

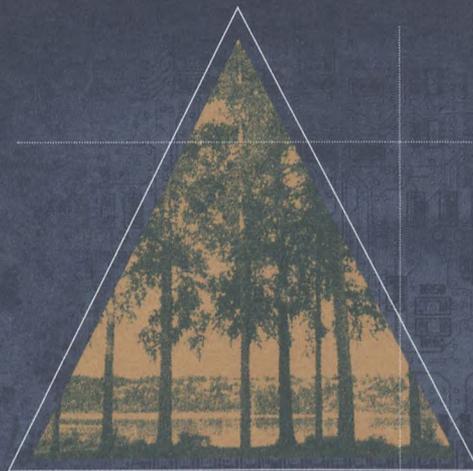
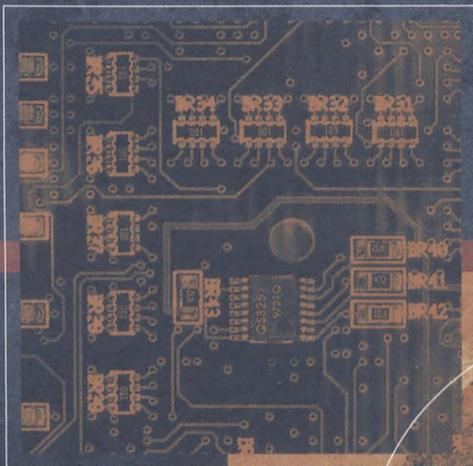
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Industry
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Eco-efficiency:

Good Business Sense
IC



Canada

be

Competitive.

be

Innovative.

be

Eco-efficient.

Eco-efficiency

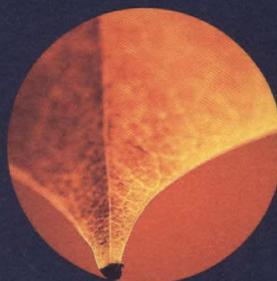
has three core objectives:

- 1** Increasing product or service value;
- 2** Optimizing the use of resources; and
- 3** Reducing environmental impacts.



Industry Canada recognizes the importance of eco-efficiency, in helping Canadian firms to become more competitive and sustainable. We are working in partnership with companies, other government departments, consumers and stakeholders to assist Canadian industry to adopt eco-efficient practices and tools. For more information on current Industry Canada eco-efficiency initiatives, please visit our website.

<http://strategis.ic.gc.ca/e2>



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Eco-efficiency

What is it?

Eco-efficiency is increasingly becoming a key requirement for success in business. It's the art of doing more with less, of minimizing costs and maximizing value. Eco-efficiency promotes the creation of goods and services while optimizing resource use, and reducing wastes and pollution. In practice, eco-efficiency has three core objectives:

1. **Increasing product or service value;**
2. **Optimizing the use of resources; and**
3. **Reducing environmental impacts.**

Each of these objectives has opportunities for costs savings, which is why addressing them makes good business sense. In fact, companies that have started integrating eco-efficient practices and tools have demonstrated that eco-efficiency stimulates productivity and innovation, increases competitiveness and improves environmental performance.

World Business Council for Sustainable Development's Seven Elements of Eco-efficiency

- Reduce material intensity
- Reduce energy intensity
- Reduce dispersion of toxic substances
- Enhance recyclability
- Maximize use of renewable resources
- Extend product durability
- Increase service intensity

Source: www.wbcsd.com/projects/pr_ecoefficiency.htm

Business Benefits

Canfor
Forest Products Company,
Vancouver, B.C.

Approx. 5030 employees

Modifications at the Prince George and Howe Sound pulp and paper mills have increased the use of wood residue as a fuel and reduced the use of natural gas. This has led to corresponding reductions in greenhouse gas emissions of 22 kt/yr and 26 kt/yr respectively for the years 1999 and 2000. The use of sawdust to make pulp has converted a former waste into a value-added product and reduced GHG by 146 kt/yr. Canfor is able to charge a premium on its product because its customers appreciate that it was produced in an environmentally friendly manner.

Source: *The Role of Eco-Efficiency: Global Challenges and Opportunities in the 21st Century*, June 2001.



The business case

Why should I be interested in eco-efficiency?
How can my company benefit?

Ever wondered how you are going to meet all of the increasing demands your business is facing? You need to offer the same quality products or services, at competitive prices. You need to become more efficient. You need to innovate to stay competitive. You need to reduce the amount of waste you are sending to landfill and the volume of emissions you are releasing from your facilities.

