

Environmental Principles Training Package

Module

4

FROM PRINCIPLES TO PRACTICE



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MODULE 4: From Principles to Practice

Session 1 – Steps to Sustainability

OBJECTIVES

The objectives of this session are to:

- Briefly review some of the procedural requirements for companies to participate in the Global Compact.
- Understand some of the critical steps that companies can take towards effectively implementing the three environmental principles of the Global Compact.
- Examine some practical case studies that illustrate what various leading companies have done in terms of promoting environmentally responsible behaviour.
- Review the benefits of participating in the Global Compact's Global Learning Forums.

BACKGROUND READING

Seven Steps to A Greener Company: From Green Trimmings to a Green Soul

by Guy Dauncey

When a company claims to be “green,” how can you tell just how green it is? I always lean towards encouraging whatever progress a business has made, rather than dwelling on the work that remains undone. I know that there are many in the business world who sincerely want to make a difference. On the other hand, many companies want to convince us that their disposable diapers are greener than the next ones, or that if you buy their products, all the birds will sing and Mother Nature will be happy.

To help you rate your local company, and to help companies assess their own progress, I have devised a seven-step evolutionary scale of company greening. Most companies have been thinking environmentally for only two or three years. As you will see from the scale, the process of “deep greening” involves some very profound shifts that cannot happen overnight. So my advice is be patient - and gently encourage a company to do more.

Step One: Green Trimmings: The company makes a symbolic nod in the right direction and offers five green products among 5,000 ungreen ones, coupled with a big green marketing push.

Stage Two: Green Cuffs: As well as its small green product line, the company orders in-house paper recycling and stocks up with environmentally sound cleaning liquids. “Switch-off” reminders are placed by light switches and the company runs a regular column on the environment in the company newsletter.

Stage Three: Green Clothes: The company commissions an in-depth environmental audit, appoints an environmental vice president, adopts an environmental mission statement, and includes an environmental section in its annual report. Management institutes permanent changes in such areas as waste management, packaging, transportation, paper use, pollution control, employee involvement, eliminating ozone-depleting substances, etc. They develop a solid green product line and adopt a policy on social responsibility.

Stage Four: Green Body: The company redesigns its product line to eliminate toxins and non-recyclables at the source. They do a complete materials-use analysis, with a view to long-term sustainability and recyclability. They examine and overhaul their purchasing policy to ensure that they are supporting sustainability down the line. They adopt a policy on global responsibility.

Stage Five: Green Brains: The company develops and implements a long-term business plan designed to achieve environmental sustainability and effects a strategic redeployment of its assets and resources into sustainable products and activities (for example, shifting from oil to solar). This entails a major shareholder education plan to protect themselves from hostile takeover bids.

Stage Six: Green Heart: The company undertakes the transfer of its company stock from the open “value-free” marketplace, where all that matters is the financial bottom line, into stock ownership funds guided by social, environmental, and global responsibility standards. It develops a community co-ownership program for local plants and branch offices.

Stage Seven: Green Soul: At this final stage, the company embarks on a conscious evolution of its overall goals, policies, practices, and processes, to shift into a mode of enlightened responsibility. This involves asking the question: “How will this benefit the planet, the environment, the community, the customer, and the work team?” and incorporating the answers into every action.

As the company does this, it will discover that it is experiencing an unparalleled release of synergy and co-creativity in the pursuit of higher goals.

Guy Dauncey is the author of *After The Crash, The Emergence of the Rainbow Economy*, published by Green Print (1996), and is the environmental consultant on the Bamberston project.

Case Study 4-1: Interface

Keywords: *Environmental management; product and process change*

Interface, Inc. CEO Ray C. Anderson has combined environmentalism with dedication to his company's success, and proven that being green can also be profitable for big business.

When Anderson started Interface, Inc., in Atlanta, Georgia, in 1973, he wasn't concerned about the environment. He'd earned a degree from Georgia Institute of Technology, worked for over fourteen years in various positions at Deering-Milliken and Callaway Mills, and was out to make his own carpet business the biggest in the world. He succeeded, turning Interface into a billion-dollar-a-year company. But there was a price. Every year his factories produced hundreds of gallons of wastewater and nearly 900 pollutants.

Then Anderson read Paul Hawken's book, *The Ecology of Commerce*. The book suggested that industry was systematically destroying the planet, and the only people in a position to stop the destruction were the industrialists themselves. The book's argument prompted him to turn Interface, Inc. into an environmentally friendly enterprise.

He began by taking steps to reduce the company's waste and conserve energy by recycling. At its plant in LaGrange, Georgia, Interface used to send six tons of carpet trimmings to the landfill every day. By June of 1997, it was sending none. At Guilford of Maine, a division of Interface, new computer controls installed on boilers not only reduced carbon monoxide emissions by 99.7%, but also improved the boilers' efficiency, decreasing waste and increasing profits.

Anderson also spread the word to other companies and to consumers worldwide. He funded the Alliance to Save Energy, helping children design energy-saving campaigns for their schools, and through his frequent speaking engagements and his book, *Mid Course Correction: Toward a Sustainable Enterprise: The Interface Model*, helped prove to other businesses they could protect the environment while increasing profits.

Anderson's efforts have begun to pay off. Sunco Bank of America, Polaroid, and General Motors now regularly consult with The Coalition for Environmentally Responsible Economics. Xerox Corporation now leases many of its business machines, recycling old equipment and parts instead of discarding them.

Meanwhile, Anderson continues to move Interface toward his goal of complete sustainability, making products in a way that will not rob future generations of raw materials or energy resources. Interface is using solar and wind power in the place of fossil fuels and is planting trees to offset the pollution caused by trucks transporting its carpet. The company has even found a way to make carpet out of corn. The carpet tiles, made in cooperation with Dow Chemical and Cargill, an agricultural products company, were unveiled in June, 2000. John Wells, president of Interface Americas, says plant-derived products could make up as much as 10% of Interface, Inc.'s business over the next three years.

Ray C. Anderson's contributions have not gone unnoticed. He's been lauded by government, environmental, and business groups alike. In 1997, Anderson was named co-chairman of President Clinton's Sustainable Development Council. In 1996, he received the Inaugural Millennium Award from Global Green, presented by Mikhail Gorbachev, and won recognition from *Forbes Magazine*

and Ernst and Young, which named him Entrepreneur of the Year. Anderson recently received honorary doctorates from two respected universities, and in January 2001, he took home the George and Cynthia Mitchell International Prize for Sustainable Development.

Anderson acknowledges there is still much work to be done, even within his own company. Interface, Inc. is only about a quarter of the way to its ultimate goal - a goal employees refer to as "the peak of Mount Sustainability." Still, Anderson believes the tide has turned irrevocably in his favour. As he told *Ottawa Citizen*, "It's a wave that's forming. I have no way of knowing how fast or how big the wave will be, but businesses that don't move in this direction won't survive."

