Ministry of Education and Training
Hanoi University of Technology
Institute for Environmental Science and Technology

Việt Nam
Cleaner Production Centre

Annual Report 2005

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PREFACE

2005 was the period that the centre started to develop new activities and services. The cooperation with the Vietnam Chamber of Commerce and Industry (VCCI) and the International Labour Organization (ILO) in the Factory Improvement Programme proved to be very successful and the programme will be repeated again in 2006. The combination of several topics related to social and human aspects, productivity, quality and cleaner production helped to support companies in a comprehensive way and gives VNCPC the opportunity to attract more clients. In another project, cleaner production was used as a first step in hazardous waste management. This project was implemented in close cooperation with a private consulting company, Colenco AG, and the Nam Dinh Local Authorities.

These two new and innovative projects and partnerships are good and important signs for the acceptance and reputation of VNCPC in Vietnam. In 2006 VNCPC will open a representative office in HCMC and offer new training programs in quality control, technology gap assessment and technology change management. With these additional topics we wish to strengthen VNCPC's technology know-how and provide added value to our clients.

Before leaving for my new assignment in UNIDO HQ, I would like to thank all involved Vietnamese ministries and partners and the staff of VNCPC for all their work and contributions. I wish them all the best for the coming years.

Heinz Leuenberger, Chief Technical Advisor

It has been a great pleasure to work and share experience with Prof. Heinz Leuenberger over the last eight years. He has laid the foundations for the centre's success, providing it with a clear strategy and a highly-skilled and motivated team. We all wish him good health and success when he returns to Europe as the Director of the Energy and Cleaner Production Branch at UNIDO in Vienna, Austria. Thanks to Heinz' contribution, the centre will continue to keep its reputation as centre of excellence.

I would like to take this opportunity to express our sincere thanks to the Swiss Government for its financial support, as well as to all our partners: UNIDO, UNEP and other international partners, the direction and cooperation of the ministries, host institution and advisory board, the contributions of national experts and participating companies. Without their supports, we would not be able to reach the achievements today.

Tran Van Nhan, General Director

One more year has passed, with many challenges as always. Beside the traditional services of training and consultancy on cleaner production, we have started new developments related to technological, financial and social issues.

More profits, less waste and much more… once again, the cleaner production motto has proved true. I hope you enjoyed working with us and will be even more satisfied with the new services. We commit to keep them at the highest standards to make sure that our quality and environmental performance meets, or even exceeds your expectations.

Ngo Thi Nga, Managing Director

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Cleaner Production

Cleaner Production (CP) is the continuous application of an integrated preventive environmental strategy applied to processes, products and services in order to increase eco-efficiency and reduce risks to humans and the environment.

For production processes: cleaner production includes conserving raw materials and energy, eliminating toxic raw materials, and reducing the quantity and toxicity of all emissions and wastes at the source.

For products: cleaner production includes the reduction of negative impacts along the life cycle of the product, from raw material extraction to its ultimate disposal.

For services: cleaner production is to incorporate environmental concerns into designing and delivering services.

Cleaner production requires changing attitudes, exercising responsible environmental management and evaluating technical options.

Definition by UNEP

POLICY

TW 02/00976 QA

TW 02/00053 EM

In connection with the implementation of its Integrated Management System following ISO 9001 and ISO 14001, the Vietnam Cleaner Production Centre has established and maintained the following Policy for Quality and Environment:

The centre in the first days of its establishment

Our Centre was certified to ISO 9001 and 14001 in 2002, renewed in 2005

Integrated systems not only help us, but also industrial enterprises to have better and cleaner working environment

Policy for Quality and Environment

The Vietnam Cleaner Production Centre is a knowledge-based organisation delivering a wide range of high quality cleaner production solutions that gives added value to industry, consulting companies, research institutions, academia, and governmental organisations.

As a national focal point on Cleaner Production, we are committed to continual improvement and prevention of pollution. We will comply with legislation and are committed to the International Declaration on Cleaner Production.

We will continuously strive to improve the quality of our solutions and services and to improve the effectiveness of our Integrated Management System.

Based on our Policy we have formulated the following principles:

- All staff have an impact on the quality of our services and on our environmental performance, and are therefore responsible for the work they deliver to internal and external customers;
- All staff shall inform the management if they cannot fulfil customer requirements; and
- All staff shall seek and share experience to continuously improve our services.

VISION AND MISSION

First CP train-the-trainers programme in 1999

Cleaner production is demonstrated to be advantageous in a wide range of industrial sectors, sizes and ownerships of companies

Cleaner production achievements in participating companies are disseminated through different media

The vision of the Vietnam Cleaner Production Centre is to play a catalytic and coordinating role in promoting sustainable industrial development in Vietnam through the application of Cleaner Production and related techniques.

The mission of the Vietnam Cleaner Production Centre is:

- To train the human resource base in enterprises, industry associations, consulting companies, research institutes, academic institutions, and governmental industrial and environmental management agencies in sustainable development approaches;
- To carry out Cleaner Production Assessments in industries to demonstrate the advantages of the Cleaner Production approach, and at the same time adapt the internationally developed approaches to Vietnamese conditions;
- To promote application of advanced preventive approaches, including cleaner technology transfer and social responsibility;
- To assist policy-makers and make recommendations on how to promote the concept of Cleaner Production in industries and through legislation;
- To promote the concept of Cleaner Production as well as other sustainable industrial development tools and raise awareness among industries and governmental agencies;
- To assist universities in integrating Cleaner Production into their curricula;
- To co-operate with domestic and international organizations with the aim of supporting the implementation of preventive environmental protection; and
- To serve as a focal point of the UNEP/UNIDO Network of National Cleaner Production Centres.