How do you take practical steps to achieve these benefits? These types of pressures can be addressed by integrating eco-efficiency practices and tools into your decision-making and business operations. The following eco-efficiency drivers have emerged as important for companies:



Internal Drivers

- Reduce costs
- Increase quality of products and services
- Stimulate innovation
- Increase employee motivation
- Personal commitment/responsibility to community
- Manage risk and liability
- Maintain or increase market share

External Drivers

- Customer or consumer demands for "greener" products
- Profitability and access to capital
- Shareholders demanding accountability and transparency
- Competitive advantage by setting the trend or following the market leader
- Government regulations

Source for Drivers: The Role of Eco-Efficiency:
Global Challenges and Opportunities in the
21st Century, June 2001

Eco-efficiency can help you address your innovation and productivity challenges which can help you to achieve:

Reduced costs – through more efficient use of energy and materials

Reduced risk and liability – by designing out the need for toxic substances

Increased revenue – by developing innovative products and increasing market share

Increased productivity and employee morale – through closer alignment of company values with the personal values of the employees

Improved environmental performance – by reducing emissions, and increasing the recovery and reuse of “waste material”

Company-wide Commitment =
Company-wide Benefits

Business Benefits

BASF Chemical Company

Approx. 100,000 employees

BASF developed an eco-efficiency analysis tool to better communicate product life cycle analyses to decision-makers and has been using it for the past five years. The company's goal of eco-efficiency in this sphere is to not only make a product that has some proven benefit to the end-user, but also has an environmental benefit.

The eco-efficiency analysis tool was used to determine the most efficient indigo dyeing process, and the least environmentally damaging process. Following the analyses BASF made the necessary investment and launched the new product. The tool was also used to compare methods for preserving cereal crops, and the results confirmed that the current use of propionic acid was the most cost efficient and least damaging to the environment. This helped BASF confirm this capital investment.

Source: *The Role of Eco-Efficiency: Global Challenges and Opportunities in the 21st Century*, June 2001.

Three Steps to Eco-efficiency

- 1 Self-assessment –**
Determine the current level of eco-efficiency activity within your company
- 2 Strategic Planning –**
Develop a customized eco-efficiency program
- 3 Benefit-cost analysis –**
Find out how to get the best return for your eco-efficiency investment.

As part of Industry Canada's efforts to assist small, and medium-sized companies to adopt eco-efficiency practices and tools, we have published this self-assessment tool and accompanying worksheets on our website:

<http://strategis.ic.gc.ca/SSG/ef00012e.html>

Actions

But where do we start? What practical tools are companies using to find out where the biggest opportunities for improvement are?

Here are three practical steps your company can take to improve its eco-efficiency.

In Step 1 – Self assessment, your company would:

- Assign a Project Manager
- Assemble your project team
- Complete a series of worksheets which assess your company's current level of eco-efficiency activity in each of the following business functions: Management, Product Design and Development, Purchasing, Accounting, Marketing and Communications, Production, Distribution and Facilities Management (see <http://strategis.ic.gc.ca/SSG/ef00012e.html> for downloadable worksheets)

In Step 2 – Strategic Planning, your company would:

- Complete an eco-efficiency profile using the results from the worksheets completed in Step 1
- Review and discuss the eco-efficiency profile with your project team and management. This profile serves as a snapshot of "where you are"
- Determine "where you want to go," (i.e. drivers & goals)
- Decide "how to get there" by brainstorming options for action, (i.e. strategy)

In Step 3 – Benefit-Cost Analysis, your company would:

- With the project team, identify all foreseeable benefits and costs associated with each action outlined in Step 2
- Rank each action based on total benefits and costs
- Implement the highest benefit/costs ratios, set targets and establish a system for measuring and tracking your progress

Business Benefits

Life Cycle Management

Alcan has been using life cycle tools to benchmark environmental performance and resource efficiency and to identify product and process opportunities. In one case, an industrial furnace was redesigned to use an alternative fuel mix. Nitrogen oxide and particulate emissions were dramatically reduced, while productivity was improved by 33%.

