The Eco-Industrial Advantage
Tendances Éco-Industrielles

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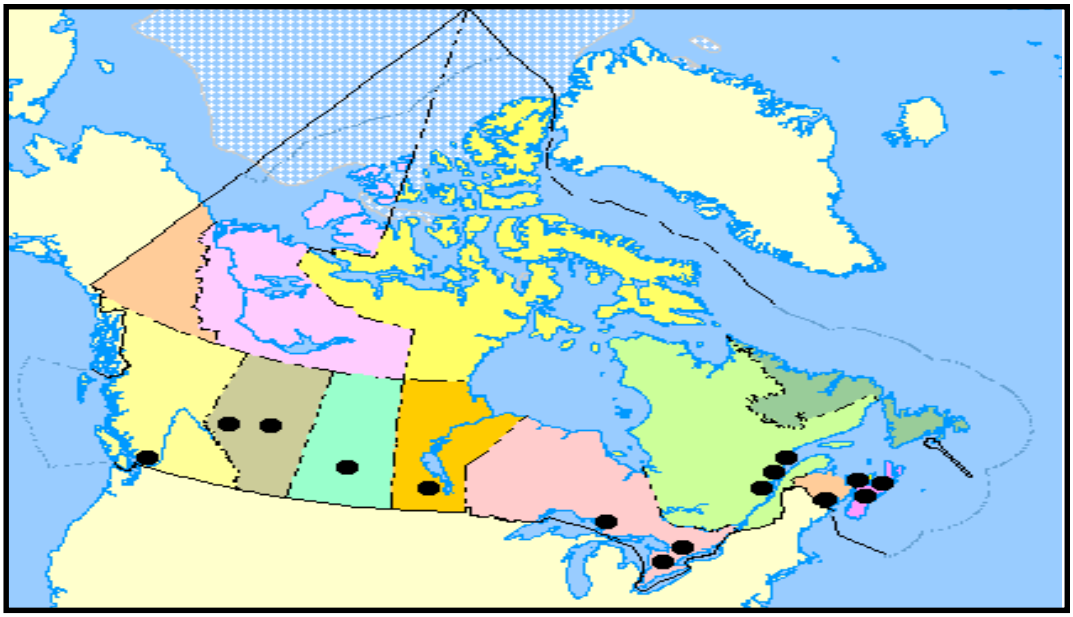
Canadian Eco-Industrial Development Project Updates

By Wendy LeBreton and Kathryn Palmer-Wilson

There are a number of Eco-Industrial Development Projects currently underway in Canada, and the number continues to grow. This article updates various projects in Canada, including those in Ontario, Quebec, British Columbia, Alberta, New Brunswick, and Nova Scotia.

In Ontario, the Golden Horseshoe By-Product Synergy (GH-BPS) project reached a significant milestone with the completion of their final report in 2002. The report presents the results of the project at the end of 2001 and outlines the future steps that companies, organizations, and Hatch (the main consulting firm) will take to ensure continued growth and evolution of the GH-BPS project. So far, the project, championed by Dofasco, Inc. of Hamilton Ontario, has resulted in the implementation of one by-product synergy. Iron oxide containing sludge or dust from a steel manufacturer is being fed as a raw material into a cement kiln for the manufacture of Portland cement. The identification and investigation of several other projects is ongoing. The report also describes the barriers and benefits of by-product synergies, as identified by



Map of Eco-Industrial Development Projects Underway in Canada

project participants. The future of the GH-BPS project involves further investigation and implementation of by-product synergies and attracting more companies to the project.

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The Eco-Industrial Advantage

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In Quebec, several industrial ecology projects are underway:

- In Bécancour, a collaborative effort of several players has resulted in the pre-feasibility study for a 2003 *Carrefour de valorisation des sous-produits industriels de Bécancour*, emphasizing value-added industrial by-products in the region.
- LaSalle, Montreal is awaiting the launch of an Industrial Eco-Centre, which will aim to boost recycling activities of more than 300 small and medium sized enterprises and the local population of approximately 75,000 people. The first phase of this project will focus on wastes such as paper, carton board, metals, and construction wastes.
- Many industrial ecology proponents in Quebec are planning to form a working group called the *Centre of Excellence for Industrial Ecology,* to be housed by the *Centre de transfert technologique en écologie industrielle*, in Sorel-Tracy.
- In Ste. Catherine, a local manufacturing plant, NovaPb, has developed a new industrial process that eliminates the need to dispose of aluminum process spent pot lining. Once thought to be an industrial hazardous waste, this material was discovered to be an important input to the production of a new material called CalSiFrit. Through intense collaboration and research involving *The Département de génie civil at Université de Sherbrooke*, several directorates of the *Ministère de l'Environnement du Québec*, and alumineries *Alcoa, Alcan, and Allouette*, several possibilities are being investigated for the use of CAlSiFrit, which can be obtained via a clean production system, without any effluent, emissions, or waste.