Case study adapted from www.myhero.com

EXERCISES

Exercise 4-1 – Understanding stakeholder interests

Divide yourselves into groups of about 10 (if possible from the same company, or similar industries). In your groups, compile a list of stakeholders that you consider to have an interest in the development of your company's environmental performance relating to a specific issue. (Note: if you are not all from the same company, then the trainer will provide you with a particular company and/or scenario to consider). Divide yourselves into even smaller groups representing these different stakeholders, with one group/individual playing the role of the company.

Each group should then:

- Brainstorm the general interests and values of their stakeholder group
- Brainstorm the changes that their particular stakeholder group would like to see to the company's policy and activities
- Develop a possible negotiating strategy aimed at achieving these changes

Groups should bear in mind the likely strategy of other groups, and should consider whether it would be advantageous to seek alliance with one or more of the other groups. Each group will make a final presentation of their view point, after which general discussion will be held.

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MODULE 4: From Principles to Practice

Session 2: The Sustainability Toolkit

OBJECTIVES

The objectives of this session are to:

- Identify some of the more prominent sustainability tools and management approaches.
- Consider which tool/s to use and when.
- Review some of examples through the use of case studies.

BACKGROUND READING

Case Study 4-2: Deloitte Touche Tohmatsu (Global)

Keywords: *Lifecycle analysis (LCA), consumer choice, ethical database*

Consumers are beginning to think about the entire lifecycle of the products they buy. Many want to know where they come from and how they, or their parts and materials, are going to be disposed of or recycled. They want certainty that what they buy has been produced in accordance with international norms and human rights standards, international labour standards and internationally acknowledged principles for the protection of the environment.

Some corporations, particularly those close to the consumer, are working on meeting this demand for information, by, for example, developing ethical guidelines for their operations at home and abroad and for the manufacturing of their products. At the same time, governments are developing initiatives to monitor and report to the public on companies' behaviour. Many of the initiatives overlap and there is no consensus about the best way to collect and report on the data available.

In Denmark, Deloitte and Touche has been working with Danish Consumer Information (DCI), a public body informing consumers about a variety of issues related to products and services in the market. The DCI has developed an "ethical database" to allow companies to provide consumers with information over the Internet about company products and services. This is increasingly important in a world where image and brand are key competitive devices. Participation is voluntary and offers the company an opportunity to demonstrate its commitment to corporate social responsibility.

Rather than seeing the ethical database as a threat to their image, companies consider it an opportunity to promote their work with corporate social responsibility and to link this work to their brands, says Jens Schierbeck, director for corporate social responsibility at Deloitte and Touche, Denmark. The long-term vision is to place terminals in every shop to enable the consumer to obtain information about a product and a manufacturer before deciding to buy the product.

For the 30 companies participating in the pilot phase, the database offers profiling, branding, and risk management on both national and international markets. The consumer, in turn, is given assurance about the reliability of the data provided through frequent random sampling performed by a third party auditor.

Case Study 4-3: Sonae (Thailand)

Keywords: *Partnerships for sustainability; Eco-labelling*

Thailand Business Council for Sustainable Development (TBCSD) was established in 1993 by the former Prime Minister of Thailand, H.E. Anand Panyarachun. The council consists of representatives from 32 leading business organizations and operates as a non-profit organization to promote sustainable development. TBCSD offers constructive policy and implementation support to encourage business leadership to catalyze change towards sustainable development. Thailand Environment Institute provides the Secretariat support for the TBCSD and works closely with members and counterparts to implement and provide support for TBCSD initiated projects.

The Thai Green Label project was initiated in October 1993 by the TBCSD in association with the Ministry of Industry, the Ministry of Science, Technology and Environment and other business sectors.

The scheme came from the idea that consumers have the power to purchase products that do not damage the environment during their manufacturing, use or disposal. Selection of a product should be weighed against its impact on the environment, as well as on price, performance and other attributes. Thus, a demand for environmentally sound products will persuade business to develop these products to fulfil consumers' need. The Thai Green Label applies to products and services, not including foods, drinks, and pharmaceuticals. Products or services which meet the Thai Green Label criteria can carry the Thai Green Label. Participation in the scheme is voluntary and the scheme is open to both domestic and foreign suppliers.

The scheme was developed to promote the concept of resource conservation, pollution reduction and waste management. The purposes of awarding the green label are:

- To provide reliable information and guide customers in their choice of products.
- To create an opportunity for consumers to make an environmentally conscious decision, thus creating market incentives for manufacturers to develop and supply more environmentally sound products.
- To reduce environmental impacts which may occur during manufacturing, utilisation, consumption and disposal of products.

The green label criteria have been developed under the guidance of the following principles:

- An environmental assessment of the product using life cycle consideration, taking into account all aspects of environmental protection, including the efficient use of raw materials and focusing on opportunities to achieve significant reductions in detrimental environmental impacts.
- Solving specific issues of high national priority, e.g. reduction of waste production and minimization of energy and water consumption.
- Capability to meet proposed criteria with reasonable process modification and/or improvement.
- Possession of appropriate test methods.

The Thai Green Label takes into account the impact on the environment of a product, and the potential of achieving environmental improvements in its production. It also draws on existing criteria set by other countries' ecolabelling schemes and alternative technologies.

In the first six years of the project more than 200 individual products have received the Green Label award.

Case study adapted from: www.wbcsd.ch

Case Study 4-4: DuPont

Keywords: Zero targets, innovation

Founded in 1802, DuPont is a science company, delivering science-based solutions from operations in 70 countries with 83,000 employees. In its 200 year history, the company has undergone several transformations, evolving from an explosives company to a chemical company and now to a science company.

The DuPont mission is to achieve “sustainable growth” which is defined as creating shareholder and societal value while reducing footprint throughout the value chain. Paul Tebo, vice president for safety, health and environment, has been a driving force behind implementing sustainable growth within DuPont. Tebo has been spreading the vision to DuPont businesses worldwide, setting challenging targets based on the elimination of all injuries, illnesses, incidents, wastes and emissions throughout the value chain. In short, ‘the Goal is Zero’. The critical aspect of the goal is that businesses must still grow while driving towards zero.

The Goal is Zero impacts on each of DuPont’s core strategies - from improving productivity, to increasing knowledge intensity and finally to delivering new products through integrated science. The mission of sustainable growth is creating alignment between business strategies and societal expectations and the Goal of Zero is driving new innovations within the company.

Innovations include progress on reducing waste and emissions at DuPont sites. A global team developed new technology for the manufacture of Terathane brand PTMEG, a key raw material for Lycra. The innovation increased yields, resulting in additional revenues of \$4 million while eliminating 4.4 million pounds of waste per year.

Another team developed and implemented methods to reduce approximately three million pounds of annual releases of HFC-23 through process optimization. The innovation saved \$20 million in capital investment and reduced greenhouse gas emissions on a CO₂ equivalent basis by 40 billion pounds. In Asturias Spain, the Sontora business determined that second quality material could be used productively rather than be waste. With the assistance of Dupont and some other local organizations, a group of unemployed women formed Novatex S.A. to take the second quality Sontora and produce one-time use products for medical and laboratory applications. Novatex is now a stable business with 13 direct and sustainable jobs for women using material that was formerly waste.

