Promoting Environmentally Friendly Enterprises in China

A Sino-Swedish bilateral environment co-operation project
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Preface

Co-operation with China in the field of Environment and Sustainable Development is of key strategic importance for the Swedish foreign policy, economic co-operation, global environmental policy and development co-operation policy.

In 2002 a Memorandum of Understanding on environmental cooperation, between the Ministry of Environment Protection of the People’s Republic of China (MEP) and the Swedish Environmental Protection Agency, was signed in Johannesburg. The MoU was renewed in 2007 between MEP and the Swedish Ministry of Environment. Within the framework of the Memorandum a Programme for Co-operation on Environment and Sustainable Development between MEP and the Swedish EPA has been developed. The programme, which is co-funded by Sida, the Swedish International Development Co-operation Agency, will run from 2007-2010. Through this programme the cooperation is taking a step forward even though Swedish support and engagement in this field represent only a very small part of China’s overall development co-operation. However, co-operation is important at the strategic level with institutions and decision-makers that can influence the long term conditions for environment in the country, as well as its impact on a regional and global scale, which has been underlined in Sida’s “Strategy for Environmental Co-operation with China”. It prioritises awareness creation, policies and institutional framework, environmental economic thinking, effects on consumption and health and demonstrations of sustainable solutions with technology to act as driving forces for sustainable development. Within the framework of the programme different projects have been developed:

- Strengthening of the MEP Capacity for Drinking Water Management
- Strengthening of the MEP Chemical Management Capacity
- Technical Assistance in Substitution of DDT Based Antifouling Paint in China
- Reduction and Control of Dioxin in the Pulp and Paper Industry in China

Before the programme mentioned above was decided upon, a project on Capacity Building on WTO and Environmental Protection was planned and has now been carried out.

In addition, the present project, Capacity Building for MEP to Promote Environmentally Friendly Enterprises in China (EFE), has become a part of the programme. The aim of this project is to enhance the MEP capacity and competence in industrial environmental management in general and the promotion of environmentally friendly enterprises through a close policy dialogue with the Swedish EPA. Two main problems have been addressed in particular: firstly the general policy instruments for promoting environmental progress in industry and the industrial pollution control that needs to be improved and diversified, secondly the
enhancement of MEP’s capacity to promote environmentally friendly enterprises through the voluntary, so called CEFE-programme. This has been realised by exploring and exchanging experiences of different policy interventions used in China and Sweden in order to promote environmental progress in industry, as well as providing recommendations on how to solve the problems which have been encountered during the project. This project was implemented between September 2006 and January 2009 and various activities have been carried out such as study tours, workshops, research and training courses as well as the production of reports on various topics. This final report from the project contains an overview of the findings of the project.

The Swedish Environmental Protection Agency January 2009
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The production of this report has involved many people from both sides. The overall responsibility for project management lies with the Swedish EPA.

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There is shared responsibility for the editing of this report. The Swedish EPA and its consultants are the main contributors to the content of the report. A significant contribution has also been made by MEP and Chinese experts connected to various institutes linked with MEP.

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The opinions expressed here are solely those of the authors and are not necessarily those of the Swedish Environmental Protection Agency.
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Summary with recommendations

China is today facing a variety of challenges regarding industrial pollution. Over the past 15 years the rate of economic growth in China has been high, on average around 10% per year, and China is now one of the largest economies in the world. This rapid economic growth has generated heavy pressure on the environment, with consequent damage to health and natural resources. Air and water have been polluted and waste management, desertification and biodiversity protection have been other challenges. The authorities are aware of the deterioration of the environment, and progress has been made since the mid-1990s to try to tackle these problems and according to the government this has led to a reduced rate of environmental degradation. At the central level the environmental awareness is noticeable, but this awareness is often lacking at the provincial and local levels. Environmental legislation has been introduced in some areas and environmental standards agreed on as examples of counter-measures, but in general these environmental efforts have lacked effectiveness and efficiency, largely as the result of an implementation gap.

Between September 2006 and January 2009 the project China Environmentally Friendly Enterprises (CEFE) has been carried out. The project is a co-operation between the Chinese Ministry of Environmental Protection (MEP) and the Swedish Environmental Protection Agency within the framework of the Programme for Co-operation on Environment and Sustainable Development between MEP and the Swedish EPA.

The aim of the CEFE project is to enhance the MEP capacity and competence in the industrial environmental management in general and the promotion of environmentally friendly enterprises through a close policy dialogue with the Swedish EPA. Two main problems have been addressed in particular: firstly the policy instruments for promoting environmental progress in industry and the industrial pollution control that needs to be improved and diversified, secondly the enhancement of MEP´s capacity to promote environmentally friendly enterprises through the so called CEFE-programme. This programme is a voluntary award system promoting environmentally friendly enter-prises going beyond legislation.

The project has been realised by exploring and exchanging experiences of different policy interventions used in China and Sweden in order to promote environmental progress in industry with a focus on Sweden. Regarding general policy instruments the focus has, in according with the wishes of MEP, been on legislation, economic instruments, green public procurement and awareness and public participation.

Various activities have been carried out such as study tours, workshops, inquiries and training courses as well as the production of reports on different topics. This final report from the project contains an overview of the findings from the project. It also includes recommendations in order to provide some input on how MEP
could continue to develop their work in order to improve the environmental performance of industry. For practical reasons the recommendations are gathered in the summary below. The Chinese project group has then based on the recommendations elaborated an implementation plan.

POLICY INSTRUMENTS AND INCENTIVES FOR INDUSTRY IN CHINA

China’s industrial pollution control policy was initially formed after United Nations Conference on Human Environment in 1972. United Nations Conference on Environment and Development was held in 1992 and China took the lead in introducing the concept of sustainable development, promulgated in succession approximately 10 environmental polices including China’s Agenda 21 and thus laid the status of the basic national policy for environmental protection. The “Programme for Ninth Five Year Plan of National Economy and Social Development and 2010 Perspective Objective” in 1996 listed for the first time the sustainable development strategy as a national basic strategy and realized the strategic transformation into sustainable development road. In the following 10 years, China’s industrial pollution control policy has developed rapidly and all sectors and all places pushed the implementation of various policies at different policy levels by means of policies, strategies, planning, laws and regulations, systems and economies. China has accumulated rich experience in the practice of industrial pollution prevention and control, achieved great effects in industrial pollution prevention and control and basically restrained the rise trend of industrial pollution.

With the new stage and opportunity, China’s industrial pollution prevention and control faces a new challenge. The “Outline of the Eleventh Five Year Plan for National Economic and Social Development of the People’s Republic of China” clearly points out the energy saving and emission reduction goals, e.g. by 2010, the total emission of key pollutants will be reduced for 10% and energy consumption per unit gross domestic product will be reduced for 20%. In order to achieve these indicators, our country’s industrial enterprises must adapt to the historical change and implement scientific concept of development in the Eleventh Five Year Plan period and a future period of time. At the same time they shall draw on the advanced foreign and domestic experience and implement the management mode in combination with Chinese national situation so that the industrial enterprises bring self regulation and control and self inspiration into play and truly, consciously, voluntarily and independently participate in and push environmental protection work by the most favourable means and effectively control industrial pollution.

From guiding ideology, formulation of China’s industrial pollution control policy shall proceed from comprehensively implementing the scientific concept of development and building resource saving and environmentally friendly society, focus on pushing the “three changes” of environmental protection and comprehensively use legal, economic, technical and necessary administrative methods to resolve the environmental problem. (1) It shall improve the law and regulation standard system for industrial pollution control. (2) Further intensify unified national environmental
supervision and management system. (3) Accelerate the change of traditional economic development model. (4) All out develop recycle economy and take the new type industrialization road. (5) Establish and improve the key environment management system. (6) Strengthen environmental economic policy reform and innovation. (7) Strengthen technical innovation for industrial pollution control, energy saving and emission reduction. (8) Carry out industrial pollution prevention and control work in the key industries. (9) Coordinate the relation between government and enterprise and establish industrial pollution control incentive mechanism. (10) Enhance the knowledge level of the whole society for environmental problem and strengthen supervision of public opinion. (11) Adjust the relation between international trade and pollution control, increase technical introduction and reduce production type pollution import. (12) Strengthen international exchange and cooperation and learn and draw on the international industrial pollution control experience.

Constructing the environmentally friendly enterprises is just the important action to implement the scientific concept of development from the microscopic level, build the environmentally friendly society and realize the historical change of environmental protection, is the necessary choice for enterprises to reinforce social responsibility and realize value maximization and is the matter of great urgency for explaining resource environmental “bottle neck” and inhibiting environmental deterioration. In order to deeply push the construction of environmentally friendly enterprises, it is suggested to carry out the following works: (1) Increase understanding, strengthen guidance and continue to deeply carry out creation work of environmentally friendly enterprises. (2) Formulate and improve the laws, regulations, standards and specifications for environmentally friendly enterprises. (3) Deepen the experimental spot and demonstration of environmentally friendly enterprises. (4) Develop recycle economy and promote work division and cooperation between enterprises. (5) Establish the technical innovation system and consultation service system for environmentally friendly enterprises. (6) Enterprises strengthen own construction and implement green management. (7) Actively push green consumption and implement green procurement policies. (8) Draw on the international experience and practically fulfil the enterprises’ social responsibilities.

POLICY INSTRUMENTS AND INCENTIVES FOR INDUSTRY IN SWEDEN

The development of the environmental policy concerning industrial pollution in the west started more than 40 years ago when the first environmental legislation was introduced. The focus was mainly on point discharges from sources like industry and municipal sewage. This work has not only been necessary but also very successful and there are many examples of how industries have managed to considerably reduce their emissions.

Today’s focus in many companies is the products. Our production and consumption produce various types of environmental impact throughout a product’s lifecycle; from the extraction of raw materials, production, use, recovery to final disposal and transportation at all phases. Significant environmental problems closely
connected to production and consumption of products include emissions of hazardous chemicals, acidification, climate impact, eutrophication, ozone layer depletion and environmental problems caused by handling huge amounts of waste etc. Several of these problems can also affect health.

Many companies realise the necessity of having a lifecycle perspective. By considering the whole supply chain, measures can be taken where they are most beneficial to the environment and cost. The use phase of products has often proved to play an important role. But still, reducing emissions from industry plays a vital role.

Environmental concern has now more and more broadened to sustainable development and taken into account social and ethical aspects, so called social responsibility. Many companies also realise the necessity of going beyond legislation.

More and more policies, instruments and tools have been developed in order to achieve more sustainable production and consumption. No single instrument, however, can solve all problems. Instruments also need good coordination. In order to create more environmentally friendly enterprises it is important for the policy level to create incentives and prerequisites and try to adapt the instruments to the present situation. It is important to work with and support both the supply side and the demand side.

The role of the Swedish Environmental Protection Agency

The Swedish Environmental Protection Agency (EPA) was created in 1967 as the first environmental agency in the world and is today one of the central environmental authorities under the Swedish Government together with the Swedish Chemical Inspectorate.

Swedish EPA is working in different ways with a variety of instruments and tools both mandatory and voluntary in order to promote environmentally friendly enterprises. Examples of voluntary instruments are eco-labelling, dialogues with stakeholders, the financing of research and development and environmental management schemes. Some instruments are described in more detail below.

DEVELOPMENT OF SWEDISH ENVIRONMENTAL LAW

With industrialisation in Sweden came first a huge demand for natural resources followed by severe consequences for Nature. Emissions from different kinds of point sources had a very negative effect on the environment and on people’s health. The legislation developed to tackle these problems could be divided into 1) natural resource legislation, with the purpose of regulating who had the right to extract natural resources and later also the preservation of such resources; 2) environmental protection legislation, with the purpose of protecting humans and later also Nature from environmentally hazardous activities; and 3) planning and building legislation, with the purpose of regulating the use of land for different purposes. To
some extent the legislation on infrastructure (transport and energy production and distribution) can also be seen as one part of the environmental legislation that emerged in Sweden following the industrialisation of the country.

Early laws on for example minerals and mining activities were generally aimed at providing possibilities to exploit those resources. Over time the mining laws have seen more and more provisions for environmental concerns.

The emergence of environmental legislation in Sweden was driven by new environmental problems. With some exceptions, each problem gave rise to separate new regulations and laws. In the late 1980s came the realisation that it was becoming harder to adapt the many laws and regulations to the new environmental challenges that were constantly arising. Further, due to the complexity and fragmented character of the environmental legislation, its impact was also weakened.

To meet the concerns expressed above, several commissions were appointed to work on a new law. The result of this work was the Swedish Environmental Code (the Code) entering into force in 1999. The Code built on the environmental provisions of 15 different acts that were reviewed and consolidated into one single law. As a result, the Code has 1) a broad application, in principle it covers every activity with a potential harmful impact on the environment, and 2) a broad legal content; it contains provisions for most parts of environmental protection, including general principles of environmental law, rules on procedure and competences for authorities, penal provisions and provisions for civil liability.

The purpose of the Code is to promote sustainable development. Its provisions relate to the management of land and water, Nature conservation, the protection of plant and animal species, environmentally hazardous activities emitting pollutants to air, water, creating waste and noise etc., health protection, water operations, genetic engineering, chemical products and waste.

The Environmental Code is applicable to all citizens and economic operators who undertake operations or measures that conflict with the aim of the Code. The rules apply to all activities potentially detrimental to human health or the environment, damage to the natural or cultural environment and the built environment and to all other places to which the public has access.

Being a framework law, the provisions of the Code do not specify limit values for various operations and do not go into detail when it comes to striking a balance between various interests. More detailed provisions are laid down in ordinances issued by the Government or in regulations issued by authorities commissioned by the Government, e.g. the Swedish EPA. Further to this, central authorities, among them the Swedish EPA, issue guidelines providing assistance on the interpretation of various provisions of the Code and underlying ordinances. It is important to note that the Code did not replace all the various acts that involved environmental protection. Many of the specific laws for certain sectors and activities, which did not
have environmental protection as a direct purpose, remain in force after the adoption of the Code. These laws are sometimes referred to as sector legislation. The provisions of the Code still apply even if these sectors are covered by other legislation.

Fundamental principles for the application of the Code are the so called general rules of consideration to matters of e.g. permissibility, permit requirements and environmental inspection and enforcement. The general rules of consideration are always applied. Examples of such rules are the Burden of Proof Principle, meaning that the person who undertakes an activity has to prove the compliance with the rules. According to the Proportionality Principle, requirements or judgements based on these rules must always be environmentally justified and financially reasonable.

In a way, the general rules of consideration all relate back to the Precautionary Principle, which requires anyone who pursues an activity to take all necessary environmental precautions in order to limit the impact on human health and the environment. The mere risk of damage and detriment activates this obligation. Such precautions may involve, for example limiting the scale of operations or applying the Best Possible Technologies, the Best Possible Technology Principle.

In order to ensure that the rules of consideration are genuinely complied with, a number of activities and operations are subject to permit requirements. From the start a large number of installations were subject to licensing. The number of such installations has been reduced over time due to improved environmental performance.

The general supervision in Sweden is conducted by certain supervisory authorities, where rights and obligations are stipulated in the Code. Further, the operators of environmentally hazardous activities have to conduct self-monitoring.

Inspection and enforcement responsibilities lie at three levels, national, regional, and local. The Swedish EPA is the main central environmental authority responsible for supervision. The Swedish Environmental Protection Agency has issued a guidebook on on-site inspections. It contains methodological guidance for site or installation visits.

More or less all personnel at the authorities – government as well as municipal - have a university degree of some kind. The Swedish EPA and other agencies continuously strive to develop competence and skills at regional and local authority levels.

ECONOMIC INSTRUMENTS IN SWEDEN

Many international institutions, countries and organisations (for example the European Union and the OECD) are today advocates of economic instruments and are
recommending their members to increase the use of economic instruments. The European Parliament has requested the possible introduction of environmental taxes at community level. The OECD has also advised its member states to increase the use of environmental taxes and charges.

According to the OECD instruments are economic "when they affect estimates of the costs and benefits of alternative actions to economic agents."

Economics and economic instruments are designed to tackle scarce resources and can therefore be useful when dealing with environmental problems and finding ways to reach environmental objectives efficiently. Economic instruments could be used to address market failure and combat negative externalities. They can act either as a carrot or a stick to steer towards more sustainable actions.

Many countries have positive experiences of using economic instruments in the environmental area, not least the Nordic and other European countries.

Sweden has a long tradition of using economic instruments and has worked with economic instruments such as environmental charges and taxes in environmental policy since the 1970s. Sweden probably has more environmental economic policy instruments than any other country, according to an OECD review in 2004.

One example is the sulphur tax. It was introduced in 1991, but was announced earlier the same year. The tax was 30 SEK/kg S in fuel. This has been an important incentive for refineries to reduce the sulphur content of oils to below legal limits. The tax contributed to approximately 30 % of emission reduction between 1989 and 1995.

A problem in Sweden, as in many other countries, has been to find the optimal level of e.g. taxes and the right balance between the different interests in society. The Swedish Environmental Quality Objectives are often affected by other political objectives in society and different objectives can come into conflict with each other. An environmental tax increase can for example lead to complaints from the industrial sector due to competitiveness concerns. Different trade-offs, between for example trade, environmental goals and efficiency, have sometimes been made. Examples of economic instruments in Sweden that partly counteract environmental objectives are the travel allowances in the transport sector and the reduced energy and carbon dioxide taxes for industry.

The Government (Ministry of the Environment) can assign the Swedish EPA to analyse the effects and consequences of a changed economic instrument in a certain area (a higher NOX charge). This information can then be part of a basis for political decisions in the area studied. Well performed impact analyses can also sometimes more clearly show that the benefits are exceeding the costs of some environmental measures and instruments. It is important to show that environ-
mental problems can imply considerable costs and cause irreversible damage in the long term if not dealt with in time.

For example, Sweden is now suffering from very costly remediation of polluted water and land areas in order to be able to achieve Sweden’s Environmental Quality Objectives. It would probably have been much more efficient and less costly if appropriate environmental policies had counteracted the emissions at the source in time.

GREEN PUBLIC PROCUREMENT IN SWEDEN

Public authorities are major consumers of products and services. In Sweden roughly 14% of the total GDP consists of spending by the public sector. The corresponding figure in the EU is 16%.

Green public procurement, GPP, means making environmental considerations when purchasing goods and services, for instance energy-efficient equipment, recyclable paper, organic food and water saving sanitary equipment. GPP is also about the public sector setting an example and influencing the market by real incentives for developing products and solutions with less harmful environmental effects and for environmental technologies.

GPP in Sweden dates back to the 1990s when some local and regional initiatives were acknowledged and guidelines were developed. The Swedish EPA also drew up some general guidelines. Between 1998 and 2001 a special committee, appointed by the Government, worked with the task of promoting ecologically sustainable procurement within government agencies, local authorities and county councils. The most significant result of the Committee’s work was an Internet-based guideline available for the entire public sector and other professional purchasers.

The guideline is nowadays managed by the Swedish Environmental Management Council, SEMCO a share-owned company with the Government as the biggest owner followed by the Confederation of Swedish Enterprises and the Swedish Association of Local Authorities and Regions. The guideline consists at present of proposals for technical specifications, award criteria and contract clauses for some 60 different criteria for some 100 products, as well as some background information about the product group. SEMCO is also participating actively in the International Green Purchasing Network (IGPN). The criteria development is done in a quality-assured and transparent process and with broad support from different stakeholders. Decisions are made by a special Decision Committee.

The public procurement is now regulated in EU-directives which are implemented in Swedish legislation. In accordance with the directive it is possible to set environmental requirements during the different phases in procurement; selection criteria, award criteria and specific contract clauses during the performance stage.
By relevant and environmentally motivated requirements in public procurement governmental authorities and other professional purchasers can contribute to the achievement of the National Environmental Objectives. The public sector is a considerable consumer of products with an impact on different environmental media. Several international studies have shown that few product areas such as transport, foodstuff and housing contribute largely to the main environmental problems facing us today.

The Swedish Government has decided on an action plan for Green Public Procurement on the basis of a proposal from the Swedish EPA in March 2007.

According to the Swedish experience so far, the purchasing power of the public sector is able to move the market in a more sustainable direction. However, it usually takes a long time for Green Public Procurement to become generally accepted. Green Public Procurement needs political as well as financial support from the Government. It might also be necessary to engage the political level at the regional and local levels for example through information. The support from the management in an organisation is a prerequisite for success. The purchasers need education. They are usually not experts in environmental issues. They also need simple tools in order to practise GPP.

The Swedish EPA now has a role to make follow ups and propose necessary changes in the action plan for Green Public Procurement. The Swedish EPA also participates on the board and in the decision committee of the EKU instrument, which is described above and supports SEMCO in the education of purchasers. As a government agency the Swedish EPA ambitious Environmental Management Scheme is a driving force in setting a good example and encouraging other agencies with Environmental Management Systems to work with GPP.

AWARENESS RAISING AND PUBLIC PARTICIPATION IN SWEDEN

An important prerequisite for carrying out the Swedish environmental policies over the last 15 years has been the principle that all sectors of society have a responsibility for the environmental work, the so-called sectors’ responsibility. This means that each actor must take their own part of the work. The Swedish EPA role is to involve and promote cooperation between different stakeholders in the environmental work through different processes such as dialogues, information and campaigns. An effective and constructive cooperation between environmental agencies at the national, regional and local levels and other agencies, sectors, organisations, the industry sector and other actors is also a fundamental condition for successful environmental work. Sweden has a long tradition and good experience of different forms of processes for cooperation.

In the report there are several examples of awareness activities and public participation in Sweden both from the national and the regional levels. For example the whole work with the Swedish Environmental Quality Objectives is built on
cooperation with different agencies and stakeholders at the national, regional and local levels. Swedish EPA has the overall responsibility for the objectives. In many cases the Swedish EPA has acted as the initiator and driving force in different fora. Today you will find a broad spectrum of different independent processes for awareness and participation around the country at the local, regional and national levels, both for sustainable development and more specifically for the environment.

**Recommendations for Future Work**

One of the most important issues in order to improve the environmental performance of enterprises is the enforcement of legislation. Generally there seems to be a high cost in obeying laws in China. One main problem is that it is usually more expensive to comply with the legislation than not, due to the fact that environmental costs are not internalised. The rules do not encourage voluntary engagement. It is therefore necessary to develop different incentives for the greening of industry along with better enforcement of legislation. Both the supply side and the demand side should be addressed. The Swedish experience in this area is that one instrument alone cannot solve all problems related to industrial pollution. In order to support sustainable development a variety of measures need to be developed. It is important to build the institutional framework along with the development of different instruments. Hopefully the description of Swedish conditions and work with different instruments and tools can give some ideas and food for thought on how to tackle the environmental problems arising from industry in China. Existing problems and suggestions for improvements in China are described in Chapter 2.4.

Below are some recommendations for how MEP could further develop their work in order to improve the environmental performance of enterprises. The recommendations are of a more general character. The basis for these recommendations is experience gained in Sweden and China. Within this project experiences have been compiled through literature studies, an inquiry made by the Environmental Development Centre of MEP and two workshops in Sweden arranged by the Swedish EPA. The recommendations have also been discussed in the project group. The recommendations are meant to strengthen ongoing processes. They are to a certain extent in accordance with previous recommendations from the China Council for International Cooperation on Environment and Development.¹

¹ See [www.cciced.org](http://www.cciced.org)
**Institutional Management**

**COOPERATE WITH OTHER MINISTRIES**

1) Intensify cooperation and co-ordination with other important actors e.g. the Ministry of Finance, Ministry of Commerce and the National Development and Reform Commission (NDRC), to be able to jointly find suitable measures and instruments like economic instruments and green public procurement.

**SUPPORT AND COOPERATE WITH LOCAL ENVIRONMENTAL PROTECTION BUREAUS (EPBS)**

2) Develop a plan for strengthening the operational power of the local EPBs in order to enforce the law and support monitoring. The plan could contain the following items:
   - Make necessary institutional arrangements
   - Increase financial support to local EPBs from MEP, allowing them more independence and to hire more staff for monitoring etc
   - Increase costs for infringements.
   - Create more room for flexibility regarding responsibilities between local EPB:s and MEP.

3) Increase the resources for the existing system for inspection and enforcement. Besides conducting inspections MEP could arrange activities together with inspectors from regional/local levels. The teams could promote information exchange between the different authorities. The teams should focus on activities with significant environmental impact. When conducting inspections the teams can set the standard for inspection activities and at the same time supply the local/regional staff with knowledge about legislation, inspection methods etc. Information and documents on Internet, e.g. on a specific website for that purpose, could be used as a complement.

4) Strengthen the communication between MEP and local EPBs. Increase capacity building for local EPBs by developing standards and technical guidelines.

5) Strengthen the overall education of the staff at local EPBs. A long-term goal could be to develop a special university degree for inspectors.

*Responsible department:* Pollution Prevention and Control Department
Support and Cooperate with Enterprises

6) Create better communication between MEP and enterprises (e.g. sector organisations). A dialogue mechanism, a platform for enterprises and clear targets should be set up. One example could be to let enterprises participate in developing legislation which concerns them. Develop partnership through common projects. Give assistance for the training of enterprises.

7) Make information about the environmental performance of enterprises more public and transparent. Make the enterprises’ records public and publish those who are violating the law.

8) Develop a mechanism for the certification of technical consultants/organisations and technical support for enterprise. Improve cooperation with technical institutions.

9) Strengthen the international cooperation regarding industrial environmental problems with exchange of information and technology on for example Best Available Technology (BAT).

Responsible department: Pollution Prevention and Control Department

Strengthen Public Awareness and Participation

10) Set up a communication system with clear division of responsibilities at the different levels; national, provincial and local. Provide a platform and guidance to the public on sustainable consumption, help them to find information, and set up a feedback mechanism. Use incentives and campaigns. Encourage education and training to raise awareness.

11) Promote co-operation between different levels through projects, activities such as “important days” and through different stakeholders.

12) Strengthen the involvement of the public in order to increase participation in public hearings and monitoring of enterprises (through for example MEP’s Green Watch).

13) Support NGOs financially and give them status. NGOs should become independent bodies in order to be able to act as watch-dogs.

14) Use media to increase awareness and participation. Continuously invite environmental journalists to seminars on “hot” topics.
**Responsible department:** Information Centre, (Provincial and local EPBs)

**Instruments**

**STRENGTHEN ENFORCEMENT OF LEGISLATION**

15) Revise the legislation for regulating industrial activities with clear and precise requirements which are easy to understand, comply with and control. Adapt the legislation to available resources at the authorities. Give the operator (this could be a long-term goal) the responsibility for controlling that the legislation is followed and being able to demonstrate this to the authorities.

*Responsible department:* Pollution Prevention and Control Department

**USE MORE ECONOMIC INSTRUMENTS**

16) Make a further study of the viability of introducing different types of instruments like the Swedish carbon tax, and nitrogen oxide charge or pollution transfer in China.

17) Generate more experience and information by discussions with experts, enterprises, consultants, international cooperation etc. and by capacity building at different institutional levels.

18) Consider increasing the use of impact assessments and pre-studies to be able to reach better knowledge before decision making and design of economic instruments.

19) Consider increasing some rates and use differentiated rates on taxes or charges between different regions and groups to be able to increase efficiency and take social factors into account.

*Responsible department:* Department of Policy and Laws
STRENGTHEN GREEN PUBLIC PROCUREMENT AND OTHER ECONOMIC INCENTIVES FOR ENTERPRISES

20) Develop a plan for further support of green public procurement (GPP). The plan could contain the following items:
   - Develop better cooperation with Ministry of Finance (MoF) and other relevant actors and set up an institutional mechanism
   - Make a survey status
   - Set up a quantity target for GPP
   - Develop technical guidance and evaluation methods including technical evaluation criteria.
   - Expand the scope of the list of environmental labelled products.
   - Match with other incentive e.g. CEFE- tools
   - Examine the need for new legislation
   - Develop training capacity building for ministries and local authorities.
   - Upgrade MEP in green public procurement decision making
   - Develop a communication plan using for example web and media. Information distribution should be diversified especially to the public.

21) Link loans from the state bank to environmental performance.

   *Responsible department:* Department of Finance and Planning

**The CEFE-program**

Through survey, workshop and indeck study in the project and considering requirement from environmental protection authority, following suggestions are put forward:

22) Issue the new CEFE indicators as a new technical guidance for national and regional industries and organise training activities in stake owners, technical workers and local EPBs officials.

23) Issue the new management and procedure for CEFE program and organise training activities for industrial applicants and EPB officials on application and evaluation skills.

24) Organise technical support institutes and enterprises in promotion of industry pollution prevention demonstration study in CEFE program

25) Encourage CEFE enterprises through incentive economic policies to attract more enterprise promote their environmental behaviours.

   *Responsible department:* Pollution Prevention and Control Department
Implementation Plan

In order to realize the sustainability of the CEFE Project, maximize its influence and effect and enable the people to use the project achievements, the Chinese Project Group has worked out an implementation plan for recommended CEFE-related measures. Under the support of the Swedish Party, the Chinese Party will carry out related dissemination activities, prepare and propagate the information on this project and the CEFE plan and organize related training activities so that local environmental protection bureaus and enterprises can learn the CEFE-plan more deeply.

In accordance with the policy suggestions and measures for promoting the development of environment-friendly enterprises as proposed in the project report, it is hereby proposed to implement the action plan for environment-friendly enterprises in three stages from 2009 to 2015 so as to practically fulfil various tasks and measures for ability construction of environment-friendly enterprises.

During the first stage, the Preparation period, the “Evaluation Index System for the Creation of Environment-friendly enterprises” will be revised, a plan for environment-friendly enterprises will be formulated, training material will be improved and a platform for environmentally friendly enterprises will be set up.

During the second stage, Critical period, preferential policies promoting the development of environment-friendly enterprises will be improved, laws, regulations, standards and specifications for promoting environment-friendly enterprises will be formulated and improved, training activities will be carried out in cooperation with local environmental protection bureaus and trade organisations, a green procurement policy will be implemented.

During the third stage, Improvement period, various laws, regulations, policies and systems for promoting the development of environment-friendly enterprises will be continuously improved, training and information to environment-friendly enterprises will be strengthened, network platform will be completed and an assessment of the implementation of the Twelfth Five Year Plan for construction of environment-friendly enterprises will be carried out.

IMPLEMENTATION PLAN FOR PROMOTING CEFE
Considering the upgrade of China State Environmental Protection Administration(SEPA) to Ministry of Environmental Protection in 1998, the official responsibility of CEFE of Department of Pollution Prevention and Control(DPPC) of SEPA is taken out from DPC of MEP and not assigned to any particular department within MEP. It is said that the responsibility of CEFE would be allocated to one of the affiliations of MEP. In such a case, the official nature of CEFE will be reduced.
Nevertheless, its importance of CEFE should be neglected. As proponent of CEFE, following measures can be taken in order to promote a more voluntary way toward CEFE:

26) Identify and Authorize an organization affiliated to MEP to be responsible for CEFE management and promotion;
27) New recognizing mechanism of CEFE should be designed and introduced for a more voluntary pursuing of CEFE;
28) Use all kinds of media to promote CEFE and advocate the good things of pursuing CEFE for enterprises;
29) Introducing encourage measures of the Chinese government in design environmental strategy and policy.
1. Introduction

1.1 The project

The Ministry of Environment Protection of the People’s Republic of China (MEP) and the Swedish Environmental Protection Agency have jointly developed and carried out a project from a proposal from MEP. The aim of this project is to enhance the MEP capacity and competence in industrial environmental management in general and the promotion of environmentally friendly enterprises through a close policy dialogue with the Swedish EPA. Two main problems have been addressed in particular: firstly the policy instruments for promoting environmental progress in industry and the industrial pollution control that needs to be improved and diversified, secondly the enhancement of MEP capacity to promote environmentally friendly enterprises through the voluntary, so called CEFE-programme. This report is the final report for the project.

1.2 Implementation and Method

Focus in the project has been on the following areas in accordance with the wishes of MEP:

- Legislation
- Economic instruments
- Green public procurement
- Awareness and public participation
- The voluntary programme, China Environmentally Friendly Enterprises (CEFE)

The project started in March 2006 with a workshop on Logic Framework Analyses in order to further develop the project plan. The project has then successfully been carried out according to the plan.

1.2.1 General Instruments

The general instruments are described in this report. The following activities have been carried out:

- One workshop on communication and outreach was carried out in Beijing in April 2007.
- One seminar on Sustainable Development was arranged in Beijing by MEP and Swedish EPA in cooperation with the Chinese Ministry of Construction and the Swedish Embassy. The seminar included a part on Environmentally Friendly Enterprises.
- A study visit to a Chinese paper industry was made in April 2008.
- Two study tours to Sweden have been made (September 2007 and May 2008). On the study tours, workshops have been held on how
MEP could develop their use of general instruments for the greening of industry, besides visits to different enterprises, waste water treatment plants, regional and local authorities etc.

- One study visit to Swedish EPA on economic instruments was made in December 2007.
- The final conference for the project was held in Beijing in January 2009

1.2.2 The CEFE-programme

The CEFE-programme has been developed further by the development of new indicators for the programme and by a proposal to develop the organisation.

Indicators

The following reports have been developed:

- Revision of the indicators for the EFE programme, Mats Almemark and Östen Ekengren, Swedish Environmental Research Institute, 2006

- Assessment of the Environmental Impacts of Products in Sweden and in Europe, Mats Almemark and Östen Ekengren, Swedish Environmental Research Institute, 2007

- Inquiry results for CEFE-programme, Ying Chen and Cheng Zhang, Environmental Development Centre for SEPA, 2007

Besides the reports, has a paper on Whole Effluent Assessment been conducted by Åke Undén, Swedish EPA

The following activities have been carried out:

- A workshop was held in Beijing in December 2006 in order to present and discuss the indicators. At the workshop there was also a presentation of the tool Life Cycle Assessment (LCA).

Organisation

Two workshops (in November and in December 2007) were carried out in Beijing in order to further develop the management of the organisation. This resulted in two workshop reports;

- Swan Eco-labelling, Ragnar Unge, 2008
1.3 Recommendations

In this report there are several proposed measures on how MEP could work further with the aim of improving the environmental performance of enterprises. The basis for these recommendations is experience gained in Sweden and China. Within this project experiences have been compiled through literature studies, an inquiry made by the Environmental Development Centre of MEP and workshops (see above). The workshops gave very valuable input to the recommendations in this report. The recommendations have also been discussed in the project group. The recommendations can be found in the summary. An implementation plan based on the recommendations can be found in chapter 9.
2. Overview of Policy Instruments for Industrial Pollution Prevention and Control in China

2.1 Current Industrial Development and Environmental Pollution in China

2.1.1 China’s Economic Development in the past 15 years

China has been experiencing the rapidest economic growth in the world. The average growth rate in the past 15 years is 10.8%. The growth rate in 2004 and 2005 was 10.1% and 9.9% respectively, and the figure reached 10.7% in 2006. China’s GDP in 2007 was RMB 24660 billion (USD 3380 billion at current price or USD 114800 PPP 2000) (NBS, 2006a) China’s economy now ranks fourth in the world.

Since 1978, China started to adopt a series of reform policies to open up its economy and promote market-oriented economy. China’s inflation rate had been low. (The inflation rate was 1.8% in 2005 and 3.6% in 2006.) At present, private economy accounts for 55.5% of China’s total economy (OECD, 2005a).

Per capita GDP in 2007 in China was three times as much as the figure in 1990 but was still lower than the OECD average (the PPP 2000 was USD 25,300). GDP figures are imbalanced among different provinces. For example, GDP per capita in Shanghai was ten times as much as in Guizhou in 2004. As the coastal provinces are more affluent than the inland provinces, labour forces migrate in large amounts from poorer regions to richer regions.

2.1.2 Industrial Development and Economic Structure

2.1.2.1 INDUSTRIAL STRUCTURE

China’s economic structure had changed dramatically between 1990 and 2007. The proportion of the first industry dropped from 27% to 13%; the proportion of the secondary industry remained between 42%-46%; and the proportion of the third industry increased from 31% to 40%. See Figure 1. for the changes in China’s economic structure.
2.1.2.2 INDUSTRIAL DEVELOPMENT

Industrial growth is mainly driven by sectors such as communication equipment manufacturing, computer, transport equipment, non-ferrous metal, raw chemical material manufacturing, iron and steel, chemical fertilizer, textile etc.

The total industrial production value increased 56% from 14,230 billion in 2003 to 31660 billion in 2007 and the heavy industry contributed to 41% of the total increment. The growth of pollution-intensive heavy industry has intensified the industrial pollution in China. See Figure 2 for the ratios of light industry to heavy industry between 1980 and 2006.

2.1.2.3 INDUSTRIAL STRUCTURES OF POLLUTION-INTENSIVE SECTORS

In China’s National Environmental Protection Plan during the Ninth-Five-Year-Plan Period, coal, oil and natural gas, electricity, iron and steel, non-ferrous metal, construction material, chemical industry, medicine, oil processing, paper making, food processing and textile sectors are classified as key sectors for pollution control. While the heavy industry develops in China, the production value of the
pollution-intensive sectors keeps rising and weighs high in total industrial production value. In 2006, the production value of the pollution-intensive sectors was RMB 12,667.2 billion, accounting for 40% of the total industrial production value. See Figure 3.

![Figure 3. Weight of pollution-intensive sectors in total industrial production value](image)

### 2.1.3 Current Industrial Pollution Emission

#### 2.1.3.1 WASTEWATER

In 2006, the total quantity of wastewater emission nationwide was 53.68 billion tons, 2.3% higher than the previous year. In particular, the industrial wastewater emission was 24.02 billion tons, 1.2% lower than the previous year. In 2006, the top four wastewater emission sectors (paper manufacturing, raw chemical material and product manufacturing, electricity and textile), discharged 12.714 billion tons, accounting for 53.9% of the total industrial wastewater emission. However, these four pollution-intensive sectors’ economic contribution is only 17.3% of the total industrial economic volume.

In 2006, the COD discharge nationwide was 14.282 million tons, 1% higher than the previous year. In particular, industrial COD emission is 5.423 million tons, 2.2% lower than the previous year. And COD emission from living is 8.859 million tons 3.1% higher than the previous year. In 2005, the top four COD emission sectors (paper manufacturing, food processing, raw chemical material and product manufacturing and textile) discharged 3.5195 mil-lion tons, accounting for 64.9% of the total COD emission. However, the economic contribution of the four pollution-intensive sectors is only 12.2% of the total industrial economic volume.
2.1.3.2 WASTE GASES
The majority of waste gases are produced and discharged from industry. Particularly, the SO2 emission was 25.888 million tons in 2006, accounting for 86.4% of the total industrial waste gas emission, and 203,000 tons higher than the previous year. In particular, the SO2 discharge by the secondary industry was 22.376 million tons, an increase of 3.2% than the previous year. In 2006, three sectors (electricity, non-metal mineral product and ferrous metallurgy) ranked the top three in terms of SO2 emission, totalling 15.40 million tons and account-in for 75.4% of the total
SO2 discharge. However, the economic contribution of the three pollution-intensive sectors is only 21% of the total industrial economic volume.

2.1.3.3 SOLID WASTES

In 2006, four sectors (coal mining, non-ferrous metal mining & dressing, ferrous metallurgy and ferrous mining & dressing,) ranked the top four in terms of industrial solid waste discharge, accounting for 69.9% of the discharge.

![Inter-Annual Changes in Nationwide Industrial Solid Waste Produced, Treated and Discharged](image)

Figure 6. Inter-annual changes in nationwide industrial solid waste produced, treated and discharged (10,000 tons)

2.1.3.4 PROBLEMS OF NEW INDUSTRIAL POLLUTION

When China is facing routine but severe industrial and domestic pollution, some new or latent environmental problems are emerging, threatening both environmental quality and human health. These problems include dangerous wastes, trace level organic pollutants, persistent organic pollutants, soil pollution, etc. Introduced species invasion is also a pressing new environmental problem.

1. Electric and electronic wastes

The peak of electric and electronic waste generation in China has arrived. It is estimated that 4 million refrigerators and 5 million TV sets will be discarded each year. In addition, electronic and electric wastes are illegally transported to China. Environmental pollution is a serious concern.

2. Persistent organic pollutants (POPs)

Persistent organic pollutants are chemical substances that possess certain toxic but stable chemical properties and do not easily break down in the environment. More are produced while chemical industry develops and chemical substances are used. Investigation suggests that trace level POPs exist universally in China’s surface water, and that the concentration levels of organic pollutants such as benzenes,
aldehydes and ketones in the air have reached several or several dozen times of the WHO standards and standards of the developed countries. Furthermore, these pollutants cannot be eliminated using traditional control methods.