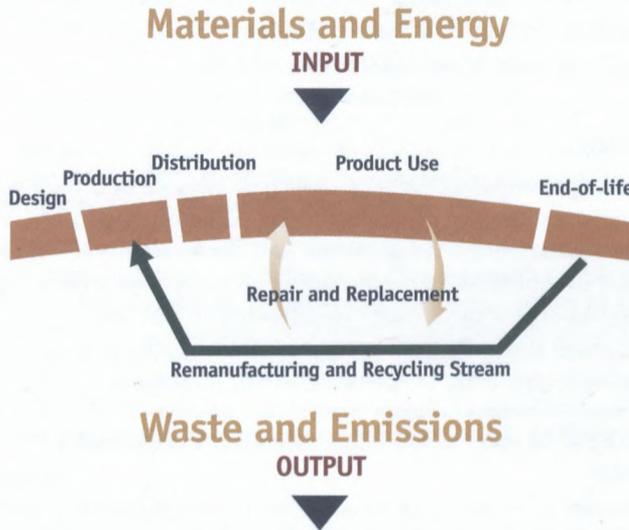
Source: *The Role of Eco-Efficiency: Global Challenges and Opportunities in the 21st Century*, June 2001.

Other Resources

Some additional eco-efficiency tools include:

Life Cycle Management (LCM)

Life cycle management recognizes that all stages of your product life cycle (extracting and processing raw materials, manufacturing, transportation and distribution, use/reuse, and recycling and waste management) have environmental and economic impacts.



Environment Canada has developed a practical “how to” guidebook to assist small businesses with this life cycle management tool. To obtain a copy, visit their website, <http://www.ec.gc.ca/ecocycle/english/pubs.cfm>, or call the Environment Canada Enquiry Centre at (819) 997-2800.

Business Benefits

Millar Western Forest Products Company, Saskatchewan.

Millar Western is a large Canadian based forest products company that has applied eco-efficiency in the plant design stage. Through design improvements, Millar's pulp mill in Saskatchewan produces a high quality pulp product without using chlorine and with a zero-liquid-effluent discharge. In addition to finding new uses for waste by-product from the production process, the company has achieved the lowest cost product in the market.

Sources: EC 's pollution prevention success stories website:

<http://www.ec.gc.ca/pp/en/storyoutput.cfm?storyID=74>

Design-for-Environment (DfE)

Design-for-Environment (DfE) is the systematic integration of environmental considerations into product and process design. The National Research Council of Canada has published a *Design-for-Environment Guide*, specifically targeted for small and medium-sized companies. To download this guide, please visit their website at www.nrc.ca/dfe, or contact the National Research Council at (613) 993-5326 for a hard copy.

Environmental Management Systems (EMS)

An environmental management system is a management structure that allows an organization to assess and control the environmental impact of its activities, products or services. To learn more about EMS and the family of standards, visit the Standards Council of Canada at: http://www.scc.ca/standards/iso14000/index_e.html.

Eco-indicators

Eco-indicators help companies evaluate their performance over time with respect to material and energy productivity and pollutant dispersion. The National Round Table on the Environment and the Economy (NRTEE) has done a great deal of work in partnership with companies to develop a core set of indicators for measuring eco-efficiency in business. To learn more about eco-indicators, visit the NRTEE website at http://www.nrtee-trnee.ca/eng/programs/Current_Programs/Eco-efficiency/eco-efficiency_e.htm or call the NRTEE for your copy of the eco-indicator workbook at (613) 995-7581.

Building Sustainable Enterprises Workshops

To help you learn more about these eco-efficiency tools and how your company can use them, visit the *Building Sustainable Enterprises website*, <http://strategis.gc.ca/BSE-CED>, or contact Five Winds International, (819) 682-1137.

Farnell Packaging Limited

Eco-efficiency Initiatives:

Recycling – In Nova Scotia, many materials have been banned from landfill, including construction waste, rubber and polyethylene. Also, the National Packaging Protocol established in 1989 formed a covenant between government, industry, consumers and environmental groups to reduce packaging waste sent to landfill by 50% by the year 2000. In response to these two important drivers, Farnell has developed extensive recycling programs for polyethylene and other materials and reduced their waste to landfill by 20% each year, even though Farnell's business has grown by 15-20% over the same period. The company's extrusion process produces chunk waste – large pieces of hard plastic – when the company switches from one custom production to the next. This chunk plastic, formerly a waste by-product, has now become a raw material for another company who chips it and makes it into plastic lumber or filler. Both of these initiatives have saved Farnell considerable costs as landfill charges are continually increasing.