ORGANISATION AND FACILITIES

Signing ceremony for the establishment of the centre in 1998

The Vietnam Cleaner Production Centre was established in 1998 within the framework of the UNIDO/UNEP programme of National Cleaner Production Centres. It is sponsored by the Swiss Government through the State Secretariat for Economic Affairs (seco) and UNIDO as executing agency. The centre is hosted by the Ministry of Education and Training and located at the Institute for Environmental Science and Technology of the Ha Noi University of Technology. The activities of the centre are evaluated jointly every two years by representatives of seco, UNIDO and the Government of Vietnam.

Advisory Board

The Advisory Board of the center consists of 12 members at department managing levels of relevant ministries and organizations: MOET, MOI, MONRE, MOF, MPI, HUT, INEST, HCM DONRE, UNIDO and seco/SDC. The Rector of the Ha Noi University of Technology, Prof. Hoang Ba Chu, is the Chairman of the Board.

Organisational Structure

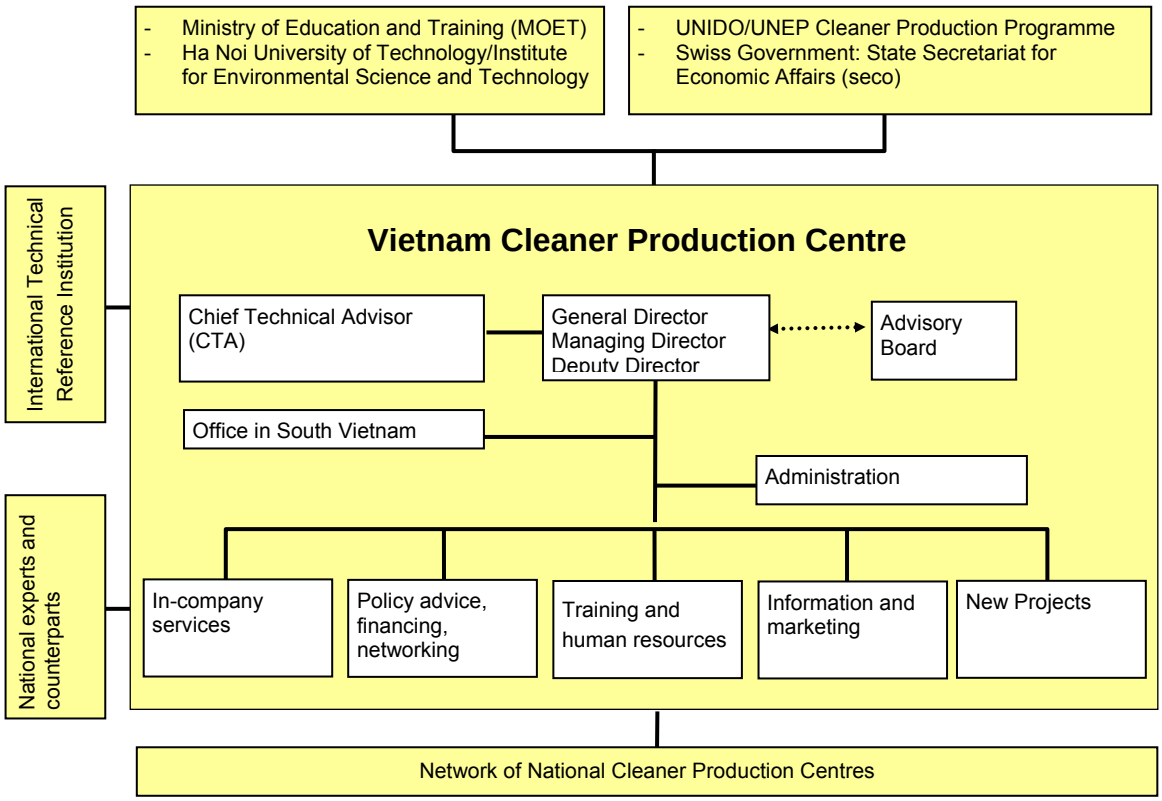


Figure 1. Organizational set-up of the Vietnam Cleaner Production Centre.

Staff

At the end of 2005, VNCPC team included 17 full time and two part-time employees. Three staff members hold Doctoral degrees, seven hold Masters degrees, and eight Bachelor degrees.

During 2005, staff members of VNCPC participated in the following training courses:

- Two-week CP training in food processing (August-September, Switzerland, three persons);
- One week training on Design for Sustainability, October, Germany, one staff member)
- One week training on Environmental Accounting System (November, Vietnam, four staff members)
- Eight-week e-learning course on Fundamentals of Energy Efficiency for Industrial Enterprises (October - December, one staff)
- Three-day training on presentation skills (October, Vietnam, 10 staff members)
- Three-day training on writing skills (December, Vietnam, 8 staff members)

Staff members were sent to workshops/seminars related to environmental improvement on a regular basis.