2.1.4 Structural Features of Industrial Pollution
China’s macro economy has the following structural problems: imbalanced industrial structures, imbalanced industrial relationship, redundant construction, low technological level, and irrational spatial layout etc. As a result of these problems, environmental pollution in China displays distinct structural features.

2.1.4.1 HIGH SIMILARITY OF REGIONAL INDUSTRIES RESULTING IN UNIVERSAL STRUCTURAL ENVIRONMENTAL PROBLEMS
One of the most prominent features of structural pollution is that industries are highly similar in certain regions and that construction is redundant. High similarity of industrial structures causes redundant construction and over-competition at low technological level, intensifying the pressure on the environment and the difficulty of pollution control. Nationwide, the problem of high structural similarity is common in the east, the west and the central part of China. In the Yangtzi Delta (one of the most economically vibrant area in China), the average coefficient of structural similarity was 0.907 between Shanghai and the major cities of Jiangsu and Zhejiang Provinces in 2005. The consequences are imbalanced resource allocation, inefficient resource use and increased pressure on the environment and resources. Moreover, as enterprises are scattered and hard to concentrate, pollution control has to be carried out separately and regional environmental improvement may not benefit from the positive effect of scale.

2.1.4.2 STRUCTURAL POLLUTION CONCENTRATED IN CERTAIN SECTORS
Nationwide, structural pollution appears to be more concentrated in certain sectors. In 2003, each of the following five sectors discharged over one million tons of industrial solid waste: coal mining and dressing, ferrous metallurgy, ferrous metal mining and dressing, non-ferrous mining and dressing and chemical manufacturing. The total discharge of solid waste by the five sectors accounted for 74.5% of the total solid waste discharge by the major industrial sectors listed for statistics. With regard to water pollution, the major pollution-intensive sectors in 2004 were paper manufacturing, chemical manufacturing, ferrous metallurgy, and food & beverage processing. These sectors make low economic contribution but high environmental pollution. Economic contribution and pollution intensity of vary, depending on different sectors. For example, paper sector has the lowest economic contribution but the highest pollution load. This sector’s COD share in Huaihe and Liaohe catchments was 47.5% and 32% respectively, but its economic contribution was only 3.6% and 0.7% respectively. Chemical manufacturing has the highest share of NH3-N discharge, the figure being 6–9 times as its economic contribution. The economic contribution of ferrous metallurgy sector is higher than its pollution share. For food & beverage processing sector, its economic contribution and pollution share lie in between the figures of chemical manufacturing and ferrous
metallurgy sectors. With regard to air pollution, six sectors (firepower generating, non-metal mineral product manufacturing, ferrous smelting & pressing, raw chemical material & chemical manufacturing, oil processing & coaking and non-ferrous metal smelting & pressing) discharged 87% of the total SO2 emission. Among the targets set forth in the Tenth Five Year Plan, SO2 emission and COD discharge were the two unmet. Notably, the total SO2 emission and industrial SO2 emission increased instead of dropping. Among other reasons (such as lack of environmental protection investment, historically accumulated problems, ineffective enforcement and supervision), inadequate holistic regulation of energy and paper sectors was another major reason. Energy consumption in 2005 increased by 55.2% compared with the figure in 2000. Particularly, coal consumption exceeded the limit set forth in the plan by 8 times. In 2005, the installed capacity of firepower plants reached 508 million KW, consuming 1.11 billion tons of coal, almost doubling the coal consumption in 2000. Paper sector is the major sector of COD discharge and straw paper manufacturing is the major cause of aquatic environmental pollution. In China, production value of paper and paper products increased from 24.87 million tons in 2000 to over 50.00 million tons in 2005.

2.1.4.3 RAPID DEVELOPMENT OF HEAVY INDUSTRY IN THE FUTURE
In the next 15 years, China’s industrial structure will put more weight on heavy industry. This will give greater pressure on China’s resources and environment. It is estimated that in the next five to fifteen years, the growth rates of agriculture and food processing sectors will be 4%, about 3.5 percentages lower than the growth rate of GDP. The growth rates of textile, garment, wood processing and furniture and paper sectors will be around 5%, about 2.5 percentages lower than the growth rate of GDP. These light industrial sectors will grow at speeds lower than general economic growth rate, therefore their weights in the whole economy will keep dropping.

The forecast is that in the next five to fifteen years, the growth rate of mechanical, electric and electronic equipment sector will grow at a rate of around 9%, about 1.5 percentages higher than GDF growth rate. Growth rates of ferrous metal smelting and non-ferrous metal smelting will reach 8.7%, about 1.2 percentages higher than GDP growth rate. Growth rates of raw chemical material and chemical manufacturing, oil processing, coal, oil and construction material sectors will also be slightly higher than GDP growth rate. Overall, the weight of heavy industry will increase in the whole economy, causing greater pressure on China’s resources and environment.

2.1.4.4 COMPLICATED CAUSES OF STRUCTURAL POLLUTION
- Accumulated problems resulted from huge volume of pollution. For example, several of the eight previously state-owned tungsten mines in Gannan region have been declared bankrupt or others are getting through the process of bankruptcy. Huge piles of gangue accumulated for a long time occupy the land, receiving no recovery.
measures and having no facilities to hold back. This pollutes the environment and damages the ecosystem. It is very difficult to acquire financial resources for the recovery of mining sites.

- Outdated and low-level technological equipments. For example, Wuhai City and the surrounding area in Inner Mongolia have over 200 energy-intensive enterprises engaged in calcium carbide, ferro-alloy and coaking. These small-sized enterprises employ low technologies, resulting in severe resource waste and environmental pollution.

- Scattered private and town or township owned enterprises demand tough and heavy supervision. In recent years, China’s town and township owned enterprises have been developing rapidly. For instance, Shengze Town in Wujiang city relocated pollution-intensive enterprises. However, it did not effectively enforce Three Simultaneoussness and EIA processes, therefore, pollution is simply relocated instead of eliminated.

- Inappropriate spatial layout of industries and pollution beyond control in poor regions. As planning is not paid due attention, layout of construction projects is often at arbitrary will. Many pollution-intensive enterprises are often located at the upwind direction, drinking water sources or highly populated areas. For example, both Jiujiang Power Plant and Nanchang Power Plant are located at the upwind direction of the cities. Annual coal consumption of the two corporations is 3.6 million and 1.1 million tons respectively. Without effective sulfur elimination facilities, this dramatically influences the air quality in Jiujiang City and Nanchang City.

- Among the targets set froth in the Tenth Five Year Plan, SO2 emission and COD discharge were the two unmet. A major cause is the structural pollution that is worsened by inadequate regulation of energy and paper sectors.

2.2 Current Instruments for Industrial Pollution Control in China

2.2.1 Management System

In China, governments at all levels are responsible for the environmental quality of the areas under their jurisdiction, and the environmental protection authorities are responsible for supervision and management. This is how the environmental management system works (fig 7). In 1998, the Central Government lifted the status of the former National Environmental Protection Bureau to State Environmental Protection Administration (SEPA). As a directly affiliated body to the State Council in charge of China’s environmental protection, SEPA is responsible for environmental supervision and management nationwide. China has established the
inter-ministerial joint meeting regime for environmental protection and has set up regional environmental supervision institutions so that the inter-ministerial and inter-regional cooperation can be strengthened. Governments at provincial, city and county level (including governments of autonomous regions and metropolitans) also set up offices for counselling and cooperation of environmental protection. By 2005, there are 3,226 environmental protection agencies at all levels and the number of staff involved in environmental management, monitoring, research, education and training exceeds 167,000. Furthermore, there are 3854 law enforcement agencies supervising environmental protection and the total staff members are more than 50,000. Government organizations, resource management bodies as well as most large and medium-sized enterprises, have also established their own environmental protection office to be responsible for environmental protection and the employees are over 300,000.

Fig 7 Institutional Framework for Environmental Management in PRC

2.2.2 Command and Control Instruments
Command and control instruments have played an important role in China’s environmental management. In China, these instruments are mainly in the form of environmental laws and regulations and sometimes environmental management systems. Environmental legislation has been developed rapidly in the past two decades, in 2002, Law on Environmental Impact Assessment and Cleaner Production Law were passed by the National People’s Congress (NPC). However, law en-
enforcement is a great challenge facing Chinese government. In order to strengthen environmental protection, Chinese government established eight management systems for new construction projects, environmental impact assessment and ‘Three Simultaneousness’ are carried out. For projects that were previously implemented, the following systems are in place: pollutant emission permit, compulsory treatment within limited time; polluted enterprises to be closed down, suspended, merged or shifted to different production lines; pollution discharge fee; and measurement of comprehensive improvement of urban environment; etc.

2.2.2.1 LAWS AND REGULATIONS
Since the establishment of the People’s Republic of China in 1949, the National People’s Congress (NPC) and its Standing Committee passed 9 laws on environmental protection and 15 laws on natural resource conservation. Since 1996, China enacted or revised specific laws about environmental protection, such as laws on water pollution control, protection of marine environment, atmospheric pollution control, ambient acoustic pollution control, solid waste control, environmental impact assessment, radioactive pollution control, and relevant laws on water resource, cleaner production, renewable energy sources, agriculture, grassland, husbandry, etc. The State Council enacted or revised over 50 administrative regulations, including Regulations on Environmental Protection Management for Construction Projects, Implementation Rules for Water Pollution Control, Regulations for Management of Dangerous Chemicals, Regulations on Management of Pollution Discharge Fee, Management Methods for Dangerous Waste Operation Licenses, Regulations on Protection of Wild Flora, Regulations on Safe Management of Genetically Modified Organisms for Agricultural Uses, etc. The State Council also issued legally binding documents, such as Decision on Adopting Scientific View of Development and Strengthening Environmental Protection, Several Opinions about Accelerating the Development of Circular Economy, Notice about Improving Works on the Establishment of a Resource Saving Society, etc. Relevant departments of the State Council, local People’s Congresses and local governments enacted or revised over 660 local regulations and rules in line with national laws and regulations for environmental protection.

2.2.2.2 SUPERVISION OF LAW ENFORCEMENT
China keeps strengthening environmental law enforcement and administrative management. A supervision and enforcement system that works on spot has been established. It features focused law enforcement and examination; and it is based on routine supervision activities, guaranteed by environmental inspection and supervision by public opinions. During 1997-2000, SEPA and the Environment and Resource Committee, the Ministry of Supervision and relevant departments of the State Council had jointly carried out the inspection of the implementation of the State Council Decision every year. A total of 42 inspection teams were deployed, carrying out inspections (63 tours at province or autonomous region level, 211 tours at district or city level, 243 tours at county level), and over 1,000 organizations were inspected on the spot. 2335 public complaints were attended and 1,174
of them were handled on the spot. These efforts solved a number of serious environmental problems. Local people’s congresses, governments, political consultative meetings and environmental protection and supervision agencies carried out law enforcement activities of various forms, promoting the implementation of policies such as ‘One Order, Two Goals’\(^2\) and the ‘33211 Environmental Protection Scheme’\(^3\). In 2000, the nationwide environmental supervision system carried out on-the-spot inspections 1.62 million times; 150,000 sets of pollution treatment facilities or equipments were examined; 14,000 new or expanded projects were examined; 14,000 projected were ordered to get improved within limited time till complying with the requirements. It turned out that 86.3% of the pollution treatment facilities were in normal operation; 61% of the projects were in stable compliance with the standards; 78.1% of the projects fulfilled the ‘Three Simultaneous’ requirements; and 74.7% of the projects ordered to get improved within limited time had accomplished the tasks.

In recent years, China has been making continuous efforts to review progresses in environmental protection, air pollution control, water pollution control and solid waste control etc. China also strengthened pollution control in major sectors and major areas. China’s Criminal Law has specific provisions against damage to the environment and resources. China issued Provisional Regulations on Punishment for Law Infringement and Indiscipline Behaviors against Environmental Protection, and has established a responsibility system for environmental protection administration and law enforcement. For three consecutive years, China carried out theme activities aiming at punishing and improving pollution discharge enterprises and protecting public health. As a result, over 75,000 infringement cases against environmental protection laws were reviewed and handled; 16,000 enterprises illegally discharging pollution were shut down, and over 10,000 environmental pollution cases were blacklisted for reinforced supervision and treatment. In 2004, China’s environmental supervision agencies at all levels carried out 2,768,059 times of inspection on the pollution spots, 474,620 times more than last year.

### 2.2.2.3 EIA SYSTEM AND ‘THREE SIMULTANEOUSNESS’ SYSTEM

EIA system and ‘Three Simultaneousness’ system are crucial for the adoption of the ‘Prevention First’ guideline for environmental protection. It plays an important role in the prevention and reduction of industrial pollution. In 1979, Environmental Protection Law (trial version) was enacted. It defines Environmental Impact Assessment and ‘Three Simultaneousness’ for construction projects as compulsory legal provision. In 1981, Management Rules for Environmental Protection in Infrastructure Projects was issued, detailing the EIA system and ‘Three Simultaneousness’ system. Several later published laws, including Law on Protection of Marine

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\(^2\) According to the policy, the country's overall pollution discharge and industrial discharge should meet state standards. Air and water quality in major cities should do the same.

\(^3\) “33211” stands for three rivers, three lakes, two zones, one city and one gulf respectively. Three Rivers are Huaie River, Liaohe River and Haihe River. Three Lakes are Taihu Lake, Dianchi Lake and Chaohu Lake. Two Zones are Acid Control Zone and SO2 Control Zone. One city is Beijing and One Gulf is Bohai Gulf.
Environment, Law on Atmospheric Pollution Control, Law on Water Pollution Control, also have provisions on the two systems. In 1986, Environmental Management Rules for Construction Projects was issued; in 1997, Management Rules for Construction Projects was stipulated; both of which have detailed provisions about the two systems. It is regulated that construction projects that may have significant environmental impacts on the environment should develop an EIA report; construction projects that may have medium environmental impacts on the environment should develop an EIA Report table; construction projects that may have slight environmental impacts on the environment and no EIA process should fill the EIA registration form. It is also regulated that environmental protection facilities have to be designed, constructed and operated at the same time with the main construction body. In recent years, EIA system and ‘Three Simultaneity’ have been reformed and refined. So far nationwide, over 1.46 million construction projects across the country have undergone EIA processes; over 630,000 new construction projects have implemented the ‘Three Simultaneity’ system; 99.3% of all construction projects carried out EIA processes, 96.4% of them implemented the ‘Three Simultaneity’ system and 95.7% successfully met the requirements of the ‘Three Simultaneity’ system. EIA system and the “Three Simultaneity” system have helped those industrial projects increase productivity while reducing pollution or at least discharging the same quantity of pollution.

2.2.2.4 ENVIRONMENTAL POLLUTION CONTROL IN A LIMITED PERIOD

Environmental pollution control in a limited period is a major legal system for environmental protection in China. This is comparatively a better refined and developed environmental law. Between 1978 and 1995, China had conducted two batches projects of environmental pollution control in a limited period at national level. 227 and 140 projects were involved in the two batches respectively. The total number of the projects in this scheme was 43,000 including local projects. This effort effectively helped the achievement of goals of pollution control and environmental protection in limited periods. In 1996, Chinese government implemented the third batch projects of environmental pollution control in a limited period (121 projects in total) to strengthen pollution control and help achieve the environmental protection goals by 2000 set in the Ninth-Five-Year-Plan Period. The total investment was RMB 9 billion. In recent years, new elements have enriched this scheme via various means, e.g., technical up-grading and innovation, phasing-out outdated techniques, equipments and products, process control, cleaner production and waste reduction, etc. It is estimated that in 2005, 22,126 projects completed environmental pollution control in a limited period and the total investment was RMB 17.838 billion. As for those that could not fulfill this target, the ultimate measures are to shut down, stop operation, merge or shift to other production lines. Statistics show that 9,175 enterprises experienced these measures in 1999 and 19,498 enterprises did the same in 2000. In 2005, the number of enterprises even reached 10,777.
2.2.2.5 TOTAL POLLUTANT QUANTITY CONTROL
Since 1980, China’s environmental protection authorities have started pilot works on total pollutant quantity control and discharge permission in the area of water pollution control. During this period, some local laws and regulations gradually clarified the provisions related to total quantity control, and local authorities set up targets of total quantity control and reduction plans for some major pollutants. In 1995, the State Council issued Provisional Rules for Water pollution Control in Huaihe Watershed, stipulating that total quantity control should be applied and a total quantity control plan was developed. In 1996, the National People’s Congress issued Decision of the Standing Committee of the National People's Congress on Revising the Law of the People's Republic of China on Prevention and Control of Water Pollution, stipulating that ‘…Governments at or above provincial level may adopt total quantity control measures for major pollutants in water bodies that cannot reach national standards for aquatic environmental quality; governments at or above provincial level should examine the quantity of major pollutant discharge by enterprises that bear discharge reduction tasks’. For the first time, this statement confirmed the position of total quantity control in China’s legal system.

2.2.2.6 DISCHARGE PERMIT
In the pollution discharge permission system, government agencies or environmental management departments should determine the total quantity of pollution discharge that is allowed for a certain area, according to this area’s environmental capacity. They should then issue discharge permission certificates to qualified polluters and forbid illegal pollution discharge behaviors. In March 1988, SEPA issued Provisional Methods for Managing Water Pollutant Discharge Permit, regulating that pollution discharge permission shall be based on notification and registration, and that water pollution discharge permission shall be implemented in successive phases for major pollutant sources and major pollutants. In August 1992, SEPA issued Provisional Methods for Notification and Registration of Pollutant Discharge, signaling that a pollution discharge notification and registration system has been started across the country. This document integrates the notification and registration of water pollutants, air pollutants, solid waste and ambient noises. By the end of 1980, more and more cities and enterprises are conducting pollution discharge notification and registration and implementing pollution discharge permission.

Statistics show that by the end of 2000, 199,049 enterprises had applied for the notification and registration of air pollutant discharge and 160,310 enterprises for water pollutant discharge. Four hundred twenty seven and 504 cities have separately adopted water and air pollutant discharge permission policy. Seventy one thousand and twenty seven air pollutant permission certificate and 71,027 water pollutant permission had been issued. In 2005, the number of enterprises that have issued pollution permission certificates reached 176,733. Practice shows that notification & registration and discharge permission system poses positive environ-
mental, economic and social effects, and therefore is an environmental manage-
ment system that suits China’s special conditions.

2.2.3 Economic Instruments
Economic instruments have been paid much attention by environmental protection
authorities. In China, economic instruments have been increasingly employed as
voluntary tools for environmental protection. Economic instruments being used in
China’s environmental management include pollution discharge fee, user fee, re-
source tax or fee, product fee, pollution permit trade and deposit refund, etc. The
system of pollution discharge fee was reformed in 2003 and now is one of the most
important economic instruments in China. Along with it, wastewater treatment fee
and urban solid waste treatment fee have been gradually employed because there
have been concerns about pollution caused by urban wastewater and solid waste in
addition to industrial pollution.

2.2.3.1 POLLUTION DISCHARGE FEE
Pollution discharge fee is one of the incentives of environmental protection in
China that has been used continuously in the past two decades. Its legal ground can
been found in Environmental Protection Law enacted in 1989 along with other
laws on water, air, waste and noise. At present, China has determined the rates for
over 100 types of pollution discharge in five major categories (wastewater, waste
air, waste residue, noise and radioactive waste). Pollution discharge fee is now
collected in all the cities (counties) across the nation. Practice proves that, despite
some problems in need of urgent improvement, the existing system is still an effec-
tive and well-developed instrument for environmental protection and has signifi-
cantly pushed forward pollution control in enterprises and capacity building of the
environmental protection agencies. Figure 8 depicts the collection of pollution
discharge fee over years.

![Figure 8. Pollution discharge fee collected over years in China](image-url)
2.2.3.2 EMISSION TRADING

Two types of emission trading policies are practiced in different areas of China. First, in areas with total pollutant quantity control and issuing permit certificates, pollution permit saved by means of technological upgrading and operation of pollution control facilities can be paid for transfer within the areas if agreed by environmental protection authorities. In areas without total pollutant quantity control, the principle of ‘equal reduction’ applies, which means that pollutant discharge reduced by enterprises in the area can be paid to offset the increased pollutant discharge by other new, upgraded or expanded facilities if agreed by environmental protection authorities. In this way, economic development can be guaranteed while pollution is not increased.

At present, Shanghai is carrying out some experiments on paid pollutant permit trade. Shanghai government claims that ‘total quantity control limit can be paid for transfer’, which gives policy ground for paid pollutant permit trade. With this policy, total quantity limit of pollutant discharge can be conditionally paid and transferred among enterprises to maintain an overall balance within this region. This provides development opportunities for some new projects that have high economic returns and produce minimal pollution. In addition to Shanghai, 11 other cities (including Shenyang, Wuxi, Jinan, Handan, Taiyuan, Liuzhou, Guiyang, Pingdingshan, Kaiyuan, Baotou and Huainan) have also sequentially explored and experimented pollutant permit trade system for water pollutant and air pollutant. The experiments and research on air pollutant permit trade were highly praised by the experts of World Bank.

During the Ninth-Five-Year-Plan period, Shanghai, Tianjin, Nantong, Benxi, Taiyuan, Huzhou and Shenzhen etc. carried out pilot projects on pollutant permit trade and paid transfer of COD and SO2. These pilot projects provided experiences, which helped the trans-regional (e.g., acid rain control regions) experiments on SO2 emission permit trade during the Eleventh-Five-Year-Plan period. In April 2002, SEPA issued a document declaring that it would officially kick off the pilot projects on emission permit trade in seven provinces (or metropolitans).

2.2.3.3 USER FEE

User fee mainly includes wastewater treatment fee and domestic waste treatment fee. In China, wastewater treatment fee is paid by all the users of central water supply system, regardless if the resulted wastewater is collected and treated. In cities, National Development and Reform Committee (NDRC) play a role in determining the fee rate for projects funded by the Central Government. Wastewater treatment fee is RMB 0.9 per cubic meter in Beijing and Shanghai, RMB 0.7 in Guangzhou, RMB 0.5 in Xi’an, and RMB 0.12 in some cities in Sichuan provinces. In some cities, families are charged for sewage pipeline network services. In Jilin, this fee is at RMB 0.15 per ton. In most cases, wastewater discharge/collection fee is not charged additionally, as users’ wastewater treatment fee contains the cost of wastewater collection. It is the corporations in charge of water supply that collect
wastewater treatment fee. However, many cities do not charge for wastewater treatment services. In cities where such fee is collected, the total sum is far less than the cost of basic operation and maintenance of wastewater collection and treatment.

China’s current fee collection system for solid waste is very complicated. In general, every user is charged about 6 yuan per month and the government pays for those who cannot afford. Fee collection for industrial waste is different. For example, waste treatment fee is decided by the amount delivered to landfills. For industrial waste treatment, the fee is collected differently. The rate varies, depending on the place that deliver waste to landfills. For instance, the rate is 10% in the western provinces and 80% in the coastal regions.

2.2.3.4 ‘THREE SIMULTANEOUSNESS’ DEPOSIT

In China, when market economy and modern corporation system are being established, enterprises will grow into independent entities to have independent rights of decision making and operation. There will be various sources of investment and restrictions from different authorities will gradually diminish and even vanish. In this new context, how to maintain the effectiveness of the ‘Three Simultaneousness’ system becomes a challenge. Facing this challenge, many local environmental protection authorities have proposed ‘Three Simultaneousness’ deposit for construction projects to enhance the implementation of this system. ‘Three Simultaneousness’ deposit is a certain proportion of a project’s investment deposited when the project is being approved. Upon the completion of the required pollution control facilities and after environmental protection authorities have inspected and approved them, the deposit will be refunded. SEPA had planned to promote the actions and experiences of Jiangsu Province, Fushun City and Suihua City. However, this system was reviewed and suspended in 1997 when China started to rectify the then chaotic situation of improperly collecting fees, imposing levy and abuse of fines.

2.2.3.5 FAVORITE TAX RATE FOR INTEGRATED USES OF ‘THREE WASTES’

This is the first economic policy for environmental protection published in China. It has played a significant role in encouraging efficient use of natural resources and pollution reduction. As situation changes, some elements of this policy are no longer appropriate today. At present, the Ministry of Commerce is considering to upgrade the catalogue of integrated uses of ‘three wastes’. For effective implementation of this policy, products involving integrated uses of three wastes should be separately accounted for the calculation of balance. Reduced tax amount must be exclusively used for integrated uses and pollution control. If enterprises do not or cannot use three wastes discharged by themselves, they must supply the wastes to other enterprises for reuse free of charge. If the wastes are processed, the cost of processing may be charged. If enterprises do not reuse wastes and do not allow others to reuse, waste discharge fee shall be doubled or fines shall be imposed. For

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4 ‘Three wastes’ refers to waste water, waste air and solid waste.
better reuse and recycling of three wastes by the whole society, provinces and cities should establish waste exchange facilities and centralized treatment, reuse and recycling centers.

2.2.3.6 ENVIRONMENTAL RESOURCE TAX

Environmental resource tax is still a new concept in China. Influenced by the traditional planned economy and environmental management, the role of taxation policies for protecting the environment has been weak in China. Existing environmental resource taxation policies are still rough. The taxes are incorporated into other taxes (such as consumption tax, resource tax, etc.) and are limited in adjusting or influencing the markets of environmental resources. Current consumption tax helps protect the environment by regulating oil products and the complementary products (e.g., motorcycle and car) which make up a small proportion of energy consumption. Because coal and other consumption goods causing environmental pollution are not taxed, the effect of environmental resource tax for environmental protection is insignificant. Another obvious shortcoming of this policy is that it does not tax resources such as water, grassland and forest, therefore a holistic protection of all resources cannot be achieved.

2.2.3.7 PAID ACQUISITION OF POLLUTION DISCHARGE RIGHT AND ECOLOGICAL COMPENSATION

Paid acquisition of pollution discharge right is needed in the development of market economy. This market-oriented tool is essential for achieving the goal of total pollution control. At present, this economic instrument is being researched jointly by the Ministry of Finance and SEPA and piloted in some areas and sectors. For instance, cities such as Shanghai, Benxi and Shaoxing have established a market for primary allocation of pollution discharge right and permit trade after acquiring some experiences in the adoption of discharge permit certificate for water pollutants. Jiangsu Provincial Environmental Protection Committee issued in 2004 Notice about the Working Plan for the Pilot Experiments of Paid Allocation and Trade of Water Pollutant Discharge Right in Jiangsu Province (Suhuanwei [2004] 6). In Shanghai, since the late 1980s, paid transfer of water pollutant discharge permit has been initiated in the upper reaches of Huangpu River (a protected water source area). This practice is still limited to the paid transfer of pollutant limit among enterprises and does not involve paid use of the permit primarily allocated. In 2001, Xiuzhou District (Jiaxing City, Zhejiang Province) issued Provisional Methods for Water Pollutant Total Quantity Control and Pollutant Discharge Permit Trade to start the paid use of primary allocated right of water pollutant discharge. This is the real start of paid allocation and uses of pollutant discharge right in China.

Ecological compensation is another economic instrument that is being promoted in China. It was as early as in 1996 that efforts have been made in this regard. The practice follows the principles ‘developers in charge of protection’, ‘damagers in charge of recovery’, and ‘beneficiaries in charge of compensation’. Ecological and
environmental compensation fee shall be collected for exploitation and use of envi-
ronmental resources (e.g., mines, hills, forests, groundwater, etc.) by financial au-
thorities and environmental protection agencies. The collected fee shall be used
exclusively for the recovery of ecological environment and pollution control. China
has gained many experiences practicing ecological compensation and has devel-
oped some good models and mechanisms. However, there is still room for im-
provement. The responsibility is vaguely determined, the implementation system is
confusing. It is necessary to establish a systematic mechanism at national level so
that legal instruments, government and market tools can be integrated to solve
problems at any level. This system will be a multi-level compensation system.

2.2.4 Other Instruments

- Voluntary tools

Voluntary tools, including ISO 14000 certification, environmental labeling and
cleaner production, are being paid more and more attention by governments and
polluters. The public is increasingly participating in environmental management
and supervision of the environmental performances of both governments and en-
terprises.

Nevertheless, voluntary tools are not very important among China’s environmental
policies. SEPA has a scheme offering the title ‘National Environmentally Friendly
Enterprises’, but by early 2006, only less than 200 enterprises have been given the
title.

Some listed companies voluntarily report their environmental performances. When
China Business Council for Sustainable Development (CBCSD) was set up, most
of the registered companies are foreign companies. In general, domestic enterprises
have poor environmental awareness and their environmental performances are not
satisfying. At present, making contact with overseas market with well-developed
environmental systems and doing business with transnational companies situated in
China may be one of the major driving forces for further improvement.

- Environmental management SYSTEM (ISO14000 certification system)

In 1997, General Administration of Quality Supervision, Inspection and Quarantine
(ASIA) introduced ISO14000 certification system as a national standard. Later,
ISO14001 certification was introduced into China’s national standard system.
There is also a national certification and test system consisting of national appraisal
institutions and auditors. In 2004, the number of certified companies has exceeded
8,000, ranking the second most in the world (second to Japan). Given the fact that
China ranked the world tenth in 2001 and there were merely around 1,000 certified
companies, this progress is impressive. This owes much to the tax and fee
incentives offered by Chinese government (mostly in the form of value-added tax reduction or tax return) to encourage enterprises to get certified.

Sepia’s Environmental Certification Center was established in 2003. It is financially independent and accepts applications of ISO14001 certificate. It has 40 ISO14001 auditors. Applications are mainly launched by small and medium-sized companies that have been growing rapidly and have entered the global market. The standard appraisal fee for ISO14001 certification is 30, 00 Yuan. There are over 100 other certification entities, including companies engaged in ISO9000 certification. Over 300 experts from universities and research institutions work as auditors.

- Cleaner production (CP)

The concept of cleaner production was introduced to China in 1980s. Since then, SEPA’s efforts for promoting cleaner production have focused on pilot project in enterprises, training, capacity building and policy recommendations. Having gone through the initial locally-driven stage, SEPA published Proposal 1997 for Promoting Cleaner Production in China, requiring the local environmental protection authorities to incorporate cleaner production into their environmental management policies.

On the second National Conference on Industrial Pollution Control held in 1993, the concept of cleaner production for industrial pollution control was put forward. So far, a total of 21 cleaner production centers have been established nationwide, including one national center, 4 sector centers (petrochemical, chemical, metallurgy and aviation) and 16 local centers. In addition to these, cleaner production teams have been set up in many organizations and cleaner production plan have been developed. At the same time Chinese government has provided favorite legal foundation for the promotion of cleaner production. For instance, Promotional law on Cleaner Production was issued on January 1st 2003. It has been a strong driving force for the development of cleaner production.

Research shows that cleaner production has reduced pollution and enhanced productivity of domestic enterprises in China. Cleaner production has reduced environmental pollution by 20% and is generating economic return of about 500 million yuan every year. In addition, some environmental management laws, regulations and processes, such as environmental impact assessment process and ‘Three Simultaneity system, encourage enterprises to introduce cleaner production in an effort to improve their environmental management.

- Product environmental labeling

China Certification Committee for Environmental Labeling (CCEL) was established in 1994 jointly by SEPA and General Administration of Quality Supervision, Inspection and Quarantine (AQSIQ). CCEL possesses specialists in all needed
disciplines, capable of the development, supervision and implementation of environmental labeling. CCEL is qualified by SEPA as the only institution in China to carry out third party certification and to award China’s environmental labeling. Annual check and random sampling check are measures for maintaining good standards. Between 1994 and 2005, 800 enterprises have been appraised and 12,000 products were awarded various environmental labels.

2.3 Assessment of Existing Policy Instruments

2.3.1 Experiences

In general, China has witnessed six major changes in industrial pollution control in the past three decades: 1) from end-of-pipe control to process control; 2) change of pollution control area: from industrial point pollution sources to urban areas and catchments (integrated management); 3) change of methods: from concentration control to combined concentration and total quantity control; 4) change of pollution monitoring: from manual sampled monitoring to automatic ongoing monitoring; 5) change of pollution control management: from simple administrative approaches to approaches combining legal instruments, administrative instruments, public opinion, public participation and economic instruments; 6) change of investment: from singular government investment to varied financing sources. With the six changes, industrial pollution control has been effective. The increase of pollution control has been generally restrained and the discharge of major industrial pollutants has been dropping. Major experiences gained during the process of industrial pollution control can be summarized as below:

- Various pollution control instruments have become the essential elements of China’s environmental policy system and are gradually incorporated into China’s macro economic, industrial and sector policy systems. Among the various environmental policies adopted in China, the weight of industrial pollution control instruments or environmental policies employing economic tools or instruments is high and still increasing. In addition, some macro economic policies (e.g., financial, taxation and fiscal policies) also start to incorporate environmental protection measures.

- The foundation of industrial pollution control is strengthened instruments and systems. Industrial pollution control must have sufficient environmental management instruments. Strengthened environmental management system is the foundation of industrial pollution control. Experiences of industrial pollution control gained during the Ninth-Five-Year-Plan period suggest: on the one hand, existing industrial pollution control instruments (e.g., EIA, Three Simultaneousness, pollutant discharge permit, pollution discharge fee, etc.) should be continuously improved; on the other hand, proper new instruments of environmental management, especially voluntary instruments and economic instruments, should be introduced. Instances include the pilot experiments of pollution discharge fee,
public information closure by enterprises, EIA and Three Simultaneousness, etc.

- Economic instruments have raised fund crucial to the work of environmental protection in China. Having insufficient financial resources and facing severe environmental challenges, China needs the raised fund to restrain the environmental deterioration following the rapid economic development. The fund has made great contribution and has built a sound capacity for future environmental management.

- Strengthening environmental supervision staff is the guarantee of industrial pollution control. Industrial pollution control requires an environmental supervision staff team that are highly qualified, well equipped and can strictly enforce the law. In recent years, China has carried out annual check of the enforcement of laws on environmental protection, air, water and solid pollution control. This has promoted pollution control in key areas. China’s Criminal Law has specific provisions on crimes of damaging environmental resources. China issued Provisional Regulations on Punishment for Law Infringement and Indiscipline Behaviors against Environmental Protection, and has established a responsibility system for environmental protection administration and law enforcement. For three consecutive years, China carried out theme activities every year aiming at punishing and improving pollution discharge enterprises and protecting public health. As a result, over 75,000 infringement cases against environmental protection laws were reviewed and handled; 16,000 enterprises illegally discharging pollution were shut down, and over 10,000 environmental pollution cases were blacklisted for reinforced supervision and treatment. China carried out supervision activities specifically aimed at environmental protection of mining sites and marine ecosystem, and many infringement behaviors were legally charged. Without a strong enforcement team, the control activities of industrial pollution could not be supervised. When the range of industrial pollution is expanding and the requirement of environmental supervision becomes stricter, the team of environmental supervision has to be strengthened.

- The adoption of industrial pollution control instruments has raised the environmental awareness of governments at all levels, enterprises and the whole society. The adoption of economic instruments has significant social impacts. To some extent, it has promoted the idea of paid use of environmental resources and services and has raised the whole society’s awareness of environmental protection.
2.3.2 Existing Problems

2.3.2.1 Scientific View of Development Has Not Been Fully Turned into Action

Chinese government has put forward some development concepts, such as the ‘scientific view of development’, ‘establishing a resource-saving and environmentally friendly society’, ‘achieve fast and good development’, ‘approach of new industrialization’, etc. However, enterprises, residents and even some local officials do not fully understand the significance of these national policies and have not realized the severe damages caused by environmental pollution. Now, words are still louder than actions. People still cannot incorporate environmental considerations into their real life and production and cannot spontaneously consider the impacts of their behaviors on the environment. A decision making system integrating both environment and development has not been formed. Environment and resources are often sacrificed in the pursuit of immediate and localized interests.

2.3.2.2 Management System Needs Further Improvement

Environmental management system needs further improvement. The system of unified supervision, management and coordination between different departments needs to be further strengthened. Take water pollution control as an example, the planning departments shall carry out integrated and overall planning and incorporate pollution control as one of the plan elements. Planning, financial, fiscal, scientific, and educational departments shall allocate specific funds for water pollution control, environmental supervision, scientific research etc. Commercial, taxation and financial departments shall actively develop technical and economic policies to give policy, fund, technology and human resource supports for water pollution control. Departments in charge of land resource, construction, agriculture, water conservancy and forestry shall have clear responsibility description and closely coordinate with each other to promote the construction and operation of wastewater treatment facilities, maintain the supply of water resources and the self-cleaning capacity of surface water. In addition, the local governments have not fulfilled their responsibility of local environmental quality and are not paying due attention to environmental protection. Sometimes they pursue short term economic returns and ignore environmental protection. Local officials’ environmental performances have not been considered when measuring their achievement and they have not fully understood the importance of constructing environmental infrastructure.

2.3.2.3 Policy System Needs Further Improvement

China needs a well-developed environmental and economic policy system to cope with structural environmental pollution. The existing policy system is fragmentary and is less effective than needed. This situation cannot meet the demand of China’s structural adjustment in this new age. In the future, the policy system shall include both positive and negative incentives. First, China shall employ positive economic instruments to restrict the growth of pollution-intensive economic activities and encourage technological development. These include increase of budget...
investment, bond policy, the central treasury’s discount interest rate, subsidy, favorite tax rate, financial guarantee, etc. For sectors that endure loss due to environmental protection activities, favorite and compensation policies shall be in place. Favorite policies shall be developed to encourage pollution-intensive enterprises to relocate and to establish pollution-free or pollution-less pilot areas. With regard to negative incentives, the range of consumption tax shall be expanded to include energy tax. Fee collection of mine resource compensation shall be reformed. Financial subsidy shall be promptly cancelled for some pollution-intensive sectors or enterprises. Compulsory measures shall be in place for environmentally harmful industries to limit their development. Enterprises that are pollution intensive, small-sized and have difficulties in treating pollution shall be restricted.

2.3.2.4 INSUFFICIENT CAPACITY BUILDING
At present, environmental supervision faces several challenges such as heavy tasks, poor equipment and insufficient staff. Therefore, it is hard to meet the goal of environmental protection. The capacity of environmental law enforcement varies at different levels (see Figure 3.1). In general, environmental supervision at provincial level is better than at district level; and at district level is better than at county level (but there are 154 counties in China still having no specific institutions for environmental super-vision). Regionally, environmental supervision in the East is better than in the central part and in the Central is better than in the West. This is one of the major reasons that ecological deterioration and environmental pollution are far more severe in the central and the western regions.

Figure 9. Institution, staff and equipment for environmental supervision in China

<table>
<thead>
<tr>
<th>Level or region</th>
<th>Average number of staff in service per organization</th>
<th>Average equipment per enforcement institution</th>
<th>Average equipment per thousand enforcement staff</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of transport equipment</td>
<td>Number of communication equipment</td>
<td>Number of evidence equipment</td>
</tr>
<tr>
<td>Province</td>
<td>21.6</td>
<td>4.0</td>
<td>9.7</td>
</tr>
<tr>
<td>District</td>
<td>19.0</td>
<td>3.3</td>
<td>6.1</td>
</tr>
<tr>
<td>county</td>
<td>11.8</td>
<td>1.3</td>
<td>1.8</td>
</tr>
<tr>
<td>Total</td>
<td>12.7</td>
<td>1.6</td>
<td>2.4</td>
</tr>
<tr>
<td>Eastern</td>
<td>13.6</td>
<td>2.1</td>
<td>3.7</td>
</tr>
<tr>
<td>Central</td>
<td>14.4</td>
<td>1.6</td>
<td>1.9</td>
</tr>
<tr>
<td>Western</td>
<td>9.9</td>
<td>1.1</td>
<td>1.7</td>
</tr>
</tbody>
</table>

2.3.2.5 INADEQUATE ENFORCEMENT OF POLICY INSTRUMENTS
The biggest problem facing China’s industrial pollution control is the inadequate implementation of policies in some enterprises and local areas. Environmental
standards and related policy instruments, especially pollution discharge fee system, are not complementary and coordinative, and their enforcement is extremely weak. Causes of this situation are many, including local protectionism and biased focus on economic growth. In fact, policy implementation appears better in provinces with better economic power. Policy implementation is also associated to public awareness, which is shown in people’s response and complaints to environmental protection authorities. To certain extent, people’s environmental awareness may be associated to their income level and perhaps educational level. Overall, policy enforcement in the poorer central and western regions falls behind that in the eastern and coastal regions. Improvement of environmental quality follows the same pattern.

