approaches and how they are doing it and how the Australian Strategy for Cleaner Production was developed, as well as describing some case studies.

2. THE NATIONAL CONTEXT

Environment Australia (EA) contains a number of different groups within its role as peak environmental body. The Sustainable Industries Division manages Commonwealth environment protection functions and works with all levels of government, business and the community to protect Australia's environment "from the adverse impact of human activity and the effects of pollution" [1].

This division works with its partners to administer a national environment protection framework and encourages Australian industries and communities to improve their environmental performance. As part of its role the sustainable industries division oversees the eco-efficiency and Cleaner Production programs and maintains databases and case studies. A whole set of publications have been produced as EA has developed its approach to CP and possibly one of the most interesting is *Towards Sustainability; Achieving Cleaner Production in Australia,* which formed the backbone of Australia's CP implementation strategy [2]. The report examines the drivers and the barriers to CP uptake and some of the background studies that were commissioned to provide a basis for the strategy are also available on the website [3]. Altogether the site can provide a lot of background information to assist others in developing a CP strategy, especially when numerous stakeholders are involved. Some interesting aspects of the strategy are:

- A substantial amount of stakeholder consultation was carried out, including commissioning background research studies, and this was from 1997-1998 when the concept of CP was relatively new to much of Australia and New Zealand;
- A Cleaner Production taskforce was set up to examine the issues;
- Four broad themes of information and awareness, tools for CP, regulatory and self-regulatory mechanisms and strengthening the market were investigated;
- Sets of objectives were developed around each theme;
- The strategy points out where CP interacts with other important strategies, such as Greenhouse Gas abatement, reduction in ozone depleting substances; and
- Some 27 measures to increase uptake were documented together with their associated objectives.

As a consequence of the strategy a roundtable of interested government parties was formed that meets regularly in various jurisdictions to discuss the various approaches to integrating and furthering the CP promotional activities and commenting on how the strategic objectives are faring.

As part of the strategy EA considers collecting and making available case studies an important part of its role and at present the EA website on Cleaner Production and Eco-efficiency contains some 155 case studies, some of which are very detailed. It is probably one of the most useful and informative sites on the topic area. EA funded a demonstration project some years ago that provided in-depth case studies of 10 companies, undertaking Cleaner Production assessments and implementation at a time when it was a new concept in Australia. These case studies are available on the website [4] (limit by "demonstration" in a search to pick up these case studies first). They were quite innovative at the time as they tried to give a useful picture of the process and included details on barriers to successful implementation as well as success factors so an informative picture of the project may be deduced by the reader. Essential process information and data is provided in detail so these studies are very useful teaching tools, whereas many case studies that have been produced are of little academic value as they tend to be too general.

3. ECO-EFFICIENCY AND CLEANER PRODUCTION

Another innovative although contentious approach is that EA has in recent years tended to promote the concept of eco-efficiency (EE) in preference to CP, as have some Australian states. One argument for this is that EE goes further than CP and tries to address business issues more clearly. EA has produced a definition to distinguish between eco-efficiency and Cleaner Production that is quite useful:

> *"Although Eco-efficiency and Cleaner Production (EECP) are closely linked concepts aimed at creating a win-win situation for both business and the environment, they do differ in the approaches they take in reaching that goal. Eco-efficiency focuses on increasing the efficiency of how environmental resources are used in the production and delivery of goods and services. It directly links environmental performance to*

financial performance and encourages a strategic focus on more efficient use of resources. Cleaner production tends to focus on business operations and places greater attention on making more efficient use of materials, energy, processes and services at the source. In doing so, the consumption of natural resources is reduced as are pollution and waste bringing both financial and environmental benefits" [5].

The EA website also discusses different tools used to bring about eco-efficiency outcomes and provides a series of links to other useful sites. Including the Australian National Pollutant Inventory (NPI) which apart from publishing emission details for different businesses also contains detailed manuals for calculating emissions. An innovative approach, that may well be of help in promoting CP approaches, is that all the NPI data is freely available on the Internet and the use of this data is being promoted to various stakeholder groups. Using the data, anyone can make maps of emissions, pinpoint sources and detail what is released and by which company around the country.