Staff of the Centre by the end 2005

(Please check our website for update)

Mr. Tran Van Nhan, General Director
Ms. Ngo Thi Nga, Managing Director
Ms. Vu Tuong Anh, Deputy Director
Mr. Nguyen Hong Long
Mr. Dinh Manh Thang
Ms. Tang Thi Hong Loan
Mr. Le Thanh Tung
Mr. La Tran Bac
Ms. Nguyen Le Hang
Mr. Nguyen Thai Hoa
Ms. Vu Minh Trang
Ms. Le Thu Ha
Ms. Nguyen Hoang Ai Phuong
Mr. Pham Dinh Phuong
Ms. Tran Minh Khue, Secretary
Ms. Nguyen Thuy Lien, Interpreter
Mr. Pham The Hung, Driver
Mr. Heinz Leuenberger, Chief Technical Advisor
Mr. Bertrand Collignon, UNIDO Associate Expert

VNCPC's staff 2005

Counterparts and Networks

The Vietnam Cleaner Production Centre has established long-term cooperation with the University of applied Life Sciences, Nordwestschweiz in Switzerland (FHNW). The Centre has contacts with numerous national and international experts in the fields of environment and cleaner production.

Within the UNIDO/UNEP network, the VNCPC is working closely with the 35 other National Cleaner Production Centres and Programmes worldwide as well as with the participants at the Asia Pacific Roundtable for Sustainable Consumption and Production.

VNCPC is maintaining a network of CP experts and institutions throughout Vietnam. A voucher system was introduced to Cleaner Production service providers in order to stimulate high-quality CP consultancy services.

UNIDO plays a significant role in connecting vncpc with international partners

The laboratory of the host institute is well equipped for environmental measurements and analysis

Facilities

The Vietnam Cleaner Production Centre and its host institution, INEST, are equipped with portable analytical equipment for both rapid and in-depth assessment of material and energy consumption in various industrial sectors.

Sectoral databases have been set up together with electronic library.

The centre provides favourable working conditions to all staff members.

OVERVIEW OF ACTIVITIES

From 2005, the centre expands its activities to broader scope with supports of UNIDO and seco

Also from 2005, we started our activities in the region (Lao and Cambodia)

The year 2005 is the first year of the new project "Promotion of New Cleaner Production Services in Vietnam through the Vietnam Cleaner Production Centre" and indeed, various new developments have been initiated. While pursuing the combined promotion of CP and Energy Efficiency, the centre has intensified its dissemination of environmental management tools and started concrete initiatives in cleaner technology transfer and social responsibility. The centre has also provided technical support to the younger UNIDO CP projects in Lao and Cambodia.

In 2005, the centre received its re-newed ISO 9001 and ISO 14001 certificates after three years of successful maintenance. The management of the centre is highly committed to ensure the effectiveness of the integrated management system in order to provide high quality services for a cleaner environment.

Our activities and achievements during 2005 will be presented as follows:

- Training
- In-company services
- Information
- Policy Advice
- New Developments

TRAINING

Types of training courses at the VNCPC:

- **Sector specific training**: this is an intensive training programme organized for representatives of a specific sector and potential service providers / promoters of cleaner production.
- **Special skills training:** The CP trainees from previous intensive training programmes or CP service providers can enrich their skills through these courses.
- **Tailor-made training**: designing and providing CP related training courses on demand.
- **University lecturer training**: providing lecturers information and proactive teaching method on how to integrate cleaner production into their curricula.

PLANNED TRAINING IN 2006

Quality Control – March

Environmental Management Accounting – May, June, July-October

Clean Development Mechanism - June

Technology Gap Assessment – July

Integration of CP into curricula – August

Cleaner Technology Assessment - September

Metal Finishing Technology – October

Maintenance Techniques – November

The lack of well-trained and experienced cleaner production specialists is one of the main barriers to the promotion of cleaner production in the Vietnamese industry. Therefore, one of the key activities of the centre is to build up, through training, a resource base of national experts on cleaner production.

One special characteristic of our training is the combination with in-company consultancy, whenever possible. By doing this, the in-class knowledge can be transferred to practice as the participants will have a chance to apply knowledge with the assistance of resource persons. The following table presents an overview of the training courses held by the centre in 2005:

Table 1. Overview of training 2005

Content	Location	Number of courses	Participant-day
Introduction to cleaner production	Nam Dinh, Thai Binh, Hanoi	4	237
Cleaner Production Methodology	Vientiane, Phnom Penh, HCMC	9	915
In-company training	Hanoi, Binh Duong	3	131
Integration of cleaner production into university curricula	Khanh Hoa, Hanoi	2	180
Environmental Management Accounting	HCMC, Danang, Hanoi	3	416
Metal finishing technology training	Hanoi	1	81

Introduction to cleaner production

This two- to three-day training is delivered to participating companies before the initial kick-off consultancy meeting to familiarize the employees with the concept of cleaner production and explain them what is going to happen in their company. Two training courses in Hanoi were delivered for ILO's Worker Manager Factory Improvement Program. A simulation game was developed for the training to support the introductory purpose.

Participants are working with simulation game during ILO's cleaner production training

The methodology is best transferred when combining in-class with on-the-job training

Cleaner Production Methodology

These trainings aim at introducing the cleaner production methodology to the participants in details, in order for them to be able to apply it by themselves. This requires extensive training, and a modular system of four to seven three-day training sessions has proved to be most effective.