2.3.2.6 LACK OF ENFORCEMENT SUPERVISION
Main symptoms of deficient enforcement supervision are:

- Most environmental protection agencies at county level have no particular offices and full-time staff for law enforcement. This hinders them to carry out routine guidance and supervision of environmental enforcement activities. Although provincial and city environmental protection authorities have special offices and full-time staff for law enforcement, inadequate attention has been paid on the establishment of an effective law enforcement system and research on this topic is also insufficient. Lack of guidance and supervision of internal administrative behaviors also limits their role to be fully played.

- In present practices, most of the local environmental protection authorities have not separated inspection activities from punishment activities. This means that the same staff in the same enforcement organization in charge of the investigation of a case are also responsible for dealing and punishment of the case. This approach lacks supervision and can hardly guarantee the legality and justice of the handling or punishment of the case.

- Supervision bodies’ right to know environmental information cannot be fully guaranteed. In China, the system of right to know environmental information has been burgeoning, but it still has a long way to go and cannot fully meet the public’s strong need for environmental information. Several areas need to be improved: the responsibilities of administrative enforcement departments to guarantee the public’s right to know are not clearly defined; information disclosed from one single side cannot effectively guarantee the public’s right to know; the right-to-know system is not closely connected to the system of public participation.
2.4 Suggestions on China’s industrial pollution control policy

China’s industrial pollution control policy was initially formed after United Nations Conference on Human Environment in 1972. United Nations Conference on Environment and Development was held in 1992 and China took the lead in introducing the concept of sustainable development, promulgated in succession approximately 10 environmental polices including China’s Agenda 21 and thus laid the status of the basic national policy for environmental protection. The “Programme for Ninth Five Year Plan of National Economy and Social Development and 2010 Perspective Objective” in 1996 listed for the first time the sustainable development strategy as a national basic strategy and realized the strategic transformation into sustainable development road. In the following 10 years, China’s industrial pollution control policy has developed rapidly and all sectors and all places pushed the implementation of various policies at different policy levels by means of policies, strategies, planning, laws and regulations, systems and economics. China has accumulated rich experience in the practice of industrial pollution prevention and control, achieved great effects in industrial pollution prevention and control and basically restrained the rise trend of industrial pollution.

With the new stage and opportunity, China’s industrial pollution prevention and control faces a new challenge. The “Outline of the Eleventh Five Year Plan for National Economic and Social Development of the People’s Republic of China” clearly points out the energy saving and emission reduction goals, e.g. by 2010, the total emission of key pollutants will be reduced for 10% and energy consumption per unit gross domestic product will be reduced for 20%. In order to achieve these indicators, our country’s industrial enterprises must adapt to the historical change and implement scientific concept of development in the Eleventh Five Year Plan period and a future period of time. At the same time they shall draw on the advanced foreign and domestic experience and implement the management mode in combination with Chinese national situation so that the industrial enterprises bring self regulation and control and self inspiration into play and truly, consciously, voluntarily and independently participate in and push environmental protection work by the most favourable means and effectively control industrial pollution. From guiding ideology, formulation of China’s industrial pollution control policy shall proceed from comprehensively implementing the scientific concept of development and building resource saving and environmentally friendly society, focus on pushing the “three changes” of environmental protection and comprehensively use legal, economic, technical and necessary administrative methods to resolve the environmental problem. It shall continuously improve environmental management system, mechanism and legal system, strengthen environmental legislation and improve environmental law and regulation standard system; implement environmental impact assessment system, carry out the strictest total pollution control and emission reduction target responsibility system and accelerate pushing the key environmental management system such as pollution discharge license system;
enlarge innovation and experimental spot of environmental economic means, promote rational development and utilization of environmental capacity and environmental protection and ensure good and rapid economic development.

2.4.1 Improve the law and regulation standard system for industrial pollution control

According to the “Eleventh Five Year Plan for National Construction of Environmental Protection Laws and Regulations”, in the construction of law and regulation systems, we shall formulate the national basic law for environmental protection—“Environmental Law” by amending the “Environmental Protection Law”, build ecological protection and nuclear safety legal framework and improve pollution prevention and control laws and regulations; in legislation content, we shall adhere to having human as fundamentality, respect the citizens’ environmental rights and interests, smooth the public participation channel and establish information disclosure system; through environmental tax and charge reform and enterprise environmental protection cost internalization, increase punishment, strengthen law enforcement means, define civil liabilities and resolve the problem of “low law breaking cost, high law observing cost and higher law enforcing cost”; reinforce government’s environmental responsibility and establish the environmental assessment and evaluation system for the political achievements of the Party and political leaders and cadres; and standardize administrative management behaviours and establish the administrative accountability system for environmental protection etc.

Implement the environmental protection law and regulation system and fill in the legal gap in the environmental protection field. From the angle of pollution control, this is manifested by the following aspects: 1) formulate related laws and regulations, e.g. “Toxic and Hazardous Chemicals Control Act”, to fill in the gap in certain aspects of the pollution control field; 2) formulate related laws and regulations, e.g. “Law of Compensation for Damage of Environmental Pollution”, to further define the civil liabilities of environmental infringement; 3) formulate related laws and regulations, e.g. “Method for Managing the Importation of Solid Waste”, to fulfil international environmental conventions; 4) formulate related laws and regulations, e.g. “Management Rules for Environmental Monitoring”, to improve environmental management system and standardize law enforcement behaviours.

In addition, we shall formulate supporting laws and regulations and reinforce operability. 1) If detailed regulations need to be made for the behaviours, types and amplitude range of the administrative punishments specified in the higher level law, e.g. to define the specific amount and amplitude of “fines” in the “Law of the People's Republic of China on Prevention and Control of Pollution From Environmental Noise”, it is necessary to formulate the “Administrative Punishment Method for Prevention and Control of Pollution From Environmental Noise”; 2) Formulate implementary laws and regulations and specify specific system and measures for the fundamental regulations of the higher level law, e.g. formulate
the “Management Method for Environmental Impact Post-Assessment of Construction Projects” in accordance with the regulations of the “Law of the People’s Republic of China on Environmental Impact Assessment” on environmental impact post-assessment system; 3) Detailed implementation rules or individual laws and regulations are formulated for the laws, e.g. “Management Rules for Prevention and Control of Emission Pollution from Motor Vehicles”; 4) carry out through cooperation the revision of the laws and regulations such as “Law of the People’s Republic of China on Prevention and Control of Water Pollution (Amendment)” and “Law of the People’s Republic of China on the Prevention and Control of Atmospheric Pollution (Amendment)” and push the revision demonstration work of “Environmental Impact Assessment for Plan” and “Environmental Protection Law” as soon as possible.

Additionally, we shall continuously improve the environmental standard system. Carefully implement the “Eleventh Five Year Plan for National Environmental Protection Standard” and establish and improve the environmental quality standard and pollutant discharge standard. At the same time, accelerate the formulation of the technical specifications and standards applicable to total pollutant emission calculation and control, cleaner production audit, ecological protection, environmental engineering construction project, environmental labelling and environmental protection product certification, environmental information and file management, environmental pollution health damage judgment, recycle economy and ecological industry etc.

### 2.4.2 Further intensify unified national environmental supervision and management system

With continuous aggravation of environmental pollution and ecological damage in China, environmental protection faces an unprecedented huge challenge in building a well-off society in an all-round way. Environmental protection work keeps pace with the times and its range is constantly expanded. Ecological protection task is increasingly burdensome and the existing environmental protection management system already does not adapt to the new situation of environmental protection. Therefore, in the next session of government institution adjustment or reform, we must take the favourable opportunity in the present environmental protection situation, further strengthen the national environmental unified supervision and management system according to the requirements of 17th CPC National Congress spirits, explore the system of “Super Ministries” for environmental protection, realize the organic unification of national environmental protection function configuration and lay the basis of management system for the environmental protection in the new stage.

First, we shall push the reform of unified environmental supervision and management system in steps: Step 1, in the next session of government institution adjustment or reform, set up the Ministry of Environmental Protection on the basis of the State Environmental Protection Administration, separate out the ecological
protection supervision and management function in the present State Forestry Administration and the Ministry of Water Resources and arrange it into the Ministry of Environmental Protection to preliminarily realize the unified supervision and management of environmental protection and have the Ministry of Environmental Protection realize the “wing to wing flight” of pollution control and ecological protection. Step 2, in the governmental institution adjustment in 2012, it is recommended to establish the Ministry of Environment into which all ecological protection responsibilities are arranged so that environmental protection starts to change from pollution prevention and control to ecological protection. Step 3, in the government institution reform in 2017, the Ministry of Land and Resources, the Ministry of Water Resources, the State Forestry Administration and the Ministry of Environment are merged to establish the Ministry of Environment and Resources which will be a powerful authority.

Secondly, strengthen the unified supervision and management function of water environmental protection in all seriousness. It is recommended to mainly resolve the unified supervision and management problem for water environmental protection in the next session of government institution reform. The water environmental protection management system shall mainly resolve the problems in the three levels of national management system, river basin management system and urban water environmental management system. The task of the next session of government institution reform shall first smooth the water environmental protection management system at the level of Central Government and have the Ministry of Environment manage water environmental protection and supervise and manage water environmental quality in a unified way.

Thirdly, strengthen the unified supervision and management function of ecological protection in all seriousness. The Ministry of Environment has the existing functions of the State Environmental Protection Administration and additionally the ecological protection supervision and management functions separated from the present State Forestry Administration and Ministry of Water Resources such as national major ecological construction project supervision and management, water and soil conservation, marine environmental protection, wild life preserve, desertification prevention and control, wetland protection, nature reserve construction management and implementation management of global and international environmental conventions etc. For this reason, we suggest making a resolution to resolve the management system problem for serious disengagement of ecological protection from ecological construction in the next session of government institution adjustment and reform and the environmental protection department shall manage the leading environmental problems in China like water and soil conservation. We shall reconfigure the management functions of ecological protection and construction of the Ministry of Water Resources, the Ministry of Agriculture, the Ministry of Land and Resources as well as Bureau of Water Environmental Protection, Bureau of Marine Environmental Protection, Department of Natural Ecological Protection, Department of Forest Plantation, Department of Wild Life Preserve,
Department of Water and Soil Conservation and Department of Construction Project Management under the Ministry of Environment in accordance with the “National Programme of Ecological Environmental Protection” and “National Plan of Ecological Environmental Construction”.

2.4.3 Accelerate the change of traditional economic development model

Make efforts to accelerate the change of traditional economic development mode and push “structural type” energy saving and emission reduction: first, increase the weight of the service industry among the three major industries; secondly, adjust the proportional relations among different industries and increase the weight of new industry; thirdly, innovate and promote the technical and process level of all industries and promote industrial optimization and upgrading.

(1) Focus on the key point and drive stock adjustment with increment optimization. The existing investment increment is the future capital stock and optimizing the existing investment increment is adjusting the future capital stock. In the Eleventh Five Year Plan period, the new assets formed by fixed asset investment will still be a half of the industrial fixed assets in 2010. Therefore, increment optimization is the key to accelerating industrial restructuring and pushing energy saving and emission reduction. From now on, it is necessary to strictly supervise and control new projects, to ensure that fixed asset investment adheres to high starting point and high standard, conforms to the requirements of new type industrialization and meets the national industrial policy and industrial development need and to optimize investment orientation and structure. On this basis, optimize the allocation of productive force of new projects and match the site selection and layout of new projects with environmental capacity, resource element and infrastructure.

(2) Break through the difficulty. Compress backward productive capacity and control the development trend of the high consumption, high pollution and resource type industries. Practice shows that backward productive capacity is the main cause for excessive resource consumption and serious environmental pollution where the part of productive capacity with the most backward technique and process and at the end of this industry consumes even more resources and causes more serious environmental pollution. According to estimate, in many regions, the added value realized by these backward facilities and enterprises is only 10% local industrial added value but its pollution discharge is more than 20% and consumption increase of energy resources is much higher than the proportion of its added value. Implementing bottom elimination for the enterprises with the most serious pollution and resolutely compressing backward productive capacity are the need of sustainable, rapid, coordinated and sound development of economic society and the key of key for energy saving and emission reduction.

(3) Emphasize the key point and promote the traditional industrial level. The traditional industries are the subject or our country’s economy and the subject of
re-source consumption and environmental pollution. Use new and high technologies and advanced appropriate technologies to promote the traditional industries, promote the economic development from being mainly driven by investment of funds and material elements to being mainly driven by technological progress and human capital, change the previous practice of advancing industrialization by plentiful elements, pay attention to investment development towards technical innovation and industrial optimization direction, pay attention to technical updating and equipment improvement of the traditional manufacturing industry, all out develop and use advanced economically rational, low resource consumption, less pollution emission and ecologically environmentally friendly technologies and make technical innovation become the powerful force for driving industrial structure optimization upgrading.

2.4.4 All out develop recycle economy and take the new type industrialization road

China’s industry shall take a new type industrialization road with high scientific and technology content, good economic benefit, low resource consumption, less environmental pollution and sufficient exertion of human resources, and less environmental pollution and good economic benefit are just the “win-win” result needed by the industrial pollution prevention and control. Extensive economic development and irrational economic structure pose a huge environmental pressure to the environment in some Chinese regions and considerable consumption of resources and energies and large scale production and wasting is the general feature of economic growth mode. It is suggested to, through technical progress, increase resource and energy utilization efficiency and economic production efficiency, reduce resource and energy consumption and pollutant production, mitigate ecological damage, make beneficial utilization of the waste produced form the production and product consumption, fundamentally change the traditional economic growth mode and establish the recycle type economic mode. Minimize the pressure on resource environment posed by human activities. In the key industries and key enterprises, all out develop recycle economy, unifiedly arrange the planning and construction of development zones with recycle economy concept, increase resource utilization efficiency and reduce regional pollution emission intensity. Increase elimination of backward equipment, push industrial restructuring and technical upgrading and reduce pollution production. Mainly eliminate small thermal power generating units, vertical kiln cement production line and the backward equipment in the iron and steel and chemical industries, promote close, shutdown, renovation or upgrading of high energy consumption and high pollution enterprises, increase resource utilization efficiency and reduce pollution production in the production process.

China’s industrial development shall take a new type industrialization road and environmental improvement is of huge potential. According to calculation, if China’s energy utilization can reach the advanced world level, 300,000,000t standard coal consumption can be reduced annually; use of approx. 30,000,000,000m3
new water can be reduced, corresponding to a quarter of the present industrial water utilization, and the resultant environmental benefit is enormous. Additionally, the emission intensity of sulphur dioxide per unit GDP presently in China is 8 times that in the United States, 26 times that in Germany and 81 times that in Japan, and pollutant reduction has a large space. We shall cooperate with trades society, start to measure and calculate the pollution production intensity for the heavy pollution industries and on the basis of measurement and calculation of the pollutant quantity produced from the same products and different processes in the industry and through comparison with foreign and domestic advanced level, propose the suggestion on the catalogue of backward processes, equipment and productive capacities to be eliminated. Pollution prevention and control work is to take the comprehensive measures such as promoting the fundamental change of the industrial economic growth mode, industrial restructuring and energy structural optimization to deepen industrial pollution prevention and control, push the industrial enterprise to enhance scientific and technological content, increase resource utilization efficiency and fundamentally improve environmental quality. While maintaining sound and rapid economic development, ensure the gradual realization of environmental protection objective and establish the harmonic relation model for economy and environment.

By developing recycle economy, push the recycle symbiosis between industries, save costs and promote the market competitive power of enterprises and regional industries. While the regional industrial system is continuously improving the industrial scientific and technological level and optimizing industrial structural and energy structural adjustment, actively participate in the material and energy cycle between different industries in the whole region through unified planning and market guidance, reduce regional energy consumption and pollution emission and realize the coordinated development of the whole region.

Innovation technology pushes enterprise transformation. In the industrial product design and production process and production use process, consider the size of resource consumption. Accelerate technical innovation and use new technology and new concept to push the enterprises to stride forward to energy saving and environmental protection. Change from high energy consumption and high material consumption to low energy consumption and low material consumption, endeavour to make labour intensive and resource intensive enterprises transform and develop to modern new and hi-tech enterprises and change from scaled production to high end design, integral and high added value brand products. Reasonably design the enterprise production scale and operation model, produce less energy consumption products, use modern information technology, change management and operation mode, reduce manufacturing cost and promote the building of energy saving and environmentally friendly enterprises.
2.4.5 Establish and improve the key environment management system

Presently, we shall mainly strictly implement the environmental impact assessment system, implement the strictest total pollution emission control and environmental goal responsibility system and accelerate the construction and improvement of the important environmental management systems such as pollution emission license system.

(1) Comprehensively implement the total pollutant control system

China’s industrial pollution control shall pay equal attention to total pollution reduction and actual environmental quality improvement. The core of the total capacity control is to gradually reduce the present total pollutant emission to be below the environmental capacity so as to truly realize the goal of environmental quality improvement. Through general investigation for pollution, define the share of industrial pollution in the regional pollution and strictly control the industrial pollution from further affecting the regional environment. In industrial pollution control, not only include the heavy pollution industries into emission reduction but also carry out comprehensive emission reduction for all industries and change from individual total pollutant control to coordinated control of multiple pollutants.

Environmental capacity resource is limited and is a valuable scarce resource. At present, while allocating the total pollutant emission control indices, we still follow the practice of planned economic system and due to uncompensated allocation and use, application for pollution emission indices is always the more the better. Once the environmental capacity total quantity control system is implemented, enterprises can not win good economic benefit and environmental benefit in the condition of limited environmental capacity resources, unless they realize the fundamental change of growth mode by improving resource utilization efficiency, reducing costs and strengthening management etc. In the condition of a certain environmental capacity, strictly control the examination and approval for environmental impact assessment of construction projects and control new pollutions from the source. Make implementing the total quantity indices the preconditions for examination and approval for environmental impact assessment of construction projects and for the new construction projects in the regions where the total quantity indices are insufficient, it is necessary to obtain the total quantity indices by eliminating backward technology and trading pollution emission rights etc, and otherwise the environmental impact assessment document shall not be approved. The environmental impact assessment for projects of the high energy consumption and high pollution industries undergo strict examination and approval. In order to vacate greater space for economic development, try to establish the paid mechanism of initial pollution emission right allocation and do not allow the enterprises to occupy the limited environmental capacity resources without compensation. Make the external diseconomy for occupation and utilization of environmental resources internalized, sufficiently utilize market mechanism and economic lever to promote the implementation of environmental capacity total quantity control plan, reduce
the execution cost of the total quantity control plan and promote the “three win” of economic, environmental and social development.

In accordance with the regional industrial pollution level and environmental capacity and in conformity with related national laws and regulations, study and formulate differential local standard systems (including emission standards, quality standards and monitoring standards etc), sufficiently utilize and exert the function of the market mechanism-based economic policy to push the strategic transformation of environment and development, mainly including environmental tax, resource and energy tax, green credit, environmental insurance, ecological compensation, pollution discharge trade etc. When considering future development, enterprises may calculate environmental treatment cost and benefit and determine appropriate production technical and address in accordance with own pollution level and local standard system so as to realize rational configuration of regional environmental capacity and emission quantity through market mechanism and promote the rational layout of regional industries.

(2) Strictly implement the environmental impact assessment system

Presently, the key to strengthening environmental impact assessment system is implementation. It is necessary to change the situation of laying stress on examination and approval and ignoring supervision and management, commencement without approval and construction without approval and practically realize concurrent design, concurrent construction and concurrent operation and use of the pollution prevention and control and ecological protection measure proposed in the environmental assessment and the principal parts of construction projects. First, make planning environmental impact assessment the main channel for the environmental protection departments to participate in comprehensive decision making and on the basis of experimental spots, comprehensively push the environmental impact assessment for various plans, establish and improve the expert examination mechanism for planning environmental impact assessment, increase the ability to implement planning environmental impact assessment and decision making environmental impact assessment, prevent environmental pollution and ecological damage from the source and make the point of application for environmental protection go from microscopic level into macroscopic level. Secondly, make total quantity reduction indices the preconditions for examination and approval of environmental impact assessment for construction projects and adhere to “driving the old with new” and do not allow new construction projects to break through the total quantity control indices. Take the “regional limited approval” measures and suspend examination and approval of new construction projects with additional total pollutant emission for the regions where the total quantity control indices are exceeded. Thirdly, strengthen the environmental management for the construction projects in the key industries. Carry out departmental interlock and control admittance for the ten major industries under the national macroscopic readjustment and control including textile, automobile, electric power, coal, iron & steel, cement,
coke, iron alloy, electrolytic aluminium and calcium carbide. Fourthly, strengthen
the “three simultaneity” management and strictly control project acceptance. Those
that do not implement the “three simultaneity” should be immediately ordered to
stop production; for the trial production enterprises, mainly check the synchronous
operation of pollution prevention and control facilities and stop trial production of
those that do not operate normally and order them to make correction and rectifica-
tion within the limited time. Fifthly, carry out special inspection for the national
execution of environmental impact assessment, comprehensively clear up and rect-
tify new commencement projects and increase the punishment for construction
without approval, commencement without approval, operation without acceptance
as well as illegal examination and approval and the examination and approval by
bypassing the immediate leadership. Those that violate environmental impact as-
essment and “three simultaneity” management system shall be resolutely ordered
to stop construction and production according to the law and examination and ap-
proval of all new construction projects of the enterprise group shall be stopped to
practically increase the execution rate of environmental assessment and “three
simultaneity” system.

(3) Implement the strictest environmental goal responsibility system

To achieve the environmental protection goal of the Eleventh Five Year Plan, it is
necessary to make a great breakthrough in implementing the total pollutant emis-
sion control, environmental goal responsibility system and responsibility investiga-
tion system. In the Eleventh Five Year Plan period, total emission of major pollut-
ants shall be reduced for 10% and this is the solemn commitment made by the
Party Central Committee and the State Council to all the people in China and is the
bounden responsibility of the environmental protection departments. First, by con-
trolling pollution “increment” and reducing pollution “stock”, maintain total pollu-
tion quantity in the allowable range of environmental capacity. Secondly, imple-
ment various measures of the environmental goal responsibility system. Mainly
define evaluation requirements, work out evaluation scheme, establish social publi-
cation system and build the favourable atmosphere for responsibility implementa-
tion. Make known to the public the situation of index completion in all places and
accept supervision from all the society. Thirdly, establish and improve the basic
system for total quantity control and goal responsibility system as soon as possible,
including: establish and improve scientific emission reduction index system, estab-
lish and improve accurate emission reduction monitoring system and establish and
improve strict emission reduction evaluation system.

(4) Accelerate pushing the implementation of pollution discharge license system

First, formulate and improve the laws and regulations and associated administrative
methods for implementing the pollution discharge license system. Only when the
State attaches great importance and provide law and regulation support, can the
pollution discharge license management be resolved. For this reason, first we shall
formulate and improve the regulations on license management and formulate and issue the “Management Rules for Pollution Discharge License” so that the pollution discharge license is fixed through legal procedure. Secondly, strengthen the supervision and post-license management for pollution discharge license. Well shall strengthen the construction of monitoring ability and metering means and promptly and accurately learn the environmental pollution discharge from the enterprises; strengthen license management work to adapt to the need of base level environmental management, carry out different classification management according to the size of environmental impact, i.e. use “Pollution Discharge License” or “Temporary Pollution Discharge License”, “Pollution Discharge Permission Approval Certificate” and “Pollution Discharge Permission Notification” for management. Thirdly, strengthen the link up with other related environmental management systems, e.g. link up with environmental impact assessment system, in combination with the system of treatment within limited time, in combination with pollution discharge charging system and in combination with total quantity control system etc.

2.4.6 Strengthen environmental economic policy reform and innovation

Presently, the key point of environmental economic policy study and practice is: propose the Chinese Environmental Economic Policy System conforming to the market economic conditions through study, select financial, environmental tax, ecological compensation, pollution discharge trade and green capital market policies etc to carry out experimental spots, make efforts to make a breakthrough in environmental financial and tax policy, regional ecological compensation policy, green capital market and pollution discharge trading fields and use 10 years of efforts to establish the environmental economic policy system that supports the construction of environmentally friendly society. In the near term, it is suggested to make efforts to make breakthrough progress in the following six aspects.

1) Design the environmental protection economic policy system framework. Mainly review and evaluate the present domestic environmental economic policy study progress, summarize and analyze the experience in the study and practice of international environmental economic policy and in combination with national social economic development trend and the demand of comprehensively building a well-off society for environmental protection, study and propose the complete environmental economic policy framework system in the new situation. The main purpose of the framework system design is to provide a medium and long term technical route guidance for environmental policy reform and innovation, realize the action of the general programme for environmental economic policy and make arrangement for near medium term environmental economic policy reform and experimental spots.

2) Improve environmental public financial policy system. Environmental protection is our country’s basic national policy and should have a clear position in the
national public financial budget system. At present, it is crucial to further define the division of central and local environmental protection duties and responsibilities and in accordance with the principle of “environmental duties and responsibilities corresponding to environmental financial power”, define the environmental public financial expenditure range, object and scale of the central and local governments at various levels, establish the environmental financial investment performance evaluation system and government green procurement system, explore the feasibility of establishing the central environmental protection fund and increase the proportion of public financed in environmental protection investment and the environmental efficiency of public financial investment.

3) Carry out environmental taxation policy design and experimental spot. On the basis of summarizing the practical experience of developed and developing countries in environmental taxation, study and propose China’s environmental taxation policy framework including independent environmental tax scheme and fusion type scheme. Fusion type environmental tax scheme shall mainly study and propose the taxation policy scheme that promotes the construction of environmentally friendly society, including recommended schemes for import and export custom duty, enterprise income tax, consumption tax and resource tax reform suggestions and fuel oil tax scheme embodying the environmental protection requirements. The independent environmental tax scheme shall mainly study pollution production tax, pollution discharge tax, general environmental tax and carbon tax schemes.

4) Carry out ecological compensation policy design and experimental spot. Ecological compensation is an economic policy that draws much attention from all social circles in the present China. Establishment of the ecological compensation mechanism shall pay special attention to the definition of central and local responsibilities and we shall mainly study and propose the national ecological compensation policy framework system, propose the water head site protection-based river basin ecological compensation mechanism policy scheme and establish the policy demand and law and regulation guarantee system for the river basin ecological compensation mechanism; study and design the ecological compensation demonstration policy scheme for mineral resource development and select key resource development areas to conduct experimental spots; select trans-provincial and trans-municipal typical river basins to carry out river basin ecological compensation policy experimental study. On the basis of experimental spots, propose the national implementation scheme for ecological compensation policies.

5) Carry out pollution discharge trading policy design and experimental spot. The pollution discharge trading system is a hot spot of present world environmental economic policy. The United States and some European countries have obtained good experience and now are expanding to the climatic change field. Presently, we shall study and propose the law and regulation system for paid obtainment of pollution discharge right and pollution discharge trading in combination with Chinese situation of pollution discharge reduction, establish the management platform for
paid use of pollution discharge right and pollution discharge trading and realize the scientific and dynamic management for paid use of pollution discharge right and pollution discharge trading. The Ministry of Finance and the State Environmental Protection Administration are going to carry out water pollutant COD and atmospheric pollutant SO2 discharge trading experimental spots in the Taihu Lake basin and the electric power industry and construct key pollution source discharge automatic monitoring system and the management network for paid use of pollution discharge right and pollution discharge trading in the experimental spot enterprises. Propose the pollution discharge trading experimental spots and popularization scheme after summarizing the experimental spot experience.

6) Carry out green capital market policy design and experimental spot. Green capital market has a very strong support action in developing the environmental protection industry, green energies and green products. Creating the green capital market can eliminate as much environmental pollution and ecological damage as possible from the source and on the other hand, it can effectively promote social investors and the board public to participate in environmental protection. Green capital market has a wide range and now we mainly carry out green credit and environmental risk management, risk credit technical support system, green financial instruments (green bond, green fund and environmental protection lottery) innovation, environmental goal insurance system, listed company environmental performance evaluation and environmental accounting study and experimental spot to guide the establishment of the green capital market.

2.4.7 Strengthen technical innovation for industrial pollution control, energy saving and emission reduction

Establish the environmental management system with the administrative department in charge of environmental protection as the responsibility subject and with collaboration from related departments to form the interlocked energy saving and emission reduction follow-up, early warning and response system and enhance the technical ability of the central and local governments to carry out energy saving and emission reduction. Establish the complete environmental information system, scientific pollution emission reduction index system, effective emission reduction supervision system and strict check and evaluation system. Carry out pollution abatement in the major pollution industries, expedite raising the construction funds for urban sewer pipe network and treatment facilities and increase the operability of COD reduction plan. While taking desulphurization control measures, strengthen the measures to increase fuel coal quality and increase washed coal proportion, effectively supervise flue gas desulphurization device quality, formulate the pollution emission reduction plan for the coal fired boilers in the non-electric power industry and improve sulphur dioxide emission reduction plan. Formulate special laws and regulations for chemicals environmental management, establish the basic institutional system for chemicals environmental management including chemicals classification, identification and announcement, risk evaluation and management, national standards and monitoring related to key chemicals,
toxic chemicals information disclosure as well as accident prevention and emergency system in coordination with the existing mechanism. Establish the record and information publication system for toxic chemical pollutants so that the public know and participate in the decision making for chemicals management. Push and encourage producers to participate in voluntary activities for strengthening chemicals environmental management.

**2.4.8 Carry out industrial pollution prevention and control work in the key industries**

(1) Coal industry: with coal structure improvement as guidance, restrict high sulphur coal mining and make efforts to increase high quality coal proportion. Increase the study and development of clean coal utilization technology, all out develop coal washing and dressing, briquette, steam coal blending, coal water slurry, coal gasification and liquefaction and gradually increase clean coal utilization level and utilization efficiency. Carry out comprehensive utilization of inferior coal and gangue, develop and utilize coalbed gas resource, gradually restrict direct use of raw coal and develop coal blending industry. Strengthen comprehensive environmental treatment in the mine fields and with land reclamation as key point, establish various mine field eco-logical construction demonstration bases and gradually form the ecological recovery construction mechanism in synchronization with production.

(2) Electric power industry: with sulphur dioxide emission reduction as key point, optimize power supply layout, promote West-East electricity transmission, control the construction of new coal fired power plants in the Eastern region, restrict construction of coal fired power plants in the “two control area” and prohibit construction and expansion of coal fired power plants (excluding cogeneration) in urban areas and out-skirts of large and medium sized cities. Adjust power supply structure, actively develop hydropower and mine mouth large thermal power units, reduce small thermal power units, close down and replace old units, properly develop nuclear power, encourage cogeneration and comprehensive utilization for power generation and develop power generation by new energies renewable energies such as wind power, solar energy and biomass energy in accordance with local conditions. For the new built coal fired power plants, it is necessary to adopt low nitrogen combustion method and concurrently construct desulphurization facilities; actively push desulphurization of the thermal power units in service. Formulate preferential economic policies and create a fair competition environment for desulphurization of coal fired power plants. The State shall provide vigorous support in desulphurization fund and policy: 1) formulate environmental protection price conversion standard for power generation in different regions; 2) give fund support to the desulphurization projects of power plants; 3) ensure preferential grid connection of desulphurization power plants; 4) increase sulphur dioxide emission charging criteria to mobilize the enterprises’ desulphurization enthusiasm; 5) speed up the use of clean coal technology.
(3) Metallurgic industry: in combination with total quantity regulation and control of iron and steel yield and structural readjustment, continue to suppress small enterprises such as small indigenous coke oven and small iron and steel, eliminate the backward process and equipment such as open-hearth furnace, downdraft roaster furnace, small blast furnace, small sintering furnace, small revolving furnace and steel making by melting iron, all out push the technical innovation centering on cleaner production, actively use the advance technologies such as dry cooling, outside-furnace refinement and high efficiency continuous casting and comprehensively popularize the comprehensive utilization of excess energy, excess pressure, residual heat and waste gas, waste water, waste slag. Gradually adjust the regional layout of the metallurgic industry and the iron and steel enterprises in the capital city, important tourist cities, famous scenery cites and the seriously water deficient regions shall strictly control the production scale and gradually reduce productive capacity.

(4) Nonferrous metal industry: continue to close up and shut down smelting by indigenous method and eliminate backward process and backward enterprises. Encourage enterprises to use new technical equipment, carry out technical innovation and cleaner production from the high technical starting point and increase the comprehensive utilization of process waste gas, waste water and waste slag. Except selectively developing nonferrous metal ore resources in the central west region, strictly restrict construction of new nonferrous metal smelting and processing projects; the nonferrous metal smelting enterprises in the big and medium cities in the central east region shall greatly reduce emission pollutants in accordance with urban environment protection requirements.

(5) Petroleum and chemical industries: with structural adjustment and cleaner production as the key point, close up the small heavy pollution chemical industrial enterprises, gradually eliminate highly toxic and high pollution organic phosphorus pesticide such as methamidophos, monocrotophos, parathion and dimecron and eliminate backward technology, serious pollution and low added value dyestuff and paint types. In accordance with the implementation progress of international conventions, gradually prohibit the production and use of persistent organic pollutants, eliminate ozonosphere consuming substances and develop substitutes. Develop high concentration, slow release chemical fertilizers and high efficiency low toxic and low residual pesticides. Expedite technical progress, push cleaner production, save energy and water and reduce consumption and pollution. Strengthen pollution prevention and control and ecological protection for oil extraction, suppress small oil well and indigenous oil refining and increase oil product quality according to the atmospheric pollution prevention and control requirements. All out develop natural gas industry and optimize energy structure.

(6) Building material industry: gradually eliminate backward processes such as mechanical vertical kiln, lepol kiln, hollow kiln, prohibit construction and expansion vertical kiln production lines and encourage development of new type dry process kiln outside decomposition large cement projects. Eliminate the backward
glass technologies such as draw up, horizontal draw and small Glaverbel processes etc and develop “Luoyang Float” glass technology. All out develop comprehensive waste utilization, develop new type wall materials and forcibly eliminate solid clay bricks in bid and medium cities.

(7) Light industry: close up heavy pollution, backward technology small pulp mills, small tanneries, small breweries and small sugar mills etc that do not conform to economic scale, eliminate backward technologies and productive capacities and increase structural readjustment and pollution abatement for heavy pollution industries. The paper making industry shall all out develop wood pulp, actively utilize waste paper pulp and reduce proportion of non-wood pulp and straw pulp proceeding from raw material structural adjustment. All out disseminate environmental label product certification and push the development of energy saving, low noise, nontoxic and pollution free environmentally friendly light industrial products.

2.4.9 Coordinate the relation between government and enterprise and establish industrial pollution control incentive mechanism

In view of the present industrial pollution prevention and control, while standardizing environmental law enforcement, the government shall more strengthen cooperation with enterprises, strengthen communication and guidance, change the previous traditional “managing” and “managed” management mode, establish a new type partnership with enterprises, inspire enterprises to consciously control industrial pollution and use such relation as the cut-in point in the present reform stage of industrial pollution prevention and control to realize coordinated development between environment and economy.

By conducting the activities for creating national environmentally friendly enterprises, enterprise environmental information disclosure, environmental audit and environmental information disclosure for the listed companies and the companies to be listed, form a new partnership between large scaled enterprise pollutant dischargers and environmental protection departments and let the large scaled enterprises truly realize that pollution abatement is not only their responsibilities and obligations but also can enhance market competitive power and get in turn greater own development. In this way, the enterprises will voluntarily reduce more emission of pollutants, increase pollution prevention effect and reduce environmental management cost.

Comprehensively evaluate the existing environmental protection investment and ensure the fund investment in the preferred fields. Where necessary, change the existing investment flow direction or increase fund sum in accordance with the need of preferred fields, formulate policies as soon as possible, erect pollution abatement financing platform and encourage private sectors to invest. Reinforce and popularize technical research and development in the environmental field and eliminate obstruction for commercialization. Accelerate the advancement of existing technology from demonstration stage to commercialization. The government

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formulates preferential pollution abatement policies, support medium and small enterprises to purchase advanced technologies or transfer pollution for centralized treatment and create attractive investment opportunity for this process. Establish the innovative incentive system for the government to participate in early stage scientific and technological research and development and private sectors and investors to participate in late stage popularization and application. Pay attention to resolving the market malfunction problem of innovation policies including the problems affecting the application of environmental technologies as insufficient enterprise participation, insufficient policy inspiration and limited punishment for law violation. Comprehensively push the government green procurement policy and provide preferential loans for environmentally friendly technologies.

2.4.10 Enhance the knowledge level of the whole society for environmental problem and strengthen supervision of public opinion

Through special training and education, enhance the knowledge level and decision making skill of local governments at various levels and the decision makers and managers in the enterprise circle for coordinating the environmental and economic social development so that the decision makers and managers face squarely and attach importance to industrial pollution control. For the present situation of regional industrial pollution, governments at various levels shall formulate regional energy saving and emission reduction plans, reduce industrial pollution emission from source control to terminal abatement and establish the political achievement evaluation system for the local governments where energy saving and emission reduction indices are preferred. Enterprises shall promote the energy saving and emission reduction objective to the strategic position, formulate plans and implementation schemes, carry out propaganda and training for enterprise employees, establish energy saving and emission reduction responsibility system, build permanent emission reduction atmosphere and promote enterprise culture.

Enhance the awareness of all public for participating in the industrial pollution control actions and supervise the industrial pollution control level. Strengthen social supervision and supervise the industrial pollution control standards of the enterprises of different scales and different types, strictly punish unqualified enterprises, reinforce the public supervision confidence and increase public environmental welfare. Encourage nongovernmental environmental protection organizations to participate so that all social circles can exert their respective functions in the strategic transformation.

2.4.11 Adjust the relation between international trade and pollution control, increase technical introduction and reduce production type pollution import

Gradually change the trade growth model and reduce industrial pollution. Sufficiently utilize China’s active trade balance to import the products and technologies with high content of energy resources and reduce export of related products. Encourage the research and development of substitutes for high energy consumption
products. Change trade growth from mainly relying on price competition and quantity expansion to mainly relying on quality, high added value and structural optimization model. Expand service trade export and promote international competitive power.

Further optimize the domestic regional structure for product manufacture and trade. Carry out comprehensive environmental upgrade for the industries in East China and take the advantage of rich human resources in central west to guide the environmentally friendly production technology to enter these regions. Impose environmental pollution taxes to the high energy consumption and high pollution products and industries and make enterprises bear the cost of environmental damage. Formulate the policies for encouraging the introduction of appropriate environmental protection technologies and equipment and promote energy saving and emission reduction.

Strengthen environmental management for recoverable waste trade. Perform life cycle analysis for the recoverable waste imported as industrial raw material; strictly execute the environmental admittance standard for importing recoverable waste; restrict enterprises from exporting those secondary raw materials process from imported recoverable waste and give priority to meeting domestic demand; strengthen across-border cooperation, fulfil international environmental treaties, strengthen international supervision and management cooperation and inhibit illegal trade of toxic waste.

Strengthen China’s environmental management for investment abroad. All out enhance enterprises’ social responsibility awareness and encourage Chinese enterprises to obtain world advanced environmental management experience and environmentally friendly technologies through overseas investment. Through environmentally friendly overseas investment, strengthen the long term competitive power of Chinese enterprise in the world. More constructively participate in bilateral and multi-lateral environmental cooperation, improve and perfect domestic convention implementation mechanism, management system and policy law and regulation framework and push the fulfilment of international environmental conventions. Actively participate in the construction of global environmental protection system, adhere to joint but different responsibility principle, assume the international obligations and responsibilities conforming to Chinese ability, take advantage of the South-North technical cooperation opportunity and strengthen the environmental cooperation action between China and developing countries.

2.4.12 Strengthen international exchange and cooperation and learn and draw on the international industrial pollution control experience

Foreign developed countries provide many beneficial experience and means for China’s industrial pollution control polices and construction of environmentally friendly enterprises and we shall extensively strengthen exchange, cooperation and study. European Union and especially Sweden has relatively successful experience
in construction of environmentally friendly enterprises. Since 1969, Sweden started environmental legislation and successfully implemented it. Presently, Swedish Government has adopted a relatively perfect index system and policy means to manage and control enterprises and in addition to economic means and imperative means, it introduced other instructive means such as voluntary means and especially for product management, it has relevant policies and has used many means in the whole product life cycle, e.g. ecological label certification, life cycle assessment, environmental management system, environmental production statement, environmental information disclosure, reaching voluntary agreement with different industries and green government procurement etc. Additionally, Sweden has formulated complete regional development plan for pushing sustainable growth and the special investment plan for accelerating Swedish transformation to ecological sustainable society and releasing climatic change. In order to push the “three historical transformations” for environmental protection and realize quick and good economic development, China also shall take various comprehensive means and measures in controlling industrial pollution and creating environmentally friendly enterprises and not only shall have laws and regulations and administrative means but also shall increase market economic means and voluntary means. At the same time, Chinese enterprises shall learn from Swedish enterprises’ strengthening of social responsibilities. While obtaining economic benefit, Chinese enterprises shall maximize social and environmental benefits and even proceed from pursuing social responsibilities to develop enterprises in serving the society and increase economic benefit.