In British Columbia, the *Maplewood Community Eco-Industrial Partnership Project*, in the District of North Vancouver, is progressing well. The Maplewood Advisory Committee (MAC), which represents residents; local, provincial, and federal government agencies; local businesses; and many other partners, continues to grow. At its most recent meeting, the MAC began to identify and prioritize potential ideas for eco-industrial networking. These ideas will be further developed and evaluated over the next few months leading up to the charette. The design charette for the *Maplewood Community Eco-Industrial Partnership Project* is scheduled for May 22-25, 2003. Three design teams will be spending an intense weekend sketching out their vision of a sustainable Maplewood Community, including plans for eco-industrial networking.

In Alberta, the Town of Hinton is proposing to develop a 108-acre Sustainable Industrial Park, using EIN principles. The application of EIN in this resource-based, rural economy will be a model for dozens of Canadian towns. The project includes an evaluation of the feasibility of sustainable desgin and development aspects such as: Green Building Features; Alternative Energy Systems; Transportation Infrastructure; Shared & Innovative Water & Waste Management; and Preferential Recruitment of Industrial Sectors. In addition to the Green Municipal Enabling Fund (GMEF) and the Town of Hinton, the project is being funded by Climate Change Central and Western Economic Diversification with support from the Province of Alberta. The study will be completed by Erin Consulting

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Feature: Fostering a Co-operative Approach to Eco-Industrial Development

By Tom Osboda, E4 Partners

The Lents Neighborhood of Portland, Oregon has the opportunity to advance much-needed economic development and make important environmental improvements by adopting eco-industrial development principles. The need for job creation and economic stimuli are central concerns of Lents Neighborhood stakeholders, and community members are looking for ways to improve this situation. Simultaneously, there are a number of environmental concerns that have brought in support from City agencies. Eco-industrial development offers Lents a way to meet these multiple goals, and in so doing create the largest single piece of industrial land available for redevelopment in the City.

The Portland Bureau of Environmental Services (BES) held an Eco-Industrial Development Workshop for the Lents Neighborhood in May 2002. BES worked with other City bureaus and the Portland Development Commission (PDC) to organize the workshop. The workshop was designed to discuss redevelopment efforts in Lents, with a specific focus on how eco-industrial development ideas might offer advantages for attaining the objectives of job creation, environmental enhancement and efficient use of land for business.

The project consultants, E4 Partners (Minneapolis and Portland) and Eco-Industrial Solutions (Vancouver, BC) put forward potential development themes for discussion, based on stakeholder interviews, observations made during urban renewal meetings, and visits to selected local businesses. These development themes were automotive repair and recycling, community food systems, and high tech clusters. Subsequent to the workshop, the consultant team produced a strategy to highlight how the City could implement these themes through specific development projects.

Gaining Cooperation

Nearly every City bureau is involved in a significant project in Lents. Effective redevelopment – which creates living-wage jobs, restores Johnson Creek for endangered salmon species, and provides for improved flood management – can only be attained by gaining an unprecedented level of inter-bureau cooperation from within the City itself. The collaborative effort requires a level of risk and innovation among the various bureau representatives that should not be pursued without the strong support of the City's political leadership. Specifically, the following steps are essential to effective collaboration.

- Forge absolute and widespread agreement among stakeholders about the objectives for redevelopment.
- Ensure access to accurate information.
- Facilitate collective action, within City jurisdiction and among interested stakeholders.
- Communicate openly and clearly about redevelopment barriers, and the emerging path toward addressing those barriers.
- Maintain discipline in process, as it relates to building consensus and keeping City leaders apprised of redevelopment progress.
- Emphasize commitment to success and not to individual or institutional roles.

The Freeway Land Site, Portland

These efforts are a tall order even at the best of times and in the best run cities. In reality, redevelopment processes tend to stray away from collaboration at every turn. A city development agency, for example, generally seeks cooperation only once it has a project conceived and ready to proceed. In Lents, the Portland Development Commission needs to involve the other city bureaus as development partners much earlier in the process. For without their active support and help, redevelopment cannot occur. On the other hand, city bureaus tend to pay strict attention to their programmatic objectives, and rightly so. However, unwavering attention to discreet bureau goals can become a willful act of non-cooperation, if plans to attain those goals cannot accommodate other objectives, which are not

competing with those of the bureau, but rather are outside of its normal sphere. Again, in Lents, several specific examples highlight the challenges of gaining inter-bureau co-operation.

