THE GREENING OF WINNIPEG'S BUSINESS COMMUNITY: OPPORTUNITIES AND MUNICIPAL PARTNERSHIPS

by

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A Practicum

Submitted to the Faculty of Graduate Studies

in Partial Fulfilment of the Requirements

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Department of City Planning

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Abstract

The Greening of Winnipeg's Business Community: Opportunities and Municipal Partnerships is a suggested method for the City of Winnipeg to target municipal conservation assistance at the small and medium size business community. It is based on the environmental management approach used by large companies practicing "due diligence" and corporate environmentalism; and translates this approach into an environmental management plan aimed at the conservation requirements of small and medium size businesses in Winnipeg. The purpose of this inquiry is to:

- identify cost saving opportunities for business in the areas of water, energy and waste minimization
- provide the City of Winnipeg's Water Conservation Program, the Power Smart Program and the Industrial Waste Branch with market information on conservation assistance needs in the business community
- allow the Water Conservation Program, the Power Smart Program and the City's waste minimization efforts to collaboratively develop conservation assistance and resources that suit the particular requirements of the small and medium size business community
- demonstrate, in practical and operational terms, the City's commitment to sustainable development and environmental stewardship as stated in Plan Winnipeg ... Toward 2010.

The practicum is organized into four components. The first section examines the purpose

of municipal environmental management and the City of Winnipeg's Department of Waterworks, Waste and Disposal and Winnipeg Hydro's current approach to conservation and environmental issues. It suggests the City build on the strength of the existing Power Smart, Water Conservation and Waste Minimization programs and develop a targeted conservation program for the business community. The second section focuses on environmental management in the business sector and suggests analytical tools, including an environmental audit and life-cycle assessment, to evaluate a company's use of water, energy and waste production and to look for opportunities to cut cost and conserve resources. Section two also includes a presentation of environmental auditing and industrial ecology as a conceptual framework in which to consider municipal environmental management. It concludes with a discussion of the environmental management practices of The Body Shop, whose environmental accomplishments and leadership set an example for businesses of any size.

The third section looks at the mechanics of how the City of Winnipeg's Water Conservation Program, the Power Smart Program and the Industrial Waste Control Branch could collectively deliver a municipal environmental management program for small and medium size business. It suggests an interdepartmental municipal structure, program goals and objectives and the benefits that will accrue to businesses who become involved. The final section describes a pilot project to test the concept of municipal environmental management on a limited and manageable scale. It recommends project management, staffing, software, budget and a timeframe.

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1. Municipal Environmental Management

1.1 Purpose and Objectives

The City of Winnipeg, through its *Plan Winnipeg ... Toward 2010* document, has stated its commitment to environmental stewardship. It promises to instil an ethic of environmental stewardship in its citizens, through leadership and communication; and will attempt to "change the attitudes and values of all its residents so that the practice of energy and water conservation, and the reduction of pollution and waste will become more widespread" (Plan Winnipeg 1993, 39). *Plan Winnipeg ... Toward 2010*, goes on to state that the City will produce, on a regular basis, a report on environmental issues which will include an evaluation of the state of the environment in Winnipeg and an assessment of progress made. This practicum is a limited attempt to quantify and evaluate the City of Winnipeg's commitment to environmental stewardship. It introduces the concept of municipal environmental management and suggests the City of Winnipeg

- focus its current water and energy conservation and waste minimization efforts to develop a tailored conservation program targeted at small and medium size business
- request that business enter into partnership with the City by internally assessing its uses of water and energy and waste minimization practices; and reporting this information to the City
- provide a "one-stop" conservation assistance service to business based on the expressed needs of small and medium sized companies; and utilizing the resources

and expertise of outside consultants in the private sector.

The purpose of this approach is to:

- allow the City of Winnipeg to evaluate its conservation efforts and progress toward environmental stewardship, within specific market segments: in this case small and medium size business
- develop a database of information on what conservation efforts business is taking and what assistance is required; and use this database as a rationale for the development of future municipal and provincial environmental programs and regulations
- to manage and monitor the use of municipal utilities and resources with aim of conservation and increased municipal efficiencies
- to help business use utilities and natural resources wisely and to look for opportunities for increased efficiencies and cost savings
- to build upon the existing strengths of the City of Winnipeg's Power Smart Program, its Water Conservation Program and the work being done by the Industrial Waste Control Branch; and to move forward by addressing the unique conservation needs of small and medium size business.

In order for the City to introduce municipal environmental management, a partnership must be established between the City of Winnipeg, Departments of Waterworks, Waste and Disposal and Winnipeg Hydro and the City's small and medium size business

community. The City is in a position to provide direction to the business community and assist companies in developing strategies and practices for resource conservation and waste reduction/recycling. Business should be encouraged to become active participants in the creation of management and accounting systems that reflect water and energy consumption and waste production in their operations. This practicum is a structured inquiry into the introduction of such an environmental management partnership to the City of Winnipeg. The Departments of Waterworks, Waste and Disposal and Winnipeg Hydro are the two primary agencies identified in this study which have the major role in working directly with the business sector.

The practicum is organized to include the following related activities and information:

1. An assessment of the current conservation approaches by the Departments of Waterworks, Waste and Disposal and Winnipeg Hydro;
2. An introduction to environmental management systems for business;
3. An approach to environmental management and conservation for the Departments of Waterworks, Waste and Disposal and Winnipeg Hydro to acquire environmental data from business and to correspondingly provide managerial or technical assistance;
4. A pilot project to test the usefulness of this municipal environmental management approach.

1.2 Rationale

Mark Roseland, in a presentation to the City of London, Ontario entitled "The Responsible City as Sustainable City," said that

> "local governments are serving as laboratories for policy invention in the environmental arena. While broad policy parameters are being formulated at the international level, local governments are developing the thousands of concrete changes in economic, political and social behaviour required for sustainable development. The concrete innovations that they are testing are providing models for national level policies and programs" (Roseland 1993, 4).

Many of these changes in economic, political and social behaviour could be influenced by the City of Winnipeg's approach to environmental stewardship and conservation. I suggest that the City of Winnipeg approach conservation on the following terms:

- that it be handled in partnership with business and business associations
- that the City regard our sources of water and energy as municipal assets and that while it is responsible for providing businesses with water and energy and the collection of waste; it is also incumbent upon the City to incorporate into these services effective conservation and environmental stewardship mechanisms
- that the City become knowledgeable about conservation practices, equipment and technologies being developed in the marketplace; and businesses, such as The Body Shop who are taking leadership roles in water and energy and waste minimization.

While the City of Winnipeg has been slow in taking a proactive approach to conservation, so too have businesses been slow in realizing the cost benefits of resource conservation

and waste minimization. A Coopers and Lybrand, Deloitte Report entitled, "Industry Briefing" February 1992, showed that initial resource conservation and waste minimization experiments showed rapid financial savings in packaging, fuel and water supply costs. Companies investing in environmental technologies or systems in the order of between $25,000 to $325,000 were showing rewards and paybacks in the period of eighteen days to two years. The report suggests:

> "all companies that improve their environmental performance will gain a significant long-term advantage over their less aware competitors. Businesses who are slow off the mark are likely to find it increasingly difficult to market their products, dispose of waste, obtain insurance, attract financing and recruit and retain the best staff (Coopers 1992, 7).

Ann Davis, senior vice-president of KPMG Environmental Services Inc. in Toronto, believes that trends in Europe and the U.S.A. suggest that Canadian companies will be compelled to move quickly to comprehensive, verifiable and qualitative disclosure of environmental performance. KPMG suggests that ultimately, this process will be mandated, either by regulation or by the voluntary adoption across industries of expected standards of environmental management such as the International Organizations for Standardization and the Canadian Standards Association (KPMG 1993).

1.3 The City of Winnipeg's Current Approach to Municipal Environmental Issues

I would characterize the City of Winnipeg's current approach to conservation as environmental promotion, rather than environmental management. Businesses pay for the

utilities they use including water and energy based on consumption and the City of Winnipeg profits by selling utilities. The City of Winnipeg is currently promoting conservation awareness to the residential and business sectors through the "Slow the Flow" program of The City of Winnipeg Waterworks, Waste and Disposal Department and Winnipeg Hydro's "Power Smart" program. Both of these programs are designed to educate the public, provide assistance or "audits" of water and energy use and recommend new technologies that will assist business and households in saving water and energy costs. This practicum suggests that the Departments of Waterworks, Waste and Disposal and Winnipeg Hydro can go beyond the promotional aspect of these programs, and facilitate businesses to voluntarily engage in environmental management and reporting on their operational use of water and energy. The City currently knows how much water and energy businesses are consuming, based upon their billings; but it does not know how these resources are being used and whether there are opportunities for increased efficiency and conservation. It is currently left up to individual businesses to approach the City for assistance in water and/or energy conservation. This is a passive rather than proactive management approach which does not address the issue of identifying what should be involved in water and energy conservation assistance programs.

1.3.1 Water

The City of Winnipeg Waterworks, Waste and Disposal Department is involved in the preparation of a long term Water Conservation Study with the assistance of Wardrop

Engineering Inc., TetrES Consultants Inc. and CH2M Hill Ltd. The study is currently ongoing, and was first initiated in 1992. The purpose is to develop a long-term water conservation strategy for the City of Winnipeg. Phase one of the study showed that Winnipeg's demand for water is still increasing and that costly system upgrades of over $400 million may be required in the next 20 years to rehabilitate the existing aqueduct and to increase system capacity to meet projected demands. Terry Josephson, Water Conservation Technologist with the Water Conservation Program, stated the goals of the Water Conservation Program include:

1. to achieve a 5% reduction in projected city wide demand by 1987;
2. to achieve a 10% reduction in projected demand by the year 2010;
3. to defer the need for a new water supply until the year 2017.

In 1993, the Water Conservation Program launched its public relations campaign called "Slow the Flow"; aimed at both households and business/industry to encourage Winnipeggers to reduce their water consumption. The assumption of a media advertising campaign like "Slow the Flow" is that industry and private citizens will respond to the plea for water conservation. This practicum supports the status quo and the current overall approach to water conservation, it suggests that now is the time to move forward and customize and target conservation assistance to selected market segments. If the Department knew how local businesses or households were using the water they received, it would know where assistance was needed in outfitting new technologies or new production processes to conserve water. Some percentage, if not all, of the money going into media advertising could be targeted at determining levels of consumption, evaluating

efficiency and identifying achievable technological and management conservation improvements.

The Water Conservation Program has identified that 60% of the City's water supply is consumed by households and 40% by business and industry; and the program is now attempting to address these two components separately. It has recently conducted a survey to develop a profile of water use among business and industry. I suggest that the program continue to address these two components separately and that a reporting system with industrial businesses/industries be established to determine precisely how water is being used and where increased efficiencies could be realized.

The City of Winnipeg Water Conservation Report states that in order to mobilize support for water conservation, an effective information program will be required "to increase public awareness of the need for water conservation, its benefits, and how the individual customer can participate" (City of Winnipeg 1992, 4-2). The environmental management and reporting system this thesis practicum describes will allow for that necessary customer participation within the business sector.

The City of Winnipeg has stated that "the water utility should be not only the supplier of water but also the promoter of water efficient technology and practices" (City of Winnipeg 1992, 4-3). It has also stated that its goals include "developing an improved understanding of the characteristics of Winnipeg's water use and increasing public

awareness of water efficiency methods and practices" (City of Winnipeg 1992, 4-3). I suggest that in order to do so, the City must work directly with business and develop an effective approach to environmental management and water conservation.

The conventional regulatory approach of altering water rates will not necessarily result in improved water conservation practices among business and industry. A business or industry may attempt to use less water generally if it is more expensive, but it will not correspondingly turn its attention to more efficient ways to conserve and manage water within the company. If a feedback mechanism was in place for business such as a monitoring system, the Department of Waterworks, Waste and Disposal could identify businesses that need conservation assistance as well as those that are conserving water through increased efficiencies. This would put the Department in a position to publicly recognize and reward companies for effective environmental management.

The current "Declining Block Rate Structure" actually makes it more economical for businesses to consume large volumes of water. This rate structure bills customers $1.55 per hundred cubic feet for volumes of water up to 9600 cubic feet; $1.23 per 100 cubic feet for volumes between 9,600 and 96,000 cubic feet; and .90 per 100 cubic feet for volumes over 96,000 cubic feet. This form of supply based rate structure actually acts as an incentive to consumption rather than conservation. Sharon Martinson, Financial Analyst with the City of Winnipeg Waterworks, Waste and Disposal Department, stated that because of this, the City is in the process of changing from the current "Declining

Block Rate Structure" to a "Uniform Volume Rate by Customer Class." The proposed Customer Classes will include residential; multi-family; commercial; large volume; and seasonal. Under the "Commercial Customer" class, all businesses will pay the same amount per unit of water consumption, ie. $1.36 per 100 cubic feet of the water they consume. The Department of Waterworks, Waste and Disposal has stated that there is the possibility of building an incentives program into the rate structure for customers to conserve water although this has not yet been done.

The advantage of the "Uniform Volume Rate by Customer Class," is that it allows the Department to target different Customer Classes. I suggest that this is a first step toward being able to identify how much water businesses in the Commercial Customer Class are consuming, and more importantly, whether or not businesses are attempting to conserve water and what kind of specific water efficiency assistance they require. This is a first attempt at targeting conservation assistance to the business sector.

The City is proposing to spend $0.7 million annually on water conservation in the hope of deferring the $25 million cost required to upgrade the existing water supply infrastructure to maintain its present capacity (City of Winnipeg 1992, 4-2). This practicum supports the premise that the introduction of environmental reporting mechanisms can contribute to this cost deferral strategy. Chapter Three describes how such reporting mechanisms could be structured.

1.3.2 Energy

Winnipeg Hydro is involved in the Power Smart Program, which is an international initiative by electric utility companies to assist their customers in conserving and using energy efficiently. Utility companies across Canada, in the United States and Europe are members of Power Smart. Mr. Tom Akerstream of Manitoba Hydro's Power Smart program reported that Manitoba Hydro's Power Smart program provides services to roughly 75% of the Winnipeg market and Winnipeg Hydro's Power Smart program services 25% of the marketplace. Power Smart's focus is public education of energy conservation practices, and promotion of energy efficient products and technologies including appliances, home insulation techniques, heat and air conditioning, lighting and motors. Consultation services are available to households and business in energy audits, technology adaptation and conservation information. As with water conservation, the onus is on the consumer to respond to media advertising and voluntarily engage in conservation behaviours.

From an environmental management perspective, the Power Smart program is helpful, but it is only the first step in a comprehensive approach. Within the business sector, Winnipeg Hydro could become informed about how energy is being used by individual businesses and where conservation efforts need to be focused. Mr. Brian Gaber, Manager of the Power Smart Program with Winnipeg Hydro, stated that Winnipeg Hydro has no source of information on how businesses and households are using energy nor has it any

measurable targets to be met by the Power Smart Program. There is no method to evaluate whether this approach to energy conservation among households or business is achieving any significant results.

1.3.3 Solid Waste and Sewerage

Environmental management and reporting on the part of business would be of assistance to the work of the Industrial Waste Control Branch of the City of Winnipeg Waterworks, Waste and Disposal Department. The City of Winnipeg Sewer Utility By-Law No. 5058/88 specifies the characteristics of wastewater that cannot be discharged into the sewer system. Businesses that are disposing of dangerous wastes must secure an industrial wastewater licence and are prohibited from dumping waste into the sewer system that has a biochemical oxygen demand concentration greater than 300 mg/L; a suspended solids concentration greater than 350 mg/L; a grease concentration greater than 150 mg/L; and a temperature greater than 65 degrees C. Metal concentrations are allotted for aluminum, cadmium, chromium, copper, lead, mercury, nickel and zinc. Gasoline, benzene, naphtha, fuel oil, flammable or explosive liquid, solid or gas, are prohibited. While these items represent the specific pollutants that are not allowed in the sewer system, there are still parts of By-Law No. 5058/88 that are general, such as any substances "containing any noxious or malodorous substance capable of creating a public nuisance; containing substances which might interfere with the operation of the sewer system, treatment and disposal process operated by the City; or any dangerous or

hazardous waste." By-Law No. 5058/88 does not address the amount of water that companies may use to dilute pollutants to reach a permissible level. There is room here for wasted water and pollutants to be entering the sewage system.

Mr. Jim Anton of the City of Winnipeg, Waterworks, Waste and Disposal Department stated that the Department is responsible for checking the sewer system to track disposed contaminants. Surcharges are levied on businesses which do not comply with the specifications of their industrial wastewater discharge licence. Mr. Anton reported that there are 34 businesses today that are being levied a surcharge by the Department of Waterworks, Waste and Disposal. This figure is down from 1990, when there were 42 businesses levied. The Department attempts to visit these establishments once per month and sample their waste to make sure they are not exceeding their pollution limits. The businesses which are surcharged are small, medium and large and fall into the following broad industrial categories: meat packing and processing; poultry; beef and pork; breweries; bottling; rail yards; dairies; tanneries; metal cleaning; dry cleaning; fish packaging; paperboard manufacturing; and food processing.

Mr. Anton reported that the Department is considering trying to obtain more environmental information from new companies when they apply for a sewer license by cross-referencing to their business license. This inter-departmental exchange of information would help the Department assess and predict the waste new business would produce. Mr. Anton suggested that if a reporting system was in place for all businesses

to report to the Department on the quantity and quality of waste being produced, it would greatly assist the contaminants tracking process. The tracking process still identifies pollutants in the sewer system without a source and any information the Department could obtain on the waste that business is disposing of in the sewer system would be helpful.

The Solid Waste By-Law No. 1340/76 governs the City's collection and disposal service. The waste collection and disposal service is intended for businesses with a low volume of waste, defined as less than four cubic yards per week. Mr. Brown, the Supervisor of the Refuse Collection and Disposal Service for the South-West Branch of the City of Winnipeg, stated that there are no "checks and balances." Drivers do not know what goes into the bins or what kind of waste they are transporting. He stated that if the Department knew what type of waste a business was producing, drivers might also be able to separate or distinguish wastes and identify what materials are currently being disposed of in landfill sites. A 1994 Landfill Report Number Z-7.7.1 from the City of Winnipeg Waterworks, Waste and Disposal Department, indicated that the City of Winnipeg transports only a small percentage of materials that are disposed of in the landfill site. In 1994, only 227,530.19 metric tonnes of waste came from the City's residential, commercial and industrial delivery. Even if the City knew what was being disposed of, it still transports only a percentage of waste. The remainder of the 667,126.85 metric tonnes of waste reported in the landfill site in 1994 came from individual transporters. If business informed the City as to the kind of waste that was being disposed of at the landfill, the City might be able to identify new opportunities for

recycling between businesses or industries.

The Department of Waterworks, Waste and Disposal is currently embarking upon a Waste Minimization Strategy, to be conducted by consultants outside the Department. The strategy will review the current Waste Minimization Program which includes: fall leaf collection; rebates on home composting units; Christmas tree chippings; office paper recycling; public information in the areas of recycling and composting; and the municipal recycling depots. The consultants will gather public input and make recommendations on future directions for the Program.