Energy Efficiency – Farnell conducted an informal energy assessment and made several changes based on the findings. They considered replacing existing lighting with highly efficient sodium light bulbs throughout their facilities but found that the quality of light was only suitable for warehouses. In all other areas they switched to metal halide bulbs – also very efficient. These changes have resulted in 5% electricity savings and increased the amount of light on the factory floor by 30%.

Water Conservation – Farnell uses extrusion machinery, which requires glycol-cooling systems. In 1999, Farnell began to use the extra capacity of the glycol cooling system in the Press Department, the Converting Department, and for air conditioning at various workstations. The printing and converting equipment had formerly been cooled using city water, which was then discharged to the sewer system. The new system cycles glycol continuously. It has led to a huge reduction in water usage from approximately 12000 m³ to 1200 m³ annually, a decrease of about 90%. The initial investment for the new system was \$8500 while water costs savings amounted to \$9000 in the first year.

Summary

Farnell has implemented eco-efficiency measures as a result of the regulatory landscape, the opportunity for cost reductions, and President Don Farnell's desire that his company "do the right thing" when it comes to the environment. Eco-efficiency is now a key pillar in the corporate culture at Farnell, has been incorporated into training for new employees, and is part of the daily activities of every staff member. Eco-efficiency has become a core component of Farnell's overall strategy, and will continue to influence the direction it takes in the years to come.

For more information on Farnell's progress with eco-efficiency initiatives, please visit the Industry Canada website at <http://strategis.ic.gc.ca/SSG/ef00032e.html>, or Farnell's website <http://www.farnell.ns.ca/home.html>.



Location:

Halifax, Nova Scotia

Service:

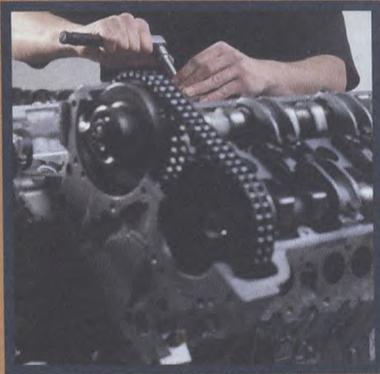
Blown film polyethylene packaging, bags and sheets

Size:

Approx. 110 employees

Background:

Founded in 1961 in Halifax, Farnell Packaging Ltd. offers a full suite of services to their customers, from product conception, through design, material selection, printing and manufacturing. Major customers are in the Maritimes and range from large grocery chains to small bakeries. Farnell's mission statement is "To be the packaging supplier of choice... for the greater good of all concerned."

**Location:**

London, Ontario

Service:

Automotive Parts Manufacturing

Size:

Approx. 6,300 employees in all of its facilities in Canada

Background:

The overall strategic focus at Siemens has been on eco-efficiency for many years. Part of its Corporate Environmental Policy statement reads: "If we let a coherent ecological analysis inform the way we think and act, this almost invariably produces economic benefits." The company has integrated eco-efficiency tools and concepts into many aspects of its business, including its product development process, which now requires designers to use Design for Environment checklists and guidelines for restricted and preferred substances. Siemens also uses Life Cycle Assessment (LCA) for product research and to help inspire innovation in the company.

Siemens North American Motor Operation Eco-efficiency Initiatives

Environmental Management Systems – In 1998, the Siemens North American Automotive plant in London, Ontario achieved savings of \$600,000 through the implementation of an environmental management system. These savings resulted from waste reductions and recycling of metals, paper/cardboard, pallets, gloves, cloths, component reuse and de-listing of wastes. Landfill costs were reduced in 1998 by 95% over 1994 costs, and the recycling rate reached 85.2%. Hazardous waste disposal costs were also reduced by 75% over 1994 costs.

Product Redesign – Siemens' first experience with Design-for-Environment, an eco-efficiency tool, was in 1997, with the redesign of the brushless motor. This motor lasts 10,000 hours (compared to 2,000 for the previous design) and is assembled rather than welded for lower cost manufacture and ease of disassembly at the end of the motor's life. It has a life cycle improvement of 80% in efficiency and environmental impact over a regular fractional horsepower motor and is designed for disassembly. With the development of the high efficiency cooling fan motors, Siemens is currently developing modules to replace the drives from the engine for both the water pump and the power steering. On a 1200kg automobile traveling at 90kph, an 8% fuel saving is conservatively achievable.

Summary

Siemens has a highly integrated and eco-efficient approach to production at their facilities, minimizing the use of resources and the production of waste wherever possible.