The real benefit to growth has been in those Goal of Zero innovations that have gone beyond DuPont sites to include customer impacts. A Packaging and Industrial Polymers team in Europe created a peelable lid system for packaging application that eliminates solvent emissions from lacquer coatings. This innovative product reduces packaging material and improves taste and odour impartation. As a result of this effort, DuPont has gained a 10 percent share of the lidding market and reduced more than 1,000 tons of methyl acetate solvents per year in Europe. A DuPont of Canada team instituted a new business model with Ford Canada. Instead of selling gallons of paint, DuPont sold painted cars. Over the four-year term of the program, Ford’s emissions were reduced by 50%. A Crop Protection team established a vision to help the poorest people in the world to continue to grow cotton with less risk to their safety and health. According to official figures in Benin alone, 37 people died from misapplication of older types of cotton insecticides. In looking to enter this new market, the West African DuPont team developed a safer product that

reduced application rates by a factor of 10, designed appropriate packaging, and then trained officials, distributors and farmers on the safe use of the product.

While the sustainable growth transformation and the attainment of zero goals throughout the whole value chain will take time, already the zero challenge is driving new innovations through the business globally. Many DuPont teams are beginning to recognise the opportunities that meeting zero targets presents, turning sustainability challenges into business opportunities. Similar examples are emerging from every DuPont business. The challenging targets are forcing DuPont businesses to rethink products and approaches and come up with new innovative solutions to drive the sustainable growth transformation.

Case study adapted from: www.wbcsd.ch

Case Study 4-5: Bovince Ltd (UK)

Keywords: *Sustainability reporting, ISO 14000*

Since it was established in the early 1990s, environmental reporting has tended to be the preserve of large corporations and multinationals. In this respect Bovince Limited is unusual. The screen process and digital printing company, based in the UK, is a family-owned business which employs no more than around 60 people.

Bovince specialises in the printing of large-format advertising posters, as well as advertising panels for buses and bus shelters. The company's site in London is regulated by the local borough council under the terms of the Environmental Protection Act 1990.

By the company's own admission, its activities have a potentially heavy impact on the environment, and more so than other types of printing process. The operation uses large amounts of energy, materials and solvents, and as a by-product it creates both solid wastes and discharges to water.

Environmental reporting at Bovince began in 1995, the same year that the company gained the BS 7750 environmental standard. In the following year it was accredited under the European Eco-Management and Auditing System (EMAS), and in January 1997 Bovince was awarded ISO 14001 certification.

In both 2000 and 2001, Bovince was named winner of the Association of Chartered Certified Accountants (ACCA) environmental reporting award in the small and medium-sized enterprises (SMEs) category. In common with many other corporate reporters, Bovince had by then broadened the scope of its corporate reports to cover social aspects as well as environmental.

A central theme in Bovince's reports is what the company terms the 'Bovince Tree of Sustainability'. This has nine 'branches', each representing a particular aspect of the company's commitment to sustainable development. They are waste production, airborne emissions, effluent, energy consumption, cyclic processes, transport impacts, people and learning, business and society, and sustainable growth.

These nine categories provide the basis for measuring sustainability within the company. According to Derek Hall, Bovince's works, quality and environmental manager, they will continue to be used in future annual reports, albeit in a format that more closely mirrors the guidelines set out by the Global Reporting Initiative.

Bovince is firmly wedded to the notion that sustainability can go hand-in-hand with improved commercial performance – the well known 'triple bottom line' of environmental protection, social responsibility and financial prosperity.

Corporate reporting gives Bovince 'a standard to work to', he says.

Within the framework of Bovince's Tree of Sustainability, a number of specific actions have been taken in recent years to reduce the company's environmental impact. Efforts to minimise the use of solvents have included investing in an automatic screen washer which uses solvent more efficiently than the manual process it replaced. Similarly, the introduction of distillation equipment means that more efficient use can now be made of solvents.

A new cyclic process has meanwhile been introduced for developing and fixing images onto the printing stencils – allowing the developer and fixer to be re-used.

The introduction of 'direct to screen' projection has enabled Bovince to eliminate several stages from its production process, reducing both the amount of photographic material used and the discharge of waste chemicals such as silver nitrate.

In 1999, Bovince took a further step to reduce its emissions of volatile organic compounds (VOCs) by introducing water-based ink. Another, more straightforward measure has been to encourage staff to replace lids on ink tins after use. This has obvious health and safety benefits, too.

On the back of these and other initiatives, Bovince has been recognised as a 'best practice site' for solvent control under the British government's Environmental Technology Best Practice Programme.

To reduce its waste levels, Bovince sends as much of its waste paper as possible for re-use in school art and craft projects. Empty tins are sent for granulation, while used films are sent for solvent recovery.

Environmental and social standards are extended to the 250 or so companies that supply Bovince with resources and services. Compliance with a set of standards is continually checked. In 1999, Bovince set up an annual 'Award for Excellence' to reward outstanding performance among its suppliers.

The Bovince sustainability report pays more than lip service to social responsibility. It sets out staff training policies under the heading 'educational sustainability', and puts on record that the company recently secured 'Investor in People' status for its commitment to staff development.

Outside the organization, the report lists several community projects to which Bovince donates time and resources. For example, the company is located in an area of high unemployment, and offers work experience to local school pupils. In addition, in 1999 the company signed up to the East London Partnership - a privately-funded institute promoting regeneration in some of London's most deprived boroughs.

Case study adapted from: www.bsdglobal.com

Case Study 4-6: Kalundborg, Denmark

Keywords: *Industrial Ecology*

One of the best-known examples of industrial ecology can be found in Kalundborg, a small industrial zone 120km west of Copenhagen in Denmark. Over time, this unplanned industrial park has evolved from a single power station into a cluster of companies that rely on each other for material inputs.

The project began in 1972 and by 1994, 16 contracts had been negotiated. The extent of the material and energy exchanges in 1995 was about 3 million tonnes a year. Estimated savings totalled US \$10 million a year, giving an average pay-back time of six years.

The core participants are:

- Asnaes, Denmark's largest coal-fired power station;
- An oil refinery owned by Statoil;
- A pharmaceuticals plant owned by Novo Nordisk;
- Gyproc, Scandinavia's largest plasterboard manufacturer;
- The municipality of Kalundborg, which distributes water, electricity and district heating to around 20,000 people.

The symbiosis has grown over the years to include partners from other districts, as well as farmers.

The participants exchange materials and energy for mutual benefit, on the basis that by-products from one business can be used as low-cost inputs by the others.

For example, treated wastewater from the Statoil Refinery is used as cooling water by the Asnaes power station. Meanwhile Statoil and Novo Nordisk purchase 'waste' process steam from the power station for their operations. Surplus heat from the power station is used for warming homes in the surrounding area, as well as in a local fish farm.