Mr. Tony Kuluk, Solid Waste Disposal Planning Engineer with the Department, stated that the current program is aimed at the residential sector only because of budgetary limitations. He suggested that the program should be developed to address the business sector and that input from business was essential in the formation of the proposed new Waste Minimization Strategy.

1.4 Municipal Conservation Efforts and their relationship to Provincial and Federal Environmental Programs

Mr. Dan McNaughton, Manager of Environmental Land Use Approvals with the Province of Manitoba, stated that environmental information from business in the areas of water and energy consumption and waste accumulation would be useful to the work of the

Environmental Officers with the Department of the Environment. The Officers currently work within a region of the Province to enforce environmental regulations after a business has been issued a license. Regulation 163/88 of the Environment Act states that under the Licensing Procedures Regulation, "for the purposes of subsections 10(3), 11(3) and 12(2) of the Act, a proposal for a Class 1, 2 or 3 development shall contain a description of the type, quality and concentration of pollutants to be released into the air, water or land; and the impact on surface water and groundwater." Regulation 163/88 also calls for "a description of the proposed environmental management practices to be employed" and "conservation and protection of natural or heritage resources." From the language of the regulation, it is clear that the Department of the Environment requires business to conduct its own environmental management and identify how it proposes to manage and conserve its water, energy and waste in a new development.

The Classes of Development Regulation, Regulation 164/88, identifies Class 1, 2 and 3 developments in municipalities. Class 1 developments include physical plants in the areas of agriculture, steam plants, fish hatcheries, forestry, manufacturing and industrial plants, and water treatment plants. Class 2 and 3 developments include electrical generating stations, pulp and paper mills, mining, recreational resorts, transportation and transmission lines, waste treatment, storage and scrap processing, water development and control projects. This regulation requires that potential polluters account for and take responsibility for their potential detrimental impacts upon the environment.

Not all businesses however, are required to have licences. It is therefore impossible to keep track of the polluting practices of non-licensed businesses. Mr. McNaughton suggested that if environmental officers knew how all municipal businesses were using their energy and water and what kind of waste they were producing, it would help offices develop and target their environmental protection and conservation efforts more fully.

Mr. McNaughton also believes that environmental management information from the City of Winnipeg would be helpful in assembling the required information for a business to secure a licence with the Department of the Environment. It would help the Department in the preparation of Environmental Impact Assessment Reports by providing a performance record of how business was managing its water, energy and waste.

The political climate for the development of various cooperative initiatives between government and business in addressing environmental management issues has improved in recent years. For example, provincial governments are providing for more multi-stakeholder consultations such as the formation of the Provincial Round Tables on Environment and Economy. They are showing a willingness to explore the use of tools relying on voluntary industry action and/or market based incentives and there are a number of examples of arrangements with individual companies and industry associations such as the Canadian Chemical Producers' Association's "Responsible Care Program" (Wassenaar 1993, 5). Since a regulatory approach involves high administrative costs for government and high compliance costs for business, the alternative of a mutually agreed

upon environmental management and reporting system can be a more cost effective way of achieving environmentally efficient business practices. If municipal governments could supply provincial governments with raw data on how business was managing water, energy and waste, provincial governments could work with industries and associations on a more issue specific basis.

The International Institute for Sustainable Development (IISD) conducted an international survey in 1992, which documented that business believes government assistance is vital to improving the environmental performance of companies. As a result of this work, the IISD suggests that provincial government policy makers need to be knowledgable of industry and private sector environmental management activities and assess their effectiveness and consistency in the context of existing and proposed government policies. They also suggest that government should consider establishing regulatory "performance" standards. The 1991 update of the World Conservation Strategy called on industry and government to identify one of their priority actions as:

> "committing business to sustainability and environmental excellence expressed in high performance standards and advanced by economic instruments. In satisfying this goal, there will be a need to consider the occupational health and safety of workers; energy, material and water efficiency of practices, processes and products; control over the life-cycle of manufacturing; and integrated approaches to pollution prevention and control" (IUCN/UNEP/WWF, 1991).

Given the preceding discussion, I will now turn to an examination of current environmental management systems in business. Following this, Chapters Three and Four will return to Winnipeg's Departments of Waterworks, Waste and Disposal and Winnipeg

Hydro to discuss: how the City can expect to obtain environmental information from business; what assistance the Departments can realistically offer business; and what value this information holds for the Departments and the business sector.

2. Environmental Management for Business

2.1 Introduction

This practicum focuses on the relationship of the City's Departments of Waterworks, Waste and Disposal and Winnipeg Hydro with small and medium size business for the following reasons:

1. There are existing models and systems of environmental management used by large corporations that could be adapted for use by small and medium size businesses. The use of these models will allow businesses to collect internal environmental information and report on their management efforts.
2. The Department of Waterworks, Waste and Disposal is already identifying and collecting data on large industrial users of water and energy who are known polluters. However, there is currently no mechanism to collect data from small and medium size businesses to ascertain how much waste they are generating or where conservation efforts could be employed.
3. Conservation must be targeted to the specific needs of business. A large section of Winnipeg economic activities are based in small and medium sized businesses and their needs must be accounted for in any effective environmental management strategy.

First, I would like to focus on what environmental management means to small and

medium size business and ways that it can be introduced into their ongoing business activities. Environmental management is currently accepted practice in many large corporations, either out of the need to demonstrate "due diligence" for legal purposes, or out of a concern for public relations and a desire to project a "green" or environmentally responsible image (Waiman and Kydd, 1994, 6.24). Environmental management programs in large corporations were developed primarily to "protect" companies. I suggest that environmental management by small business can be used toward the goal of conservation and increased economic efficiencies in business operations. Environmental management in this context simply involves business being able to account for its use of energy and water and the type of waste being generated. Accounting for these functions gives business a baseline of how it is managing its utilities and waste and where conservation can occur.

This kind of environmental or resource use accounting can be accomplished through a number of specific procedures including an Environmental Audit or a Life-Cycle Analysis. Both approaches require companies to examine how they are using water and energy and what sort of waste they are producing. The following sections will describe these procedures and also introduce the concepts of environmental accounting and industrial ecology as a basis for technological design and efficiency. Section 2.7 will present the example of The Body Shop as a multi-national corporation whose corporate values and commitment to the environment are exemplary and could be fostered in any small or medium sized business.

2.2 How Businesses are Currently Involved in Environmental Management and Reporting

The suggestion that small and medium size businesses evaluate their use of water, energy and waste management practices, comes from a model that large corporations use to demonstrate to Boards of Directors and government their compliance with provincial environment regulations. A similar format could be used by small and medium size businesses looking for ways to save money and increase efficiencies in their use of water and energy and their practice of waste minimization. Rather than report to Boards of Directors, small and medium size businesses report to the City of Winnipeg who in turn will refer them to available consulting expertise in the private sector for assistance.

Nitkin and Powell of EthicScan Canada (1993) surveyed private businesses, crown corporations and industry associations to find out what sort of corporate or business/industrial environmental management and reporting is occurring in Canada. They suggest that business reporting on environmental issues is essential in developing a dialogue and partnership between business and local government. Environmental management and reporting are required in order to conduct private sector cost-benefit analysis and economic decision-making; assess the health and welfare of workers, communities and regions; determine the long term availability and use of resources; quantify Canada's standard of living; attract international investment in Canada; and integrate the issues of the environment, the economy, health and ethics into one organic

decision-making whole.

Nitkin and Powell report that currently fewer than one in one hundred corporations in Canada are committed to releasing an environmental report. Only about seven in every hundred firms report to their Boards on environmental matters. At the same time, there is evidence that our international trading competitors are adopting waste, packaging, management, transportation, audit and other sustainable practices that represent highest rather than lowest environmental standards. Those companies that do report, represent a concern for economic efficiency, environmental effectiveness and social equity (Nitkin and Powell 1993, 1).

Most companies that are currently concerning themselves with environmental matters are doing so in a reactive program of the three Rs: reduce, reuse and recycle. They set management and reporting standards on compliance with current minimum standards regulations (Nitkin and Powell, 1993, 7). This is not environmental management or reporting, but rather recycling and compliance. The environmental management system I am suggesting for small and medium size business will move companies beyond the three Rs into a more comprehensive examination of how the resources, utilities and materials in their companies are being managed.

A representative sample of Canadian companies that are currently involved in environmental management and reporting to government include Union Gas and

Consumers Gas, Xerox Canada, Cargill, IBM Canada, McDonald's, Kodak Canada, Bell Canada, Shell Canada and Ontario Hydro (Nitkin and Powell 1993). There are also industry associations that require members to submit environmental performance reports to their associations. These reports serve as benchmarks for members to compare their performance against the membership as a whole and to serve as a measure of accountability to the public. Examples of these are the Responsible Care program developed by the Canadian Chemical Producers' Association which includes guiding principles and codes of practice for the environment and health and safety which all its members which must implement as a condition of membership; the Quebec Mining Association; the Canadian Petroleum Products Institute; the Council of Forest Industries of British Columbia; the Alberta Forest Products Association and the Mining Association of Canada.

Significant progress in environmental management in the business community has been demonstrated in Ontario.

> As of the end of 1993, Ontario's educational institutions, construction and demolition companies, food service establishments, health care facilities, hotels and motels, manufacturers, multi-unit residential dwellings, office buildings and retail shopping complexes are required to carry out waste audits and establish work plans, implement source separation of recyclables, and implement work plans so as to reduce unnecessary waste disposal. All audits and work plans must be updated annually and the work plans displayed for municipality or Ministry of Environment spot checks (Campbell 1994, 92).

What is notable here is that the work plans of businesses and facilities will be reviewed and "spot checked" by the Municipality or provincial government. This requires

businesses to institute and conduct some regular form of environmental management.

While a few companies do report to government on environmental issues, the majority do not. The reasons why most companies do not report their environmental activities and operations are (Nitken & Powell 1993):

- environmental factors are not typically represented on a company's balance sheet and it is challenging to assemble the required financial, scientific, ethical and statistical information;
- lack of industry association leadership;
- real or espoused uncertainty about how to manage and what to report;
- lack of business commitment to experimenting with environmental management approaches;
- traditional business training that excludes environmental factors from rational economic modelling, decision-making and economic analysis;
- a piecemeal approach to the subject such as a waste management report or energy efficiency audit rather than a comprehensive environmental management program;
- lack of accepted standards for data collection and measurement; management's response to environmental issues as regulatory issues and compliance still being the over-riding concern;
- a belief that reporting on environment concerns is primarily a public relations exercise rather than a component of comprehensive management;
- fear of voluntary disclosure that a company is not meeting the required

environmental rules in its activities and processes;

- tough recessionary times in recent years have meant that many companies streamline their business audits and total quality management considerations (assuming they were there in the first place). It has not been an appropriate time to invest in new technologies, staff and managerial systems;
- competition rather than ethical leadership, is rewarded in business;
- there is often a difficulty in finding an outside consultant to undertake a company review because of the lack of a defined procedure. Lawyers, accountants and environmental audit professionals are all competing for these opportunities.

2.3 The Environmental Audit

The Environmental Audit is one environmental management procedure whereby business can evaluate its use of water, energy and waste management practices. In 1990, the Conference of British Industry, based on the International Chamber of Commerce's principles, defined an "environmental audit" as "the systematic examination of the interactions between any business operations and its surroundings. This includes all emissions to air, land and water; legal constraints; the effects on the neighbouring community; and the public's perception of the operating company. An environmental audit approach is not limited to minimum compliance, nor is it a "green-washing" public relations exercise. It represents a "total strategic approach to a company's activities" (Gray 1993, 79).

The Environmental Audit requires a company to:

(1) gather operational and performance data from staff;

(2) factor environmental data into all of management's decision making;

(3) set environment goals and objectives;

(4) define environmental policies that guide the decision-making and priority setting of the company.

In Canada, no official statutory definition yet exists for environmental audits. However, the federal government's Enforcement and Compliance Policy published in 1988 to accompany the proclamation of the Canadian Environmental Protection Act defines environmental audits as:

> "internal evaluations by companies and government agencies, to verify their compliance with legal requirements as well as their own internal policies and standards. They are conducted by companies, government agencies and others on a voluntary basis, and are carried out by either outside consultants or employees of the company. Audits can identify compliance problems, weaknesses in management systems, or areas of risk. Their findings are documented in a written report" (Wainman and Kydd 1994, 5.2).

Although there are numerous ways to structure and conduct an environmental audit, the Harmony Foundation in Ottawa suggests the basic categories and components of small and medium size business activities that should be considered. Each business will have different sources of data available to them and differing abilities to gather and assess information. The Environmental Audit will allow a company to amass the following data:

1. Production

i. Waste - an identification of the specific types of waste produced, ie. paper, office supplies, food, aluminum, metal, glass, plastics, packaging, textiles, grease, motor oil, batteries, tires, construction, or other.

- the annual volume of waste per type
- the percentage of waste that is currently recycled
- the annual cost of hauling away waste
- the destination of the waste, be it landfill, incinerator or other
- a description of the current 3Rs programs in the workplace

ii. Materials - the substitution or recycling of materials

- opportunities for products to be reduced in size or reshaped to minimize materials and packaging
- types of materials which either are or come from renewable resources
- replacement of toxic materials with less toxic ones
- use of non-recyclable materials which could be replaced with recyclable ones.

iii. Hazardous Materials - A company's use of hazardous materials requires that management provide employees with training in the handling of hazardous goods; secure storage; and registration with government agencies as a waste source and hazardous waste site.

iv. Water - A water audit would involve determining the following information:

- the annual volume of water consumption per year and the cost/year
- the uses for water and average percentage of use in each case
- how water could be used more efficiently in business operations and processes
- employees encouraged to reduce personal water use, reduce outdoor water use, not dispose any hazardous materials down the drain, protect water by using environmentally sound cleaning products, and recycle/reuse grey water
- the installation of water conservation technologies to reduce the consumption of water.

v. Energy - Depending on a company's accounting system, it may be able to determine the amount of energy that goes into particular products or services (Harmony 1991, 154).

2. Building or Plant Operations and Maintenance

i. Energy - The energy audit would include a determination of the major uses of energy including lighting, equipment, HVAC, specific processing or other and the amount or percentage of energy that is used in each case. A profile of each area of energy use would include:

- Lighting - type and number of fixtures; if fluorescent, type of ballast and luminaire; lamp wattage; number of lamps per fixture; watts per fixture; total watts in area; number of hours per day and days per year the lights are on;

opportunities for lights to be switched off when not required.

- Heating, Ventilation and Air Conditioning - the energy use for HVAC according to fuel type, cost/unit, volume/period and total cost/period; whether domestic hot water is heated by boiler; efficiency testing/cleaning of boiler and % of combustion efficiency; make, size, type and location of air conditioning; whether or not thermostat is set back at night and during the weekend; does the building have warm or cold spots and is it drafty near windows and doors; are the ceilings, walls, floors and sills properly insulated.
- Hot water - what is the fuel type used for hot water and the cost/unit; volume/period; total cost/period. What is the tank location and the temperature settings. If the hot water system is serviced by an outside contractor, what are the guidelines for service.
- Overall energy consumption - electrical: kw of electricity consumed per period for motors and equipment and the cost/period. Gas powered: cubic meters of gas consumption for motors and equipment per period and the cost/period. Are existing elevators, escalators and motors turned off when possible. Is office equipment turned off when not in use. Have opportunities for energy efficiency in all energy systems been explored.

ii. Hazardous Materials

- Building Maintenance - paints, varnishes, stains, paint thinners, turpentine, solvents, paint stripper, wood preservatives, aerosol containers, fibreglass resins,

epoxy resins, glues, window cleaners, rust removers, salt or other de-icers

- Grounds Maintenance - pesticides, herbicides, fertilizers, pool chemicals
- Transportation Maintenance - car batteries, transmission fluid, antifreeze, acids, engine coolant, motor oil, brake fluid, tires, windshield washer fluid, freon, degreasers, cleaners
- Interior Building Materials and Furnishings - insulation material, asbestos costings, fire extinguishers, sprinkler systems, floor coverings, furniture, light fixtures, ballasts
- Interior Office Equipment and Supplies - air conditioners, photocopiers, computer printers, air cleaners, photographic equipment, photographic chemicals, video display terminals
- Cleaning Materials - aerosol containers, bleaches, carpet cleaners, detergents, disinfectants, general cleaners, lighter fluid, waxes.

3. Transportation

- number of cars and trucks in the fleet; kilometres, in total, the fleet travels per year; is fuel efficiency a consideration in purchasing a new vehicle; are employees encouraged to car pool or use public transportation and use teleconferencing rather than business travel; is fuel efficiency emphasized in fleet maintenance (Harmony 1991, 156).

4. Purchasing

- what environmental considerations are incorporated in making purchasing decisions; is there participation in a trade/industry association that coordinates efforts on behalf of members to promote environmentally sound products and purchasing practices; is there a purchasing policy and does it contain environmental considerations; are suppliers/dealers involved in any environmental initiatives (Harmony 1991, 158).

2.3.1 Audit Review

Once a business has conducted an initial Environmental Audit, it has a picture of the company's environmental behaviour and can look for opportunities for cost savings and technological or managerial change. Mr. David Van Seters, an environmental management consultant with the firm of KPMG in Vancouver, has stated that

> "energy, waste, effluent - all those things have costs attached which a lot of companies look at as the cost of doing business, not something they have control over. But it has been shown in many cases that just by taking a few strategic measures, companies can, for example, cut their waste production or energy use in half" (Banks 1992, 24).

When the audit is completed, an inventory of information will have been established and management and staff can begin to define objectives and areas of business activities that require modification in order to conserve water and energy and minimize waste. With the audit results in mind, management can decide what strategic measures are required

to be taken and what overall changes the company may need to make in the areas of:

- investment decisions
- purchasing practices
- insurance decisions
- product design
- consumption of raw materials, energy and water
- reduction and disposal of waste
- education and training for staff and management
- technology choices (Nitkin and Powell, 1993).

Assiniboine Community College, a medium size business with two hundred employees in Brandon Manitoba, recently conducted a six month environmental audit of their operations and facility. The College engaged the services of three unemployed professional engineers through the Manitoba On-Site Program, a program funded by the Federal Department of Employment and Immigration. The program funds unemployed engineers, planners or managers with environmental experience and collecting unemployment insurance, to work for companies in the environmental field. This allows environmental projects to be undertaken by businesses and government departments and unemployed professionals an opportunity to exercise their skills and abilities. The College's Environmental Audit included the following components:

- an assessment of energy consumption within the building envelope;
- a water audit;

- an assessment of the College's compliance with environmental regulations;
- a definition of the College's purchasing policy and procurement practices;
- a hazardous and non-hazardous waste audit;
- an indoor air quality audit;
- an assessment of the College's system for materials management.

The protocol for the audit came from many of the references listed in this practicum, including: The National Round Table's, Small Business Guide to Environmental Management, the Canadian Standards Association, The Harmony Foundation's The Workplace Guide and Rob Gray's Accounting for the Environment. Chartered Association of Certified Accountants.