An innovative aspect of promoting Cleaner Production across different industry sectors is that EA has developed a set of partnership agreements with different industry sectors. Industry Associations agree to work within their sector promoting the aims of eco-efficiency and receive funding from EA to do this. So far some 25 agreements have been signed across a diverse range of industry sectors from metal finishing to wine making. EA funds these agreements depending on the deliverables offered, however it is not clear how much of the results generated will come into the public domain. Obviously for many commercial organisations, confidence is a prime consideration. The diversity of the types of activities undertaken under the agreements is another very interesting issue. This highlights the many aspects that may well represent a CP attitude and uptake. Cutting across different industry sectors shows that issues that are important to one sector may not achieve the same prominence in another. Such agreements may be criticised on the basis that the industry association may not have the knowledge or skill to effectively disseminate eco-efficiency - maybe even interest - to its members, however they do represent a start in putting forward a message to a large group of stakeholders that otherwise might ignore it.

As another essential part of the strategy, EA has commissioned a training package "Business Sustainability; a Cleaner Production Approach to Small Business" that is a useful tool for educational bodies interested in starting a CP course and not having the resources to develop their own curriculum. The resource again is freely available on the Internet [6]. The course is integrated, depends upon groups of students finding a company on which to practice a demonstration CP assessment and contains a number of useful resource materials tips and ideas. The difficulty is that it is often very difficult for students to approach a company in the first place and then even harder to get company agreement and help to conduct an assessment. At the University of Queensland, this resource, and others of our own, has been used to successfully run this type of activity, but generally the company, and sometimes even the individual who will help, have to be identified for the students. To overcome this barrier, we have worked with our local Environmental Protection Agency (EPA), with industry associations and other government departments to recruit companies to participate.

EA has also undertaken a large amount of work in the mining sector. A series of booklets with the title *Best Environmental Practice in Mining* and a video have been produced to promote the concept of better mining management [7]. Again the concept is interesting and innovative in that a whole series of related booklets of from 40 to 80 pages has been produced within the theme. They are available for download from the internet and they are designed to identify and provide for each issue:

- Basic principles, guidance and advice;
- Case studies from leading Australian companies; and
- Useful references and checklists.

Another very useful addition to the site is the provision of training slides for some of the topics. The Cleaner Production booklet also contains some interesting case studies of CP activities in mining. In fact a significant amount of work is progressing in the mineral sector in Australia that will be discussed later.

Another interesting facet of EA's involvement is the decision to use the Internet to deliver information freely and to promote a series of updatable databases to manage the data. Environet is the result, a set of freely available databases on topics such as:

- Environmental technologies, service providers and equipment,
- Tertiary courses in environmental education,
- Industry use of environmental technologies, and
- Eco-efficiency and Cleaner Production.

One important aspect of such online data is that these databases can serve to publicize the business providing such services, as well as informing the general public and others and the information is current and readily accessible. The decision to use the Internet as a primary delivery vehicle was made some time ago, before in fact there was the general acceptance of the internet as an essential communication tool.

4. STATE ACTIVITIES

After the federal approach, states have the responsibility to take on board the CP message and promote it to their constituencies. There is a big difference between the states and territories in their approach to CP and how much emphasis is placed on it. Major highlights of CP activities in some of the states are summarized in this section.

4.1 Victoria

Victoria was an early adopter of the concept, taking the CP message seriously and attempting a number of ideas to persuade companies to take the implementation path. There is some interesting innovative data available on the EPA Victoria website (http://www.epa.vic.gov.au/); for example a winemaker's environmental management tool, details of a dairy project, several case studies and a project to reduce or remove the top 30 hazardous chemicals and a supply chain project aiming to implement waste management plans. One interesting and innovative project to promote CP to a specific sector was the Green Profits program [8]. This was a 17-company environmental best practice program across the food and beverage industry in Victoria. Some 36 benchmarking measures were recorded and each company was able to compare its performance against its peers. Some outcomes were:

- Comparing environmental performance with the group,
- Identifying areas of performance which offered best opportunities for improvement,
- Identifying practices for improvement,
- Encourage employee support, and
- Provide a platform for introduction of an improvement program.

