

FOREWORD

We need a greater commitment by the private sector to engender a new culture of environmental accountability; we need to develop and use cleaner technologies that are resource efficient and that prevent pollution at source; we need to invest in more sustainable production and consumption patterns; we need to transfer environmentally sound technologies to developing countries.

This is part of the message sent to the United Nations Millennium Assembly by more than 100 environment ministers who gathered in Malmö, Sweden, in May 2000 for the first Global Ministerial Environment Forum convened by the United Nations Environment Programme (UNEP).

For a number of years, UNEP has been actively raising awareness of decision makers in government and industry on the cleaner production approach, the only strategy to reconcile environmental and economic benefits. UNEP has been facilitating the transfer of information and experiences on cleaner and safer practices in industry. It has contributed to developing the capacity of industry managers to evaluate cleaner production alternatives. UNEP has also facilitated the creation of necessary institutions, such as National Cleaner Production Centres.

The UNEP Financial Services initiatives, now involving more than 260 financial institutions and insurance companies in all parts of the world, has also demonstrated that sustainable development offers many opportunities for the financial sector, and that financing sustainable investments is also good business.

Despite those demonstrated benefits, however, many new investments, particularly in developing countries, are made in obsolete technologies which have significant adverse environmental impact. It is also difficult to secure funding to upgrade existing technologies.

Therefore, to understand better the barriers to a wider use of cleaner processes and technologies, UNEP has launched a project “Strategies and mechanisms for promoting cleaner production investments in developing countries”, focusing on five countries: Guatemala, Nicaragua, Tanzania, Vietnam, Zimbabwe, but also taking into account inputs received from other countries.

The purpose of this report is to present the results of the study carried out during the first phase of the project, with the objective of better understanding the decision making process of past investment practices.

The results of this study demonstrate in particular that:

- there are many stakeholders and actors involved in the decision making process for new investments or for approving loans or grants for cleaner production projects: planning authorities, investment boards, bilateral or multilateral development banks, commercial banks, industry managers;

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- those actors and stakeholders, particularly in the financial sector, have not yet integrated environmental or sustainability criteria in their choices;
- financial institutions lack the specific technical expertise to evaluate adequately the environmental risks or opportunities associated with investments;
- incentive schemes that will orient choices towards cleaner production are lacking.

The second phase of the project will be concentrating on ways and means to overcome these barriers.

We at UNEP hope that this work will contribute to redirecting choices towards urgently needed sustainable investments patterns, and to bigger a worldwide transformation of industrial practice.

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1. Introduction

Cleaner Production (CP) as a concept has expanded rapidly in recent years. Since its inception in 1989, the United Nations Environment Programme (UNEP) has been a leading force behind the development and dissemination of CP as a practical way of moving toward sustainable development.

UNEP has embarked on this three-year project with an aim to increase investments in cleaner production in developing countries. This project will demonstrate how helping national and local policy makers, industrial associations and financial institutions understand the importance of CP can stimulate such investments. It is also anticipated that the outcome will assist CP experts to develop creditworthy investment proposals.

Throughout the four-year period, the project focuses on five demonstration countries: Guatemala, Nicaragua, Tanzania, Vietnam and Zimbabwe. The study is conducted under a trust fund created by the Government of Norway.

The project will demonstrate in the five participating countries how to initiate and facilitate the financing of CP investments. The project also aims to persuade public and private financial institutions and the industrial community to adopt these instruments. The results obtained and the lessons learned in the demonstration countries will be used at the global level to inform key decision-makers to pursue CP investments in developing and developed countries.

More specifically, the project will:

- Show financial institutions and industrial authorities how to assess the merits of CP investment proposals
- Persuade financial institutions to introduce credit schemes customised to CP investments
- Induce new initiatives, such as credit lines, trust funds, policy changes and training
- Teach CP assessors how to make creditworthy loan applications
- Improve the general environment for investment in CP.

In light of the project aims, it is important to understand past investment practice to provide background for the discussion on promoting CP investments. For this reason, UNEP/DTIE has studied the experience of the demonstration countries, as well as three additional countries for the sake of comparison, and reviewed how selected financial institutions in the developed world address environmental issues, particularly related to cleaner production. This document provides a summary and an analysis of the results of this work.

2. Background

The CP Programme has launched this project in response to a UNEP Governing Council decision in 1989. Its objectives are to:

- Increase world wide consensus on a “CP vision”
- Catalyse implementation of policies and strategies, environmental management systems, environmentally sound technologies and products and the establishment of National CP Centres
- Support the growing network of organisations dedicated to promoting CP and eco-efficiency activities
- Help enhance capabilities through training and education
- Support demonstration projects and provide technical assistance.

The programme brings together international organisations, governments, industry, non-governmental organisations (NGOs) and academics. The signature of the International Declaration on Cleaner Production by ministers, industry managers and leaders of other organisations demonstrates the importance those decision-makers attached to CP as a strategy to achieve sustainable development.

CP is a recognised and proven strategy for improving the efficient use of natural resources and minimising wastes, and pollution and risks to human health at the source, rather than the end of the production process. CP is a step beyond waste management – it deals with the source of the problem, rather than its effects. The traditional focus on production processes and on environmental management systems has expanded to include product-cycle aspects such as eco-design, and more recently, a consideration of the consumption patterns of products in use.

Investments in CP can have attractive economic benefits due to reduction of input costs for materials, energy and water and reduced expenditures on waste treatment and disposal. Payback periods may, however, be longer than is customary in a typical new investment. Small- and medium-sized industries have a particularly difficult time making CP investments for reasons that range from the cost of capital to the absence of appropriate funding mechanisms. Furthermore, CP is less likely to be economically attractive in countries with few and/or lax environmental regulations, and under-priced or free natural resources.

Several international organisations, development banks and donors have initiated and implemented projects to facilitate the introduction of CP investments in developing countries. Most projects have been in the form of technical assistance grants and training to industries and/or loans at below market rates from dedicated trust funds. Yet the present level of lending through such projects is by far not sufficient to trigger widespread adoption of CP.

From the perspective of industries considering the adoption of CP measures, listed below are six constraints for CP investment. They include:

- **Financial** - i.e. high cost of capital, lack of funding mechanisms, high transaction costs
- **Economic** - i.e. cost effectiveness of investments based on natural resource prices, immaturity of companies' internal capital budgeting, cost calculations and allocation procedures
- **Policy-related** - i.e. lack of sufficient industrial development policies and strategies, lack of national environmental policy and framework
- **Organisational** - i.e. lack of company environmental leadership, limited involvement of employees, non-existence of environmental management systems
- **Technical** – i.e. lack of well established production practices and maintenance schemes, limited access to reliable technical information and equipment
- **Conceptual** – i.e. Indifference to good environmental performance, misinterpretation or misunderstanding of the CP concept, resistance to change.

Financial analysis is essential to make a decision on any types of investment. Decision-making processes can be adapted and improved to translate CP assessments into feasible investment options.

For some companies, the management has the intention to invest in CP, as well as the knowledge and the skills to correctly appraise environmentally-related costs and benefits. Yet, the implementation of such a proposal can still be hindered by a lack of financial resources and/or a difficulty in accessing them.

Financial institutions and other providers of private sector funding follow a well defined process of due diligence when evaluating loan and investment proposals. This process consists of verifying the technical, financial and legal aspects of the project, evaluating the creditworthiness of the borrower and assessing the different potential risks involved.

Environmental risks are often undervalued and the costing of inputs often favour less efficient options – particularly in developing countries. Consequently, projects that might be good investments with national environmental benefits fail to advance because of a misconception of the risks involved and misleading financial assessment.

Listed below are five general constraints to CP investment in developing countries:

- Inability of financial institutions and industrial authorities to assess the technical and financial merits of CP investment proposals
- Lack of credit schemes customised to CP investments
- Inability to develop creditworthy CP investment proposals
- High cost of implementation of CP
- Lack of enabling environment for CP.

The above constraints are caused, in part, by a lack of awareness of industrialists and financiers to fully understand the impact of CP to investment profitability and the skills and knowledge to assess CP content of an investment proposal. It is also due to stage of development of the banking systems in the

developing world. This is reflected in the short-term repayment periods, the provision of working capital only and high interest rates, mostly due to macro-economic and financial instability.

There is a need to develop financial and economic tools and instruments that correct this bias and address less tangible factors, such as avoided costs, compliance, training, liability and quality of products.

Governments can facilitate this process by introducing policies and instruments (import tax reductions, special funds and credit windows for CP, etc.) that promote CP rather than promoting end-of-pipe measures. This will require the participation of a number of ministries and agencies in the process, such as ministry of finance, customs and tax departments, investment promotion and licensing authorities, industrial promotion and control agencies, etc.

In light of the hurdles that exist for the wide spread adoption of CP, the financial institutions, governments and industry should consider the following strategies:

- Increased capacity of technical assistance providers and CP assessors in the preparation of creditworthy loan applications
- Awareness of new tools and instruments to financial institutions in developing countries on the assessment of the economic merits of CP options
- Mainstreaming of environmental investments into a bank's portfolio (adopting CP as a viable investment field by loan officers)
- Promotion of credit schemes customised to CP investments
- Active match-making between potential investors and credit lines, trust funds, etc dedicated for pollution prevention or other environmentally sustainable projects and initiatives
- Global networking and advocacy with multinational financing institutions to increase emphasis on the preventative approach in their commitment for and implementation of environmentally sustainable financing schemes.

CP financing has emerged as a topic at most CP regional round tables held in Asia and the Pacific, Europe and the Americas. National CP roundtables have also introduced this element to their agendas. Governments, industrial enterprises and financial institutions are increasingly aware of the importance of the issues covered in this report.

The number of dedicated revolving funds and credit lines for CP investment has increased considerably over the past few years. Several initiatives by the World Bank, Asian Development Bank, Inter-American Development Bank, EBRD, etc have been launched or are in the process of being formulated. An inventory on who's-who in CP financing has been compiled by UNEP/TIE for global dissemination as a separate document.

Further details on the constraints and possible strategies and approaches are provided in the Issue Paper in Annex 1 of this report.

3. Methodology

The purpose of the overall project is to identify specific obstacles to CP investment and to provide series of tools and framework recommendations to stimulate change. This study is to be used to generate a baseline of information concerning past investment experience globally and within specified industries in the five demonstration countries of the project. The countries represent a wide span of socio-economic conditions, have different industrial interests and are at different stages of industrialisation. The demonstration countries include Guatemala, Nicaragua, Tanzania, Vietnam and Zimbabwe.

The CP concept is relatively new in the developing world. For this reason, additional information about three comparator countries with well-established CP Centres has been augmented into the analysis. These countries include Lithuania, Mexico and India. The additional cases, which are included in the CP Project Studies, are to provide some context into the world-wide take-up of CP projects. However, in-depth analysis of the national situation within each of the three countries is not covered in this study.

There are three main components of the study, which include:

- **5 Country Financial Study** – Assessment of the level of awareness and capacity for CP investments in the financial sector in the five demonstration countries. This includes: individual country briefings and country-specific financial sector overviews.
- **8 Country Projects Study** – Analysis of past project activities and related investment practice in the five demonstration countries, with additional information collected from India, Mexico and Lithuania. This includes an analysis of activities by industry sector and by country.
- **Global Financial Survey** - Assessment of current investment practice, financing strategies and cleaner production investment potential. This includes surveying global financial institutions and interpreting their responses.

The *global component* of the project required surveying over 50 of the top international financial institutions to examine the current and past investment practice. The aim in launching the global component was to develop more effective interaction between the financial community and industry about CP investment opportunities. The objectives for the global study were three-fold:

- To demonstrate how to initiate and facilitate the financing of Cleaner Production investments.
- To develop financial instruments for effectively promoting Cleaner Production investments. This will include developing strategies for both public and private financial institutions to adopt the use of such instruments.
- To motivate key decision makers in the international community and the public and private financial sectors to identify Cleaner Production as an attractive investment.

The global study methodology was by way of written survey, later followed up by an e-mail survey and telephone requests. There was too low a response to provide any sound statistical basis upon which conclusions could be drawn. This in itself demonstrated a lack of clear understanding of cleaner production concepts. A sub-group of those surveyed were previously contacted regarding environmental management issues and were keen to respond.

The *country component*, which includes the 5 Country Financial Study and the 8 Country Projects Study, was designed to demonstrate how CP investments can be facilitated and enhanced. This involved examining past practices in the financial services sector and investment projects at the national level. The aim was to review the information to understand the obstacles that exist in promoting CP production investments.

Cleaner Production Centres (CPC) have been established in all 8 countries and have been closely involved in the project. The National Focal Points, National Project Coordinators and Advisory Boards were also involved in the survey in each of the five demonstration countries.

An International Advisory Board, including the Norwegian government, UNIDO, UNDP, IFC, World Bank, International Chamber of Commerce and a commercial multinational bank, provided overall guidance.

Two workshops were arranged with the Directors of several UNEP/UNIDO National Cleaner Production Centres (NCPC) to introduce and discuss the project aims, objectives and content. These meetings took place in Norway in September 1998 and Prague in May 1999. NCPC Directors present at the workshops include: Brazil, China, Costa Rica, Croatia, the Czech Republic, El Salvador, Guatemala, Hungary, India, Mexico, Nicaragua, the Slovak Republic, Tunisia and Zimbabwe. UNIDO, UNEP/DTIE and financial and project advisors were also in attendance. At each of the workshops the proposed methodology was presented and at Prague, where a more developed version was available, significant constructive comments were received that influenced the process. As a result, an initial first output of the project was produced – a primer concerning the financial markets. This was written directly for the Director's of the National Cleaner Production Centres and its aim is to explain the workings of such markets, including common terminology, to the NCPCs. This provides a level of awareness and a first level of skills transfer in understanding the workings of the local financial sector.

Within each of the five demonstration countries and three comparator countries, the Cleaner Production Centres, were appointed to work closely with the national governments, local financial institutions and other international agencies. The project was conducted in close co-ordination with UNEP's regional offices and project National Advisory Boards. The appointed CPCs and consultants gathered specific information relating to past investment practice and investments potential, a review of bottlenecks encountered in financing CP investments in companies and the identification of 'lost' opportunities for CP.

During the preparation stages of gathering information, UNEP/DTIE staff visited the five demonstration countries. An assessment was made of various industrial, financial and government stakeholders to

support and participate in the project. Following this, desktop research was conducted to examine the general investment climate in the respective countries, including major reforms in public and/or financial sectors, monetary crisis, political instability, social conflicts and natural disasters.

Some of the country studies were distributed to the respective National Advisory Boards for a peer review.

5. Guatemala: Study on Past Investments

I. Background

In 1996, Guatemala saw the arrival of a peace settlement that brought an end to a 36-year civil war. In late 1998, the destruction wreaked by Hurricane Mitch had a profound effect on Guatemala and its Central American neighbours' economies.

Guatemala's monetary policy for 1999 was overshadowed by three general aims: renew confidence in the currency, reduce the deficit and strengthen the country's financial system. The crisis in the banking system has contributed to the lingering financial problems in the coffee industry, compounded by the effects of Hurricane Mitch. A squeeze in private sector credits, weak exports performance, a rise in inflation rates and continued currency instability was partly to blame for this.

Business confidence dampened in 1999. The restriction in credit to the private sector has had a significant effect on the private sector growth. During 1999, commercial banks were reluctant to make loans.

The slow-down in the economy has been attributed to Hurricane Mitch, despite the rise in government investment relating to the peace process and emergency relief. Economic growth in 2000, which is expected to remain at 3.5%, will be dependent on coffee and sugar prices and export earnings. World prices are not expected to recover during 2000. Latest estimates for 2001 are that the GDP is expected to grow by 4.0%. It is anticipated that export earnings will increase and the high level of public spending will continue.

Guatemala is among the world's leading sugar producers and is dependent on its export earnings. The recent decline in world prices and Hurricane Mitch sent shock waves through the national economy. The Government is likely to take an aggressive stand to promote their sugar in foreign markets.

Sugar mills have been undergoing modernisation, which usually has occurred at the same time as installation of electricity co-generation. Plantation crops of sugarcane and coffee receive ongoing investment. Increasingly, this has involved technology transfer regarding harvest handling, cold storage, cold shipping and packaging. Investment opportunities include agricultural inputs and technology for crop handling in fields.

Guatemala is the fifth largest exporter of coffee in the world and the largest in Central America. Between October 1998 – September 1999, Guatemala's coffee crop has reached 5.4 million quintals (45-kg bags), exceeding earlier expectations. However the depression of world coffee prices and damage from Hurricane Mitch is expected to dampen growth outlook.

Despite difficulties from adverse weather, the Asociacion Nacional de Café (National Coffee Growers Association) aims to double national output over the next six years by stimulating domestic consumption

and developing new markets in Europe and China. Guatemala’s coffee producers are increasingly aiming to produce at the high-quality (arabica beans) end of the market.

II. Overview of projects

The Guatemala Cleaner Production Centre examined 20 enterprises for this study. The companies cover a spread of three sectors, including four different industries listed under the sector described as ‘Other’. Listed below is a breakdown of respondents.

Respondents According to sector	
Sector	Respondents
Sugar	7
Manufacturing	4
Other	9
Total	20

Project venture

The projects are categorised according to three types of ventures. These are:

- New construction sites (greenfield or brownfield)
- Plant expansions
- Retrofits.

Of the 20 projects evaluated, 14 projects were identified as retrofit projects, three were new construction projects and three were plant expansions. With the exception of projects in the sugar sector, all projects refer to small and medium enterprises.

The reason a predominance of retrofits lies in the fact that retrofit project are a low cost, quick way of increasing efficiency the processes and upgrading to the available technology. Additionally, retrofits allows changes in small step which more acceptable to the company staff and management. Naturally, a complete revamp of industry appears less likely to occur, especially due to the conspicuous financial burden involved.