Within the framework of cleaner production in Laos and Cambodia, we followed the successful experience of VNCPC in Vietnam by combining intensive in-class training sessions with on-site demonstration. The training was divided into four modules, following the flow of a cleaner production assessment.

In-company training

During the in-company training, targets are set up

These two-to-three day training courses are tailored and delivered to staff companies participating in the cleaner production assessments. The contents normally combine introduction of cleaner production and kick-off meeting, to start up a programme. in 2005, theses courses were delivered to Rang Dong Thermos and Light Bulb Company, Dong Xuan Knitting Company and An Binh Paper Company

Integration of cleaner production into curricula

While the training in Nha Trang University of Fisheries aimed specifically at setting up the curriculum, the second training in Hanoi targeted a new group of lecturers: economist. So far, eleven technical universities have introduced cleaner production into their curriculum.

Cleaner production teaching method was introduced to lecturers through discussion

"We highly appreciate your support and advice to the University through the whole process, including preparation and development of CP curriculum that will be delivered for students of the seafood process faculty. It is a certainty that the curriculum will benefit both University students and teachers and the seafood processing industry as well. On behalf of the Environmental Management Unit, I would like to express our thankfulness to VNCPC consultant team on their excellent work, both in quality and timing. We hope we will have further cooperation in the next period in area of cleaner production and environmental management.

Le Thi Thanh Huyen, Project manager of Environmental Management Unit / Seafood Export and Quality Improvement Program

Participants are encouraged to work in group with support of spreadsheets during EMA training

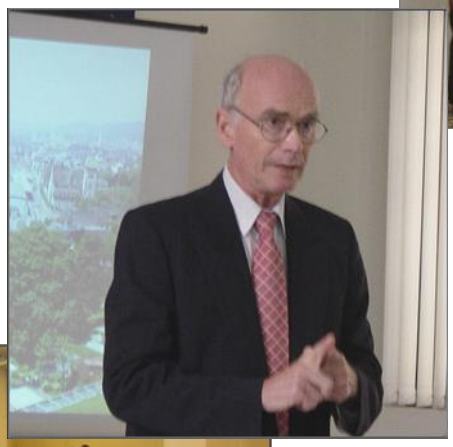
Resource person is facilitator during training

Environmental Accounting Management (EMA)

Following the awareness raising seminar delivered in 2004, these four-day training courses were delivered to industries and consultancy in order to transfer experience on how to apply EMA in a company. During the training, participants applied the EMA methodology step-by-step one actual Project Case. In the end of the training, it is expected that participants from industry can apply this approach in their situation; while the selected participants of consultancy will go for further computer based training and two-week train the trainers sessions to build up the capacity for Vietnam. Experts from the University of Lueneburg, Germany, delivered three training courses. The EMA training programme was organized under sponsorship of InWent and the Asian Society for Environmental Protection. Trained Vietnamese resource experts will start delivering the trainings in the middle of 2006.

Metal Finishing Technology Training

This five-day training was specially organized to metal finishing companies in order to review the state-of-the art available technologies. Another one is planned in October 2006 in the South.



Joining us for a greener industry

IN-COMPANY SERVICES

The VNCPC uses three approaches in carrying out its assessments in companies. They are:

- ***On-the-job training combined with consultancy***: Staff of the participating companies join intensive training programme and apply the knowledge with facilitation from our centre staff. In-company training is organized for one or some groups of staff, if needed. After the programme, the staffs of participating companies are able to maintain the program by themselves.
- ***Semi-consultancy***: The centre organizes introductory training for selected staff of companies and work together with their CP team. During the assessment, the centre staffs help team members to develop cleaner production opportunities and to monitor results.
- ***Consultancy:*** The staffs of the centre works together with cleaner production teams of the companies to develop their options. The staffs of the centre carry out necessary measurements and analysis.

Measurement and recording are critical to ensure the success of any improvement program

One of our main missions is to promote improvement programmes to ensure the application in participating companies, thus the most efforts have been spent for on-the-job training combined with consultancy.

Cleaner Production Application has been proved to be applicable in Vietnam in every industrial sector, independently from the size or ownership of the participating enterprises. However, actual achievements depend on the efforts and commitments of the companies themselves.

In 2005, the centre has followed up and completed CP assessments in textile (9), paper (6), mechanical and metal finishing (19), construction materials (4), food and beverage (5), shipbuilding (2), rubber (1), chemical (1), wood processing (1), handicraft (1) and thermo flash (1) sectors within the framework of the following programs:

Cleaner Production Component within Hazardous Waste Management for Nam Dinh city (or CP-HWM)

Within this program, cleaner production was introduced as a useful tool in improving the efficiency of material uses, including chemicals. The cleaner production program was divided into two phases, of which 9 companies participated in 2004 and 24 in 2005. The final follow-up is expected to be completed by the middle of 2006. The program was sponsored by SDC and managed by Nam Dinh DoNRE and Colenco Power Engineering Ltd.

Greenhouse Gas Emission Reduction from Industry in Asia and the Pacific (Geriap)

This three-year programme started in 2002 with the objectives to develop and practically demonstrate a mechanism for encouraging company-level actions to increase the efficiency of energy use in their production processes, thereby reducing associated emissions, especially greenhouse gases. The demonstration sectors are chemicals, iron and steel, lime and cement and pulp and paper. As focal point of the program in Vietnam, the centre provided training and consultancy to four participating companies. Results from the demonstration were finalized to develop training materials and published under the website www.energyefficiencyasia.org. These activities are sponsored by UNEP/Sida.