Although Assiniboine Community College has yet to realize any cost savings or efficiencies, Mr. Mark Birch, Sustainable Development Coordinator with the College, believes the audit is an important first step; and that with managerial and behavioural change, the College will recognize opportunities to better conserve resources and manage waste.

2.3.2 Policy Formation

Once a business' environmental audit is complete and activities and behaviour have been modified, it is time to make more formal changes within the company. After having

completed an environmental audit, and established a baseline of information, a company should be in a position to document how its operations and processes could be adjusted to conserve water and energy and minimize the production of waste. These changes must be worked into their overall management policies and procedures. Without a policy framework, a business is likely to end up with a patchwork of uncoordinated piecemeal measures and uneven participation throughout the company (Wainman and Kydd 1994, 4.5). The exercise of developing an environmental policy in response to an audit allows the company to formally identify the management objectives it will take on and what water, energy and waste practices are required to meet these objectives. Policies are typically associated with large corporations, but I suggest they can be used effectively by small and medium size business. A policy in this context represents an agreed-upon approach to dealing with environmental management issues as determined by a review of an environmental audit.

2.3.2.1 Examples of Environmental Management Policies

The following section provides two examples of environmental policies from large corporations that could be modified for use by small and medium size business. They are intended to illustrate the kinds of management issues that should be considered.

The first example is from a company called Pilkington Glass Limited in the United Kingdom (Gray, 1993, 62). The PGL Environmental Policy states:

"To sustain and protect the environment, we will:

- conduct environmental audits of all our operations to ensure that waste and pollution are minimized.

- regulate and improve our manufacturing processes to cause the least practicable impact on the environment, encouraging our employees to help and investigating ahead of legislative requirements.

- develop and market products that have excellent environmental characteristics and which meet the highest demands for efficiency.

- liaise with suppliers and customers to facilitate the best possible environmental practices in the manufacturing and installation chain, and promote the recycling of glass and related materials.

- co-operate with the appropriate authorities and technical organizations in the formation of standards and means of compliance.

- promote and undertake educational programmes and discussions on environmental issues for employees, suppliers, customers and the community at large protecting health and safety.

- discuss environmental issues regularly at the highest level of the Company" (Gray 1993, 62).

The second example is from The Workplace Guide, published by the Harmony Foundation (Harmony, 1991, 133). It outlines a model environmental policy for business that includes the following components:

- to responsibly manage all aspects of our operations to ensure that recognized environmental standards and legal requirements are met and exceeded.

- to give appropriate consideration to environmental concerns in the management of our investments and assets.

- to manage our internal operations to promote environmental protection in all feasible ways.

- to work with industry, government and public groups to help determine the

activities necessary to improve our environmental performance.

- to conduct and make public an annual evaluation of our progress in implementing our environmental goals and policy.

To date, no formal municipal or provincial policy statement relating to environmental audits and their disclosure has been published. The Ontario Ministry of Environment and Energy has issued a draft policy on access to environmental evaluations. The policy addresses the voluntary disclosure of environmental evaluations, the circumstances when involuntary disclosure may be required and protection from prosecution (Wainman and Kydd 1994, 5.9). There is an interesting European initiative in this area. In 1990, the Commission of the European Communities completed a "Proposal for a Council Regulation allowing voluntary participation in a Community Eco-Management Scheme" for adoption by the European Community. The European Parliament passed the Eco-Management and Audit Regulation in June 1993. The regulation binds member states to set up national certification schemes and is scheduled to take effect in April 1995. The objective of the scheme is:

"to promote improvements in the environmental performance of industrial activities by:

- the establishment and implementation of environmental protection systems (defined as a coordinated set of measures of various kinds aimed at protecting the environment) by companies;

- the systematic, objective and periodic evaluation of the performance of such systems, including assessment and record of relevant data such as, in particular, those on the natural resources and energy used, the releases of pollutants into the air, waters and soils, noise levels with the aim of reducing the environmental impact to a minium;

- the provision of information on environmental performance to the public" (Wainman and Kydd 1994, 5.12).

The Proposal sets out the issues, criteria and requirements relating to environmental protection systems, environmental auditing and accreditation of environmental auditors. Participating companies must establish an internal environmental protection system, conduct an objective evaluation of the environmental performance of the system using a prescribed form of audit and issue annual summary reports on the audit results. The proposal does not set reporting or accreditation standards (Wainman and Kydd 1994, 5.12).

A thorough environmental management system should begin with an audit and subsequent identification of management objectives and result in a commitment to a new company policy. The policy should lead to an implementation strategy to be carried out by staff, accompanied by regular monitoring and adjustments as required. The daily realities of improved environmental behaviour must be sustained by staff responsible for regular monitoring and internal reporting to management. An operational commitment to the company policy is required to keep information flowing and data current in all aspects of business operations. Continual input from employees is essential since they are the ones actively involved in the businesses procedures and products. As Wainman & Kydd (1994, 4.8) have stated: "The best boardroom policies in the world are of little use if the truck drivers are not aware of the environmental hazards posed by the cargo they are carrying." Involvement and participation of employees can generate positive ideas and

increased enthusiasm for the system. They must be active in creating the systems of communicating and reporting required for company review and improvement of operations.

The following example is from the staff of the International Institute for Sustainable Development (1994), who voluntarily changed their behaviour and environmental accountability after conducting an audit and incorporating the findings into their day to day business activities and decisions.

IISD became very conscious of its paper waste once it conducted an internal environmental audit. The company began to produce all of its documents using recycled paper which it purchased from a local Winnipeg supplier. It also began to make sure that all its documents were printed on both sides and that double sided photocopying was taking place. In order to reduce the amount of paper that was being used, the office decided to make sure that all inter-office memos were sent by electronic mail. Newspapers, magazines articles and journals were shared and passed around the office rather than being photocopied. Cloth napkins were provided to staff to use in the lunch room and washroom to reduce the paper towel use. China and ceramic cups and plates were also used in the lunch and coffee areas to cut down on waste. Name tag holders were collected after meetings for reuse.

The office also designed its own recycling system. Each employee had his/her own tray

for recycled goods by the desk. He/she would recycle daily materials such as paper, glass, aluminum, plastic soft drink bottles and milk cartons. Each employee was responsible for taking their recyclables to the proper office depot in the staff room. The staff was very comfortable with this system and each person could see how much waste he/she was accumulating and where it was going.

IISD became very conscious of its purchasing practices and developed a policy on business purchases. It asked all of its major suppliers to submit a statement of their environmental policies and practices. It also asked certain suppliers to change their packaging practices and to take away packaging materials delivered to the office that were not recyclable. It attempted to purchase items in bulk to reduce packaging waste and endeavoured to buy from local Manitoba suppliers. When the company was looking for hotel accommodation it chose Canadian Pacific Hotels and Resorts because of its environmental sensitivity and its Green Partnership Policy. When the company catered a meeting or dinner, it used the services of a catering company that was acting in an environmentally responsible manner.

Energy efficiency was also addressed by IISD. Although they were renting their office premises and were not in a position to modify the building's heating and cooling system to operate at full energy efficiency, they did however change their office behaviour. The staff began to turn off lights that were not in use. They stopped using large overhead lights and used desk lamps for specific tasks. They changed the layout of office furniture

so as to take advantage of natural lighting coming in the windows and closed window shades at night to retain heat. The staff also became conscious of the amount of energy being used by office equipment and made sure to turn off computers, printers and photocopiers when not in use.

The staff began meeting with the building manager to learn more about the building envelope and opportunities for energy efficiency. They took to using the stairs between floors rather than the elevator and began to look at broader issues of transportation. One staff member volunteered to be the transportation coordinator and arranged for carpools for the rest of the staff. IISD decided to give out bus passes rather than parking passes and staff decided to take the bus rather than their own cars to downtown meetings during the day. IISD also installed a bicycle rack and the use of bicycle transportation went up dramatically.

The staff became attuned to water conservation and began looking for ways to save water. They started keeping a pitcher of water in the refrigerator rather than running water to make coffee or tea. They also made sure that the taps were shut off properly after use and that water was not wasted.

The entire office took an interest in energy and water conservation and waste management and started brainstorming about more ways they could change their behaviour. They rewarded staff who came up with innovative ideas and approaches. They are still in the

early stages of modifying their behaviour and are actively looking for ways to measure their progress towards conservation. They do believe they have taken the first step, and will continue to look for methods of measuring their conservation efforts.

In Winnipeg, there are two other examples of small and medium size companies who have tackled environmental management with the objective of realizing cost savings. The Harmony Foundation reports that Winnipeg Photo realized technological and managerial advances by installing equipment to recover silver, bleach, fixer and developing fluid for recycling. It quickly recouped its investment in recovery equipment through the re-sale of the silver and chemicals. Export Packers of Winnipeg also made progress into the area of environmental management. The company processes about 1.3 million eggs a day in manufacturing dehydrated egg powders and generates about 6.8 tonnes of egg shells daily. Until 1984, shells were hauled away to a local dump at an annual cost of $40,800. In 1984, the company formulated a new product "Egg Shell Meal," a calcium and protein compound for chicken feed. This closed the recycling loop and provided an additional $110,000 in annual sales. Additional costs for equipment were $125,000 which were paid back in less than a year ($40,800 in avoided landfill costs and $110,000 in additional revenue). Both of these companies carefully examined their uses of water, energy and what sort of waste they were producing in search of ways to save money and conserve resources.

2.4 Life-Cycle Analysis - A Practical Application of Environmental Management

In addition to the Environmental Audit, a second useful technique is the Life-Cycle Analysis, or Assessment (LCA). Life-Cycle Analysis allows a company to analyze the amount of energy and water that goes into a product and the amount of waste that is produced (Canadian Standards Association 1992). It would be helpful to companies comparing different production processes or the effectiveness of various conservation technologies. LCA is a very technical and sophisticated analysis, but it can be used in a more limited capacity by business to see how much water, energy and waste is involved in a company's products, processes or services. It is increasingly being used by large companies and is being considered by some governments as a possible regulatory measure (Little 1994, 7). LCA has been approved by the Canadian Standards Association and is a recognized element of an environmental management system.

In order to apply an LCA, a business will need to have an accounting system that separates the water, energy and waste costs associated with products from those associated with the plant, building and maintenance. For example, the amount of electricity used to produce an individual product needs to be selected out, rather than including electricity in the company's overhead. This accounting is necessary to determine the unit costs of water, energy and waste being used in production of products. A unit cost system can be used to dissect the business into key activities and determine their environmental management objectives.

The Canadian Standards Association Guideline Z760.2 "Environmental Life Cycle Assessment" provides technical guidance on conducting and reporting LCA results. The Guideline has been prepared with input from business and industry associations, environmental interest groups, municipal, provincial and federal governments, organized labour and the financial community. It is not a regulatory instrument, but rather a framework to help government and industry develop environmental policies and programs. The following section outlines the general LCA procedure and suggests how it could have an immediate application to a small or medium sized business and eventual application by the City of Winnipeg for environmental monitoring and management programs.

An LCA for a product or process involves the following steps (CSA, 1992):

1. To quantify the water and energy that goes into a product; and the water, energy, and waste that result from the product. Water, energy and waste are applied to the entire life-cycle of a product including:
    - All of water and energy and waste associated with the phases of product development such as exploration, acquisition of materials, transportation and packaging
    - All of the water and energy and waste that are part of the manufacturing of a product
    - All of the water, energy and waste associated with packaging and distribution of the product including warehouse/filling/packaging, retail/wholesale channels, transportation and storage

- The water, energy and waste involved in disposal/waste management and recycling including collection, transportation, processing and preventative measures.

2. Identify opportunities to redesign or construct products or processes to consume less water and energy and produce less waste. Changes may include material substitution, improved production/process, improved distribution/transportation systems, alternatives to consumer use and maintenance of products, improvements to solid waste management techniques, energy efficiency, cleaner production technologies, recycling schemes, reduced consumption of raw materials or reduced packaging. The LCA is a useful exercise for both businesses and the City to attempt, in order to recognize the environmental impact of everyday products and processes and to look for opportunities for improvement and conservation.

2.4.1 Acrylon Plastics - A Practical Application

I applied an LCA to a medium size business in Winnipeg to test its usefulness. The company I chose, Acrylon Plastics, is a leading Canadian manufacturer of high quality, low cost plastic products. The company uses a process of rotational moulding and thermo forming to create products used in manufacturing, medicine, aerospace, recreation, agriculture, construction, transportation, engineering and packaging. The management of Acrylon Plastics is committed to finding responsible solutions to environmental problems

and was receptive to new systems of thinking and problem solving. I chose to conduct an LCA on the "Enviro Float," one of Acrylon's Products. The Enviro Float is a floating dock made of post-industrial waste made into a recycled polyethylene outer shell and post-consumer plastic waste made into a secondary flotation system consisting of 80 sealed two litre plastic soft drink bottles.

Acrylon Plastics was using an accounting system known as Activity-Based Costing (ABC). ABC accounting involves breaking down the individual costs of a total manufacturing process; costs which are typically included in general overhead. Resource consumption of water, energy and production of waste are among the manufacturing costs that can be pulled out of the overall manufacturing process; thereby allowing the company to consider its resource use and the environmental affects of its activities. Acrylon was able to develop a baseline of resource consumption and look for ways to improve its conservation efforts in the production of the Enviro-Float.

I gathered the following information by referencing the company's ABC accounting system. The production of each Enviro Float required:

- 152 cubic feet of natural gas
- 1,5 kW of electricity
- no consumption of water in the process
- 0.08 kg of waste plastic was created with each float

The value of this information is its usefulness as a baseline for Acrylon Plastics to look for ways to conserve energy and materials, cut costs and improve the environmental performance of the Enviro Float.

Businesses could use LCAs as an internal management tool in the following areas:

- to compare water and energy use and waste production among products, processes or activities
- to assist product designers and engineers to develop energy and water efficient products
- to provide information to the City of Winnipeg, professional and industry organizations
- to inform consumers about the water, energy or waste characteristics of products
- to negotiate with suppliers for materials that produce less waste
- to allow managers to set targets and measure environmental performance (Gray 1993, 174).

The City of Winnipeg could use LCAs as part of a broad environmental impact assessment process to:

- evaluate policies that affect water and energy use or conservation
- assist in the development of provincial policies and regulations on materials, resource use and pollutants
- evaluate environmental reports from companies

- establish federal and provincial research and policy priorities (CSA, 1993).

2.5 Environmental Accounting

Environmental accounting is included here along with industrial ecology, section 2.6, as a recommended framework within which to consider the introduction of municipal environmental management. As the City of Winnipeg and the small and medium size business community enter into a municipal environmental partnership, water, energy and land need to be regarded by both parties as municipal assets. Thomas A. Robertson, a Washington D.C. consultant and former coordinator of the Energy Centre at the University of Florida suggests that the ecosystem constitutes the primary asset base of any country (municipality) (Makower 1993, 37). The challenge will be to define and measure environmental information into all business decisions (Gray 1993, 21).

Daniel Rubenstein (1991), a principal in audit operations with the office of the Auditor General of Canada in Ottawa, refers to a new accounting model to promote what he calls "ecopreneurship." This is a company's ability to deliver goods and services with a full accounting of the inherent water, energy and waste disposal costs. Rubenstein believes that in traditional accounting, assets and liabilities are defined according to a traditional concept of private property which is no longer valid. The concepts of national and municipal ownership of natural resources are gaining increasing acceptance by government, members of the public and corporations. There is increasing pressure to

incorporate these concepts into new accounting models.

Rubenstein (1989, 31) describes the inadequacies in current business accounting systems as follows. First, businesses of all sizes cannot account for the full costs of production, which includes the costs of consuming energy, water and land, because they have no assigned monetary costs associated with the production phase. Rubenstein goes on to say that our "double-entry" accounting efforts, based on almost 500 years of practice, are geared to measure financial transactions rather than resource consumption. As such, our accounting rules penalize, rather than encourage, environmentally responsible business. We currently lack an accounting vehicle for providing business with incentives to improve environmental protection.

I believe Rubenstein's redefinition of accounting has applicability to municipal and business affairs. He states:

> "Accounting measures the resources consumed in producing goods and services for trade and for promoting public welfare, as well as the resources preserved, and the wealth created for future use, in accordance with conventions mutually agreed upon by both the stewards of these resources and the stakeholders to whom they are accountable." (Wainman and Kydd 1994, 9.6).

The Departments of Waterworks, Waste and Disposal and Winnipeg Hydro have an opportunity to show real leadership in the area of environmental accounting and management. If the Departments believe in the principles of water and energy conservation and waste minimization, a direct accounting and reporting relationship with

business will allow the Departments to assist business and acquire valuable information upon which to set environmental programs and initiatives. This thesis practicum recognizes that the vast majority of environmental accounting is a matter of voluntary disclosure. Businesses are not required but ought to be encouraged to make public their internal environmental management techniques and work cooperatively with government (Gray 1993, 207).

This practicum suggests that the City of Winnipeg keep informed of the software and templates currently available to implement environmental management and accounting systems. Sources of software include: GreenLEAP The Independent Association of Legal, Engineering and Accounting Professionals for the Environment, located in Toronto, Ontario; Canadian Institute of Chartered Accountants (CICA); the Canadian Standards Association; the Canadian Bankers Association; the Rural and Small Town Programme of Mount Allison University in Sackville New Brunswick; and the Canadian Environmental Auditors Association (Wainman and Kydd 1994, s.15).

2.6 Industrial Ecology - A Conceptual Framework for Industrial and Natural Process Interactions

Industrial ecology provides an emerging conceptual framework and systems design approach which addresses the interrelationship between industrial activity and the cycles and process of the natural world. Many of the businesses and industries we take for

granted have processes that run contrary to the natural processes occurring in the environment. Industrial ecology provides the City of Winnipeg and business owners with an opportunity to reflect upon business operations and processes and to look for cost effective ways of bringing industrial cycles more into keeping with the rhythms and patterns of natural cycles. Recycling is one example of an industrial ecological approach to managing waste. In the natural environment, all materials are reused and recycled for other purposes. Industries' attempt to recycle waste is a mimicking of the environment's own ability to reuse and reabsorb natural materials.

Hardin Tibbs believes that industrialization is the driver of the current global environmental crisis and business and government must create significant systemic change (Tibbs 1992, 5). He calls for a long-term perspective from government and industry for "industrialization that is not only more efficient but that is intrinsically adjusted to the tolerances of the natural system." While many business managers are concerned about isolated issues such as reducing the use of chlorofluorocarbons or promoting recycling, Tibbs suggests that business still knows too little about the adaptive capacity of the natural environment and how to predict how it will react to continuing industrialization. Business and local governments must learn how the natural global ecosystems function and how to design industrial systems based on the systemic design of the natural world; endlessly circulating and transforming materials. Environmental management systems, using techniques such as environmental audits and life-cycle analysis, examine the design and construction of products and processes and look for opportunities for recirculation of

water and energy and recycling of waste. Environmental management systems look to utilize technologies that work with natural systems not against them (Tibbs 1992, 6).