Environmental characteristics

Environmental characteristics of the projects fall into three groups. They include:

- Cleaner production
- End-of-pipe
- Other general industrial projects.

Listed below is a break down of the environmental characteristics according to sector.

Environmental characteristics according to sector				
	CP	End-of-pipe	General industries	Combination CP/EoP
Sugar	-	-	-	7
Manufacturing	2	2	-	-
Other	3	4	-	2
No. of projects	9	3	-	8

Project Description (including economic, environmental and social considerations)

Sugar

Overview	
Number of enterprises	7
Project description*	<ul style="list-style-type: none"> • Waste recovery and reuse techniques • Gaseous emissions and effluents reduction measures • Renewable energy
Known drivers for change#	<ul style="list-style-type: none"> • Production efficiency (i.e. cost savings) • Pollution abatement

* Companies can have more than one project carried out simultaneously, many of which are inter-related.

Drivers for change are not listed in order of priority.

The study assessed the activities of seven of the top sugar producers in the country. Production in each of the companies, which includes both raw and refined sugar, ranges from 600 up to 2,930 thousand MT/year. A majority of the sugar output is produced for export markets. All companies are members of the Guatemala Sugar Cane Producers Association (ASAZGUA).

All seven companies focused on three key areas of activity:

- Reduction of gaseous emissions
- Use of filter cake as organic fertiliser
- Electric generation through sugar cane bagasse.

All seven companies generate their own electricity through the use of sugar cane bagasse. The bagasse is also used as a main ingredient of organic fertiliser. Bagasse, also called filter cake, contains potassium and sodium to help enrich soil. This is mixed with fly ash, which is recovered from chimney filters, to produce fertiliser.

Six companies use a water recycling system, which extracts redundant water from production processes and later uses it for irrigation in the fields. Two of the companies also adopted systems of recovering sugar cane from the washing tables to reduce river pollutants.

All seven companies considered the environmental and human health effects of their operations to nearby towns and cities, which ranged from 35,000 to 480,000 people. Social considerations also focused on the employees. Protective gear is provided, along with special food supplements and medical care.

Alternative designs were considered by all of the companies. Final decisions were based on the following:

- Size of initial investment
- Rate of return
- Level and sophistication of technology
- Expected results.

Manufacturing

Overview	
Number of enterprises	4
Project description*	<ul style="list-style-type: none"> • Waste recovery and reuse techniques • Renewable energy • Water treatment plant • Emissions reduction measures
Known drivers for change#	<ul style="list-style-type: none"> • Production efficiency (i.e. cost savings) • Intervention by the National Environmental Commission • Pollution abatement

* Companies can have more than one project carried out simultaneously, many of which are inter-related.

Drivers for change are not listed in order of priority.

Four companies make up the manufacturing sector. The companies produce the following products:

- Coffee machinery
- Fertiliser
- Rubber
- Chemical Spray.

A coffee machinery producer researched and designed a new pulp remover, which uses no water and replaced toxic copper parts with aluminium parts. The new design allows the users (coffee producers) to

enhance their environmental performance by reducing water and energy consumption, as well as generation of effluents. The machinery is also lighter and, therefore, cheaper to transport.

This project stands as a case where the benefits associated to cleaner production are translated forward to the customers. It further shows the importance of analysing a cleaner production option with the life cycle approach.

A fertiliser company identified wastewater effluent and energy consumption as an area of concern. They took steps to recycle waste solids and to generate energy from photovoltaic cells, as regular, uninterrupted service is not available in the area. No alternative designs or social considerations were considered.

On the orders of the National Environmental Commission (CONAMA), a rubber producer reduced its effluents, which had previously been contaminating local water systems. As a consequence, the company installed a wastewater treatment plant, which includes the use of lagoons (or sedimentation ponds). The company had no prior experience and no alternative designs were considered.

A chemical spray company was the first in Guatemala to adopt the principles of UN's Montreal Protocol, which seeks to eliminate the use of CFC's in manufacturing processes. The company has replaced CFC's with Freon 11-12. Alternative designs were considered, such as the use of CO₂ and LPG, but they were considered too expensive. The company has also adopted the principles of ISO 9000 and is due to begin certification towards ISO 14001.

Other

Overview	
Number of enterprises	9
Project description*	<ul style="list-style-type: none"> • Waste recovery and reuse techniques • Renewable energy • Emissions and effluent reduction measures
Known drivers for change#	<ul style="list-style-type: none"> • Production efficiency (i.e. cost savings) • Pollution abatement

* Companies can have more than one project carried out simultaneously, many of which are inter-related.

Drivers for change are not listed in order of priority.

The sector 'Other' is made up of nine companies, which include the following industries:

- Eco-tourism & Services (2)
- Agriculture (2)
- Tannery (2)
- Food processing & Beverages (3).

Eco-tourism & Services

The eco-tourism and service sector includes a hotel and resort company and an environmental recycling company. The hotel and resort company provides meetings, seminars and conferences relating to sustainable development, such as renewable energy, recycling, sustainable agriculture, forestry, aquaculture and pollution abatement. The company also practices what it preaches – CP measures have been implemented throughout the resort. These include:

- Electric generation using photovoltaic cells
- Use of recycled products rather than disposable articles
- Use of environmentally friendly cleaning products
- Forestry conservation programme to prevent soil erosion.

These measures were adopted with the help and advice of the Guatemala Cleaner Production Centre.

An environmental services company collects, processes and commercialises from oil and petroleum recovery. The aim of the company is to reduce water and soil pollution in ports, gas stations and construction sites.

Agriculture

Two agricultural companies produce coffee and African palm trees.

A company, which grows African palm trees, recently seeded 5,000 hectares of land. They plan to construct an extraction mill to produce palm oil with a capacity of 250 MT/day. If the project goes ahead, the plans include the adoption of anaerobic digestors and facultative ponds for treating liquid effluent. The company also plans to recover solid waste for electric generation.

A coffee grower adopted organic farming techniques. As well as eliminating the use of pesticides, the company also uses a closed water system for coffee production and dries the beans by sunlight rather than use electrical driers.

Tanneries

Two tannery companies identified untreated wastewater as a problem. One company adopted a system by which the solids are separated from the liquid and later disposed of.

The other company gathered its solid waste (2 MT/month). The waste was then decomposed and later mixed with coffee pulp to produce feed for farmed-earthworms. The earthworms are raised to help produce humus (or compost) to use in fertiliser, which is then sold commercially. Alternative designs were considered but deemed to be too expensive.

Food processing & Beverages

Three companies in the 'Food processing & Beverages' sector produce candy, beer and liquor.

A candy company was a participant of the Eco-design Programme as part of the Chamber of Industry activities. Measures that were adopted include use of non-toxic inks for packaging and reduction of candy plastic wrap and packing bags.

A beer company started considering CP and end-of-pipe options in the early 1990's. Measures they adopted include:

- Reductions of water consumption through the implementation of a closed water cleaning system
- Retention of 90% of fly ash from chimneys
- Recycling of glass, carton and plastic packaging.

No detailed information was provided about the company that produces liquor.

III. Type of financing

The companies assessed in this study were reluctant to disclose detailed information, which has made it difficult to provide in-depth financial analysis.

Of the 20 projects examined, 15 projects were funded from internal resources. One of the companies also received technical assistance from a local university.

In terms of size of investment, the seven sugar companies implemented projects that totalled \$3,856,041. All the projects were financed from internal resources.

The eco-tourism company invested \$7,105,784 in a conference centre and CP measures. Corporacion Financiera Ambiental(CFA) provided venture capital at a rate of 6-7%. CFA also provided venture capital to the environmental services company at a rate of 6-7% for 5 years.

The agricultural company that grows African palms is seeking finance from two banks, Banco Europeo de Inversiones and Belgium's Fortis Bank. If the loans are approved, the company will receive funding at a rate of 7.6% and 11.6%, respectively.

IV. Conclusions

The study reveals that commercial banks in Guatemala do not show a preference for financing environmentally related projects as yet. This also explains why the financing of such projects occur under

the same loan terms as any other investment. It has also to be noted that local commercial banks' loans have been accessible to borrowers over the last two years and that the funds now available show very high interest rates.

Some international financial institutions have preferential funds dedicated to the projects at issue, e.g. *via* capital risk or special credit lines that can be accessed through commercial banks, although, these banks are not yet actively promoting these dedicated funds.

Generally, it was reported that banks in the due diligence process consider mainly the financial aspect of a loan application, without paying too much heed to the technical ones.

No special governmental financial mechanism or subsidy to promote investment in cleaner production exists. Technical support is given in the form of training to business, via appropriate bodies such as the *Instituto Nacional de Capacitation* (National Training Institute). In addition to that, sector specific institutions, e.g. the Chamber of Industry, Chamber of Commerce, Managers Association, as well as private organisation and university provide training to entrepreneurs.

It was noted a certain reluctance on the part of banks and financial institutions in providing internal information to contribute to the study. The same attitude was observed amongst entrepreneurs who normally do not like to give away information that they regard as "private".

The study highlighted that the number of cleaner production projects in the country is still very little. Often projects developed on an environmental basis are intended to achieve compliance with the environmental legislation, whilst only a few of them were conceived as a result of a convinced decision by the investors. It is worth noting however, that most entrepreneurs would be willing to either maintain or even increase the level of investment in cleaner production or environment, if the financial terms would be more advantageous. Businessmen are aware that the current not favourable financial conditions are also affected by factors which are external to the banking system. Nevertheless, there is a belief among the business community that the banking sector could do more to improve their financial conditions.

6. Guatemala: Survey of Financial Institutions

I. General background and marketplace

The objective of this study is to gather information on financial institutions (FIs) in Guatemala to provide a picture on current and past financing activity and to assess the type of financing available to CP investments. This required CP Guatemalan experts to interview financiers and determine how they view environmental issues (if at all) and if they are aware of the CP concept.

As a backdrop to this study, it is important to provide an overview of the state of Guatemala's financial services sector.

During the 1990's, liberalisation of Guatemala's financial sector led to an increase in the number of banks and other financial institutions. Nevertheless, business confidence dampened in 1999. A crisis in the banking system was attributed to the lingering financial problems in the coffee industry, compounded by the effects of Hurricane Mitch.

During 1999, commercial banks were reluctant to make loans. A squeeze in private sector credit, weak exports performance, a rise in inflation rates and continued currency instability was partly to blame for this.

The restriction in credit to the private sector has had a significant effect on the private sector growth. The level of outstanding loans to the private sector was partly to blame for this. By September 1999, the stock of outstanding loans increased by quetzal Q1.77 billion, an increase of 9.4% since January 1999.

Guatemala's monetary policy for 1999 was overshadowed by its aim to further strengthen the country's financial system. With the backing of Guatemala's Bankers Association, the Junta Monetaria's (the Monetary Policy Committee or JM), which is the banking and financial sector's highest authority, begun to introduce further banking reforms.

As part of the study, CP Guatemalan experts interviewed seven FIs that focus, in some capacity, on providing funds for environmental and sustainable development projects, rather than traditional industrial projects. The FIs include:

- Banco Centroamericano de Integracion Economica (BCIE)
- Banco de Desarrollo Rural (BANRURAL)
- Corporacion Financiera Ambiental (CFA)
- Banco del Café (BANCAFE)
- Fideicomiso para la Conservacion en Guatemala (FCG)
- Banco Agricola Mercantil (BAM)
- Fondo Guatemalteco del Medio Ambiente (FOGUAMA).

Interviews with the FIs listed above revealed that six out of seven banks have developed a clear policy on the type of industry in which they invest. Unique to most developing countries, six Guatemalan FIs focus on sectors that relate to natural resources and agriculture, with a particular emphasis on:

- Organic agriculture
- Sustainable forestry
- Eco-tourism
- Renewable energy
- Energy efficiency
- Recycling
- Waste management
- Pollution abatement.

Only one bank looks at “all industrial activity.”

Two FIs have a regional spread of activities, with operations in most Central American countries, while the remaining five FIs’ operations concentrate in Guatemala exclusively.

Among the seven FIs interviewed, one is a regional bank that acts as a financial intermediary for multilateral institutions, five are private banks and one is a government-funded institution. The latter is FOGUAMA, which started in 1997, with assets of \$1.4 million, to support municipal and NGO projects that focus on:

- Preservation of natural resources
- Improvement of environmental quality
- Health
- Environmental education
- Sustainable agriculture
- Energy.

Projects funded by FOGUAMA that range from \$2,600 - \$6,600 are eligible for non-refundable funds. Projects that are up to \$13,300 are eligible for refundable loans at a rate of 10%, based on a 1-year term. In both cases, a minimum of 50% match-funding is required.

The average size of investment by Guatemalan FIs is unclear. Only two FIs, BCIE and BANRURAL, specified that they provide funding for medium-, small- and micro-sized enterprises.

The five private banks are described below.

- **BANRURAL** – Previously known as the Agricultural Development Bank, 94% of the bank’s clients are small and micro enterprises.
- **CFA** – is managed by the Environmental Enterprises Assistance Fund (a US NGO) and is wholly owned by Empresas Ambientales de Centroamerica.

- **BANCAFE** – is the second largest bank in Guatemala with assets of around \$430 million. It holds 8.1% of the market share (or 78,000 customers) in Guatemala. Corporate clients account for 17% of the bank’s total assets.
- **FCG** – was formed with the funding of three organisations: Whitley Animal Trust, World Wildlife Fund and a private US bank. FCG work with the World Bank’s International Environment Fund.
- **BAM** – is the 11th largest FI in Guatemala. In mid-2000, it is due to merge with Banco del Agro to become the 3rd largest FI.

Listed below are the types of funding offered by Guatemalan FIs in this survey.

Types of funding	
Company	Types
BCIE	• Equity & Mortgage Finance – 6 years in quetzals; 15 years in US\$
BANRURAL	• Equity & Mortgage Finance – 5 years
CFA	• Venture Capital – 5-10 years
BANCAFE	• Equity & Mortgage Finance – 2-5 years
FCG	• Equity & Mortgage Finance – 3-4 years
BAM	• Equity & Mortgage Finance – 3-6 years
FOGUAMA	• Refundable/Non-refundable loans – 1 year

A majority of the seven FIs provide finance at a rate of approximately 20%.

Projects are funded on the basis of size of company (in terms of production and capital), cash flow, credit history, industrial sector, production capacity, level of technology production and organisational structure.

II. Environmental considerations

All seven FIs consider environmental risks and liabilities, to a varying degree, when considering investing in projects. Environmental impact assessments are required by all the banks, which must then be approved by the National Environmental Commission (CONAMA).

CFA has clear mandate to invest “only in environmental businesses which have a net positive environmental impact”. As well as reviewing environmental risks and liabilities, it examines environmental benefits and compliance records with local and national laws and with its own company guidelines. It also reviews a project’s product efficiency and best available technology (BAT).

Although the FIs surveyed in this study are active in financing environmental projects, only three banks have their own corporate environmental policy. These include CFA, FCG and FOGUAMA.

BCIE and BANRURAL interact with government agencies to provide finance to environmental projects. BCIE acts as a financial intermediary for community projects through the Promuni Programme. It also provides funds for local and municipal agencies through the Guatemalan Federation of Environmental Funds (The Guatemalan Federation of Environmental Funds was created with the support of FOGUAMA.) BANRURAL provide a credit line for reforestation, with the support of the government and the National Forest Institute.

Future programmes that are considered to provide important financial instruments for initiating the take-up of CP measures include the following:

- The Carbon Fund
- The Central American Fund for Environment and Development
- The Central American Federation of Environment Funds.

Four FIs have indicated that they are considering the above initiatives as investment vehicles for increasing their environmental portfolio.

III. Conclusions

Sustainable development has become a new buzz-word for countries in Central America. Almost every country has now begun to embark on the formulation and implementation of a national environmental policy, drawing up international and regional agreements as well as legislation. Guatemala has also begun to translate environmental considerations and sustainable development into its financial markets.

The Guatemalan FIs that participated in this study have demonstrated that they are familiar with environmental opportunities, which centre on environmental investments. This concentration of activity has most likely been triggered by the mass destruction of Hurricane Mitch.

However, little is known about the volume of financing (i.e. average size and extent of investments) to demonstrate the extent to which environmental investments have become mainstream in Guatemala. The length of the investment period is considered relatively short and, consequently, indicates that the size of the investments may be small (See table: *Types of Funding*). This is reinforced by the fact that two FIs specified that they cater to medium-, small- and micro-sized enterprises.

It is most likely that the financial institutions and investment vehicles outlined in this study are considered niche. Yet, further steps taken by government agencies and multilateral institutions through credit schemes and policy are expected to change the scale of investment to be more far-reaching. This can be demonstrated by the forthcoming launch of environmental funding programmes (i.e. The Carbon Fund, etc). Several FIs have indicated that these programmes are likely to have a positive impact on the extent to which they provide finance for CP projects.

7. India: Study on Past Investments

I. Background

In 1997, India embarked on a five-year economic plan. Over this period, the government has projected GDP to grow at an average of 6.5% (in real terms). Real GDP growth in 1999 was 6.2%. It is forecast to reach 6.5% in 2000 and 5.9% in 2001.¹

Restrictions regarding foreign investment were relaxed in 1991. A combination of fiscal tightening and lower interest rates has also been designed to boost investor confidence. Yet restrictions imposed on foreign investment still remain, which has hindered India's economic development. Bureaucracy and infrastructure inadequacies have been blamed as an impediment to attracting foreign investment.

The government has renewed efforts to speed up the process of implementing its privatisation programme. This is demonstrated by the fact that privatisation revenue of \$2.34 billion has been earmarked in the 1999-2000 fiscal budget. Plans will include the sale of the state telephone service, oil and gas production, food production and tourism.

Currently, publicly-owned companies, which make up a large proportion of the business community, have been held back by the lack of investment, high staffing levels and the use of obsolete technology and manufacturing techniques.