The power station produces other valuable by-products including 170,000 tonnes a year of fly ash, which is used in cement manufacturing and road building. The wallboard company, Gyproc, uses the power plant's fly ash to obtain gypsum, a by-product of the chemical desulphurization of flue gases. Gyproc purchases about 80,000 metric tons of this material each year, meeting almost two-thirds of its requirement.

Surplus gas from the Statoil refinery, which used to be flared off, is now delivered to the power station and to Gyproc as a low-cost energy source. Local farmers, meanwhile, make use of Novo Nordisk's by-products as fertilisers. Industrial enzymes and insulin are created through a process of fermentation, the residue from which is rich in nutrients. After lime and heat treatment, it makes an excellent fertiliser. Some 1.5 million cubic metres a year are delivered to local farmers, free of charge.

Originally, the motivation behind the clustering of industries at Kalundborg was to reduce costs by seeking income-producing applications for unwanted by-products. Gradually, though, industry managers and local residents realised that they were generating environmental benefits as well.

This project has enabled its participants to achieve substantial cost savings and to improve their

resource efficiency. Gyproc has recorded a 90-95% saving in oil consumption after switching to gas supplied by the adjacent refinery.

In addition to these reductions, the use of the excess heat from Asnaes for household heating has eliminated the need for about 3,500 oil-burning domestic heating systems.

Case study adapted from: www.bsdglobal.com

Case Study 4-7: Hitega (Chile)

Keywords: *Cleaner Production*

Hitega (Hilados y Tiejidos Garib) is a Chilean textile mill producing dyed yarn and fabric made of polyester and rayon. It produces more than 1,000 tonnes a year of dyed material and a similar quantity of non-dyed, finished fabric.

The production process requires several changes of water, and the use of dye, bleach and other chemicals. The company identified several 'cleaner production' opportunities, in relation to the improvements in the use of water and energy, and the amount of suspended solids in the effluent stream.

Hitega used three techniques to improve the plant's water management: recycling the softened water used to cool the dye bath; recycling the water supply for the air conditioners in the spinning and weaving rooms; and improving softener regeneration and service.

To become more energy-efficient, Hitega developed a maintenance plan for leaking steam traps. Screens were installed in dye room drains to reduce the amount of suspended solids in effluent.

The resulting environmental benefits of these initiatives were water, energy and chemical conservation, and reduced emissions and effluent-borne solids. Most of the measures adopted had pay-back periods of two years or less. The recycling of dye cooling water, for example, cost \$750 but delivered a saving of \$400 a year.

Case study adapted from: www.bsdglobal.com

Case Study 4-1258: IBM's recycled-resin personal computer

Keywords: *Product stewardship*

In March 1999, IBM introduced the IntelliStation E Pro, the first personal computer (PC) in the world that has all of its major plastic parts made of 100 percent recycled resins. According to Inder Wadhera, an IBM senior plastics engineer who helped develop the new PC, using all recycled resins “hasn't cost one extra cent.” In fact, switching from virgin to recycled plastics made one part in the new unit 20 percent less expensive to manufacture.

The IntelliStation is the first of many IBM products that will incorporate recycled plastics. IBM's Austin facility is developing two models that each contain about 25 percent recycled plastic. “Eventually every division will use recycled resins,” Wadhera said.

Because these highly engineered recycled plastics are new, IBM must carefully test each resin for long-term performance and safety. Also, it is harder to use recycled resins in parts of the computer that are visible, or “appearance parts,” since people expect their computers to look evenly coloured and unblemished. To address the issue of colour irregularities, IBM's new 100-percent recycled resin PC is completely black.

The main barrier to using recycled resins is limited supply. Debbie Horn, lead engineer of the Environmentally Conscious Products team for the IBM Server Group in Rochester, Minnesota, explained that for plastic parts, IBM always specifies a recycled-content resin and a virgin resin, so that manufacturing is not delayed if a resin is unavailable.

The recycled plastics come from four main sources: one is pre-consumer and three are post-consumer. The pre-consumer source is IBM's own manufacturing process. When plastics are poured into moulds, the leftovers are broken off and sent to be reground by an IBM supplier into new resins.

One of the resins that IBM needs for its new PC is polycarbonate. Post-consumer sources for this resin include the large, refillable water bottles that are used in office water coolers, and the shatter-resistant window panes, the type often found in schools. Once the metals are stripped, the plastic from old compact discs and CD-ROMs can also be recycled.

IBM is beginning to explore another source of recycled resins — old computers that have been returned under warranty or through collection programs established in response to government requirements in Europe and Asia. IBM has Materials Recovery Centres worldwide, including one in Endicott, New York, that disassemble old computers and process millions of pounds of plastic. The company is trying to use some of the recovered resins to produce new computers, but they have encountered several problems. For example, the products that are returned to the Materials Recovery Centres vary in age, and contain an assortment of plastics types. Some of the plastics are no longer used by IBM since the company instituted its Environmentally Conscious Product Design protocols.

Case study adapted from: www.moea.state.mn.us/stewardship/productstewardship.cfm

Case Study 4-9: Elk Falls pulp mill (Canada)

Keywords: *Total Cost Accounting*

The Elk Falls pulp mill owned by Fletcher Challenge is located on Campbell River, on the east coast of Vancouver Island in British Columbia. The mill began operation in 1952 as a single-line newsprint plant. It is now a world-scale Kraft pulp and newsprint complex, shipping products to customers around the world. The mill employs over 1,000 people and plays a major role in the local economy.

In 1996, management at the Elk Falls mill was considering a retrofit of the main power boiler. Power boiler 5 uses a horizontally mobile 'travelling' grate on which the combustion of hog fuel takes place. As a result of incomplete combustion, the boiler produces large amounts of unburned carbon or fly ash, which creates costs in terms of landfill, boiler maintenance, and permitting. Overall, the annual operating cost of the boiler is in excess of \$6 million.

These high costs led the managers at Elk Falls to investigate the feasibility of retrofitting power boiler 5 with a 'bubbling fluidised bed boiler' (BFBB). This consists of a layer of homogenised sand particles injected with air. The effect created by the air injection is to mix the hog fuel with oxygen. The more efficient combustion associated with BFBB leads to a huge reduction in fly ash production, and hence lower operating costs overall.

An internal study of the profitability of BFBB, conducted in 1996, concluded that the financial returns from a retrofit were insufficient to satisfy the company's existing policy regarding capital expenditures. However, the environmental manager at Elk Falls felt that the internal study had overlooked many of the potential benefits associated with the retrofit.

To allow a more comprehensive financial analysis, a total cost assessment (TCA) was carried out.

Traditional pollution control initiatives consist of 'end of pipe' solutions, and focus on treating waste products rather than reducing their creation. In recent years, many of these technologies have been replaced by measures collectively known as pollution prevention, or 'P2'.