Source for Siemens and KEI case studies:**The Role of Eco-Efficiency:**

Global Challenges and Opportunities in the 21st Century.

June 2001.

Kuntz Electroplating Incorporated (KEI)

Eco-efficiency Initiatives:

Environmental Management Systems – KEI was certified to the ISO 14001 EMS standard in June 1998. The process took 14 months to complete and included the help of a consulting firm to perform the gap analysis and make sure KEI was meeting the requirements. The final system that is now in place for KEI is unique for its excellent integration of 9000 and 14001. Planning procedures for environmental impacts and aspects follow a routine similar to quality control. Severity of an incident, probability of occurrence of impact and likelihood of detection and containment follow a Failure Modes and Effects Analysis (FMEA) chart model. The EMS group at KEI felt that the FMEA method for identifying risks was familiar to all personnel already engaged in the QS-9000 implementation. It made sense to use the same tool for environmental issues as for quality.

Energy efficiency – KEI initiated a Cogeneration project that began in the spring of 1997. This project is based on new technology that converts approximately 30% of total energy input into electricity. In addition, another 50% of available heat is converted to hot water and steam that can be used immediately for space heating, domestic hot water, process needs and absorption chilling. This project has allowed KEI to switch from relatively high-cost electric power as its dominant energy source to low-cost natural gas – producing an annual financial savings of 20% or more in the first year. These savings alone will pay back the system installation costs by the year 2002, after which the savings will provide annual cost reductions for the operating life of the system.

Summary

Because of the strong commitment from upper management and the overall proactive attitude of the departments at KEI, eco-efficiency initiatives have been very successful. Now at KEI, there are more than 20 employees engaged in EMS activities as a part of their work routine. The benefits KEI has experienced as a result of ISO 14001 and various eco-efficiency projects are numerous, including: substantial cost savings, improved public perception, environmental achievement awards, and operations that are more efficient.



Location:
Kitchener, Ontario

Service:
Electroplating for Automotive Industry

Size:
Approx. 725 employees

Background:
KEI was classified as an SME until recently when the company experienced a tremendous period of growth. KEI's first involvement in voluntary environmental initiatives dates back to the 1970s when they undertook a pollution prevention program involving the recycling of the chrome solutions they use in their electroplating processes. Their initial motivation was to decrease costs by reduced raw material use. KEI's president is a strong visionary and believes that involvement in environmental initiatives that exceed government requirements helps KEI to strengthen their competitive advantage in the marketplace.



Location:

Prince Rupert, British Columbia

Service:

Fish Reduction Plant, Manufacturing

Background:

J.S. McMillan Fisheries Ltd. decided to take advantage of the *EcoDesign Innovation (EDI) Program. The primary objective of EDI is to help BC companies become more competitive through process efficiencies. These efficiencies, and subsequent cost savings, may be achieved through energy use reduction, water use reduction and waste reduction. The EDI Program utilizes a systems thinking approach and uses the following tools to help companies pursue opportunities: process mapping, energy, water and material balances, total cost assessments and integrated teams from several departments within the company.

J.S. McMillan Fisheries Ltd.

Eco-efficiency Initiatives:

Opportunity Assessments – As part of the EcoDesign Innovation Program, an Opportunity Assessment was conducted at J.S. McMillan's fish reduction facility in Prince Rupert, B.C. The focus of the assessment was energy, water and materials use with a particular emphasis on natural gas consumption through the production and use of steam. Several opportunities were identified to reduce total energy consumption by 15%, which saves J.S. McMillan an estimated \$40,000 annually.

Steve Parkhill, President of JSM Fisheries says, "We knew there were opportunities but we did not realize they were as significant as what we found. The EDI process provided us with a better understanding of our operations that lead to energy savings through better maintenance practices."

Summary of Results for J.S. McMillan

| Capital Cost | Annual Operating Savings | Reduction in Environmental Impact | Greenhouse Gas Reduction (CO ₂ tonnes) |
|--------------|--------------------------|-----------------------------------|---|
| \$8,000 | \$40,000 | Natural Gas: 5,400 GJ | 269.3 |

J.S. McMillan realized significant cost savings through their reduced energy consumption and reduced greenhouse gas emissions at the same time. J.S. McMillan will be further exploring the option of reducing fish entrails using an enzyme process, another opportunity that arose from the Opportunity Assessment.

* For more information on the EcoDesign Innovation Program, please contact the Science Council of British Columbia (800) 665-7222.