Tibbs describes industrial ecosystems as "closed loops" involving recycling, making maximum use of recycled materials in new production, optimizing use of materials and embedded energy, minimizing waste generation and re-evaluating wastes as raw material for other processes. Frosch and Gallopoulos (1989) see this as the transformation of the traditional model of industrial activity where manufacturing processes take in raw materials and generate products plus waste; into a model where the consumption of energy and materials is optimized and the effluent of one process serves as the raw materials for another process. Looked at from a global perspective, they envisioned the cycling of iron, plastic and platinum in ways which mimic natural hydrological cycles, nitrogen cycles or other nutrient cycles (Cote and Plunkett 1994, 1).

Although it may appear to be a daunting task for the City of Winnipeg and the business community to address the notion of industrial ecology, governments and business internationally are struggling to redefine the relationship between industry and the environment. David Chittick, the Environment and Safety Engineering Vice-President of AT&T, speaking before the American Senate Environment and Public Works Committee on February 23, 1993 observed that:

> "the integration of environmental considerations into the development of our technology and our economy will be a compelling challenge during the coming decades. We in American industry are beginning the comprehensive integration

> of environmental considerations into every aspect of our design, manufacturing and products. It will require all of us - legislators, industrialists, regulators, and the public to move forward together; sharing ideas and concerns; fostering innovation."

He concludes by saying that "all these efforts are preliminary and tentative, more in the nature of experiments than anything else: not only do we not have the answers, but in many cases we are still groping for the right questions. It is a time calling for innovation and flexibility; progress could easily be stifled by inappropriate public policies."

Bruce Paton (Lowe, 1992), a quality program manager at Hewlett-Packard in the United States, comments on industrial ecology from the business perspective by saying that "corporate environmental decisions used to be driven primarily by government regulations, addressing pollution control and remediation of wastes. Now, customer demands and competitor initiatives are introducing environmental initiatives into decisions regarding product design. Customers are sending us questionnaires that ask: How much energy are you using to make products, how do you recycle products, and how much waste is produced? As a result, Hewlett-Packard and other firms are exploring a new corporate environmental objective called "Design for Environment." It is concerned with product design, materials selection and concern for dissipative use of toxic materials. It attempts to design all products with materials that permit reuse or recycling" (Lowe 1992).

Ernest Lowe (1992) of the Change Management Centre in Oakland California believes

that an industrial ecology approach can stimulate an evolution from a company's current fragmented and costly compliance with regulations to the development of proactive programs yielding cost savings and new sources of revenue. Small and medium size businesses in Winnipeg need to be encouraged by the City to look for new ways of saving money by reusing and recycling resources and wastes. The City of Winnipeg could show leadership by assisting in identifying opportunities for profitable waste exchange between companies or industries.

Tibbs describes the new "green business" as one that displays environmental leadership. It takes on a "proactive" strategy by looking for ways to minimize the use of natural resources; reduce pollution and waste; and engage in product and process redesign. These companies recognize that company environmentalism is essential for business survival (Tibbs 1992, 8). Figure #1 that follows (Tibbs 1992, 8) illustrates the industrial ecology integrated managerial and technical approach which includes:

A. Managerial tools to analyze how industry and environmental processes inter-relate.

B. Engineering and technological inquiries to design processes and products in keeping with the ecosystems.

Tibbs foresees the combination of this approach resulting in:

- the exchange of recycled materials and by-products between companies and industries

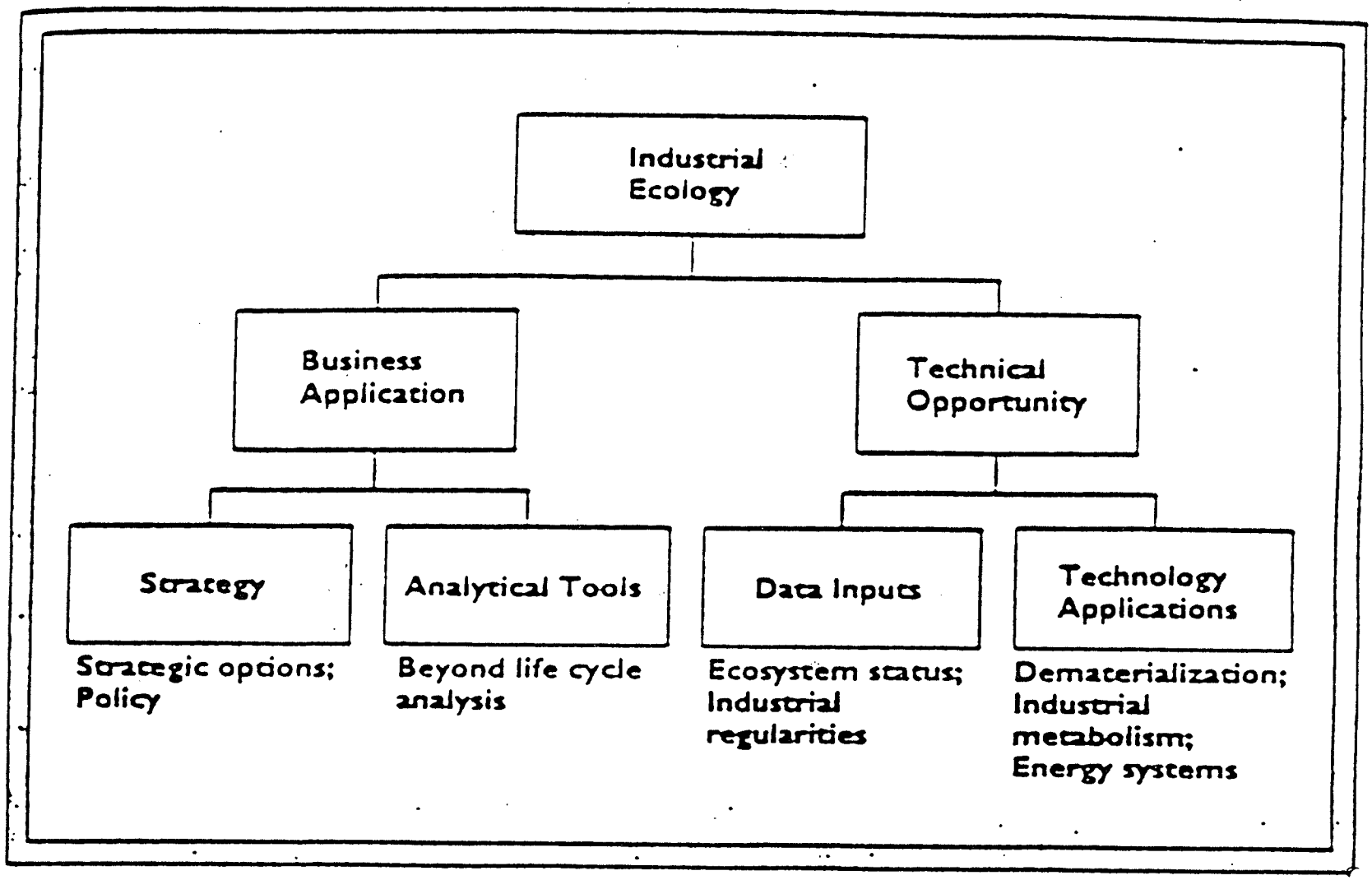
- a re-evaluation of waste as raw materials or products for other processes
- an increase in a company's knowledge about natural ecosystem dynamics and environmental conditions
- industries learning new ways to locate in the natural environment; to adjust the intensity of their activities and processes; and other methods of responding to the demands and limitations of the natural environment
- the formulation of a new definition of nature and natural quality
- the establishment of continuous real-time monitoring of environmental conditions using computer technologies
- large-scale integration of environmental data to provide a global picture of environmental conditions
- environmental policies based on a scientific understanding of environmental processes
- a dematerialization, or decline in materials and energy used in industrial processes and production
- eventual transition to an "eco-industrial infrastructure," where all process systems and equipment, plant and factory design, will be built to interconnect with the natural ecosystems.

Tibbs offers a reassuring comment by saying:

> "We should remember that human modification and manipulation of ecosystems is as old as agriculture. The challenge we face now is to integrate industry into the equation, and consciously to design a world that is aesthetically pleasing, biologically stable, and economically productive" (Tibbs 1992).

Figure #1.

Industrial Ecology.
Hardin Tibbs 1992 p. 8



2.7 The Body Shop

The Body Shop has been included in the thesis practicum to illustrate how one business has chosen to develop a system of environmental management. The Body Shop is a manufacturer and retailer of naturally-based skin and hair care preparations and cosmetics. Even though it trades in more than 40 countries, in nineteen languages and in more than 900 retail outlets worldwide; its approach to environmental management could be adapted to any size and scope of business. The Body Shop processes are not a significant source of pollutants or a major user of raw materials. After examining many corporate environmental and sustainable development reports from international businesses, I believe The Body Shop has set the highest standard for environmental and social responsibility, innovative and creative approaches to problem solving and a moral obligation to drive toward sustainability and environmental stewardship in business.

The Body Shop has an Environment, Health and Safety Department managed by Dr. David Wheeler in West Sussex England. The company is committed to "best practice" in environmental management in line with the recommendations of Agenda 21, the European Community 5th Environmental Action Programme and the CERES Principles. It produces independently verified environmental reports that are consistent with the new European Eco-management and Audit regulation. Mr. Wheeler in his book, Two Years of Environmental Reporting at The Body Shop (1993), states that we may be approaching an era where resistance to environmental reporting will simply denote second rate

business behaviour. Companies which do not report will be assumed not to be measuring and managing environmental information in a systematic way. If they cannot collect quantitative data on raw materials consumption, energy efficiency, emissions and solid waste generation, what else are they failing to track?

The Body Shop (1992, 14) believes it is not possible to reconcile ecological impacts with conventional financial indicators and does not identify key indices of sustainability from cost accounting. The company does not believe that money will provide an ideal indicator as a measure of progress toward sustainable business operations. It believes that environmental and welfare impacts cannot be reduced into financial terms. Instead, it has its own system of environmental auditing and internal accounting which includes energy and water statistics relating to production and manufacturing efficiencies, materials use, re-use and recycling, waste generation and disposal. It involves all staff and managers in continuous data collection, frequent reviews of priorities and targets on a departmental basis and an annual process of public reporting of results. This practice goes on in all retail outlets. Performance indicators are calculated annually and monthly.

The corporate team of Environment, Health and Safety (EHS) specialists acts as the company's central resource for networks of environmental advisors and co-ordinators in headquarters, departments, subsidiaries, retail outlets and international markets. It makes sure that policies and guidelines are disseminated effectively, coordinates specific terms of reference for auditing and environmental management and receives and collects data

on environmental indicators relevant to each part of the operation. The EHS department coordinates environmental policy development with the Board of The Body Shop; sets targets and objectives at corporate and departmental levels; and liaises with senior managers on a regular basis to ensure constant support for the environmental management system.

The Body Shop convened a working group of international environmental representatives in order to establish uniformity in environmental audit procedures in over forty countries around the world. A process of environmental audits and reviews was designed and adopted and a system of checklists was determined to be the most efficient and appropriate way to implement environmental audits.

In addition to ensuring good environmental performance for its own operations, The Body Shop set up a program of product stewardship which takes a life cycle approach (LCA) to the sourcing, manufacturing and use of products. The Body Shop conducts a full ecological consideration of product life cycles taking into account the impact of raw material procurement on biodiversity, endangered species, human and animal rights and non-renewable resources. This approach to an LCA covers the full range of potential ecological impacts associated with the sourcing of ingredients as well as the manufacture, distribution and eventual use of products (Wheeler 1992, 14).

In summary, The Body Shop has an impressive and comprehensive approach to

environmental management. Its annual sustainable reports include a statement by the Board of Directors, a description of the main business activities, details of environmental policies and management systems, summaries of key environmental impacts by site and by department and a verification statement. I believe The Body Shop's approach to environmental management has many potential applications for small and medium sized businesses.

3. A Proposed Environmental Management Service for Business, to be conducted by the Water Conservation Program, the Power Smart Program and the Industrial Waste Control Branch of the City of Winnipeg

This practicum suggests that in order for the City of Winnipeg to implement environmental management within the business community, it must develop a collaborative, interdepartmental conservation program designed to meet the particular needs of business. The Water Conservation Program, the Power Smart Program and the Industrial Waste Control Branch of the City of Winnipeg need to work together to develop a set of objectives and a program framework.

This practicum recommends the organization of an Interdepartmental Conservation Group (I.C.G.) to collaboratively design a conservation program aimed at the business community. The I.C.G. should be made up of representatives from the Water Conservation Program, the Industrial Waste Control Branch of the Waterworks, Waste and Disposal Department and the Power Smart Program of Winnipeg Hydro. The I.C.G. should be charged with the following responsibilities:

1. To prepare a self-assessment environmental workbook for business which includes instructions on how to conduct an environmental audit, a life-cycle analysis and an introduction to environmental accounting.
2. To prepare a letter of introduction for business which explains the purpose of the

I.C.G. program and the advantages to businesses of becoming involved and implementing the self-assessment environmental manual.

3. To develop a questionnaire for business to complete in order for the City to collect environmental information for I.C.G. analysis and referral.
4. To compile a resource list of consulting engineers, equipment suppliers and technology specialists working in the environmental field who are interested in receiving referrals from the City.
5. To analyze the incoming data from business and to make an environmental conservation assistance information package available to all businesses who participate in the program.
6. To develop a "one-stop" information package for business that directs them to consultants and resources that provide hands-on help with energy efficiency options, water conservation strategies, recycling and waste reduction opportunities and clean and efficient transportation alternatives.

The Interdepartmental Conservation Group program objectives should include:

- to target the conservation efforts of the Power Smart Program, the Water Conservation Program and the Industrial Waste Control Branch on meeting the conservation and waste management needs of the small and medium size business community in Winnipeg
- to encourage businesses to report to the Departments on their use of water and energy and their waste management practices

- to develop a database of information on the conservation practices of small and medium size business and the nature of their waste being generated
- to provide an environmental brokerage service to business whereby the City receives environmental data from companies and correspondingly provides appropriate referrals to outside consultants for service and assistance
- to develop a list of outside consulting engineers, technologists, equipment and managerial professionals which can be retained independently by companies
- to make this brokerage service easily accessible to companies looking for opportunities for cost savings and increased efficiencies
- to encourage connections and communication between businesses looking for innovative ways to conserve resources and manage waste
- to publicly recognize businesses who are conserving their resources and managing their waste well; to encourage leadership by example in the business community
- to establish indicators and methods to evaluate the value of the conservation program for both the City and the independent business
- to make environmental data from business available to the Provincial Government for its use in developing environmental regulations and funding programs.

Small and medium size businesses must see some advantage to becoming involved in the I.C.G. program. Any company's opportunities for change are limited by their established methods of conducting business, their existing technologies and physical structures and

the need to convince a wide variety and often a large number of people to change their behaviour. In order to convince business, the I.C.G. must offer a comprehensive approach that addresses the financial, administrative, technological and social realities of small and medium size business. The I.C.G. must present business with the advantages of being involved in the program, for example:

- energy efficiency design analyses in a self-assessment format
- means to lower energy and water bills
- a selection of appropriate and efficient technologies
- means to lower waste disposal costs
- construction site recycling
- local contacts with the Canadian Association of Energy Saving Companies including Honeywell and Johnson Controls in Winnipeg, who will finance conservation assistance based on the cost savings the company receives
- conservation equipment and product information from the Power Smart and Water Conservation Programs
- contacts with Manitoba Hydro's Power Smart program which offers service in the areas of energy audits; energy saving technologies and financing options for new technologies and equipment
- referrals to managerial assistance for the implementation of environmental audits or reviews
- waste minimization techniques and recycling assistance
- referrals to federal and provincial government funding programs that assist

business with new technologies or environmental innovations such as the Federal Manufacturers Adaptation Program, the Environmental Industrial Development Initiative, and the Accelerated Capital Cost Allowance Program for Pollution Control Equipment, Machinery and Structures

- contacts with environmental business associations
- contact with GreenLEAP, the independent Association of Legal, Engineering and Accounting Professionals for the Environment located in Toronto which offers business environmental management software, consulting services and a network of other business people nationally involved with environmental management
- information on Total Quality Environmental Management, including the International Standards Organization 9000 Standards which incorporates environmental issues into business decisions
- contacts with the Harmony Foundation in Ottawa which has focused much of its attention on environmental management for small and medium size businesses.
- case studies and examples of other businesses who have realized savings through analyzing their use of energy and water such as Carlton University in Ottawa, Ontario, the Waterloo Family YMCA in Waterloo, Ontario; and the Sheraton Hotel in Toronto, Ontario.

The Departments of Waterworks, Waste and Disposal and Winnipeg Hydro should publically recognize companies as an important component of the program. Companies receive awards for defining energy or water conservation goals; training employees in

conservation procedures; soliciting conservation ideas from employees and suppliers; recognizing employees for their ideas and accomplishments; monitoring progress toward goals and reporting results to the City.

The City of Portland Oregon Energy Office has a conservation program targeted at business called BEST: Business for an Environmentally Sustainable Tomorrow (see appendix). It awards businesses for achieving specific conservation goals that include: having a company's building energy use below that of similar buildings; receiving utility rebates; using energy efficient technologies; using water conservation fixtures; using efficient process water systems in production; collecting rainwater runoff for reuse on site; training employees to reduce, reuse and recycle; purchasing recycled content paper and other products; receiving tax credits for reduction, reuse and recycling, using recycled products as feedback for manufacturing; purchasing fuel efficient vehicles for the business' "fleet"; providing alternative transit incentives for employees; operating vehicles on cleaner, alternative fuel; and encouraging flexible work schedules for employees. These innovation awards are meant to recognize unique and creative approaches to conservation issues. Judging is done by an independent panel of business and environmental professionals.

The BEST program is designed to consolidate the delivery of conservation assistance to business. It allows the municipality, the state and the private sector to collectively provide business with a "one-stop" shop approach. The purpose is to help companies

realize financial savings and water and energy efficiencies in their processing, manufacturing and related business activities. By helping business, the municipality conserves its own natural resources and minimizes its collection and waste disposal efforts.

Mr. Tony Kuluk, Solid Waste Disposal Planning Engineer, for the Department of Waterworks, Waste and Disposal, stated that interdepartmental collaboration at the City of Winnipeg was the preferred method of tackling the issue of conservation. Although this is not currently being done, Mr. Kuluk hoped that interdepartmental cooperation would take place in the future. Since municipal resource conservation includes energy, water and waste, it requires a multidisciplinary, interdepartmental approach to find solutions that suit targeted groups such as business, households and large industries.