The relative shortage of industrial land in Portland means that properties such as the Freeway Land site (pictured on page 3) should be evaluated to gauge the maximum potential for industrial activities and job creation that fit the characteristics of the site. The Portland Development Commission cannot redevelop the Freeway Land property in a way that would attain job creation and development goals without accepting that Johnson Creek restoration must embrace critical salmon habitat issues and provide adequate flood management. While there is seldom debate over that fact, the process of conceiving of a course of action that embraces these numerous objectives in harmony can be difficult and time-consuming. In public meetings, Portland Development Commission actions have to support all objectives and not merely their own. While this statement may seem obvious, in reality this level of co-operation is difficult to achieve.

This point is not meant to single out development agencies. City bureaus have to be prepared to compromise on specific elements of their conceived plans. In the case of Freeway Land, the Transportation Bureau has to work cooperatively to identify the best ways to ensure site access in a way that supports economic development. Planning regulations must adhere to objectives and also embrace creative ways of solving unique problems on the site. Environmental Services needs to explore alternative flood management scenarios that may enhance the development potential of the site. The numerous layers make for a complex process, and highlight the importance of considering eco-industrial development approaches.

An eco-industrial approach would help the owner meet his financial goals for the property, and would support development of high performance, low-impact, energy-efficient buildings that optimize land use consistent with the restoration of Johnson Creek. Green building design presents numerous opportunities for development in Lents. For instance, several areas are not suitable for conventional development.

Innovative design could not only reduce the environmental impacts of buildings and production facilities, but also may present some interesting potential to support environmental goals around the Creek.

A City-led process, by which each bureau, the development agency, business owners, and citizens can embrace a shared set of objectives that all agree is important, could go a long way to fostering the positive, supportive relationships needed for innovative development projects.

To learn more about the Lents project and specific redevelopment opportunities, contact Tom Osdoba [tom@e4partners.com] or Tracy Casavant [tracy@ecoindustrial.ca].

Updates, Continued from Page 2

(Regina), Eco-Industrial Solutions (Vancouver), and AMEC Earth & Environmental (Calgary).

Also in Alberta, the Alberta Industrial Heartland (AIH) is continuing to develop new projects. See page 6 of this newsletter for more details.

In Regina, Saskatchewan the sustainable Communities Initiative has approved the project to redevelop the Ross Industrial Park as an Eco-Industrial Park. The project will be initiated on April 1, 2003 under the leadership of Erin Consulting.

In Saint John, New Brunswick there has been a hiatus since Michael Nisbet of JAN Consultants, Matt McKim of the New Brunswick Community College and Ray Cote of Dalhousie University undertook a one year study to investigate the potential for eco-industrial networking in the city of Saint John. The city is home to one of Canada's largest concentrations of large industries in the country. These include an oil refinery, a pulp mill, a paper mill, a tissue mill, a lubricating oil manufacturing facility, two electricity generating stations, and a brewery. There are also three industrial parks. The similarity to Kalundborg, Denmark is striking.

The study identified, in a preliminary way, the potential for additional networking among industries and collaboration among organizations in a report titled *Making the Most of Materials and Energy: Industrial Ecology in Saint John, New Brunswick*. Additional research is required to determine whether the quantities and qualities can satisfy potential partners in a by-product synergy project. A local organization, ACAP Saint John, maintains an interest in promoting the concept further.

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New Zealand's Eco-City Projects

By Peter C. Lowitt, Devens Enterprise Commission

Waitakere, New Zealand is located west of Auckland on the North Island. Its location and attendant isolation from Auckland have historically made it the 'badlands' of the region. According to locals, "Westie" was a derogatory often stereotyped as someone who wore black t-shirts, had long hair, smoked dope and was into cars. This was also a place of refuge, where cheap land beckoned new immigrants and artists from the Auckland area who developed their own community. Many Dalmatians (from Croatia) settled in the area bringing their wine growing talents with them. The area developed a reputation for growing maverick politicians – "real characters." One such character was former Mayor of Waitakere, Bob Harvey, who came to office with a background in marketing and who had an ecological bent. EcoCity was his initiative.

In 1989 the City of Waitakere was formed from an amalgamation of four towns. Mayor Harvey was elected along with a green city council. Senior staff with green expertise and values were hired and developed the City's "Greenprint" – both a local Agenda 21 plan and strategic plan for the city. Steve Wilcox, Partnerships & Advocacy Leader: Economic Development Strategic Group of Waitakere, notes that while the "Greenprint" has never officially been adopted as Council policy, all of the Council's policies have been consistent with the document.

The Greenprint called for redesigning the City's regulatory processes into pathways. These pathways are as follows: Sustainable Business; Urban Villages; Passenger Transportation; and Green Networks. City budgets are based on these pathways giving them added weight. Steve Wilcox notes that city staff view the pathways and themselves as part of a process, not city bureaucracy. The Greenprint has engendered a strong constituency for green programs and sustainability in general.