2.5 Policy suggestions on promoting the development of environmentally friendly enterprises

Presently, due to prolonged follow of traditional industrial civilization, some places have gained affluence in material and wealth from rapid economic growth but the production mode of unrestrained consumption of natural resources and environmental pollution has greatly restricted the development of economic society and deficiency of environment and resources as basic production element has become the bottle neck for development in many places. The 17th NCCPC Report points out that it is necessary to place the construction of resource saving and environmentally friendly society in the conspicuous position of industrialized and modernized development strategy and carry out it down to every organization and every family”. Constructing the environmentally friendly enterprises is just the important action to implement the scientific concept of development from the microscopic level, build the environmentally friendly society and realize the historical change of environmental protection, is the necessary choice for enterprises to reinforce social responsibility and realize value maximization and is the matter of great urgency for explaining resource environmental “bottle neck” and inhibiting environmental deterioration.
The State Environmental Protection Administration attaches great importance to creating environmentally friendly enterprises. Since 2003, it started to carry out the activity of creating national environmentally friendly enterprises and local environmental protection departments at various levels and many enterprises actively responded. On November 12, 2004, it held the awarding ceremony for the first group of national environmentally friendly enterprises and Vice Premier Zeng Peiyan sent a congratulatory letter to point out that “creating the national environmentally friendly enterprises is the specific action for implementing the scientific concept of development and is positive significance to promoting the harmonious development between man and nature”. In December 2006, the nomination conference of national environmentally friendly enterprises” was held in Beijing. After more than three years of creation work and after strict examination, the State Environmental Protection Administration nominated totally 38 national environmentally friendly enterprises, from more than 400 enterprises recommended by all provinces, which are distributed in 18 provinces, municipalities and autonomous regions in the country and involve more than 10 industries such as chemical, petroleum, building material, energy, iron and steel and automobile etc.

In order to deeply advance the creation work of environmentally friendly enterprises, since December 2006, the State Environmental Protection Administration and Swedish Environmental Protection Agency cooperated and conducted the “Project of Pushing the Ability Construction of Environmentally Friendly Enterprises”. We will, in the two-year project period, study advanced Swedish experience in enterprise management, learn Swedish and even European effective environmental inspiration polices and means in the course of industrialization through many forms of research, observation and discussion, complete the revision of environmentally friendly enterprise creation indices conforming to Chinese national situation, improve various preferential policies and inspiration policies and strengthen the ability of the State Environmental Protection Administration and its related technical departments to use various policy means and control industrial environmental pollution. In the project, a group of technical personnel that master new environmental management technical means will be trained through experimental spot work and by driving area with point, realize the key advance of the environmentally friendly concept in the major industries and strengthen the technical support ability for enterprise creation work. Practice shows that national environmentally friendly enterprises are becoming the demonstration and example for Chinese industrial enterprises to implement the scientific concept of development, the outstanding in taking the new type industrialization road and practicing recycle economy, the leading role for building resource saving and environmentally friendly society and the pioneer for promoting rapid and sound development of social economy.

The Report to the 17th National Congress of Communist Party of China proposes new and higher requirements for environmental protection work and international call for enterprises to fulfil social responsibilities is becoming higher and higher.
In the face of new situation, new task and new requirement, in order to deeply push the construction of environmentally friendly enterprises, it is suggested to carry out the following works:

2.5.1 Increase understanding, strengthen guidance and continue to deeply carry out creation work of environmentally friendly enterprises

The environmental protection departments at various levels shall make the overall arrangement for the creation work in accordance with the annual work plan for “creating environmentally friendly enterprises” and instruct the enterprises to gradually carry out the work by stages, by steps and in a unified way with reference to the creation objective and realize sustained improvement; carry out experimental spot, push by layers, pay attention to and discover exemplar, emphasize enterprise and industry key point and by driving area with point, better exert the leading function of the environmentally friendly enterprises.

(1) Formulate environmentally friendly enterprise plan and implementation scheme

In order to make the national environmentally friendly enterprises become the cut in point for the environmental protection departments to guide the enterprises to develop recycle economy and fulfill social responsibilities, the State Environmental Protection Administration printed and issued the “Notification on Further Carrying Out the Creation Work of National Environmentally Friendly Enterprises” (HB[2005]No.27) in March 2005 and required enterprises and local environmental protection bureaus to work out plans, carry out key point fostering and sufficiently exert the guidance function of local environmental protection departments, required strengthening guidance for the enterprise creation process and increased the requirements for including key fostered enterprises in the plan for reporting, and required local environmental protection departments to give key guidance to representative enterprises. All local environmental protection bureaus shall strengthen guidance in accordance with the requirements of the Notification and promote all enterprises in the jurisdiction to work out specific, scientific and highly operable environmentally friendly enterprise plan and implementation scheme.

(2) Strengthen the work force of the governments at various levels

Presently, many provinces and cities have carried out provincial creation work of environmentally friendly enterprises with reference to the national environmentally friendly enterprise indices and chosen and recommend the best from the provincial level environmentally friendly enterprises to create the national environmentally friendly enterprises. This is conducive to push and promote by levels the enterprises to solidly carry out the creation work and gradually advancing to the goal of national environmentally friendly enterprise. In the index setup of provincial level environmentally friendly enterprise, all provinces can set up appropriate indices in accordance with local features to facilitate the gradual creation of enterprises. At the same time, all places shall pay active attention to and discover the tractive, convictive and infectious exemplar in their work, emphasize enterprise and indus-
trial key points, be good at finding the pioneer in national key enterprises for pollution prevention and control, promptly report and commend these advanced exemplars and encourage and support them in creating friendly enterprises so as to drive area with point and better exert the leading action of the friendly enterprises.

(3) Improve the environmentally friendly enterprise creation index system

The national environmentally friendly enterprise index system is not invariable but dynamic. The 22 indices formulated in the beginning of the Tenth Five Year Plan period already do not suit the requirements of the new situation and need further adjustment, supplementation and improvement. In the subsequent index system modification, one the one hand, we shall make the national environmentally friendly enterprise indices sufficiently embody the requirements of new type industrialization road with low resource consumption, less environmental pollution and sufficient exertion of human resource superiority and make the new index system pay a positive role in guiding enterprises to all out develop recycle economy and establishing the resource saving and environmentally friendly society; on the other hand, the indices shall sufficiently embody the requirements of producer responsibility extension system, incarnate the important constants of the environmental protection objective in the national Eleventh Five Year Plan, the historical change of the environmental protection cause and harmonious society construction and be advantageous to enterprises for finding defects with reference to the indices so that creation indices are more strongly instructive and operable.

(4) Further improve the inspiration and preferential policies

The Report to the 17th National Congress of Communist Party of China points out that “It is necessary to the laws and policies conducive to saving energy resources and protecting ecological environment, accelerate the formation of sustainable development system mechanism and implement energy saving and emission reduction work responsibility system”, “Improve the production elements and resource price formation mechanism that reflect market supply and demand relation, resource deficiency extent and environmental damage cost” and “Establish and improve the paid resource use system and ecological environmental compensation mechanism”. Obviously, environmental economic policy, as an important means for environmental management and a long effect mechanism, is conducive to enhancing efficiency, reducing cost and increasing benefit and is of important significance to the present China’s industrial pollution prevention and control and energy saving and emission reduction. In the course of creating environmentally friendly enterprises, the State shall grant enterprises more inspiration and preferential policies in taxation, credit, listing examination and technical development and supervise their implementation to encourage the enterprises to enhance environmental performance.
The environmental protection departments at various levels shall also attach great importance, increase the instruction for the creation work and take various policy measures and encourage more enterprises to take the new type environmentally friendly and resource saving industrialization road. For example, The Party Committee and Government of Ningxia Hui Nationality Autonomous Region decided to exempt the organizations that have obtained the title of national environmentally friendly enterprises from three years of income tax. Jiangsu and Shandong provinces etc have issued encouragement policies to award and commend the organizations that have obtained the title of national or provincial environmentally friendly enterprises. These encouragement polices greatly have mobilized the enthusiasm of the enterprises for carrying out cleaner production, developing recycle economy and improving environmental behaviours.

While granting substantial preferential policies to the national environmentally friendly enterprises in the future, let the public know and supervise the creation work, establish market mechanism and guide the public to purchase environmentally friendly products and services. By increasing the understanding of the enterprises and the public for environmentally friendly enterprises, promote the whole industry’s environmental protection work and forge the brand of “national environmentally friendly enterprises”. Encourage the enterprises environmentally friendly behaviours.

Following China’s accession to WTO, enterprises’ and especially excellent enterprises’ awareness of promoting public image keeps enhancing and whether environmental protection is good or not is directly related to entering the international market, participating in international competition and also is the important means to break through the nontariff barrier. We shall strengthen international exchange, expand enterprises’ popularity, forge the national brand and win a green pass for enterprises to enter the international market.

(5) Strengthen the instruction work for training and propaganda

Now our propaganda for the national environmentally friendly enterprises is far from enough and we shall give full publicity to the creation work of environmentally friendly enterprise. The present progress already lags behind the present development situation and compared with several millions of enterprises in the country, more than 30 environmentally friendly enterprises appear much insufficient. We shall set up the positive image.

At the same time, since China’s creation work of national environmentally friendly enterprises is still in the initial stage, the environmental protection departments and enterprises in all places do not have sufficient experience and lack systematic theoretical guidance. In order to strengthen the instruction for creation work of the national environmentally friendly enterprises, increase efficiency, ensure quality and make the creation work standardized and systemized, it is necessary to
strengthen the training work for the environmental protection system and enterprises’ environmental protection personnel.

Promote to the height of implementing the Party Central Committee’s scientific concept of development and focusing on the key of promoting enterprises to develop recycle economy and entering on establishment of resource saving and environmentally friendly enterprises, give full publicity to own environmentally friendly behaviors. It is possible to give technical guidance to friendly enterprises by holding TV interview programs and building websites etc.

2.5.2 Formulate and improve the laws, regulations, standards and specifications for environmentally friendly enterprises

Establish the environmental law and regulation system for promoting the development of environmentally friendly enterprises. Accelerate studying and formulating supporting laws and regulations on various solid waste reutilization and pollution control and gradually establish the producer responsibility extension system. Improve the pollution emission charging policy and push the development of recycle economy. In the central and local centralized use of pollution emission costs, mainly support the demonstration and dissemination of cleaner production projects, “zero discharge” technology and cyclic utilization technology.

Scientifically formulating and implementing the cleaner production standard system is an effective means to improve product quality, save cost and rationally utilize resources. The environmental and resource problem is arousing higher and higher attention from home and abroad and the enterprises must change the resource-dependent economic growth mode. We must strengthen the formulation work of national industrial pollution emission standards and promote the enterprises to use environmentally friendly technologies and processes. Organize the formulation of the industrial cleaner production audit guide and instruct all places and all industries to carry out cleaner production audit. Environmental protection departments of all provinces (autonomous regions and municipalities directly under the Central Government) shall strengthen the formulation of local industrial pollution emission standards. For the key development zones and heavy industrial concentrated regions, propose the comprehensive control requirements for enterprises’ cleaner production and waste discharge.

Formulate the technical policies for pollution prevention and control and ecological protection. Formulate and improve the pollution prevention and control technical policies for the high resource and energy consumption and heavy pollution industries, make “reducing, reuse, beneficial and harmless treatment” the basic approach for pollution prevention and control, strengthen pollution prevention in the whole process of product production and minimize end abatement pressure. In accordance with the actual need of ecological protection in the key regions and basins, formulate related technical policies and disseminate the environmentally friendly enterprise production technology and pollution control technology.
Carrying out cleaner production and protecting the environment are not only related to the enterprises’ economic benefit but also directly related to enterprises’ image and existence. The enterprises must promote the resource and environmental problem to the height of enterprise development strategy, work out scientific plan, emphasize the key point, systematically tap the potential and with improvement of knowledge level and technical level, continuously promote and improve the strategy. First, with cost and the point of attention and with promoting market competitive power as the core, push energy saving and consumption reduction in the intentional potential tapping strategy. Secondly, with environment as the point of attention and with promoting enterprises’ sustainable development ability as the core, push cleaner production. Thirdly, with growth mode as the point of attention and with scientific development as the core, push recycle economy and continuously improve the standard system in all strategic stages.

The enterprises shall compile the energy saving plan based on standardization, and during implementation, increase resource utilization factor, shorten energy transformation levels, strengthen energy utilization management, enlarge comprehensive utilization of emissions, realize closed cycle, guarantee the internal circulation of various materials and rational allocation of energies and continuously reduce water, energy and material consumption. With saving costs and increasing enterprises’ benefit as the tenet, stick to reinforcing the management of enterprises’ internal technical standards, mainly emphasize the three major standards in the technical standard system including raw material procurement acceptance standard, product internal control standard and process technological operation instructions and promote the implementation of the product internal control standard through strict evaluation means. Introduce modernized management means as the strategic content of standard implementation, comprehensively realize resource saving from production technology to management, reduce production organization and management cost and enhance enterprises’ comprehensive competitive power.

2.5.3 Deepen the experimental spot and demonstration of environmentally friendly enterprises

Choose the enterprises with outstanding economic benefit, rational resource utilization and clean and beautiful environment to carry out environmentally friendly enterprise demonstration. The environmental protection departments in all provinces (autonomous regions and municipalities directly under the Central Government) shall actively carry out the experimental spot and demonstration work of the environmentally friendly enterprises in their regions under the guidance of the State Environmental Protection Administration and strengthen the guidance, supervision and management for the environmentally friendly enterprises. First, for the index system and acceptance standard of environmentally friendly enterprises, standardize the experimental spot and demonstration work. Secondly, organize the formulation of technical guides for various environmentally friendly enterprises and instruct the construction of various experimental spots and demonstration.
Thirdly, strengthen the management of various experimental spot and demonstration organizations including field supervision and inspection to ensure that the experimental spot and demonstration organizations can reduce the total pollutant emission and improve environmental quality. Fourthly, promptly summarize the experimental spot experience in the national environmentally friendly enterprises and popularize advanced exemplars.

Guide the enterprises to develop towards environmentally friendly enterprises. Through creation activities of national environmentally friendly enterprises, enterprise environmental information disclosure, environmental audit and environmental information disclosure of the listed companies and the companies to be listed, let enterprises truly know that pollution abatement is not only their responsibility and obligation but also can enhance market competitive power and gain greater own development. The environmental protection departments of all provinces (autonomous regions and municipalities directly under the Central Government) shall cooperate with the State Environmental Protection Administration to give instruction, supervision and management for national environmentally friendly enterprises and if any major problem is found, promote report and propose the rectification and improvement measures. Give publicity and education for normal enterprises and provide technical support and preferential policies so that they develop towards the environmentally friendly enterprises.

2.5.4 Develop recycle economy and promote work division and cooperation between enterprises

The concept of recycle economy was formed and introduced into China in 1990s. After entering the 21st century, the development of recycle economy draws attention from the Chinese top decision making level. In view of China’s actual situation, if we develop recycle economy, we shall mainly advance the following aspects:

1) Enhance enterprises’ environmental management level by carrying out standardization management and cleaner production and audit, and increase resource use efficiency and enterprises’ benefit through management innovation.

2) In accordance with the principle of reducing, reuse and recycle and the actual situation of different enterprises, strengthen intra-enterprise and inter-enterprise material and energy circulation to form the inter-industrial metabolism and symbiosis, realize reutilization of waste and byproducts, push the comprehensive utilization of resources and reduce costs.

3) Support the development of key technologies. The experience of developed countries shows that investment in the key technologies for recycle economy promotes the rapid development of recycle economy. Therefore, the government must encourage the development and application of the resource saving and modern technology of universal popularization sense, e.g. cleaner coal, coalbed gas utilization, green lighting and reproduction.
4) Formulate and improve the encouragement policies. The document of the higher level in this aspect has definite requirements and many senior government officials express that they shall formulate and mainly implement the related policies as soon as possible, mainly final and tax policies. It should be made clear that the subject of developing recycle economy is enterprise other than government and the government only plays a guide role. At the same time, we shall master the key point and especially for the high energy consumption and high pollution industries, the encouragement for development of recycle economy and punishment for illegal pollution discharge shall be high enough.

5) Strengthen enterprise environmental supervision and management force. On the one hand, enhance environmental admittance standard, strengthen environmental law enforcement, promote enterprises to eliminate heavy pollution processes and equipment and promote them to carry out cleaner production. On the other hand, we shall put forth efforts to strike some high energy consumption and high pollution projects that make use of recycle economy.

Strengthen the pollution emission control for the whole production process of the pollution industries and enterprises and compulsively carry out cleaner production audit for the enterprises whose emission of pollutants exceeds the standard and total quantity according to the law. Presently we shall mainly strengthen the cleaner production audit for the heavy pollution industries such as electric power, iron & steel, chemical industry, nonferrous metal, printing and dyeing, foodstuff and paper making industries and promote the enterprises to develop towards environmentally friendly direction.

Establish strict compulsory elimination system. Cooperate with the development and re-form (economic and trade) departments to publish the directory of eliminated backward technology and heavy pollution production techniques and equipment and carry out compulsory elimination for the scale-uneconomic and heavy pollution paper making, brewing, tanning, electroplating, printing and dyeing, chemical industry, smelting, coking, building material and thermal power enterprises and backward productive capacity, equipment and products to facilitate industrial structural optimization.

Govern in strict accordance with the law and resolutely punish the illegal acts. Organize and carry out the special actions for environmental law enforcement to combat environmentally illegal enterprises in the key regions and industries and proceeding from standardizing enterprises’ environmental law-abiding conducts and promote the construction of enterprises’ syngenetic community, strictly enforce environmental laws, enhance the environmental awareness of the whole society, create fair competition environment and push the development of recycle economy.
2.5.5 Establish the technical innovation system and consultation service system for environmentally friendly enterprises

Establish the technical innovation system for environmentally friendly enterprises. Increase support to the technical research and development and dissemination of environmentally friendly enterprises and enhance our enterprises’ technical support and innovation ability. The environmental protection departments at various levels shall encourage scientific and technical research institutions and enterprises to mainly develop the appropriate technologies of dissemination significance such as reduction technology, reuse technology, recycling technology, substitution technology, syngenetic link technology and system integration technology and promote cyclic utilization of resources. Increase the study on the theory, method, development strategy and policy of recycle economy, lay stress on research the material circulation and material metabolism rules of the high resource and energy consumption and heavy pollution industries and regions and research material metabolism recombination technology. Organize the research and investigation of material consumption, energy consumption and waste production and discharge condition in different regions and different industries and study the development potential and approach of environmentally friendly enterprises in China.

Establish the consultation service system of environmentally friendly enterprises. Actively support the establishment of the environmentally friendly enterprise information system and technical consultation service system and promptly publish to the society the information in enterprise technology, management and policy etc. sufficiently use the existing force of environmental scientific research, service agencies and social groups to carry out environmentally friendly enterprise information consultation, technical dissemination, propaganda and training work.

2.5.6 Enterprises strengthen own construction and implement green management

(1) Concept innovation

To establish environmentally friendly enterprises, it is necessary to first set up the enterprise green operation concept in the big concept and global concept and only when we have the concept, can it be possible to have the development of environmental culture and only when we have environmental culture, can it be possible to promote the realization of green concept. Therefore, construction of environmentally friendly enterprises require the enter-prises to have harmonious coexistence between man and nature at all present and future levels and all links so as to guide the enterprises’ value orientation and carry out cultural baptism. During internalization of enterprise environmental concept and view of value, it is necessary to emphasize the following aspects:

1) enterprise leaders shall strengthen their knowledge, set up the comprehensive enterprise development concept and include the construction of environmental culture into the overall strategy of enterprise economic and cultural development.
The leaders shall set an example with their own conducts, match their words with deeds, take the lead in carrying forward the “concept of environmental economic decision making” and scrupulously abide by the enterprise environmental concept and view of value advocated by them;

2) enterprise leaders shall continuously imbue the enterprises employees with the environmental projection concept and view of value, train all employees in environmental service so that they truly recognize the importance of environmental service and set up the enterprise spirit of providing consumers with “green service”, and increase the overall environmental protection awareness level of all enterprise employees;

3) enterprise leaders shall take the opportunity of related ceremonies and activities to publicize enterprises’ environmental protection and view of value and set up enterprises’ environmental protection image such as environmental protection donation, environmental protection envoy etc. When an enterprise makes an innovation in concept and has a profound environmental cultural concept, it can make some accomplishments in product structure adjustment, cleaner production and green product development etc so that the enterprise keeps good positive ecological effect in production.

Concept innovation also requires enterprises to have their own environmental moral standards. When conducting production activities, the enterprises must determine the environmental moral standards, i.e. what behaviours conform to what environmental moralities, what behaviours belong to environmental immoralties etc. In reality, enterprises often use the “own benefit maximization” as the most fundamental standard to evaluate enterprise performance and ignore social environmental morality and domineer their own benefits over the masses and other organizations. While in society, as the economic integration pattern is formed and the relation between enterprise production and ecological environment is valued by the society, the enterprises’ own benefit maximization principle will not be understood as a pure egotistic principle and should be a basic value criterion for realize own benefit under the precondition of pursuing social benefit or ecological benefit. Otherwise, the enterprises can not obtain own maximum benefit and may obtain minimum benefit and even no performance at all. Presently, our country’s public environmental awareness and knowledge level are still very low and environmental moral awareness is weak. To get into environmental protection, the enterprises must determine the correct benefit tendency, truly regard “never eat our ancestors’ meal, do evil for our descendents, destruct foundation and self destroy our homeland” as the enterprises’ own environmental moral standards and place environmental development and economic development in the same position.

(2) Product innovation

Establishment of environmentally friendly enterprises shall be embodied in the products produced by the enterprises, i.e. enterprises shall produce the green products that conform to the present consumption tide. Green products refer to the products that do no harm or slight harm to environment, conform to particular
environmental protection requirements and are conducive to resource regeneration in the whole course from design, manufacture, sales to recovery and disposal, and they mainly include two major types: pure natural product and nuisance free product. The characteristic of green products is mainly manifested by the following links:

- **Green materials.** When selecting raw materials, note their “green nature”, i.e. give priority to renewable materials, try to use recovered materials, increase resource utilization factor and realize sustainable development; try to select low energy consumption and low pollution materials; try to select the materials and parts and components with good environmental compatibility and avoid toxic, hazardous and radiant materials.
- **Green technology.** Green technological design mainly involves the following aspects: change the input mode of raw materials and utilize them locally, reutilize the byproducts of use value and recovered products and cyclically use various materials in the technological process; change production process or manufacturing technology, innovate existing equipment and minimize raw material consumption, waste production, energy consumption, health and risk as well as damage to ecological environment.
- **Green packages.** Green package design requires commodity package to do no harm to natural environment and human health. In the design the following methods can be used: by innovating old technologies and adopting new technologies, save and simplify packages; strengthen recovery of packing materials and development of reutilization technologies and cyclically use existing package waste and develop corresponding replacement packages; increase product internal structural strength, reduce product breakage risk in transportation to reduce packing materials and reduce packing cost.
- **Product recovery processing.** To easily recover products, reduce its environmental impact and gain greater use value, the enterprises shall try to design removable utilization in the beginning of products. Now many foreign enterprises have adopted removable design and developed popular green products. Xerox Co. has used this technology to develop copying equipment and most of the equipment parts and components can be removed and reutilized, thus achieving the goal of cost reduction.
- **Product use.** Products may consume resources and bring burden to environment in their use. Therefore, enough attention should be paid to the energy consumption and environmental pollution problems caused by the products in the product design stage and energy consumption in product use should be reduced insofar as possible. For example, the SMPS multi-chip power supply module developed by Philips is called “green chip” and it aims at green design and can make many power supplies reduce power consumption greatly when they are in standby condition.

(3) Management innovation
The enterprises set up the concept of environmental operation and carry out en-
vironmental innovation in products. In addition, the enterprises need to innovate in
management and implement environmental management. Enterprise environmental
management innovation covers environmental operation concept, environmental
product development, environmental production process, environmental cost man-
agement and environmental technical assurance system etc. The enterprises shall,
by constructing the environmental management system, strengthen environmental
consumption and market competition concept and improve environmental opera-
tion so as to maximize enterprise material resource utilization and efficiency, opti-
mize the “three wastes” emission and environmental protection and green product
production. Enterprises shall accelerate the adjustment of enterprise development
strategy according to this operation and management concept, establish the enter-
prises’ “environment” operation mechanism and form the environmental market
development and innovation ability. In cost management, enterprises shall include
the expenditure in environmental protection and external loss costs into product
costs and disclose environmental cost information and form the environmental cost
report. To reasonably control various expenditures, enterprise accounting depart-
ments shall compile environmental cost budget and reasonably allocate various
environmental expenditures.

(4) Push green accounting

Enterprise green accounting is a multidisciplinary crossed boundary science and its
implementation depends on the comprehensive improvement of enterprise account-
ants and environmental management personnel. Enterprise green accounting means
to use a certain measure to systematically meter, record, analyze, check and report
the occupied assets, produced labour consumption and debt as well as produced
related losses and earnings in the course of enterprise environmental protection and
resource utilization. The implementation of enterprise green accounting makes
environmental cost enterprise internalization, causes product price rise and drive
the enterprises to most effectively utilize resources in order to reduce cost. The
setup and use method of its subjects shall be consistent with the existing enterprise
accounting items.

The benefits brought by the enterprise green accounting are indirect and appear to
be harmonious enterprise public relation, improved social image and attraction of
more customers etc. in the short term. In the long term, they are manifested by
improvement of enterprise market share, easy recruitment of excellent talents, easy
financing and fund raising etc. Therefore, enterprises’ carrying out green account
shall not only find a foothold in the present and but also keep the future in view.

Enterprise green report is a form of enterprises’ provision of environmental infor-
mation to the outside and it enriches financial statement and is embodiment of
enterprises’ fulfilment of social responsibilities. Enterprises disclosure their green
reports to the outside and let the social public know their environmental
information. This can help them supervise the enterprises and form the “everybody participation” atmosphere. The main content of the green report includes: basic enterprise situation description, e.g. region, industrial output value and product situation etc.; objective and plan of environmental pollution management set by the enterprises, enterprises’ use and efficiency of natural resources, enterprises’ pollutant emission and disposal, enterprises’ main environmental design and comprehensive utilization of “three wastes”, enterprises’ major environmental accident report and dispute description of surrounding communities.

(5) Push green marketing

Green marketing is the process of a series of overall operation activities such as market investigation, product development, price fixing and promotion carried out by the enterprises through market exchange to meet the people’s green consumption demand and promote the coordinated development of economy and ecology.

First, product package. Enterprises’ product package shall conform to the environmental standards and packing laws and regulations for the international market, and packing materials shall be:
1) easily recoverable, reusable or resource renewable;
2) easily degradable, do not produce environmental pollution;
3) save energies and materials in production;
4) do not pollute the atmosphere and may be renewable in incineration. The product package design shall adopt the theme of rich ecological flavour and environmental beautification. Attention also should be paid to information of product green package. Green package is a dynamic concept and its standard gradually increases with development of science and technology and production. Therefore the enterprises shall promptly improve product green packages.

Secondly, green price. Enterprises shall penetrate the ecological value in the product price fixing system, strengthen calculation of ecological environmental cost, include ecological environmental cost of green products in the total cost, determine a certain price mark up rate on the basis of the price of the same type of products and set up the product image of high quality and high price.

Thirdly, green promotion. Enterprises shall use pollution free transport means, reasonably set up supply distribution centres and links and select the intermediate merchants with good green reputation to maintain the product green image. In the promotions such as personnel sales promotion, advertisement and public relation etc, emphasize the products’ green characteristic and organically relate products and enterprises to environmental protection. By collecting the information required for enterprises’ green marketing strategy in the international target market, analyze the company’s internal superiority and defect as well as external opportunity and threat and improve the enterprises’ green marketing strategy.
2.5.7 Actively push green consumption and implement green procurement policies

Actively guide the public green consumption. Continue to actively push the development of environmental labelling product certification and environmental management system certification. Environmental protection departments at various levels shall extensively carry out publicity and education activities and enhance the public environmental awareness and green consumption awareness. All out advocate the lifestyle conductive to environmental protection, guide enterprises to actively participate in green consumption activities and creation activities of green schools and green communities. Take effective measures, strengthen guidance and law enforcement and reduce excessive packaging of consumer goods.

Actively advocate government green procurement. Cooperate with related departments and make efforts to establish our country’s government green procurement system as soon as possible and encourage the use of recycled products, environmental labelling products, organic foods as well as the products passing ISO14001 environmental management system certification or produced by cleaner production audited enterprises. Through the exemplar action of governments, guide the social groups and enterprises to actively participate in green consumption activities.

Formulate green procurement implementation policies, carry out market product investigation, preferred product selection, set the procurement target, make follow-up investigation and finally provide procurement personnel with the easy-to-use green public procurement tools. In formulating the list of green procurement products, first choose the materials and goods that have great impact on environment and are used in large quantities so that green procurement generates greater environmental benefits. The suggested specific operation flow is: set contract content, analyze the user’s demand and market situation, designate environmental manifestation required by products/services/works, propose the criteria of environmental manifestation that the bidders are required to reach, set the award standard, formulate contract period, draw up environmental manifestation required by products/services/works (sign related clauses), follow-up investigation, inform the contract users and continue improvement investigation.

2.5.8 Draw on the international experience and practically fulfill the enterprises’ social responsibilities

In accordance with the definition of Word business council for sustainable development, WBCSD, enterprises’ social responsibility (CSR) is the enterprises’ continued commitment and commercial behaviours more conform to moral standards. While making contributions to economic development, improve the quality of life of the employees and their family members and expand the scope to the community and the whole society. That is to say, while creating profits and bearing responsibility to shareholders, the enterprises shall assume the responsibilities for stakeholders such as the labourers, consumers, environment and communities.
Presently, international call for enterprises to fulfill social responsibilities is becoming higher and higher and this is jointly pushed by environmental, economic and social factors. First, climatic change is deemed the environmental problem most worthy of attention in the world and generates influence on the global business through political force. However, limited emission of sulphur dioxide still has not been compulsively required in laws and regulations. Judged from the tendency, carbon emission trade will become a compulsive means and at the same time it will in combination with carbon tax and related laws and regulations. Secondly, sustainable development has become the important examining and weighing factor for investigation strategy, pension fund and investigation institutions more and more tend to use social responsibility investment (SRI) technology to formulate investment policies and evaluation for enterprises’ social responsibilities is more and more stringent. Also socially, employees (particularly young people) require the employer’s company to possess a good social image and the company’s behaviour in environmental protection and health affects their loyalty. The tendency of economic global development has a stricter and stricter requirement for the suppliers’ quality and the procurement enterprises must require the suppliers to carry out sustainable development. In a word, enterprises’ fulfilment of social responsibilities is from external pressure on its economic development, e.g. law violation cost, commercial partners, purchasers’ requirements, NGO criticism and business reputation etc.

Fulfilment of social responsibilities can be analyzed from the development stage shown by enterprise environment. Enterprise environment manifestation can be divided into three development stages. The first stage is a passive stage in which the enterprises avoid sustainable development requirements and environmental problems, make excuses for their behaviours, condemn critics and refuse action. But the market effect brought by such action is that enterprises’ improvement action is slow and thus the enterprises lose business reputation. The second stage is a passive stage in which the enterprises have recognized their problems, wish to cooperate but only abide by basic laws and regulations and will not consciously make rectification and improvement or actively take actions under the pressure from all circles. Its market effect is that the enterprises can only act as the followers of the leaders in the industry, waste opportunities and time and still have the risk of market reputation. The third stage is a “self regret” stage in which in face of the possible environmental and social crisis, the enterprises try to be the first to implement the overall sustainable development strategy, specifically implement the commercial concept, realize enterprise information transparency and actively have a dialogue with the parties concerned. The result will surely promote the enterprises to become the leaders in the industry and they not only abide by the laws and expect legislation but also establish good market reputation.

In the fulfilment of social responsibilities, enterprise culture shall change from scientific and economic orientated development to paying attention to social and
environmental aspects. Take DuPont as an example, in the beginning of 1930s, DuPont Co. invented CFC substance which was mainly used for refrigeration of refrigerator. In 1980s, scientists thought that CFC substance might damage the ozonosphere and this was proved by National Aeronautics and Space Administra-
tion in 1988. DuPont was the biggest CFC supplier at that time and 25% CFC in
the world was from DuPont. Before 1988, DuPont management always refused to
recognize the hazard of Freon and did not take substantial improvement actions.
Although there was not any legal compulsive requirement, under the social opinion
and market pres-sure, the company quickly developed CFCS substitution products,
integrated the attention to environment and society into the enterprises’ economic
growth process and implemented sustainable development and reduced energy and
resource consumption and pollution emission.

CSR does not depend on the enterprise external standard-ISO14000 and can be the
means of internal control. Most large scaled trade enterprises in the European mar-
ket have issued sustainable development environmental and social report. However
presently CSR is only a new enterprise development concept and has not shown
substantial influence on enter-prises’ business decisions even in Europe. Swedish
enterprises’ social responsibility extension is mainly manifested in the following
aspects: contribution of energy saving, risk (refer to environmental law violation
cost) management to delaying climatic change. Then how to measure enterprise
sustainability? For checking whether the enterprises have practically implemented
social responsibilities, mainly pay attention to the following aspects: first, are there
key indices and quantitative data in the list of pollutants, greenhouse gas emission,
energy utilization and raw materials input-output? Secondly, is sustainable devel-
opment the footstone for enterprises’ all investment decisions (i.e. consideration
factor)? Thirdly, the managers and co-operators sign and understand product regu-
lations. Fourthly, propose environmental and social policy requirements to the
suppliers. Fifthly, attention to climatic change. Sixthly, influence of social and
environmental behaviours on their economic manifestation.

It is suggested that Chinese Government should practically strengthen guidance
and pro-mote the enterprises to fulfil the social responsibilities from passively to
actively. Efforts can be made in the following aspects: first, be the law abidance
enterprises, observe disciplines and laws, pay taxes on time and observe social
moral standards. Good law abidance record makes it easy for enterprises to develop
in different regions. Secondly, establish good enter-prise image, brand and em-
ployer behaviour record and avoid law violation cost. Thirdly, from institutional
framework, make enterprises’ view of value the approach to strengthen own con-
struction so that internal and external stakeholders take positive actions. Fourthly,
define market green orientation and reinforce enterprises’ market competitive
power. Highlight enter-prise brands and win trust from suppliers, customers, busi-
ness partners and other stake-holders.
In general, we shall use various means, care and cherish and promote the construction of environmentally friendly enterprises, guide the whole society to care and participate in environmental protection, encourage the environmentally friendly enterprises to make persistent efforts, adhere to taking the new type industrialization road, all out develop recycle economy, continuously improve their own environmental behaviours, fulfil social responsibilities, drive more enterprises to join the team of environmentally friendly enterprises and make greater contributions for promoting the harmonious development between man and nature and realizing the all round construction of a well off society.
3. Overview of Policy Instruments to Increase Environmental Performance in Industry in Sweden

3.1 Background

Today’s environmental problems are to a great extent associated with the industrialised world’s consumption of products. The aggregated production and consumption in the world today is estimated to exceed the earth’s long-term ecological capacity by approximately 25 per cent. If today’s technology were used, another three or four planets would be needed in order to provide the world’s population with an average standard of living at a European or an American level.5

Our production and consumption have various types of environmental impact throughout a product’s lifecycle; from the extraction of raw materials, production, use, recovery to final disposal and transportation at all phases. Significant environmental problems closely connected to production and consumption of products include emissions of hazardous chemicals, acidification, climate impact, eutrophication, ozone layer depletion and environmental problems caused by handling huge amounts of waste etc. Several of these problems can also affect health.

There is a need to reduce emissions from industry with a negative impact on the environment, make the use of natural resources more efficient, substitute hazardous chemicals and create sustainable production and consumption patterns. This has been established in several policy documents such as in the agreement from the World Summit 2002 in Johannesburg.6 The background is the problem of poverty in several parts of the world combined with increased environmental degradation and the increasing needs of a growing population.

3.1.1 Development of Environmental Policy

The development of the environmental policy concerning industrial pollution in the west started more than 40 years ago when the first environmental legislation was introduced. The focus was mainly on point discharges from sources like industry and municipal sewage. This work has not only been necessary but also very successful and there are many examples of how industries have managed to considerably reduce emission. During this time there were many accidents which gave rise to an interest in environmental issues in society at large. However, companies started to work with environmental problems more systematically. It is for example very common nowadays to have an environmental manager at least in the larger companies. At the Rio Conference on Agenda 21 in 1992, business was particularly

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highlighted. This led, among other things, to the development of the ISO-standard 14 001 on Environmental Management Systems. This standard has now been followed by a number of standards in the 14 000-series.

Today’s focus in many companies is on the products. Many realize the necessity of having a lifecycle perspective. By considering the whole supply chain, measures can be taken where they are most beneficial to the environment and costs. The use phase of products has often proved to play an important role. However, reducing emissions from industries still plays a vital role.

Environmental concern has now more and more broadened into sustainable development and takes into account social and ethical aspects, so called social responsibility. One example is the World Business Council for Sustainable Development (WBCSD) a CEO-led, global association of some 200 companies dealing exclusively with business and sustainable development. Environmental issues are now not only connected to costs but also to business opportunities. According to a recent study commissioned by the European Commission the eco-industry is now expanding fast with a growth in turn-over of around 7% between 1999 and 2004.\footnote{Ernst & Young (2006), Eco-industry, its size, employment, perspectives and barriers to growth in an enlarged EU}

The authors of the study estimate that the EU environment industry represents around 3.4 million jobs.

Businesses in the west are now becoming more open to dialogue with authorities and other stakeholders. Many companies realize the necessity of going beyond legislation.

The most important driving force for all companies is their own profit. When developing driving forces for a better environment authorities could seek to enhance profit for the companies in the front line for a better environment. Opportunities could be found where environmental improvements support long-term industrial competitiveness. It is therefore necessary that environmental policy continuously develops over time. Regulations are of course one of the most important driving forces for reducing the environmental impact (e.g. emissions) from production. Yet over the years legislation has also served as a very strong driving force for the development of environmentally sound technical solutions such as closed processes, substitutions of hazardous chemicals and sewage water treatment. Swedish EPA is actively participating in the EU process for Best Available Technology in order to raise the level.

According to experience\footnote{E. Bingel, C. Sjöberg, C. Sjöquist (2002), Från defensiva till proaktiva, Företag och hållbar tillväxt, Svenskt Näringsliv, 2002, NMC:s enkät 2004} important driving forces for the enterprises to comply with legislation and become more environmentally friendly and sustainable are:

- demand from customers
better corporate image brand
- economic gains through saving energy, water and natural resources and materials etc.
- the policy and management system in the company
- personal interest from the management and especially the CEO
- demands from employees. Employees often act as fiery spirits for the improvement of the environment in the company
- avoiding risks of accidents etc, media
- economic incentives

Among the disadvantages are that environmental concern can add cost in a short-term perspective (due to time, human resources, procedure controls etc). Many of the driving forces mentioned above could be strengthened by the authorities. More and more policies, instruments and tools have been developed in order to achieve more sustainable production and consumption; from legislation to economic instruments and voluntary instruments like Green Public Procurement, Ecolabelling and Environmental Management Schemes. At the EU-level there are several policies of interest, for example Sustainable Consumption and Production, Integrated Product Policy and Environmental Technologies Action Plan\(^9\). The Commission presented a series of proposals on sustainable consumption and production in July 2008. The building blocks of the policy include:

- Integrated Product Policy (IPP)
- Thematic Strategy on the Sustainable Use of Natural Resources
- Thematic Strategy on Waste Prevention and Recycling
- Eco-Management and Audit Scheme (EMAS)
- Eco-label Scheme
- Environmental Technologies Action Plan (ETAP)
- Green Public Procurement (GPP)
- Eco-design of Energy Using Products Directive (EuP)
- European Compliance Assistance Programme - Environment & SMEs.

Generally, policy instruments are, divided into three main groups: informative, economic and regulatory. However no single instrument can solve all problems. Instruments also need good coordination. In order to create more environmentally friendly enterprises it is important for the policy level to create incentives and prerequisites and try to adapt the instruments to the present situation. It is important to work with and support both the supply side and the demand side.