4. The Pilot Program - A Test Case for the City of Winnipeg

This practicum recommends that the Power Smart Program, the Water Conservation Program and the Industrial Waste Control Branch jointly undertake a Pilot Program on a small scale to test the ideas which underlie the Interdepartmental Conservation Group's program targeted at business. A Pilot Project would accomplish the following:

- operationalize sustainable development within the framework of the City's sustainable development policies and programs. To measure and evaluate, on a small scale, the City of Winnipeg's facilitation of sustainable development within the small and medium size business community;
- initiate a small program to realize the City's commitment to environmental stewardship stated in Plan Winnipeg ... Toward 2010;
- test the effectiveness of an interdepartmental approach to targeting conservation efforts;
- experiment with a new survey software program called InfoQuest (see appendix) from the Rural and Small Town Programme of the Department of Geography at Mount Allison University in Sackville, New Brunswick. The Business and Environment program of InfoQuest has survey questions that measure a businesses' use of water, electricity and fuel; resource conservation procedures; and business attitudes toward the environment. The software would allow the Pilot Project to survey the required number of businesses and systematically evaluate their responses;

- provide the basis upon which to estimate the cost of a large scale targeted conservation program;
- test the reaction of the small and medium size business community to being involved with the City in the area of conservation;
- evaluate the current effects of the Power Smart Program and the Water Conservation Program and the extent to which they are utilized by the business community;
- demonstrate the mechanics and results of targeted conservation efforts to other government colleagues and departments;
- budget the amount of staff time required for a large scale program;
- budget the costs of gathering the required information, contacts and resources;
- identify any gaps in the program concept, objectives or implementation;
- give business an opportunity to recommend how it could most effectively become involved with the City and participate in the program;
- identify training requirements for staff responsible for implementation of the program;
- establish the mechanics of the program and work out the "bugs";
- provide a database to demonstrate to business and industry the costs and benefits of the proposed program.

Once approved by the City, the Pilot Project would proceed in the following manner:

1. A Steering Committee would be struck and assume responsibility for carrying out

the Pilot Project over a five month period. The Steering Committee would be made up of five senior representatives from the Power Smart Program, the Water Conservation Program, the Industrial Waste Control Branch, the Department of the Environment, and the Chamber of Commerce. These representatives would be responsible for designing and overseeing all phases of the Pilot Project. The actual implementation of the pilot project would be done by three seconded staff positions from the Department of Waterworks, Waste and Disposal and Winnipeg Hydro and unemployed professional engineers and planners from the Department of Employment and Immigration's On-Site Program. The hiring of professionals from this employment program would give the City an opportunity to utilize the professional skills of unemployed engineers, planners and managers experienced in the environmental field, and not incur too large a staffing expense during the initial pilot project stage.

2. The Steering Committee's first task would be to select a sample of 25 small and medium size businesses in the Whyte Ridge industrial park area. Whyte Ridge was selected because the businesses are similar in size and age and most moved into the area at about the same time. Their facilities and technologies are relatively new. Even though it is serviced by Manitoba Hydro, businesses will be asked, during the pilot project, to turn to the City of Winnipeg for conservation assistance.

3. The seconded and on-site staff members would research and prepare the Environmental Management Self-Assessment Workbook instructing businesses

in how to conduct environmental audits and life-cycle assessments. A synthesis of these approaches would be developed to meet the differing information gathering and assessment abilities of business. The staff would use the information presented in Chapter Two of this practicum.

4. Seconded and On-Site staff would make personal visits to the Presidents or C.E.O.'s of each of the sample companies to encourage them to become involved, answer any of their questions and gather their recommendations and concerns about the value and need for the a conservation program in the business sector.

5. The staff would develop a questionnaire for the sample group. The questionnaire would be completed once businesses had received and agreed to follow the instructions set out in the Environmental Management Self-Assessment Handbook. The questionnaire would gather information to determine how businesses are using their resources and what conservation assistance they require. The software used in the questionnaire would come from "InfoQuest," a software survey program from the Geography Department of Mount Allison University in Sackville, New Brunswick. InfoQuest's Business and the Environment Software Program has questions and analyses to measure resource consumption and conservation practices. It is an ideal tool for the Pilot Project.

6. The staff of the pilot project and representatives of the InfoQuest survey software program would be available by telephone to assist business in working through the self-assessment handbook and completing the questionnaire.

7. After business has returned the questionnaire to the City, the staff would analyze the information using the InfoQuest software and create a database to include the business' current water and energy conservation practices, its waste management practices and its conservation assistance requirements.
8. The staff would also prepare for each business in the sample, an Environmental Information Package which would include a complete resource of appropriate contacts and consultants who can provide conservation assistance. This process would involve amalgamating contacts with consultants, resources and information available within the Departments of Waterworks, Waste and Disposal, Winnipeg Hydro and Manitoba Hydro's Power Smart Program. This would be the most time consuming step of the Pilot Project.
9. The staff would prepare a detailed report on all aspects of the pilot project for review and evaluation by the Steering Committee.
10. The Steering Committee would publicly recognize and award businesses who participate in the pilot project. They would be featured in the Winnipeg Free Press and in a special issue of "Manitoba Business."

The Budget for the Pilot Project would include the following:

- three seconded staff positions from the Departments of Winnipeg Hydro and the Department of Waterworks, Waste and Disposal for a five month period to prepare the written materials; conduct the on-site visits with businesses; analyze the incoming questionnaires; develop the database; and prepare a follow-up

evaluation report for review and evaluation by the Steering Committee

- production costs of preparing and delivering written materials
- costs to recognize sample businesses in the Winnipeg Free Press and "Manitoba Business"
- administrative costs for the On-Site Program.

The results of the Pilot Project will be of interest to a number of City of Winnipeg initiatives including the budgeting for a proposed new aquaduct for Winnipeg's water supply; further budgeting for continuation of the Water Conservation Program and the Power Smart Program, the Transplan Committee which is looking at municipal transportation issues; and the International Downtown Association Conference, entitled Sustainable Downtowns, to be held in Winnipeg in September of 1995. The pilot project could be showcased at the conference as an innovative municipal approach to conservation in the business community. It could also be showcased to an international audience at the Winnipeg Winter Cities Conference taking place in February, 1996. The Pilot Project will have implications for the planning of the up coming Pan-Am Games as the City works with sponsors, donors, suppliers and service vendors, and plans and constructs new facilities. Mr. David Chernushenko in his book Greening the Games (1994), talks about methods for municipalities and event organizers to incorporate environmental considerations and criteria into their planning and decision making.

Councillor Terry Duguid believes that the Pilot Project will be of real value to the City

of Winnipeg. He believes the City should take a more proactive approach to conservation and work directly with business. Attention to environmental issues is currently spread too thinly between departments and a coordinated approach to water, energy and waste management is lacking. Councillor Duguid stated that an Environment Coordinator position for the City of Winnipeg is currently being created and will be responsible for: coordinating conservation efforts, targeting conservation at specific market segments, most importantly businesses; identifying a list of consultants to provide conservation assistance to business; setting standards for environmental audits and evaluation procedures; and facilitating conservation assistance programs for the business sector. Duguid believes the City of Winnipeg should show leadership on conservation and environmental issues among business and facilitate a "one-stop" conservation program using consultants and resources in the private sector.

Once the pilot project has been completed, this practicum recommends the results be made available to the Sustainable Development Committee of the Winnipeg Chamber of Commerce. It is suggested that the Committee review the findings and present the project to the Chamber's membership to determine:

- if the business community believes it could benefit by municipal conservation assistance
- how business could work most effectively with the City of Winnipeg
- who in the business community will take responsibility for working with the City in further implementing a conservation program.

Appendix 1.

The Business for an Environmentally Sustainable Tomorrow program from the City of Portland, Oregon Energy Office included in Appendix 1 will provide the Water Conservation Program, the Power Smart Program and the Industrial Waste Control Branch of the City of Winnipeg with a model upon which to design its own "one-stop" municipal environmental management program for business. Mr. Curt Nichols, Senior Energy Program Manager, is currently developing a workbook to allow adaptation of the BEST Program to other cities. I have contacted Mr. Nichols and he would be pleased to visit Winnipeg and meet with representatives to assist in the creation of a municipal environmental management program aimed at the small and medium size business sector.

Appendix 2.

InfoQuest is a survey software program developed by the Rural and Small Town Programme of Mount Allison University in Sackville, New Brunswick. The Business and Environment software contains survey questions to choose from as well as custom designed questions. Among these questions, businesses may be asked to measure their use of water and energy and identify resource conservation practices. Question response and analysis is included in the software.

BUSINESSES FOR AN ENVIRONMENTALLY SUSTAINABLE TOMORROW

Curt Nichols
City of Portland Energy Office
1211 SW Fifth Avenue,
Suite 1170
Portland, OR 97204

P198

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- Better Business Profitability
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- Improved Local Economy
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Portland, OR 97204-3711
(503) 823-7418

Mike Lindberg, Commissioner

BEST Services have been supported by contracts with the Portland Bureau of Water Works, Portland General Electric, Pacific Power the Urban Consortium Energy Task Force.

BEST

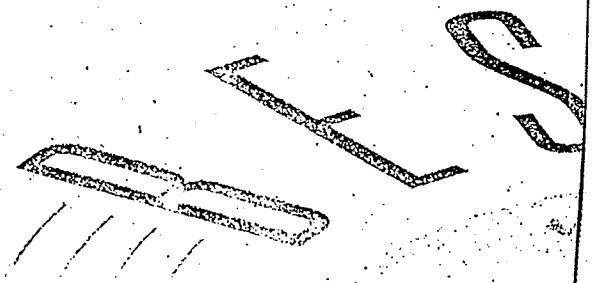
Portland is consistently recognized as one of the best cities in the United States. You can be recognized among the best too — as one of Portland's "*BEST*" businesses.

What is *BEST*?

Businesses for an Environmentally Sustainable Tomorrow (BEST) is a free service offered by the City of Portland Energy Office. *BEST* is for businesses that want to operate in a manner that will benefit us all in the future. We will show you the *BEST* way: one that is better for your bottom line and the environment.

BEST offers a comprehensive package of energy and environmental services. This includes information and hands-on help in four areas:

- Energy efficiency options
- Water conservation strategies
- Recycling and waste reduction opportunities
- Clean and efficient transportation alternatives.



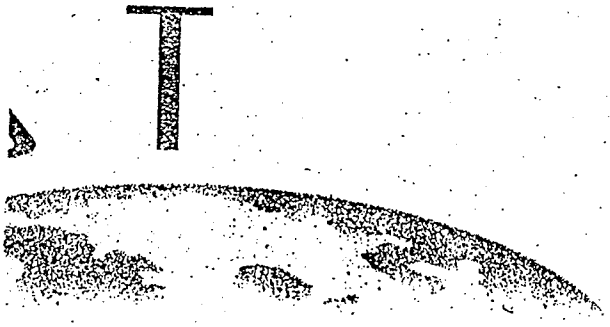
Who is eligible?

All metro-area businesses locating new facilities or renovating existing facilities are eligible... With a little help, your business can be better than the rest. Being one of the *BEST* means you save money and help the environment at the same time. We can show you how.

What does *BEST* offer?

Whether you're planning a new facility or renovating an existing one, being *BEST* pays. Our professional staff will help you:

- Obtain free energy design assistance
- Apply for tax credits offered by the state
- Receive rebates and incentives offered by local utilities
- Select appropriate and efficient technologies
- Get long-term, fixed-rate financing for energy projects
- Recycle construction waste
- Use water efficiently
- Offer telecommuting or other transportation alternatives for your employees
- Receive recognition as a "*BEST Business*"



BEST businesses get recognition

Today's consumers are looking for environmentally conscious businesses. *BEST* businesses will receive official recognition from the City. We will work to publicize your efforts. And, we will produce *BEST* Success Stories featuring "the *best* of the *BEST*".

BEST businesses are leaders

You can be an environmental leader while improving your bottom line. *BEST* helps you put all the pieces together. Then you get the environmental and economic benefits of:

- Energy Efficiency
- Waste Reduction (Recycling)
- Water Conservation
- Clean and Efficient Transportation

ENERGY

BEST can help you select the appropriate technologies. Free design assistance is available for new buildings or major renovations. When you use energy efficiently, your business helps to reduce our nation's dependence on imported oil. At the same time, you help improve the region's air quality and reduce your operating cost. The state offers energy loans and tax credits. The utilities offer technical assistance and financial incentives.

WASTE / RECYCLING

BEST can show you how to reduce your waste. Reduce, reuse, and recycle — it makes sense for your firm, just like it does at home. Recycling can start during construction. Most job site debris can be recycled. After construction, businesses find their white paper waste is a valuable commodity. That's often true of other wastes too. Commercial recycling is expanding — more businesses served and more waste material accepted. We can help you obtain containers and educate your employees. You will find that recycling is surprisingly simple and profitable.

WATER

BEST can help reduce your water and sewer costs. With the recent dry winters, dwindling salmon runs, and our area's population growth, we need to use water wisely. Everyone is affected — from restaurants to hospitals. There's much that you can do to reduce water use. Like energy savings, the benefits of saving water show up on your bottom line.

TRANSPORTATION

BEST can help you develop a clean and efficient transportation system. In Portland, air quality, parking and traffic congestion are key issues for many people — employees and customers alike. Cars cause these problems. But, what are the alternatives? Some businesses are converting their cars and trucks to electricity or other cleaner fuels. Propane, natural gas, ethanol, and others can be cleaner than gasoline. Fuel and maintenance may cost less, too. Let us show you how you can benefit...and help the City at the same time.

BEST BUSINESSES

Energy, Recycling, Water, and Transportation: together these four elements add up to a *BEST* business. Being *BEST* pays! It means profit and recognition for your firm, increased livability for residents of the Portland metropolitan area, and a broader impact that helps the whole globe. With rebates, tax credits, and free design assistance available, *BEST* pays...now more than ever.

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For *BEST* Information
Call Curt Nichols
at 503-823-7418

BEST Fact Sheet: Energy Efficiency

BEST Services

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Through *BEST* we offer information and hands-on help with your facility's energy efficiency options. We also offer services that promote water conservation, recycling and waste reduction, and clean and efficient transportation alternatives.

The new 23 story, class A office building, 1000 Broadway, not only looks good, it's energy efficient too. During the building design, Hillman Properties, the owner/developer, worked with their architect, the Oregon Department of Energy, and Pacific Power. The result was a design that saves 30% of the energy it would have used if it just met Oregon's Non-residential Building Energy Code. These savings come from state-of-the-art lighting (1.1 watts per square foot), an efficient heating and cooling system (and controls), and better quality, insulated walls and windows. This design saves Hillman $61,000 per year.

BEST Businesses

All metro-area businesses locating new facilities or renovating existing facilities are eligible for this service. We will help you make your business better than the rest. Being one of the *BEST* means you save money at the same time you help the environment. *BEST* Businesses are leaders in four areas:

- Energy Efficiency,
- Waste Reduction,
- Water Conservation, and
- Clean and Efficient Transportation.

It is surprisingly easy and economical to be *BEST*. We can show you how.

BEST Technologies

Businesses are investing in better lighting, more accurate control systems, "free heating" with waste heat, more insulation, better windows, and much more. These businesses find their return on energy-saving investments are 15 to 40 percent or more! On top of energy cost savings, they can reduce maintenance costs too. Some even reduce their taxes. And, available financing options provide a net positive cashflow from the very first month.

BEST Help

Whether you're planning a new facility or renovating an existing one, *BEST* can help. We can show you how to do it, and how easy it is. You can obtain free energy efficiency design assistance. We can help you get long-term, fixed rate financing for energy projects. You will get information on appropriate and efficient technologies. We will help you apply for state tax credits that equal 35 percent of your energy efficiency investment. You can get rebates and incentives from local utilities. We will help you with this and more ... what it takes to be "*Best* in Energy Efficiency".

Two office buildings in Portland's Central Eastside have recently been upgraded to save energy. The **Lloyd 500 Building** and the **Lloyd 700 Building** now have better lighting, heating and air conditioning. The results are more satisfied tenants, lower energy costs, and tax credits from the state. The upgrades — for both buildings — cost $3.4 million. Together, the savings add up to $460,000 per year. So, the upgrades will pay for themselves in energy savings at a rate equal to a 13.4% simple ROI.

BEST Recognition

Today's consumers are looking for environmentally conscious businesses. *BEST* businesses receive official recognition from the city. We will work with the local and regional media to publicize your efforts. And, we will produce *BEST* Success Stories that feature "the *best* of the *BEST*".

BEST Leaders

You can be an environmental leader while improving your bottom line. Being *BEST* pays. *BEST* businesses see the economic -- and environmental -- benefits of energy efficiency. In addition, *BEST* businesses also practice waste reduction (recycling), water conservation, and clean and efficient transportation. Other *BEST* Fact Sheets have more details on each of these areas.

As part of an effort to upgrade the look of a US Bank branch in Southeast Portland, the main lobby lighting was replaced. This involved converting 25 fixtures from Mercury Vapor to Fluorescent. This saves US Bank over $300 per year for an investment of slightly more than $5,000. "Now the bank lobby costs less to light . . . and it looks better," according to US Bank's Facility Manager, Dan Green.

Small businesses can — and should — save energy too. One that is, is the Mill End Store in Milwaukie. By adding skylights and lighting controls to the store, they are saving as much as 70% of their prior energy use. The skylights with dimming sensors, and a light control system, maintain a constant light level. The same control system optimizes the building's heating and cooling. Together, the savings add up to more than $4,000 per year.

Producing dairy goods for stores located in Oregon and Washington, the Fred Meyer Dairy in North Portland uses a lot of energy for refrigeration and hot water. But, since they changed their pasteurization process, they now use less. The new efficient, regenerative pasteurization process saves both electricity and natural gas. The result? Fred Meyer cut their operating costs by almost $23,000 per year.

BEST Assistance

We can help you be BEST.

Technical and financial assistance is available. For more information, call the City of Portland Energy Office at 823-7418.

or write
Curt Nichols
BEST Program Manager
City of Portland Energy Office
1120 SW Fifth Ave. Room 1030
Portland, OR 97204

BEST Fact Sheet: Water Conservation

BEST Services

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Through *BEST* we offer information and hands-on help with your facility's energy efficiency options. We also offer services that promote water-saving, recycling and waste reduction, and clean and efficient transportation alternatives.

Red Lion Inns are actively saving water at their local hotels. They have found ways to save water without impacting the comfort of their guests with showerhead, faucet, and toilet retrofits. Their water saving will add up to more than 12 million gallons per year in their five Portland hotels. That is a 36 percent water savings for the guest rooms and public rest rooms. This will cut an estimated $24,000 dollars from their water bills. They will also save energy by using less hot water. In addition, the Red Lion laundry uses a special water recycling system that saves about 20,000 gallons per day by using the final rinse water in the wash cycle of the next load of linens.

BEST Businesses

All metro-area businesses locating new facilities or renovating existing facilities are eligible for this service. We will help you make your business better than the rest. Being one of the *BEST* means you save money at the same time you help the environment. *BEST* Businesses are leaders in four areas:

- Energy Efficiency,
- Waste Reduction,
- Water Conservation, and
- Clean and Efficient Transportation.

It is surprisingly easy and economical to be *BEST*. We can show you how.

BEST Technologies

Water-saving technologies range from low flow faucets and low flush toilets to enhanced water treatment for boilers and cooling towers. For motels, there are high efficiency showerheads, sprinkler control systems, and swimming pool covers. For restaurants, there are more efficient ice machines and low water use dishwashers. Water-saving designs are available for production facilities too.

Studies done in California, Arizona, and other states show that many commercial water-saving investments can pay for themselves in less than one year. These economical and ecological investments set *BEST* businesses apart from the rest.