Cleaner production option can just be good house keeping;

Cleaner Production Assessments with local authorities (or VCEP)

The Vietnam Canada Environment Program II is designed to expand environmental management capacity from individuals and groups, placing greater emphasis on organizations and institutions. Within this framework, VNCPC worked together with local environmental officials in selected provinces to carry out cleaner production assessments. Six assessments were completed in 2005. Improvement measures are proposed and partly implemented.

Cleaner Production in Binh Dinh Province (hereafter called Binh Dinh)

The objective of this project is to show the potentials of cleaner production to local authority of the province, so that they can include cleaner production as a management tool in future. The selected case studies cover the sectors of wood processing, sugar, seafood and paper. This project was carried out under the management and supervision of Binh Dinh DONRE in 2004 and completed in the beginning of 2005.

Energy Efficiency Improvements for Process Heat Production in Vietnam (hereafter called EPA)

This project was initiated by US-EPA in 2004 and aimed specifically at reducing pollution from boilers used to produce steam and process heat, and other types of machinery used in the textile industry. Main activities are surveys, training and rapid assessments.

equipment modification or new technology

or material substitution, recycling, reuse, product modification.

This is the new product of Tan Binh Paper Company from sludge of wastewater treatment system

The following table shows the results reported by participating companies.

Table 2. Overview of benefits from 50 assessments and follow-up in 2005

Programmes	implemented /proposed measures	Investment, USD	Annual Savings, USD	Results
CP-HWM (33 assessments and follow-up)	434 / 516 (84%)	817,000	621,000	Annual savings of electricity (486 MWh), water (84,000 $m^{3)}$, chemicals (660 ton including 5.4 ton toluene), coal (1800 ton), DO (0.5 ton), LPG (1.9 ton) and FO (9 ton). Reduction of solid waste by 1,000 ton and GHG (CO_2) by 3700 ton
GERIAP (4 follow-up)	38 / 51 (74%)	400,000	567,000	Annual savings of electricity (4800 MWh), water (252,000 m^3), coal (7500 ton), DO (279 ton) Reduction of solid waste by 7,300 ton and GHG (CO_2) by 18,000 ton
VCEP (6 assessments)	47 / 113 (42%)	13,500	308,000	Annual savings of electricity (700 Mwh), water (130,000 m^3), FO (122 tons) and coal (28 tons) Reduction of solid waste by 1,600 tons and GHG (CO_2) by 920 tons
Binh Dinh (4 assessments)	49 / 67 (73%)	30,000	49,300	Annual savings of electricity (86 MWh,) water (127,000 m^3) Reduction of solid waste by 1,500 ton and GHG (CO_2) by 62 ton
EPA (3 rapid assessments)	15 / 23 (65%)	0	3,000	Actual annual savings of coal (5000 ton), water (6,000 m^3) Reduction of GHG (CO_2) by 92 ton With proposed investment of 6750$, the estimated annual savings is 16,460$ from reduction of coal by 378 tons, Water by 20,000 m^3 – reduction of GHG (CO_2) by 697 tons.

This new economizer in Viet Tri Paper Company brings investment back after 7 months

This new production line in Bach Dang JS Company will save them materials, improved working condition and have potential of new product

Since 1999, the centre has worked on promotion of cleaner production in various industrial sectors. We've learnt that cleaner production can easily be applied with low and no cost options like good housekeeping or equipment modification. However, the potentials of savings will even be more attractive with the application of higher investment options. Below are some examples of implementing companies in 2005:

Nam Dinh Textile Silk Company invested 70,000 USD in a new high-pressure jigger. Compared to the existing dyeing machines, this investment will save the company 50% water and chemical consumption due to its low liquor ratio (1:3).

Viet Tri Paper Company installed an economizer was installed to use the heat of stack gas (190-200^{o}C) to pre-heat the feed water, which is at ambient temperature. The implementation of this option costed the company 4762$ and additional operation costs of 368$, but reduced coal consumption by 380 tons/year, equivalent to 8750 USD annually. Pay back is returned right after 7 months and the will company also reduced its CO_2 emissions by 950 ton annually

Bach Dang Join Stock Company Bach Dang Join Stock Company is producing asbestos roof panels with open one wheel milling technology. The company invested 474,700 USD in a closed, automated, two-wheel milling, auto feeding, mixing and transporting line. The investment results in reduced health risks for the workers and the line allows for the production of asbestos-free panels in the future. This change saved the company 252 tons of asbestos and 350 tons of cement annually. It reduced the defect rate from 1% to 0.3% and low quality product rate from 5% to 3 %. Annual savings amount to 247,000 USD annually and the payback is less than 2 years.

Hanoi Ceramic Tile Company decided to make use of waste hot air (185^{o}C) from the rapid and final cooling in its vertical drier in order to save 136 tons of DO per year. This option required an investment of 21500 USD, and increases operation cost by 8179 USD, but enjoys a payback of nine months and allows for annual GHG emission reductions of 344 tons CO_2.