Pollution prevention initiatives seek to anticipate and mitigate the production of wastes by examining the processes which lead to their creation. However, many P2 projects are rejected because financial evaluations are incomplete, time horizons are insufficient, or the required return on investment requirements is too great.

Traditional accounting methods tend to 'pool' costs into a limited number of accounts. This means that costs such as insurance, regulatory fees and maintenance, which are associated with specific outputs and activities, may be partially hidden, and often allocated on the basis of a single overhead rate.

A modified approach is required in order to understand more clearly the costs and benefits which have an impact on the bottom line.

The financial components considered in the TCA included landfill costs, boiler operation and maintenance, environmental permitting costs, and intangible costs. Savings would be realised in landfill costs due to the large reduction in fly ash. Meanwhile a lower concentration of fly ash in the

boiler's flue gases lowered maintenance costs. This in turn would increase boiler availability, and reduce the plant's reliance on other energy sources.

As well as drastically cutting fly ash emissions, the lower combustion temperatures of a BFBB also result in lower particulate, nitrogen oxide and sulphur dioxide emissions. When investing in pollution abatement equipment such as a BFBB, the Canadian government allows firms to write off their capital costs over the first three years of operation.

The results of the TCA indicated a payback period of just over two years - close to the company's requirement of a two-year payback period on capital investments. The net present value (NPV) of the BFBB was estimated to be \$25 million, using a discount rate of 8%. Therefore the total future saving as a result of the BFBB operation would be more than twice the initial outlay of \$10 million. Thus the installation of a BFBB was judged to be not only environmentally beneficial but also a financially sound investment.

Case study adapted from: www.bsdglobal.com

Case Study 4-10: BHP Billiton

Keywords: *Life Cycle Analysis*

All products in BHP Billiton's Stainless Steel Materials portfolio have life cycles that begin with the extraction of raw materials and progress through manufacturing to consumption and finally disposal or reuse of the end products. Throughout the product life cycles, inputs include resources and energy, while outputs include air emissions, water, wastes and commercial products, many of which play useful roles in our everyday lives. This year BHP Billiton completed a study to help them better understand the environmental strengths and weaknesses of their processing operations and the environmental impacts and benefits of stainless steel (made from their products) during its life cycle.

Conducted with the BHP Billiton Newcastle Technology Centre, the study was undertaken to determine how changes in eco-efficiency of the plant operation since 1998, and the proposed introduction of new technology as part of future expansion, could deliver improvements in the environmental performance of stainless steel made from nickel and chrome products.

The impact assessment is based on the following inventory values:

- Resource energy
- Greenhouse gas emissions
- Oxides of nitrogen
- Oxides of sulphur
- Suspended particulate material
- Acidification potential
- Nitrification potential
- Photochemical ozone formation potential
- Solid waste

The study found that, when compared with the current mining and refining process, the expanded Yabulu Refinery would significantly reduce the environmental impacts of nickel production.

The company has conducted and been involved with previous LCA studies on nickel and chrome products, including the Nickel Development Institute (NiDI) worldwide nickel LCA study and the pilot project performed at the BHP Billiton Newcastle Technology Centre for the purpose of establishing a baseline stainless steel case study.

In addition to details of LCA studies, the company has information on health, safety and environmental issues associated with their products available on-line. This system provides BHP Billiton businesses with access to relevant current and proposed legislation, life cycle inventory and assessment information, safety data sheets on different materials, and health and environmental data on all their products.

Based on this and other relevant information, the company provides advice on the responsible use of their products to immediate customers, end-users and other interested parties. This advice includes information on product use, storage, transport, recycling and disposal.

Ultimately, by taking a whole-of-life view of its products, BHP Billiton aims to ensure that they are sustainable and valuable to its customers and shareholders.

At the end of their product life, stainless steel and most nickel and chrome alloys are recycled into new stainless steel, which usually contains around 50 per cent recycled material. Properly applied, materials containing nickel and chrome can help maintain and improve the quality of life and provide sustainable product solutions.

Case study adapted from: www.bhpbilliton.com

Case Study 4-11: RMC

Keywords: *Benchmarking, auditing*

Employing over 29,000 staff worldwide and with annual turnover of some £4.8 billion, RMC is the world's largest supplier of ready mixed concrete, Europe's largest aggregates producer and the world's 10th largest global cement producer.

Due to the decentralised and far-flung nature of its operations and business units, RMC Group has developed a unique annual benchmarking process that uses the BiE Index as a core element. The audiences for this process are the environment managers in each country, the individual business and country managers, the Board Environment Committee, Board Executive Committee and the Group Main Board.

Annually, since 1999, each audience is presented with a clear overview of how the countries and major business units are progressing in terms of improved environmental management. The elements of this overview consist of three strands:

1. The BiE Index score for each business (original ten "engagement" questions);
2. The external "environment" in which each business operates;
3. The size of the business unit within the Group in terms of annual sales.

Typically, some 35 businesses across 22 countries participate in the assessment – incorporating all of RMC's business interests in 16 European countries, 3 countries in the Americas, 2 countries in the Middle East, and 2 countries in Asia and Australia.

Each participant completes the BiE Index questionnaire in December. The questionnaire is scored in January and the results are fed back in March. The BiE scores are subsequently correlated with the size of the business in terms of annual sales and the external environment within which the business operates. The latter is derived by assessing a basket of environmental drivers in each country (or states in the case of the USA) - these cover single or multi media regulation and its effectiveness, access to justice, national NGO interest, national media interest, local community action, fiscal incentives and eco-taxes. This 3-D analysis is then communicated up through the Group. The Group Board receives the final version in late Spring as part of the annual Board Environment Report.

Internally, assessment of the drivers enables RMC to conduct an efficient review of the engagement of management in the countries and major businesses, the environment the operation is working in, and the risk significance of the business to the Group. These assessments are fundamental to ensuring that senior managers and directors can prioritise action where it is most effective.

The three numeric strands for each country are then converted to a 'traffic light' system to improve communication, simplify the scores and avoid unnecessary debates about fractions of a percent difference in individual scores. This system enables each country to see how it scored in comparison with other RMC businesses. The results are also consolidated into an assessment of how well RMC overall has improved its engagement and thus the level of its risk management and impacts worldwide.

For the BiE Index strand of the process, RMC sets an internal pass mark of 70%. In 1999 the average score across all business units was 25%, within a range from 5% to 95%. By the end of 2002 the average score was 60%.

Like many assessment systems, there are inherent risks with incompleteness or incompatibility of data between levels within an organization. From practical experience, RMC can demonstrate that it is possible to obtain different results by carrying out the assessment at various levels. This is not a surprise as large companies often struggle to link boardroom policy and aspiration with day-to-day practice at site level, particularly when insufficient time is available to move the policy to practice or when buy-in is inconsistent across the organization. Nonetheless, used in the right way and with appropriate caveats, linking the BiE Index score with a measure of the external drivers and the size of the business unit in commercial terms has proven an invaluable tool in raising awareness throughout the RMC Group, building understanding and commitment at many levels, and helping focus improvement on priority businesses and tasks.