The rewards were outstanding showing greater manufacturing and environmental efficiencies. For example, one company saved AU$ 4.25 million from improvements, another reduced solid waste by 3290 tons per year, another cut effluent by 84 000 KL per year and another reduced carbon dioxide emissions by 5900 tons per year. The resultant publication has 19 case studies detailing energy savings, water minimization, resource savings and better management. This kind of program highlights clearly the benefits to be gained and the synergies realised when larger sectoral programs are instituted.

4.2 New South Wales

New South Wales (NSW) has also carried out some substantial CP activities in the past and continues to develop opportunities with industry. Although not part of a CP delivery strategy, the state

has instituted a "load based licensing" scheme which arguably is an efficient system for reducing pollutant loads by internalizing externalities, one of the major principles of sustainability. Such an innovative policy should be a good driver for CP adoption as companies are forced to pay the true cost of their emissions.

The NSW EPA has a Cleaner Industries Unit to work with small businesses (SMEs) on a range of CP issues and McCauley [9] comments that only a small number of businesses are adopting change across the whole spectrum of CP, but many businesses will buy in to projects with short paybacks of less than 2 years. An interesting innovation is providing matching funds to businesses to adopt CP through a partnership program that targets individual businesses, associations and clusters. The clusters results are particularly interesting. A cluster of metal finishing companies realized AU$ 1.28 million in annual savings from product redesign, use of utilities - air and energy, water savings, recovery of swarf, etc. Another cluster of diverse businesses managed to accumulate annual savings of AU$ 170,000 from savings in energy, raw materials reuse and improved solid waste management. Again this shows the value from bringing multiple firms into the project and obtaining synergies.

4.3 South Australia

South Australia has also undertaken many CP initiatives being one of the first states to introduce revolving loans to encourage businesses to invest in CP opportunities. Today a number of initiatives are involved, however much of the funding for the business improvement program has dried up. An interesting demonstration project in supply chain management is underway with a mentor company providing support and encouragement to ten of its small suppliers [10]. The EPA and Yalumba highlight supply chain management through the greener Business Alliance Project describes how a wine company accepted a mentoring role for its suppliers. Wilczek [10] points out that there are about 2000 businesses that are licensed to the EPA but more than 65,000 other businesses that are not licensed and they represent an unknown environmental impact and a great challenge to the EPA. This project points the way to using a large organization and then the resultant networks to influence the supply chain for environmental improvement. The core of the plan is that each supplier will enter an eco-efficiency agreement with the EPA and the mentor to achieve certain targeted environmental improvements. At the moment, the project was not finalized, but many direct and indirect benefits had already been noted.

4.4 Western Australia

Western Australia made a late start in CP, but now has a substantial number of activities, mostly undertaken by the Centre for Excellence in Cleaner Production at Curtin University, a center which is partially funded by a state-wide levy on waste and other sponsors. The center conducts training in CP for SMEs on a regular basis, as well as being involved in diverse activities such as CP audits, producing case studies and carrying out consultancies. An innovative action of the center was to form and host the Western Australian Sustainable Industry Group (WA SIG) in collaboration with the World Business Council for Sustainable Development.

The aim of the group is to: "Encourage participants to identify and pursue their own opportunities for implementing Cleaner Production and Eco-Efficiency, in particular through promotion and administration of the WA Cleaner Production Statement." The WA SIG looks to supporting members by:

- Encouraging participants to identify and pursue their own opportunities for implementing Cleaner Production and Eco-Efficiency, in particular through promotion and administration of the WA Cleaner Production Statement;
- Fostering dialogue on how local, national and international experience can best be utilized for the development and implementation of environment and sustainable development related policies and strategies, in particular those affecting businesses; and

- Partnership with other organizations in the public and non-government sectors to raise general awareness and understanding of sustainable development issues and the opportunities it presents to Western Australia.