Nevertheless, industrial production in India in the past two decades has doubled. Significant growth has taken place in thermal power generation, chemicals, leather production and pulp and paper sectors.² Consequently, this rapid industrialisation has had a negative impact on the environment.

Small- to medium-sized enterprises (SMEs) feature heavily in India's economy and currently make up more than 3 million companies. While SMEs account for over 40% of industrial output in terms of value, it is also estimated that the pollution they generate is significantly higher in proportion to overall industrial production.

Environmental policy and regulation falls under the responsibility of the Ministry of Environment and Forests (MEF). The Environmental Protection Act, passed in 1986, requires all new, expanding or modernised industrial units to seek environmental clearance from the central or state government.

Industrial-production licenses, which are issued by the Secretariat for Industrial Approvals (SIA), take environmental considerations into account. As part of the application process, SIA issues guidelines and agreements with companies to install appropriate equipment and measures to prevent and control pollution.

¹ EIU, *India Country Forecast*, 2000.

² National Cleaner Production Centre, New Delhi, May 2000.

Recently, the MEF has entered into discussions with the Department of Company Affairs to make environmental audits mandatory. The MEF is also expected to finalise new guidelines to restrict the location of petroleum refineries, petrochemical, chemical, fertiliser operations, pulp and paper, cement, tanneries and pesticide operations.

A \$2 million World Bank credit line has been set up to provide free, state-of-the-art cleaner production technologies to large and medium-sized companies. The aid-in-grant programme also involves the Confederation of Indian Industry, Tata Energy Research Institute and the National Environment and Engineering Research Institute.

II. Overview of projects

The National Cleaner Production Centre approached 40 companies, representing 10 major sectors, to participate in this study. The Centre collected 17 responses via site visits, correspondence and telephone interviews. Listed below is a wide spread of industries represented in this study.

The low response rate and direct feedback indicates that companies in India are suffering from overexposure to similar types of surveys. In general, detailed financial information about companies' activities is considered to be sensitive amongst the business community.

Respondents according to sector	
Sector	Respondents
Pulp and paper	4
Textile dyeing and printing	3
Leather, Tannery	3
Food processing	3
Other	4
Total	17

Project Venture

The projects are categorised according to three types of ventures. These are:

- New construction sites (greenfield or brownfield)
- Plant expansions
- Retrofits.

A majority of the projects are retrofits, while only two were new businesses and two were plant expansions. Five companies did not indicate the nature of their project.

Environmental characteristics

Environmental characteristics of the projects fall into three groups. They include:

- Cleaner production
- End-of-pipe
- Other general industrial projects.

CP is often combined with end-of-pipe options. In the case of this study, seven of the fifteen companies that chose CP solutions also included end-of-pipe technologies and techniques. Whilst it is difficult to capture the choice of individual companies, the table below highlights that the ratio of CP to end-of-pipe investments is 5 to 3.

The study also examines two companies, which chose end-of-pipe options exclusively, and it should be noted that no general industrial projects were assessed.

Environmental characteristics according to sector			
	CP	End-of-pipe	General industries
Pulp and paper*	4	1	-
Textile	3	3	-
Leather, Tannery*	3	1	-
Food processing	1	2	-
Other*	4	2	-
No. of projects	15	9	-

* Projects can demonstrate more than one characteristic.

Project description (including economic, environmental and social considerations)

Pulp and paper

Overview	
Number of enterprises	4
Project description*	1) Waste and water recovery and reuse technology 2) Water and energy reduction measures 3) Production efficiency technology 4) Pulp washing system upgrade
Known drivers for change#	5) Product quality improvements 6) Production efficiency (i.e. cost savings) 7) Pollution abatement 8) Meet local environmental regulatory standards

* Companies can have more than one project carried out simultaneously, many of which are inter-related. ## Drivers for change are not listed in order of priority.

The pulp and paper companies specialise in producing various grades of bleached, unbleached, semi-craft and craft paper for packaging and industrial use. Three out of four companies had no prior knowledge of the CP concept. In each case, the main objectives of the projects were to reduce manufacturing costs and conserve raw materials, due to increasing national and international experience.

Two companies noted specifically that improved environmental performance was also a key objective.

One company implemented four separate CP measures, all of which resulted in economic and environmental benefits. The four measures included the installation of:

- A high velocity hood to improve paper drying efficiency
- A 'save all' to enhance fibre recovery and enable water recycling
- A vibratory screen for pre-cleaning of raw materials to reduce chemical & energy consumption and also reduce pollution load
- An upgraded pulp washing system to reduce water and energy consumption.

As a result of the reduction of raw material used and cost savings made, the company went on to install a wastewater treatment plant as well.

Another company introduced a new technology which treats pulping liquid while recovering a by-product of sodium carbonate pellets. The technology was installed to deal with the treatment of black liquid waste and the recovery of soda ash, which led to the elimination of up to 80% of pollution.

A third company implemented a number of CP solutions, which required a range of low to high level investments. The overall aim was to optimise resource consumption, maximise profit and reduce environmental pollution. The success of the CP programme resulted in the doubling of production and the introduction of a new product range. For the remaining low levels of pollution, the economic savings of the CP programme made it economically viable for the company to install a wastewater treatment plant.

A fourth company focussed on three CP options, which included:

- The installation of broke pulper to avoid reprocessing
- The installation of a heat recovery unit to recover heat from boiler flue gases
- The installation of dosing pumps for dosing sizing chemicals.

The above measures were adopted on the basis that the solutions were considered to be 'low cost and provide a fast payback period'. The local Waste Minimisation Circle, of which this company is a member, tried and tested alternative designs, which led to the final decision to adopt CP solutions.

Textiles

Overview	
Number of enterprises	3
Project description*	<ul style="list-style-type: none"> • Wastewater treatment plant • Multi-fuel, high efficiency boiler • Atmospheric jet machine • Production line design
Known drivers for change#	<ul style="list-style-type: none"> • Production efficiency (i.e. cost savings) • Reduce water consumption • Meet local environmental regulatory standards • Securing competitive advantage

* Companies can have more than one project carried out simultaneously, many of which are inter-related. # # Drivers for change are not listed in order of priority.

All three companies specialise in bleaching and dyeing of knitwear and hosiery for both domestic and export markets.

Environmental regulation has exerted considerable pressure on textile companies to meet local standards. Two of the companies identified regulation as a main driver for implementing CP solutions measures.

One company implemented four CP measures, which include:

- Installation of a multi-fuel high efficiency boiler with dust control system and economiser
- Installation of a low liquor to cloth ratio atmospheric jet machine (self flow)
- Collection and usage of condensation as boiler feed water
- Installation of waste water treatment plant for remaining wastewater.

The measures were put in place to reduce gaseous emissions and to enhance steam generation capacity. Besides the above four measures, additional low-cost options were also implemented to improve product quality and maintenance.

A second company adopted a number of CP solutions, which include:

- Existing boiler upgrade to optimise combustion and heat recovery
- Redesign of production line layout to segregate various waste stream for recycle and reuse
- Installation of waste water treatment plant for process effluents.

With the help of the national CP Centre, various technologies were assessed before the company decided on implementing CP measures. However, the company dismissed the more technically advanced technologies due to its high price tag. For example, a low liquor ratio dyeing machine (soft flow machine) was evaluated but eliminated as a viable choice due its high cost. The company was unable to raise the required funds from internal resources.

A third company relocated its production line, as recommended by NCPC India, to reduce waste water volume and load in order to commission economically viable wastewater treatment plant. The company was using obsolete technology, which led to high usage of water, chemicals and processing time. In addition, the company did not have sufficient space to install a wastewater treatment plant for existing wastewater volume and load. The decision was made to relocate the production line to a bigger area and where good quality water could be obtained, which is essential for textile wet processing.

In terms of alternative designs, in all cases the highly technical options were not considered due to financial constraints.

Two of the three companies did take social aspects into consideration when making their decision to pursue end-of-pipe measures and CP solutions. Employee conditions were considered the most important factor. This included quality and condition of shop floor and control of dust emissions, which also had implications for local residential community.

Leather, Tannery

Overview	
Number of enterprises	3
Project description *	<ul style="list-style-type: none"> • Waste recovery and reuse of by-products • Diffused aeration system for wastewater treatment • Compressing and fleshing device • Noise reduction measures
Known drivers for change #	<ul style="list-style-type: none"> • Product quality improvements • Production efficiency (i.e. cost savings) • Reduce waste and associated toxins • Meet local environmental regulatory standards

* Companies can have more than one project carried out simultaneously, many of which are inter-related.

Drivers for change are not listed in order of priority.

The three companies in the leather/tannery sector produce leather garments and goods for both domestic and export markets.

Projects for two companies were aimed mainly at improving the product quality, production capacity and reduction of input costs. Major CP measures were implemented, which include:

- Replacement of old fleshing machine with advance hydraulic fleshing machine to reduce chemical consumption and improve product quality
- Installation of auto logging machine to improve the yield (area) and quality of leather
- Installation of screw compressor in place of reciprocating compressor to reduce energy consumption
- Provision of safety chain in front of drums, encasing of motors, usage of hydraulic forklift trolleys and other safety devices
- Chrome recovery unit
- Replacement of metal gears with Teflon gears to reduce noise level
- Recovery of leather by splitting of finished leather into various different layers for different usage.

Only one of the two above companies considered alternative technical designs.

With regard to a third company, environmental regulatory standards prescribed by the local government and complaints upheld by the local residential community were the main driver for change. The company adopted both CP and end-of-pipe measures, which focussed on the reduction of toxic wastewater. The company considered alternative CP technical designs, such as the recovery of chrome using a Paddle mixer. The results brought limited success and therefore, a more conventional chrome recovery technology was used instead.

Social considerations included improving working conditions for staff and reducing occupational risk.

Food Processing

Overview	
Number of enterprises	3
Project description *	<ul style="list-style-type: none"> • Dust extractor (scrubbing of sugar dust) system • Wastewater treatment plant
Known drivers for change #	<ul style="list-style-type: none"> • Product quality improvements • Reduce wastage • Reduce airborne sugar dust • Meet local environmental regulatory standards

* Companies can have more than one project carried out simultaneously, many of which are inter-related.

Drivers for change are not listed in order of priority.

Three companies represent the food processing sector. These include producers of sugar, cheese and fast food.

Two of the three companies were prompted to make investments relating to wastewater treatment for reasons relating to compliance with regulatory standards.

Based on low cost and ease of operation, one company chose an effluent treatment plant, which was supported by studies carried out by the NCPC in New Delhi. The technology is designed on a basis of three stages of treatment. The first stage includes anaerobic treatment processes followed by two stages of aerobic treatment systems. The company's aim, to meeting U.P. State Pollution Control Board standards, was achieved.

Another company implemented a comprehensive waste minimisation programme, which resulted in the reduction in volume and load of waste. Consequently, a treatment plant was later designed for the residual waste.

The main driver for a third company related to international competition in the sugar industry. The company identified the need to secure competitive advantage by adopting a CP measure, the installation of an operation dust extractor (scrubbing of sugar dust) system. The extractor was needed to achieve the following:

- To control air borne sugar dust in the environment
- To reduce sugar losses through dust emission
- To improve the sugar quality by controlling sugar dust settling which deteriorate the appearance and glossiness

As well as securing competitive advantage, the company also considered occupational risk to workers as another crucial factor for making the investment. The other two companies did not make any social considerations with regard to their decision to invest.

Other

Overview	
Number of enterprises	4
Project description*	<ul style="list-style-type: none"> • Waste and effluent recovery measures • Wastewater treatment plant • Hazardous waste management and design of landfill site • Wood processing balancing technology • Boiler upgrade • Efficiency measures
Known drivers for change#	<ul style="list-style-type: none"> • Product quality improvements • Production efficiency (i.e. cost savings) • Pollution abatement • Meet local environmental regulatory standards

* Companies can have more than one project carried out simultaneously, many of which are inter-related.

Drivers for change are not listed in order of priority.

The group of companies, representative of the sector 'Other', include the activities of the following industries:

- Chemical (1)
- Wood Processing (1)
- Engineering (2).

Based on different economic drivers and environmental considerations, two engineering companies made investments in both CP and end-of-pipe measures.

The first company, which is ISO 14001 certified, is part-owned by a large international corporation. It has an environmental policy, which is part of its environmental management framework. The company, as part of its continuous improvement and conservation objectives, initiated a Cleaner Production programme. The CP measures that it adopted include conservation of water, oil (cooling and lubrication) and energy consumption measures.

Social considerations included improving working conditions for staff, reducing occupational risk and promoting environmental awareness amongst local community through sponsorship and campaigning.

Compliance with environmental regulation was the catalyst for change for the other engineering company. It opted for a wastewater treatment plant. No considerations were made for the long-term financial implications of the investment due to the fact that this was required as part of their licence to operate.

A wood processing company, which manufactures plywood and door panels for the domestic market, introduced measures to conserve wood, energy and resin used for bonding. This was achieved through a number of measures ranging from end-of-pipe, general industrial expansion and CP. The measures included:

- Installation of additional press to increase production capacity
- Installation of balancing equipment
- Manufacture of false roof ceiling panel from saw dust as a by-product
- Improvement of boiler efficiency by optimising combustion
- Modification of dryer to improve/optimize drying efficiency
- Modification of process regarding veneer cutting to reduce wastage.

Various alternative technologies were evaluated based on technological, economic and environmental considerations.

The objective of one project, undertaken by a chemical company, was to recover chemical by-products, which were otherwise ending up into waste stream. The project involved the implementation of 25 CP

measures. Four major solutions were achieved, resulting in significant economic and environmental performance improvements. These included:

- Concentration and recovery of acids for reuse/sale for other product
- Recovery of Glauber salt from mother liquor
- Recovery of final product by installing bag filters.
- Dehydration/drying of gypsum sludge for sale to cement manufacturing.

Various alternatives for all the CP measures were evaluated before selecting the solution for implementation. The company also considered the pay back period, efficiency of recovery and probability of success rate for selected solutions. The demand for recovered products was not a major concern as most of the recovered products were either used in-house or sold to other industries.

III. Type of financing

Companies adopting CP measures, in theory, have access to most available financing mechanisms. In practice, however, CP technologies and techniques require specialised assistance partly due to the size of the projects (usually micro- to medium-scale), the difficulties of securing long-term finance and the lack of understanding by the financial community about the CP concept.

In financial market terms, the projects assessed in this study, as indicated in the table below, are considered micro- to small-scale. Few CP projects are rarely able to cross the threshold of large-scale investments, which make them eligible for project finance. Equally true, the provision of leasing finance, whilst ideally suited for CP projects, is often not available to companies in the developing countries. Consequently, such scenarios necessitate the need for innovation in accessing finance, which is geared to the needs of the CP concept.

Size of projects according to industry (US Dollars)			
Industry	500,000 & more	100,000 to 500,000	100,000 & less
Pulp and paper	1	2	1
Textile	-	1	2
Leather, Tannery	1	-	2
Food processing	-	-	3
Other	1	3	-
TOTAL	3	6	8

Pulp and paper

Perhaps prompted by the increasing competitiveness of the international market in pulp and paper, all four projects focused on the need to be more efficient and reduce manufacturing costs. This was achieved through implementing CP measures. The level of investment amongst the four projects averaged \$1,441,000. The projects ranged from as little as \$14,000 up to \$2.5 million.

To varying degrees, all four pulp and paper companies contributed internal financial resources to each of their projects. For instance, the project valued at \$14,000 was considered by the company to be too small to approach financial institutions.

Another pulp and paper company that implemented a \$400,000 project involving both CP measures and general industrial expansion secured a portion of the funding from external sources. However the costs relating to the adoption of CP measures was funded internally. The company viewed the process of securing government support as bureaucratic and tedious while commercial banks were not considered as an option. It is not clear to what extent the CP measures made up the total value of the project, as no other detailed financial information was disclosed. The industrial expansion was funded by UP Financial Corporation, a leading public sector financial institution.

As for the two other pulp and paper companies, the development banks played a key role in financing their projects. Funds were provided by the Indian Credit and Investment Corporation of India (ICICI), as part of a USAID programme, and the Industry Development Bank of India (IDBI), through a Ministry of Environment and Forests grant. The development banks provided 40-50% of the overall investment package. The ICICI provided a loan at a rate of 16.5% over a 5-year term and the IDBI offered a grant and therefore charged no interest. As well as the provision of a grant, UNIDO's international experts, NCPC professionals and an industry research institution provided technical assistance.

It appears, however, that the type of financial mechanism used has implications for the extent to which funding was released to the company. The ICICI loan was available to the company within 7 days of invoicing. The IDBI grant took 18 months to be released.

Textiles

Three companies, which represent the textile sector, sought external funding for their projects. However, only one company successfully secured funding. The other two companies resorted to using limited internal resources, which resulted in scaling down the extent to which measures were implemented.

Investments ranged from \$25,000-230,000, with the average project costing \$105,000.

Two companies, with investments of \$230,000 and \$25,000, respectively, approached the Ministry of Environment and Forests, which operates under the World Bank's Line of Credit. Their applications were denied based on the fact that one company's "turnover was considered too low" and funding was not available for the purchase of hardware.

A third company secured 45% of the total project funding from the State Bank of India, a private sector bank. A loan was provided at a rate of 17% based on a three-year term. The funds were released in instalments, which were linked to the project implementation. Although no specific details were provided, the company considered the length of disbursements to be “very long”.

Leather/Tannery

Three companies in the leather/tannery sector made investments ranging from \$15,500 – \$1.5 million.

Only one company received external funding equating to \$9,300, which was provided by the State Bank of India, a development bank. The company’s internal resources covered the remaining 40% of the total investment package. The loan was based on a 16.5% interest rate with a 3-year term. The funding was disbursed within 15 days of invoice. Due to lengthy and cumbersome application procedures, the company decided against a grant scheme, which was available through the Ministry of Environment and Forests.

The remaining two companies used internal resources. One of the companies did approach a number of financial institutions but its loan application was denied because of a “poor balance sheet”.