BEST Help

Whether you're planning a new facility or renovating an existing one, *BEST* can help. We can show you how to do it, and how easy it is. You can get information on efficient water systems. We will help you select appropriate and efficient technologies. You may be able to use state tax credits to offset your investment in water-saving equipment. We will help you with this and more . . . what it takes to be "*Best* in Water Conservation".

At the new **Oregon Museum of Science and Industry** (OMSI) location in southeast Portland, the landscape architect designed the grounds to minimize irrigation water use and vegetation maintenance. They included native plants that, once established, will sustain themselves without irrigation. They plan only a small lawn, and a water-saving sprinkler control system. One feature automatically lowers water use so the irrigation rate can be lessened as the years go on and vegetation matures.

BEST Recognition

Today's consumers are looking for environmentally conscious businesses. *BEST* businesses receive official recognition from the city. We will work with the local and regional media to publicize your efforts. And, we will produce *BEST* Success Stories that feature "the *best* of the *BEST*".

BEST Leaders

You can be an environmental leader while improving your bottom line. *BEST* businesses recognize the environmental and economic benefits of water conservation. In addition, *BEST* businesses also practice energy efficiency, waste reduction (recycling), and clean and efficient transportation. Other *BEST* Fact Sheets have more details on these areas.

At **Gunderson Inc.**, a railway car manufacturer, they use several large sprinklers to keep paint drums from reaching their flash point during hot weather. After an employee suggestion, they installed a recycling system. The used water now runs into a storage tank, and then is pumped back out and used again. Vice President Craig Coffey states, "We've only been using the system a short time, but it will save us a lot during the hot weather."

Zefiro Restaurant in northwest Portland, saves water as well as energy with its low temperature dishwashing machines. They now save at least 6,000 gallons of water annually compared to their old system. They also save water by eliminating rewashing because of a special flush feature which means the dishes rinse cleaner than they did before. In addition, they cut their energy costs by about $25 for each 1,000 loads.

Irrigation Management Systems (IMS) uses a special computerized "smart" system to control the water use for several clients, including four Fred Meyer locations in the Portland area, and the Gateway Shopping Center. The IMS computer "calls" weather stations. Depending upon the atmospheric readings, it signals the various locations to run the water for a certain time period (or not at all if appropriate). Ellen Beighley of IMS states, "The system conservatively results in a 35% water savings, but, in certain cases, could save as much as 70%, depending on the maintenance program and previous sprinkler system."

BEST Assistance

We can help you be BEST.

Technical and financial assistance is available. For more information, call the City of Portland Energy Office at 823-7418.

or write
Curt Nichols
BEST Program Manager
City of Portland Energy Office
1120 SW Fifth Ave. Room 1030
Portland, OR 97204

BEST Fact Sheet: Waste Reduction

BEST Services

BEST stands for Businesses for an Environmentally Sustainable Tomorrow. It is a service offered by the City of Portland Energy Office. *BEST* will show you a better way of doing business. One that is better for the environment and your bottom line.

Through *BEST* we offer information and hands-on help with your facility's waste reduction efficiency options. We also offer services that promote energy efficiency, water conservation, and clean and efficient transportation alternatives.

Standard Insurance in downtown Portland has a very successful paper recycling program. It has been in place since 1989. They recycle about 200 tons of office waste paper and cardboard annually. This saves money by reducing waste disposal fees. In addition, their printing operation recycles about 300 pounds of aluminum printing plates per year. Standard has also encouraged others to use recycled paper products. Because of their leadership, they are part of METRO's Recycling Task Force.

BEST Businesses

All metro-area businesses locating new facilities or renovating existing facilities are eligible for this service. We will help you make your business better than the rest. Being one of the *BEST* means you save money at the same time you help the environment. *BEST* Businesses are leaders in four areas:

- Energy Efficiency,
- Waste Reduction,
- Water Conservation, and
- Clean and Efficient Transportation.

It is surprisingly easy and economical to be *BEST*. We can show you how.

BEST Technologies

Many offices now recycle their white office paper. Other materials can be recycled too. Retail stores recycle cardboard. Distribution facilities recycle pallets. Businesses are also recycling plastics and other materials. Many production facilities even reuse materials from their own operation, cutting their raw material costs

Disposal costs are going up. The financial incentives of recycling are three-fold. You can cut your disposal costs, sell your recyclable materials, and take advantage of state tax credits and other incentives. *BEST* will show you how recycling pays!

Recycling at Providence Hospital began as a grass roots employee effort in 1989. It has since grown into a successful hospital-wide program. Providence recycles about 25 tons of paper and over 6 tons of plastics each month. They also recycle tin, glass and construction debris. Sam Nero, program coordinator, credits positive employee support, from the administration on down, for their success. Sam adds, "The program is very cost effective. We save over $20,000 a year in disposal costs just counting paper we no longer throw away. The revenue we receive is passed on to the Providence Foundation and helps support their charitable efforts. Employees can see their efforts pay off."

BEST Help

Whether you're planning a new facility or renovating an existing one, *BEST* can help. We can show you how to do it, and how easy it is. You can obtain job-site, construction debris recycling. We will help you select appropriate materials and supplies and effective technologies. You can take advantage of state tax credits that equal up to 50 percent of your waste reduction or recycling investment. We will help you with this and more . . . what it takes to be "*Best* in Waste Reduction".

BEST Recognition

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BEST Leaders

You can be an environmental leader while improving your bottom line. *BEST* businesses recognize the environmental and economic benefits of recycling and other waste reduction activities. In addition, *BEST* businesses also practice energy efficiency, water conservation, and clean and efficient transportation. Other *BEST* Fact Sheets have more details on these areas.

Metropolitan Service District (METRO) has gone beyond simply recycling construction debris at their new location. They are "closing the loop" by using products made from recycled waste where possible. METRO will have recycled content in their acoustical board, rubber mats and counter tops. They will have bathroom tiles made from old fluorescent lamps, and toilet partitions manufactured from recycled milk jugs. A lot of the paint used was once "thrown away" at METRO's Household Hazardous Waste dropsite. About 300 gallons per week is collected, and 60-70% is recyclable. The good paint is strained and reprocessed by a local paint company, put into recycled plastic buckets and used at the construction site.

Tektronix, an electronics firm in Beaverton, goes beyond office paper in their waste reduction plans. Their efforts earn them about $3 million per year. Since 1975 they have been recycling scrap and precious metals from their offices and manufacturing processes. They send old circuit boards, solder paste jars, and even cleaning wipes to a refiner, who pays Tektronix for the precious metals extracted. They also have a store where they sell used desks, computers, typewriters, and other items that they no longer need. Items that don't sell are dismantled and recycled.

BEST Assistance

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Rim Co, the developers of a new Safeway store and shopping complex at the former Rose City Fred Meyer location on Sandy Boulevard, wanted to reuse or recycle as much of the demolition material as possible. They contracted with Obrist-Trucking and Excavation to crush the concrete into gravel to be used as fill. Dan Obrist says, "At least 12,000 tons of concrete have been diverted from the landfill. In addition, 200 tons of steel rebar have been recycled. Only about 150 tons of unusable debris (such as worn carpet) have been landfilled." They are also chipping waste wood products for recycling. And are selling, not dumping, the old store's light fixtures. The net savings for this development is estimated to be at least $100,000.

BEST Fact Sheet: Transportation Alternatives

BEST Services

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Through *BEST* we offer information and hands-on help with your facility and your employee's transportation options. We also offer services that promote energy efficiency, water conservation, and recycling and waste reduction alternatives.

Franz Bakery originally changed its fleet over to propane fuel to help solve a maintenance problem. They converted 120 trucks at their Portland location. And, the maintenance problem has not recurred since. Tom Powers, Vice President/ Transportation is very pleased with the fuel. "Propane is about 98% efficient so almost nothing comes out the tailpipe. Since it burns so clean, we don't get as much engine contamination, and we almost literally don't even have to change the oil! In actual cash we may only save about 10% over gasoline, but the savings to the environment cannot be measured."

BEST Businesses

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- Waste Reduction,
- Water Conservation, and
- Clean and Efficient Transportation.

It is surprisingly easy and economical to be *BEST*. We can show you how.

BEST Technologies

Many employers subsidize bus passes for their employees. Some allow flexible work schedules. And, some encourage the work-at-home, telecommuting approach.

Some businesses are converting their cars and trucks to electricity or another clean fuel — propane, natural gas, ethanol, etc. Fuel and maintenance may cost less, too.

More employees using carpools, vanpools or mass transit means more parking spaces for your customers. And, consumers like to patronize businesses that are helping clear the streets and clean the air. Let *BEST* show you how you can benefit...and help the city at the same time.

A meter reader at Portland General Electric (PGE) came up with an idea to save fuel. He saw many neighborhoods where meter readers could park their trucks and use bikes to read individual electric meters. PGE liked the idea because they could save gasoline and avoid air pollution. They purchased some bikes in the spring of 1992, and now have a dozen meter readers using them. Dennis Lahmers, Manager of Customer Service Field Operations, estimates that PGE will save about $1,500 the first year. There are other positive effects, too. "Our customers like to see us using the bikes," Lahmers says. "Even our safety levels are improved, since we are backing trucks out of driveways less".

BEST Help

Whether you're planning new vehicles or considering changes to existing ones, *BEST* can help. We can show you how to select clean and economical vehicles. We can point you to state tax credits that equal 35 percent of your investment in vanpool or telecommuting equipment. You can also get tax credits for investments in alternative fuels. We will help you with what it takes to be "*Best* in Transportation".

BEST Recognition

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BEST Leaders

You can be an environmental leader while improving your bottom line. *BEST* businesses recognize the environmental and economic benefits of energy efficiency. In addition, they show their concern and leadership in other ways. *BEST* businesses also practice water conservation, waste reduction (recycling), and energy efficiency. Other *BEST* fact sheets have more details on these areas.

Nike Inc. has creatively encouraged employees at both their main headquarters in Beaverton and Nike Town in downtown Portland to "give up" their cars. Nike subsidizes Tri-Met transit passes for any employee who requests it. They also have readily available mass transit schedules and maps. A new twist rewards employees for carpooling, biking or running to work. Each day of participation, these employees receive $1 vouchers that can be used in any of the Beaverton Campus stores. The vouchers are also entered into a monthly drawing. The more vouchers an employee has, the better chance to win. Dan Wright, Project Manager, Facilities, analyzed the participation for the new program's first month, "Our participants kept cars off the road for 53,000 commuter miles, saved a total of over $10,000 in commuter costs, and kept 82 pounds of hydrocarbons out of the air."

Flightcraft General Aviation Co. uses two electric carts (or "tugs") to tow corporate aircraft that fly in and out of Portland International Airport. The tugs move airplanes between the runway and the terminals and hangars. Gary Zenzen, the Line Facility Manager, comments, "We are saving a minimum of 60 gallons of gasoline per week, and probably more. The electric tugs run quieter, and maintenance costs are less."

BEST Assistance

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U.S. Bank wanted to help their employees commute after 1,500 workers were relocated from downtown Portland to new office space in Gresham. They purchased four vans to be used in vanpools, taking advantage of a 35% tax credit from the Oregon Department of Energy. Approximately 10 people participate in each vanpool, some from as far away as Salem. The cost is based on the number of riders in their vanpool and the miles driven. The bank subsidizes the first $21 of their expenses. Curt Meyers, Vice President and Human Resource Officer, estimates "Using the vanpools should save over half a million commuter miles per year and more than 35,000 gallons of gasoline."

BEST
BUSINESSES FOR AN ENVIRONMENTALLY SUSTAINABLE TOMORROW

RESULTS

Riverside Golf Course Finds Green Solutions

ONE IN A SERIES OF CASE STUDIES FEATURING BEST BUSINESS AWARD WINNERS

At Portland's Riverside Golf and Country Club, there's more "green" than the turf. Green also describes Riverside's comprehensive environmental policy, which saves cash while conserving resources. Included in the club's program are innovative water reduction and reuse strategies, integrated pest management, and more.

Water Reuse

When Riverside employees wash golf course equipment, the water doesn't just go down the drain. Instead, it is recycled back to where it began: in a hose, ready to wash more equipment. Along the way, grass clippings, grease, oil, and other chemicals (including pesticides) are filtered out. The clippings are composted on the course. The grease and oil are recycled. Even the carbon in the chemical filters can be reused.

The closed-loop treatment and recycling system, one of the first of its kind on an American golf course, was adapted from car and truck wash equipment. According to the National Golf Foundation, the average 18-hole course uses 45 thousand gallons of water each month to wash equipment. By using the system, Riverside saves that amount each month! It also saves at least $1,000 per year in water purchase costs.

Computerized Irrigation

Riverside saves water and money on irrigation too. Only one-fourth of the course is irrigated. No effort is made to water the rough. All the course sprinklers are tied to a computerized system, which responds to an onsite weather station. As a result, turf gets no more water than it needs and players get optimal playing conditions—neither too wet nor too dry.

Before the irrigation control system was added, Riverside used more than 300 thousand gallons of well water for irrigation each day. Now, it has cut back to an average of 150-200 thousand gallons a day.

Using less water saves energy. By pumping less water and running pumps more efficiently, Riverside cut its pumping energy by 30 percent. This amounts to an annual cost savings of $5,000-10,000.

Integrated Pest Management

More than half of the Riverside course received no pesticide applications. Even so, in 1992 the club established an Integrated

BEST

Pest Management (IPM) policy to cut pesticide use still further. IPM uses natural factors to keep pests under control. Riverside's policy states: "No action will be taken until pre-set threshold population or damage levels have been reached. Chemical applications will be used only in cases where mechanical or biological solutions would be ineffective or cost prohibitive."

There were startup costs, such as staff training, required for IPM. In the long run, though, the club saves money. By cutting back 25 percent on pesticide use, Riverside now saves $5,000-10,000 per year.

Wildlife Habitat

IPM matches Riverside's interest in wildlife enhancement. The club recently joined the Cooperative Sanctuary Program, a joint effort of the U.S. Golf Association and the Audubon Society of New York State. The program supports and enhances urban wildlife habitat areas within golf courses. One means is special seed mixtures designed to make portions of the golf course more attractive to selected birds and animals.

Benefits

Riverside employees also recycle all glass and aluminum containers left in receptacles on the course. They donate half of the $800 annual recycling proceeds to local charities.

Riverside's staff and board have been pleased by the financial and environmental dividends of the club's "green" policies. As Golf Course Superintendent Thomas Christy says, "How could anybody not respond to saving money and having a better product?"

Awards

In April 1994, in recognition of its innovative water management program, Riverside Golf and Country Club received a "BEST Innovation Award" issued jointly by the City of Portland, the Association for Portland Progress, and the Portland Business Journal. The prior year, the club was one of only six in the country to receive an Environmental Steward Award from the Golf Course Superintendents Association of America.

For more details, contact Thomas Christy, Golf Course Superintendent, Riverside Golf and Country Club, at (503) 288-3471.

HOW TO...Cut Irrigation Use

Here are six steps to reduce irrigation water and energy use:

1) Obtain copies of water use records for the past two years.
2) Note summertime water use. This shows how much is used for irrigation.
3) Your savings potential from computerized controls can reach half of your summertime water use.
4) Contact irrigation equipment suppliers about the cost to install a computerized irrigation control system.
5) Calculate the payback for better controls (cost of controls divided by estimated annual savings).
6) If your payback is four years or less, consider adding the control costs to your budget.

You may well find, as Riverside Golf and Country Club has, that saving water can mean green grass and more "green" in your

BEST
BUSINESSES FOR AN ENVIRONMENTALLY SUSTAINABLE TOMORROW

RESULTS

Construction Recycling Cuts Arena Project Costs

ONE IN A SERIES OF CASE STUDIES FEATURING BEST BUSINESS AWARD WINNERS

When the new Rose Garden Arena opens visitors will have more to cheer than the Trail Blazers. They can also applaud Arena owners for the largest construction and demolition (C&D) recycling program in the US. By late 1994, with the project more than half complete, nearly 36,000 tons of C&D waste had been recycled—97 percent of the total! In addition, over 340,000 tons of excavated dirt had been reused. The Oregon Arena Corporation (OAC) has set standards in C&D recycling and reuse and saved $127,000 - with more to come!

Origins

Before site demolition began, they hired River City Resource Group (RCRG) to do a recycling cost/benefit analysis for them. The study showed potential savings from recycling. Waste disposal costs range up to $75 a ton, not including dumpster rental. However, some local businesses view C&D wastes as resources. So, they take materials away for less than the cost of disposal - or at no cost in some cases.

OAC decided on an aggressive waste reduction and recycling policy. It followed RCRG's waste management plan. The plan had strategies for minimizing wastes, recycling during construction, and using recycled materials in the building itself.

Stop Waste Before It Starts

The first step was minimizing waste created. The Arena design kept that goal in mind. Contractors were encouraged to reuse materials where possible. They exercised care when ordering, storing, and cutting materials. Finally, they worked with vendors to reduce packaging brought to the site.

Divert What's Left

The general contractor agreed to divert as much as possible from the site waste stream. This included concrete, asphalt, masonry, land-clearing debris, metals, wood, drywall, and cardboard. In turn, the contractor extended the same policy to its subcontractors. Each began to source-separate waste materials into individual recycling containers.

Recycling began with diversion of demolition debris. This included waste from a demolished exhibit hall at the Portland Coliseum, an adjacent carwash manufacturing facility, and part of a street and parking lot. The demolition contractor kept large timbers

BEST

and large metal pieces for reuse. All 214 tons of land-clearing debris was recycled. Most was turned into compost.

Find New Uses

Other wastes generated by the project found a variety of new "lives." Much of the excavated dirt went to Portland Meadows or the Portland International Raceway for reuse. Wood waste was used as "hog fuel" in industrial boilers or as furnish for particle board. A processor turned metal scrap into a steel mill feedstock. Cardboard was taken to a recycling facility. Concrete and asphalt rubble were recycled into gravel or new asphalt.

Savings

OAC Project Manager Bob Collier expects to save another $60,000 or more by the time the Arena is completed. This means total savings could reach $200,000.

Environmental Benefits

While helping its own bottom line, OAC is also encouraging a sustainable actions. Producing new products from recycled metal, for example, conserves metal and saves energy by not mining, shipping, and processing virgin ore. Less transportation and processing energy means less air pollution.

OAC is also purchasing recycled-content materials for the Arena - helping to promote "closed loop" business practices.

The Future

Recycling won't end when the Arena opens for business. RCRG and OAC's "Green Team" have a waste management plan for the Rose Garden and Blazer offices there. They're also looking at ways to make recycling a regular feature of all Arena events.

Awards

In April 1994, in recognition of its innovative waste reduction and recycling efforts, the Oregon Arena Project received a "BEST Innovation Award" issued jointly by the City of Portland, the Association for Portland Progress, and the Portland Business Journal.

For more details, contact Debbi Allen at RCRG or Christee Sweeney of OAC at (503) 731-5239.

HOW TO...Cut Costs with C&D Recycling

Here are 5 steps to cut disposal costs during new construction or major renovations:

1. Be efficient with materials and products used. Think about ways to reduce the waste generated before it's created.
2. Look for opportunities to reuse materials or salvage existing building materials.
3. Identify recyclable materials. Develop a waste management plan.
4. Set up the site for efficient collection of recyclable materials. Clearly mark the separate bins.
5. Monitor and track the cost savings. Let upper management and contractors know the amount, types and cost saving associated with recycling.