The WA SIG has also assumed an innovative approach by promoting a WA Cleaner Production Statement in a similar manner to the United Nations Environment Programme (UNEP) CP declaration. The WA SIG felt that because Cleaner Production and Eco-Efficiency are in first instance business opportunities, they cannot be regulated by government, and should be promoted through industry, government and professional channels, therefore a voluntary approach would be required. The statement was developed through internal and external consultation and presents a vision of a "clean and competitive Western Australia, achieved through collaboration between industry, state and local government, professional and community organisations, and the education sector".

The WA Cleaner Production Statement with explanatory notes and implementation guidelines can be viewed at *http://cleanerproduction.curtin.edu.au/sig/sig_pub/cp_statement.pdf.* The website also provides a discussion of some issues that may represent barriers to the uptake of this interesting initiative.

The Centre of Excellence provides Cleaner Production courses and training materials through Curtin University of Technology. The center also produces case studies as a training and demonstration tool and has produced a number of excellent case studies for different sectors such as the process industries and the minerals sector, highlighting areas of significant savings and environmental improvement. The formation and funding by an innovative measure of this center in the state shows that a government committed to a policy of encouraging CP can achieve goals far beyond a modest budget.

4.5 Queensland

Queensland has a different approach by developing a Sustainable Industries Division within the EPA that works to promote eco-efficiency and water and energy conservation and management. From an initial start of a couple of people, five years ago, the division now employs over 90 people working in many different areas of sustainability, including administering renewable energy schemes and promoting the possibilities for water minimization and recycling within the state. The division supports sustainability initiatives such as CP assessments and eco-efficiency agreements and includes introduction of tools like Life Cycle Assessment under its agenda.

An innovative program was a sustainable communities program that sought to engage local communities (that can be quite remote in Australia) in developing and adopting sustainable practices. See for example *http://www.sustainablegladstone.com* for a report of a project undertaken with a community that sought to identify sustainability indicators for the region.

Also based in Queensland, the United Nations Environment Programme (UNEP) Working Group for Cleaner Production in the Food Sector was formed some six years ago to promote and implement the concepts of CP. The UNEP group is based at The University of Queensland and works with many industry sectors besides food including metals, metal finishing, foundries, agriculture, aquaculture to deliver the benefits of Cleaner Production, often in association with industry group partners such as the Australian Industry Group. The group supports the student activities of The University of Queensland which offers environmental management degrees at undergraduate level with a CP component as well as higher degrees specializing in CP and industrial and overseas training courses.

The Food Industry Project

An innovative and groundbreaking eco-efficiency for the food sector project is just being initiated in Queensland. The features of the project are the immersion of a consultant (the UNEP food working

group) in a year-long project to take the concept of eco-efficiency through to some form of implementation coupled with the involvement of an active steering group to select participants and guide the work.

The project is funded by a selection of stakeholders that are important for the food sector:

- An industry association - The Australian Industry Group;
- The Department of State Development;
- The EPA;
- The Department of Agriculture Fisheries and Forestry, Australia;
- The Australian Water Association; and
- The Brisbane City Council.

These groups are all represented on the steering committee as well as five industry "champions" who have undertaken CP activities or are in process, other food interests and the chamber of commerce, as well as the UNEP group, who are running the project.

So far three major in-depth studies have been carried out and a further five are in progress (see case studies at *http://www.geosp.uq.edu.au/emc/cp/res/xcase_studies.htm*). These will form the basis of case studies to be used in the report. To add to this, a further 8 to 12 companies will be visited and CP discussions held as well as plant walkthroughs. The aim of this exercise is to obtain information about the extent of CP uptake and see if there are useful stories that can be integrated into a report. A final aim of the project is to produce a manual containing full case studies, as well as mini-studies and anecdotes, and benchmarks for different sectors, a how-to-do-it guide and some training materials. This manual will be used in workshops to introduce the concept to various operational personnel and will be improved and finalized as a result of the workshop process. Eventually the aim is to disseminate the CP manual and accompanying materials to the food sector firstly in the state and then nationwide [11].