Other

The category listed as ‘Other’ is an amalgamation of companies, representing three sectors: engineering, chemical and wood processing.

Two engineering companies funded projects valued at \$200,000 each, using internal resources. One of the companies, which considered the size of the project to be too small to approach a commercial bank, regarded the investment as part of routine maintenance of its operations.

A chemical company funded a \$700,000 project, using internal funds, a commercial bank loan and a government grant. The IDBI, which was the lead financial institution, provided the loan as part of the World Bank’s Line of Credit programme. The loan was provided at a rate of 17.5%, based on a 5-year term. The Ministry of Environment and Forests provided the grant. The disbursement of the grant funds was considered excessively long.

A wood processing company funded a \$250,000 project through a commercial loan. The lead financial institution was the Oriental Bank of Commerce. The company had an existing relationship with the bank. The loan was provided at a rate of 16%, based on a 4-year term. Yet, the loan was eventually paid off in 2.5-years.

IV. Conclusions

India faces two immediate challenges:

- 1) Improving competitiveness due to increasing industrial globalisation and
- 2) Improving environmental performance based on efficiency of natural resources and pollution control.

Industrial production in India has doubled since the 1980's. The level of pollution created by the country's industries per unit of output is generally considered to be much higher than their counterparts in the developing world. This is attributed to a number of reasons, which include:

- Continued use of outdated and inefficient technologies, which generate waste
- Large, unplanned and unregulated industrial growth
- Lack of regulatory enforcement and implementation of pollution control programmes
- Lack of public pressure and market incentives for improving environmental performance.

The ever-increasing competition, both from within the country and outside, has begun to impose a need for companies in India to operate more efficiently while cutting production costs. With regard to this study, these were one of many drivers for change which were identified for the pulp and paper, wood processing, food processing and textile industries.

CP, as an integral part of Total Quality Management, is a concept that is based on pollution prevention. It is also a step-change that can lead to improvements in productivity. Several examples in this study illustrate that CP options can reduce inputs, such as raw materials, energy and water. Hence, financial as well as environmental and social savings are made.

Yet the implementation of CP is hindered by a lack of financial resources. The most important funding channels for financing CP in developing countries, such as India, continue to be government-backed specialised assistance funds and development assistance. Development banks, such as ICICI and IDBI, play a significant role in providing finance although the high rates of interest are considered to be an impediment, especially for SMEs.

Loans sanctioned under programmes, such as the Industrial Pollution Control and the Industrial Pollution Prevention funded by the World Bank, are applicable to only medium to large industries. The Industrial Energy Efficiency Line, provided by the Asian Development Bank, is again restricted to large companies. Typically, the eligibility criteria as well as the choice of the disbursing financial institution are not oriented to small companies.

The development of financing mechanisms for CP is paramount, especially for SMEs. In many cases, internal funds are not always a viable option. However, some of the blame can be apportioned to the SMEs. Ideally, CP proposals should be intrinsically bankable but the appraisal of a loan application also depends on the firm's overall creditworthiness. Inexperience in preparing bankable proposals for CP

investments is a problem amongst SMEs. Many of the companies do not maintain accurate and up-to-date balance sheets let alone a comprehensive financial evaluation of environmental costs and benefits.

Other basic documents needed by a bank are the technical specifications and an environmental impact assessment. Increasingly, bankers are becoming aware of the risks associated to bad environmental performance. The National Banks Association in India reported that in 1998, environmental concerns attributed to nearly 17% of the share of factors for non-performing assets. The Indian Chartered Accountants Institute (ICAI) has issued guidance (August 1999) concerning the valuation of environmental costs and liabilities. This is in response to an initiative led by the ICAI at an international level to improve transparency and comparability of environmental as well as financial performance.

Education both for companies, in particular SMEs, and financiers will lead to a greater acceptance and adoption of the CP concept. In terms of SMEs, greater support is needed to help in the preparation of a viable CP proposal, which project CP as an economic tool for improving a company's bottom-line. As for the financiers, guidance needs to be provided to financial institutions about how to evaluate and appraise CP as a viable investment opportunity.

In addition, governments have a significant role to play in terms of the provision of grants and other incentive programmes. While a number of companies in this study received grants from the Ministry of Environment and Forests, the disbursement process was considered inadequate and bureaucratic. Some companies assessed in this study had to wait 18 months for the funds to be released.

8. Lithuania: Study of Past Investments

I. Background

Lithuania is one of the fastest growing economies in Central and Eastern Europe. In 1998, industrial production grew by 7%, the highest rate of increase in the Baltic States. In 1991, Lithuania became independent. The principle aims of the Lithuanian government since then have been to maintain a balanced budget, reduce inflation, reform the banking sector, free prices and liberate foreign trade.

Lithuania is seeking membership with the European Union, which is expected to have a major influence over the development of its economic and monetary policies.

The privatisation of commercial banks were first introduced in January 1989. Since 1997, the sector has gone through a period of marked development and is expected to continue.

Lithuania produced a Priority Action Plan, which is due to be introduced over the period of 1999-2000. The Action Plan concentrates on a national energy strategy, enforcement of bankruptcy laws and judicial reform.

Other fundamental reforms include mass privatisation programmes. The private sector now produces over 70% of Lithuania's gross domestic product. Over the next few years, priority areas for privatisation are energy, transport and environmental projects.

70% of the workforce is employed by the private sector. In November 1998, the Law on Development of Small- and Medium-sized Business (or SMEs) was introduced. The Law provides a framework the central and local government authorities to support SME activity, which includes financial incentives and technical cooperation.

During the period of pre-independence, Lithuania's natural environment suffered as a consequence of heavy industrialisation. After 1991, emissions of pollutants fell by over 65%.

II. Overview of projects

Three projects were assessed in Lithuania. The spread of industrial activity covers the following sectors:

- Electronics
- Textiles

The projects were selected from a portfolio of investment proposals supported by the Institute of Environmental Engineering (Apini) at the Kaunas University of Technology and funded under the cleaner

production revolving fund of the Nordic Environment Fund Corporation (NEFCO) for the Baltic States and Northwest Russia.

Project Venture

The projects are categorised according to three types of ventures. These are:

- New construction sites (greenfield or brownfield)
- Plant expansions
- Retrofits.

All three projects were considered retrofits.

Environmental characteristics

Environmental characteristics of the projects fall into three groups. They include:

- Cleaner production
- End-of-pipe
- Other general industrial projects.

All three projects were identified as cleaner production.

Each of the companies has previous experience with CP investments and, therefore, the economic and environmental benefits were realised at an early stage. As a result of the documented evidence and benefits of CP innovation, the companies have continued with a business strategy that embraces the application of cleaner production technologies and techniques.

Project description (including economic, environmental and social considerations)

Overview	
Number of enterprises	3
Project description*	<ul style="list-style-type: none"> • Steam boiler system • Heat energy recovery measures • Galvanic wastewater treatment plant
Known drivers for change#	<ul style="list-style-type: none"> • Environmental tax savings • Production efficiency (i.e. cost savings) • Pollution abatement

* Companies can have more than one project carried out simultaneously, many of which are inter-related.

Drivers for change are not listed in order of priority.

One company implemented a modernisation programme, which required the utilisation of wasted thermal energy. The recovered energy was then used for the preheating section of an air conditioner, in order to maintain a microclimate of +22 +/- 2 °C and humidity 60 +/- 2%. The cost savings of thermal energy per month were 517.26 Gcal, which is equal to 5% of thermal energy purchased from municipal thermal stations.

Environmental considerations for a project of this kind were significant.

- Reduced thermal energy emissions
- Reduced thermal energy consumption
- Reduced oil burning in municipal thermal station by 374.395 t/year
- Reduced air emissions:
 - Ashes 0.376 t/year
 - SO² 14.68 t/year
 - CO 1.2 t/year
 - NO_x 1.2 t/year.

Another company identified the need to convert to a new, more efficient steam boiler to replace the previous Russian-made model installed in 1984. The previous boiler consumed excessive energy, provided excess capacity beyond the needs of the company, required a team of 10 staff to maintain the system and emitted air pollution.

Environmental considerations were made, which include:

- Energy consumption savings \$9,645/year
- Fuel oil savings \$6,000/year
- Environmental tax savings \$211/year.

The third company had previously implemented a recycling project in 1997, supported by the Danish Institute, using CP techniques and technology. Efficiency measures were achieved, such as reducing wastewater by 10 fold.

Consequently, the reduction in wastewater presented new challenges, which had a knock-on effect on the company's operations. The existing wastewater plant was not economically feasible to maintain any longer and a new technological process, galvanic wastewater treatment, was adopted in 1998.

The environmental considerations had a significant impact on the company's decision to invest in a new wastewater treatment plant, which included:

- Improved energy efficiency
- Reduced chemical use by 8 t/year
- Reduced slime volume by 52 t/year

- Reduced solid waste volume by 10 t/year.

The new CP investment did have implications for the work force. Work conditions improved and occupational risk was reduced. Conversely, the new wastewater treatment plant required fewer staff to maintain the facilities. As a result, two staff members were transferred to another department, two retired on a full service pension and another two were released from the company.

All three companies considered alternative technical designs. Due to their size, the projects went out to tender. As part of each proposal, technical, economic and environmental evaluations and designs were submitted.

III. Type of financing

All three companies secured loans for their respective projects from the Nordic Environment Finance Corporation (NEFCO), which acted as the lead financial institution. Five countries set up NEFCO: Denmark, Finland, Iceland, Norway and Sweden. Its purpose is to provide risk capital to support long-term co-operation between business enterprises in Nordic countries and Central and Eastern Europe in the field of environmental technology.

The loans were dealt with primarily in the Euro currency. In all three cases, this was the companies' first dealings with NEFCO.

All three companies received a loan from NEFCO at a rate of 3% with a payback period ranging from 2.27 - 3 years. Project finance for two of the three projects included a minor contribution from the companies' own funds as part of the overall investment package.

The size of the investments were considered relatively small, as indicated below.

Size of projects according to industry (US Dollars)			
Industry	500,000 & more	100,000 to 500,000	100,000 & less
Electromechanical		✓	
Electronics (air conditioner)		✓	
Textile (steam boiler)			✓

In each case, the financing proposal was prepared by the Institute of Environmental Engineering (Apini). The Institute, which is a provider of training and technical assistance to businesses about the CP concept and solutions, ran a course entitled Financing Engineering, in which each of the three companies was a participant. The course was part of the Lithuanian – Norwegian Cleaner Production programme (1996 – 1998).

With the help of the Institute, the following information was included in the proposals:

- Cost/benefit analysis
- Pay-back period
- Net present value analysis
- Tax considerations
- Depreciation period
- Decrease of processes prices (cost-price)
- Long and short terms of return.

The application process for two companies took approximately four weeks for the preparation of the application and other technical juridical documentation. The third company gathered and compiled information over a period of 4-5 days. The information was later submitted to the Institute of Environmental Engineering, which prepared and submitted the final application to NEFCO.

All three companies received the loan within seven to ten months.

All three companies generate positive cash flow and, according to the companies, they are perceived to be 'successful businesses'. They attribute this to both their economic and environmental performance.

When companies were asked for the reasons they believe their projects were funded by NEFCO, the reasons varied. They included:

- Implementation of CP solutions has had significant environmental and social benefits
- Stable production activity and internal financial growth
- Participation in the Lithuanian – Norwegian Cleaner Production programme
- Specific projects fall within NEFCO's economic, environmental and technical requirements
- CP solutions contribute to the alleviation of Lithuania's waste problem.

In terms of future plans, all three companies intent to proceed with additional CP solutions with the hope of achieving continued good environmental performance, further expansion of business activities and improve market competitiveness.

IV. Conclusions

The above examples illustrate that a change in production technology and techniques can help to minimise consumption of resources and reduce the impact on the environment. However, these changes did not come automatically. One prerequisite for change is increasing knowledge amongst the business community about the practical environmental and economic effects of CP solutions. This will require cooperation amongst company managers, academic institutions, national and local government

authorities and financial institutions in order to serve as an effective means of promoting the application of CP.

The Lithuanian – Norwegian Cleaner Production programme is a positive example of ways in which active interaction between principal organisations and companies can work towards achieving a preventative environmental strategy. Similar programmes exist (or can certainly be duplicated) in other regions of the world, with a focus on either a specific geographical reach or industry activity.

Central and local government has begun to play a role in working with the business community and, in particular, SMEs. Through the Law on the Development of SMEs, which came into force in 1998, government policy is providing measures to support SME activity. Whilst the Law does not focus solely on environment, it does embrace the need to provide SMEs with technological support and co-operation. Clearly the government has a significant role to play in providing SMEs with financial incentives for improving the way they do business.

Another prerequisite for change is the availability of financing options for developing, incorporating, using and marketing CP solutions. Incorporating CP into industrial processes requires significant investments, which can not always be met through companies' own financial resources.

Therefore, in addition to promoting companies' and investors' recognition of environmental issues, a goal should be to help make investing in the environmental area attractive. NEFCO was set up to do just that – to build up the local production capacity for goods and services needed for environmental investment.

Nevertheless, the challenge will be the continuous promotion of CP investment opportunities to mainstream financial institutions. The lack of knowledge amongst investors about the economic and environmental benefits of CP has proved to be a significant barrier. Conventional investors do not generally distinguish between environmental investments and investment in production equipment, and thus it is not possible to make more specific calculations of investments in the environment. Moreover, it is unlikely that investors will be able to distinguish between CP or end-of-pipe technology without a greater degree of education.

Current efforts in the area of promoting and implementing CP mostly concentrate on developing and adapting technology and techniques to the existing production plants. In the future, the focus will eventually involve 'technological leaps'. This will require a shift primarily to fundamental changes in the production plant, composition of raw materials and intermediary products, product design and so on.

As this transition takes place, the size and magnitude of the CP projects will begin to reflect the fundamental change that is taking place. Consequently, this will have significant implications to the financing requirements for industry.

Ideally, national governments will usher in the development of national action plans which incorporate 'technological leaps' in given industries, based on the maturity of the industry and economy, the state of

technical advancement and the national pollution situation. Lithuania is ideally placed to adopt an ambitious approach.

9. Mexico: Study of Past Investments

I. Background

In the past 20 years, Mexico has transformed into a largely market-oriented economy, with most areas now open to private investment. Mexico's privatisation programme, initiated in 1983, continues to shape the business environment. Its progress has assisted in closing Mexico's technological gap while helping to reduce its large budget deficit.

Strong economic growth in the United States has had a positive knock-on effect for Mexico. Strong trade relations which now exist between the two countries has been a catalyst for transforming Mexico from an oil-based economy to a manufacturing economy. Increased trade has been a key factor in improving the economy while offsetting the impacts of low oil prices.

Mexico's economy suffered in 1994 due to a banking crisis, which resulted in the devaluation of the Mexican peso and has since been unable to recover. Over the next few years, Mexico is expected to take significant steps to strengthen the financial sector.

Long term credit for infrastructure and other projects is not readily available to the business community. Mexico's development banks are increasingly playing a significant role in the economy. For example, Nacional Financiera (NAFIN), the country's leading development bank, is expected to have achieved its 1999 lending target of Ps16 billion, although it is a 38% decrease from 1998 targets.

Until recently, the business community has done little to consider the environmental consequences of growth and development. A long-awaited overhaul of Mexico's environmental policy recently established a framework of tools for enforcing and extending compliance mechanisms. As part of the new mechanisms, economic incentives are used to promote the use of environmental technologies. For instance, since 1996, Mexico allows for duty-free import of certain contamination-control equipment.

II. Overview of projects

The Mexico Centre of Cleaner Production (MCCP) analysed 22 enterprises for this study. The companies cover a wide spread of 11 industries, including 9 different industries listed under the sector described as 'Other'. Listed below is an overview of their responses.

Respondents according to sector	
Sector	Respondents
Chemical	7
Transformation	3
Other	12
Total	22

Project Venture

The projects are categorised according to three types of ventures. These are:

- New construction sites (greenfield or brownfield)
- Plant expansions
- Retrofits.

Of the 22 projects evaluated, 11 projects were identified as new construction projects, six were plant expansions and five were retrofit projects.

Fifty percent of the companies are considered medium-sized, 32% are large and 18% are small and micro-enterprises.

Environmental Characteristics

Environmental characteristics of the projects fall into three groups. They include:

- Cleaner production
- End-of-pipe
- Other general industrial projects.

Listed below is a general break down of the environmental characteristics according sectors.

Environmental characteristics according to sector			
	CP	End-of-pipe	General industries
Chemical	7	-	-
Transformation	1	1	1
Other	4	4	4
No. of projects	12	5	5

Project description (including economic, environmental and social considerations)

Chemical

Overview	
Number of enterprises	7
Project description*	<ul style="list-style-type: none"> • Waste recovery and reuse techniques • Water and energy reduction measures • 'Injection and air blown' equipment
Known drivers for change#	<ul style="list-style-type: none"> • Product quality improvements • Production efficiency (i.e. cost savings) • Pollution abatement

* Companies can have more than one project carried out simultaneously, many of which are inter-related.

Drivers for change are not listed in order of priority.

The chemical industry is represented by 7 enterprises.

Four companies identified solvent and gas emissions recovery and reuse as an opportunity of improving production efficiency and reducing pollutants. Some companies invested in special equipment while others implemented specific techniques to aid in the manufacturing process. Even simple measures, such as simple quantification of emissions, had significant impacts on identifying opportunities for recovery and re-use. In case of one company, recovery and re-use of solvents decreased from 4,000 tonnes/year down to 500 tonnes/year.

One company recovered residual combustion gas and reused it as an alternative fuel. The high caloric fuel was then used to operate a new boiler.

Social considerations mainly focussed on the improvement of working conditions for employees. This included the provision of protective gear, personnel training and the creation of teamwork – all of which has led to an improvement of performance measures and reduction in risk.