You may well find, as the Oregon Arena Corporation has, that recycling construction debris saves money as well as landfill space.

BEST
BUSINESSES FOR AN ENVIRONMENTALLY SUSTAINABLE TOMORROW

RESULTS

Oregon Soil Corp Feeds Waste To Worms

ONE IN A SERIES OF CASE STUDIES FEATURING BEST BUSINESS AWARD WINNERS

Like many people in the Portland area, Dan Holcombe makes frequent stops at Fred Meyer stores. But Holcombe, President of Oregon Soil Corp., loads his truck with something others are happy to leave behind: waste produce. At the Oerther family farm in Clackamas County he feeds this material, mixed with yard debris and waste paper, to thousands of earthworms. The result is Oregon Soil Earthworm Castings All-Purpose Planting Mix—which Fred Meyer plans to sell to gardeners! Holcombe is showing how the "trash" which clogs our landfills is often treasure in disguise.

Origins

Dan Holcombe has been working with worms since the 1970s. At first, his worms fed mostly on manure, but with rising landfill rates in the 1980s, he saw an opportunity. Rather than paying to landfill spoiled produce, food suppliers could let worms turn their waste into a valuable resource.

In 1988, Holcombe began to collect food wastes from Gatto & Sons, a wholesale fruit and produce company. The arrangement with Gatto was mutually rewarding, and in 1991 Holcombe had another chance to demonstrate the value of vermiculture (i.e., worm culture). He received a "One Percent Well Spent" grant from Metro, the Portland-area regional government. Metro's grant program was designed to promote innovative recycling and waste reduction. In the case of Oregon Soil Corp., it made possible an 18-month project that showed the potential for earthworms to handle a combined waste stream of yard debris, food waste, waste paper, and municipal solid waste.

The Metro grant also allowed Oregon Soil to build, as a pilot project, a special 120-foot-long continuous-flow reactor. This device spreads mixed feedstocks over the worm bed and automatically harvests the castings. The reactor can process 2,500 tons of organic material a year.

BEST

Savings

Vermiculture continues to benefit the companies Holcombe serves. "We save money by using Oregon Soil," says Joseph Gatto of Gatto & Sons. So Does Fred Meyer. The 15 Portland-area stores that Holcombe collects from save 10 to 20 percent overall on store waste disposal costs. Fred Meyer also gains a valuable product for sale to its customers. The All-Purpose Planting Mix will be sold in cubic-foot bags.

Environmental Benefits

Oregon Soil Corp. works with companies to divert a significant volume of material from landfill disposal. Fred Meyer cuts its landfill contribution by approximately 1,200-1,800 tons per year. Gatto & Sons has reduced its disposal volume by 450-500 tons per year. Worms feed on this waste, turning it into a natural product that can stimulate plant growth in place of petrochemical fertilizers.

The Future

Holcombe sees a bright future for earthworms as part of an ecologically sound waste management strategy. He hopes to expand the benefits of vermiculture to other clients in the future.

Awards

In April 1994, in recognition of its unique waste reduction and recycling efforts, Oregon Soil Corp., in conjunction with Fred Meyer Inc. and Gatto & Sons, received a "BEST Innovation Award" issued jointly by the City of Portland, the Association for Portland Progress, and the Portland Business Journal.

For more details, contact Dan Holcombe, President, Oregon Soil Corporation, at (503) 629-5933.

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HOW TO...See if Worms will Work for You.

Here are five questions to ask yourself if you're considering using worms to reduce your waste. To answer these questions, contact Metro, refer to one of the books on the topic such as "Worms Eat My Garbage" by Mary Appelhof, or call Dan Holcombe for more details.

1) Do I have the right kind of waste?
2) How large a worm bin will I need, and where can I put it?
3) How many worms do I need, and where can I get them?
4) How do I feed/take care of my worms?
5) How do plants benefit from a worm bin?

You may well find, as Oregon Soil has demonstrated to Fred Meyer and Gatto & Sons, that your garbage can be worth cash.


ENERGY


WASTE

To Find Out How Your Business can be "BEST" contact:

Curt Nichols, Program Manager
City of Portland Energy Office
1120 SW 5th Avenue, #1030
Portland, OR 97204
Phone: (503) 823-7418
Fax: (503) 823-5370


WATER


TRANSPORTATION

BEST
BUSINESSES FOR AN ENVIRONMENTALLY SUSTAINABLE TOMORROW

RESULTS

"Free" Energy Shines Through at Marco's Cafe

ONE IN A SERIES OF CASE STUDIES FEATURING BEST BUSINESS AWARD WINNERS

Housed in an 80-year-old building in historic Multnomah Village, Marco's Cafe & Espresso Bar is pioneering a frugal new Portland tradition. The restaurant heats its water with an array of rooftop solar collectors and a waste-heat recovery system, coupled with an efficient backup gas heater. During its first year of operation, this system helped Marco's reduce its total natural gas use by 24 percent. The impressive savings came even though the restaurant cooks with gas--a substantial use not affected by the water-heating apparatus.

Origins

Marco's president Peter Zych recalls that several years ago, when he took up fly fishing, he began to think more seriously about natural resource issues. He decided that he wanted to transform himself, as much as possible, from an energy consumer to a producer of clean, renewable energy. In 1993, he and business partner Dean Rothenfluch arranged with the Gen-Con Solar Energy Division to install the solar/waste-heat system at Marco's.

The restaurant had seven solar collectors mounted on its roof. The collectors were connected to two 120-gallon insulated storage tanks/heat exchangers in the basement. From these first-stage tanks, water was sent to a single 100-gallon insulated tank. This second-stage tank also drew waste heat from an air conditioning compressor. The pre-heated water was finally sent to a 120-gallon insulated tank. Here, additional heat, as needed, was supplied by an efficient, instantaneous natural gas heater.

Savings

Reductions in natural gas use at Marco's during the first year of system operation were substantial! The greatest savings were on bright summer days, but benefits were year-round. On bright winter days, the solar collectors heated water to as much as 130 or 140 degrees Fahrenheit. With a thermal efficiency of 86 percent, the final-stage gas heater proved to be a great improvement over the restaurant's old water-heating system. It brought significant savings all by itself.

BEST

During the first year after instalation, Marco's total gas bill was 19 percent lower. This brought savings of nearly $900. The savings came even though the restaurant's cost per therm rose more than 14 percent during that period.

Marco's saved big when the sun shone! July saw the greatest monthly drop in gas use. Compared to the previous July, it reduced total gas use by 37 percent. Marco's saved even when it wasn't as sunny. In January, the restaurant used 18 percent less gas than it had twelve months earlier.

Tax Benefits

Marco's also gained tax benefits. The new system qualified for a 35 percent Oregon Business Energy Tax Credit (BETC) and a 10 percent Federal tax credit. Furthermore, the value of the system is property-tax exempt. It is also 100 percent depreciable over five years under the federal Modified Accelerated Cost Recovery System (MACRS).

The Future

While $900 per year is nice, Zych and Rothenfluch want to "recycle" still more heat. They have planned to alter the system so it will recover waste heat from a walk-in freezer at the restaurant. This should provide them with even greater savings.

Awards

In recognition of its innovative energy-efficiency efforts, Marco's received a "BEST Innovation Award" in April 1994. The award was issued jointly by the City of Portland, the Association for Portland Progress, and the Portland Business Journal.

For more details, contact Peter Zych, Marco's Cafe and Espresso Bar, at (503) 245-0199, or Doug Roeterman, Gen-Con Solar Energy Division, at (503) 245-7657.

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HOW TO... Benefit from solar/waste heat recovery

Your business could cut energy costs with waste heat recovery or solar water heating. Here are four easy steps to help you realize that potential:

1) Do basic conservation first! Low-cost measures produce immediate savings.
2) Look at potential "free" heat sources – sun, boiler exhaust, and/or refrigeration and air-conditioning waste heat.
3) Get expert advice on system requirements. Your utility, the Solar Energy Association of Oregon, or Oregon Department of Energy (ODOE) are good places to start.
4) Contact your utility, ODOE, or your tax adviser to ensure that you apply for all the rebates and tax credits you're due.

You may find -- as Marco's has -- that you have a source of "free" heat in your facility. And, using free heat from the sun or your own equipment can save you money -- even in cloudy Portland!

ENERGY

WASTE

To Find Out How Your Business can be "BEST" contact:

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WATER

TRANSPORTATION

BEST
BUSINESSES FOR AN ENVIRONMENTALLY SUSTAINABLE TOMORROW

RESULTS

Franz Powers Delivery Fleet With Propane

ONE IN A SERIES OF CASE STUDIES FEATURING BEST BUSINESS AWARD WINNERS

United States Bakery is a family-owned company with operations in several western states. For generations, Portland residents have enjoyed the company's best-known local product: Franz Bread. Franz is also sold elsewhere in Oregon and Washington, and much of it travels to stores in trucks powered by propane. Use of the alternative fuel has benefited both the environment and United States Bakery's bottom line.

Origins

Like butane, propane is a liquified petroleum gas (LPG) derived from processing natural gas or refining crude oil. More often associated with backyard barbecues or rural home heating, propane has actually fueled vehicles for many years. The National Propane Gas Association estimates that today, 350,000 vehicles in the United States run on the fuel.

United States Bakery's experience with propane goes back to the oil shortages of the 1970s. As a security precaution, the company converted a modest number of vehicles to the alternative fuel, but interest waned when the shortages ended. That changed in the mid-1980s, when Tom Powers, United States Bakery's Vice President for Fleet Operations, made an intriguing discovery: the piston problems then plaguing much of the Franz fleet seemed to bypass the propane-powered trucks. Theorizing that the difference had to do with propane's consistently high octane level, he began to convert more trucks to run on the fuel. As the conversion process continued, propane's range of virtues became increasingly evident.

Environmental Benefits

A recent draft report from the U.S. Environmental Protection Agency concludes that "LPG-fueled vehicles have the potential to provide significant environmental and economic benefits." The draft report notes, for example, that "CO [carbon monoxide] emissions from LPG-fueled vehicles at low temperatures...should be much lower than those from gasoline-fueled vehicles" and that "LPG-fueled vehicles are expected to provide

small but significant benefits with respect to greenhouse gas emissions."

Financial Advantages

The propane vehicles in the Franz fleet—now totaling about 180—have approximately 10 percent lower maintenance costs than comparable gasoline-powered vehicles—a substantial savings. According to Powers, this is because propane produces less crankcase dilution, and thus places less wear on engines.

The cost advantages are further extended by propane's eligibility for a 35 percent credit per vehicle conversion on Oregon income taxes and a deduction of up to $2,000 per conversion on Federal taxes.

And the company saves still more money on insurance. The propane supplied to the Franz fleet is stored in above-ground tanks that are protected by stringent safety features. In comparison to the large underground gas and diesel tanks they replaced, which had a potential for leakage, the propane tanks carry much less insurance liability.

Conclusions

In looking back, the only regret Tom Powers has is that he didn't switch to propane sooner. Noting that United States Bakery works hard to produce wholesome products in sanitary conditions, Powers is pleased that propane, with its clean-air advantages, allows the company to carry the same responsible attitude "out into the streets."

Awards

In April 1994, United States Bakery's use of environmentally desirable propane for the Franz fleet earned the company a "BEST Innovation Award" issued jointly by the City of Portland, the Association for Portland Progress, and the Portland Business Journal.

For more details, contact Tom Powers, United States Bakery, at (503) 232-2191.

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HOW TO...Explore alternative fuel options for your fleet

Alternative fuels are becoming more available. State, federal, and (in some cases) utility incentives are available too.

There are seven easy steps to converting your vehicles to a cleaner-burning alternative:

1) Inventory the vehicles in your fleet.
2) Check your vehicles' annual operating costs—mileage, fuel use, and maintenance.
3) Find out which alternative fuels are avail able in your area.
4) Ask your vehicle supplier(s) about alterna tive fuel OEM vehicles or conversion kit availability.
5) Check on technical and financial assistance available from utilities and fuel suppliers.
6) Calculate net payback for most likely vehicle replacements or conversions.
7) Budget for new vehicles or conversions as appropriate.

You'll likely find—as United States Bakery did—that alternative fuels can benefit your fleet in a variety of ways.

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WATER

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RESULTS

Team Effort Cuts Water Use At Hercules

ONE IN A SERIES OF CASE STUDIES FEATURING BEST BUSINESS AWARD WINNERS

Hercules Inc. has a number of plants in the United States and abroad. The company's Portland facility on N.W. Yeon Avenue produces specialty chemicals for the paper industry. Since 1991, led by its Environmental Team, the Portland plant has found ways to reduce its water consumption by 39 percent. They saved nearly 75 million gallons during 1993—cutting costs by $82,000.

Origins

Water is an essential resource at Hercules' Portland plant. Large quantities are required for heating, cooling, and product dilution. By 1992, the company had taken a number of conservation steps, but the drought that year provided additional impetus. Hercules initiated Phase I of a comprehensive water conservation program.

The Environmental Team

The spearhead for Phase I was Hercules' Environmental Team. Formed in 1991, the Team includes both supervisory and non-supervisory personnel, drawn from all areas of the plant. The six to seven full-time members are joined by temporary members—employees with special expertise in some aspect of Hercules' operations. A leader functions to keep the Team on track, but members have an equal voice in addressing environmental issues facing the plant.

Implementing Conservation Measures

In planning Phase I, the Team looked at three main uses of water at the plant: for processes used to turn raw materials into chemical products; for dilution of those products; and for post-production cooling of the products.

In some cases, the Team found simple operational changes could save significant amounts of water. In other cases, equipment modifications were required. One important modification was conversion of a tank, formerly used for product storage, to a central reservoir where water is collected from various operations and saved for reuse. This reservoir serves as the hub of Hercules' water conservation system.

The handling of non-contact cooling water provides an excellent example of how the conservation program benefits the plant. Formerly discarded after serving its initial purpose—cooling raw materials and finished products by absorbing

their heat as it passed through cooling coils—this water now has additional "lives." In place of water once drawn directly from the city supply, it is used in boilers. When steam from the boilers is used to heat products and raw materials, condensate is collected and used to wash Hercules' tank trucks.

The Future

During Phase II of its conservation program, set to begin soon, Hercules will be looking for areas where process modifications and upgrading of equipment can yield additional water savings. It will also explore further uses for the water saved and stored as a result of Phase I changes.

Even more important, says Peter Harris, Portland Plant Engineer and Environmental Coordinator, "is looking at an operation and identifying where we can run it more effectively, so we don't use the water to begin with." Harris estimates that changes implemented in Phase II could cut Hercules water usage an additional 25 percent over 1991-92 levels.

Benefits

What does 75 millions of gallons of saved water look like? While visualizing such a vast quantity may be difficult, Harris notes that the corresponding monetary savings are very easy to see on the company's bottom line. Furthermore, the water saved and stored as part of its conservation program gives it a measure of security in the event of future shortages. And, since the water the company no longer requires is available to other Portland businesses and households, Hercules functions as a corporate good neighbor. Another intangible benefit, according to Harris, is the positive spirit the conservation program has generated among Hercules employees.

Awards

In recognition of its innovative water conservation program, Hercules received a "BEST Innovation Award" in April 1994, issued jointly by the City of Portland, the Association for Portland Progress, and the Portland Business Journal.

For more details, contact Preston Trotter, Hercules Plant Manager, at (503) 224-1200.

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HOW TO...Start an Environmental Team

Your employees are some of the most knowledgeable "consultants" you can find. If empowered to provide efficiency improvement ideas, they can save you money.

Here are six steps to starting and managing an "Environmental Team":

1) Publicly state upper management's commitment to environmental action and employee involvement.
2) Create a team of key employees from across the organization.
3) Solicit efficiency improvement ideas from team members and other employees.
4) Prioritize ideas; implement low-cost/no-cost measures and budget for ones with higher capital requirements.
5) Document results (resource savings and cost avoidance) from implemented ideas.
6) When achievements are made, publicize and celebrate to keep interest and motivation levels high.

You'll likely find—as Hercules has—that an employee Environmental Team can improve your efficiency, your image, and your bottom line!

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RESULTS

Red Lion Hotels Uncover Energy and Water Savings

ONE IN A SERIES OF CASE STUDIES FEATURING BEST BUSINESS AWARD WINNERS

Red Lion Hotels & Inns own and operate 55 hotels in eleven western states, including five in Portland. Their Portland hotels have nearly 1,600 guestrooms. Recent changes are saving Red Lion more than $290,000 per year in lower energy, water, and sewer costs at their Portland properties.

Cost Cutting

Over the past few years, Red Lion has upgraded their Portland area hotels. Each hotel director is given specific energy use goals and a reward for reaching them. They want to reduce energy use and maintenance costs while improving the "look" of their facilities. They replaced old lighting and improved their heating and cooling systems. And, they changed guestrooms to cut water use. Red Lion's customers save too. Bob Brewer, energy management coordinator, noted, "Lowering our utility costs through improved efficiencies helps us maintain more favorable rates for our guests."

Lighting

Red Lion retrofitted nearly 3,000 old-style incandescent light fixtures with more efficient compact fluorescent lights. These changes were made to each hotel's corridor, lobby, and exterior lighting. They cut the lighting energy use in these areas by 80 percent or more. They also upgraded existing fluorescent lighting in more than 500 fixtures to use more efficient lamps and ballasts. The new lamps and ballasts cut the lighting energy use by nearly 50 percent.

Heating & Cooling

The hotel's heating and cooling systems were updated to be more energy efficient. The changes made varied with each hotel, depending on the specifics of their systems. In some cases they added economizers to take advantage of outside air for "free" cooling. They added thermostats to control the guest room fans. Each hotel was linked to a central energy management control system. This allows the systems to be controlled by PC from the engineer's office, enabling instant response to guestroom comfort. They save energy while providing flexibility to guest requests.

Controls

Several variable speed drives (VSDs) were added to supply, return, and cooling tower fan motors. The result is that energy is not wasted to run fans more than needed when

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minimal heating or cooling is required or the rooms are unoccupied. The fan system changes save thousands of kilowatt hours per year, increase fan motor and belt life, and enhance space comfort.

Water-Saving Fixtures

Standard showerheads use 5 gallons per minute (gpm). Red Lion had 3 gpm showerheads. But, with the drought in 1992, they replaced them with 2.5 gpm models. They also added sink faucets aerators that save 40 percent. Together these save 3.5 million gallons of hot water per year. They cut toilet water use too (from 5 gallons per flush to 2.5). Their total water savings — hot and cold — is more than 12 million gallons per year.

Energy Savings

Red Lion's new equipment and operating changes cut their energy use by more than 10 percent and save over 4.8 million kilowatt hours and 16,000 therms of natural gas each year. Their savings add up to $260,000 per year. This is enough energy to supply 400 typical homes. It also keeps nearly 1,000 tons of CO_2, a global warming gas, from reaching our atmosphere each year.