The local Agenda 21 process, by design a grassroots effort, has created a strong partnership between the community and city staff. A strong ethic of partnership and commitment to process has been the result. Waitekere early on embraced the neotraditional planning concepts of new urbanism being touted at this time in North America. This philosophy is embodied in the Urban Village Pathway.

In 1998 the green council and Mayor Harvey were voted out of office. The specific instance for their ouster lay in a requirement prohibiting landowners from cutting down native trees on their property. Underlying concerns among large landowners who were invested in speculative sprawl reaching out from Auckland and viewed the council's urban villages pathway as being counter to their prospects may have played a part in this turnabout.

The new council placed an emphasis on economic development. Steve Wilcox notes that Enterprise Waitakere's services while limited, are still consistent with the greenprint and pathways of the past. Current sustainable economic development programs offered include:

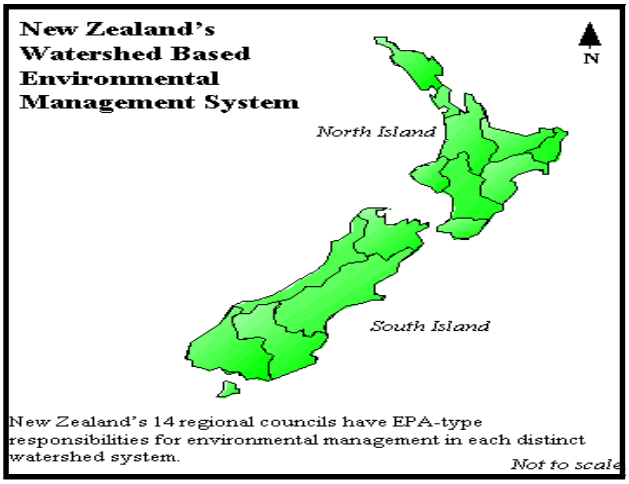
- Be Your Own Boss: (welfare to self-employment program which includes a cleaner production component in the course)
- Bank of New Zealand Annual Business Award includes environmental programs as part of the core criteria for every award they give, including a separate environmental award.
- A cluster of industries program. Five industrial clusters have been identified. These include an environmental technology cluster (which currently does not exist but which the city hopes to attract through its Eco-City branding program); a marine/super yacht cluster (New Zealand won the America's Cup for a reason!); a film industry cluster; a wine and food cluster; and a tourism cluster.

Mr. Wilcox notes that the whole greenprint has been woven together like a fine fabric. As he put, the Council has made extensive efforts to "pull everything into everything." Eco City is the embodiment of this effort. Sustainable development efforts include a Pacific Island Advisory Board for local pacific island migrants to the area whose main goal is to integrate these folks into the local economy. Similar programs exist for the Maori.

Social infrastructure is of particular importance to the community. Waitakere is the only city in New Zealand to receive World Health Organization safety accreditation. Social partnerships are also of importance. These include community green building initiatives, a

Continued on Page 6

main street program, and industrial revitalization efforts as well. Three new town centers are being created through the urban villages pathway. And to top it all off, the City has two Industrial Ecologists on staff. Their job is to assist in cleaner production efforts, clean retail programs and waste minimization programs.



The City's industrial ecologists were involved in the design of the city's EcoMall. Their efforts centered on cleaner production and waste minimization as well as green building education. Imagine the staff industrial ecologist advising mall retailers on how to reduce packaging. That is exactly what they do. Other sector programs where they are involved include efforts to introduce cleaner production to the yacht and marine industry cluster which currently utilizes hazardous materials in its production processes, especially fiberglass hulls for boats.

The City has launched efforts to use biofilters and living systems to naturally treat waste and minimize the use of potable water for nonpotable uses. EcoCity with Mayor Harvey's marketing background, has never been shy about celebrating its successes. Signs celebrating their successes are abundant in the city. Projects are now underway to create an Eco-Hospital and an Eco-School.

By Peter C. Lowitt, AICP Director – Devens Enterprise Commission. Mr. Lowitt visited New Zealand in March 2001 as an instructor in Sustainable Development as part of the Executive Economic Development Institute held in Napier, New Zealand.

To learn more about New Zealand's Eco-City Projects, contact Peter Lowitt at peterlowitt@devensec.com.

The Alberta Industrial Heartland Association (AIHA)

The AIHA was established in 1998 as a new model in inter-governmental and industry co-operation. Its membership includes the municipalities of the City of Fort Saskatchewan, Lamont County, Strathcona County, Sturgeon County, and the industries belonging to Northeast Capital Industrial Association. The AIHA was established to develop and promote the Heartland region as a global leader in processing, manufacturing, and eco-industrial development.