Cleaner Production in the Minerals Sector

The University of Queensland has recently opened the Sustainable Minerals Institute (SMI) that is aimed at bringing the principles of sustainability into the mainstream minerals arena. The SMI has a number of sub-centers that it works with or supports including the Centre for Social Responsibility in Mining, the Centre for Mined Land Rehabilitation and the Centre for Health and Safety in Mining, as well as the UNEP group. This new initiative has already brought accomlishments with various projects under way including the Sustainable Opportunities and Threats Analysis (SOTA) project for the minerals sector that brings the power of risk assessment into the arena of CP and takes it beyond into social assessment areas.

The SOTA project is quite innovative in its treatment of the sustainability concept. The idea is that businesses should not see environment (and the other pillars of sustainable development - economics and social issues- maybe even governance) as a threat but should look to realizing the opportunities that may be involved in a more sustainable approach. The project starts in the same manner as other CP activities by obtaining sign off from someone with responsibility in the company. After this, issues are prioritized to provide the maximum benefit to the company - basically it is ensured that this is a company owned activity. Too many CP projects are consultant launched, driven and owned and in the end result in few benefits to the companies. In order to maximize the power of a workshop approach, a preliminary checklist generation is undertaken by site visits and working through the issues with a team member from the company. The company identifies team members, depending on specific issues and they may be technical, commercial, environmental, management, or concerned with social issues. A workshop is then arranged with a team from the company helping to analyse the sustainability threats and opportunities and a facilitator whose job is simply to keep discussion around the issues that have been identified and possibly provide incentive and advice if things start to flounder. The checklists contain a series of prompts to encourage the participants to think sustainability principles and relate them to the issues of concern on the site.

After noting all the sustainability threats and opportunities, the team members then go through a process of quantifying them by giving them a score for the degree of the hazard (opportunity) and the frequency of the occurrence. This generates a quantified list of opportunities and threats that might represent worthwhile CP activities. As can be imagined the process is time and "person" consuming however the real benefit may be from participating in the process as it can get many stakeholders actively involved, seeding the way for implementation. Thus the activity stands out from more usual CP projects where too often implementation becomes a "forlorn wish" as there has been no buy-in of important stakeholders.

Another innovative project in the sector is that the UNEP center and Curtin University are collaborating on a project to assess the uptake of CP in the coal industry through the Cooperative Research Centre for Coal in Sustainable Development (CCSD). The CCSD seeks to tie research in coal use into the need for a more sustainable approach from the mine through utilisation and final disposition of the by-products. This project is still in its early days and is in the process of identifying early opportunities for CP in the utilization of coal, from washing, transport, stockpiling, crushing and final burning [12]. The innovation here comes from tying two organizations together across a continent and delivering a package to:

- identify where CP benefits might come from in the coal utilization chain,
- identify the impacts of coal utilization,
- derive case studies from actively working with the players, and
- workshop the final products and identify company issues in detail.

In terms of sustainability, the minerals sector in Australia, has advanced significantly over the past two years. The report, Mining, Minerals and Sustainable Development (MMSD) brought down last year by the Australian Minerals and Energy Environment Foundation (AMEEF) envisaged a number of changes that the sector would be required to undertake to actively join in with the sustainability agenda. The result is that the minerals sector in Australia is heavily engaged in the dialogue, especially through environmental reporting, supply chain management and community involvement. Some mining organizations have even involved community NGOs to undertake audits of their operations to assess their compliance and level of environmental performance (see *http://www.ilmc.org/news_eng_pdf/newscast17.pdf)*. As mentioned previously, Environment Australia has produced a booklet on CP in mining and there are many case studies of best practice in the booklet.