Manufacturing

Overview	
Number of enterprises	3
Project description*	<ul style="list-style-type: none"> • Production line design • Reuse/Recycling waste by-products
Known drivers for change#	<ul style="list-style-type: none"> • Product quality improvements • Production efficiency (i.e. cost savings) • Pollution abatement

* Companies can have more than one project carried out simultaneously, many of which are inter-related.

Drivers for change are not listed in order of priority.

Recovery and reuse of waste is again a prominent activity that is identified in this sector. Two companies have produced valued products that have been extracted from industrial waste streams.

One company redesigned an existing production line in order to recycle used batteries. The new production line incorporated new machinery and high-technology systems and processes, which optimised lead recovery and generate non-toxic slag.

Another company intends to produce pre-manufactured refractory pieces, aluminium products and basic refractory specialities.

A third company purchased and installed a calendar for the production of plastic film.

Social considerations included the assessment and reduction of risk to employees and improved working conditions.

Other Sectors

Overview	
Number of enterprises	12
Project description*	<ul style="list-style-type: none"> • Dust control measures • Wastewater treatment plant • Production line design • Energy efficiency measures • Waste recovery and reuse techniques • Resource efficiency measures
Known drivers for change#	<ul style="list-style-type: none"> • Securing competitive advantage • Product quality improvements • Production efficiency (i.e. cost savings) • Pollution abatement

* Companies can have more than one project carried out simultaneously, many of which are inter-related.

Drivers for change are not listed in order of priority.

The sector listed as ‘Other’ provides a broad spectrum of business activities in Mexico. This group is made up of 12 companies, whose activities include:

- Galvanoplast (2)
- Melting (2)
- Furniture (1)
- Agro-Industry (1)
- Mining (1)
- Cement (2)
- Graphic Arts (1)
- Medical (1)

- Metal-Mechanic (1).

Most projects concentrated on aspects of energy efficiency measures as a means of increasing cost savings.

Five companies adopted end-of-pipe solutions included water recycling measures, installation of a water treatment plant and the installation of a mobile dust collector.

Amongst the 12 companies, five projects were identified as general construction with no environmental considerations taken into account. These types of projects included technological hardware and software solutions, lightweight structures to enhance wind resistance to industrial agricultural crops and a new production line within a distribution terminal.

Only one company, a cement manufacturer, was prompted to invest in a project based solely on social considerations. The company installed a mobile dust collector to help improve working conditions for personnel.

For other companies, social considerations were one of many factors for investing in CP technology and techniques. Reduction of risk to employees was an important concern to companies, as well as improved working conditions in general and the provision of training for personnel.

III. Type of financing

In-depth financial analysis of Mexican projects is difficult, as companies were reluctant to provide detailed information. Nevertheless, some general observations have been made and are listed below.

Size of projects according to industry (US Dollars)			
Industry	500,000 & more	100,000 to 500,000	100,000 & less
Chemical	2	1	4
Transformation	2	1	-
Other	5	2	5
TOTAL	9	4	9

In general, companies embarking on CP projects in Mexico have found that training, technical assistance and financial support are not readily available. In particular, two new enterprises, an agro-industry and a medical company, were unable to secure any financing because of the following commercial bank requirements:

- Ability to secure guarantees for credit extensions
- Age of the business (usually three years minimum)
- Uncertainty in accurately projecting future profits.

Consequently, financial constraints prevented these two companies from investing in CP options.

In contrast, larger multinational companies, that have a proven track record and extensive knowledge base, have been able to implement CP measures due to research and development of technologies and techniques. In most cases, large companies have had the access to internal financial resources from within the corporate group.

Two companies sought external funding through a development bank at a rate of between 28-36% based on a 3-5 year term. Another company received a grant from a multilateral agency for the equivalent of 40% of the project value. The remaining 60% was funded from internal resources.

With regard to the profitability, 12 projects are considered highly profitable. Four companies, three of which were internally financed, are not considered profitable. The remaining five companies were unable to secure funding for CP projects and opted for general industrial options.

IV. Conclusions

It is not surprising that the chemical industry is more advanced, in terms of implementing CP. In part, the very public environmental sensitivity of the sector and high levels of regulation can explain this. Yet, the challenge for Mexico will be to introduce CP into every industry, including those not initially seen as heavy polluters or consumers of natural resources. It is unlikely that industry will be able to achieve this in isolation. Essential to the successful take-up of CP will be the interface that will need to exist between industry bodies, government, academia and public and private financial sectors.

A common philosophy amongst these groups will be necessary to integrate CP fully into business practice. This will include a common framework on education, training, government policy, institutional building and capacity building. In Mexico, there are opportunities for amassing a knowledge base about CP through appropriate general and financial training and technical assistance. The demand exists amongst companies - four out of the 22 projects assessed specifically noted that they had training needs.

With regard to financing training, strategic partnerships can also be forged. A number of higher educational institutions in Mexico, such as IPN, UNAM and other reputable research centres, are equipped to provide high quality training and technical assistance. For instance, the Integral Quality and Modernisation Programme, Mexico's Labour and Social Provision Ministry-backed initiative, as well as the Business Modernisation Program of Nacional Financiera's (NAFIN) Private Sector are ideally placed to provide financial training.

Thus far, government policy has focused mainly on the tools for enforcing and extending compliance. The challenge for the government will be to create a framework that provides incentives for companies to move beyond compliance and to take-up CP as an efficiency measure.

Policy recently introduced in Mexico has highlighted the importance of environmental technologies with tax breaks on the importation and use of contamination-control equipment. Equally, the establishment of a similar programme focusing predominately on CP technologies could highlight the advantages over end-of-pipe.

While CP is a recognised and proven strategy for optimising industrial environmental performance, securing investment finance continues to be a problem. Among the 22 companies assessed in Mexico, five companies (or 23%) were prevented from pursuing CP options because the necessary funds were unavailable. This is especially true for small and medium sized companies. The very recent threatened boycott of an international private sector financial institution has rekindled this debate. In that situation the enterprise had received all the relevant planning permissions for the project but had not taken the threat to the salt marshes adequately into account. Whilst the financial institution was willing to finance the project, this offer was withdrawn and the project cancelled following lobbying of the finance provider.

Mexico experienced a relatively recent banking crisis, which has resulted in the banking sector playing a less significant role in industrial investment and growth. Currently there is little long-term credit available to businesses. Development banks, like the North American Development Bank, are increasingly filling this gap by providing project finance. Such development banks have environmental protection as part of their mandate and will be key to mobilising finance in the region.

Special investment schemes have been set up to promote both the business case and financial solutions for CP investments. These schemes are available through institutions such as NAFIN, the Science and Technology National Council and the Mexican Foundation for Innovations and Technology Transfer for Small and Medium Businesses.

The ability to purchase appropriate machinery and equipment to support the CP concept has also proven to be difficult for businesses. Financing equipment and machinery has recently been made available via equipment-leasing companies. Most important among these are Arrendadora Bancomer and Arrendadore Internacional.

10. Nicaragua: Study of Past Investments

I. Background

The Nicaraguan industrial sector is considered the least competitive in Central America. Employment in this sector decreased from 170,000 in 1992 to 157,000 in 1995 reflecting a large number of small business failures. The participation of the sector in GDP went down by 10 percentage points over the past two decades (from 25% in 1978 to 15% in 1994). Trade liberalisation and structural adjustment policies, which were initiated only in 1990, have had the least positive effect in Nicaragua as compared to other countries in the region, due to the extremely bad shape in which the economic crisis of the 1980's had left the sector (high prices for imported inputs, depressed local demand for manufactured products). There are three Industrial Chambers in Nicaragua, which count ca. 500 SMEs and large enterprises. The most important sub-sectors are food products, textiles, chemical products, metal products and wood products.

Industry in Nicaragua is not strong enough to be competitive in the international market. Micro, Small and Medium Enterprises (SMEs, i.e. with less than 100 workers), that represent 99% of the enterprises, are faced with competitiveness problems in both the domestic and the external markets due to high production costs, low production volumes, relatively low quality of products and lack of entrepreneurial management. Enterprises generally sell their products in the domestic market and compete strongly with imported products. They have their own sale forces and distribution channels to the retailers. Since 1990, some enterprises began to develop commercial relationships with foreign counterparts to export. Enterprises that possess an international license have a better and more stable access to international markets.

Micro and SMEs are dispersed all over the national territory with a major concentration in the Pacific area. They tend to operate individually and are normally not organized in industrial chains, network, associations or clusters.

As regards the environment, deforestation and increasing contamination of the Managua Lake are amongst the major issues. Industrial pollution, caused mainly by micro- and SMEs is a major cause of the latter problem, while making the possible treatment of municipal waste-waters more difficult.

Concerning environmental legislation, Nicaragua has some of the strictest regulations in Central America. However, their enforcement is still rather limited.

The Ministry for Natural Resources and Environment (MARENA) has been promoting cleaner production, through dedicated activities and institutions (e.g. "Instituto de la Pequeña y Micro Empresa").

II. Overview of projects

Eight Nicaraguan enterprises agreed to participate in this study. They have been in business for 30 years, on the average (one has been operational for 9 years only). Legally, they all are registered (6 Anonymous Societies, 1 Limited Company and 1 as "Natural Person"). It was found that all these enterprises have been operating with the same originally installed production processes which were not designed to take environmental issues into account. These processes underwent some improvements (e.g. expansion or incorporation of new production lines) since 1990. In all cases waste management has been carried out through the use of the Municipal Trash Collection Service, of the National System of Pluvial Water Drainage and/or System of Sewage, and in some cases with end-of-pipe treatment

Only four out of eight respondents have obtained financing for their projects, with interest rates between 13% and 18% and loan terms between six months and four years. One of the enterprises obtained credit from an international bank at an interest rate of the 6% and a four-year term. The form of loan repayment is generally monthly.

Respondent enterprises implemented their projects based on general studies, focussing mainly on investment calculations and justification of the financing, without conducting a deep technical analysis, nor an evaluation of the environmental and marketing issues. It was not possible to see the respondents' business plans, nor to access the information provided in the questionnaire. Hence, the information reported in this study reflects what the interviewees wished to offer. In Nicaragua there is still mistrust, and sometimes indifference, to offer business related information.

An overview of the respondents is given below.

Respondents according to sector	
Sector	Respondents
Food processing	2
Wood & Furniture	3
Leather & Shoes	3
Total	8

Project venture

The projects are categorised according to three types of ventures. These are:

- New construction sites (greenfield or brownfield)
- Plant expansions
- Retrofits.

Four projects involved plant expansions while three were retrofits. Only one project involved a new construction site.

Environmental characteristics

Environmental characteristics of the projects fall into three groups. They include:

- Cleaner production
- End-of-pipe
- Other general industrial projects.

Environmental characteristics according to sector			
	CP	End-of-pipe	General industries
Food processing	1	-	1
Wood & Furniture	1	-	2
Leather & Shoes	2	-	1
No. of projects	4	-	4

Project description (including economic, environmental and social considerations)

Food processing

Overview	
Number of enterprises	2
Project description*	<ul style="list-style-type: none">• Transportation equipment• Production line design
Known drivers for change	<ul style="list-style-type: none">• Production efficiency (i.e. cost savings)• Meet local environmental regulatory standards• Minimisation of environmental and occupational risks

* Companies can have more than one project carried out simultaneously, many of which are inter-related.

The food processing industry is represented by 2 enterprises, which produce tomato sauce and cookies.

One company re-designed and constructed a new production line. It also invested in new transportation equipment for distribution. The measure was considered to be a general industrial project. The company did not consider CP measures.

The second company installed measures relating to industrial hygiene, occupational and product safety and environmental protection. The measures adopted by the company were considered to have CP characteristics.

Both companies had prior experience in the type of technologies and techniques they implemented.

In terms of environmental considerations, energy efficiency and regulation were the main drivers for change. Social aspects related to occupational safety and health were also considered.

Wood & Furniture

Overview	
Number of enterprises	3
Project description*	<ul style="list-style-type: none"> • Wood-drying oven • Production line design
Known drivers for change	<ul style="list-style-type: none"> • Production efficiency (i.e. cost savings) • Energy efficiency • Meet local environmental regulatory standards • Dust, waste and noise reduction

* Companies can have more than one project carried out simultaneously, many of which are inter-related.

Three companies represent the wood & furniture sector. They produce raw material and wood products for household, residential and building construction use.

Two companies constructed a wood-drying oven as part of the production process. One company installed an oven, which uses solar energy and redundant heat from a boiler, while the other company opted for an electricity-powered model. The former considered alternative designs, such as a traditional electrically powered oven.

Both companies invested in the ovens to achieve energy efficiency and waste reduction. It is not known to what extent the solar oven compared to the electricity model is more efficient in terms of energy savings.

The third company installed a new production line to achieve production efficiency and cost savings.

For all three companies, occupational safety and hygiene were the most prominent considerations.

Leather & Shoes

Overview	
Number of enterprises	3
Project description*	<ul style="list-style-type: none"> • Water treatment plant • Production line design
Known drivers for change	<ul style="list-style-type: none"> • Production efficiency (i.e. cost savings) • Energy efficiency • Waste reduction

* Companies can have more than one project carried out simultaneously, many of which are inter-related.

The leather and shoe sector is represented by three companies, which produce footwear and general leather products.

All three companies introduced new production lines which involved relocation. One of the companies is also considering installing a water treatment plant in order to minimise solid waste and reduce toxic odours.

Only two of the companies took into account social considerations relating to occupational health and safety, in accordance with Nicaragua’s Ministry of Labour.

III. Type of financing

Out of the eight projects assessed, only three companies disclosed financial information. With the exception of the size of the investment, little more is known about the other five projects. The table below indicates the size of investment according to the sector.

Size of projects according to industry (US Dollars)			
Industry	500,000 & more	100,000 to 500,000	100,000 & less
Food Processing	-	1	1
Wood & Furniture	-	-	3
Leather & Shoes	-	1	2
TOTAL	-	2	6

As indicated above, the scale of the projects is considered small which reduces the number of financing options available to the companies. There are few private financial institutions in Nicaragua specially devoted to micro or small-scale investments. Project finance and leasing, although in theory accessible to CP investments, serves mostly large-scale, short-term projects. Therefore, most projects incorporating CP measures are likely to require a long-term oriented investor (sometimes up to 10 years). The capital appraisal process needs to incorporate the potentially higher up-front costs and lower running costs.

The table below outlines the financial information provided by the three companies noted above.

Sector	Size	Type	Rate
Leather & Shoes	\$36,000	loan	15%
Food Processing	\$200,000	loan	6%
Food Processing	\$60,000	loan	18%

Two local banks provided loans at a rate of 15% and 18%, while an international bank provided a loan of 6%. The terms of the loans are not known.

IV. Conclusions

General business context

The industrial policy of the government over the last 10 years, has been focused on the creation of favourable conditions to foster the development of the private sector, particularly through the reduction of the inflation rate, as well as tariff and taxes; deregulation and support to industrial reconversion (modernization); promotion of exports, as well as incentives to foreign investment; the creation of Free Trade Zones (FTZ); development of programmes to support to Micro, and Small Enterprises, promotion and introduction of incentives to investments in the tourism sector.

Within this context, export-oriented industrial enterprises and companies with an international license, are those that improved their productive processes with the specific aim to achieve ISO Certification, and compliance with the Hazard Analysis Critical Control Point System (HACCP), which helps in gaining easier access to international markets.

The study highlighted that very few industrial enterprises include the environmental variable in their investment projects. Furthermore, when environmentally-related investments occur, they often are in end-of-pipe measures, and taken more to respond to legal regulations than to a real environmental conscience or social responsibility.

Along these lines, plant sanitation as well as the adoption of some hygiene and occupational safety measures are traditional legal obligations requested by the Ministry of Health and Ministry of Labour, respectively.

The study observed that financial institutions do not use environmental criteria in the due diligence process and entrepreneurs seeking funds are only asked to fill general loan application forms.

Access to and availability of finance

Industrial enterprises have generally limited access to financing. This is reported both for small and large-scale investments. In the latter case, the banks demand the applying enterprises mortgage guarantees for a value of 1.5 or more of the amount of credit requested. Additionally, banks tend to prefer lending to the trade sector, which guarantees short-term, higher interests and more secure clients, which is also in line with the nature of the banks' main sources of funds: fixed-term deposits of one to three years.

As a general observation, the cost of financing is relatively high in Nicaragua, mainly due to high interests on deposits, the existence of a legal deposit reserve, high credit risks and transaction costs. High cost of financing and not favourable lending requirements are therefore still major barriers to access finance.

Organizations and networks in Nicaragua that may be relevant to CP investments

Within the Nicaraguan National Financial System, the most viable source of funds for investments in CP appears to be financial intermediation through the "Financiera Nicaragüense de Inversiones, S. A. (FNI, S. A.)", a second tier development bank, which is regulated under specific political and credit bylaws.

Alternatively, credit funds could be handled as a Fideicommissum or other similar legal instruments, directly by one or more local banks.

Special finance schemes provided by government or agencies

Government or state agencies do not appear to have special financing mechanisms, nor such plans.

Potential sources of funding come from some international technical cooperation projects implemented by government agencies, that have special credit components, e.g. to support SME production in rural and urban areas.

11. Nicaragua: Survey of Financial Institutions

The Nicaraguan financial and banking system is relatively recent. It was not until 1991, that the development of the private commercial banking and the decrease of the state banking system began. Out of the four state-owned banks which existed in the early nineties, only the Banco Nicaragüense de Industria y de Comercio (BANIC) was privatised, with 49% of the shares belonging to the state.

The Nicaraguan national financial system is composed of eleven private banks, four financial institutions (including two leasing companies) and a second tier bank: the "Financiera Nicaragüense de Inversiones, S. A. (FNI, S. A.)", all supervised by the Banks Superintendence of Nicaragua. There are no state-owned banks.