There are several examples of the industrial sector going beyond legislation because they can see the advantages in doing so. One example shows that product

development has resulted in that in 1999 it was possible to produce 50 per cent more packaging from the same amount of wood compared to 1960.\textsuperscript{10}

In the booklet “A Toolbox for the Greening of Products” from the Swedish Confederation of Enterprises, 123 examples of best practices are presented. More than half of the examples originate from SMEs.

A European study\textsuperscript{11} in three countries among SMEs, trying to measure the relation between firm competitiveness, management environmental culture, the importance of external advice on the use of cleaner production and the firm’s environmental performance was carried out during the period 1998-2002. In the study it was concluded that obstacles to adoption of environmental initiatives reported by the firms were capital constraints, poor payback, low priority, lack of management time and an absence of the correct skills and/or advice.

In a German study,\textsuperscript{12} European environmental initiatives and environmental incentives schemes designed to promote Environmental Management Systems (EMS) are reviewed. The study also contains a number of recommendations to Chinese public authorities on how to achieve a higher uptake of different forms of EMS.

In a Nordic research project\textsuperscript{13} on the availability and impact of environmental incentives for Nordic small and medium-sized enterprises (SMEs) investigations have been made into the impacts of seven different environmental incentives and grants, such as the Swedish Environment-Driven Business Development Grant. It is concluded that within the Nordic public sector environmental incentives:

\begin{itemize}
  \item are supporting a range of environmental investments which in many cases would otherwise not have been realized.
  \item have contributed to raising environmental awareness in the companies.
  \item have had identifiable economic impact on the companies’ performance, although sometimes modest. SMEs receiving these incentives have improved performance and become more competitive.
\end{itemize}

\textsuperscript{10} Tetra Pak, Stora Enso and The Swedish Forest Industries Federation (2002) This is IPP!
\textsuperscript{11} Thankappan, S; Clausen, J; Hitchens, D; Trainor, M; Keil, M (2006) Competitiveness, environmental performance and management of SME:s, Managing the Business case for Sustainability, ed by Schaltegger, S., and Wagner, M
\textsuperscript{12} GTZ (2005) Incentives and Incentives Schemes in Europe, M. Born May/June 2005
\textsuperscript{13} Nordic Council of Ministers (2005) Environmental Incentives and Nordic SMEs, TemaNord 2005:543
3.1.2 Actors

Figure 10: Different levels of work with environmental issues in Sweden

Parliament

Government
Ministry of Environment

Swedish Environmental Protection Agency

regional level

County Administrative Boards

local level

Municipalities

THE SWEDISH GOVERNMENT
The Government is assisted by the Government Offices, an integral authority comprising the Prime Minister's Office, the Ministries and the Office of Administrative Affairs. The Government comprises twelve different ministries.

The Ministry of Environment is responsible for environment issues and construction. The ministry also has the overall responsibility for coordinating Government work on sustainable development.

The overall goal of the Swedish Government is to hand on to the next generation a society in which the major environmental problems facing Sweden have been solved. In order to realise these policy aims the Swedish Parliament has adopted 16 Environmental Quality Objectives and a great number of Interim Targets. These are also broken down into sector objectives, regional and local objectives. The sector objectives are formulated by the authorities, organisations and enterprises in each sector. The regional objectives are decided by the county administrative boards and the local objectives by the municipalities. In order to fulfil the targets three different strategies have been developed; A More Efficient Energy Use and Transport, Non-toxic and Resource-efficient Cyclical Systems, Management of Land, Water and the Built Environment, all including a wide range of different
policy instruments. International commitments e.g. environmental conventions on climate etc. are also important drivers for the use of policy instruments.

The National Environmental Quality Objectives forms the basis of Sweden's environmental policy. The goals are being continuously evaluated and revised.

The Swedish environmental policy has been quite successful in many areas during the last decades. Some examples of this are the reduction of acidification and the reduction of the impact of pollution of the outdoor environment on human health. Now one vital concern is the prevention of new environmental problems. One way of achieving this is by decoupling economic growth from environmental impact and maintaining sustainable production and consumption patterns by using different programs and instruments.\(^{14}\) It is important that there is also a decoupling in absolute numbers of environmental impact and not only a relative decoupling vis-à-vis economic growth. The State should set an example regarding the promotion of environmental aspects and by achieving the Environmental Quality Objectives.

THE ROLES AND RESPONSIBILITIES OF SWEDISH AUTHORITIES

The Swedish EPA is one of many government agencies, boards and corporations in the environmental area\(^{15}\). Public agencies are independently responsible for the actions they take on the basis of the guidelines and instructions issued by the Government each year. The role of the agencies is regulated in the Government Agencies Ordinance\(^{16}\) and in an instruction\(^{17}\) and in an “appropriations letter” which regulates the government’s requests and priorities for the Swedish EPA and other agencies each budget year.

Swedish government agencies are governed via goals/objectives and results and have to describe to the Government in an annual report to what extent the objectives have been achieved and how efficiently the resources have been used. There are also general/horizontal demands on the agencies in areas such as the proper handling of gender issues and the integration of immigrants.

Responsibility for the environmental issues is not confined to the environmental actors but extends to all societal sectors. The so-called sectoral responsibility has been a part of Swedish environmental policy for the last fifteen years.

The agencies are responsible for environmental protection and policy within their own sphere of operation. For example, the agencies responsible for energy production, agriculture and transport must also ensure that those sectors develop in a

\(^{14}\) Environmental Quality Objectives –A Shared Responsibility, Summary of Government Bill 2004/05:150

\(^{15}\) Other Swedish government agencies involved in the work with the National Environmental Quality Objectives are for example: The National Board of Housing, Building and Planning, the Swedish Chemicals Inspectorate, the Swedish Radiation Protection Agency and the Geological Survey of Sweden

\(^{16}\) Verksförordningen (1995:1322)

\(^{17}\) Regulation (2001:1096) with instruction for the Swedish Protection Agency
sustainable way. County administrative boards and municipalities are important partners in this process, since they are responsible for environmental issues at regional and local levels.

The sectoral responsibility is very important in order to achieve the National Environmental Quality Objectives and is coordinated with that process. Using Environmental Management Systems is a tool to organize and systematise the work.

Proposed measures from the Government regarding for example changes in regulations are usually submitted for consideration to the parties involved. These parties could be authorities at different levels but also enterprises often represented by the industrial sector organisations. Sweden has ambitious laws concerning the freedom of information. For example in principle all documents to and from ministries and authorities are publicly available. This rule provides a good basis for involving stakeholders in the process towards sustainable development.

THE ROLE OF THE SWEDISH EPA

The Swedish Environmental Protection Agency (EPA) was created in 1967 as the first environmental agency in the world and is today one of the central environmental authorities under the Swedish Government together with the Swedish Chemical Inspectorate. The main tasks are to co-ordinate and promote environmental work at both a national and an international level. The agency shall ensure that environmental policy decisions are implemented by guiding and coordinating environmental protection, producing knowledge and information, by reporting on the state of the environment and by evaluating the efforts being made in various environmental fields.

The EPA also allocates funding for nature conservation, remediation of contaminated sites, investments to limit greenhouse gas emissions and other commitments. The agency produces background material for environmental policy decisions, as instructed by the Government, and devotes considerable resources to environmental protection work conducted in the EU, since EC environmental legislation increasingly governs Swedish national environmental policy and protection.

The Swedish EPA also has the role of developing, implementing and monitoring the achievement of environmental protection and policy, which includes proposing the use of various environmental instruments. This in turn involves legislation, information and communication, spatial planning, as well as proposing, analysing and assessing economic instruments.¹⁸

¹⁸ For more information see the report Swedish Environmental Protection Agency which can be accessed at: http://www.internat.naturvardsverket.se/documents/swepa/welcome_swepa.pdf
Greening of Enterprises

Swedish EPA is working in different ways with a number of instruments and tools in order to promote environmentally friendly enterprises. In this study, in accordance with MEP’s wishes we have focused on three areas; enforcement of legislation, economic instruments for Green Public Procurement and public participation and awareness, see below. But the Swedish EPA is also working in different ways with the development of other policy instruments and tools aimed at contributing to more sustainable consumption and production, see some examples below.

ECO-LABELLING

One of the main environmental labels (type I, according to ISO standards) on the Swedish market is the Nordic Swan label. Swedish EPA has for many years been on the board of the Nordic Swan label, and also supported the development of new criteria. The agency carried out an evaluation of the environmental effects of the eco-labelling scheme within the framework of the Nordic Council of Ministers some years ago as a part of a more detailed evaluation of the scheme.\(^\text{19}\) The evaluation showed that the ecolabelling’s main products are important to the environment. The Swan label is being used as a guide for the establishment of Environment Management Systems and for guiding private as well as public purchasers. It has also led to increased environmental awareness among consumers, purchasers and companies. Within the framework of this project a report on the Swedish eco-labelling has been produced.\(^\text{20}\)

ENVIRONMENTAL MANAGEMENT SYSTEMS

The Swedish EPA, in cooperation with the Swedish Agency for Economic and Regional Growth and the Swedish European Social Fund, has carried out an evaluation of Environmental Management Systems in enterprises.\(^\text{21}\) As a follow up, a network with representatives from authorities (e.g. Swedish EPA) and the business sector was established. A project was carried out with the aim of identifying driving forces contributing to more efficient application of today’s EMS. The network still exists.

Most (some 240) authorities are obliged to introduce an Environmental Management System. Swedish EPA is responsible for a network supporting the authorities and is regularly making evaluations of how the work is proceeding.

STANDARDISATION

The Swedish EPA has for many years participated in the development of new standards relevant to environmental issues. Examples relevant to enterprises are management systems, methods of measurements and environmental considerations for products. The Swedish EPA strives to integrate environmental issues into the standardisation process and the agency in cooperation with the national standardisation

\(^\text{20}\) Unge, R., SIS Miljömärkning (2008) Swan Eco-labelling
\(^\text{21}\) Naturvårdsverket (2003) Effektivare miljöledningssystem, Naturvårdsverkets rapport 5304
body SIS has developed a guideline on environmental aspects in products. Similar work is ongoing in the electric sector. Work on this issue is ongoing at both EU level in the European standardisation organisation, CEN\textsuperscript{22} and at global level in ISO. During 2007 and 2008 CEN and the European Commission are implementing a training programme on environmental aspects in standards.

A new standard on Social Responsibility (ISO 26 000) is now being developed in ISO. Sweden together with Brazil is one of the leading countries. The Swedish EPA is however not participating in the development of this particular standard.

RESEARCH AND DEVELOPMENT

The Swedish EPA is financing research in many areas such as environmental pollutants and health, climate, biological diversity, environmental legislation and research on instruments.

Two ongoing research programmes linked to sustainable consumption and production are the FLIPP-program (Furthering Lifecycle Considerations through Integrated Product Policy) aiming at developing knowledge and understanding of the dynamics, mechanisms and interactions in complex product chains necessary to underpin life-cycle based decision support systems. The research programme which will have been completed during 2008 is adjusted to the needs of relevant users, primarily policymakers and businesses.\textsuperscript{23} Another programme, which is co-financed, is SHARP (Sustainable Households – Attitudes, Resources and Policy).\textsuperscript{24} The programme combines political, economic, legal, psychological and time-geographical methods and employs a bottom-up perspective to understand how environmental policies and intentions are perceived and implemented within Swedish households.

Some of the financial grants from the Swedish EPA are used for research cooperation between the state and the business sector together with an institution – the Swedish Environmental Research Institute- as performer. The research embraces different projects such as The Development of Different Technical Measures and Methods for Prioritisation in Environmental Work (for example LCA).

DIALOGUES WITH STAKEHOLDERS\textsuperscript{25}

Below are some examples describing how the Swedish EPA cooperates with stakeholders.

The Swedish EPA has regular meetings with different sector organisations for example the Forest Industries and the Swedish Steel Producers’ Association in order to discuss different environmental issues relevant to that sector.

\textsuperscript{22} See CEN:s Guide No 4, Guide for the Inclusion of Environmental Aspects in Product Standards
\textsuperscript{23} For more information see: www.iiee.lu.se/flipp
\textsuperscript{24} For more information see: www.sharpprogram.se
\textsuperscript{25} See also section X on Awareness Raising and Participation of Different Stakeholders
The European Commission runs a process on Integrated Product Policy (IPP) which aims at minimising the environmental impact from products by looking at all phases of a product’s lifecycle and taking action where it is most effective.\(^\text{26}\)

The Swedish EPA is participating in the European process and has been running a national IPP-network with representatives from the business sector, researchers, other authorities and different governmental ministries since 1998.

The process at the European level has recently become more focused on sustainable consumption and production with IPP as one component.

The Swedish EPA is also involved in different dialogue projects. These dialogues have resulted in voluntary agreements with the Government in order to take tangible measures for sustainable development. One dialogue called Future Trade is a cooperation activity with supermarket retailers in order to contribute to ecologically sustainable industry and commerce. Companies, municipalities and authorities as well as the Government have been engaged in the project. The dialogue has focused on objectives for sustainable supermarkets including transport companies and food industries. The aim is to reduce environmental impact at all stages.\(^\text{27}\) The Swedish EPA has been responsible for a secretariat for this project.

The Swedish EPA is also involved in another dialogue project with the construction and real estate sectors: Building, Living and Property Management for the Future. The project has three prioritised areas, all considering the whole life-cycle: a healthy indoor environment, effective use of energy and effective use of resources.\(^\text{28}\)

Finally, the Swedish EPA is working in a secretariat for a dialogue project called Samverkansforum (Forum for Cooperation) which has been established for state property developers and property managers. The activities span a broad range of areas, from technological development, procurement, regulations and contracts, occupational health and safety to architecture, cultural environment and sustainable development.\(^\text{29}\)

Two similar dialogue projects have been carried out at EU level, one on mobile phones and one on tropical wooden garden chairs, in order to demonstrate how IPP can work in practice. The projects resulted in concrete commitments in September 2006, which are now being carried out. They are both considered quite successful so far.\(^\text{30}\)

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\(^{26}\) The policy approach is based on five principles: Life-cycle thinking, working with the market, stakeholder involvement, continuous improvement and a variety of policy instruments. For more information see: \url{http://ec.europa.eu/environment/ipp.htm}

\(^{27}\) For more information see: \url{www.framtidahandel.se}

\(^{28}\) For more information see: \url{www.byggabodialogen.se}

\(^{29}\) For more information see: \url{www.samverkansforum.nu}

\(^{30}\) For more information see: \url{http://ec.europa.eu/environment/ipp/pilot.htm}
CAMPAIGNS\textsuperscript{31}

The Swedish EPA arranges campaigns on special issues directed towards citizens. Examples of successful campaigns are our Climate Campaign, Mercury Campaign and Battery Campaign. The aim of the climate campaign was to increase knowledge of the greenhouse effect. This campaign, carried out between 2002 and 2003, was launched in collaboration with public authorities, local councils, trade, industry and voluntary organisations. The campaign included a variety of activities: a mass communication campaign carried out on the theme ‘Something strange keeps happening to the weather.’ A very popular activity which received a great deal of attention was that two prominent weathermen from television were engaged to tour around the country and talk about climate change to the general public and the press. One reason was that they were well known and had high credibility. Surveys undertaken before and after the campaign showed that people had increased their knowledge about the causes of the greenhouse effect from 57\% to 67\%, increased their knowledge of the effects from 31\% to 44\% and had become more knowledgeable about what they could do as individuals.

Another example is the Mercury Campaign. Mercury emission has led to increased concentration of mercury in the soil and in fish in many lakes in Sweden. Mercury pollution not only originates from industrial processes but also from sources including the use of mercury – the content of goods and products. Therefore Sweden decided on a phase-out of those goods as well as undertaking a five year Action Programme on the Collection of Mercury between 1994 and 1999. Almost all the municipalities participated actively and the Swedish EPA collaborated with numerous actors and target groups in the different phases of the action programme. A large number of information activities in the form of exhibitions, lectures, press conferences, workshops, etc have been carried out and a great deal of information material has been generated. One of the most successful ways of reaching out to the population was through a programme carried out with the help of two dogs trained to smell and find mercury in sinks and spills. A total of 10-11 tonnes of mercury were identified during the action programme.

From time to time the Swedish EPA also arranges seminars on different themes which are directed towards journalists.

LOCAL INVESTMENT PROGRAMMES/ CLIMATE INVESTMENT PROGRAMMES

The Swedish Parliament has decided on grants to local investment programmes aiming at increasing ecological sustainability from projects for creating good living areas and efficient energy systems to projects for creating wetlands etc. An investment programme consists of one or several coordinating measures. The Parliament has also decided on grants for a Climate Investment Programme. The focus of this programme is climate investments aiming at reducing greenhouse gases. The grants are based on cooperation between the national and the local level and can stimulate

\textsuperscript{31} See also chapter 7 on Awareness Raising and Participation of Different Stakeholders
municipalities, enterprises and other actors to make long-term investments reducing environmental impact. Totally the investment programmes have generated environmental investments of SEK 22B of which the grants accounted for almost SEK 6B.

ECO-DESIGN

The Swedish EPA, within the framework of the Nordic Council of Ministers has carried out a project on eco-design aiming at finding out how authorities can better support the introduction of eco-design into companies.\textsuperscript{32} The focus in the project is on energy using products but with a life-cycle perspective. Another focus in the project is on SMEs. Findings from the project are that the companies interviewed said they could do more for the environment but saw little incentive for doing so. Regulations and laws aim too low and the implementation of environmental criteria in public procurement should be better implemented. There should be more support for research, development and marketing. There is also a need for more easy-to-use tools for eco-design.

The Swedish EPA has financially supported a Nordic network on eco-design. The Swedish EPA has also financially supported the production of A Global Guide for Design for Sustainability. The project is a cooperation activity between UNEP, the Delft University and experts from Sweden, Germany, and Italy etc. The Guide will have been completed by late 2008.

LIFE CYCLE ASSESSMENT

Life-Cycle Assessment (LCA) is a methodology to assess in a quantitative way the natural resource use, waste generation and emission of pollutants to air, water and soil from the manufacture, use and final disposal of products. When using an LCA perspective all phases of a product’s life are taken into account, which avoids taking measures, just shifting the environmental burden from one part of the life cycle to another.

Life-cycle thinking has influenced policy making both in Sweden and in Europe. Policy areas influenced by a life-cycle perspective are the European Thematic Strategy on the Prevention and Recycling of Waste, and the European Thematic Strategy on the Sustainable Use of Natural Resources, both from 2005. The Directive on Eco-design of Energy Using Products from the same year also aims at encouraging manufacturers to design products with the environmental impact in mind throughout their entire life-cycle.

At the national level, the Swedish Government has for example in one of its Strategies expressed that action proposals must include a life-cycle perspective (Strategy for Non-toxic, Resource Efficient Eco-cycles in order to fulfill the Swedish Environmental Quality Objectives). Measures must be aimed at more than one

\textsuperscript{32} How Central Authorities can support Eco-design! – Company Perspectives, Nordic Council of Ministries TemaNord 2008:569
environmental aspect or at several phases in a product’s life cycle. Conflicts between objectives must be avoided as far as possible.

Another example is the Swedish Packaging Ordinance from 1994 where LCA analyses were used as one of the bases for the legislation.

In 2005 The European Commission set up a European Platform on Life-Cycle Assessment. The aim is to support business and policy making in Europe with reference data and recommended methods on Life-Cycle Assessment (LCA) for better practice in LCA use and interpretation.\(^{33}\)

The Swedish EPA supports the idea of life-cycle thinking and the use of LCA. The Swedish EPA has earlier been involved in the development of the tool but is at present not working so actively with the instrument itself. In Sweden there are different research institutes along with the business sector working with LCA.\(^{34}\)

In the present CEFE-project a report on LCA and some other relevant tools has been produced \(^{35}\). The methodology and development over the past years of the tool LCA is described, as well as its application, pros and cons and experience from industry and policy making. The report is intended to be used for educational purposes with enterprises in China along with a PowerPoint presentation which has been created in this project for the same reason.

**The Role of the Business Sector**

Companies have an important role in environmental policy through both the developing and demanding of environmentally sound products. Due to the introduction of Environmental Management Systems this has become more and more common.\(^{36}\) Supply chain management deals with the interaction between different parties along the supply chain like suppliers, contractors and customers. There are often complex patterns and suppliers may be spread all over the world. International as well as national cooperation and standardisation is therefore valuable.

Industrial sector organisations are important actors in the environmental work. They often have environmental managers who can act as a link between companies and authorities as contact persons to authorities. They can then inform and discuss with their members on environmental issues and they can forward these views to the authorities.

The financial sector is also becoming more aware of environmental issues. The sector organisation for accountants in Sweden is carrying out a project in order to

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\(^{33}\) For more information see [http://lca.jrc.ec.europa.eu](http://lca.jrc.ec.europa.eu)

\(^{34}\) For more information see: Swedish Environmental Research Institute (2007) Assessment of the Environmental Impacts of Products in Sweden and Europe

\(^{35}\) : Swedish Environmental Research Institute (2007) Assessment of the Environmental Impacts of Products in Sweden and Europe

\(^{36}\) : A Toolbox for the Greening of Products, (2002) Confederation of Swedish Enterprises
develop and disseminate an Internet based tool for accountants in order to analyse customer costs for the transportation of goods. An additional effect is that information is obtained about the environmental effect of changes in transportation. The Swedish EPA supports this work both financially and with knowledge. The next step is business travel. (See also the section on Dialogues with Stakeholders above)

The Role of NGO:s

Environmental Non-Governmental Organizations (NGOs) can play a vital role in the process with the greening of industry. Their most important task might be to contribute to raising citizens’ knowledge of environmental issues which, for example, could lead to people buying more environmentally friendly products. They could act as watchdogs for different issues by drawing attention to issues such as hazardous chemicals in products, emissions from industries, the exploitation of biologically valuable areas etc and thus support the environmental authorities. They can thus influence the general public, enterprises and public authorities. Their role in Sweden has changed somewhat over the years. It is not unusual nowadays that enterprises and NGOs cooperate and NGOs help companies to become more environmentally friendly. The Swedish EPA contributes to the financing of some NGOs.

In this project there has been cooperation with an NGO - Ekocentrum – which assisted in arranging a study visit to Gothenburg.

For more information

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4. Development of Swedish Environmental Law

4.1 Background

It was not until the late 19th century that the first “real” environmental laws started to emerge. The development of environmental legislation in Sweden was to a large extent driven by the new challenges the society faced due to urbanisation and industrialisation. Up until the late 19th century most of the Swedish population was dependant on agriculture. With industrialisation came first a huge demand for natural resources followed by severe consequences for Nature. Emissions from point sources in Sweden had a strong negative impact on the environment and were detrimental to people’s health and quality of life.

In principle, the legislation developed to tackle the new problems could be subdivided into three categories, 1) Natural Resource Legislation, with the purpose of regulating who had the right to extract natural resources and later also the preservation of such resources 2) Environmental Protection Legislation, with the purpose of protecting humans and later also Nature from environmentally hazardous activities and 3) Planning and Building Legislation, with the purpose of regulating the use of land for different purposes. To some extent the Legislation on Infrastructure (transport and energy production and distribution) can also be seen as one part of the environmental legislation that emerged in Sweden following the industrialisation of the country.

4.1.1 Legislation on Natural Resources

The exploitation of natural resources such as mining and the exploitation of minerals have a long history of regulation. Early laws on minerals and mining activities were generally aimed at providing opportunities to exploit those resources. Over time the mining laws have seen more and more provisions for environmental concerns. A new Mineral Law was enacted in 1991.

With the first Water Act, in 1918, a specific regime was created for the use of water resources, including among other things, a certain Permit Regime for water activities. This act was very much aimed at providing opportunities to expand hydropower into an industry with a growing demand for electricity. Five specific Water Courts were established to deal with the complex cases involving water activities and new hydro power plants. The exploitation of Swedish rivers not only brought with it a large supply of renewable energy, but also several environmental problems. The new Water Law of 1983 provided for stronger provisions for environmental protection, but kept in many ways the character of an exploitation law.
The environmental aspects of farming and forestry were expressly regulated at a fairly late stage. In 1979 a law on the management of agricultural businesses was enacted. Forestry, as an important provider of raw materials for Swedish industry, has been regulated in various ways. As for minerals, the early legislation was focused on securing the production of raw materials through effective forest management. In 1979, Sweden got its first modern law on forestry, the Forestry Act. In this Act, the environmental objectives and the production objectives are applied in an equal manner.

4.1.2 Legislation on Environmental Protection

During the early years of the last century, waste and waste water and other forms of pollution from cities and factories became a serious problem. In 1941 certain provisions for water contamination were included in the water law of 1918 (see above). It was nevertheless not until 1969 that Sweden got its first Environmental Protection Act which dramatically strengthened the role of the state in the protection of the environment. Among other things it contained a Permit Regime for environmentally hazardous activities. This Permit Regime was based on an integrated approach including conditions on most disturbances from a plant in one and the same permit. A specific permitting body, the National Licensing Board was created to deal with the permitting matters. In return from having to apply for a permit, industries were protected from further restrictions from neighbours or authorities as long as they kept operations within the boundaries of their permit. Nuclear activities and radiation were however left outside this act. The Environmental Protection Act also contained provisions for environmental damage and compensation. These provisions were in 1986 transferred to a specific law on environmental damage. Another new feature in the Environmental Protection Act was its provisions on remediation of polluted areas. These provisions were based on the Polluter Pays Principle and stipulated, in principle, that the person or company that had polluted a certain site was also responsible for remediation (or clean-up) of that area provided the area could potentially pollute other land or water areas. In 1989, those provisions were strengthened to also include remediation of areas solely on basis that they were polluted.

The Act on Measures to Prevent and Limit the Consequences of Major Accidents transposes the Seveso II Directive (96/82/EC) adopted by the European Community. It applies to all operations that use hazardous substances in quantities that exceed a given limit. The quantity that should be considered is the maximum quantity that is or can at any single moment be present in the operation. Operators have an obligation to prevent the occurrence of major accidents and to limit the effect they could have on people and the environment.

4.1.3 Court System

The Swedish judicial system includes a three instance structure of judicial procedures and two parallel types of courts: general courts, which deal with criminal and civil cases; and administrative courts, which deal with cases relating to public
administration. The general courts are organised in a three instance system: district
courts, courts of appeal and the Supreme Court. Likewise, the administrative courts
consist of county administrative courts, administrative courts of appeal and the
Supreme Administrative Court. No public authority, not even Parliament, may
determine how a court of law shall adjudicate or otherwise apply a rule of law in a
particular case.

For matters pertaining to general environmental law, which means basically all
cases that fall under the Environmental Code (see below) and secondary legislation
enacted under the code, Sweden has developed a unique court organisation, the so-
called Environmental Court System which is specifically designed to deal with the
technical complexity of environmental matters.

4.2 The Environmental Code

4.2.1 Background

As illustrated above, the emergence of environmental legislation in Sweden was
driven by new environmental problems. With some exemptions, each problem gave
rise to separate new regulations and laws. In the late 1980s came the realisation
that it was harder to adapt the many laws and regulations to the new environmental
challenges constantly arising. Furthermore, due to the complexity and fragmented
character of environmental legislation, its impact was also weakened. Another
factor this time was that Sweden had become more and more affected by the envi-
ronmental legislation of the European Community (EC) of which Sweden became
a full member in 1995.

To meet the concerns expressed above, several commissions were appointed to
work on a new law. The result of this work was the Swedish Environmental Code
(the Code) entering into force in 1999. The Code was built on the environmental
provisions of 15 different acts that were reviewed and consolidated into one single
law. As a result, the Code has 1) a broad application, in principle it covers every
activity with a potential harmful impact on the environment, and 2) a broad legal
content; it contains provisions for most parts of environmental protection, includ-
ing general principles of environmental law, rules on procedure and competences
for authorities, penal provisions and provisions for civil liability.

4.2.2 Purpose and Application

The purpose of the Code, set out in its first chapter, is to promote sustainable de-
velopment. Its provisions relate to the management of land and water, Nature con-
servation, the protection of plant and animal species, environmentally hazardous
activities emitting pollutants to air/water, creating waste and noise etc., health pro-
tection, water operations, genetic engineering, chemical products and waste.

The Environmental Code is applicable to all citizens and economic operators who
undertake operations or measures that conflict with the aim of the Code. The rules
apply to all activities potentially detrimental to human health or the environment, damage to the natural or cultural environment and the built environment and to all other places to which the public has access.

Being a framework law, the provisions of the Code do not specify limit values for various operations and do not go into detail when it comes to striking a balance between various interests. More detailed provisions are laid down in ordinances issued by the Government or in regulations issued by authorities commissioned by the Government, e.g. the Swedish EPA. Further to this, central authorities, among them the Swedish EPA, issues guidelines providing assistance on interpretation on various provisions of the Code and underlying ordinances. Much of Sweden’s transposition of the European Community legislation is done through Governmental Ordinances and Authority regulations.

The 16 national long-term Environmental Quality Objectives, EQOs (See 3.1.1) and intermediate targets are non-binding, but fill a function to guide the authorities in their work and also serve as a policy instrument when applying the legislation.

It is important to note that the Code did not replace all the various acts that involved environmental protection. Many of the specific laws for certain sectors and activities, which did not have environmental protection as a direct purpose, remained in force even after the adoption of the Code. These laws are sometimes referred to as sector legislation. The provisions of the Code apply also if these sectors are covered by other legislation. This “parallel application” means, for example, that some activities might require permits under two separate permit regimes or that the operator of a certain activity, which does not in itself require any permit, still might be obliged to take certain action in order to comply with the code, i.e. reduce noise along a rail road line.

4.2.3 Content
Here follows a brief description of the Code and its major provisions.37

GENERAL RULES OF CONSIDERATION, CHAPTER 2
The so called general rules of consideration constitute fundamental principles for the application of the Code to matters of e.g. permissibility, permit requirements and environmental inspection and enforcement. The general rules of consideration are always applied and, according to one of them, the Burden of Proof Principle, it is the person who pursues to undertake an activity who has to prove the compliance with the rules. According to the Proportionality Principle, requirements or judgements based on these rules must always be environmentally justified and financially reasonable.

37 A more concise description can be found in the memorandum The Swedish Environmental Code, a Résumé of the Text of the Code and Related Ordinances published by the Swedish Government (www.regeringen.se)
In a way, the general rules of consideration all relate back to the Precautionary Principle, which requires anyone who pursues an activity to take all necessary environmental precautions in order to limit the impact on human health and the environment. The mere risk of damage and detriment activates this obligation. Such precautions may involve, for example, to limit the scale of operations or to apply the Best Possible Technologies, the Best Possible Technology Principle (interpreted together with the proportionality principle this corresponds to the requirement of Best Available Technologies, (BAT)).

Other general rules of consideration related to the precautionary principle are: 1) The Knowledge Requirement, according to which everyone who pursue an activity must acquire the knowledge to do so in an environmentally responsible way, 2) The Appropriate Location Principle, according to which the site must be appropriate with respect to the objectives of the Code and the rules concerning land and water management and 3) The Product Choice Principle, requiring the operator to refrain from the use or sale of chemical products that may involve hazards to human health or the environment if other less dangerous products can be used instead.

Further to the principles described above, The Polluter Pays Principle requires anyone who takes a measure that might have an impact on human health or the environment to be responsible for complying with the rules and to pay any resulting expenses, including also clean-up of polluted areas. Finally, The Resource Management and Eco-cycle Principles stipulate that an operation must be undertaken in such a way as to ensure efficient use of raw materials and minimize the use of energy and generation of waste. The use of renewable energy sources should be preferred and resource extraction from Nature should be minimized. Waste formed should be recycled, reused or recovered to the extent possible and disposal should be made without damaging the environment. The ultimate goal of this principle is to maintain closed material loops.

Even though the general rules of consideration have been applied to require proportionate precautionary measures for an operation or activity, this activity may still cause substantial damage to human health or the environment. To avoid such consequence, the general rules of consideration have been complemented by a so called “Stopping” rule. According to this rule, which applies to all activities under the Code, the relevant authority can order seizure or ban the start-up of the activity.

RESOURCE AND LAND MANAGEMENT, CHAPTERS 3 AND 4
The provisions from the Resource Management Act were included in Chapters 3 and 4 of the Code. The purpose of these provisions are to specify areas which are of a specific interest for certain land use and thus give those areas priority for this use and to, as far as reasonably possible, protect them from changes being detrimental to such purposes. The interests of priority can be both conservation and utilisation interests. Consequently, areas of great natural value and of value for
recreation as well as forestry and mining are among the interests listed in these chapters.

ENVIRONMENTAL QUALITY STANDARDS, CHAPTER 5
Environmental Quality Standards (EQS) are adopted to address actual or potential environmental problems. The standards are established on the basis of scientific criteria and indicate levels of pollution or other impact that humans or the environment may be exposed to without risk of significant detriment.

ENVIRONMENTAL IMPACT ASSESSMENTS, CHAPTER 6
Provisions regulating when and how Environmental Impact Assessments (EIA) shall be made are set out in the Code and in an underlying Ordinance. EIAs must be conducted before and submitted together with an application for a permit under the Code. This requirement also applies to several other activities (see below) and for new planning decisions (so called Strategic EIAs). The purpose of the requirements is to establish and describe the direct and indirect impact of the planned activity or plan. The statement must describe the impact on people, animals, plants, land, water, air, the climate, the landscape and the cultural environment, on the management of land, water and the physical environment in general and on the management of materials, raw materials and energy.

NATURE PROTECTION AND PROTECTION OF ANIMALS AND PLANTS, CHAPTERS 7-8
Chapter 7 stipulates a wide variety of protection for certain areas, animals and plants, such as: national parks, nature and culture reserves, nature 2000 areas, shore protection areas etc.

CERTAIN ACTIVITIES, CHAPTER 9-15
Chapters 9 to 15 contain provisions on certain activities, namely i) environmentally hazardous activities and health protection, ii) polluted areas and the remediation thereof, iii) water activities, iv) environmental concerns in agriculture, v) genetic engineering, vi) chemical products and vii) waste and producer responsibility. Many of these provisions are complemented by Governmental Ordinances and Authority regulations, providing for more detailed provisions regulating the conduct of the respective activities. Many of these provisions are based on various types of EC legislation, generally providing minimum environmental requirements for many of the specific activities. Environmentally hazardous activities and water activities are subject to a specific Permit Regime which is described below.

PROCEDURAL PROVISIONS, CHAPTERS 16-25
As mentioned above, the code not only sets up direct provisions on environmental protection, it also contains the rules of procedure and the legal foundation for the permitting regime and the permitting authorities and also for the Government’s consideration of permissibility for certain matters (today limited to certain major
infrastructure projects and nuclear activities. A general outline of the procedures for permit review and appeals of authority decisions is provided in section below.

PROVISIONS ON INSPECTION AND ENFORCEMENT, CHAPTERS 26-28
A general outline of the provisions for inspection and enforcement is included in chapter 4.3.

SANCTIONS, CHARGES AND PENAL PROVISIONS, CHAPTERS 29-30
A general outline of the provisions for sanctions and penalties is included in chapter 4.10.

PROVISIONS FOR ENVIRONMENTAL DAMAGE AND COMPENSATION, CHAPTERS 31-33
The last part of the Code contains provisions for compensation and environmental damage for example. Under these provisions, a landowner may for example be entitled to compensation for public interventions for the purpose of protecting certain natural assets. In addition, anyone who has pursued an activity and thereby caused bodily harm, material damage or pecuniary loss through pollution, noise, vibrations or similar impact is liable to be taken before an environmental court.

Activities subject to permit or notification requirements must normally pay contributions to both an environmental damage insurance scheme and an environmental remediation insurance scheme. Those two schemes are used for financing remediation of contaminated areas and environmental damages respectively, in cases where it is not possible to obtain sufficient funds from the person liable for remediation or damages.

4.2.4 Development of the Environmental Code
Since its entry into force in 1999, the Environmental Code has already been subject to many changes and adjustments. This is partly due to the fact that it is a relatively new and yet comprehensive piece of legislation, partly due to the rapid way in which the regulation of the environment has developed in recent years. In a way, the constant changes of the Code illustrate the fact that environmental protection, if anything, is a long term project.

4.2.5 Other Laws on the Environment
As mentioned above, many so called Sector laws on activities with a potential harmful impact on the environment remain, even after the entry into force of the Code. These laws generally regulate certain sectors, which fall under the competence of specific authorities, and generally do not aim at environmental protection as a primary objective. Some examples of the sector legislation that is in force today are set out below.
The Act on Measures to Prevent and Limit the Consequences of Major Accidents – under the Swedish Rescue Service Agency. Some of the provisions under the Act refer to the Environmental Code. The Code and its Permit Regime cover enforcement and inspection.

The Planning and Building Act still remains the basis for and framework within which municipalities act on planning matters. The Act sets out a series of general requirements to be observed in the planning and design of building development, but refers to the Environmental Code in many of its provisions; e.g. regarding EIAs and the fact that planning may not interfere with environmental quality standards.

The Mineral Law, setting out certain provisions and a certain Permit Regime under the Mining Inspectorate for the exploitation of minerals. It contains several references to the Code and mining operations also require permits under the Code.

4.3 The Environmental Permit System

4.3.1 Permit Purpose and Requirements

In order to ensure that the rules of consideration are genuinely complied with, a number of activities and operations are subject to permit requirements. From the start a large number of installations were subject to licensing. The number of such installations has been reduced over time due to better environmental performance.

These activities or operations may not be commenced without a permit from a competent authority or an environmental court. The permit states the conditions under which the activity may be carried out. The authority in charge may also refuse a permit if they find that the activity is not permissible under the Code. In return, the permit protects the operator from any claims or actions due to disturbances from the activities, as long as the operations are kept within the frames stipulated by the permit.

In principle the permit stipulates that a certain activity, i.e. the production of a certain quantity of a certain product, use of a certain amount of a certain product for a certain purpose, etc., is permissible on certain conditions. The conditions are stipulated in the permit and vary with the activity in question. The general rules of consideration are of fundamental importance for the Code Permit Regime, as they provide the basis for determining whether and under what conditions a permit can be granted. Permits must in some cases contain some specified conditions, e.g. emission limit values\textsuperscript{38} and conditions for how to monitor emissions. This is the case for activities regulated under the IPPC directive adopted by the European Community.

\textsuperscript{38} Usually these are expressed as total load (e.g. tons/year) maybe combined with concentration values (e.g. mg/l) in order to avoid dilution of pollutants
Activities or operations for which permits are compulsory are specified directly in the Environmental Code and in a specific Ordinance under the Code. Based on severity from an environmental point of view, activities are divided into three main categories; i) so called A-activities, which comprise all major activities, ii) B-activities, which are of a lesser size or environmental impact, but still require a permit and iii) C-Activities, which do not require a permit, but fall under a certain notification regime.

The environmental protection legislation and the permit system have been successful in reducing the emissions from point sources. The system has also contributed to decoupling such emissions from the growth of industrial production. However, current legislation is less capable of dealing with the increasing number of diffuse sources of pollution.\(^{39}\)

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to permit requirements, but to a mandatory Notification Regime. This means that the operator must notify the local Environmental and Public Health Committee (EPHC), within the relevant municipality before the activity in question is commenced. The EPHC may, within a period of six weeks, decide and notify the operator of precautionary measures to be taken in the specific case. In addition to this, the EPHCs are generally also competent for the supervision of B-activities.

In general, the division of competences for permitting is based on the type of case. The permit review and appeals structure can be illustrated by the following examples:

A. Licensing of IPPC-installations and water activities (deciding authority under lined): Environmental Courts → Environmental Court of Appeal → Supreme Court (leave to appeal);

B. Licensing of medium size polluting activities:
   CAB → Environmental Courts → Environmental Court of Appeal (leave to appeal);

C. Decisions on Notifications
   EPHC → CAB → Environmental Courts → Environmental Court of Appeal (leave to appeal);

PERMIT REVIEW

According to the Code’s interpretation of the Polluter Pays Principle, it is the applicant who is responsible for preparing and compiling the permit application. During the preparation, the applicant is obliged to consult the CAB and EPHC, as well as other stakeholders (the general public in the area affected by the activity and environmental NGOs). This part of the permit process is commonly referred to as the Public Consultation Phase.