Since the founding of the AIHA, the region has seen one new chemical plant and related cogen and an expansion of an existing cogen. Also, just coming on-stream is a $3.5 billion heavy crude upgrader meshed with an existing refinery and a new cogen.

The Alberta Industrial Heartland Association's March 5, 2002 forum (breakfast/discussion) for senior process industry personnel provided much information on prospects for new oil/chemical industry in the AIHA and its many ties to existing AIHA and external feedstock sources, utilities, and markets. Included in the forum was a report on a study entitled *Petrochemicals from Oil Sands* and a companion report on its Eco-Industrial implications. They are available on the AIHA web site www.industrialheartland.com. The same web site also has another shorter overview of eco-industrial development in the AIHA.

The AIHA is also starting a transport corridor study. To learn how the AIHA and Eco-Industrial Planning formally enters regional planning, visit www.sturgeoncounty.ab.ca.

For more information on Alberta's Industrial Heartland (AIH), the AIHA and related land use concepts and regulations, visit www.sturgeoncounty.ab.ca/heartland/index2.html.

Pollution Prevention and the Integration of Air Emission Strategies

By Manfred Klein, Environment Canada

Today's concerns over atmospheric stress are in large part due to the way in which we produce and use energy. These impacts have the potential to very seriously affect the economy. The regional and international issues arise both:

1. From the health concerns of traditional air pollution which have been recognized for the past four decades, and
2. From the discussion on the evidence suggesting a discernible human influence on global climate change due to greenhouse gas emissions.

The energy industry is closely associated with these subjects, as well as with potential solutions in conservation, and cleaner fuel use in electricity production and in industrial heat processes. These issues are highlighted by the important linkages between the economy, energy use, the environment and our health.

Emissions of several pollutants usually stem from the same source, especially in electricity, industrial heat, and transportation sectors. Emissions from thermal energy can be reduced by four fundamental methods:

1. Energy Conservation; the avoidance of energy use where possible,
2. Efficiencies in energy production, and the use of waste heat,
3. Combustion and process modifications, using cleaner fuels, or
4. Back-end emission control.

Policies based on pollution prevention will maximize efforts on the first three above items. While acid gases, particulate matter, and mercury emissions can be reduced using a wide range of available back end control technologies, lower CO_2 emissions can best be attained via prevention; higher thermal efficiency, energy conservation, cleaner fuel selection or non-fossil alternatives such as renewables.

In most cases, air pollution cannot be produced without CO_2 emissions.

It is important to appreciate that these emissions come from the same sources, and that investments in their prevention can have multiple benefits if planned properly. There is therefore a need for developing an integrated approach to these issues. CO_2 prevention, in the form of renewable energy or efficient Combined Heat & Power systems (Figure 1), leads to other many emission reductions.

Figure 1

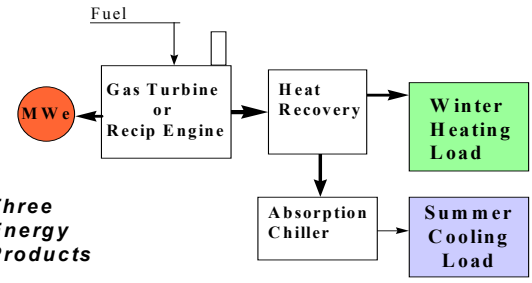
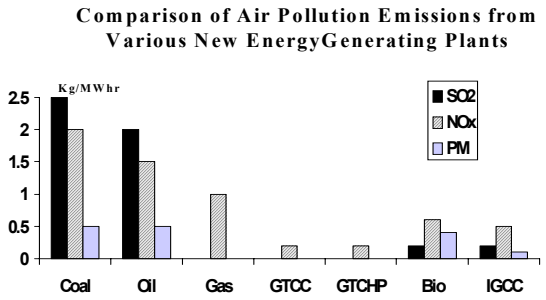


Fig 1. Combined Heat & Power Schematic

Figures 2 and 3 (below and on the next page) provides an approximate emissions comparison of typical modern coal, oil and gas-fired Rankine Cycle boiler systems, with Gas Turbine Combined Cycle, District Energy and Gasification plants (GTCC, GT DE, IGCC). The use of natural gas in a high efficiency cycle results in much lower emissions of all acid gases, thus accomplishing goals consistent with a comprehensive pollution prevention strategy. About 60 percent of the energy value of natural gas is from its hydrogen content, thus CO_2 emissions from high-efficiency natural gas combustion are a small fraction of those for coal-fired systems. Particulates, associated toxic trace elements, (and thermal impacts from cooling water) are also minimized.