The benchmarking process employed by RMC is one of a number of initiatives that the Group is undertaking to reduce its environmental impact globally. Working on the adage: "If you can't measure it, you can't manage it" RMC uses tools, including the BiE Index, to provide a measure of improvements in environmental performance. The integration of environmental data collection into RMC Group's business reporting and auditing process has enabled progress towards best practice goals. For example, with verifiable CO₂ emissions data available from 1990 to 2001, RMC Group is developing forecasts and scenarios to 2012.

By combining the BiE Index with two other measures, RMC has created a valuable management tool that provides a good top-down assessment of the state of environmental management across its many businesses. This is underpinned by more sophisticated performance-based audits in individual countries and sites, including from 2003, cross border audits. Overall, the RMC process remains true to the spirit of BiE but has taken it to another level of usefulness.

Case study adapted from: www.bitc.org.uk

Case Study 4-12: Cardboard packaging (Thailand)

Keywords: LCA

The use of cardboard is on the increase in Thailand, particularly in use as packaging. Cardboard boxes are very simple products, but behind them are a comprehensive series of processes. The processes are organised in a loop with continuous input of virgin material (tree) and continuous output of used material (used boxes). Each process in the circle causes emissions to the environment and contributes to environmental impacts such as global warming, acidification, eutrophication, oxygen depletion and photochemical ozone formation (smog).

This case study considers an analysis of a cardboard box produced, used and recycled in Thailand. Based on measurements, estimations, assumptions and simulations, the cardboard box has been analysed, using life cycle assessment, in all production steps from wood production to landfill disposal.

The exact fraction of cardboard boxes which are ending up in landfills in Thailand is unknown, but even at a low estimated land filling rate of 20%, methane emissions from anaerobic degradation of the paperboard appears to constitute a major potential source of global warming and smog formation in the box's life cycle. Contributions to acidification are to a large extent due to transportation, paper forming and virgin pulp production as a result of SO_x and NO_x emissions from engines, heat and power plants. The main sources of eutrophication and oxygen depletion are the cleaning steps in the recycling processes of cardboard factories as well as thickening and paper pressing in papermaking processes. This is due to washout of organic matter and nutrients from the pulp. Other major sources of smog formation are the drying processes in the cardboard factory as a result of coal-based steam production.

In order to reduce the overall environmental impacts from cardboard in Thailand, a number of suggestions have been given below.

- **Reuse the box as many times as possible:** In many cases cardboard boxes can be used repeatedly, limiting the production of new boxes and associated environmental impacts.
- **Recycle the cardboard when the box cannot be used anymore:** Old and worn out boxes can be collected, sorted and used as raw material for new cardboard. Recycling of the cardboard saves impacts from all pulp production processes and should be applied whenever possible.
- **Do not put cardboard in landfill:** Land filling is not a suitable disposal method for cardboard because the material is converted into methane which contributes to global warming and smog formation. Contributions to global warming and smog formation can be reduced dramatically if the land filling of cardboard is limited.
- **Implement landfill gas collection and treatment systems:** Landfills which receive cardboard and other organic matter in spite of the above recommendations should be equipped with proper landfill gas collection and treatment systems to limit impacts from methane and other gaseous emissions.
- **Reduce electricity consumption in the cardboard factory:** Electricity consumption contributes significantly to environmental impacts in the box's life cycle. Contribution to global warming, smog formation and acidification could be reduced if electricity use in all factories was reduced by implementation of "cleaner production" in the factories.

- *Avoid N-compounds in sizing additive:* It has been difficult in this study to find information about chemicals applied during the lifecycle of the cardboard box due to confidentiality. However, it has been observed that some sizing additives contain nitrogen (e.g. ammonium sulphate) which supposedly contributes to eutrophication when the paperboard box is recycled. Hence, replacing N-based sizing additives whenever possible should be considered provided that impacts from substitutes are not worse.
- *Limit the use of clips and sticky tapes in paperboard boxes:* Clips and sticky tapes applied in boxes become solid waste when the box is recycled. Box designers should consider how to limit the use of clips and sticky tapes during both production and use without compromising box quality. This would also limit impacts from clips and sticky tapes production, which have not been considered in this study.
- *Establish cleaner paperboard collection systems:* Presently in Thailand, boxes are disposed off with other waste, meaning that they have to be cleaned on arrival at the recycling factory. Collecting boxes separately from other waste will reduce the cleaning required and hence electricity consumption in the factory. Furthermore, the need to import recycled cardboard with less contamination can be reduced.

Case study adapted from: www.howproductsimpact.net/box/

EXERCISES

Exercise 4-2 – Identifying environmental tools

With reference to the experiences in your own company identify which of the various environmental tools discussed in this session you have used in the recent past. Identify some of the key learning points associated with the implementation of each tool (you may wish to focus only on one or two of these tools), and share these with the colleagues in your small groups.

- What was the underlying motivation for introducing the tool in your company? Was there a particular champion who may have driven the introduction of this tool?
- What was the anticipated outcome of the tool? Has this objective been met? If not, why not?
- What do you think should be done differently for the tool to be more effective?

(See also exercise 4-3)

Exercise 4-3 – Reviewing the case studies

Each delegate should choose one of the case studies contained in their manuals, read through it, and then present a summary of this case study to the other delegates. After presenting the case study, delegates should consider some of the key learning points that have arisen from this study, focusing in particular on the implications of the case study for their respective companies.

Exercise 4-4 – Benefits and barriers of environmental tools

The following table lists some of the principal types of environmental tools that have been reviewed in this module. Using this table – and with reference to the experiences in your own company – identify which of the various environmental tools you have used in the recent past. For each of these tools, highlight some of the benefits that have achieved for your company, and identify some of the key barriers that may have been encountered. For those tools that have not yet been used in your company and/or which you have not had direct experience with, identify what you see as potential benefits and barriers that may typically be associated with each tool.

TOOL	SUMMARY	CASE STUDY	BENEFITS REALISED FOR THE COMPANY	BARRIERS ENCOUNTERED
Environmental management tools				
Environmental Management Systems	The part of the overall management system that includes organizational structure, planning activities, responsibilities, practices, procedures, processes and resources for developing, implementing, achieving, reviewing and maintaining an environmental policy			
Internal training and communication	The provision of structured training programmes aimed at building capacity and awareness on the benefits and techniques of environmental management.	Case study 3-3		
Cleaner production strategy and management programme	The continuous application of an integrated preventive environmental strategy to processes, products and services so as to increase efficiency and reduce risks to humans and the environment.	Case study 3-11 and 4-7		
Eco-Efficiency	Eco-efficiency is a management philosophy which aims to achieve “more with less” by making efficiency improvements within existing processes.	Case study 3-12		
Sustainable production and consumption	It includes interventions that influence consumption patterns (e.g., product stewardship, product labelling and information and product design).			
Life cycle management	An integrated concept for managing the total life cycle of products and services towards more sustainable consumption and production patterns.			