The application must, among other things, include an Environmental Impact Assessment (EIA) and a technical description of the planned activity or operations. Upon receipt of the application, the permit authority makes it publicly available and refers it to the key stakeholders, including relevant authorities. The purpose of this First Consultation Round is to conclude whether or not the application is sufficient in order to cover all aspects relevant for the permit review. If not, the permit authority usually orders the applicant to provide additional material. This consultation phase gives the authorities, including the Swedish EPA, an opportunity to participate at an early stage in the licensing process and thereby influence the content of the EIA. The Swedish Environmental Protection Agency used to be very involved in the licensing process for plants with great environmental impact. Along with reduced emissions, the role of the Swedish EPA has decreased. The cases the Swedish EPA chooses to be involved in today either contain important legislative principles or there is a risk that the activity concerned may lead to a significant environmental impact for example, pulp and paper mills, refineries and mines.
During a Second Consultation Round, stakeholders and authorities are invited to comment on the application as regards its permissibility and if so, under what conditions it may be permissible. This part of the permit review often includes a public hearing. Upon the basis of the application and the comments received, the permit authority decides on the matter, either by revoking the application or by granting a permit on certain conditions. The applicant, relevant stakeholders and certain authorities, including the Swedish EPA, can appeal against a permit decision.

As mentioned above, the permit review is generally based on an application of the general rules of consideration. For example, the Precautionary Principle and the Best Available Technique (BAT) Principle stipulate that the mere risk of damage or detriment implies an obligation to take necessary measures to mitigate or prevent adverse health and environmental effects. Examples are limiting the risk of emissions and other damage, choosing appropriate methods, limiting the scale of the operation, choosing suitable raw materials and fuels, using control equipment, only carrying out harmful operations during specified periods of time, appropriate packaging and handling of chemicals and providing information about the proper use and handling of various substances.

**Supervision: Injunctions and other supervisory decisions**

EPHC → CAB → Environmental Court → Environmental Court of Appeal (leave to appeal); or CAB → Environmental Court → Environmental Court of Appeal (leave to appeal).

### 4.4. Product Legislation

It is not only point sources like emissions from industries that are of interest. Products are also subject to regulation. Below are some examples of this.

#### 4.4.1 Producer Responsibility

The work for sustainable development includes transforming today’s consuming and polluting “waste society” into an ecologically sustainable society. By means of reuse, recycling and energy recovery, we learn to utilise different materials more efficiently. The introduction of producer responsibility is a step along the way towards checking our profligate use of natural resources. Swedish legislation provides for producer responsibility within five areas: packaging, tyres, waste paper, motor vehicles, and electrical and electronic products. There is also a voluntary commitment on the part of the industrial sector for office paper.

A producer is defined as one who produces imports or sells the specific types of products or materials that are provided for in the legislation. The producer must have a system or be a partner in a system that safeguards collecting, transport, recycling, reuse, recovery of energy or other environmentally friendly means of taking care of the waste and materials. At the same time households and consumers are responsible for sorting out packages etc, and taking them to the producer’s system. Consequently consumer awareness is essential to the system. The overall
recycling rate, including materials and energy, for all packaging in 2005 was approximately 60 percent.

The long-term goal of producer responsibility is that it should lead to more environmentally responsible product development. In this way, producer responsibility becomes an instrument to induce producers to develop products that are more resource-efficient and easier to recover/recycle and that do not contain environmentally hazardous substances.

Producer responsibility is regulated via the Environmental Code Chapter 15 on Waste and Producer Responsibility, as well as different ordinances on Producer Responsibility. In order to live up to the requirements laid down in the legislation, the business community has formed joint recycling companies, also called material companies. These companies are run on a non-profit basis and their purpose is to ensure that producer responsibility is fulfilled. They have thus assumed responsibility on behalf of the producers.

4.4.2 EU directive on Eco-design from Energy-using Products

The EC directive on eco-design of energy-using products (EUP) entered into force in August 2005. The directive provides a legal framework for regulation of the environmental impact of energy-using products. The Directive encompasses all products whose function is dependent on energy, with the exception of the transport of people and goods.

Being a framework law, the EUP does not have a direct effect on enterprises producing energy-using products. The main principles laid down in the EUP are to be activated through sub-directives for specific products. The EUP-directive was implemented in Swedish law in 2007. The Commission of the European Union is now carrying out studies on different product groups. A study is also in progress to establish a working plan for the following three years setting out an indicative list of product groups which will be considered as priorities for the adoption of implementation measures.40

4.5 Legislation on Chemicals

Swedish legislation on chemicals is included in Chapter 14 of the Environmental Code. Chemicals are subject to European harmonization and there are several regulations and directives dealing with this matter. In recent years the development of new European legislation on chemicals has been ongoing in the European Commission. The new Directive, REACH, came into force on 1 June 2007. It replaces a great number of other EC rules.

40 For more information see: http://ec.europa.eu/energy/demand/legislation/eco_design_en.htm
REACH stands for Registration Evaluation and Assessment of Chemicals. REACH is based on the idea that the industrial sector itself is best placed to ensure that the chemicals it manufactures and puts on the market do not adversely affect human health or the environment. The REACH Regulation thus gives greater responsibility to people in industry to manage the risks from chemicals and also to pro-vide safety information on the substances. This requires that the industrial sector has knowledge of the properties of its substances and can manage potential risks. Manufacturers have to register the information in a central database run by the European Chemicals Agency (ECHA) which ensures that industry is meeting obligations and taking action on substances of very high concern. ECHA will run a public database in which consumers and professionals can find hazard information.41

4.6 Inspection and Enforcement

4.6.1 Inspection Purpose and Requirements

The general supervision in Sweden is conducted by certain supervisory authorities, where rights and obligations are stipulated in the Code. Furthermore, the operators of environmentally hazardous activities have to conduct self-monitoring. This is one example of the application of the knowledge requirement in the general rules of consideration. Supervisory decisions must be based on competence through relevant laws and regulations and must always be in accordance with the Proportionality Principle.

4.6.2 Financing

The costs for supervisory activities, including inspections, are covered partly by the public, partly by the operator of the activities in question. Under the Code, anyone carrying out an activity is obliged to pay for work done by the permitting and supervisory authorities, e.g. permit reviews, inspection and enforcement. The cost for government permitting and inspection and enforcement of environmentally hazardous activities are financed to approximately 50 % by annual charges and 50 % by tax revenue. The municipalities are free to regulate the local balance between financing through charges and by local tax revenue. Two types of charges exist, annual charges and charges related to an authority effort. The annual charges are related only to the size and potential environmental risks that are normally connected with a certain type of installation.

The government or local inspection or permitting authorities debit the charges but they never benefit directly from the income. No charges exist for emissions or other types of measured impact on the environment to finance inspection and enforcement. By this the authority is safeguarded from any irrelevant considerations and from public suspicion of such considerations in their exercise of authority.

41 For more information see http://ec.europa.eu/environment/chemicals/reach/reach_intro.htm
4.6.3 Inspection and Enforcement Authorities

Inspection and enforcement responsibilities lie at three levels, national, regional, and local. The Swedish EPA is the main central environmental authority responsible for supervision. The Swedish Rescue Services Agency is the authority on supervision concerning the Seveso II Directive. Both these authorities have guiding, evaluating, advising and co-ordinating roles. There are also 10 other national authorities with some limited inspection and enforcement responsibilities. The supervisory tasks of the Swedish EPA are generally conducted as guidance and co-ordination of regional and local authorities. For example, the Swedish EPA issues general guidelines for inspection and enforcement.

Environmental inspection and enforcement concerning installations and other activities is mostly planned and carried out at the regional and local levels by the CABs or the EPHCs. As mentioned, the CABs are generally responsible for supervision of A-activities and Compliance with legislation based on EC-directives is generally a responsibility for the CABs but, with the exception of the Seveso II-Directive, could be delegated to the EPHCs according to a special procedure. The EPHC has a general supervisory function for environmental and health protection in the municipality and for the use and handling of chemicals and waste within the municipality.

During the 80s local municipalities were allowed to take over some parts of the inspection and enforcement tasks if they could provide the necessary competence and knowledge and present a satisfactory organisation to handle the task. The responsibilities were brought back to the municipalities con-currently with the reduced problems from emissions from point sources, the growing awareness, knowledge and competence in the municipalities and the gradual need to change focus in the Government environmental policy.

In 1989 most of the installations were made subject to local inspection and enforcement, except the largest ones. The County Administrative Boards (CABs) have the right to redraw a municipality inspection of installations subject to licensing if it is not carried out satisfactorily. From the 70s to the beginning of the 90s the Swedish EPA carried out parallel inspections, which were sometimes notified in advance and sometimes not. The aim was to check the quality of local and regional inspections, to calibrate their quality or to trace undiscovered emissions with the help of a mobile laboratory.

Sweden has personnel resources for environmental inspections equalling more than 1,250 full-time officials (2002)\(^2\). On average one inspector is responsible for 20 activities for which permits are required (A and B activities) or for which a notification to the municipality is required (C activities). They spend one-fifth of their working time on A and B activities. In 2002 around 3,700 of the country’s 5,500

installations for which permits are required were inspected. Central guidance on how local and regional authorities should apply the legislation became – and still is – an important government task. To make the guidance legally correct, comprehensible and practical to the authorities and to industry, the guidance is produced in collaboration with central experts and regional and local personnel. Knowledge from industrial representatives is taken into account.

The division of competence for supervision is based on the type of case. The permit review and appeals structure can be illustrated with the following examples:

1. Supervision: Injunctions and other supervisory decisions by CAB
   CAB → Environmental Court → Environmental Court of Appeal (leave to appeal)

2. Supervision: Injunctions and other supervisory decisions by EPHC
   EPHC → CAB → Environmental Court → Environmental Court of Appeal (leave to appeal)

4.6.4 Interaction between Administrative Levels
The Swedish EPA cannot govern nor direct the CABs and no government authorities can govern the EPHCs because of the municipalities’ strong local self-governance. Instead we need to collaborate at both central and regional levels to safeguard an equally satisfactory and effective application of the Environmental Code.

By interacting with the CABs, the Swedish EPA obtains knowledge of the practicability of the central guidance. The CABs and EPHCs obtain new knowledge and awareness of central and other CAB or EPHC perspectives and of European legislation. Central guidance documents are often produced in collaboration with the CABs and/or the EPHCs. Such a process comprises seminars and workshops (often together with industrial representatives) to increase the knowledge and to gain support for the guidance document, that will be the outcome of the process.

In summary, Swedish EPA governance of the CABs and the EPHCs very much depends on how:

- The Swedish EPA manages the role of expert, collaborates and maintains confidence
- The Swedish EPA follows up, communicates, publishes and reports the CAB or the EPHC shortcomings to them, to the general public and to the Government.

4.6.5 Inspection Procedures
INSPECTION PLANNING AND INITIATION

All environmentally hazardous activities and other operations under the Code are subject to supervision by the competent authorities. The immediate enforcement authorities themselves are obliged to continuously plan and carry out inspections. Inspections may also be the result of complaints from individuals, the general public or from information provided by the operator.

Since the authorities cannot give priority to all activities and operations under the Code, there must be a methodical approach to manage their obligations. Therefore authorities responsible for inspection and enforcement must keep records of all their activities and operations. Every year these authorities must prepare written plans with inspection priorities and estimated inspection requirements for the coming year. The plans should be based on the regional or local environmental objectives that have been prepared based on the national ones. The immediate enforcement authorities should regularly follow up and evaluate their planning and implementation to improve inspection efficiency.

Inspection should primarily be concentrated to such activities, operations and installations that are important for meeting the Environmental Quality Objectives and Targets, and where the inspection can be expected to improve conditions because of internal control system deficiencies. The annual environmental reports provided by the operators are used as a basis for assessing the need for inspections. The presence of an ISO-14001 certificate is a factor to be considered when planning an inspection, but does not automatically result in less frequent inspections.

AUTHORITY FOR ACCESS AND INSPECTION

An inspector is entitled to have access to a factory, an operation or other installation, regardless of whether or not it is in operation, and to carry out site visits (ask questions, take samples, read documents, take photographs etc.). Furthermore, the operator of an activity is obliged to submit information to an inspector upon request. This, however, is provided that the information is necessary for the fulfilment of an inspection task.

Normally, all types of information (for example figures on emissions or reports on the impact on the environment) and documents given to an inspector or submitted to an authority are available to the public pursuant to the Swedish Constitution. However, if the information concerns business interests, for example detailed chemical recipes, it might be confidential. The authority decides whether the information is confidential or not pursuant to the Secrecy Act. It is possible to appeal against authority decisions on supervision.

INSPECTION METHODOLOGY

The Swedish Environmental Protection Agency has issued a guidebook for on-site inspections. It contains methodological guidance for site or installation visits.
The guidebook recommends the authorities responsible for inspection and enforcement to plan each visit in advance and to decide on its scope. Visits may focus on all aspects of the legislation, but also be limited to some special problems.

There are no legally binding rules for the organisation and performance of the authorities’ inspection methodology. Instead such methodology is seen as a competence that the personnel performing inspection and site visits must possess and develop. Inspectors should be able to handle many different activities and inspection situations. It would be too bureaucratic and inefficient to regulate for example the number of site visits or the performance of them. Such a regulation would make it difficult to adapt the resources needed for the actual visits and desired quality of a site visit. Training programmes for and organised exchange of experience between inspectors are therefore the preferred tools.

AVOIDANCE OF CONFLICTING INTEREST

It is stated in the Swedish Constitution that all courts and authorities - governmental as well as municipal - must exercise their authority under the laws independently from irrelevant influence. The parliamentary Ombudsmen are elected by the Parliament and supervise the authorities’ exercise of authority. A civil servant or politician at an authority who neglects his duty may be criticized or sued and the authority may be liable for damages due to deficient exercise of authority.

It is stated by law that the municipalities must organise EPHC exercise of authority in a way that separates the authority from conflicting interests. It is also stated that persons with conflicting interest or who are at risk of conflicting interests shall avoid participating in the decisions. They are regarded as challengeable in such cases and are obliged to notify their challenge in advance. If decisions taken involve challengeable persons this can be appealed by the general public and declared invalid. The CAB follow up the inspection and enforcement carried out by the EPHCs and scrutinize the community organisation. Their reports are available to the public.

The system for finance of the authorities is also constructed so as to minimise conflicting interests.

COMPETENCE BUILDING/DEVELOPMENT

Almost all personnel at the authorities – government as well as municipal - have a university degree of some kind. At the EPHCs the inspectors are to a large extent qualified as Environmental and Health Inspectors. They hold a university degree in the field of environment and health protection and inspection. The degree course was established at the end of the 70s due to increased local awareness of environmental issues and increased local demands for trained personnel. The personnel at

the CABs are mainly engineers, biologists and other natural scientists and lawyers and to some extent Environmental and Health Inspectors.

The Swedish EPA and other agencies continuously strive to develop competence and skills at the regional and local authority levels. The Swedish EPA efforts aim to:

- involve personnel at the CABs and EPHCs in participation in the EU network IMPEL (Implementation and Enforcement of Environmental Legislation) in which inspecting personnel from the member states exchange experience and knowledge
- promote national collaboration and exchange of experience and knowledge within and between the central, regional and local levels and industry representatives
- arrange seminars and courses
- promote research

An educational method used on special occasions, e.g. before the Environmental Code came into force, was to train selected personnel at the CABs and EPHCs thoroughly at the central level. They in turn trained all other personnel at the regional and local levels, often as a team – one from the CAB and one from an EPHC. This arrangement was cost-effective.

4.7 Operator Self-monitoring

The inspection and enforcement authorities cannot regularly scrutinise all the thousands of activities, installations, operations and processes to which the Code applies, especially not all the various parameters set out in conditions of integrated permits. Besides this practical aspect, the Code also stipulates that everyone must take on the responsibility for doing what is possible to minimise their environmental impact and to gain knowledge of the environmental consequences of the operation of their activities. It is therefore mandatory for an operator to have a self-monitoring system. In this way, the Environmental Code very clearly allocates the responsibility for monitoring to the operators.

The operator is obliged to have a Self-Monitoring System (SMS). The system shall make it possible to comply with all the rules in the Code, the ordinances, the regulations and permits applicable to a specific activity. The system can be described as a minimal Environmental Management System limited to compliance. It is easy to integrate or harmonize with an Environmental Management System (e.g. ISO 14001) and other types of voluntary management systems. It is also easy to combine with the systematic work that shall be carried out according to the Swedish Occupational Health and Safety Act.

Operators should continuously plan and monitor the activities in order to mitigate or prevent detriment to human health or the environment. They should also keep
themselves informed about the activity’s impact on the environment. This is done by carrying out studies and by measurements on one’s own initiative or by other means. Operators should also have routines that allow response to knowledge and information obtained, e.g. by taking appropriate counter-measures.

The Ordinance on Operator Self-Monitoring contains more specific rules. It is applicable for professional activities that require a permit, or activities for which environmental reporting is compulsory. The Ordinance specifies that environmental accountability in the organisation of the operator should be made clear and documented. The operator should also establish and document procedures for process and emission monitoring to be implemented to ensure compliance and should keep the equipment in good condition. The operator should also systematically examine, identify and assess the environmental risks connected with the activity and if necessary take appropriate action. Action taken and the results should be documented.

The operator must keep a record of chemicals and genetically modified organisms used by the activity. The register should contain the name of the product, the quantity used and information about risks to human health or the environment. If accidents or emergency situations occur that may cause detriment to human health or to the environment, the operator of the activity should promptly notify the relevant authorities.

The Swedish EPA has issued a Regulation that further details monitoring requirements and rules for compliance checking.

4.8 Annual Environmental Reports

Operators of an environmentally hazardous activity requiring a permit are obliged to submit an annual environmental report to the supervisory authorities, normally at regional and local levels. Since 1989, the annual reporting for those operators is stipulated by law. However, the same requirement has been imposed for a long time on a more or less mandatory basis through case by case decisions.

The annual report shall include a summary of all measures taken to comply with the general rules of consideration and the conditions of the permit and the results. Results from measurements and all studies performed during the year according to the SMS should be summarised. Data on emissions to air and water, and when required according to the legislation, also on products and waste, consumption of energy, use of chemicals and hazardous substances should be included. The person accountable for the activity, normally the Managing Director or the Environmental Director should sign the report. All reports are available to the public after having been submitted to the authority. Any person who violates the environmental reporting requirements may be prosecuted (see chapter 4.10).
The Swedish Environmental Protection Agency has issued regulations and general guidelines concerning environmental reporting.

4.9 ISO 14001 Certified Activities

Experience shows that an Environmental Management System (EMS) in place at an operator does not automatically reduce the need for inspections. However, an EMS normally improves an operator’s ability to comply and to implement the mandatory self-monitoring system (SMS). An efficient use of an SMS, but without an EMS, may also result in compliance. Experience shows that an EMS cannot be taken as a guarantee that an activity is in compliance with the requirements. The inspection needs must therefore be assessed on a case by case basis.

The outcome of an EMS depends very much on whether an operator uses its EMS proactively or not. The presence of an EMS, however, can influence the inspection methodology, e.g. focus on whether an operator’s SMS is well implemented or not. Such “system-monitoring” is carried out in a similar fashion as audits performed by accredited certification bodies. If the inspectorate focuses on compliance control and an auditor uses the results from inspections for auditing purposes, the interaction might increase efficiency. A prerequisite for such interaction is a transparent dissemination of results from the audits and inspections.

Experience also shows that EMS influences the contact pattern between operators and inspectorates. Operators with an EMS initiate more contacts, which is positive, but results might lead to an externally driven allocation of inspection resources rather than allocation based on the authority’s own priorities. Therefore, each authority has to carefully plan its inspections and implement the plan in an efficient manner to avoid paying too little attention to activities without an EMS.

4.10 Sanctions and Penalties

4.10.1 Administrative Sanctions

SUPERVISORY ENFORCEMENT POWERS

Injunctions

A supervisory authority has several instruments to use for enforcing the Environmental Code and related ordinances and regulations. Some of those, access to information and premises etc. have already been described above. In order to demand certain actions from the operators, regardless of whether or not a permit is required for the activity in question, the supervisory authority may issue an injunction concerning precautionary measures or prohibitions as needed for compliance with the rules. Injunctions can have different content and purposes.

Should a permit holder disregard any condition specified in a permit or otherwise act in conflict with the Code, the authority may, though an injunction, enjoin him to rectify the matter. As mentioned above, the supervisory authority may enjoin an
operator to submit information required for the super-vision. The authority may also enjoin the operator to carry out examinations of the activity and its effects necessary for fulfilment of the inspection objectives. If appropriate, it may be prescribed that someone other than the operator should carry out a study. If so, the authority may also appoint such a person. For example, it may be prescribed that a specified environmental auditor should inspect the self-monitoring system or a part of that system. In accordance with the Polluter Pays Principle, the operator must bear the cost of the study. Injunctions can also contain an order to seize operations or to prohibit an operator to start a certain operation.

**Administrative Fines**

The supervisory authority may also impose fines linked to an injunction (so called administrative fines). Should anyone fail to observe the content of an injunction, the supervisory authority may turn to an environmental court to get a ruling on fine, which must then be paid by the operator. The amount of the fine should approximately correspond to the operator’s costs to implement the measures ordered in the injunction.

**Environmental Sanction Charges**

Injunctions usually fulfil their purpose as a means of pointing activities in the “right direction”. In cases where something has already “gone wrong” the supervisory authorities are empowered to levy so called environmental charges. Such charges are imposed where operators fail to comply with certain rules issued pursuant to the Environmental Code, for example where an operation, for which a permit must be obtained, is started without a permit or where an operation has not been reported to the relevant authorities. Charges may only be imposed for certain infringements, about 50, stipulated in law and are levied at amounts between SEK 5,000 and 1,000,000 (550 – 110, 000 Euro). Charges are payable by operators pursuant to a decision by an inspection authority.

A separate Ordinance specifies the infringements for which inspection authorities can impose charges as well as the respective amounts. The charges are always imposed immediately following infringement of a rule. It makes no difference whether the infringement is intentional, due to negligence or whether it damaged the environment or human health or benefited the operator. However, environmental charges should not be imposed when manifestly unreasonable. Before the authority concerned decides to impose a charge, an investigation must be carried out and the operator given the opportunity to make a statement. Decisions on environmental sanction charges can be appealed to the environmental courts.

**REPORTING OBLIGATIONS**

It is incumbent on the supervisory authority to ensure that suspected offences of penal provision in the Environmental Code are brought to the attention of the public prosecutor. Therefore the staff of the supervisory authorities are under a mandatory obligation to report any suspected offences of penal provisions to the public.
prosecutors office. The supervisory authority does not investigate offences further unless they have been ordered to do assist the prosecutor in a criminal investigation. Investigation of possible offences is instead a matter for the prosecutor and the police (see below).

4.10.2 Environmental Penal Law

PENAL LAW IN THE ENVIRONMENTAL CODE

Before the Environmental Code, provisions for environmental offences were regulated in the Swedish Penal Code as well as in some other acts. With the introduction of the Environmental Code, all provisions on environmental penal law were moved to Chapter 29 of the Code. Today, this chapter contains a number of environmental offences considered so serious that they shall be regarded as crimes. The offences in the Environmental Code are nevertheless still subsidiary to any general criminal offences stipulated in the Penal Code. Punishments for environmental offences range from penalty fines to imprisonment up to six years. In most court rulings where offender has been found guilty the offenders have been sentenced to pay fines, sometimes in combination with a conditional sentence.

The penal provisions of the Code include several offences, such as:

- **Environmental offence**; includes the deliberate or negligent i) pollution of land, water or air deemed not to be minor, or ii) causing of a substantial detriment to the environment, iii) storage of waste or other matter in a manner which may give rise to health risks or detriment to the environment, etc.
- **Capital Environmental offence**, as set out above but on a large scale or with the risk of serious consequences
- **Unauthorized environmental activity**, infringement of limitations or conditions of a permit
- The infringement against specified regulations in the Code or specified regulations issued pursuant the Code, such as protection of certain areas, handling of chemicals, use GMOs, use of water, etc.
- **Obstruction of environmental control**, supply of incorrect information contrary to the provisions of the Code or to rules issued in pursuance thereof and thereby

PROCEDURE

As mentioned above, the supervisory authority does not investigate potential environmental offences. Instead it is a matter for the public prosecutor to decide whether or not an offence is likely and may lead to a conviction. If the prosecutor decides to commence a criminal investigation, this will be done with assistance from the police authorities. Today, most prosecutor chambers have specially trained prosecutors dealing only with environmental offences. Many police de-
partments also have specially trained police officers for investigating environmental offences.

Unlike matters relating to administrative injunctions and charges, criminal offences are brought before a general Court of Law and not before the Environmental Courts. Appeals are made to the Courts of Appeal and the Supreme Court. In addition, administrative enforcement powers relate to the operator of an activity, being a natural or legal person. Charges of environmental offences, on the other hand, always relate to a natural person, either in the capacity as a direct offender or as being the legal representative of the legal person within whose operations the offence has occurred. The prosecutor can, however, also charge a legal person, within whose operations an environmental offence has occurred, with forfeiture and corporate fines.
5. Economic Instruments in Sweden

5.1 Background

5.1.1 Instruments and Objectives

Many international institutions, countries and organisations (e.g. the European Union and the OECD) are today advocates of economic instruments and are recommending their members to increase the use of economic instruments.

Sweden has a long tradition of using economic instruments and has worked with economic instruments like environmental charges and taxes in environmental policy since the 1970s.

5.1.2 What is an Economic Instrument?

It is not always easy to make a distinction between economic instruments and regulations and there are many different definitions of economic instruments. According to the OECD instruments are economic when they affect estimates of the costs and benefits of alternative actions to economic agents.

Positive economic instruments include different forms of state or municipal subsidies and provide financial benefits, for example tax relief (lower taxes, tax deductions), refunds, grants and financial support. Economic instruments involving expense for those concerned are e.g. environmental taxes and charges.

Emissions trading (tradable permits) can be viewed as a combination between an economic instrument and a regulation. The right to emit is regulated and limited and at the same time tradable emissions rights are issued, which can be bought and sold on a market.

More examples of instruments can be found in a database created by the European Environment Agency and the OECD: Examples of economic instruments in Sweden in relation to environmental quality objectives can also be viewed in Appendix 1.

5.1.3 Why use Economic Instruments?

Economics and economic instruments are designed to tackle scarce resources and can therefore be useful when dealing with environmental problems and finding ways to reach environmental objectives efficiently. Economics can for example be used to ensure that the cost of environmental measures does not exceed the benefits.

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44 Economic instruments are also sometimes called e.g. market-based or market-oriented instruments.

However, economic theories are generally based on simplifications of the complex real world and many assumptions are made in formulating these theories. In a perfect market economy, scarce resources are priced and traded in such a way that their value is maintained or increased. The product will command a high price if demand is high and supply is limited. But the market is not perfect and one reason for that is the presence of so-called externalities.

Externalities can be described as effects, positive or negative, which are not reflected in prices or production costs. One example is a negative effect on the environment, which is not compensated for those affected and which has been caused without any market transaction. Discharges by one company could e.g. cause the operating conditions for other companies to deteriorate. For example, when the production of goods and services causes external costs, which are not reflected on the market, this is often termed market failure.

Externalities can arise due to poorly defined property rights and/or because a good is characterised by “non-rivalry” and “non-exclusiveness” as is the case for so-called “public goods” like air. If nobody owns the assets and the assets are collectively shared and can be used free of charge (like air, water or biological diversity), these assets can obviously not be traded or managed as scarce resources.

Private consumption of common assets can lower the standard of living for others, since they can not be compensated for their loss by assets of an equivalent (environmental) value.

In many cases, voluntary efforts are not enough to achieve the environmental objectives and necessary tools to preserve assets of this kind can be lacking in a free market.

The state can try to address the market failure and problems with e.g. destruction or overuse of common assets and act as an owner of these environmental assets. Governments could also try to reflect the environmental cost e.g. by imposing market-based instruments such as environmental taxes. However, it is difficult to estimate the size of the externalities (costs) and benefits correctly and there are many different ways in which external effects can be calculated and monetised.

Governmental intervention can also be necessary to achieve allocative efficiency, produce welfare-enhancing outcomes and for other health and social concerns.

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46 Another reason can be that there is imperfect competition on the market. A powerful competition agency can be an important measure to counter incentives of companies to restrict competition.
47 When a non-rival good is consumed it does not affect other person’s possibilities to consume that same good (e.g. a TV show).
48 With a non-exclusive resource it is impossible to reduce the right for people to use the resource. The air around a house can for example not be protected from long distance air pollution.
49 Examples are contingent on valuation, hedonic pricing, and the travel cost method.
Environmental instruments are in many countries also intended to encourage people to change their behaviour and lifestyle and thereby enhance the transition towards more sustainable development.

5.1.4 What makes Economic Instruments Effective?

As mentioned above, economic instruments could be used to address market failure and combat negative externalities. They can act either as a carrot or a stick to steer more sustainable actions. But the question is how environmental policy and economic instruments are to be best designed in order to be effective.

Much of the economic literature in this area suggests that negative environmental impact can be avoided or minimised if appropriate or "optimal" environmental policy is in place. "Optimal" environmental policy means that there is full internalisation of environmental externalities and well defined property rights. Even though achieving an optimal and perfect environmental policy is highly improbable, experience suggests that countries with comprehensive environmental policies in place (even if not optimal) can do much to reduce adverse effects and to promote economic development that is more beneficial for the environment.

How environmental policy and instruments are best designed (to be optimal) has been discussed and described both theoretically and empirically in many different articles and studies. Goulder et al. (1999), for example, suggest that an optimal instrument operates through four main effects, which are:

- the abatement effect
- the input substitution effect
- the output substitution effect, and
- the revenue-recycling effect

"The abatement effect" means the incentive to use less of an input, "the input substitution effect" stands for a substitution among inputs and "the output substitution effect" implies that higher product prices lead to less use of embodied emissions. Finally "the revenue-recycling effect" gives the budgetary effect of taxes collected.

All the mechanisms described above are in use when a perfect tax (or an auctioned permit) operates by addressing an environmental problem. This means that a given target can be reached at the lowest possible cost.

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51 One complication is the fact that the effect of economic conditions, eco-systems, and pollution on the recipient and environmental resilience varies between different geographical areas, which means that the optimal level of environmental policy also varies. A differentiated environmental policy e.g. a differentiated tax between regions can be more environmentally efficient but can e.g. be viewed as unjust by the actors involved.
Subsidizing the use of renewable energy sources, or research into such sources, can not be considered as optimal and is according to some studies\(^{53}\), less efficient than raising the true price of carbon (pointed out as the most efficient way to reduce carbon emissions).

A major advantage with say an emission tax on carbon is that it puts pressure on consumers to conserve and on producers to employ more efficient technologies and also gives the untaxed renewable energy a better chance to expand their share of energy production. However emission taxes are unpopular since they are more visible and governments often fear that the use of these kinds of taxes will reduce the economic growth. Even though subsidies to renewable energy do not burden consumers, they can imply other problems like tax revenues foregone and can be less effective e.g. to reduce carbon etc. Subsidies can however be motivated in some cases which will be described later in this section.\(^{54}\)

When introducing economic instruments and policy it is pertinent to study whether some economic instruments and environmental policies have been more effective than others.

There are several ways to evaluate the efficiency and to estimate costs and benefits. For example some criteria could be used to decide whether a political instrument will be considered efficient or not. Brännlund and Kriström (1998)\(^{55}\) for example suggest that environmental policy is efficient if:

- the marginal benefit of the environmental improvement equals the marginal cost\(^{56}\) of the improvement
- the chosen environmental quality is achieved at the lowest possible cost.

The first criterion suggests that emissions should be reduced as long as the cost does not exceed the benefit. This criterion assumes full knowledge of the damage of the emissions, not only the physical damage but also knowledge about the value of the damage. Since this knowledge is rarely available, due to uncertainty in the calculations of the damage and the valuation, the first criterion is seldom fulfilled. A calculation of both the benefit and cost is therefore not often used when environmental quality goals are established. The ambition is rather that the environmental goals should reflect the critical capacity of the environment and what it is economically reasonable to achieve. The environmental quality goals may therefore indirectly reflect a valuation in the sense that an ambitious goal suggests that the environmental improvement has great value.

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\(^{53}\) See e.g. Fischer and Newell (2004)
\(^{56}\) Marginal cost and marginal benefit basically means the cost of reducing emissions with one more unit (based on a certain level) and the benefit of this reduction.
Since the first criterion is difficult to establish, the second criterion becomes more important. This criterion, which means that the goals should be attained cost-effectively, can however be measured in different ways. Either the measures/instruments are chosen that lead to the goal at the lowest possible cost or measures that attain the highest possible environmental benefit in relation to a given cost are chosen. To reach a goal at the lowest possible cost measures are often directed to many different sources and sectors necessary. A cost-effective allocation of measures is achieved when the marginal costs for reducing the emissions are the same for all measures. It is desired that economic instruments should to a greater extent take into consideration the difference in effect of measures e.g. depending on the geographical location, which could be done e.g. by differentiating taxes. Measures should be located in areas where they have the largest impact on the goal. Generally market based instruments such as emissions trading or taxes have high potential for reaching a cost-effective allocation of measures.

It is clear that the level of available background information is essential when the effectiveness of instruments is discussed. For example, some environmental regulations may not be cost-effective but may have the advantage that they can be used without much information (e.g. about pollution quantities, effect on the recipient etc.) and other "transaction costs". Other instruments may be cost-effective but could have very high transaction costs. The choice of suitable instruments is apart from cost-effectiveness also generally based on available information and the other associated costs that each instrument requires.

For most economic instruments such as taxes and subsidies, it is difficult to predict the reduction of emissions and they are accordingly not as effective in combating environmental problems if we need to know the exact result of the instrument introduced. It may therefore be better to use other instruments e.g. a ban when dealing with some very dangerous and hazardous substances that need to be reduced to certain levels.

It can also be interesting to note that policy instruments can be directed to different groups in society and have different distribution effects. The size of e.g. governmental, private economic and business effects depends on the choice of instrument to generate the measures. If subsidies are used in the agricultural sector to stimulate the implementation of certain measures, the costs are allocated to the taxpayers and not to farmers.

57 Sometimes average cost is used as an approximation for marginal cost since in many cases it is, if not impossible at least very resource demanding to estimate the marginal cost.
58 With "transaction costs" here basically is meant the costs that are associated with the introduction and maintenance of an economic instrument where information is an essential part.
59 Green I-M., Scharin, H., Water pollution policies: What do we learn from economic theory and empirical evidence?
60 See Swedish Environmental Protection Agency (2005) “Economic Instruments for the Environment”
Regulation that implies e.g. a demand for abatement means that the costs are allocated to those who implement the measures. This is also the case for fees and emission allowances that are distributed free of charge (grandfathered).

A tax on emissions or emission permits that are auctioned implies a larger cost for the sector whose activities are controlled since, besides the abatement cost they also need to pay for remaining emissions. On the other hand the government can use the revenues from a tax to compensate groups that are negatively affected by the emissions etc. Taxes and auctioned emissions allowances are the only instruments that fulfill the Polluter Pays Principle (PPP) since the polluter has to pay taxes for all emissions even after the desired abatement level is reached.

Subsidies are suitable (and are corrected for market failure), mainly for activities that are associated with positive external effects like wetlands, where the subsidy is given to internalise the positive external effects e.g. biological diversity that a wetland can generate, in the price for the creation and care of these wetlands. These kinds of subsidies imply, like taxes, cost-effectiveness and dynamic efficiency. The financing of subsidies, for example through taxes on some other market may however have negative effects on the economy.

The economic instruments presently used in Sweden were evaluated and analysed during 2006 based (among other things) on their ability to achieve environmental benefits effectively in the long term. One of the main criteria in this study was the ability to achieve the desired Environmental Quality Objectives as quickly as possible and at the lowest possible cost (cost-effective). The use of the instrument was also viewed as effective if it promoted technical development, encouraged the most cost-effective solutions over time and created financial incentives for improving production processes and changing patterns of consumption.

The study also pointed out the advantages of multi-sector instruments (e.g. multi-sector taxes) for example due to the ability of these instruments to effectively reduce environmental problems in many areas and sectors. More results from this study and examples of effective economic instruments in Sweden (according to the study) will be described later. International aspects, trade and competitiveness concerns, which are also relevant for instruments’ effectiveness will be described briefly in the following section.

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61 Dynamic efficiency basically means the capacity of an instrument to generate technological development and encourage the most cost-effective solutions over time.
62 The size of the subsidy should equal the size of the positive externality. With the subsidy the production cost would better reflect the welfare economic marginal cost of the production.
63 "Economic Instruments in Environmental Policy" (2006), see reference list.
64 In the study the environmental objectives are taken for granted and the analysis is focused on the costs to society of the instruments used, which formed the basis for the aim to achieve socio-economically effective environmental policy in the long term.
65 For more info about the economic theory see e.g. reference "Economic Instruments in Environmental Policy" in “For more information”.
66 For more information about what makes an economic instrument effective see also e.g. “Using the market for cost-effective environmental policy” (EEA Report No 1/2006), mentioned in the reference list.
5.2 International Experience of Economic Instruments

5.2.1 International use and Recognition of Economic Instruments

Many countries have positive experience of using economic instruments in the environmental area, not least the Nordic and other European countries. The need to use economic instruments is now clearly emphasised in the European Union and the European Parliament has also requested the possible introduction of environmental taxes at community level. The OECD has also advised its member states to increase the use of environmental taxes and charges.

To combat some environmental problems, e.g. in cases of trans-boundary pollution such as problems with CO2 emissions, there is also a need for the use of many policy instruments worldwide and for multilateral co-operation for example via multilateral environmental agreements, MEAs. In addition, economic instruments are often essential in order to achieve the goals of the MEAs.

The work with Agenda 21 includes recommendations to the nations of the world to increase their use of economic instruments to promote sustainable development. The Plan of Implementation adopted by the World Summit on Sustainable Development (2002) stated that action should be taken at all levels to "continue to promote the internalisation of environmental costs and the use of economic instruments, taking into account the approach that the polluter should, in principle, bear the costs of pollution, with due regard to the public interest and without distorting international trade and investment".

5.2.2 The Impact of Environmental Policy and Instruments on Trade and Competitiveness

In the debate on economic instruments and environmental policy their impact on companies’ competitiveness and international trade is often mentioned. There are many different theories and hypotheses among researchers on the effect of environmental policy and instruments in this area. For example, some theories imply that higher environmental standards, for example the raising of a certain environmental tax, will force pollution intensive companies and capital resources to move to other countries with more lax environmental regulations and lower environmental costs (taxes) according to the so called "pollution haven" hypothesis.

Another similar hypothesis, the so called "race to the bottom" hypothesis indicates that trade liberalisation and the desire to keep domestic industry and business internationally competitive will result in pressure to weaken environmental regulations.

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67 A multilateral environmental agreement (MEA) can be defined as an international agreement (treaty, protocol, convention) between more than two countries e.g. for conservation of the environment or to secure prevention of pollution. Membership can be open or limited.
On the other hand, according to the so called “Porter-hypothesis”, high environmental requirements lead to a better environment and also to more efficient production and productivity and thereby better competitiveness.

Empirical evidence for these theories / hypotheses seems to be inconclusive. Schulze and Urspung (2001) found, in their review of theoretical arguments and empirical evidence in this area, that there appears to be little evidence for the different hypotheses and of a widespread movement of capital influenced by environmental regulation. Their results indicate that trade flows are only marginally affected by differences in regulations and standards and that environmental policy appears to have had only a small effect on high-polluting industries or firms. One of the main reasons for that is the fact that the costs for environmental control appear to be too small to cause a relevant comparative advantage between countries and that other factors like technologies, labour costs and endowments with natural resources are much more important for companies’ competitiveness and preferences for moving to other countries.

However, the effect of especially non-harmonised environmental regulations at the national level can be significant for some companies and e.g. for those sectors which are most sensitive to competition and in which capital resources can be moved.

The investments that are necessary to comply with some requirements might be considerable in some cases and the competitive effects will vary between companies. Some instruments and proposals might also affect price and demand for some products and the effect on trade also depends on how sensitive the buyers are to changes in prices (price elasticity). Overall, any effect of new policy instruments on costs and price levels is likely to decrease over time due to economics of scale and innovations in the area.

Even though there is little evidence of any widespread movement of capital to countries with lower standards, countries may still have lowered their standards in order to attract investment or kept them at relatively low levels. There is e.g. some evidence of a “regulatory chill” effect, which means that policy makers have not adopted some environmental policies because of the competitiveness concerns of industry. The industrial sector has clearly often appealed to competitiveness concerns when they (often successfully) have lobbied against environmental regula-

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70 This term “economies of scale” points at the tendency for average production costs to be lower the larger the scale of production. One of the reasons for this is that at a low production level the producer might need to use less automated and more labour intensive production techniques.
A relevant question is therefore how serious is this “regulatory chill” effect and how should it be addressed by responsible policy makers?