5. FUTURE DIRECTIONS

It is difficult to say where CP will head in the future, except that a greater permeation of the concept throughout society is envisioned. The application of more sophisticated tools such as Life Cycle Assessment, Risk Analysis and Social Assessment, will give an added dimension to the concept, as will furthering the concepts of Industrial Ecology and Public Environmental Reporting. In certain sectors such as food, the application of CP will spread up and down the supply chain and across the life cycle of the products to include primary agricultural production and distribution. More Cleaner Production will be taught in technical colleges and universities and, possibly even in schools and again this will increase the acceptability of the concept. As wider dissemination occurs, then more local governments will accept the challenge to adopt CP strategies and some local councils have already adopted "zero waste to landfill" policies that will undoubtedly create a need for CP if taken seriously.

6. CONCLUSIONS

Cleaner Production in Australia has displayed some innovative and imaginative efforts to take the strategy into the market place and persuade companies to integrate it into their everyday activities. There are a number of other initiatives that may be said to be related to Cleaner Production in Australia such as the Greenhouse Challenge Program, the National Packaging Covenant and the National Pollutant Inventory, among others. All of these programs will reinforce each other and build on their particular strengths. There has not been space in this paper to investigate the "grass roots" level of application of CP from a local government level, but it may be said that most local governments would now have some level of appreciation of what CP might mean, and how it could be important. Many councils are actively applying the concept, however there is probably still be a large gap for most local governments in implementing CP and selling it to their constituencies.

It is gratifying that CP does appear to have a role in a developed economy such as Australia, and that it is still in its very early stages of acceptance in many areas. The plethora of case studies, manuals and best practice guides that have been produced show that there is significant demand in various industry sectors, from seafood to minerals. The level of uptake, on the other hand, seems to be variable. Funding for continued and in-depth application of programs is always an issue. Usually programs are funded for certain periods and this may not be long enough to obtain the continued support and commitment that such programs need for widespread dissemination, especially to SMEs.

7 ACKNOWLEDGEMENTS

The author would like to acknowledge the assistance of the people who were consulted in the production of the paper and kindly provided information. The author would also like to apologize for the omission of the many other fascinating and innovative approaches that have been tried and for not including data from other jurisdictions precluded by time and space.

8. REFERENCES

[1] Environment Australia. Department of Environment and Heritage, Canberra, Australia. http://www.ea.gov.au/industry/index.html

[2] Australia and New Zealand Environment and Conservation Council (ANZECC). 1998. *Towards Sustainability, Achieving Cleaner Production in Australia*. Canberra: Commonwealth of Australia.

[3] Environment Australia. Department of Environment and Heritage, Canberra, Australia. http://www.ea.gov.au/industry/eecp/publications/index.html

[4] Environment Australia. Department of Environment and Heritage, Canberra, Australia. http://www.ea.gov.au/industry/eecp/case-studies/

[5] Environment Australia. Department of Environment and Heritage, Canberra, Australia. http://www.ea.gov.au/industry/eecp/tools/tools12.html

[6] Anon. 2000. *Business Sustainability: a Cleaner Production Approach to Small Business*. Canberra: Environment Australia.

[7] Environment Australia. Department of Environment and Heritage, Canberra, Australia. http://www.ea.gov.au/industry/sustainable/mining/booklets/

[8] Anon. 2002. *Green Profits Benchmarking to achieve environmental best practice in the food industry*. Melbourne: Department of State and Regional Development, Victoria.

[9] McCauley, P. Personal correspondence, May 2003.

[10] Wilczek, E. 2002. The EPA and Yalumba highlight supply chain management through the Greener Business Alliance Project. In *Proceedings of the Second National Wine Industry Environment Conference and Exhibition*. Adelaide, Australia.

[11] The University of Queensland, UNEP Food Working Group. http://www.geosp.uq.edu.au/emc/CP/food_project/

[12] Pagan, R. J.; Prasad, P.; Diniz da Costa, C.J.; and R. van Berkel. 2003. Cleaner production application for coal utilization. In *National Environmental Conference*. Brisbane, Australia, June 2003.