INFORMATION DISSEMINATION AND AWARENESS RAISING

We share the achievements through public media and dissemination seminars

The purpose of these activities is to share the achievements and experiences of our activities with industries, consultancy, government agencies and universities so that we can join the hands toward sustainable industrial development.

Public Media

After the three video clips produced in 2004, another two on “Cleaner Production in metal finishing” and “Reduction of Green house gases in industry” were aired on Vietnam Television VTV2. Now the Vietnam Television has a whole set of examples of CP application in textile, paper, metal finishing as well as a general CP introduction clip.

Our website has been moved to www.vncpc.org. News and events are now updated monthly.

In the framework of GERIAP, the centre has worked together with UNEP in developing a website on energy efficiency, which includes information on methodology and sector case studies (www.energyefficiencyasia.org). Information is also available in Vietnamese.

Awareness Raising Seminars

Eight CP introductory seminars, including two end-of project dissemination ones, were organized in 2005. Instead of focusing on industrialized provinces, this year, the concept of CP was introduced mainly in the craft village, where we are starting a new project.

226 participants took part in the seminars, increasing the total to 2,145 participants for the period 1999-2005.

Beside that, VNCPC staff members actively participated and made presentations in environmental and cleaner production related workshops inside and outside the country.

POLICY ADVICE

Key CP supported legal documents

Strategy for Socio-economic Development in the period 2001-2010

Resolution No 41-NQ/TW "On environmental protection in the period of industrialization and modernization enhancement"

National Strategy on Environmental Protection to 2010 and orientation to 2020

Environmental Action Plan 2001-2005

Revised Law on Environmental Protection 2005

Industrial Development Policy and Strategy to 2010

Key CP supported secondary legislation documents

Decision No. 64/2003/QD- TTg of 22 April 2003 on approving the plan for thoroughly handling establishments which cause serious environmental pollution

Decree No. 67/2003/ND-CP of 13 June 2003 on environmental protection charges for wastewater

Key CP actions by the Government

International Cleaner Production Declaration signed by former Minister of Science, Technology and Environment,, 1999

National Cleaner Production Action Plan 2001-2005

Two national cleaner production roundtables in 2002, 2004

Future high level CP activities in Vietnam

3rd national cleaner production roundtable, October 2006, Quang Ninh

Asia Pacific Roundtable for Sustainable Consumption and Production in Vietnam, 23-25 April 2007, Hanoi

Decree on the promotion of cleaner production in industry by Ministry of Industry by the end 2007.

An effective policy framework for cleaner production is essential to promote this concept in industry. Such a framework must involve not only administrative measures as licensing and the enforcement of the laws and guidelines, but also economic instruments such as a duty and tax system for waste disposal and a realistic pricing system for raw materials and energy.

Under the framework of the SEMLA programme (Vietnam – Sweden Cooperation Programme on Strengthening Environmental Management and Land Administration), the centre reviewed the Vietnamese legal framework and institutional set-up related to cleaner production and provided recommendations to further support its uptake by the industry in a paper called "Situation analysis paper on cleaner production in Vietnam". This paper was submitted to the Ministry of Natural Resources and Environment (MONRE) for consideration.

Together with MONRE, the centre is actively preparing the coming 7th Asia Pacific Roundtable for Sustainable Consumption and Production, which will take place in the period of 23-25 April 2007 in Hanoi, Vietnam.

Vietnam is going to host the next Asia Pacific Roundtable for Sustainable Consumption and Production in 2007

NEW DEVELOPMENTS AND ON-GOING

Working in Xuan Hoa Company on electroplating process

Investment in cleaner technology will receive partly financial support from Green Credit Line

ISO 26000 working group meeting

More profits, less waste and much more...

In 2005, the centre has started the following new activities. Please contact us for updates:

Technology Transfer

Following the in-depth metal technology training, the team has worked with Xuan Hoa Company to explore a potential investment in a new Cr-Ni electroplating line. A feasibility study has been carried out by Mr. Roberto Kistler, Swiss electroplating expert, and will be translated and send to the company for decision.

Financial Engineering

The Swiss Embassy is studying the feasibility to introduce a Green Credit Line (GCL) in Vietnam to support cleaner production / cleaner technology investment. It is expected that GCL will be put in operation by the last quarter of 2006.

Social Responsibility (SR)

Together with the Directorate for Standards and Quality (STAMEQ), the centre has sent one staff member representing the Vietnamese Industry Stakeholder Group to the ISO Working Group Meeting on Social Responsibility. This Working Group aims at developing the ISO 26000 standard, an International Guidance Standard on SR applicable to all types of organizations and is expected to be published in the first half of 2008. See more information at www.iso.org/wgsr.

After the completion of its pilot Factory Improvement Programme (FIP) in July 2005 and in light of the significant contribution provided by the centre, the International Labour Organization (ILO) has selected the centre as service provider in the North of Vietnam to lead the programme in the 2006-2007 period. The programme will include training and factory-level consulting on working conditions, labour practices, quality, productivity and CP in 10 to 12 factories. Two National Project Coordinators will work full time on the project on behalf of VNCPC.

Cement is one of the potential sector for CDM

Strengthening the contact with national service providers...

... and with the ones from Asia Pacific countries

There are many challenges in craft village

Clean Development Mechanism (CDM)

From its experience in energy efficiency programmes, the centre will develop potential PINs (Project Idea Note) and one PDD (Project Design Document) in CDM, in the framework of a UNIDO project financed by the Austrian government. Training on concepts, techniques and procedures for CDM project development will be delivered to service providers starting in the middle of 2006.