The total assets of the national financial system equal to US\$ 1,903.8 million; the total passive equals to US\$ 1,732.9 thousands, while the total equity is US\$ 170.9 million representing 9% of the total assets. The total deposits of the financial system are equal to US\$ 1,441.9 million, i.e. 83% of the total assets.

Commercial banks

Private Commercial Banks capture public money through deposits, which represent 83% of the total assets of the national financial system. These banks are requested by the Central Bank of Nicaragua (BCN) to maintain a legal deposit reserve at the Bank (16.25% of the "Saving Accounts to Undefined Term" and "Saving Certificates to Fixed Term").

The structure of the deposits of the national financial system is the following:

Type of deposits	# Accounts	Amounts US\$ (000)	%
Current accounts	48,408	222,498.00	15.43%
Saving accounts	382,048	455,423.35	31.58%
Fixed Term Deposits	28,901	690,389.90	47.88%
Others	3,096	73,617.20	5.11%
TOTAL	462,453	1,441,928.45	100.00%

To collect fixed-term deposits (47.88%), banks pay annual interest rates varying from 11.80% to 13.84% (national currency) and from 8.93% to 10.64% (foreign currency).

Long-term credits are granted at interest rates that range from 15.78 % to 22.36%, if in national currency, and from 14.10% to 21.10%, if foreign currency.

Interest rates are fixed by banks, normally by adding six to ten percentage points to the real cost of money, a criterion applied for financial money intermediation not originated from public deposits.

Private commercial banks operate mainly with public financial resources. Of these resources, 68.3% are in foreign currency, divided among "Current Accounts modalities", "Saving Accounts

to Undefined Term" and "Saving Certificates to Fixed Term", for a total of 462,463 accounts of the three types. The greater concentration of accounts is reported under the "Saving Certificates to Fixed Term", 47.9% of the total deposits.

Banks and Financial Institutions direct their funding mainly to trade activities, services and individual deposits, the industrial sector representing hardly 1% of the clients of the whole system and 12.3% of the total credit portfolio.

Financial institutions

Four financial institutions were surveyed, including two leasing companies.

The "Financiera Nicaragüense de Inversiones, S. A. (FNI, S. A.)", a second tier development bank, can channel short and long term resources also to environmentally related investments, through commercial banks.

FNI, S. A. has a total portfolio of US\$ 75.6 million (as of 31 March 2000) divided as follows: 56% destined to the agricultural sector, 34% to the industrial sector and 10% to trade and other sectors. Funds are normally reserved to Micro and Small Enterprises, the promotion of exports and various productive activities, with terms of 5 to 12 years.

Typically, a bank would subscribe a "General Contract of Financial Intermediation" with FNI, S. A., subject to previous evaluation of its financial situation, according to criteria and parameters established in the "Bylaw of Eligibility of Intermediate Financial Institutions". Upon positive evaluation, the bank is declared eligible by FNI.

The two leasing companies, Financiera Arrendadora Centroamericana (Finarca) and Arrendadora Financiera (LAFISE) lease industrial, communications and construction equipment under 3-5 year terms.

As the study revealed, typically loan granting is based on the financial analysis of the applicant project, verifying the existence of environmental "permits" (issued by the Ministry of Natural Resources and Environment, MARENA) of projects with important budgets. It was further noted that credit to small enterprises is dependent to a great extent on the personal profile of the entrepreneur.

The study also highlighted that commercial banks in Nicaragua do not normally consider environmental aspects in their due-diligence process and when they do, this occurs mainly with a view to complying with relevant laws and rules. A lack of bank personnel skilled in analysing environmental cost and benefits associated in a project was also reported.

12. Tanzania: Study of Past Investments

I. Background

In 1986, Tanzania embarked on the Economic Recovery Programme (ERP), which was supported by the World Bank and the IMF. The ERP focused on trade reforms on export-oriented industries, liberalisation of agricultural marketing and economic liberalisation through promoting the role of the private sector in the economy.

Through an ambitious privatisation programme 222 companies, out of 401 earmarked, had been privatised by the end of 1998. In late October 1999, the government announced further measures to strengthen the development of the private sector.

The liberalisation programme is also supported by a US\$25 million loan from the World Bank to strengthen the capital markets and to create a privatisation trust unit. The Trust will control the government's remaining stake in divested companies and will also enable the general public to participate in divestitures of parastatals.

The recent announcement of Tanzania being admitted into the World Bank/IMF's Heavily Indebted Poor Countries (HIPC) initiative is also expected to free up resources, which is expected to be channelled to priority sectors and infrastructure projects.

Most of the enterprises in this survey, with the exception of a few, were started prior to the ERP when the concepts of globalisation, liberalisation, cleaner production and even export oriented industrialisation were new or unheard of. It is in the context of this that pollution abatement/minimisation and energy efficiency of the past investments must be examined.

This study of past CP investments focusses mainly on the textile, tannery and food processing (in particular fish processing) sectors. The inclusion of 'other industries' is to broaden the coverage of business activity for this study, whilst acknowledging the decline of the leather and textile industries.

The Tanzanian tanning industry is not highly developed, as only a few leather projects currently exist. The industry is thought to employ about 900 workers. Out of the four existing tannery companies in Tanzania, only two are in operation. This is partly due to the disruption of recent privatisation. For this reason, only one tannery agreed to participate in this survey. The sector is therefore poorly represented.

The textile industry in Tanzania has been in decline in recent years, with production of fabrics generally decreasing since the late-1980s. The industry is made up of ten mills, with most either not in operation or running below full capacity. Many of the mills, which were under public control, are currently undergoing privatisation. Most of mills producing knitted fabrics have been closed due to competition from the importation of used clothes. Bearing this in mind, three out of six textile mills responded.

Tanzania has nine fish processing companies, all of which are located in Lake Victoria, the largest lake in Africa. Almost all the output of the fish processing industry is exported, which equalled 25,721 million tonnes of fish fillets in 1998. The industry has been identified as a high growth market, with every fish processing plant having expansion plans in the near future.

In August 1997, the European Union (EU) banned freshwater fish imports from the member states of East African Co-operation (EAC), which includes Uganda, Tanzania, Kenya and Mozambique. The ban is partly due to fishermen in East Africa using toxins to kill large quantities of fish supplied to processing points. At the time of gathering this data, the European Union (EU) was still imposing a ban on export of fillets.

The EU is insisting that the processors must comply with HACCP Principles. HACCP is a systematic approach to food safety consisting of seven principles (refer to Annex A). Consequently, the ban has prompted some companies to work with Cleaner Production Centre of Tanzania (CPCT) to assist in the integration of ISO 9002 and HACCP into one management system.

The ban has prompted fish producers to form a regulatory body, the Lake Victoria Fish Processors' Association (LVFA), which has been set up to ensure export quality standards. LVFA monitors processors, packagers and exporters, although limited resources have prevented it from achieving an industry discipline originally envisaged.

II. Overview of projects

Listed below is an overview of the selected projects which were targeted, according to sector and the number of respondents.

Response rate by sector		
Sector	Targeted project/enterprise	Respondents
Textiles	6	3
Tanneries	3	1
Food processing	12	7
Other	14	9
Total	35	20

Project venture

The projects are categorised according to three types of ventures. These are:

- New construction sites (greenfield or brownfield)
- Plant expansions
- Retrofits.

Out of a total of 20 projects evaluated, 14 projects were identified as new construction, five were plant expansion and one was a retrofit.

Environmental Characteristics

Environmental characteristics of the projects fall into three groups. They include:

- Cleaner production
- End-of-pipe
- Other general industrial projects.

Listed below is a general break down of the projects according these characteristics. Some companies also incorporated minor or secondary-related changes and techniques into the industrial project, which may not be captured in the table below.

Environmental characteristics according to sector			
	CP	End-of-pipe	General Industries
Textiles	-	3	-
Tanneries	-	1	-
Food processing	4	2	1
Other	5	4	-
No. of projects	9	10	1

The environmental characteristics of projects in the textile sector are all categorised as end-of-pipe. The same is true for the one tannery project evaluated. As for the food processing industry, four projects were identified as cleaner production, two as end-of-pipe and one as general industry. Among the other industrial sectors, a majority (5) of the projects are CP and four are considered end-of-pipe.

In terms of considering alternative technical designs to end-of-pipe, only two companies explored other options. However, it is unclear whether the considered alternative options included CP technology and/or techniques. Of the companies which chose the CP option, only three considered alternative technical designs, which was implicit in the fact that they had previously made similar investments and were extremely knowledgeable about the market and best available technology.

Project description (including economic, environmental and social considerations)

Textiles

Overview	
Number of enterprises	3

Target market	Local and export markets
Project description*	<ul style="list-style-type: none"> • Wastewater treatment plants • Energy efficiency techniques
Known drivers for change[#]	<ul style="list-style-type: none"> • Intervention by National Environment Management Commission • Production efficiency (i.e. cost savings) • Public scrutiny of environmental track record

* Companies can have more than one project carried out simultaneously, many of which are inter-related.

[#] Drivers for change are not listed in order of priority.

The textile industry is represented by responses from three mills (two of which were established in the 1960's). The mills are engaged in the production of dyed and printed fabrics and yarns for both the local and export markets.

Textile mills are known to generate effluent, which pollutes the environment. All three of the mills invested in the instalment of wastewater effluent treatment plants. In the case of two companies, untreated wastewater was being pumped into nearby oxidation ponds and the sewage system, resulting in serious environmental concerns to the nearby community. The third company, which was previously equipped with a treatment plant, decided to construct an even larger wastewater treatment facility.

Two out of three enterprises also identified the need for better energy efficiency although it was not clear if this resulted in implementing any solutions. It was also unclear if the need for energy efficiency was prompted by the considerations of cost savings, concern for the environment or a combination of both.

Intervention by Tanzania's National Environment Management Council prompted one company to approach the CPCT to carry out an environmental audit. The aim of the audit was to assist in the introduction of cleaner production techniques and technology at the plant.

Social concerns stemmed mainly from occupational health problems arising from the inhalation of dust in the weaving and spinning sections of the mills. It was unclear whether any of the mills provide medical check-ups and protective gears as a preventative measure.

Tanneries

Overview	
Number of enterprises	1
Target market	Export markets (Europe & Far East)
Project description*	<ul style="list-style-type: none"> • Effluent and industrial waste treatment system • Energy efficiency techniques
Known drivers for change[#]	<ul style="list-style-type: none"> • Production efficiency (i.e. cost savings) • Securing competitive advantage

* Companies can have more than one project carried out simultaneously, many of which are inter-related.

[#] Drivers for change are not listed in order of priority.

At the time of data collection, only one tannery was operational. The Tanzanian government and a private company own the enterprise. The tannery produces wet blue/finished leather for exporting to Europe and East Asia.

A wastewater treatment facility was semi-built when private ownership was recently acquired. The existing structure had design faults, which demanded substantial additional investment. The re-designed facility is now said to be operating effectively, although it could not be ascertained to what extent pollution is mitigated, as the facilities are not monitored.

Environmental issues are said to have been the primary concern of the new private owners. Second to this was the concern for efficiency and reduced cost of production due to the pressures of international competitors.

The tanning industry in Tanzania is known for discharging polluting substances, which result in environmental degradation. These pollutants include leather dust, H₂S and CO₂ emissions, chromium sludge heaps and contaminated process water containing a high level of organic lead and chrome, sulphide, ammonia and other salts.

The company's liquid waste comprises mainly of sulphides and solid wastes (i.e. fleshing and leather cuttings). The liquid waste is now treated in the new facility while the municipality discards fleshings by burying in the nearby dumping ground.

With the exception of equipping employees with uniforms and gear, there were no other social considerations identified by the tannery.

Food processing

Overview	
Number of enterprises	7
Target market	Local and export markets (US, Europe & Middle East)
Project description*	<ul style="list-style-type: none"> • Implementation of HACCP and/or ISO 9002 principles • Wastewater treatment plants • Energy efficiency techniques • CP Power generation • Reuse/Recycling waste by-products
Known drivers for change#	<ul style="list-style-type: none"> • Intervention by Tanzania's Lake Zone fisheries authorities and others • Production efficiency (i.e. cost savings) • Securing competitive advantage

* Companies can have more than one project carried out simultaneously, many of which are inter-related.

Drivers for change are not listed in order of priority.

Seven companies represent the food processing industry. Of the seven companies, three process fish products (mainly fillets), three produce edible oils and fats and one produces pasteurised and homogenised milk, cream, yoghurt and mozzarella cheese.

The three fish processing enterprises cater mostly to US, Europe and Middle East export markets. At the time of data collection, the European Union (EU) had imposed a ban on export of fillets from Tanzania, Kenya and Uganda due to pollution-related incidents within the fishing industry.

Lake Zone Fisheries authorities frequently visits one fish processor. The visits may have prompted the company to pursue a more rigorous management system, although this was not confirmed.

The investments have focused mainly on the integration of ISO 9002 and HACCP principles into one management system, which has been brought on by the EU ban. Companies have begun to identify the implementation of the HACCP/ISO principles as a way of remaining competitive by ensuring uninterrupted exports in the future.

In addition to implementing management systems, factories are installing wastewater treatment facilities to reduce the levels of bacteria content in effluent. A wastewater recycling system is under proposal in one company. As for the two other companies, water is collected in septic tanks or wastewater settling tanks. Only one of the two companies claims to treat and regularly test the level of bacteria content before dumping wastewater in Lake Victoria or elsewhere.

Other investments among fish processing plants include energy efficiency technology. One company installed 'power-factor correction' equipment for power efficiency.

Social concerns among the industry mostly relate to occupational health and safety standards. In two factories, employees were provided protective clothing. A health officer has also been appointed to monitor workers' health in one of the companies.

Three companies, which produce edible oils and fats, have focussed mainly on wastewater treatment facilities. One company has taken steps to procure best available technology throughout its operations. This has resulted in no wastes due to all inputs and outputs being accounted for during the process of producing oils.

Further examples of steps that the company has taken include:

- Cottonseed husks decorticated and 100% utilised as fuel in generation of steam.
- Soap-stock, a by-product of refining oil, is sold to external users for soap making.
- Effluents are monitored by measuring the input and output samples of the effluent treatment system and results are compared with limits as per government specifications.

Whilst economic benefit is usually an underlying incentive for companies considering CP technology and processes, the return on investment is not always immediate. CP techniques can be expensive, as two companies found out. They embarked on CP-related projects, yet were unable to fully implement all of the options available, such as adopting ISO 9000, due to financial constraints. The companies, therefore, carried out only certain aspects of the management system principles and techniques, which provided the most immediate economic return on investment.

Environmental considerations mostly included the effects of untreated liquid waste. With the exception of occupational health and safety standards, there were no social considerations identified.

A company, which produces pasteurised and homogenised milk, cream, yoghurt and mozzarella cheese, has designed its factory to run off cleaner electricity. However, no details about the design were provided.

As part of the company's daily operations, detergents used for cleaning dairy equipment. Environmental concerns for the impact of the detergents into the wastewater was identified as a concern. The company is considering CP options for the future.

Other sectors

Overview	
Number of enterprises	9
Project description*	<ul style="list-style-type: none"> • Implementation of HACCP and/or ISO 9002 principles • Wastewater treatment plants • Water efficiency techniques • Air pollution abatement technology/techniques • Energy efficiency techniques • Reuse/Recycling waste by-products
Known drivers for change#	<ul style="list-style-type: none"> • Production efficiency (i.e. cost savings) • Securing competitive advantage

* Companies can have more than one project carried out simultaneously, many of which are inter-related.

Drivers for change are not listed in order of priority.

The group of companies listed below have been included in this survey to provide a broad spectrum of business activities in Tanzania. This group is made up of nine companies, whose activities include:

- Brewery (1)
- Essential oils (1)
- Soap (4)
- Bicycle and bicycle parts (involving electroplating) (1)
- Glass manufacturing (1)

- Pharmaceuticals (1).

Most projects concentrated on wastewater treatment. A majority of companies opted for either recycling of waste or end-of-pipe technologies and discharge rather than CP techniques and technologies. This is particularly true for the soap industry. The CP options were not considered due to financial constraints.

Other investments focus on minimising energy consumption and gaseous emissions through the instalment of fuel-efficient furnaces or boilers.

Two companies specifically identified ISO 9000 as means to access export markets and, therefore, are working to achieve certification.

Social considerations have played a role in some companies' decisions to invest in CP or end-of-pipe techniques and technologies. The considerations ranged from implementing solutions for air pollution, which has affected nearby local communities, to the provision of safety equipment for employees.

III. Type of financing

An essential aspect of implementing CP project(s), as with any other type of project, is the provision of finance. However, misconceptions about the economic benefits of investing in environmental protection are not uncommon. The business community usually identifies environmental projects as a cost-incurring activity rather than a profitable business decision. CP can result in both environmental and economic benefits, while reducing health risks to workers and the local population.

Whilst companies in Tanzania are at the early stages of considering CP investments as an essential part of conducting business, they are reluctant to be transparent about their needs for environmental protection. Regardless of CP, end-of-pipe or general industry investments in technologies and processes, few companies were willing to provide information regarding the financial aspects of their projects. Companies pointed out that they operate in highly competitive markets and disclosing detailed financial information could put them at a disadvantage. However, some general financial information was gathered.

As you can see in the table below, a majority of companies have invested in projects that fall into the category of '\$500,000 and more'. All investments have been identified by the owner/operators as profitable but no further details have been provided.

Size of projects according to industry (US Dollars)				
Industry	500,000 & more	100,000	to	100,000 & less

		500,000	
Textiles	2	0	1
Tanneries	1	0	0
Food processing	6	1	0
Other sectors	9	0	0
TOTAL	18	1	1

Listed below is information, albeit incomplete, which assists in providing some background into the nature of the investments.

Textiles

The average level of investment amongst the three textile companies, which responded to the survey, was \$6 million.