One solution to the competitiveness problems is to try to negotiate multilateral agreements to address the environmental problems. However, if the MEAs are not completely multilateral (which they seldom are) a regulatory chill effect can also appear here, where competitiveness concerns can arise between those who are party to an agreement and those who are not.

Furthermore, high environmental standards and regulations in developed countries are sometimes considered to be barriers to trade and to cause some problems for exporting companies in countries with lower environmental standards (e.g. some developing countries).

The OECD Joint Working Party on Trade and Environment (JWPTE) has studied market access concerns arising from environmental requirements and initiated some case studies in this area. These studies were also the background to an OECD Global Forum on Trade workshop in 2002 in India. The results from these discussions and studies have shown that many exporters in developing countries lack information on new regulations and standards. This could be negative for their competitiveness and lead, for example, to insufficient time to adjust to the new regulations before the developing countries exports are affected. Higher environmental requirements in developing countries may therefore be beneficial and lead to lower adjustment costs and better market access for exporting companies.

How to handle these issues is regularly discussed in many international forums like the WTO and OECD and more information in this area can be found in the report “Capacity building on WTO and Environmental Protection” (2005).

5.3 Swedish Experience of Working with Economic Instruments

5.3.1 Background
Sweden has worked with economic instruments such as environmental charges and taxes in environmental policy since the 1970s. Sweden has probably more environmental economic policy instruments than any other country, according to an OECD review in 2004. About SEK 75B in tax revenue, which represents about 3% of GDP, can currently be classified as coming from environmental instruments.

Problems can also appear in countries where the environmental standards and enforcement differ between regions within the country, e.g. pollution-intensive companies with old emission cleaning technology may be tempted to move to regions with lower standards.

Described e.g. in OECD report: COM/ENV/TD(2003)33/REV1


See also info in e.g. Swedish EPA report (2006)
The revenues from some environmental taxes in Sweden are described in the table below.

Table 1: Environmental taxes in Sweden, (MSEK)

<table>
<thead>
<tr>
<th></th>
<th>1993</th>
<th>2000</th>
<th>2003</th>
<th>2004*</th>
<th>2005*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td>47 726</td>
<td>61 547</td>
<td>71 931</td>
<td>73 464</td>
<td>77 570</td>
</tr>
<tr>
<td><strong>Energy tax</strong></td>
<td>39 629</td>
<td>52 907</td>
<td>62 555</td>
<td>63 594</td>
<td>65 903</td>
</tr>
<tr>
<td>Including fuel tax</td>
<td>23 524</td>
<td>27 013</td>
<td>29 717</td>
<td>17 987</td>
<td>19 862</td>
</tr>
<tr>
<td><strong>Electricity tax</strong></td>
<td>5 710</td>
<td>11 300</td>
<td>15 657</td>
<td>17 206</td>
<td>18 222</td>
</tr>
<tr>
<td><strong>Nuclear tax</strong></td>
<td>100</td>
<td>1 708</td>
<td>1 829</td>
<td>1 864</td>
<td>1 794</td>
</tr>
<tr>
<td><strong>Carbon tax</strong></td>
<td>13 662</td>
<td>12 149</td>
<td>23 813</td>
<td>26 428</td>
<td>26 535</td>
</tr>
<tr>
<td><strong>Sulfur tax</strong></td>
<td>184</td>
<td>89</td>
<td>159</td>
<td>90</td>
<td>75</td>
</tr>
<tr>
<td>Tax on domestic flights</td>
<td>196</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tax on pesticides etc</td>
<td>13</td>
<td>58</td>
<td>67</td>
<td>61</td>
<td>75</td>
</tr>
<tr>
<td>Tax on fertilizer</td>
<td>185</td>
<td>357</td>
<td>340</td>
<td>303</td>
<td>329</td>
</tr>
<tr>
<td>Tax on waste</td>
<td>1 085</td>
<td>852</td>
<td>752</td>
<td>736</td>
<td></td>
</tr>
<tr>
<td>Tax on transport</td>
<td>8 119</td>
<td>7 025</td>
<td>7 665</td>
<td>8 062</td>
<td>10 243</td>
</tr>
<tr>
<td>Environmental taxes as % of GDP</td>
<td>3.10%</td>
<td>2.90%</td>
<td>2.90%</td>
<td>2.90%</td>
<td>2.90%</td>
</tr>
<tr>
<td>Environmental taxes as % of GDP</td>
<td>10.90%</td>
<td>8.70%</td>
<td>10.60%</td>
<td>10.10%</td>
<td>10.20%</td>
</tr>
<tr>
<td>EU average env taxes as % of GDP</td>
<td>2.80%</td>
<td>2.80%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As can be seen in the table, the largest share of revenues comes from the carbon dioxide tax and the taxes on energy products.

Sweden has a relatively large number of environmental economic policy instruments, but the level of environmental taxes in relation to GDP is about the same as the average in the EU.

The development in Sweden has partly been driven by the work with environmental quality objectives, interim targets, sector objectives, regional and local objectives and the fact that at least one instrument per objective is often necessary.

The work on environmental issues and instruments at the national level is complemented with the efforts at regional and local levels. Examples of local instruments are waste fees based on weight (lower weight gives lower fees) or differentiated waste collection fees for households with source separation, lower or no parking fees for “environmental cars” etc. Municipalities generally charge households the full cost of environmental services, such as waste and sewage treatment, in
accordance with the Polluter Pays Principle (PPP). Municipalities also charge households for drinking water.

A problem in Sweden, as in many other countries, has been to find the optimal level of e.g. taxes and the right balance between different interests in society. The environmental objectives are often affected by other political objectives in society and different objectives can be in conflict with each other. An environmental tax increase can e.g. lead to complaints from industry due to competitiveness concerns etc. Different trade-offs between e.g. trade, environmental goals and efficiency have some-times been made. Examples of economic instruments in Sweden that partly counteract environmental objectives are the travel allowances in the transport sector and the reduced energy and carbon dioxide taxes for industry.

It is important to keep all these factors in mind, and to be aware that many instruments can also include some disadvantages or conflicts of interest, when the environmental objectives and economic instruments effectiveness are discussed.

5.3.2 The Swedish EPA and Economic Instruments

The Government (Ministry of the Environment) can assign the Swedish EPA to write an analysis of the effects and consequences of a changed economic instrument in a certain area (e.g. a higher NOX charge). This information can then be part of a basis for political decisions in the area studied.

Evaluation and analysis of policy and proposed instruments (ex ante and ex post) can include more or less comprehensive regulatory impact assessment, cost-benefit analysis, cost-effectiveness analyses, environmental impact assessments etc. and is an important task to ensure regulatory efficiency. The Swedish EPA like all agencies is also required to analyse and describe the consequences their regulations and propositions have in an impact analysis. Consequences described may include a recommendation for suitable policy instruments that can effectively reach a situation where the intended and necessary abatement (environmental) measures are taken and also what the different costs (and often benefits) are for the authorities affected, and persons or companies associated with the recommended instruments. The methodology is however not specified and varies among agencies.

The quality of the impact analyses performed by the Swedish EPA and other agencies varies ac-cording to a study performed by the Swedish EPA in 2004 and the Swedish EPA and the Government agrees on the need to improve their quality.

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76 The role of the Swedish EPA has also been described (in general terms) in section 2.1
77 Examples of such reports can be found in the reference list
78 The decision preparation process in the government and the interaction with governmental agencies is previously described in section 2.1.
79 The purpose of economic impact assessment is to obtain good and comprehensive information to form a base for policy decisions.
The Ministry of Finance and the Ministry of the Environment have also pointed out, in the study mentioned, that it is important to have good estimates of costs and benefits and to perform accurate calculations of the cost-effectiveness of different proposals and also the importance of a description of possible synergies between different goals.

In addition, a representative of the Ministry of the Environment, mentioned in the report that better background information in this area could enhance their ministry’s possibilities to argue for environmental proposals and measures with other parts e.g. ministries within the Government such as the Ministry of Finance.

Well performed impact analyses can sometimes more clearly show that the benefits exceed the costs of some environmental measures and instruments. It is important to show that environmental problems can incur considerable cost and cause irreversible damage in the long term if not dealt with in time.

Sweden is now suffering from very costly remediation of polluted water and land areas to be able to achieve Sweden’s Environmental Quality Objectives. It would probably have been much more efficient and less costly if appropriate environmental policies had counteracted the emissions at the source in time.

The Ministry of Environment and other ministries have also pointed out that the agencies need to set aside enough time and resources and improve their competence (e.g. by employing more environmental economists) in order to be able to upgrade the quality of the economic analyses.

The Swedish EPA is presently conducting a process where discussions about suitable contents and structure of an adequate economic impact assessment have been intensified and more resources are also being allocated to this area.

Economic impact analyses are now conducted on for example interim targets, environmental quality objectives and actions and measures to reach these objectives in order to form a better base for the Government’s new major environmental proposal in 2009 in this area.

5.3.3 Examples of “Effective” Economic Instruments
As previously described, the economic instruments presently used in Sweden were evaluated in 2006 based on their ability to achieve environmental benefits effectively in the long term. By analysing the instruments’ cost-effectiveness, dynamic efficiency, and achievement of objectives etc. some of Sweden’s most “effective and successful” economic instruments were identified.

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81 The Swedish EPA has prioritised employing environmental economists. Other organisations/countries might instead want to use e.g. an institute with environmental economist competence.
82 Under the heading “What makes economic instruments effective?”
83 Swedish EPA et. al. “Economic Instruments in Environmental Policy” (2006), see reference list.
The result of the study coincided with economic theory by pointing at the advantages of taxes as cost-effective and recommending instruments that serve several environmental objectives and cover many measures and sectors and which do not require too much measuring, monitoring and administration.

The energy tax system on fossil fuels, which includes the carbon dioxide tax, the tax on sulphur and the energy tax were identified as some of our most effective and successful economic instruments. These taxes, as well as the successful NOX charge and some other instruments (mainly in the energy tax system) will be described after a short introduction of the energy tax system.

THE ENERGY TAX SYSTEM

The energy tax system in Sweden is based on a combination of different taxes e.g. carbon dioxide taxes, energy taxes on fuel, an effect tax on nuclear power and consumer tax on electricity. These are economic policy instruments which are important in climate policy and for a reduced climate impact. The taxes on CO2 and energy are a part of an energy system transition and have also fiscal purposes. The tax on sulphur and the NOX charge mainly affect the Environmental Quality Objectives that deal with eutrophication, acidification, and air emissions. Some "effective" economic instruments that are part of the Swedish energy tax system will be described briefly as follows:

THE ENERGY TAX AND THE CO2 TAX

The energy tax on mineral oil and coal was introduced in 1957. The scheme was extended in 1964 by the introduction of an energy tax on Liquid Petroleum Gas (LPG) and in 1985 natural gas was included in the system. The tax rate was relatively modest when it was first introduced but has under-gone periodic increases over time. In the 1980s the energy crises and the increased awareness of negative environmental effects of fossil fuels supported higher taxes and the energy tax rate continued to rise until 1991 when the entire energy taxation scheme was restructured.

The introduction of a CO2 tax in 1991 meant a decreased energy tax which gave an almost un-changed overall tax burden. The CO2/carbon tax rates on fossil fuels were differentiated based on the carbon content in the fuels. The tax scheme was introduced to give a clear economic incentive to reduce CO2 emissions.

The intent with the introduction of the CO2 tax was not to increase the overall tax burden, but rather to provide an economic incentive to consume more environmentally friendly energy products.

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84 Most text in this section is drawn from the report: Nordic Council of Ministers (2006)
85 The tax on nuclear power generation amounts to SEK 5,514 per MW of thermal power of the reactor.
86 This tax can be considered a minor instrument and will not be further described
87 This is a tax that is differentiated between regions, the level of consumption and business sector, will not be further described
In Table 2 below are the different carbon tax and energy tax rates for the different sources illustrated.\(^87\)

### Table 2: Examples of CO2 and energy\(^1\) tax rates for different energy sources

<table>
<thead>
<tr>
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<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Light fuel oil (EUR/cent/1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy tax</td>
<td>8,3</td>
<td>12,77</td>
<td>6,63</td>
<td>8,8</td>
<td>7,72</td>
<td>8,18</td>
</tr>
<tr>
<td>CO2 tax</td>
<td>1,84</td>
<td>1,67</td>
<td>1,23</td>
<td>1,23</td>
<td>1,23</td>
<td>1,23</td>
</tr>
<tr>
<td>TOTAL TAX</td>
<td>10,11</td>
<td>14,44</td>
<td>8,22</td>
<td>8,22</td>
<td>8,22</td>
<td>8,22</td>
</tr>
<tr>
<td>Heavy fuel oil (EUR/cent/1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy tax</td>
<td>8,3</td>
<td>12,77</td>
<td>6,63</td>
<td>8,8</td>
<td>7,72</td>
<td>8,18</td>
</tr>
<tr>
<td>CO2 tax</td>
<td>1,84</td>
<td>1,67</td>
<td>1,23</td>
<td>1,23</td>
<td>1,23</td>
<td>1,23</td>
</tr>
<tr>
<td>TOTAL TAX</td>
<td>10,11</td>
<td>14,44</td>
<td>8,22</td>
<td>8,22</td>
<td>8,22</td>
<td>8,22</td>
</tr>
<tr>
<td>Natural gas (EUR/cent/1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy tax</td>
<td>4,72</td>
<td>4,86</td>
<td>2,24</td>
<td>2,85</td>
<td>2,5</td>
<td>2,85</td>
</tr>
<tr>
<td>CO2 tax</td>
<td>9,25</td>
<td>9,38</td>
<td>14,85</td>
<td>14,85</td>
<td>14,85</td>
<td>14,85</td>
</tr>
<tr>
<td>TOTAL TAX</td>
<td>14,47</td>
<td>14,22</td>
<td>17,10</td>
<td>17,10</td>
<td>17,10</td>
<td>17,10</td>
</tr>
<tr>
<td>LPG (EUR/cent/1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy tax</td>
<td>1,07</td>
<td>2,79</td>
<td>2,92</td>
<td>2,92</td>
<td>2,92</td>
<td>2,92</td>
</tr>
<tr>
<td>CO2 tax</td>
<td>12,98</td>
<td>13,17</td>
<td>20,85</td>
<td>20,85</td>
<td>20,85</td>
<td>20,85</td>
</tr>
<tr>
<td>TOTAL TAX</td>
<td>14,05</td>
<td>15,96</td>
<td>23,73</td>
<td>23,73</td>
<td>23,73</td>
<td>23,73</td>
</tr>
<tr>
<td>Coal (EUR/cent/1)</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Energy tax</td>
<td>2,5</td>
<td>6,12</td>
<td>13,71</td>
<td>14,84</td>
<td>20,36</td>
<td>29,73</td>
</tr>
<tr>
<td>CO2 tax</td>
<td>10,76</td>
<td>10,89</td>
<td>17,07</td>
<td>25,25</td>
<td>34,8</td>
<td></td>
</tr>
<tr>
<td>TOTAL TAX</td>
<td>13,26</td>
<td>17,01</td>
<td>34,77</td>
<td>34,77</td>
<td>34,77</td>
<td>34,77</td>
</tr>
</tbody>
</table>

\(^1\) Before 1993, the energy tax was named excise tax
\(^2\) A special excise tax was levied on fuel oil before 1991 when the CO2 tax was introduced.

Source: Nordic Council of Ministers, 2006

As can be seen in the table above, the total tax level in this area has increased considerably during the period illustrated. The development should be seen in the context where the increase of these taxes is part of a political programme that was launched by the Swedish Government in 2001 with the main objective to shift the tax burden to environmental taxes and away from taxes levied on labour.

However, the tax rates presented in Table 2 above do not represent the tax burden on the industrial sectors. Households and companies in the service sector pay a higher tax than industry. The household sector is the only sector that has paid full energy and CO2 tax since 1993. The CO2 and energy tax burden was dramatically reduced for industry, agriculture, forestry and fisheries in 1993, due to competitiveness problems during the economic crisis in Sweden in the 1990s. These sectors are still exempted from energy tax and pay a reduced CO2 tax.

The share paid by industry (shown in Table 3) fluctuates and has lately decreased as a consequence of the increasing CO2 tax rate. The overall increase in the CO2 tax rate has been countered so that industry pays a lower share in order to maintain a constant CO2 tax burden on industry.

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\(^87\) Nordic Council of Ministers, 2006
Besides these general tax exemptions for industry, further tax reductions (24% of the paid taxes) can be granted to energy-intensive industry if the company tax bill for CO2 exceeds 0.8 percent of the sales value. The companies can also get a full refund of the share of the CO2 tax that exceeds 1.2 per cent of the sales value. (Nordic Council of Ministers, 2006). The share of the energy and CO2 tax that households and the industrial sector pay is shown in the table below.

Table 3: Industrial and household payment of the CO2 and energy tax as a share of total tax (%)

<table>
<thead>
<tr>
<th>Year</th>
<th>Energy tax</th>
<th>CO2 tax</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Household</td>
<td>Industry</td>
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<td></td>
<td>100</td>
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<td></td>
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<td></td>
<td>100</td>
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</tbody>
</table>


It should be noted that the shares shown in the table above and the whole system of energy and carbon taxes might be changed or removed from heavy industry, since Sweden now belongs to the European Trading System for carbon use in heavy industry. The system and possible solutions are now being analysed by the Swedish Government.

Even if there are many exemptions and reductions in the present system, the tax system is considered to have been important for emission reductions in the sectors involved. In theoretical terms, general use of (and increase in) energy taxes is considered to be cost-effective means of improving energy efficiency and is also considered by many to be an effective instrument in energy and climate policy issues. This has also been confirmed by interviews with builders, window manufacturers and people in a number of energy-intensive industries. High energy prices are cited by many people as the single most important reason for improving energy efficiency.

Sweden together with Norway has higher carbon taxes than any other country. The carbon tax has had a significant effect in the heating and household sectors, where the use of fossil fuels has been greatly reduced and been to a large extent replaced by biomass.\(^{88}\)

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TAX ON TRANSPORTATION FUELS

Fossil fuels in transportation are also burdened with energy and carbon taxes. The energy tax on petrol consumption was introduced as early as 1924. Petrol has always been charged at a higher rate than diesel, which was not taxed until the late 1950s. In 1986, two different tax rates for unleaded and leaded petrol were introduced to give an incentive to choose the least environmentally harmful type of petrol and thereby phase out lead in petrol. Transportation fuels were also included in the CO2 tax scheme when it was introduced in 1991. The most common transportation fuels and tax rates charged are illustrated in Table 4 below.

Table 4: Tax rates on the most common transportation fuels (EURcent/l)

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<thead>
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<tbody>
<tr>
<td>Unleaded</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Petrol 1</td>
<td>energy tax</td>
<td>38.75</td>
<td>42.75</td>
<td>34.43</td>
<td>31.59</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CO tax</td>
<td>10.10</td>
<td>10.13</td>
<td>15.94</td>
<td>23.69</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TOTAL TAX</td>
<td>39.82</td>
<td>42.88</td>
<td>50.37</td>
<td>55.23</td>
<td></td>
</tr>
<tr>
<td>Unleaded</td>
<td>energy tax</td>
<td>39.45</td>
<td>43.10</td>
<td>34.62</td>
<td>31.93</td>
<td></td>
</tr>
<tr>
<td>Petrol 2</td>
<td>CO tax</td>
<td>10.10</td>
<td>10.13</td>
<td>15.94</td>
<td>23.69</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TOTAL TAX</td>
<td>39.55</td>
<td>43.23</td>
<td>50.75</td>
<td>55.51</td>
<td></td>
</tr>
<tr>
<td>Other Petrol (leaded)</td>
<td>energy tax</td>
<td>45.80</td>
<td>60.58</td>
<td>41.02</td>
<td>30.38</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CO tax</td>
<td>10.10</td>
<td>10.13</td>
<td>15.94</td>
<td>23.69</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TOTAL TAX</td>
<td>55.90</td>
<td>70.71</td>
<td>56.96</td>
<td>54.07</td>
<td></td>
</tr>
<tr>
<td>Diesel*</td>
<td>energy tax</td>
<td>6.29</td>
<td>12.77</td>
<td>17.38</td>
<td>22.02</td>
<td>14.41</td>
</tr>
<tr>
<td>Class 1</td>
<td>CO tax</td>
<td>12.33</td>
<td>12.55</td>
<td>19.65</td>
<td>29.04</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TOTAL TAX</td>
<td>18.62</td>
<td>25.32</td>
<td>34.03</td>
<td>43.45</td>
<td></td>
</tr>
<tr>
<td>Diesel</td>
<td>energy tax</td>
<td>5.29</td>
<td>12.77</td>
<td>19.73</td>
<td>24.75</td>
<td>17.00</td>
</tr>
<tr>
<td>Class 2</td>
<td>CO tax</td>
<td>12.33</td>
<td>12.55</td>
<td>19.65</td>
<td>29.04</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TOTAL TAX</td>
<td>17.62</td>
<td>25.32</td>
<td>35.38</td>
<td>46.25</td>
<td></td>
</tr>
<tr>
<td>Diesel</td>
<td>energy tax</td>
<td>5.29</td>
<td>12.77</td>
<td>22.90</td>
<td>28.18</td>
<td>20.41</td>
</tr>
<tr>
<td>Class 3</td>
<td>CO tax</td>
<td>12.33</td>
<td>12.55</td>
<td>19.65</td>
<td>29.04</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TOTAL TAX</td>
<td>17.58</td>
<td>25.32</td>
<td>40.73</td>
<td>40.06</td>
<td>46.45</td>
</tr>
</tbody>
</table>

1 It should be noted that diesel was charged with various extra charges between 1984 and 1994. For example diesel was charged with a special tax of SEK 0.118/l between 1984 and 1990. In 1991, diesel was classified in three different categories based on different environmental characteristics such as the sulphur content of the fuel. Source: Nordic Council of Ministers, 2006

Regarding the fuels for transportation purposes, all sectors and companies are taxed in the same way and no rebate is given on the CO2 tax compared to households. The taxes in this sector have been quite successful and the different tax rates for unleaded and leaded petrol have vastly reduced the use of lead in transportation fuels in Sweden.

89 Nordic Council of Ministers, 2006
EMISSIONS TRADING

The European Emissions Trading Scheme (EU ETS) for carbon dioxide is not a Swedish instrument but will be mentioned here since it affects Swedish industry and energy production and might in the long term replace some of the Swedish economic instruments such as the carbon taxes.

The EU ETS is also the first major case in which a system for tradable allowances has been applied in Sweden. Sweden has agreed not to increase greenhouse gas emissions by more than 4 percent during the Kyoto protocol’s first commitment period.

In Sweden approximately 720 installations are covered by the EU ETS. The allocation to these installations for the first trading period 2005-2007 is 22.5 M tons/year on average. This equals about 30 % of the total Swedish CO2 emission. Each year the companies involved present a verified report on emissions in the previous year, which is then investigated and approved by an accredited controller.

The reported emissions for 2005 and 2006 are 19.4 and 19.8 M tons respectively. Emission allowances are distributed among the EU ETS industries based on the average historic emissions of the period 1998 to 2001. Extra allowances may under certain circumstances be allocated for increase in production. For new entrants to the system, however, a reserve of allowances is set aside.  

The EU ETS is quite new so it is difficult to discuss the effectiveness of this system. However one advantage with the system is that the maximum allowed emissions from industries involved are set and many companies prefer this system compared to taxes and regulations. Another advantage is that it gives more equal rules for all companies involved in an international region, which can reduce competitiveness concerns.

A prerequisite for efficiency is however a scarcity of allowances. The result of the recent evaluations over the first two years of the EU ETS indicates that the system has been too generous with allowances and that the companies involved have not reduced emissions due to this system. Hopefully, the next period, when the amount of allowances is reduced, will lead to a better situation with greater emission reduction and more reasonable prices for allowances.

SULPHUR TAX

The sulphur tax\(^1\) is levied on the fossil fuel categories with the highest sulphur content, i.e. coal, peat and on heavy fuel oil. The tax was introduced in 1991 and is differentiated based on the sulphur content in the fuels. The tax rate has been the

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same since the introduction at SEK 27/kg for each thousandth of sulphur content by weight in pertinent oils and at SEK 30/kg sulphur for solid fuels. Some fuels with a sulphur content not exceeding 0.05 percent in weight are exempt from tax.

The exact effect of this tax in relation to other taxes on fossil fuels is difficult to estimate but many studies have identified it as successful and it is obvious that the revenues generated from this tax have dropped from MSEK 217 in 1996 to about MSEK 122 in 2003\textsuperscript{92}. Even though the rates have not been raised since 1991, the Swedish sulphur tax is still the highest in the world\textsuperscript{93}.

THE NOX CHARGE

The NOX charge was introduced in Sweden in 1992 and is focused on the emissions of nitrogen oxides (NOX) from energy generation at certain large combustion plants. The charge presently amounts to SEK 40/kg\textsuperscript{94} nitrogen oxides emitted (about Euro 4.3/kg NOX) and applies to NOX emissions from electricity and heat-producing boilers, gas turbines and stationary combustion engines with a useful energy production of at least 25 gigawatt hours (GWh) per year (based on actual recorded emissions).

With the exception of 0.7 % of the total revenue that is retained for administration costs all revenue is returned to the participating plants in proportion to the plants’ production of useful energy. This means that the combustion plants with the highest emission of NOX relative to their energy output are net payers to the NOX tax scheme and are encouraged to reduce their emissions of nitrogen oxides. Sources with low emissions relative to energy output are accordingly net receivers. The size of the refund varies but has in recent years been about 0.95 Euros per megawatt hour of useful energy\textsuperscript{95}.

In the beginning the scheme\textsuperscript{96} included about 124 combustion plants (182 boilers) producing at least 50 GWh of useful energy per boiler. The limit has now been reduced to 25 GWh of useful energy per year and the system includes about 260 plants (460 boilers) today. This system is generally considered one example of an effective instrument for the sources it covers and has doubtless been effective and an important factor in reducing monitoring costs as well as emissions. For example boilers that entered the system in 1992 have decreased their specific emissions by about 42 %.\textsuperscript{97} The scheme today covers about 5-10% of the total NOX-emissions in Sweden. The NOX charge is also considered to be less burdening to industry as a collective than many other instruments.\textsuperscript{98}

\textsuperscript{92} Nordic Council of Ministers, 2006
\textsuperscript{94} Recently proposed to be increased to SEK 50/kg NOX
\textsuperscript{95} Nordic Council of Ministers, 2006
\textsuperscript{96} The scheme which is regulated in SFS 1994:1776, is sometimes called “Refunded Emission Payment (REP) System” among economists.
\textsuperscript{97} Swedish EPA et. al., 2006 and Swedish EPA’s website: http://www.internat.naturvardsverket.se/
\textsuperscript{98} Naturvårdsverket, 2006; Nordic Council, 2006
5.4 Discussion and Conclusions

Sweden has introduced a considerable number of economic instruments in the area of the environment and international organisations like the OECD and European Union recommend an increased use of well designed and effective economic instruments. The development in Sweden with the economic instruments has been partly driven by the work on Environmental Quality Objectives. Instruments at the national level like taxes are complemented by instruments at other levels for example the municipalities charges for waste and sewage treatment etc. The instruments in Sweden vary in effectiveness and the rates are sometimes a compromise between different interests and political objectives.

In Sweden, better background information on costs and benefits is considered essential to improve the ability to argue for environmental proposals and measures e.g. between ministries. A common view is also that well performed impact analyses can more clearly show whether the benefits are exceeding the costs of some environmental measures and instruments and for example also show that some environmental problems can imply considerable cost and cause irreversible damage in the long term if not dealt with in time.

It is clear that the effectiveness of economic instruments can be measured in many different ways e.g. cost-effectiveness, incentives for technological development (dynamic efficiency) and how well stated objectives are achieved. Economic theory and many studies indicate that multi-sector taxes such as the carbon dioxide tax are cost-effective in both the short and the long term. This means for example that the tax has the potential to influence actors to take the cheapest measures first and create an incentive for market actors for technological development. The result of taxes and subsidies is how-ever less certain than regulation and can also raise trade and competitiveness concerns.

Moreover, there is a theory in economics that the best approach to deal with negative external effects is to internalise the environmental cost e.g. by a tax and not to offer grants for alternative solutions. Grants also necessitate central government funding, and each grant scheme requires administration, which in some cases may be disproportionate to the results expected from the grant scheme.

The introduction of some temporary subsidies and grants, e.g. to persons that want to install solar-panels, can also cause some distortions on the market and e.g. lead to an overload of work for some companies during the time the subvention/grant is distributed. It is therefore important that subsidies and other instruments are introduced with a long term perspective to create rules so that actors on the market have time to respond to a higher demand etc.

One should also be aware that the discussion of "optimal" environmental policy is based on the common view among economists (and in neoclassical theory) that in
basic economic models of closed, non-distorted economies, taxes appear preferable to other instruments since they achieve goals with fewer distortions to the economy. In a more complex model, or in a real world where taxes are resisted or evaded, other instruments could be just as effective. The prerequisites and achievement of stated objectives are important factors that should also guide the choice of instrument. It is also important to note that the design of environmentally related taxes therefore not only reflects general environmental objectives, but also the specific interests of some enterprises, that are affected by international competition.

There appears to be little evidence for the different hypotheses and of a widespread movement of capital influenced by environmental regulation. Studies indicate that trade flows are only marginally affected by differences in regulations and standards and that environmental policy appears to have had only a small effect on high-polluting industries or firms. One of the main reasons for this is because the costs for environmental control seems to be too small (rarely exceeding 3% of the turnover for polluting businesses) to cause a relevant comparative advantage between countries and that other factors like technologies, labour costs and endowments with natural resources are much more important for the companies’ competitiveness and will to move to other countries.

Even though the costs associated with environmental policy are relatively small the industrial sector has (often successfully) lobbied against environmental regulations. To address this in order to deal with negative externalities is a challenge for policy makers.

Valuable fora for discussions and analysis of economic instruments and competitiveness issues are also ongoing in international organisations like the world trade organisation (WTO) and in the OECD.

Evaluations and follow-up studies performed on some of Sweden’s major economic instruments, the energy tax and carbon dioxide tax, indicate that they have had a major impact on emissions, particularly from district and individual heating systems. The studies also show that current tax levels have a clear effect on behaviour. The carbon tax has had a significant effect in the heating and household sectors, where the use of fossil fuels has been greatly reduced and been replaced to a large extent by biomass. The industry has been critical to this and discussed the tax based on the effect on competitiveness which has to some extent influenced the use and level of taxes in Sweden.

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100 Swedish EPA et. al 2006.
Although taxes are generally attractive in terms of their cost-effectiveness they might not be sufficient to achieve some important environmental objectives e.g. to combat climate change. The recently introduced emissions trading system will hopefully help to reduce Swedish carbon emissions in the long term and might also affect the Swedish taxation system and the way in which Sweden will use and develop the present carbon dioxide tax.

In the transport sector some of the instruments used like the lead-differentiation of the tax on petrol have clearly been effective.

Regarding the NOX charge scheme for power plants it is possible to conclude that this is a cost-effective instrument and an important complement to emission conditions set in operating permits. The result of the NOX charge scheme has been a quicker and cheaper reduction in emissions than could have been achieved if only the more static instrument of emission conditions had been used.\(^{102}\)

The Swedish sulphur tax, which is the highest in the world, has also been quite successful and the problem with acidification is today less in Sweden partly as a result of this tax. The revenue generated from this tax has also been halved in the last 10 years.

It is important to note that the examples of effective instruments described above are one part of a system with regulations and other instruments that helps them to become more effective. Some effective instruments are not effective unless they are combined with other instruments to create a balance in the effects of the instruments. Sweden has for example apart from the instruments described also economic instruments related to promote renewable energy sources like quota-based certificate system from 2003, called "green certificates". Sweden has also an excise tax on electricity consumption i.e. an end-user tax. The tax on electricity consumption in Sweden is differentiated between regions, the level of consumption (high level leads to higher tax) and business sector. It is important to look at the whole taxation scheme and local prerequisites before introducing new economic instruments.

The choice of a suitable instrument is often based not only on cost-effectiveness but also on available information and other associated costs (transaction costs) in introducing or altering an economic instrument in each specific environmental area. In this section optimal instruments according to economic theory, have been discussed. But it is also important to realise that a national instrument can have difficulties in addressing global externalities and if e.g. taxes are low or non-existent in surrounding countries then a national tax may lead to distortions and those affected by the competition may cry out for tax exemptions.

\(^{102}\) Swedish EPA et. al. “Economic Instruments in Environmental Policy” (2006)
Other factors besides effective instruments are also important in a country that wants to improve environmental work and effectiveness. For example is it generally important in a competitive free-market economy to have agencies that can address market failure e.g. problems with restricted competition and environmental problems. In order for market based (economic) instruments to function well it is also important to have a well functioning market economy and an administration and a regulatory framework that supports the use of these economic instruments. The goal must accordingly be not to have an unregulated market but to meet objectives efficiently, weigh the costs and benefits of new regulations and to minimise distortions and burdens.

For more information:
- EEA Report No 1/2006, "Using the market for cost-effective environmental policy”, Copenhagen
- Britt Hägerhäll Aniansson, "Economic Instruments for the Environment”
- Information on the EU Environment web site on environmental economics and the cooperation between the EU and the OECD on this issue http://ec.europa.eu/environment/enveco/index.htm
- Information in English on Economic Instruments for the Environment etc: http://www.internat.naturvardsverket.se/documents/issues/issues.htm
• Database on economic instruments in environmental policy at: http://www2.oecd.org/ecoinst/queries/index.htm
6. Green Public Procurement in Sweden

6.1 Background

Public authorities are major consumers of products and services. In Sweden roughly 14% of the total GDP consists of spending by the public sector. The corresponding figure in the EU is 16%.

Green public procurement, GPP, means making environmental considerations when purchasing goods and services, for instance energy-efficient equipment, recyclable paper, organic food and water saving sanitary equipment. GPP is also about the public sector setting an example and influencing the market by real incentives for developing products and solutions with less harmful environmental effects and for environmental technologies. Most (some 240) Swedish authorities are obliged to introduce an Environmental Management System including Green Public Procurement.

GPP in Sweden dates back to the 1990s when some local and regional initiatives were acknowledged and guidelines were developed. Also Swedish EPA made some general guidelines. In the late 90s the issue gained political interest and in 1998 the Government appointed a Committee for Ecologically Sustainable Public Procurement. The Committee operated until 2001 with the task of promoting ecologically sustainable procurement within government agencies, local authorities and county councils. The Committee was also assigned to develop a common, Internet-based instrument as well as a model policy for ecologically sustainable procurement. The Committee was made up of representatives from various interest groups, such as local authorities, county councils, government agencies including the Swedish EPA, the business sector and environmental organisations. The Committee’s work contributed with a lot of information of strategically significant goods and services, such as energy issues, transportation, food, building and contract work. The most significant result of the Committee’s work was, however, an internet-based guideline, which is available for the entire public sector and other professional buyers. The guideline developed by the Committee, the so called EKU-guideline, is now being managed by the Swedish Environmental Management Council, SEMCO.

SEMCO is a share-owned company with the Government as the biggest owner followed by the Confederation of Swedish Enterprise and the Swedish Association of Local Authorities and Regions, SALAR. The Ministry of Environment has the overall responsibility for governing SEMCO.

The purpose of SEMCO’s work is to give the market a user-friendly instrument for purchasing organisations, both public and private, that have the ambition to make
environmental considerations when purchasing. The objective with the further development of the instrument is to help purchasers to identify environmentally less damaging products without having negative effects on other important aspects of the purchase. Works is now going on in order to take into account the economic dimension in procurement, through life cycle cost (LCC).

SEMCO also plays an active part in the International Green Purchasing Network (IGPN).

Public Procurement is regulated in EU-directives which are implemented in Swedish legislation. The directives allow the possibility but no obligation to purchase environmentally sound products. In accordance with the EG-directive it is possible to set environmental requirements during the different phases in procurement; selection criteria, award criteria and specific contract clauses during the performance stage.

The fundamental principles of European Community law regarding public procurement are the principles of non-discrimination, equal treatment, transparency (openness and predictability), proportionality and mutual recognition. Mutual recognition means amongst all that documents issued by the appropriate authority in one EU member state must be accepted in other Member States. At international level, public procurement is not exempt from the basic rules of the World Trade Organisation. In addition to the Community, 12 countries have signed the WTO government procurement agreement (GPA). Signatories to the Agreement undertake to provide national treatment and non-discrimination to goods, services and suppliers of the other signatories, ensuring through detailed procedures, a real chance to compete for government contracts.

In June 2003 the Commission published a so called communication on Integrated Product Policy, IPP describing the guiding principles of the Integrated Product Policy of the European Union. Green Public Procurement is one instrument of the policy and the Commission in its communication encouraged Member States to draw up publicly available action plans on greening their public procurement. The Commission has published a handbook on the subject and has also launched a web-site on Green Public Procurement with a multitude of new and updated information on environmental purchasing in the European Union and beyond.

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103 Directive 2004/18 on the coordination of procedures for the award of public works contracts, public supply contracts and public service contracts ("classical" directive), and Directive 2004/17 on the coordination of procurement procedures of entities operating in the water, energy, transport and postal services sector ("special sectors" directive).

104 http://www.nou.se/pdf/english.pdf


The Swedish Government, on the basis on a proposal from the Swedish EPA, decided on an action plan for Green Public Procurement in March 2007. According to the action plan, several measures are to be taken in order to enhance Green Public Procurement. Among the measures are; better financing of SEMCO, better management of responsible authorities, information to local and regional politicians and other decision makers, support and education to purchasers and others who need help with their green procurement for example by establishing a help-desk and developing training material, higher quality of the criteria for green products, the link between the EKU-tool and eco-labelling must be clarified, continuous follow-ups and evaluations.

6.2 The EKU-guideline

The EKU-guideline consists of proposals for technical specifications, award criteria and contract clauses for some 60 different criteria for some 100 products as well as background information about the product group (May 2008). These are available in English. The criteria also contain instructions on how the criteria could be verified. It is very important that it is possible to verify requirements and that this is followed up during the process. Otherwise there is a risk that the credibility with the green public procurement is weakened. The challenge is to find identifiable significant environmental aspects with cost-effective, practical indicators and evidence. This issue is further dealt with in the report Setting Verifiable Environmental Requirements in which different verification methods are described and discussed.

In order to guarantee that criteria development in the EKU Instrument is done in a quality-assured and transparent process and with a broad support from different stakeholders, the following organisation structure is in place:

![Organisation Diagram]

Figure 10: Organisation of procedure for decision process for criteria for green public procurement

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108 Regeringens skrivelse,(2007) Miljöanpassad offentlig upphandling, 2006/07:54
109 IVL (2006) Setting Verifiable Environmental Requirements, B 1685
The initial basic work is carried out in different Criteria Working Groups where development and update of criteria is done. The criteria groups have competence in different fields, e.g. technical, environmental and quality knowledge in specific product areas and are broadly represented by different stakeholders, including the business sector. Environmental product information from eco-labelling is a valuable asset in the work if eco-label criteria exist for the product group. It is, however, not possible according to the legislation to require a specific eco-label. But the criteria in the eco-label can serve as a starting point. The eco-label itself is a source of verification. Companies with eco-labelled products thus have an advantage in the procurement process.

Every criterion must also have a scientific relevance. SEMCO is responsible for coordinating the work in the criteria groups and to secure criteria from a purchasing technique and a purchasing legislative perspective. When a criteria document is prepared and negotiated in a consensus dialogue in the criteria group it will be sent to next level in the organisation – the Decision Committee.

In the Decision Committee a final review and approval take place before the criteria document is published on the EKU Instrument website. The decision committee’s task is to check whether the criteria have an environmental relevance, high credibility and that the criteria are developed in a broad consensus process. The Swedish EPA is represented in the decision committee together with representatives from business, the Swedish Association of Local Authorities and Regions and Stockholm County Council.

The Board of SEMCO decides upon overall issues concerning the EKU Instrument and which product areas will be prioritized in the future work of the organisation. If consensus cannot be reached in the decision committee the specific issue will be brought before the board for further handling. The board consists of representatives from the owners, Swedish EPA etc.

### 6.3 Government Procurement

In 1998 the Swedish Government established a co-ordination function for government procurement. The objective was to increase efficiency in public spending and thus achieve better value for money by co-ordinating the central government purchasing and procurement. Behind this objective lies a reasoning that together, government authorities should be able to buy supplies or services with better terms than each authority could do separately. The system is based on the principle that the authority that has the best prerequisites to perform a procurement, common for the relevant other central authorities, is asked to procure a framework agreement for all the central government authorities. Today twelve procurement responsible authorities are working together with the co-ordination function in the system for framework purchasing.
The system includes some 95 product areas, e.g., for stationery, cars, IT supplies and services, furniture, flight services. The annual turnover is around 750 million Euro. This corresponds to about 8%-10% of the estimated total expenditure for the central government from external suppliers.