National and regional networking

Over the years, VNCPC has built a network of cleaner production expertise, including many of our trainees. In order to support them, the centre has provided special skills training courses every year. In 2005, a voucher system has been prepared to introduce to this group. The objective of the voucher system is to provide the experts with a quality feedback allowing them to improve the service to their customers and to promote sharing of experience (within the limits of confidentiality requirements). Information on the voucher system is available in our website.

A new Cleaner Production Centre has been set up in Ho Chi Minh city Environmental Protection Agency (HEPA). A meeting of the two centres was organized, which resulted in an agreement according to which Vietnam Cleaner Production will provide technical assistance to this new centre.

Contacts to Asia Pacific countries are setting up and tightened.

South Vietnam Office

The South Vietnam Office of the centre will be located at the DOST of HCMC, under the joint-management of the Energy Conservation Centre of Ho Chi Minh city and the Vietnam Cleaner Production Centre.

Cleaner production in Van Chang Craft Village

The project focuses on cleaner production awareness raising for villagers in a craft village. Four in-depth demonstration cases on cleaner production will be carried out in order to show the benefits in small-scale operations. This project is expected to be completed by middle of 2006.

Designing the rainwater harvesting and wastewater reuse system in Binh Dinh Sugar Company

UNEP Binh Dinh

Within the framework of the project "Resource Augmentation by Tapping Renewable Resources and Utilizing waste", which started in August 2005, the project aims at introducing new methods of of industrial rainwater harvesting, wastewater treatment and reuse as well as production of compost and biomass from municipal organic waste within the company. Binh Dinh Sugar Company was selected as pilot for this project. It is expected that the company will put the designed system in place in 2006.

COOPERATION

Thanks to the supports of the Swiss Government, the centre has set up strong cooperation with national, regional and international experts

Beside its close cooperation with the Swiss partner, FHNW in Switzerland, as well as with UNIDO, UNEP and other national cleaner production centres within the network, the Vietnam Cleaner Production Centre has established and maintained cooperation with and provided services to a wide range of partners from US, Switzerland, Germany, Denmark, the Netherlands, Sweden, Australia, India, Thailand, Japan, Lao, Cambodia, and Vietnam. Our cooperation mainly comes from the common objectives of sustainable industrial development, mainly on capacity building, consultancy activities, and information.

During 2005, we highly appreciated the contribution of Ms. Nguyen Thi Truyen (truyen05@yahoo.com.vn) from the Institute for Environment and Resources, Mr. Tang Ba Quang (quangtangba@yahoo.com) from the Institute of Chemical Engineering and Mr. Vu Ba Minh (vbminh@hcmut.edu.vn) from the Ho Chi Minh city University of Technology. They have been most active in promoting cleaner production and kept close contact with the centre. Ms. Truyen is going to work with the new Cleaner Production Centre at Ho Chi Minh city Environmental Protection Agency (HEPA). This will be an advantage for further promotion of cleaner production in Vietnam.

VNCPC is willing and interested to cooperate with all national and international organizations working in the fields of sustainable industrial development.

CLEANER PRODUCTION ACTIVITIES IN VIETNAM

In addition to the activities directed by VNCPC, several other projects that focus on cleaner production or at least have a component on cleaner production have been started or designed in the country during 2005.

The Vietnam Cleaner Production Centre tries to coordinate all these different activities to create as much synergy as possible. Cleaner Production will only have a significant impact on the industrial development of Vietnam if it is possible to strengthen and mainstream the different inputs and to build up efficient coordination. The table below presents the list of projects with involvement of the centre.

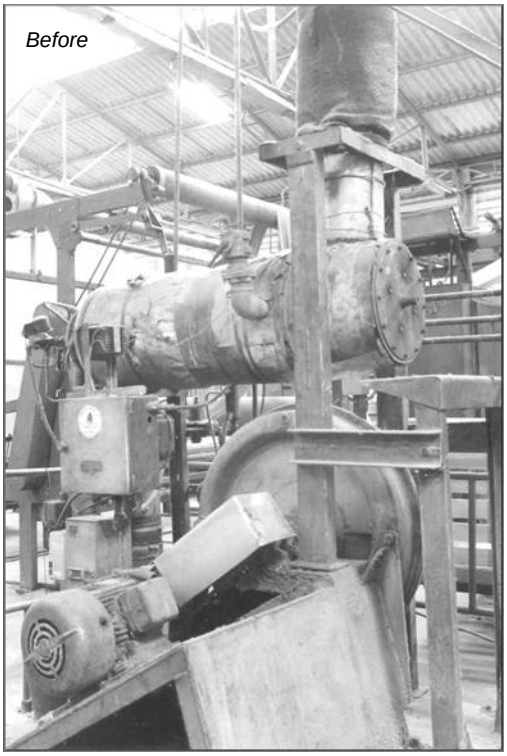
Foreseen large-scale CP activities in 2006 are from:

- The component of Cleaner Production in Industry (CPI) under Development Cooperation in the Environment Program, hosted by Ministry of Industry;
- The new Cleaner Production Centre in Ho Chi Minh city;