Figure 2



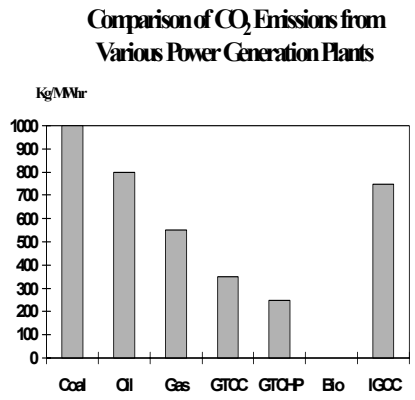


Figure 3
Coal, Oil and Gas Boiler Rankine Cycles
Bio - Woodwaste Biomass
GTCC - Gas Turbine Combined Cycle
IGCC - Coal Gasification CC
GTDE - Gas Turbine District Energy (Cogen & CHP)

From this profile, it is important to note that the prevention of CO_2 emissions can result in a reduction in all other pollutants for these energy choices, whereas the back end control of pollutants does not contribute to CO_2 reductions.

When a total package of emission prevention is addressed, the $/tonne cost-effectiveness of reductions will be very attractive. The acid gases and toxics could also each be given some, or equal, weight in society for health benefits (each emission type has some allocation of the annual cost). Then a better economic analysis would show a reasonable charge for combined reductions of CO_2, NOx , SO_2, air toxics and mercury.

An example below (Table A) demonstrates the cost-effectiveness of switching from coal generation to natural gas cogeneration or CHP, in terems of air pollution, GHGs and water thermal pollution. Table A shows the cost in $ per tonne of individual emission reductions, based on the comparisons in the Charts above.

A. **Multi-Emission Economic Evaluation of Choices**

1 MWhr	Cost $	NOx/SO_2 kg	PM kg	CO_2 kg	Water m^3
Coal Boiler	40	10	0.5	1000	2500
Gas Cogen	60	0.5	0	300	800
difference	***$20***	***9.5 kg***	***0.5 kg***	***700 kg***	***1700 m^3***
Full $20 cost per tonne		**2100**	**40 000**	**29**	**-----**

The $20 / MWhr cost increase can result in rather high per unit emission reduction costs of air pollution or GHGs. However, in Table B below, these $20 / MWhr costs are split (arbitrarily in relative importance) among the main air and water issues.

B. Shared Multiple Benefits for Extra $20/MWhr
Environment and Health

	Relative Importance %	*Allocated Incr. Cost $*	*$/tonne*
NOx/SO_2 (.0095 t)	40	8	840
CO_2 (0.7 t)	30	6	8.5
Particulates (.0005 t)	15	3	6000
Water Thermal (1700 t)	15	3	.002
	100%	$20	

The result is that cost effectiveness is shown to be very good, with overall multiple benefits. This is how several major environmental initiatives should be considered together to maximize benefits, and to avoid certain conflicting strategies.

As this analysis demonstrates, by encouraging inter-facility energy systems in eco-industrial parks, additional cost savings can often be achieved and waste heat recaptured.

Upcoming Conferences

The Canadian District Energy Association (CDEA)

The Canadian District Energy Association (CDEA) 8th Annual Conference and Exhibition, *Delivering Energy Solutions: District Energy, Energy Efficiency and Local Partnerships,* in association with the Canadian Energy Efficiency Alliance, has been moved to June 18 to 20, 2003 at the Hilton Suites Toronto/Markham Conference Centre & Spa in Markham, Ontario, Canada.

Speakers and exhibitors from across Canada, the US, and Europe will focus on:

- ❖Bill 210's impact on district energy and energy efficiency
- ❖Local, national, and international industry trends
- ❖Financing local energy projects
- ❖Emission reduction implications for decision makers
- ❖Developing the right partnerships
- ❖The latest in R&D and technical advancements
- ❖Best Practices for energy systems and supply
- ❖Strategies for delivering energy efficiency
- ❖Policy and regulatory tools to deliver energy solutions.

Attendees will include: private developers; suppliers; district energy system operators; energy efficiency practitioners; financiers; energy, regulatory, and municipal lawyers; and government decision-makers.

The latest in district energy and energy efficient technologies, programs, and systems will be on display. Industry professionals can participate in Technical Workshops on recent operational developments.

For registration information, details on sponsorship opportunities, or to secure exhibit booth space, please visit the CDEA websites at www.cdea.ca or www.energyefficiency.org.

The International Society for Industrial Ecology (ISIE)

The International Society for Industrial Ecology (ISIE) Second International Conference will be held June 29 – July 2, 2003 at the University of Michigan, Ann Arbor, Michigan. The event is expected to bring together more than 300 individuals from business, engineering, environmental science, social science, government, and community development representing academia, industry, organizations, and agencies from around the world.