All three companies declined to provide detailed financial information about their investments, with exception of the following:

- Two of the three projects were internally financed
- The third company was provided a Tanzanian shillings TSh60 million grant from the Chinese Government in 1966-68 for the \$12 million construction of the mill
- All companies confirmed that the projects were profitable.

Tanneries

Soon after privatisation, the new owners of the tannery plant decided to spend their own funds to relocate some machines to improve efficiency. The plant, which included a semi-built plant for effluent treatment, was redesigned and built. The project required US\$1.2 million in investment and is reported to now be operating effectively.

Food processing

Each of the three fish processing companies financed projects worth approximately US\$2 million each. Two of the three companies secured funding for their projects through shareholders.

The producers (3) of edible oils and fats invested an average of approximately US\$4.5 million in new construction projects. Only two of the three companies commented that the projects were financed from internal company resources. One of the companies also received additional funding from Barclays Bank but no further details were provided.

A manufacturer of dairy products financed the design of a new plant, which uses CP electricity, for US\$500,000, which was self-financed. No other financial information was provided.

Other sectors

With the exception of indicating the level of investment (i.e. 'over \$500,000') and the source of finance, four of the nine enterprises did not comment on the financial background of their projects with the exception of the following:

- One company received financial assistance through private and government loans
- Another company self-financed its project.

The remaining five companies made investments ranging from US\$2 million to US\$31 million. Two of the companies received a loan from the East African Development Bank, although they did not divulge information about the interest rate at which it was borrowed. Another company internally financed the project while another received a national government loan, which was provided through bilateral support. Another company financed its projects through a combination of foreign direct investment and existing shareholders.

IV. Conclusions

Whilst information about the 20 projects can be considered incomplete, listed below are some general conclusions.

Firstly, the CP concept is fairly new to Tanzania. This is attributed to the stage of Tanzania's development as it is with the lack of understanding and knowledge about CP and related financial benefits. The enterprises in this survey, with the exception of a few, were started prior to the Tanzania's Economic Recovery Programme (ERP) in 1986. The concepts of cleaner production were either new or unheard of at the time of their establishment. It is in the context of this that pollution abatement/minimisation and energy efficiency of the past development and investments in manufacturing were examined.

Of the 20 projects examined, only 10 were considered to be cleaner production. However, the CP concept is wide ranging. It can encapsulate anything linked to preventative environmental strategies to processes, products and services.

The nature of this concept, therefore, can be considered ambiguous. The projects described in this survey cover a wide spectrum of complexity and financial requirements. Not all projects described in this study are strictly CP, but rather a combination of end-of-pipe and CP. For instance, some projects may have elements of CP embedded in an overall end-of-pipe solution.

Without ambitious educational and marketing programmes, companies are unlikely to perceive CP as a financially viable alternative to end-of-pipe. Only two out of 10 companies, which chose end-of-pipe options, explored alternative technical designs. It is unclear whether the companies considered CP

technology and/or techniques as the alternative option. Greater education and marketing of the CP option, however, may have influenced a larger number of companies to invest differently.

Consequently, the drive for efficiency and cost savings appears to be an underlying reason why a majority of companies made investments in either new construction sites, expansion or retrofits which include CP solutions. Marketing the CP concept to companies as a way of gaining competitive advantage and maximising efficiency will undoubtedly be a strong position to take in the more highly competitive markets of Tanzania.

The European ban on fish fillet exports from east Africa certainly will have prompted the adoption of a combination of ISO 9000 and HACCP principles. However, a small but growing number of companies identify the systems as a prerequisite for accessing international export markets. As a result of the EU ban, Lake Victoria Fish Processors' Association (LVFA) was formed to ensure export quality standards. LVFA is in a strong position to promote the CP concept and specific, tangible technologies and techniques, which are likely to reinforce the need for companies to gain competitive advantage.

A majority of owners/operators of the companies were unwilling to share detailed information about project financing, extent of profitability and performance. This is mostly attributed to the following:

- Enterprises did not believe the relevance of gathering financial data, especially when they understood that the main objective of the survey was to gather information with respect to the environment.
- Companies are suffering from questionnaire fatigue, which may have attributed to the low response rate.
- Most past parastatal investments occurred in the 1970s – 80s. After privatisation, new owners/operators were unable to trace information on the financial background of projects.
- Government loans are loosely related to privatisation programmes, rather than environmentally-specific investment schemes. Therefore, it is difficult to trace the extent to which the government focusses on the need for businesses to make environmental investments.

Nevertheless, financial requirements for CP technologies and techniques are amongst of the greatest barriers for its take-up. The harsh reality for the business community in Tanzania is that there is a lack of financial support from the commercial banking sector and government supported investment schemes.

However, Tanzania's liberalisation programmes provide a unique opportunity for the government to build environmental considerations into existing measures that promote the role of the private sector alongside the need for good environmental performance. For instance, conditional on the purchase of parastatals, companies could be required to invest in CP techniques and technologies as a means of modernising the manufacturing sectors.

The recently created Privatisation Trust Unit, which controls the government's remaining stake in divested companies, could also stipulate that companies must consider CP options during the process of modernisation.

Also as part of the government's programme to strengthen the capital markets, environmental/CP investment schemes and facilities could be created for long-term loans as distinct from short-term finance.

Appendix A to Tanzania Study on Past Investments

HACCP is a systematic approach to food safety consisting of the following seven principles:

1. **Conduct a hazard analysis.** Prepare a list of steps in the process where hazards occur and list the preventive measures to control these hazards. Determine the significant hazards.
2. **Identify the critical control points (CCPs) in the Process.** CCPs steps at which control can be applied and are essential to prevent or eliminate a food safety hazard or to reduce it to an acceptable level.
3. **Establish critical limits for preventive measures associated with each identified CCP.** Critical limits are the boundaries of safety. When a critical limit is violated, it is likely that the product is unsafe.
4. **Establish monitoring requirements.** Monitor the critical limits at each CCP.
5. **Establish corrective actions to be taken when monitoring indicates that there is deviation from an established critical limit.** Bring the process back under control and determine the proper product disposition.
6. **Establish effective record keeping procedures that document the HACCP system.** Monitoring and corrective actions are recorded, the development of the HACCP plan is recorded, and verification activities are recorded to ensure the HACCP system is working.
7. **Establish procedures to verify that the HACCP system is working correctly.** These procedures are scheduled for each CCP as well as for the entire HACC plan.

HACCP divides the food service process into specific steps. Each step can contain critical points that may allow bacteria entry into the system. The steps include: purchasing, receiving, storing, preparing, cooking, serving and holding, cooling and reheating.

13. Tanzania: Survey of Financial Institutions

I. General background and marketplace

The aim of this survey is to collect country-specific information on financial institutions (FIs) that are currently or potentially involved in funding CP projects in Tanzania. This involved the Cleaner Production Centre of Tanzania (CPCT) interviewing FIs that provided financed projects in the manufacturing industries in the past five years. This report provides an overview on the type of investments that have been made and the types of funding mechanisms available.

In August 1991, the Tanzanian government passed legislation, which allowed private banks back into Tanzania. By June 1998, several private banks registered with the central Bank of Tanzania. Prior to the financial sector reforms, the institutions operated as state-owned monopolies.

With the Tanzanian banking sector undergoing significant reform, a consequence has been that almost all FIs have stopped providing long-term loans and equity finance in favour of short-term lending. This has led to a shortage of funds available to small- and medium-sized enterprises (SMEs).

Eighteen FIs were considered by the CPCT. Seven institutions were selected for the survey. They are:

- The East African Development Bank (EADB)
- Co-operative & Rural Development Bank (1996) Ltd (CRDB)
- Tanzania Investment Bank (TIB)
- Tanzania Development Finance Company Ltd (TDFL) which trades through Capital Finance Ltd.
- National Bank of Commerce (1997) Ltd (NBC-1997)
- National Micro-Finance Bank*
- Tanzania Postal Bank (TPB).

*The National Micro-Finance Bank, previously part of NBC, was visited. However, since its establishment, it has neither provided credit nor does it as yet have a credit policy. All previous loans are handled by the NBC (1997) Ltd.

As observed by CPCT, there is no clear bias by the Tanzanian FIs towards financing projects in particular sectors. The main criteria for lending is almost always based on cashflow. Projects, which have secured funding, are from various sectors ranging from manufacturing to food, wood, pharmaceuticals and textiles.

However, a few exceptions were noted. They include:

- CRDB has financed projects mostly in the agricultural sector
- TPB has financed small-scale projects mostly in the food sector

- TDFC and EADB tend to finance the larger scale projects, which could be attributed to their greater ability to mobilise funds.

The majority of investments range from TSh1,000,000 or greater.¹ There is no bias towards new, retrofits or expansion projects. With the exception of TPB, which has financed only new projects, all other Tanzanian FIs surveyed have financed both new and ongoing projects. Also, FIs did not attach any priority towards particular geographical locations within Tanzania.

Various types of funding are provided by Tanzanian FIs. These range from term loans to working capital. Listed below are the types of funding offered by FIs surveyed.

Types of funding	
Company	Types
TDFL	<ul style="list-style-type: none"> • Term Loans • Working Capital • Equity Finance
EADB	<ul style="list-style-type: none"> • Short-term loans 12-14 months • Long-term loans – term depending on cashflow • Lease of 12,24,36 months – 5 years depending on cashflow • Working capital
CRDB	<ul style="list-style-type: none"> • Short-term loans – less than 1 year • medium-term loans – 1 to 5 years
TIB	<ul style="list-style-type: none"> • Short-term loans
TPB	<ul style="list-style-type: none"> • Short-term loans – less than 1 year • Working capital
NBC (1997)	<ul style="list-style-type: none"> • Short-term loans – less than 1 year

II. Environmental considerations

In terms of considerations for the environment, interviews conducted by CPCT revealed that not one of the FIs has a clear policy on either the environment or CP, although they are aware of environmental issues. Top consideration is given to the technical feasibility and economic viability of a project with a view to the repayment of a loan. Environmental issues are taken into consideration only if they have a negative impact on future cashflow, which may necessitate further injection of funds and may delay or affect the repayment of a loan.

The FIs regard the environment generally as a Government matter. However, the government has not issued instructions or regulation to the financial sector regarding the environment, as they have stated that it should be left to the discretion of the FIs.

The EADB appears to have the most positive approach towards the environment. The Bank requires a feasibility study, which must include a section on the environment. If there are any discrepancies, the

¹ EIU forecast TSh750:US\$1 in 2000.

applicant must seek necessary clearance and licences from the relevant authorities before proceeding with the loan application.

The Bank has also initiated training for senior personnel on general environmental issues. Future plans include strengthening the training programme in order to position loan managers to evaluate environmental impacts when processing loan applications.

III. Conclusions

The Tanzanian FIs that participated in this study indicated that the CP concept is new to them. CPCT received maximum cooperation from the institutions during the interviews, showing willingness for further dialogue about the ways in which CP investments are relevant to their operations. Thus, this initial study may have acted as a catalyst for CPCT to work more closely with Tanzanian FIs.

A challenge for CPCT will be to articulate and disseminate a coherent case for the relevance of CP projects as investment opportunities. Education and professional training is needed to incorporate environmental and CP considerations into investment analysis and decision-making.

There is a need for collaboration amongst highly influential individuals and organisations to establish and gradually expand a network that will stimulate change. Regular dialogue will help to form a shared vision and build a consensus about the best way forward.

Government commitment to change is paramount. Although the FIs interviewed in this survey view environmental issues as a government concern, the CP concept is based on a business efficiency model. The concept focuses on the continuous use of industrial processes and products to increase efficiency, reduce wastes at source and minimise risks. It works on the premise that competitive advantage can be gained through the use of CP technology and techniques.

The Government can support the take-up of CP measures by working with the financial sector. Good policy and regulation can create incentives for FIs to shift funds towards CP investments and, thus, motivate industry to opt for CP measures. Government incentives might include:

- Voluntary agreements with FIs to provide special funding schemes through guarantee mechanisms
- Funding for research to aid in the development of new financial products
- Tax incentives to encourage investment in CP projects, including tax reductions and exemptions on the returns from investments.

One of the most common accusations the FIs are confronted with is their short-term perspective. This is particularly true for Tanzania due to recent banking reforms.

Long-term finance is essential for assisting companies to shift from end-of-pipe to CP solutions. Yet, with the exception of TDL, long term equity finance is not available and special funding schemes do not exist in Tanzania to support this change.

14. Vietnam: Study on Past Investments

I. Background

In 1986, Vietnam's Sixth Party Congress committed to the policy of *doi moi* (or renovation). Economic reform pressed ahead throughout the late 1980's and 1990's, although economic crises persisted.

The policies of *doi moi* brought a shift from a centralised planned economy based chiefly on public ownership to a market-oriented economy with state management and a socialist orientation.

The effects of the Asian financial crisis in 1997 were not felt immediately by Vietnam's domestic economy. By 1998-99, the regional economic slowdown did contribute to Vietnam's falling exports and decreasing foreign direct investment. This coincided with economic reforms, which intensified bureaucracy and increased costs for foreign-owned companies. Economic growth is expected to pick up from 2001, driven mainly by the strengthening domestic and external demand.

Vietnam's commitment to privatise approximately 5,700 of its state enterprises has not proceeded as quickly as foreign investors and the international donor community expected. It is anticipated that the slowdown will have an impact on the development of the stock market, whose launch has experienced a series of delays. In the absence of a formal stock market, long term credit available to business remains limited. In July 1988, the government reorganised the banking system to give the central bank more power while diversifying the system and providing services to a broader customer base.

Growth in industrial activity (as high as 100% in some sectors) has had significant environmental consequences. In the past eight years, 67 industrial zones (IZs) have been mapped out, with 48 now operational. Among the 48 operational IZs, only 12 have their own wastewater treatment plants. Other identified types of pollution resulting from IZs include air, solid waste, noise, radiation and toxic chemical pollution.

Vietnam's Central [government] Committee response to the growth in pollution has been to introduce a new Directive relating to the Law of Environmental Protection. The new Directive, which aims at improving current environmental policies and measures, issued recommendations on ways in which environmental protection can be strengthened in conjunction with the national industrial and modernisation programmes.

II. Overview of projects

The Vietnam Cleaner Production Centre (VNCPC) contacted 25 enterprises to request their participation in this study. Eighteen out of the 25 companies agreed to be interviewed by VNCPC. Listed below is an overview of their responses.

Respondents according to sector	
Sector	Respondents
Food processing	5
Pulp and paper	6
Textile	4
Cement	3
Total	18

Project venture

The projects are categorised according to three types of ventures. These are:

- New construction sites (greenfield or brownfield)
- Plant expansions
- Retrofits.

Out of a total of 18 projects evaluated, 14 projects were identified as expansion projects, two were retrofits and two were new construction projects.

Environmental characteristics

Environmental characteristics of the projects fall into three groups. They include:

- Cleaner production
- End-of-pipe
- Other general industrial projects.

Listed below is a general break down of the environmental characteristics according sectors.

Environmental characteristics according to sector			
	CP	End-of-Pipe	General Industries
Food processing	1	2	2
Pulp and paper	3	-	3

Textile	2	-	2
Cement	1	-	2
No. of projects	7	2	9

Project description (including economic, environmental and social considerations)

Food processing

Overview	
Number of enterprises	5
Target market	Local and export markets (Asia and Eastern Europe)
Project description*	<ul style="list-style-type: none"> • Wastewater treatment plant • Industrial waste reduction measures • Production line design
Known drivers for change#	<ul style="list-style-type: none"> • Securing competitive advantage • Production efficiency (i.e. cost savings) • Meet local environmental regulatory standards

* Companies can have more than one project carried out simultaneously, many of which are inter-related.

Drivers for change are not listed in order of priority.

The food processing industry is represented by 5 enterprises, which produce soft drinks, sugar, candy, beer, alcohol, aquatic products and stock.

Two of the projects involve the design and construction of new production lines, which aim to increase capacity and minimise waste. One of the companies also considered wastewater treatment measures while the other chose a design consistent with the HACCP principles. The latter identified the principles as a prerequisite to accessing new international markets.

Another company incorporated waste minimisation measures into its operations. The measures resulted in significantly reducing levels of wastewater, solid organic waste and air emissions and maximised production efficiency.

Two companies installed wastewater treatment plants. However, even with considerable investment, only one of the companies has been able to meet Vietnamese discharge standards.

In terms of social considerations, two companies noted that as a result of cost savings derived from investments, more jobs were created and revenues generated for the local community. Other social considerations included the existence of better working conditions for employees and a greater incentive to educate workers about environmental protection.

Pulp and paper

Overview	
Number of enterprises	6
Target market	Local markets
Project description*	<ul style="list-style-type: none">• Production line/factory design• Resource efficiency measures• Energy efficiency measures• Waste reduction measures
Known drivers for change#	<ul style="list-style-type: none">• Public scrutiny of environmental track record• Production efficiency (i.e. cost savings)

* Companies can have more than one project carried out simultaneously, many of which are inter-related.

Drivers for change are not listed in order of priority.

The six companies, which represent the pulp and paper sector, are producers of pulp and paper, printing paper, packaging and toilet paper. Three companies use waste paper as the raw material for producing pulp and paper.

Most of the six companies expect the demand for pulp and paper products in Vietnam to increase significantly in the next few years, although illegal imports do pose a threat to local production. Consequently, four of the six companies have embarked on designing and constructing new production lines, as the existing ones are considered dated and restrict production capacity. The design of the new production line have also build in waste reduction and resource efficiency measures.

The pulp and paper companies were also confronted with the effects of pollution on nearby local communities. Although these companies have taken some steps to reduce dangerous levels of pollution, three of them continue to discharge large quantities of effluent, which includes a large portion of untreated wastewater, into the local waterways.