Water Use Reduction

Red Lion's improvements had a significant impact on their water use. They cut water use in their hotel rooms by 38 percent. The 12 million gallons they no longer use saves them more than $13,000 each year. Less water use also means lower sewer costs. Their sewer bill savings are nearly $29,000. And, they use less natural gas for hot water.

Results and Rewards

In March '93, Red Lion received a "BEST Innovation Award" for the energy efficiency and water conservation efforts at their Portland hotels. However, the best reward is more efficient, more comfortable buildings that have better lighting, more precise hot water temperature control, and more efficient ventilation systems. The savings, along with the state tax credit and utility rebates, gave them a net return on investment of better than 100 percent!

For more details, contact Red Lion's Bob Brewer, Energy Management Coordinator, at (503) 283-5141 x4272.

HOW TO . . . Track Energy Use

Tracking energy use is a starting point for saving energy. Without some monitoring of energy-saving projects, you can't be sure of the impacts of your investments.

Here are six easy steps to track your energy use:

1) Request building energy use history (for the past two years) from your utility or fuel supplier.
2) Correlate energy use between buildings on a per square foot basis.
3) Normalize energy use based on temperature to account for weather variations.
4) Take meter readings daily (or per shift) for more precision.
5) Consider sub-metering — available from utilities or energy consultants — for even more detail.
6) Graph energy use at least monthly and share progress with management and employees.

You'll likely find — as Red Lion did — that when you track your buildings energy use, it helps you save money too!

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RESULTS

Elf Atochem Captures Impressive Water Savings

ONE IN A SERIES OF CASE STUDIES FEATURING BEST BUSINESS AWARD WINNERS

Elf Atochem North America operates a chemical manufacturing plant in Northwest Portland. They are one of the City's largest water users. Starting in 1992 they voluntarily cut water use at their plant by 15 percent. The savings add up to as much as 346,000 gallons per day, more than enough to supply 1,500 typical homes. The results are lower water — and sewer — costs and more water available for the rest of us.

Idea Origination

Elf Atochem employees suggested many of the water-saving projects. When they saw "water waste" they were encouraged by management to assess the impacts. As a result, a number of water-saving modifications were made at the plant.

Water Use Eliminated

In some cases, Elf Atochem found that they were using water where it wasn't needed at all. In one case they now shut off the cooling water for an air compressor when it is not useed. Since the air compressor serves as a backup, the water savings add up quickly. Other plant expansion and process changes were made with water use in mind. The Sodium Chlorate process — expanded in 1991 — eliminated all city water process use. They also cut water use by purchasing nitrogen rather than producing it themselves. The nitrogen production process was water intensive, using about 72,000 gallons per day.

Another Water Source

The plant also realized that paying for treated City water wasn't always necessary. Since they're located near the Willamette River, they had a permit to use its water. They now draw river water for their roof sprinklers and to run through an intercooler that provides cooling for an air dryer. The air dryer removes moisture from their compressed air. River water is pumped through the intercooler and then returned without contacting any impurities. This cut Elf Atochem's City water purchases by 120,000 gallons per day during the winter and as much as 220,000 gallons per day during the summer.

Savings Benefit City

Like most cities, Portland's water supply system has a summertime peak demand.

Many of Elf Atochem's voluntary water-saving projects directly reduce this peak. They save water year around, but during the summer they save an additional two-thirds of the total daily water savings. That leaves more water available just when people use it the most. This is especially beneficial during dry summers like Portland experienced in 1992.

Benefits

One benefit is the additional water available for the Portland water system. Another benefit is the cost savings to Elf Atochem. They cut their water costs. They also reduced their wastewater charges for water discharged to the sewer. The total savings for both add up to more than $110,000 per year.

Awards

In early 1993, Elf Atochem received a "BEST Innovation Award" issued jointly by the City of Portland and the Association for Portland Progress (APP). The "BEST" award recognized their innovative water conservation activities.

For more information about Elf Atochem's innovative water-saving efforts, contact Bill Robbins at (503) 225-7271.

HOW TO...Analyze water use

Your businesses water use may not seem to be a large part of your overhead. However, you pay for that water twice — once as water (coming in) and again as sewer (going out). When you know how much it costs to use water in various parts of your operation, you'll see just how much you can save.

There are five easy steps to analyze your water-saving potential:

1) Keep records of water use. Remember the old rule — "You can't save what you don't measure."
2) Publicly state top management's commitment to water conservation.
3) Use in-house experts - or bring in consultants - to provide a technical and financial analysis of potential water saving options.
4) Specify "water efficient fixtures" in all purchase and construction specifications.
5) Track and publicize the results (for management/other employees).

Like Elf Atochem, you'll find you can easily find ways to save water once you know where it's being used. You may be surprised at the high return on your water-saving investments.

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RESULTS

NIKE Encourages Alternative Commuting

ONE IN A SERIES OF CASE STUDIES FEATURING BEST BUSINESS AWARD WINNERS

NIKE, Inc. is a sport shoe and fitness company. Their corporate headquarters is located in the Portland area. They also have a retail outlet, NIKE TOWN, located in downtown Portland. Since 1992, they have reduced employee commute trips at their facilities. NIKE TOWN is a unique retail store. That store won an award for their efforts and is the focus of this case study. Their efforts encourage — and reward — almost any transit alternative to driving to work alone. The results are reduced fossil fuel use, cuts in air pollution, and less traffic congestion.

A Dollar a Day

NIKE offers employees an incentive to bike, run, walk, or skate to work. They receive a $1 voucher (a "NIKE Buck") every day they commute that way. NIKE Bucks are good at the employee store, the cafeteria, and their child care center. Each carpooling employee also gets a NIKE Buck. And, carpoolers get choice parking spots in NIKE's parking lots.

Transit Passes

NIKE has an incentive for public transit too. They joined forces with Tri-Met to provide reduced cost transit passes for their employees. These passes are available for as much as 75 percent off the regular price. The value of the discount is equal to the "NIKE Buck" option, $21 per month. So, whichever option employees choose, NIKE's level of support is the same.

Trip Reductions

Only a small fraction of NIKE employees work in downtown Portland. Seventy-five people work at NIKE TOWN and most of them used to drive to work in single occupant vehicles. Before they started promoting transit alternatives, only a few NIKE TOWN employees rode the bus or biked to work. Now, they have two car pools, along with 27 bus riders, and 20 employees that bike, run, walk, or skate to work each day.

NIKE's corporate-wide numbers are significantly higher. Commute changes at NIKE TOWN impact downtown traffic levels. Changes by NIKE TOWN employees have cut out trips by 26 single occupancy vehicles per day. Over a year that adds up to more than 6,700 avoided trips. NIKE TOWN's employees average 20 miles for a round trip commute. So, they have reduced vehicle travel by more than 135,000 miles per year. Fewer car miles mean less gasoline use and reduced air pollution.

Assuming an average vehicle city mileage of 18 miles per gallon, the trips that NIKE TOWN employees now avoid, save more than 7,500 gallons of gasoline per year. That equals nearly 4,700 pounds of air pollutants — carbon monoxide (CO), unburned hydrocarbons (HC), and oxides of nitrogen (NO_X). It also results in a reduction of carbon dioxide (CO_2) emissions by more than 150,000 pounds per year. CO_2 is a greenhouse gas that contributes to global warming.

Benefits

One benefit is that NIKE TOWN employees are now more fit than before. Using muscle power instead of fossil fuel to get to work helps in many ways. They cut gasoline use. They've eliminated hundreds of pounds of pollutants and global warming gasses. Now there's cleaner air, less congestion on the roads, and more space for downtown business customers to park.

Employees are having more fun too. One employee that never thought she would share a ride with anyone started carpooling for the "NIKE Bucks". Now she enjoys it so much that she would continue carpooling even if the incentives were discontinued. She said, "I enjoy the people I'm riding with and we're all having a lot of fun."

Awards

NIKE TOWN has won awards for its innovative approach to retailing. In early 1993 they received a "BEST Innovation Award" issued jointly by the City of Portland and the Association for Portland Progress (APP). They received an award in the "Clean & Efficient Transportation" category. The award recognized their innovative transit alternative activities.

For more information about NIKE's innovative transit efforts, contact Julie Papen at (503) 671-2961.

HOW TO...Start your transit program

Employee transportation may not seem to be part of your day to day operations. However, the stress of driving and parking hassles can impact your employees' work. If encouraged to do so, they will use the bus or another transit alternative to commute.

There are six easy steps to helping your employees use an alternative commute method:

1) Publicly state top management's commitment to mass transit, carpooling, and other alternatives.
2) Establish an employee transit coordinator and make it a high profile appointment.
3) Offer discounted transit passes and other rewards for alternative commuting to all employees.
4) Provide parking space for bicycles and reserve some choice parking spaces for carpools.
5) Stop paying for (or sell rights to) freed-up parking spaces, if any.
6) Track and publicize the results (for management/other employees).

Like NIKE, you'll find your employees appreciate your efforts and it will show up in their work.

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RESULTS

Port of Portland Building Slashes Energy Use

ONE IN A SERIES OF CASE STUDIES FEATURING BEST BUSINESS AWARD WINNERS

The Port of Portland building is a 16 story Class A office tower in the Lloyd District. The Port is a major tenant in the building owned and managed by Pacific Development, Inc. (PDI). The building was constructed in the early 1970s. It has 350,000 square feet of office and retail space. Recent changes have cut PDI's energy costs by nearly $200,000 per year.

Building Upgrade

In 1992 PDI retained a local consultant to manage an upgrade of the building. It is now among the most energy efficient in Portland. The primary goals were to reduce energy use while improving tenant comfort. They replaced the old lighting system. The single pane glass was changed to double pane and the heating and cooling system was upgraded. By performing the work at night, this was completed while the building was occupied -- without disturbing tenants.

Lighting

PDI replaced 3,200 old-style fluorescent fixtures with higher efficiency parabolic fixtures. They relamped and reballasted another 1,800 fluorescent fixtures. They upgraded the lighting in the offices and corridors. The fixtures now use high efficiency T-8 lamps. The new lighting controls include occupancy switches and after-hours "sweeps" to turn off lights inadvertently left on. These changes provide the needed light while saving energy and reducing glare on computer monitors. Tenants comment that eye strain has been almost eliminated.

Heating & Cooling

The building's heating and cooling system was updated to a more efficient type. The dual duct constant volume system was completely renovated and converted to a variable air volume (VAV) system. The new system combines an additional 3,000 control points with advanced strategies available in a package known as TRAV (terminal regulated air volume). Direct digital controls (DDCs) were also installed replacing the prior pneumatic control system. DDC allows full utilization of TRAVs capabilities. The entire system can be controlled by PC from either the Engineer's office or the security desk enabling instant response to tenant comfort requests. This flexibility to tenant demands is a key benefit.

Seven variable speed drives (VSDs) were

also added. They were installed on the supply, return, and cooling tower fan motors. More than 400 mixing boxes were modified to operate as VAV boxes. The end result is that energy is not wasted to maintain high static pressures, conditioning spaces more than necessary or when unoccupied. The fan system has a low speed nighttime operation. This reduces simultaneous heating and cooling during the morning start-up. It also adds purge capabilities bringing in fresh air to improve indoor air quality (IAQ). Added CO_2 sensors are used to track the building's IAQ at all times.

Windows

The exterior of the building is largely glass — nearly 40,000 square feet. The windows were all single-pane in aluminum frames with a low insulating value. And, weatherstripping was nearing the end of its service life. PDI replaced 1,600 windows with double-pane insulating glass. The new windows included a low emissivity coating that further reduced the heat transfer.

Energy Savings

The equipment and operating changes cut PDI's energy use by 40 percent; saving nearly 5 million kilowatt hours and cutting demand by 750 kW. These savings add up to $180,000 per year. This change has kept over 1,000 tons per year of CO_2 from reaching our atmosphere — adding to global warming.

Waste Reduction

This project resulted in a large amount of waste. PDI recycled 90 percent of the 1,600 panes of glass, 3,000 light fixtures, lamps and ballasts, and other removed materials. This saved approximately 2,000 cubic feet of landfill space and cut their waste disposal costs by $10,000.

Results and Rewards

In March '93, PDI received a "BEST Innovation Award" for the energy efficiency and waste reduction efforts at the Port of Portland Building. According to tenants, the best reward is a more efficient, more comfortable building that has better lighting, more precise temperature control, and better indoor air quality. The efficiency gains, along with utility-provided financing, gives PDI a net positive cash flow. They also received a 35 percent tax credit from the State for their efforts.

For more details, contact PDI's Ralph Coppersmith, the Port Building manager or Stan Maier, chief building engineer at (503) 233-4048.

HOW TO...recycle construction debris

An increasingly large component of the expense involved in any construction or retrofit project is waste disposal. Landfilling construction materials is costly and unnecessary.

There are four easy steps to recycling your construction materials:

1) Specify "removed material separation/ recycling" in your construction contract specifications.
2) Contact recyclers to determine materials that can be recycled and coordinate a pick-up schedule.
3) Create a secured area to locate bins and label each for acceptable materials.
4) Remind contractors and site workers of construction waste separation for recycling.

You'll likely find — as PDI did — that when you recycle your waste and surplus building materials, it saves money too!

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"Green Team" Cuts Waste At Kaiser Permanente

ONE IN A SERIES OF CASE STUDIES FEATURING BEST BUSINESS AWARD WINNERS

Kaiser Permanente is a health maintenance organization serving 375,000 people in Oregon and Southwest Washington. They have achieved dramatic results in waste reduction at their facilities. This effort is directed by an employee based "Green Team". Their activities cover a wide variety of actions that reduce, reuse, or recycle waste at their two medical centers and more than 30 medical and dental facilities in and around Portland.

Reduce

Kaiser Permanente cut their use of polystyrene cups by 16,000 per month — a reduction of more than 40 percent. To do this they give each new employee a reusable thermal mug (made from recycled plastic). Their purchasing agents work with suppliers to reduce excess packaging or switch to more environmentally friendly products. The emergency room at Bess Kaiser Medical Center uses biodegradable bedpans. These are made from recycled phone books and newspapers (creating a market for recycled goods). Both their medical centers have replaced the traditional plastic pitchers and polystyrene cups given to their patients. They now receive an attractive sip bottle the paitents can take home with them when they leave. The sip bottles also encourage paitents to drink more water — a medical benefit as well.

Reuse

Both Bess Kaiser and Kaiser Sunnyside medical centers have eliminated the use of over 40,000 disposable diapers each year by switching to reusable cloth diapers. Medical forms are now printed on recycled paper. They use business envelopes without plastic windows making them easier to recycle. Outside their medical facilities, they now use mulching lawn mowers, and chippers. This allows them to reuse their lawn clippings and prunings and cut yard debris landfilled by nearly 40 truckloads per year.

Recycle

All Kaiser Permanente employees are trained to recycle office paper, recycling about 360 tons of paper per year. They also recycle old magazines from patient waiting rooms: more than 300 pounds each month. In addition, all cardboard packaging they receive is recycled too — about 125 tons a

year. Other packaging materials are recycled where possible. That included more than 12,000 cubic feet of styrofoam "peanuts" in 1992, for example.

Employee Involvement

Kaiser involves all of their employees — more than 7,600 — in these efforts. Employees share their ideas on how to reduce waste and a 13 person team (known as the "Green Team") reviews the suggestions. The Green Team also oversees implementation of the suggestions, tracking the progress with monthly "Green Team Updates" for the employees. As you would expect, the updates are printed on recycled paper — both sides of a single page. "There is no level of this organization which isn't committed to the program," says Green Team co-chair Carol Winter-Behn. "We have very environmentally conscious people who believe in doing what they can. It feels good to be investing in the future," she added.

Rewards

A formal suggestion program encourages all employees to submit suggestions to improve everything Kaiser Permanente does. Many waste reducing suggestions have been received. If implemented, employees receive awards of cash or merchandise for their ideas. Kaiser Permanente has found waste reduction reduces their operating cost — a 'reward' every business manager can appreciate. They don't mind sharing a small part of the savings with the employees who submit good ideas. Kaiser Permanente is convinced that green thinking has a positive effect on their bottom line. They have found that they get positive feedback from their members too.

Awards

Kaiser Permanente has won awards for their recycling and waste reducing efforts. They received a Recycling Achievement award from Metro for recycling in the fall of 1992. In early 1993 they received a "BEST Innovation Award" issued jointly by the City of Portland and the Association for Portland Progress (APP). The "BEST" award recognized their innovative waste reduction activities.

For more information about Kaiser Permanente's earth-friendly efforts, contact Carol Winter-Behn at (503) 786-2601.

HOW TO...Get your employees involved

Front line employees are the closest to your day-to-day operations. They often see opportunities that nobody else can. If encouraged to do so, they can provide easy and effective solutions to problems in your organization.

There are six easy steps to helping your employees 'think green':

1) Publicly state top managements' commitment to efficiency, resource preservation, and employee involvement.
2) Create a review committee with key employees selected from across the organization.
3) Publicly solicit ideas/suggestions from all employees.
4) Review ideas and facilitate implementation of the best ones.
5) Reward employees based on the savings from their idea(s).
6) Publicize the results (for management/ other employees).

You'll likely find — as Kaiser Permanente has — that when your employees 'think green' it means more green for your bottom line too!

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Portland Area's Best Businesses

1994 BEST INNOVATION AWARDS WINNERS

Energy Efficiency

- Blue Cross & Blue Shield of Oregon
  100 Market Building
- Marco's Cafe & Espresso Bar

Waste Reduction (Recycling)

- Oregon Arena Corporation
- Oregon Soil Corporation
  With A&J Gatto's Salad Co. and Fred Meyer, Inc.
- Oregon Steel Mills

Water Conservation

- Hercules Incorporated
- Riverside Golf & Country Club

Clean & Efficient Transportation

- United States Bakery (Franz)

Best Business Awards are sponsored by:

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The Business Journal

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February 14, 1996

Mr. Curt Nichols
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1211 SW Fifth Avenue
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Portland, OR 97204

Dear Mr. Nichols:

Ms. Barbara Myers a City Planning graduate has used your publications in the appendix of her Master's thesis. Before we can bind and submit her thesis to the Library at the University of Manitoba, we must have your permission to include these brochures in her thesis. They are "Businesses for an Environmentally Sustainable Tomorrow";Best Fact Sheet: Energy Efficiency; Water Conservation; Waste Reduction; Transportation Alternatives; Results: Riverside Golf Course Finds Green Solutions; Construction Recycling Cuts Arena Project Costs; Oregon Soil Corp Feeds Waste to Worms; "Free" Energy Shines through at Marco's Cafe; Franz Powers Delivery Fleet with Propane; Team Effort Cuts Water Use at Hercules; Red Lion Hotels Uncover Energy and Water Savings; Elf Atochem Captures Impressive Water Savings; NIKE Encourages Alternative Commuting; Port of Portland Building Slashes Energy Use; "Green Team" Cuts Waste at Kaiser Permanente; 1994 Best Innovation Awards Winners.

Please indicate your approval on this letter and return by Fax.

Thank you.

Yours truly,

Helen Agar
Thesis Officer

Barbara has my full approval to use the BEST materials above. Thanks for asking!