Through a series of *Technical Programs*, *Plenary Sessions*, *Short Courses*, and a *Poster Session*, participants will examine current research, applications, and best practices in industrial ecology. The conference will also feature Exhibitors.

For conference topics, registration information, and details on sponsorship and exhibition, please visit the ISIE website at www.yale.edu/is4ie.

USCHPA (United States Combined Heat & Power Association)/WADE (World Alliance for Decentralized Energy) International Conference

The USCHPA/WADE International Conference *"The New Worldwide Opportunity for CHP and Decentralized Energy"* is taking place on May 2, 2003 at the Hotel Washington in Washington, D.C. The event is a part of the larger USCHPA Fourth Annual Conference *CHP on the Move: Meeting State, Federal, & International Challenges* taking place in the same hotel from April 30 – May 2, 2003.

For further details on the conference agenda, sponsorship and exhibition, and registration information, please visit the World Alliance for Decentralized Energy (WADE) at www.localpower.org.

Resources

Book Announcements

Greenleaf is releasing a second book on industrial ecology in April 2003. The book is titled "Perspec tives on Industrial Ecology" and is edited by Suren Erkman of ICAST in Geneva. The book begins with a forward by Jacques Chirac, the President of France. The authors are well-known to many in the field, and include Marina Fischer-Kowalski on industrial metabolism, Jean-Francois Valles on eco-industrial sites and networks, Judy Kincaid on metropolitan industrial ecosystems and develop ment, Colin Francis on the chemical industry from an industrial ecology perspective, Chiro Watanabe on Japan's industrial technology system, Tom Graedel and Michael Jensen on urban transporta tion, and Helge Brattebo on teaching industrial ecology in universities. Given the quality of Suren Ekman's work and his dedication, this book will provide a wide range of perspectives on the applica tion of ecological thinking to industrial systems.

Three new Cogeneration / Power Generation titles have just been published. They are:

1. *Combined Heating, Cooling & Power Handbook: Technologies & Applications*, by Neil Petchers – 875 pages, Illus., Hardcover, 8.5 x 11.

2. *The Gas Turbine Handbook: Principles & Practices*, 2nd edition, by Tony Giampaolo, MSME, P.E. – 405 pages, Illus., Hardcover, 6 x 9.

3. *Guide to Electric Power Generation*, 2nd edition, by Anthony J. Pansini and Kenneth D. Smalling – 243 pages, Illus., Hardcover, 6 x 9.

In addition, one of the best resources available today is the *Handbook of Industrial Ecology*, 2002, by Robert and Leslie Ayres, Cheltenham, U.K.: Edward Elgar Publishing. 680 pp.

Web Site Launching

On February 20th, 2003 the *Centre for Resource Education* (CRE) launched the website www.gogreenindia.org which focuses on issues of eco-industrial development.

The CRE is a non-profit, non-governmental organization that promoted several Clean Technology & Environment Management Initiatives through NGO-Business partnership.

Go-Green is a newsletter committed to promoting Eco-Industrial Development by strengthening the process of collective Environmental Management Practices. It focuses on exploring sustainable mechanisms through the Systems Approach.

The first issue is dedicated to the Late Ed. Cohen –Rosenthal, Cornell University. Dr. Rosenthal successfully transformed the basic principles of the Ecological Sciences and also motivated several industrial promoters to apply these principles into practices. He was instrumental in developing a new academic branch – Industrial Ecology.

Visit www.gogreenindia.org for more details.

Corrections from last issue

In the last issue (Vol.2, No.2, 2002), Ray Cote was listed as the author of a couple of reports from Quebec, however he was just the go-between. The articles, and proper authors, include:

1. Industrial Ecology Priorities in the European Commisssion, submitted by Anthony Chiu.
2. Sorel Tracy IETC, submitted by people from that center.
3. Le CIRAIG, submitted by Daniel Normandin.

Our Apologies!

Eco-Industrial Development Rapidly Implemented In Asia Pacific... How Far to Real Success?

By Anthony SF Chiu, Asia Pacific Professor, De La Salle University, Manila

After Japan's enactment of the *Recycling Oriented Economic Society Law*, many other Asian economies are mainstreaming recycling behavior into the national and regional macro-policy and development plans. Ecotown projects in Japan have increased to 17 strong, and the number is still growing. Taiwan has held several eco-industrial park seminars and workshops since 2000. The 2000 workshop looked at the basic concepts of how ecosystem and industrial development worked in harmony; while two years later, discussions advanced to planning, design factors, performance indicators, and implementation strategies. A few months later in January 2003, two more environmental science-park sites were identified in Hualian and Kaoshiung. Specialists from the Universities of Dalian, Tsinghwa, De La Salle, Dalhousie, and Taiwan[1] have interactively visited each other's project sites in their respective regions. There are more than ten Eco-Industrial Development (EID) initiatives in China, with the latest two in Guiyang city and and and Jiangsu Provincial Industrial System.