TOOL	SUMMARY	CASE STUDY	BENEFITS REALISED FOR THE COMPANY	BARRIERS ENCOUNTERED
Environmental management tools				
Design for environment	An integrated concept for managing the total life cycle of products and services towards more sustainable consumption and production patterns. Design changes may apply to: <ul style="list-style-type: none"> ● raw materials ● manufacturing process ● product use ● end-of-life 	Case study 3-14		
Product services systems	Developing a marketable mix of products and services that are jointly capable of fulfilling a client's need – with less environmental impact.			
Product stewardship (also known as shared responsibility, and extended producer responsibility)	Product stewardship is where all parties involved in the production, selling or use of a product take responsibility for the full environmental and economic impacts that result from the production, use and disposal of that product.	Case study 4-8		
Industrial ecology	Industrial ecology aims to mimic natural ecosystems in industry. It looks at promoting the symbiotic co-location of industries so that waste from one industry can serve as a raw material input into another.	Case study 4-6		
Environmental impact assessments	Provides a description of accepted levels of performance and/or prompts the setting of performance targets. Identifies proven means for modifying behaviour to reach these performance targets.			
Environmental risk assessments	A structured process for describing a hazard, identifying the potential for exposure to the hazard, estimating the risk or likelihood of a negative effect based on the hazard and exposures and considering uncertainties associated with the hazard.			

TOOL	SUMMARY	CASE STUDY	BENEFITS REALISED FOR THE COMPANY	BARRIERS ENCOUNTERED
Environmental management tools				
Environmental technology assessments	Helps decision-makers assess the potential impact of using a new or existing technology. The assessment considers the costs of the technology, the monetary benefits, and its environmental, social and political impacts.	Case study 4-10 and 4-12		
Cleaner production opportunity assessments	A systematic approach to identifying opportunities for implementing cleaner production/eco-efficiency measures in a company.			
Life cycle assessments	Provides a systematic approach to measuring resource consumption and environmental releases throughout the entire life cycle of a product or service – from resource extraction, raw material transport, manufacture, distribution and use, to final disposal.			
Total cost assessments	TCA captures costs and savings that are generally ignored by traditional approaches, with the aim of allowing environmental investments to compete more successfully for limited capital funds. TCA helps to 'level the playing field' for investments in environmental improvements and pollution prevention.	Case study 4-9		
Environmental monitoring and auditing tools				
Environmental auditing	A systematic, documented verification process for objectively obtaining and evaluating audit evidence to determine whether specified environmental activities, events, conditions, management systems or information about these matters confirm with audit criteria, and communicating the results of this process.	Case study 3-7		
Supply chain audits	Provides the means for monitoring progress in the performance of suppliers against the host company's environmental and/or social criteria.	Case study 3-9	Prompts the setting of performance targets	

<p>Environmental performance indicators</p>	<p>Indicators are a form of quantified information that is presented as broad-brush aggregated data that provides decision-makers and interested parties with an indication of performance trends.</p> <p>These may include input, output and outcome indicators, and may be aggregated into a smaller set of composite indicators.</p>			
<p>Environmental communication and reporting tools</p>				
<p>Corporate environmental / sustainability reporting</p>	<p>Disclosure by a company of its environmental (and often also its overall “sustainability”) performance. Many companies report against a set of core indicators (including those contained in the GRI guidelines) as well as against issues of concern identified by external stakeholders.</p>	<p>Case study 4-5</p>		
<p>Stakeholder engagement</p>	<p>The process of interaction between an organisation and its stakeholders, beyond the one-way communication of data. Such engagement may be undertaken in order to gather information and ideas, build and strengthen relationships and trust, improve decision-making and enhance the company’s reputation.</p>	<p>Case study 3-3</p>		

MODULE 4: From Principles to Practice

Session 3:

Principles to Practice – Additional Reference Material

The list below offers a broad range of training programmes and kits in the environmental management arena. These should help add to what you have learnt on the course obtained and integrate into the ideas and information you have obtained. Also listed below are some other publications that will be useful.

General

The Efficient Entrepreneur Programme

Lead by UNEP/Wuppertal Institute. Includes calendar and guidebook which help small companies (SMEs) to measure and improve business performance month by month.

www.efficient-entrepreneur.net

Cleaner Production

Cleaner Production: A Training Resource Package

This package focuses on CP. It assists individuals who wish to teach the techniques and ethos of *cleaner production* at educational institutions, but it is also applicable to training at government and company level. http://www.uneptie.org/pc/cp/library/catalogue/cp_training.htm

Sectoral Workbooks

- Pulp and Paper Mills
- Leather Tanning
- Breweries
- Textile Wet Processing
- Lead-Acid Battery Recycling

Available from UNEP DTIE website or on CD ROM. More information for PDFs can be found on: <http://www.uneptie.org/pc/cp/library/home.htm>

Capacity Building in Training Centres

Training Package 1 includes three components:

- Integration of Sustainable Production and Consumption
- The Application of Environmental Technology Assessment (EnTA)
- Using Cleaner Production to Facilitate the Implementation of Multilateral Environmental Agreements

Training Package 2 focuses on how to establish and operate a CP Centre including background on CP, training on the tools used by Centres, and information/advice concerning other key operational issues.

Trainer's guide

Introduction to Cleaner Production concept and practice, Introduction to capital budgeting and funding of capital projects, Profiting from Cleaner Production, and Funding Cleaner Production projects.

Short **executive presentations** 'Profiting from Cleaner Production' for government, industry, and financiers (includes CD-ROM). More information can be found at <http://www.financingcp.org/training/training.html>

Profiting from Cleaner Production: Checklists for Action

This support document gives a set of checklists for businesses, government and banks to facilitate financing Cleaner Production investments. More information for PDFs and other materials can be found on: <http://www.financingcp.org/training/training.html>

Life Cycle Assessment

Life Cycle Assessment: What It Is and How to Do It

An introduction to LCA, covering its main characteristics and applications, where and why it is used and other tools associated with it. This report provides a useful structure for anyone interested in this teaching approach. More information on: <http://www.uneptie.org/pc/pc/tools/lca.htm>

UNEP, Life Cycle Management Programme

http://www.uneptie.org/pc/sustain/lcinitiative/lcm_program.htm

The UNEP DTIE Life Cycle Management Programme is oriented to the application of life cycle approaches. How can LCA and life cycle thinking be brought into practice of business and be related to policy decision-making? The LCM programme creates awareness and improves skills of decision-makers by producing information materials, establishing forums for best practice, and carrying out training programmes in all parts of the world.

UNEP, Life Cycle Initiative training material

<http://www.uneptie.org/pc/sustain/lcinitiative/training.htm>

- The **Life Cycle Inventory** programme refers to the second phase of LCA and aims at increasing the access to and quality of LCI databases. The LCI programme improves global access to transparent, high quality life cycle data by hosting and facilitating expert groups whose work results in (web-based) information systems.
- The **Life Cycle Impact Assessment** programme refers to the third phase of LCA and deals with the evaluation of environmental impacts, (e.g. climate change and toxicity) of products and services over their whole life cycle. The LCIA programme increases the quality and global reach of the life cycle indicators by promoting the exchange of views among experts whose work results in a set of widely accepted recommendations.