Textiles

Overview	
Number of enterprises	4
Target market	Local and export markets (EC and Japan)
Project description*	<ul style="list-style-type: none"> • Production line design • Energy efficiency equipment • Waste reduction measures
Known drivers for change[#]	<ul style="list-style-type: none"> • Public scrutiny of environmental track record • Production efficiency (i.e. cost savings) • Securing competitive advantage

* Companies can have more than one project carried out simultaneously, many of which are inter-related.

[#] Drivers for change are not listed in order of priority.

The textile companies produce dyed fabrics and garments for both the local and export markets. Three enterprises invested in the expansion of new production lines, brought on by expectation of growth in the market.

One of the companies, which produces almost exclusively for export markets, noted that EC requirements of high quality fabrics matched with environmental protection prompted them to invest in the new product line.

A fourth company implemented a new boiler system and additional energy-efficiency technology, which helped to decrease energy consumption, dust and smoke emissions and wastewater effluents. Regardless of the new investments, it is thought that the nearby local community continue to be effected by the company's poor environmental track record. The company's name remains on the environmental blacklist of Ho Chi Minh City.

Cement

Overview	
Number of enterprises	3
Target market	Local and export markets
Project description*	<ul style="list-style-type: none"> • Production line design • Water recovery system • Dust control measures
Known drivers for change[#]	<ul style="list-style-type: none"> • Public scrutiny of environmental track record • Production efficiency (i.e. cost savings) • Securing competitive advantage

* Companies can have more than one project carried out simultaneously, many of which are inter-related.

[#] Drivers for change are not listed in order of priority.

Three cement companies represent the industry. Growth is expected in the sector over the next few years and, consequently, two of the three companies have designed and installed new production lines. The companies identified old and out-dated equipment as a limiting factor to keeping up with expected production capacity, rather than those relating to environmental concerns.

The third company is due to install a water recovery system.

All three companies sited dust as a major environmental concern at the factories and/or during the transportation of raw materials. This has been a particularly significant issue for one company that is located near a residential community. One company now transports all raw materials in closed pipes to minimise dust.

III. Type of financing

In almost all cases, discussions with companies about the financial aspects of their projects were considered a sensitive issue. The difficulty in gathering financial information is exacerbated by the fact that most interviewees were technical managers, therefore they did not know the financial details of the projects. Unfortunately, further questions posed to financial departments did not prove to be satisfactory. Nevertheless, some information was extrapolated and a general picture on financing CP, end-of-pipe and industrial investments begins to emerge.

The decision to invest in CP technologies and processes is likely to have been considered by technical managers with the approval from financial controllers, rather than senior management. When board members were interviewed about CP, only 4 of 18 board members had a broad understanding the concept.¹ Most interviewees associated CP technology and processes with excessive capital expenditure.

Of the 15 companies that provided financial details about their projects, the quality and detail of information was considered, at best, vague. Rather than give specific financial figures about the size of investment, five of the companies were only willing to provide the following:

- An investment range (e.g. \$1-3 million)
- Examples of similar past projects and investment levels, or
- General details of investments that companies are intending to make in the immediate future.

These figures were used in the analysis.

The average size investment among the 15 companies, which provided financial information, was \$26 million. Investments range from \$230 million to as little as \$7,000. With regard to the design and construction of new production lines, it is unclear to what extent the portion of the investments were

¹ Report on Data Collection in Vietnam prepared by INEST/VNCPC, January 2000.

spent on CP or end-of-pipe technologies and techniques. The table below indicates the size of investment according to sector.

Size of projects according to industry (US Dollars)			
Industry	500,000 & more	100,000 to 500,000	100,000 & less
Food processing		2	1
Pulp and paper	4	1	1
Textiles	3		1
Cement	1	1	
TOTAL	8	4	3

Although the information regarding the financial aspects of many projects is incomplete, observations can be made to reflect activity on a sector-specific basis.

Food processing

Among the 5 food processing companies, only one is privately owned. The company is a joint venture between the Vietnamese government and a foreign company. The financing for a wastewater treatment facility was provided by foreign direct investment. No other financial information was provided.

The remaining four companies are state owned. Two of the companies did not provide financial background about the project, with the exception that provincial bank loans and internal company resources were accessed.

The two other companies were more transparent. They financed their projects through a combination of internal resources, local government funds and banks, such as the Industrial Commercial Bank of Pho Tho Province and the VIETINCOMBANK. One company secured a loan from a provincial bank at a rate of 1.15%/month based on a 4-year term.

Only one company commented that the loan proposal was prepared in-house. It is unclear about the length of time it took to arrange finance or the extent of prior experience in preparing proposals and securing financial support for these types of projects.

Pulp and paper

All six pulp and paper companies are state-owned. In all cases where external financial support was needed, the Vietnam Paper Corporation, acting as the legal agency on behalf of the paper companies, secured the loans. The loans were financed from VIETINCOMBANK, regional banks and government

credit lines and funds. The rates at which these loans were secured ranged from 1.1%/month down to 0.85%/month for terms between 3-7 years.

Unwilling to confirm that exact source, one company said that they received foreign aid from either SIDA (Sweden) or JBIC (Japan).

In terms of the relatively small size of investment that was needed for two CP projects, the companies did not approach the commercial bank because of the high interest rates and unattractive terms on the loans. In these cases, the projects were financed from internal resources.

Most proposals for external financial support were prepared in-house.

Textiles

Three of the four companies are state-owned. A combination of government support, bank loans and internal company funds were used to finance projects. Internal resources were always used to finance specific CP/end-of-pipe aspects of the larger industrial projects. It's not clear whether companies originally sought financial support from banks for these specific measures, although it is considered unlikely. In one case, alternative financial support was sought from a local government scheme.

Loan terms ranged from 1-10years based on rates between 5-12%/year.

Cement

Among the three cement companies, only two provided financial background about the projects.

One company constructed a new production line at the cost of \$66.1 million. In 1980, the former Soviet Union funded the construction of the original plant. Internal resources and a bank loan funded the recent expansion. The loan was secured at a rate of 7%/year based on a 10-year term. In-house staff and an external consultancy prepared the loan proposal.

The second company is due to install a new water recovery system at the cost of \$207,000. A feasibility study was conducted and submitted to the Vietnam Cement Corporation for prior approval. The Corporation has not yet confirmed its decision.

IV. Conclusions

Like many emerging economies, the challenge for Vietnam in the forthcoming years will be to strike a balance between economic growth, social equity and concerns for the environment. Moreover, as Vietnam's efforts to attract foreign direct investment are expected to intensify, so will it heighten the need for the country to create links between development and environmental protection.

Vietnam's privatisation programmes pose a unique opportunity for economic efficiency and environmental protection to be achieved simultaneously. These opportunities include industrial modernisation, improving productivity operations, replacing obsolete technology and updating work methods.

Capital investment will flow to these enterprises at the time of privatisation and CP investments could be promoted as part of the privatisation programme. This would require an awareness raising exercise to be undertaken, led by the appropriate ministries to inform those who are managing privatisation. Given that the privatisation programme has not moved ahead at the pace originally envisaged such an exercise may stimulate change and help to transfer enterprises into the private sector.

Industrial activity on Vietnam has grown by 14% per year, with some sectors as much as 100% in recent years. Since 1992, 63 industrial zones (IZs) have been mapped out, with 20 now operational. Such a high level of industrial growth has resulted in environmental degradation. Among the 20 operational IZs, only eight have their own wastewater treatment plants. Other identified types of pollution resulting from IZs include air, solid waste, noise, radiation and toxic chemical pollution.

The growth of IZs offers an opportunity for the government to introduce environmental planning regulation alongside the promotion of CP solutions. Elements of a new Directive relating to the Law of Environmental Protection are relevant to CP investment opportunities and implementation (See Appendix). The new Directive, which aims at improving current environmental policies and measures, issued recommendations on ways in which environmental protection can be strengthened in conjunction with the national industrial and modernisation programmes.

With regard to securing finance for CP solutions, few companies in this study approached external financial institutions for specific CP/end-of-pipe investments. Bank loans are considered unattractive due to high interest rates and unattractive terms on loans. Most companies require low interest, long term loans for environmental projects. Furthermore, the procedure for borrowing money from commercial banks in Vietnam is considered by many companies to be complicated and costly.

As the nascent private commercial financial sector develops there is a role for the CP sector in training the lending function to develop appropriate risk management policies and procedures. This could be done in partnership with the development agencies, both national and international, to achieve a higher impact and more efficient use of scarce resources.

Annex to Vietnam Study on Past Investments

The new Directives relating to the Law of Environmental Protection make recommendations, which include:

- The national educational system must build formal environmental criteria into the curricula in order to improve the accessibility of environmental information.
- Funding for environmental protection must be institutionalise. This can include the adoption of cleaner production technologies through the creation of tax incentives and credit policies.
- Environmental impact assessment (EIA) procedures must be implemented when reviewing and licensing any investment plan and projects. Plans and projects, which fail the terms of an EIA, could result in suspension or relocation.
- Priority should be given to the adoption of technologies, which are considered cleaner or require low or no waste raw material and are energy efficient.
- Extraction and utilisation of natural resources must be rationalised, and biodiversity and nature conservation must be improved.
- The government should determine rates of environmental investment by state owned businesses.
- The government management of environmental protection at both central and local levels must be strengthened in terms of institutional arrangements, human resources as well as physical and technical infrastructures.
- A system of scientific research and environmental technology institutions must be established with a training system of specialised environmental disciplines developed to support environmental experts and managers on environmental protection.
- International co-operation in the field of environmental protection should be extended to regional and international organisations.

15. Zimbabwe: Survey of Financial Institutions

I. General background and marketplace

The Cleaner Production Centre of Zimbabwe (CPCZ) embarked on a series of interviews with financial institutions (FIs) that operate in the country. The aim of interviews was to provide an overview of past and present investment practice and identify the types of funding available in Zimbabwe for CP projects.

Zimbabwe's financial sector is relatively sophisticated, consisting of a Reserve Bank, discount houses, commercial banks, merchant banks, finance houses, building societies, the Post Office Savings Bank, numerous insurance companies and pension funds and a stock exchange.

As a result of the liberalization of the financial sector in 1991, the establishment of local banks has grown considerably. The Reserve Bank of Zimbabwe (RBZ) expect that this is likely to improve efficiency and lead to an expansion of a range of financial sector products available on the market. Barriers to entry are currently low which means that market differentiation is not made particularly on price but on customer segmentation. This has led to a tailoring of services towards the relatively wealthy personal sector; high net worth individuals and the top end of the corporate markets. Whilst all of the commercial banks will compete for the business of the transnational corporations there is relatively little servicing of the lower end of the corporate market. For example there is no venture capital house within the country that will consider funding start up situations.

However, Zimbabwe's financial system came under great stress in 1998 with the collapse of the United Merchant Bank. One response by RBZ was to increase the capital adequacy requirement for banks, compared to the internationally accepted minimum ratio of 8%. This has also brought about a greater awareness of the importance of credit policies and the need for regular assessment of assets.

The investment climate at present is very difficult with minimal investments made in view of inflation (60%), interest rates (MLR is 55%) and the structure for capital allowances (4 years). The EIU rates Zimbabwe's banking sector as high risk, which they attribute to Government intervention during the past two years.

Amongst the 51 FIs that operate in Zimbabwe, 11 were selected for interviewing. They are:

- International Finance Corporation – Harare (IFC)
- Barclays Bank Zimbabwe
- African Project Development Facility (ABDF)
- Zimbabwe Development Bank (ZDB)
- Zimbabwe Banking Corporation Limited (ZBCL)
- Merchant Bank of Central Africa Limited (MBCA)
- UDC Holdings Limited (UDC)
- First Banking Corporation Limited (FBCL)

- First Merchant Bank of Zimbabwe Limited (FMBZ)
- Zimbank - Retail Sector
- Standard Chartered Bank Zimbabwe Limited (SCZL).

The ZCPC also interviewed the Reserve Bank of Zimbabwe (RBZ) and Zimbabwe Bankers Association (ZBA).

The FIs that were interviewed are active in a diverse spread of sectors, with a particular focus on tobacco and agriculture. A number of banks provide special credit lines to the tobacco industry, which is Zimbabwe’s main commodity export product. The only other exception is the Zimbabwe Development Bank, which focuses on the transport and construction industries. A majority of FIs are active within Zimbabwe and some banks, such as the African Development Bank and IFC, have a presence in the region.

A majority of finance available in Zimbabwe is considered short- to medium-term, with the length of investment ranging from usually 1-5 years. The average size of investment is relatively small, which is symptomatic of the unavailability to long-term finance. This is generally made through leasing instruments for plant and machinery and typically will be less than US \$ 20,000. Larger financing requirements are very much dependent on the level of foreign exchange earnings the corporate may generate.

The type of finance available in Zimbabwe is described in the table below.

Types of funding	
Company	Types
IFC	<ul style="list-style-type: none"> • Term loans • Equity finance
Barclays Bank Zimbabwe	<ul style="list-style-type: none"> • Term loans • Equity finance
APDF	<ul style="list-style-type: none"> • ?
ZDB	<ul style="list-style-type: none"> • Leasing
ZBCL	<ul style="list-style-type: none"> • Term loans • Overdrafts
MBCA	<ul style="list-style-type: none"> • Working capital • Project finance • Overdrafts
UDC	<ul style="list-style-type: none"> • Leasing
FBCL	<ul style="list-style-type: none"> • Equity finance
FMBZ	<ul style="list-style-type: none"> • Trade finance • Project finance
Zimbank	<ul style="list-style-type: none"> • Term loans
SCZL	<ul style="list-style-type: none"> • Working capital

A number of commercial and development banks provide leasing, equity and project finance, which are geared mostly towards the needs of CP investments. Interest rates, however, make the prospects of borrowing less commercially viable for companies, especially small- and medium-sized enterprises.

Environmental considerations

Among the 11 FIs interviewed by ZCPC, four banks have an environmental policy. These banks include the IFC, APDF, Barclays and FMBZ. The FBCL is currently drafting a policy and the UDC is considering the adoption of one.

The IFC prompted the FMBZ to build environmental considerations into their business practice as a consequence of having a credit line through IFC since 1993. The arrangement requires EIAs to be undertaken, with mitigation components included. They also liaise with IFC specialists and, as a result, they have adopted an environmental risk policy. The FMBZ have one of 10 officers trained in this area.

The UDC, which is the largest established leasing company in Zimbabwe with operations throughout the region, are negotiating a US\$ 5 million credit line with the IFC, based on a three year term that incorporates an environmental audit. In light of the potential agreement, the UDC is considering their position regarding an environment policy.

The FBCL, which is the newest commercial bank in Zimbabwe having been established in August 1997, is currently drafting an environmental policy. The bank was prompted by the Board's concerns relating to reputational risk and competitiveness. The FBCL is also creating a training course for credit officers, which may include an environmental component.

Only three of the 11 FIs conduct environmental audits. This is mostly driven by the activities of the IFC. The banks include the IFC, APDF and Barclays. APDF conduct their own audits as well as those on behalf of the IFC. Barclays have a special risk unit, which assesses environmental risk. The APDF provides a model that might be used for cleaner production investment promotion. It positively promotes good environmental management and assists corporations in the development of sound business plans for presentation to a variety of lenders. This could be extended to incorporate CP principles from the design stage through to the management of waste products and end of life considerations. It is however dependent on the support of the IFC and a number of local relationships.

The IFC has not only influenced local FIs to consider the relevance of environmental issues; it has also prompted lenders to consider the environment relative to their own operations. When considering an investment, the IFC has a policy to assess production efficiency-related issues in the context of project viability. It also requires that all projects comply with the health and safety standards and guidelines, which are set out in their lending policy.

The FIs were asked if they would consider investing in CP projects, if further information were provided about the CP concept and the commercial viability of the projects. All FIs were receptive to the idea of CP investments.

III. Conclusions

The development banks have made the most progress toward building environmental considerations into their lending activity. In doing so, they have influenced two private FIs to consider environmental issues, which is due to the fact that they are (or are about to) secure credit lines through the IFC.

The commercial banks have made minimal progress with, at the very most, the adoption of an environmental policy and/or environmental risk guidelines for the loan application process. The commercial banks have yet to identify the CP concept as an investment opportunity or to respond by creating innovative financial products and new funding techniques.

Nonetheless, commercial banks are one of the most important contributors of private sector credit and therefore highly influential over most areas of economic activity. So it is crucial that the case for CP measures is articulated as a viable investment opportunity. The commercial banks in Zimbabwe have the potential to play a more prominent role in removing unnecessary barriers to accessing finance and by ensuring that it is available at the lowest practical price.

Within Zimbabwe, there are a number of leverage points that may prompt the local financial community to provide finance for CP projects. These leverage points include the Zimbabwe Investment Centre (ZIC) and the Zimbabwe Bankers Association (ZBA), the latter of which was interviewed by ZCPC.

The greatest potential for CP in Zimbabwe is the inflow of foreign direct investment (FDI). Inflows of FDI can stimulate further new investment through downstream or upstream production (i.e. suppliers and sub-contractors). Hence, FDI can contribute to Zimbabwe's capital formation and job creation.

In 1989, the Zimbabwe Investment Centre (ZIC) was set up to act as a clearing agency for foreign direct investment (FDI). All investment proposals with a foreign shareholding are submitted to ZIC for approval and registration.

As part of ZIC's remit, the CP concept could be incorporated into the investment approval process and, therefore, enhance the likelihood of directly funding CP projects. Links could also be forged between ZIC and the local financial community, as part of a voluntary initiative, to exchange information about CP investment opportunities, as an indirect result of FDI.

The supplying of necessary capital is only possible if Zimbabwe's financial community is intellectually engaged and convinced of the CP concept as a viable investment opportunity. Education and professional training are essential to this.

The support of the ZBA, which is influential amongst the local banking industry, is key to the sector's involvement. It is clear from the results of the interviews that local FIs are receptive to the idea of CP investments. By way of tapping into this initial enthusiasm, the ZBA is in a unique position to stimulate interest among FIs through lobbying, training and on-going dialogue about the issues.