Group photo of the panelists in Shimizu City

Also in January 2003, Korean *National Cleaner Production Center* held an international seminar on eco-industrial park development, and concretely presented a 15-year, 3-phase development plan of eco-industrial parks in Korea. Again, specialists from Thailand, China, Philippines, and Japan converged in Seoul for a one-day seminar. Many things were shared, learned, and explored.

After a hard days work, the impression I received was that the Koreans are very serious on this matter, and treat eco-industrial development as an asset and a future competitive edge for the nation.

Australia, a giant economy in the Pacific, also has a number of eco-industrial development initiatives. Perth and Brisbane are currently home to at least two byproduct synergy park projects. Some projects are underway, while others have gone through feasibility studies.

A good phenomenon is that the national authority is now recognizing and integrating eco-industrial development into the mainstream of economic plan. However, I felt that there is a clear gap between the schools of thought of regional cluster-based economic development and the eco-industrial development. There is a need to integrate these two disciplines. More often than not, many of the eco-industrial developments are building the environmental dimensions into the pre-planned economic model; hence, the achievement is just minimizing the environmental impact of the economic activity. On the other hand, when eco-industrial concepts are used during the design and planning phase of the development, the total performance surely leapfrogged as compared to the traditional industrial development model. Furthermore, regional eco-industrial development also lacks the holistic approach of a macro-national level movement, such as that in Japan and China.

A recycling-oriented economic model brings in many dimensions that make the regional model deficient, since small geographic areas, such as cities and towns, may not be geographically large enough to close all of the "priority" material cycles, making them unsustainable. First and foremost, the performance of an eco-industrial development is subject to how many priority material cycles are closed. Furthermore, in closing a cycle, value-adding contributions on the downstream of the life cycle need to be emphasized.

There is a plan to hold the second regional conference on eco-industrial estates for Asia Pacific (EIEAsia) in the second half of 2003. Tentatively, it is to be held in Thailand. As of press time, the potential organizing group, which is composed of the IEAT, GTZ Thailand, and UNDP EPIC Project team Manila, has not released any schedule.

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Anthony Chiu's presentation of Sustainable Value Chain Model for Eco-Industrial Development in a 5-man Expert Meeting, Japan.

The Asia Pacific research work on this area has to be strengthened. There is a long way to go, but certainly Asia Pacific is moving in the right direction.

[1] Information for this article was gathered from attending conferences and discussion with the EID colleagues from Japan, China, Thailand, Korea, India, Australia, Singapore, Taiwan, Philippines, and Sri Lanka. Many views are gathered from these colleagues and summarized here. Major discussions of individual projects and author's debate can be found in the upcoming *Journal of Cleaner Production, Special Issue on Industrial Ecology Applications*, to be released soon.

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The area of Point Tupper /Port Hawkesbury, Nova Scotia was identified as a potential industrial ecoystem site in a study undertaken by Thermoshare some years ago. The industrial base is still expanding and diversifying. The arrival of offshore natural gas and a fractionation plant has spurred further interest in the potential for symbiosis and networking. The announcement that the Stora Enso pulp and paper mill will not only stay but expand is another positive signal, as well as interest being expressed by other companies in reopening a gyproc factory. A group of consultants is in discussion with government and development agencies to initiate a study of the area.

The use of Burnside Industrial Park, in the Halifax Regional Municipality as a laboratory for testing strategies that will support eco-industrial development continues. On of those strategies is to maintain essential ecological functions and features such as wetlands. With support from EcoAction 2000, the TD Canada Trust Friends of the Environment Foundation, the EJLB Foundation and the Halifax Regional Municipality, Professors Ray Côté (Environmental Studies), Abdel Ghaly (Biological Engineering) and Rob Gordon (Agricultural College) are developing a constructed wetland to treat leachate from an old landfill and street runoff in the park. They are being assisted by Master's and a Ph.D. student. This wetland will be integrated into an educational park within the larger industrial park.

The Eco-Efficiency Centre at Burnside, Nova Scotia, continues to expand its role and the Eco-Business Program with 100 businesses now in the program. Among other things it has emphasized toxic chemicals use within the Park in the past year identifying opportunities for reduction and substitution. The results of this work will be presented at the Canadian Pollution Prevention Roundtable conference this sprring.

With financial support for conducting feasibility studies now available through the *Federation of Canadian Municipalities Municipal Enabling Fund*, additional eco-industrial development projects are a sure bet in the future.

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