Table 3. List of cleaner production projects with involvement of VNCPC

Project	Period	Donor	CP content 2005	Counterpart	Location
Industrial Pollution Management. VCEP II	2002-2005	CIDA	CP training and demonstration projects in 3 provinces	VEPA, local DONREs	Hanoi, Binh Duong, Long An
GERIAP	2002-2005	Sida / UNEP	CP-EE training and consultancy in GHG emissions, toolkit development	Companies	Northern Vietnam
Hazardous Waste Management in Nam Dinh	2004-2006	SDC	Cleaner Production Assessments in nine selected companies	DONRE in Nam Dinh and Colenco (Swiss consultant)	Nam Dinh province
Environmental Management Accounting (EMA)	2003-2007	Inwent / Asep	Training	companies, consultants	whole country
Strengthening Environmental Management and Land Administration (SEMLA)	2004-2009	Sida	Situation analysis paper on cleaner production in Vietnam	-	-

LESSONS LEARNED



Cleaner production is not a destination, but a journey

- by the centre over the years showed that most of the companies continued applying CP measures after our intervention. This demonstrates the relevance of our approach: combining on-the-job training and consultancy helps the companies integrating the CP methodology in their culture, thereby ensuring long term impact. Some companies, however, didn't develop new options after we left and therefore lost the momentum, and the initial benefits were soon lost again. This proves once again that CP is not a destination, but a journey. We will look in more details into the sustainability and long-term impact of our services next year through an in-depth evaluation of around 50 of the CP assessments conducted so far.
- One clear lesson is that CP measures have much more impact on the long term if the CP methodology is integrated in the overall management system of the company, in particular ISO 9000 and/or ISO 14000 (if the companies apply those systems).
- The Nam Dinh Hazardous Waste Management programme has proved that CP is a very good tool to apply as the first step towards integrated hazardous waste management.
- The integrated package services consisting of CP and other related subject such as EMS ISO14000, OHS, quality etc. seem to be interesting to companies. This is shown by the success of the Nam Dinh project on CP and Hazardous Waste, which also integrated OHS measures, and by the success of the pilot phase of the ILO Factory Improvement Programme, which combined working relations and labour issues with quality, productivity, CP and OHS.

Measurement and record all important parameters to ensure the sustainable improvement program

OUTLOOK

Industrial activities have high potential in savings costs...

... improving product quality...

... environment, and more...

- Cleaner technology implementation is hindered by financial barriers. To overcome this, we are planning together with seco to introduce a new green credit line in Vietnam. This GCL is expected to start its operation by the last quarter of 2006. With this instrument, investments in cleaner technologies should become more attractive for companies.
- Very soon, Vietnam will join the WTO. The Vietnamese industry will then face strong competition, and it will have to apply higher-level CP options, including technology changes, to gain further savings in material and energy, better product quality and of course, lower production costs. This strengthens the relevance of the centre's move towards services for cleaner technology assessment and transfer.
- In order to further boost its exports, which are one of the major contributors to the country's fast economic growth, Vietnam will also have to adapt its products to the ever-stricter requirements and new needs of the international markets. This will require upgrading its capacity in product development and design. In order to ensure that this is done in a sustainable way, the centre intends to develop its expertise in sustainable product development in the near future.
- The reviewed Vietnamese Environmental Law will be effective on 1st July 2006. In line with the document, environmental fines applied to polluters will be stronger, as well as the fees for the use of natural resources. Therefore, industries will have to save material use and discharge to keep production costs under control, providing good opportunities for CP.
- With the application of decree No. 67/2003/ND-CP on environmental protection charges for wastewater based on the quantities of pollutants discharged, industries have started thinking how to reduce water consumption and pollutant discharged. Cleaner production can help, specially when the fee is getting higher.

List of Abbreviations

ASEP	Asian Society for Environmental Protection
CDM	Clean Development Mechanism
CIDA	Canadian International Development Agency
CP	Cleaner Production
Danida	Danish International Development Assistance
DO	Diesel Oil
DONRE	Department of Natural Resources and Environment
DOST	Department of Science and Technology
EMA	Environmental Management Accounting
EMS	Environmental Management System
FHNW	Fachhochschule Nordwestschweiz (University of Applied Sciences in North-western Switzerland)
FO	Fuel Oil
GERIAP	Greenhouse Gas Emission Reduction from Industry in Asia and the Pacific
GHG	Green House Gas
GLC	Green Credit Line
HCMC	Ho Chi Minh City
HEPA	Ho Chi Minh city Environmental Protection Agency
HQ	Head Quarter
HUT	Ha Noi University of Technology
ILO	International Labour Organisation
INEST	Institute for Environmental Science and Technology
ISO	International Organization for Standardization
MOET	Ministry of Education and Training
MOF	Ministry of Finance
MOI	Ministry of Industry
MONRE	Ministry of Natural Resource and Environment
MOST	Ministry of Science and Technology
MPI	Ministry of Planning and Investment
OHS	Occupational Health and Safety
SDC	Swiss Agency for Development and Cooperation
seco	State Secretariat for Economic Affairs
SEMLA	Vietnam Sweden Cooperation Program on Strengthening Environmental Management and Land Administration
Sida	Swedish International Development Cooperation Agency
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organization
VCCI	Vietnam Chamber of Commerce and Industry
VCEP	Vietnam - Canada Environment Project
VEPA	Vietnam Environment Protection Agency
VNCPC	Vietnam Cleaner Production Centre