Eco-design

Eco-design: A promising approach to sustainable production and consumption

This manual provides basic information to support education programmes in eco-design. More information from: <http://www.uneptie.org/pc/pc/tools/ecodesign.htm>

Sustainable Consumption

- UNEP/UNESCO: YouthXchange, training kit on responsible consumption, 2002
<http://www.youthxchange.net>
- UNEP, Production and Consumption tools
 - <http://www.uneptie.org/pc/pc/tools/ems.htm>
 - <http://www.uneptie.org/pc/pc/tools/supplychain.htm>
- UNEP, Sustainable Procurement Activities
 - <http://www.uneptie.org/pc/sustain/design/green-proc.htm>

Talk the Walk – Advancing Sustainable Lifestyles through Marketing and Communication

This publication by UNEP, the Global Compact Office and Utopies (2005) provides critical analysis and a collection of examples of advertising to promote sustainable lifestyles. It builds on the Global Compact Policy Dialogue on 'Sustainable Consumption: Marketing and Communications', hosted by UNEP and the Global Compact in Paris, April 2004. Available at <http://www.unep.fr/pc/sustain/> and <http://www.utopies.com/indexflash.htm>

Sustainability Reporting

High 5! – Introducing SMEs to sustainability reporting and the GRI”

This handbook was developed using a multi-stakeholder consultative process convened by the Global Reporting Initiative (GRI) in response to many requests for a “beginner’s guide”. It offers a step-by-step guidance and practical how-to advice on using the GRI Sustainability Reporting Guidelines, so that SMEs can easily and effectively create sustainability reports that bring value to their businesses and communications practices. Available from: <http://www.globalreporting.org/workgroup/sme/intro.asp>

Environmental Technology Assessment

An interactive, e-learning package designed to increase dissemination, aid promotion and facilitate the application of Environmental Technology Assessment (EnTA). <http://www.uneptie.org/pc/pc/tools/enta.htm>

APELL

A Training Resources Package : Management of Industrial Accident Prevention and Preparedness – This package provides material to give an introduction to the issues of industrial accidents and APELL. It includes background papers, references, overhead slides, case studies and work exercises. More information: http://www.uneptie.org/pc/apell/publications/related_pubs.html

Tourism

Sowing the Seeds of Change: An Environmental Teaching Pack for the Hospitality Industry – This is a comprehensive information pack for developing and expanding the environmental curriculum in hotel schools, produced with the International Hotel and Restaurant Association and EUHOFA. More information on: <http://www.uneptie.org/pc/tourism/library/training-hotel.htm>

Thematic Publications, Brochures

The above training manuals are supported by a library of UNEP documents on various technology and policy issues, as listed in the brochures below – available on: <http://www.uneptie.org/pc/pc/library.htm>

Hazardous Waste

Training Resource Pack for hazardous waste management in developing economies. More info on: <http://www.uneptie.org/pc/hazardouswaste/menu.htm>

Hazardous Waste Policies and Strategies – a trainer’s manual

UNEP/ISWA (1991) Included in Training Resource Pack referenced above; also on: <http://www.uneptie.org/pc/hazardouswaste/ssmenuD2.htm>

Landfill of Hazardous Industrial Wastes – A trainers' manual

UNEP/ISWA included in Training Resource Pack referenced under APELL; also on <http://www.uneptie.org/pc/hazardouswaste/ssmenuD3.htm>

Risk Management of Contaminated Industrial Land

Included in Training Resource Pack referenced under APELL; also on <http://www.uneptie.org/pc/hazardouswaste/ssmenuD5.htm>

Environmental Management System (EMS) Training Resource Kit 2nd Edition (UNEP/FIDIC/ICC)

Allows trainers to conduct courses in environmental management systems and offers guidance on adapting the kit to local conditions and culture. More information on: <http://www.uneptie.org/pc/mining/library/publications/manual.htm>

UNEP/FIDIC / ICLEI Urban Environmental Management: Environmental Management Training Resources Kit

This offers local authorities a systematic approach to integrate environmental considerations into all aspects of their activities. More information on: http://www.unep.or.jp/ietc/Announcements/EMSKit_launch.asp

Environmental Impact Assessment: Training Resource Manual

Produced by DTIE Economics and Trade Unit. Also available on: http://www.unep.ch/etu/publications/EIAMan_2edition.htm

Environmental Technology Assessment (EnTA) - is a tool for improving the quality of decision-making, building consensus among stakeholders and keeping assessments focused. Teaching material can be developed from EnTA on-line, found on: <http://www.unep.or.jp/ietc/Publications/index.asp>

Environmental Technology Assessment (EnTA) in Sub-Saharan Africa – a UNEP EnTA Leadership

More information: http://www.unep.or.jp/ietc/Publications/index_Integrative.asp

The Environmental Management Navigator

The package includes materials for training of SMEs on selecting and applying appropriate tools for improved environmental management and performance. For more information: <http://www.em-navigator.net/>

Resources for Life Cycle Assessment and Life Cycle Management:

<http://www.uneptie.org/pc/pc/tools/lca.htm>

Environmental Management of Industrial Estates: Information and Training Resources

This manual shows the potential environmental impacts of industrial estates, introduces the strategies and tools that are available for managing these impacts, and provides case studies collected from real practices around the world. It also proposes some modules for training workshops and a collection of overhead presentations. A list of further reading and contacts is included.

Also available on: <http://www.uneptie.org/pc/ind-estates/support-tools/Kit.htm>

Final Report on Joint Conference on Engineering Education and Training for Sustainable Development

This report has been prepared for the sponsors and participants of the conference. The collected papers are held by UNEP DTIE in Paris. Some of the material is also available on the Conference website available from here: <http://www.enpc.fr>

Training Publications from other DTIE Branches

Additional useful training materials useful can be found at
<http://www.uneptie.org/energy/act/re/RETS/index.htm> <http://www.ared.org/training/index.htm>

OzonAction

Training resources awareness materials, guidelines, resource modules and reports can be found on: <http://www.uneptie.org/ozonaction/>

Energy

Information useful for training and education on environmentally sound technologies and services can be found on <http://www.unep.fr/en/branches/energy.htm>

Chemicals

Information useful for training and education can be found on:
<http://www.chem.unep.ch/publications.htm>

Economics and Trade

Information useful for workshops and seminars can be found on:
<http://www.unep.ch/etu/etp/acts/manpols/index.htm>

International Environmental Technology Centre (IETC)

Information on materials useful for teaching can be found on:
<http://www.unep.or.jp/ietc/Publications/index.asp>

Training on tools for SCP:

<http://www.uneptie.org/pc/cp/library/training/cdgpack/cpsc.htm>