6.4 Potential for Development

Through relevant and environmentally motivated requirements in public procurement, government authorities and other professional buyers can contribute to the achievement of the national environmental objectives, such as the objective of climate change, non-toxic environment and no eutrophication.

The public sector is a considerable consumer of products with an impact on different environmental media. Several international studies have shown that a few product areas such as transports, foodstuff and housing contribute largely to the main environmental problems facing us today. The potential for GPP lies in product groups where the environmental impact is considerable and the public sector is a large consumer.

Our experience is also that the buying power of the public sector is able to move the market. IT-equipment for the state agencies are procured through framework agreements, which means that all state agencies are buying their equipment according to the same terms of reference from the suppliers contracted in the agreement. In the 90s the coordination of IT framework agreements was handled by the Government purchasing coordination mentioned above and environmental requirements were set. The framework agreement contracts with all state agencies is a valuable deal for any IT-supplier, also since many local authorities use the same framework agreements for IT products. The IT sector has had to adapt its products to the environmental and quality requirements for the public sector agreements and today only products with high environmental performance are sold to public bodies at different levels. The IT sector in Sweden has responded by developing an IT eco declaration to satisfy the information needs of public and private professional buyers.

Other product areas where the potential of GPP is remarkable are light bulbs and energy from renewable resources. For instance light bulbs account for 1/3 of the total energy use in public buildings in Sweden. A change to low energy light bulbs could contribute with a considerable reduction in both energy use as well as energy cost. Also, if the public sector purchased ecologically produced foodstuff their market share could increase considerably. In Sweden the government has issued an ordinance for all governmental agencies on procurement and leasing of environmentally preferable cars.110 85% of all cars purchased or rented should now fulfil the criteria of an environmental vehicle. The definition includes for example cars

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110 Förordning 2004:1364 om myndigheters inköp och leasing av miljöbilar
using renewable fuel. There are a lot of examples of local authorities purchasing environmental vehicles for their different needs.

GPP is seldom an inherent part of a procurement policy. The ambition to buy green must in most cases come top down. This can either be set forth by requirements or objectives from higher instances or through an Environmental Management Scheme. In Sweden both of these have contributed to public authorities taking environmental consideration in purchasing. In the best case scenario environmental aspects form an integral part of any technical or quality requirements set in a procurement process.

Some 60% of public purchasers in Sweden always or often set environmental requirements in the calls for tender. In EU studies Sweden is often mentioned as one of the forerunners and top 7 performing countries in Europe.\(^{111}\) Despite these comparisons, we are still facing several challenges in developing the potential of GPP. Capacity building and training of purchasers, further developing the EKU instrument and assessing the environmental benefits of GPP still have to continue and the system of public procurement needs to be improved.

Sustainable procurement means purchasing goods and services with high environmental performance that consider the social and economic impacts of procurement. There is a growing interest in social requirements in GPP both in Sweden and in the EU. The issue is still in the early stages and many questions need to be solved. An EU guidance is however coming soon. According to the EU directives it is possible to set both social and environmental requirements in procurement. One important issue is that the requirements must be able to be followed up. Work is ongoing in different fora amongst all in the organisation ICLEI.\(^{112}\) The organisation runs a sustainable procurement campaign (Procura+) aiming at supporting public authorities across Europe in implementing sustainable procurement.\(^{113}\)

### 6.4.1 Technology Procurement

Technology procurement could be described as a sort of Green Public Procurement but with the aim of pushing the development of new technology. The aim of technology procurement is thus to promote new products or processes. Technology procurement means that a number of purchasers (they can be both private and/or public) together elaborate a technical specification for a coming product. At the same time they make a commitment to buy the product that complies with the specifications. The supplier who can comply with the specifications will win the competition. Through gathering several buyers the volume of the products becomes bigger and the manufacturers’ risk in developing new products becomes less if he or she is guaranteed a market.

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\(^{112}\) An international association of local governments dedicated to a sustainable urban environment.

\(^{113}\) [http://www.procuraplus.org](http://www.procuraplus.org)
This method can be used in order to promote more environmentally friendly products. In Sweden there is both positive and negative experience of the method. At EU level a successful project has been carried out aiming at developing more energy efficient white goods.\textsuperscript{114}

6.5 The Role of the Swedish EPA

The Swedish EPA participated in the earlier work of the EKU Committee, made some general guide-lines and has also been conducting follow up studies since the mid 90s. Our ambition is to measure the effects and potential of GPP.

This has been done through following up the state of play in GPP every three years. This is usually done by surveys sent out to purchasers in all authorities at national, regional and local levels. Through investigations of procurement documents (calls for tender, specifications, evaluations and the final decision) we have seen that environmental considerations are often taken but often have no effect on the final procurement decision. There are probably several reasons for this, but our conclusion is that there is a lack of knowledge in how to integrate properly stipulated environmental requirements in order to obtain a product with a certain environmental quality. This is of course due to the fact that public procurement in itself is a very challenging area and it is not always a properly trained procurement officer who actually does the purchasing. At local level procurement is often done by those responsible for different activities such as day care, maintenance and public education. Such in-depth investigations have also been done at Nordic and EU-level and the results are identical to the fact that environmental considerations set are unable to effect the decision. Capacity building is thus needed.

We have also made efforts to calculate the environmental potential in GPP. A problem that can-not be ignored here is the lack of correct data on the public procurement of different products. This makes it less possible to make accurate assumptions of the potential of GPP.

The Swedish EPA also participates on the board and in the decision committee of the EKU instrument, which is described above and which supports SEMCO in the training of purchasers. The Swedish EPA has proposed that the Nordic eco-label board and SEMCO should cooperate on education and training for public purchasers and for private buyers.

As a governmental agency EPA’s ambitious Environmental Management Scheme drives us to set a good example and to encourage other agencies with EMS to work with GPP. GPP is an important part of an Environmental Management System.

The Swedish EPA now has the role of administering follow up and proposing necessary changes in the action plan for Green Public Procurement.

\textsuperscript{114} http://www.energy-plus.org
6.6 Experiences

According to Swedish experiences so far, it takes a long time for Green Public Procurement to become generally accepted. Green Public Procurement needs political as well as financial support from the Government. It might also be necessary to engage the political level at the regional and local levels for example through information. The support from the management in an organisation is a prerequisite for success. The purchasers need training. They are not usually experts in environmental issues. They also need simple tools in order to practice GPP.

For more information

Setting Verifiable Environmental Requirements,. B 1685, IVL Swedish Environmental Research Institute (2006)

Internet
www.eku.nu
http://ec.europa.eu/environment/gpp/
www.avropa.nu choose English
http://www.energy-plus.org
7. Awareness Raising and Public Participation in Sweden

7.1 Background

The background to the Swedish EPA activities in this field is the conviction that environmental problems cannot be solved alone by the traditional actors in the environmental field, such as the Swedish EPA and the NGOs. An important prerequisite for carrying out Swedish environmental politics over the last 15 years has been the principle that all sectors of society have a responsibility for environmental work, the so-called sectors’ responsibility. This means that all actors must take their own part of the work. The Swedish EPA’s role is to involve and promote cooperation between different stakeholders in environmental work through different processes such as dialogue, information, and campaigns. (See also section 3.1.2) An effective and constructive cooperation between the environmental agencies at the national, regional and local levels and other agencies, sectors, organisations, the industrial sector and other actors is also a fundamental condition for successful environmental work.

Furthermore, during the last 10 years’ focus on sustainable development the cooperation has been broadened beyond the traditional environmental sphere and involved new actors in environmental work. The insight that the environmental work needs to involve new actors has led to different forms of inter-sector cooperation between the national, regional and local levels. To strive to find the synergies between the economic, social and environmental dimensions has become a way to bridge the conflicts. Of course there will always be conflicting objectives but by focusing on finding synergies and widening perspectives through broad dialogues with different actors, it will be easier to break outdated patterns of thought and behaviour, to break new ground and find new solutions.

Sweden has a long tradition and good experience of different forms of processes for cooperation. The Swedish EPA role in these processes has often been the driving force and the creator of fora for contacts, exchange of information and discussions. The Swedish EPA has also coordinated work for developing methods and guidance and compiled information, experience and good examples from different levels and actors to inspire others to follow those that are ahead.

In some cases the work is initiated by the Government, in others the Swedish EPA is the initiator. Below follow some examples on cooperation projects and processes, both between different actors at the same level and between actors from different levels on structured ways to work with environmental integration.

7.1.1 Regional Environmental Work in Cooperation
The so called MARS –project (1998-2000) was initiated by the Swedish EPA with the purpose to suggest how the regional environmental work could be developed and furthermore how the cooperation and support from the Swedish EPA could be improved. The project was mainly driven with a process oriented approach with the purpose of creating conditions conducive to discussion between the EPA, the CABs (County Administrative Boards) and other important actors about future regional environmental work. The purpose was also to initiate processes for new contacts and ways for cooperation to be created and developed. The project was driven as a joint project together with the CABs but involved also other national agencies as the Swedish Agency for Public Management, The National Board of Housing, Building and Planning and the Swedish Agency for Economic and Regional Growth. As some of the main purposes with the project were to stimulate a broad discussion about the future regional work, a lot of work was put into creating contact areas through interviews, workshops and meetings. The project has in different ways brought together experts from different areas with various culture and competence to meet and cooperate over sector boundaries.

The project focused on three subjects:

- Environmental integration – environmental strategic work for integrating environmental considerations in new areas such as the work for regional growth and development, work for transport infrastructure and spatial planning at the regional level.
- The Swedish Environmental Quality Objectives and the Swedish Environmental Code – how could the Environmental Quality Objectives be used practically in the legislative work.
- Better coordination of the resources for regional supervision, preservation of nature, liming of lakes and remediation of contaminated sites for higher efficiency.

The project resulted in concrete proposals for ways to develop and change the way of working to reach higher efficiency, quality and coordination in the regional environmental work. The project was highly appreciated by the CABs. Most of the proposals were carried out and integrated in the daily work at the agencies or taken care of in different processes. The ideas and experiences on environmental integration and cross-sector cooperation have been further developed during following years, both at the national and regional levels, which are described below.
7.1.2 The Pilot County Project – Broaden the Perspective

In the year 2000 the Government earmarked funds for the development of methods and tools for ways to incorporate the ecological perspective both in the regional growth process and in various action programmes. The Swedish EPA was instructed to work with three counties, Skåne, Dalarna and Västerbotten. Based on experiences from the regional level and discussions, a number of obstacles were identified and proposals were given on how environmental integration may be achieved within the regional programmes.

General obstacles found during the project include:

- Attitude problems
- A lack of knowledge about ways in which sustainable development and regional growth can work together
- Territoriality and rivalry over responsibility for issues
- A lack of time and resources
- A lack of developed methods, criteria and indicators
- Ambiguous directives from the top in which sustainability has not been highlighted with sufficient clarity
- Sustainability often takes second place to the main work being done by a given group. It has then been difficult to ensure that due account is taken of sustainability in the groups responsible for taking key decisions.
- Sustainability is often considered too late and then becomes a restrictive factor instead of providing a positive contribution for growth.

The project resulted in a report on environmental integration containing strategic guidelines and methods of using the environment to drive growth and development. The report also contains examples of best practice in the form of projects yielding synergies by combining environment and growth.

Integrating the environment and sustainable development into regional development work is a long-term process of change. It’s a question of breaking patterns, and traditions, bridging cultural differences and building new avenues of contact. It is also a question of creating basic conditions by building up competence and by establishing new working methods. The desired change requires commitment and

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115 In 1998 the Government introduced regional growth agreements inspired by the EU Structural Funds programme, later on the name changed to regional growth programmes. A growth programme is developed through a regional partnership. It comprises an analysis of the region’s scope for development, a programme with objectives and priorities for growth and a plan for funding, implementing and evaluating the programme. The aim is to support sustainable economic development, create more new companies and help existing companies to expand and create new jobs for women and men. The idea is make better use of and support regional and local initiatives for growth. Trade and industry are also invited to play an active part and influence the design of the growth programmes. The programmes to be implemented must be sustainable from an economic, social and ecological perspective. The aim is to use existing government funding from various budget appropriations creatively and efficiently to promote growth and development. Later on the name changed to regional growth programmes.

116 Bredda perspektiven – Miljöintegration i tillväxtarbetet, Naturvårdsverket, 2001
motivation from many actors and this in turn necessitates wide-ranging transparency to enable dialogue and communication.

At the same time as this project was running, three other pilot counties were charged with the task of developing methods for greater integration of equality of the sexes. This project also resulted in a methods handbook.\textsuperscript{117}

### 7.1.3 Inter-Sector Cooperation

Swedish administration is sharply divided into sectors. This is perceived as a problem at the regional level, where the various policy areas must be reconciled. In 2002, the Government instructed 27 national agencies to develop methods and processes for increased inter-sector cooperation in the field of regional development. In this context the Swedish EPA took the initiative and conducted a joint regional sustainable development project with 27 other agencies and organisations at national and regional level. The aim of the project was to create a forum for a dialogue on sustainability, synergies and conflicting objectives. The project led to a report\textsuperscript{118} on strategies and methods for integrating sustainability with efforts to achieve growth. Below is an outline of the strategy showing ways in which environment and sustainability can be integrated with efforts to stimulate growth. The proposals are based on an analysis of obstacles and keys to successful integration and are the result of the joint efforts of a large number of central agencies and regional actors. The strategic guidelines are intended to ease the process of integrating sustainability aspects with efforts to achieve regional development.

**Strategic Guidelines**

- It is essential to gain the support of politicians and strategically important actors and report back to them on a regular basis.
- Clear requirements that environment and sustainability should be taken into account must permeate all work in this field. Clear and robust support from the management of organisations responsible for growth is essential if growth programmes are to reflect the sustainability dimension.

**Common vision and involvement**

- Develop a common vision of a sustainable future for both women and men in the county.
- Create involvement and a common view of the implications of sustainable development in various fields of activity. Identify non-sustainable trends, potentially conflicting objectives, as well as the know-how and resource base and the driving forces that may form the basis for sustainable development in the county.

\textsuperscript{117} Tillväxt jämt, Marianne Bull, 2002.  
\textsuperscript{118} Det nya tillväxtarbete – Förändringsarbete för en hållbar regional utveckling, Naturvårdsverket 2002
Beware of polarisation between differing "competence cultures", of resistance that may be due to a lack of interest or ignorance and that may take the form of territoriality and rivalry.

**A pro-active approach**

- Incorporate an overall approach and sustainability from the outset in efforts to stimulate growth. Base the approach on material reflecting social, environmental and economic factors and ensure that the material is actually put to proper use in all aspects of the work. This will allow environmental and social factors to offer potential for growth, and will reduce the risk of them having an inhibitory effect at the end.
- Identify synergies and highlight positive scenarios and best practice as regards the way social and environmental considerations can act as powerful growth factors in trade and industry, benefiting men and women alike. Many potential conflicts between objectives can be avoided by focusing on finding synergies from the outset.
- Where objectives do conflict, the issue may have to be resolved politically so that the project does not lose momentum.

**Approach and organisation**

- Integrate skills and know-how in the field of environmental and social sustainability in the organisation for regional growth and development.
- Improve the dialogue and cooperation between the regional development function and functions for social issues, environment and physical planning within and between the county administrative board/regional development council.
- Allocate necessary time and resources.
- Broaden the partnerships. Involve companies, particularly those with a pro-active approach to sustainable development. Make it possible for men and women at small and medium-sized companies to take part in the process. Involve universities and other educational institutions, cultural institutions and artists to stimulate creativity in the process.
- Involve local authorities, local stakeholders, trade associations etc. in local partnerships.

**A learning process**

- Education and training for all. Enhanced skills and know-how are the keys to insight and motivation. Resources should therefore be continuously allocated to broad education and training on the theme of sustainable development and sustainable growth.
- Focus on broad information campaigns aimed at stakeholders, e.g., at municipal meetings with trade and industry representatives.
• Improve information and the support given to various stakeholders in relation to sustainable development. Raise standards for data on the environment, equality of the sexes and integration submitted with funding applications.
• Develop tools for sustainability in programmes, implementation of measures and monitoring of results. Develop criteria, indicators and checklists, for example.

The project also resulted in a further report\textsuperscript{119} containing examples of regional processes for sustainable development in three counties.

7.2 The Role of the Swedish EPA

At the start the Swedish EPA was in many ways the initiator and driving force in this work for regional sustainable development. Today you will find a broad spectrum of different independent processes for awareness and participation around the country at the local, regional and national levels, both for sustainable development and more specifically for the environment. The Swedish EPA is not always involved. The work is nowadays decentralized and the initiative and driving-force is now from the regional and local level. During the last period sustainable business and entrepreneurship, sustainable growth and regional sustainable development has been a prioritized issue at the regional level. Today the climate change is highly prioritized at both the local and regional level and has soon been integrated in different sectors as a very important challenge for the whole society.

Here follow some examples from the regional level on how some counties are involving different stakeholders to increase awareness and participation and promote sustainable development from their own conditions.

7.3 Case Studies

7.3.1 The case of Västerbotten County Administrative Board

AN OVERALL APPROACH TO SUSTAINABLE DEVELOPMENT

The County Programme “Cooperation for Sustainable Development in Västerbotten County – Environmental Quality Objectives, Targets and Overall Strategies” was developed between 2001 and 2003 by the county’s six cooperation groups for environmental objectives. The groups were broadly based, with a total of 140 county authority representatives, the county’s 15 municipalities, the County Council, the state traffic authorities, the National Institute for Working Life, Umeå University, the Swedish University for Agricultural Sciences, Luleå University of Technology, the Confederation of Swedish Enterprises, the Federation of Private Enterprises, and some 30 companies and NGOs represented. The programme was officially adopted by the County Administrative Board and the Swedish Forest Agency in 2003.

\textsuperscript{119} Vägar till hållbar utveckling – Processer i tre län, Naturvårdsverket, 2003
The four basic principles for our work to achieve sustainable development for the county are:

- To start from the county’s possibilities, problems and visions
- To have strong regional/local participation, with close cooperation between the state, municipalities, businesses and other organisations
- To employ an overall approach to sustainable development in terms of ecology, the economy and society
- To encourage all actors in society and citizens to participate based on their individual circumstances and their own decisions about sustainable measures and activities

OVERALL STRATEGIES FOR SUSTAINABLE DEVELOPMENT

The idea with the overall strategies is to create an overall perspective on ecological, economic and social development in the county, and to cooperate in the planning and implementation of environmental objectives, growth programmes, infrastructure planning, gender equality, and other regional planning in such a way that the three dimensions are always considered together. Major efforts and resources are being directed at the following ten important areas of sustainable development:

- Lifestyle, health and consumption
- Energy production
- Energy use and transportation
- Forests and timber
- Tourism
- Foods
- Construction
- The Metals Industry
- Land and water issues
- Knowledge and development

Ecological sustainability

The national and regional environmental quality objectives form the basis of the ecological aspects of the overall strategies.

Economic sustainability

The rapidly rising demand for sustainable products and services in the world market and the rich possibilities of finding measures which lead to economic as well as ecological and social sustainability effects in the county’s business community is a fundamental “business concept” of the overall strategies.

The experience of our participation in the 2001 county pilot project “Broaden the Perspectives”, in which we developed environment integration with regional growth efforts, has been a valuable asset in our continued cooperation on environmental objectives and growth programmes. Another powerful source of inspiration
has been our active participation in the “Sustainable Robertsfors” project, in which the municipality collaborated with businesses, neighbourhood councils and others to develop an overall programme for sustainable development.

The content of the county’s growth and development programme has much in common with the overall strategies, and there are considerable similarities between the partnerships with municipalities, the County Council, businesses and other organisations which have developed in both processes. The overall strategies have also been used as “checklists” for the assessment of the effects of EU projects on environmental objectives and sustainable development.

A large number of business operators, who have participated in the cooperation groups and in the referral process, have contributed to the shaping of the strategies and the proposals for measures.

Social sustainability
The basis for the social vision that must be included and applied in all strategy areas is expressed in the “Lifestyle, Health and Consumption” strategy area:

“It is a fundamental element of the county’s development that all its inhabitants, regardless of where in it they live, shall have opportunities for quality of life in the form of good housing, employment, nutritious food, recreation, and the ability to make independent choices” and that “a strong integration of democracy, gender equality, public health objectives, and cultural diversity shall be present in the work”.

The 2003 Riksdag Bill, “Public Health Objectives” has been the value basis and inspirational source for the development of the social aspects of the strategies. The overall strategies have been defined on the basis of the national objectives for gender equality. The Director for Gender Equality of the County Administrative Board has participated actively, producing, among other things, a checklist of issues surrounding gender and equal opportunities which has been used as support for gender analyses and gender perspectives in the work on the county programme.

AN OPEN INVITATION WITH MANY ALTERNATIVES FOR MEASURES
Our cooperation concept is based on extending an open invitation for active participation and individual involvement to all companies, agencies, organisations and individuals.

The overall strategies give concrete examples of measures and activities (incremental strategies) that contribute to sustainable development in each of the ten strategy areas. Participating companies, organisations and individuals decide for themselves which mix of measures and sustainable overall solutions to apply. In the process of cooperation, we have brought about creative encounters and
practical cooperation between companies, government authorities, teachers, students, researchers, and various NGOs.

ACTIVE COOPERATION FOR THE IMPLEMENTATION OF THE COUNTY PROGRAMME

A large number of representatives from the business community and from most sectors of society have participated in the “Cooperation Groups for Sustainable Development in Västerbotten County. General, multi-sector aspects such as “Energy Use and Transports”, “Knowledge and Development”, Public Health, Gender Equality, Integration and International Issues have been dealt with in all groups.

Activities and objectives

The groups and associated networks have initiated, promoted and highlighted good examples. The activity goals of the groups have included:

- To contribute to new thinking and measures that create long term sustainable ecological, economic and social development in the county
- To promote the development of a “green business community” with new products, new methods, new companies and new markets
- To discuss and garner support for a proposal for a “statement of intent” among participating organisations
- To discuss and complement the incremental strategies and the concept catalogue’s proposal for measures and “bring these home” to one’s own organisation
- To inform about planned and completed measures within each individual organisation
- To contribute good examples to a common knowledge bank

Examples of activities in the” Cooperation Groups for Sustainable Development 2005-2006

Energy production, Construction, Forests and Timber

Participants included representatives from the forestry business, municipalities, the energy sector, the National Institute for Working Life, Umeå University, the County Administrative Board, the construction industry, the FHU forum for sustainable development, the Swedish Council for Sustainable Development, and the Umeå School for the Environment.

During 2005, the group formulated a new core area in building a society adapted to ecological cycles, with GreenZone, Nyab’s energy-smart blocks of flats adapted to the eco-cycle, and the “Healthy Housing projects” in “Sustainable Robertsfors”, the pilot municipality, as living examples. To construction, housing and working in ecological-cycle neighbourhoods, we add new thinking and vision on

\[120\] An eco-cycle block for motorism.
infrastructure, transportation, energy issues, green spaces, integrated housing for the elderly, and development of the county’s timber industry. Advanced research and teaching on these issues at the county’s universities and university colleges are also part of the area of focus.

The Metals Industry (including mining)

The group worked on sustainability issues in the mining and metals industry and included participants from the mining industry, metals technology companies, surface treatment and recycling companies, the Georange research project, the Consultant and Granér Natur och Miljö consultancies, the Umeå School for the Environment, Umeå University, municipalities, and the County Administrative Board.

The group drew up a list of a number of important issues for the mining and metals companies. Examples of issues were energy, transportation, workplace environment and staff recruitment (how to create attractive workplaces), as well as knowledge and development issues specific to the business.

The metals group focused for some time on the possibilities of creating increased and more efficient transportation by rail, and of developing cooperation on logistics in the metals industry. The group will now be joined by the National Rail Administration and affected transportation actors in order to further explore the possibilities of bringing about an increase in the share of transportation done by rail. Other aspects to focus on include important quality aspects such as keeping timetables, lead times, goods protection and system flexibility.

Metals’ recycling was covered on visits to Kuusakoski Recycling plant in Skelleftehamn and in a report on the recycling activities at Boliden’s smelter in Rönnskär.

Visits to Marksaneringscentrum Norr (Soil Remediation Centre) and the Environmental Chemistry section of the Department of Chemistry at Umeå University, and to the Georange pilot facilities to study dry cover for remediation of tailings at the Kristineberg mine have increased knowledge about different remediation methods.

Statements of intent

One of the activity objectives of the cooperation groups has been to discuss and garner support for suggested statements of intent for participating organisations. In a statement of intent, the company/organisation confirms that it backs the objectives and strategies described in the county programme “Cooperation for Sustainable Development in Västerbotten County” and that it wishes actively to contribute to sustainable development in the county. The company/organisation also specifies in what way and in what parts of its activities it intends to contribute to sustainable development.
Evaluation of the work done in the cooperation groups

A survey is currently being carried out to gauge the experiences of participants in the “Cooperation Groups for Sustainable Development in Västerbotten County”. This survey also explores issues surrounding what forms for continued cooperation on sustainable development the participants would prefer.

It is the County Administrative Board’s view that the work done by the cooperation groups has contributed to:

- The identification of active and interested companies and organisations in the ten strategy areas
- The identification of key prime movers, innovators and enthusiasts
- The mapping of what has been done, what is being done and what is being planned in the companies and organisations in the county.
- The identification and highlighting of a large number of good examples of sustainability activities
- The promotion and implementation of activities in learning for sustainable development, sustainable construction and sustainable transportation, and in environmentally sound purchasing practices
- The spreading of information and involvement
- Creative contact-taking across sectors

7.3.2 The Case of Region Skåne – Sustainable Development at the Regional level

In this paper we will give a brief account of our work concerning the development of an Environmental Strategy Policy Programme (ESPP) for Skåne and the tool SYNAPS (Systems Analytical Process oriented tool for Sector integration), which is closely linked with this programme. This account will include some background information explaining the context in which ESPP and SYNAPS has emerged and why we’ve come to adhere so strongly to a strategic and proactive approach. The process and its challenges and successes will also be outlined.

CONTEXTUAL BACKGROUND

Region Skåne consists of one political organisation. The organisation has been commissioned by the Swedish Government to be the responsible public organ for all developmental issues in this region and this has a trial period that extends until the year 2010. This extended commission is believed to increase the efficiency in the work of regional development and to establish strong democratic anchorage amongst its different actors and where the overall aim is to ensure the development of a sustainable Skåne.

As a regional public body responsible for all developmental issues, Region Skåne has a responsibility towards its citizens, its 33 municipalities and the various different actors in this region to make sure that the region develops in a sustainable way. This in turn implies the need for new ways of working with society and progress and to engage different interested parties in this process at an early stage.
SYNAPSE is the result of a two-year process involving a range of different actors - from different sectors but also from different political levels i.e. local, regional, national and international. SYNAPSE aims to offer a concrete form of how to work practically with sustainable development at several different levels of society, by integrating environmental issues with social and economic ones.

THE POLITICAL COMMISSION LEADING TO SYNAPS

“Environmental issues are often treated as if they were separate from the rest of society. This is due to the way in which environmental problems used to appear. The Environmental Quality Objectives have a weakness in that in reality they have to be integrated with all other objectives of society, such as objectives to achieve economic growth, public health, energy supply, building and physical planning, traffic, infrastructure and technology supply and other objectives which all aim to improve our quality of life. If we want to move forward in the environmental field, then environmental issues have to be discussed from this perspective and balanced against all the other objectives of society and thus bring about what is commonly known as sustainable development. The different sectors of society should be the starting point of this programme in order to shed light on the different relations [or in-deed lack of relations] between these, balance and weigh different objectives against each other and from that identify which measures different sectors must take in order to optimise the conditions for Skåne to develop in a sustainable way.”

This is an extract from the commission given to civil servants of the Regional Development Board in January 2004 by the politicians of Region Skåne. The commission calls for the development of a proposal for an Environmental Strategy Policy Programme for Skåne (ESPP). The aim of the ESPP is to develop strategies for a sustainable Skåne by integrating environmental objectives with all other political objectives. Hence, this policy programme will place environmental issues in a larger context, where they may be balanced against other objectives of society.

Key functions of the ESPP will be the identification of positive synergy effects and conflicts between/within political areas. This will facilitate the identification of which measures different sectors in Skåne should prioritise.

APPLICABILITY OF SYNAPS

In order to be able to meet the aim and objectives of the political commission, it became apparent quite early on that this was not going to be a “traditional” policy programme. This was going to equip different actors with a readiness to act – to integrate environmental issues into their own organisations and businesses irrespective of prior knowledge of these issues and irrespective of which sector they belong to.

SYNAPS is especially suitable for interdisciplinary discussions and processes at fairly strategic levels, whereby different stakeholders should be engaged early. From experience, it has become apparent that often it is the actual process of
individual growth and realisation of what sustainable development is and what societal aspects it actually entails that is the real contribution to sustainable development. It’s especially rewarding to work with SYNAPS when it’s clear that people who normally wouldn’t use the concept “sustainable development” start to discuss the importance of looking at social, economic and environmental issues as being mutually reinforcing and dependent upon each other. It’s particularly rewarding when representatives from the different environmental, economic and social sectors learn from each others’ perspectives and can reach an understanding in how certain decisions should later be carried out.

The collaboration with interested parties i.e. representatives of different stakeholder groups and different political levels has been fundamentally important for the development and the success of the ESPP and SYNAPS. By adopting an inclusive and transparent process rather than an exclusive and selective process we have been able to apply the theory and general ideas behind the commission in a real life laboratory giving us instant feedback on how such a programme and tool best should be constructed... This approach has been immensely important not the least from a learning perspective on how different actors perceive sustainable development, how they operate and what kind of things they emphasises. We’ve come to learn that different sectors have very different worldviews sometimes and mean very different things when they speak of sustainable development. We’ve learnt that this doesn’t have to be a problem - that it can actually be turned around into possibilities.

No worldview is right or wrong, better or worse but rather they are all true as they are part of this world. Further, we have found, when trying to convince different actors to change the way they work, that carrot over stick is the way forward.

Processes like these are never easy as there are many conflicting views on what sustainable development is and what should be done to get there and often the area may be perceived as extremely controversial because of this. It is also time consuming if one compares it to the traditional way of dealing and planning for societal development but not if one compares it to the enormous task of steering the whole social system around to become more sustainable. There is no easy fix. Long-term goals have to be considered by applying long-term solutions and processes.

CONCLUSION
A very important feature of SYNAPS (Systems Analytical Process oriented tool for Sector integration) - is that it besides being a political instrument to achieve sustainability, it should also be an approach, which the different sectors themselves should be able to apply and implement in their respective organisations.

A more development oriented and proactive view towards environmental issues and their potential contribution to sustainable development demands approaches
characterised by systems thinking, contrary to the traditional western, linear way of thinking and problem-solving. Systems thinking facilitates better and more accurate predictions of how to coordinate environmental issues with other important issues of societal development and enables the identification of possible positive synergy effects and conflicts between different issues long before they occur. This way we may achieve sustainable development in the long-term and cost-efficiency in the short term. It’s crucial to therefore try and integrate environmental issues with other social and economic issues important to consider for sustainable development and no longer treat environmental issues as something that’s separate from the rest of society. When societal issues changes characteristics like this as the case of environmental issues – then people and the different sectors representing these different issues and objectives also has to change the way in which they conduct their work.

SYNAPS is currently under development as an Internet based software tool, for improved dissemination and use.

### 7.3.3 The Case of the Regional Council in Kalmar County

The Regional Council (RC) is the coordinating body of Kalmar County’s 12 local authorities (municipalities) and the county council. The politicians in the Regional Council are indirectly elected, i.e. they are appointed by the local councils and by the county council.

The RC secretariat performs the daily work. It is financed with money from the municipalities, the County Council and the Government. The RC is also active in many projects with outside financing, mostly from the EU and the state.

We work to coordinate regional development issues. Using new approaches, we will create, develop and try new conditions for the positive development of both social life and business in the county. Issues we are involved with are: business issues, infrastructure, Baltic issues, design, music, tourism, social issues, culture, education, environment, regional profiling, EU structural funds, youth issues.

Regional development increases growth in a region. The function of the RC is to make sure this occurs by initiating and pursuing important issues for the region and by supporting and supplementing the work of the municipalities and other players in the region.

We accomplish this by working closely with many different players in our county. We achieve our greatest success when the university, the public sector and trade and industry move together in the same direction.

**THE REGIONAL DEVELOPMENT PROGRAMME**

*The Regional Development Programme is the most important instrument in the regional development work and describes the direction we want to go. The pro-
gramme is developed together with thousands of county residents through idea seminars. It is the foundation for a number of decisions made by the Regional Council. The programme is updated every second year.

Sustainable development is the overall objective for the Regional Development Programme. Sustainable growth is a tool to reach this long term objective. To achieve sustainable development in Kalmar County, a five-point strategy is required:

- Market Place Baltic Sea - actively participate in the development of the Baltic Sea region.
- New knowledge and competence for the entire county.
- Stimulation of new and growing business enterprises.
- The entire county is made into an attractive place to live and work in.
- A modernised public sector

In the daily work, we focus on six thematic areas:

- Infrastructure
- Culture and tourism
- Entrepreneurship
- Competence, learning and education
- Environment
- Management and disposal of radioactive waste from the Swedish nuclear power plants.

SUSTAINABLE DEVELOPMENT IN KALMAR COUNTY

Today, most actors (private as well as public organisations) in Kalmar County are aware of the necessity to include all three dimensions of sustainability (not only economy) in the work for growth and development. Many important actors also have the same picture of what we mean when we use the expression “sustainable development in Kalmar County”, and of the most important questions to focus on. Priority is given to sustainable growth, environment, health, gender equality, ethnic integration and good possibilities for young people (see annex). The situation was different some years ago and the process can be described as a “journey”. During this journey, we have developed methods and ways of working that increase the weight of environmental and social aspects in the traditional work for regional growth and development. We have also developed a “sustainability tool” for the daily work within the Regional Council of Kalmar County (See Annex 2). The starting point is to discuss the three dimensions of sustainability in one context.
EXPERIENCES AND CONCLUSIONS

- Develop a strategy
- Identify key actors from all sectors in the society
- This is a process. Work step by step (commission- awareness- understanding- common ground- common view- delimitation-internal work-external work)
- Create a common view through dialogue and broad participation
- Use local examples
- The implication of “sustainable development” has to be adapted to local circumstances.
- Work with all three dimensions in the same time – show the connections between these dimensions.
- Checklists, and other tools, can function as a support for the daily work but only if people involved have a clear awareness and understanding about sustainability issues and a clear wish to work with these issues.
- There is a need for a Coordinator/Project Manager
- A process like this takes time!
- During the whole process – open and clear information is given to the mass media. Use the mass media as a way to raise awareness, disseminate information, create a discussion, present results etc.
- Make plans for an external and independent evaluation early on in the process

To reach sustainable development, it is important to get support from the national level. The national level can, among other things:

- Ensure that different national decisions, policies, legislation, taxes/charges, grants etc are co-ordinated and give the same message
- Present good examples/best practices on how to integrate all the three dimensions of sustainability in daily work and existing projects.
- Present good examples of tools for sustainability audits etc.

Including sustainability in the work for regional development gives surplus value! You get a broader and more balanced discussion, as a base for different kind of decisions. You also gain better co-ordination, efficiency and quality.

7.3.4 The Case of the Regional Council in Västra Götaland

The Regional Council in Västra Götaland, as the democratically elected representative, is the uniting and driving force for sustainable development in Västra Götaland. Regional development is one of the Council’s two main areas of responsibility; health and medical care is the other one. The region is one of Sweden’s largest employers, with approximately 50,000 employees.
The Regional Council’s Environment Committee is charged with creating special opportunities and fora for regional ecological development, in partnership with representatives from the business community, municipalities and organisations, as well as with international actors. Region Västra Götaland can do this by means of political initiatives and by granting financial support to strategic development projects. The Environment Committee is also in charge of coordinating and supporting internal environment efforts.

Below are examples of different projects originating in Västra Götaland which, by means of different actors, approaches, methods and target groups, all affect the market for more environmentally sound practice and new and environmentally improved products and services.

ENVIRONMENTALLY SOUND PROCUREMENT PRACTICE

Region Västra Götaland is actively promoting sustainable development within its own activities. This includes making environmental preference demands on procurement. In order to ensure that those responsible really do choose the most environmentally sound alternative, information and evaluation are essential parts of this policy.

In developing environmentally sound procurement practice, factors for success and for added environmental value have been identified, and a structured working process has been established. This policy push and its results can be demonstrated by means of three good examples.

Environmentally sound cars

All cars owned by Region Västra Götaland region shall use renewable fuels or technology that reduces fuel use. This decision by the Regional Executive Board in 2004 was unique in Sweden at that time. Agreements were signed with seven different suppliers in 2005, and a large part of the exchange took place in 2006. The total number is 1,200 cars, and at the end of 2006, more than 600 environmentally sound cars were on the roads.

Organic food products

Region Västra Götaland annually buys food products for about SEK 100 million to supply kitchens in hospitals, folk high schools, upper secondary schools specialised in natural resource use, etc. Between 2003 and 2006, the Regional Executive Board contributed SEK 7 million to promote organic food products. The money was divided between meeting possibly increased costs for organic food products and training buyers and kitchen staff.

In 2006, food procurement was tendered with the express purpose of including as many organic products for large-scale catering as possible. A campaign was also held in 2006 in Region Västra Götaland canteens about the added value of organic
food. Between 2001 and 2006 the procurement of organic food increased from 2.3% to 10.4%.

Eco-labelled furniture
Every year, Region Västra Götaland buys furnishings for about SEK 50 million. A new procurement was tendered in 2006, with a clear environmental focus. A special assortment catalogue, called the Green List, was created. This drive for environmentally sound furniture and textiles was done in collaboration with the Considerate Design Project (see below)\(^{121}\).

CONSIDERATE DESIGN
Considerate Design is an education and development project that was begun by Region Västra Götaland’s Environment Committee in 2001. Its purpose was to increase knowledge within the public sector and publicly-owned companies of how spaces could be designed and demand stimulated for products and materials that contribute to sustainable development in the long term. The three dimensions of working towards sustainable development – social, economic, and in particular environmental – are very significant for Considerate Design’s methodology. Considerate Design is now a ready methodology for redesigning public spaces, with ethics, economics, ecology and not least, aesthetics as its four pillars. During the five years of its existence, the Considerate Design project has collaborated with more than 80 different actors, from architects to furniture companies to designer training programmes. Over 50 spaces, from day-care homes to employment exchanges, bus terminals and cultural centres, have been redesigned to become more attractive and functional.

The Considerate Design programme has been made permanent through the creation in Västra Götaland of three regional design centres for counselling and training. A few years ago, the project’s methods for bringing about sustainability thinking were made a compulsory element of Swedish designer training programmes.

With Considerate Design’s methodology, there is a tool for managing the collaboration between the client and the architect/designer. This process is important in itself, since it can both inspire different solutions or new flows that can improve and develop the workplace further, and control the way in which space is designed and what products are selected. With closer collaboration and a structured working model, all actors can contribute their best knowledge and experience.\(^{122}\)

GREEN CHEMISTRY
The Green Chemistry Project\(^{123}\) was launched in 2000 and is run by the following organisations: the Göteborg Region Association of Local Authorities, Business

\(^{121}\) www.vgregion.se/miljo
\(^{122}\) www.designmedomtanke.com
\(^{123}\) www.gronkemi.nu
Region Göteborg, the County Administrative Board for Västra Götaland, and Region Västra Götaland.

The main purpose of the Green Chemistry Project is to encourage the development of more health and environment adapted yet effective products. Efforts are focused on high-volume products that contain risk compounds and are widely spread in the community. The project has worked with lubricants, car tyres, alkylate petrol for two-stroke engines, antifouling and other paints, car care chemicals, and chemical products used in shipping.

The working method begins with the gathering of detailed knowledge about the product area. An important part of this is to try to identify obstacles to and opportunities for change. In order to promote development the project has initiated a process between forward-looking producers and interested users.

In bringing about change, market forces are used as a frequently effective means to rapid and overall improvements. One objective is to create good examples for others to follow and spread.

Different approaches to different products
Widely differing “key actions” may be needed to affect development. Examples of activities within the framework of the project include applying pressure for the lowering of taxes on pure alkylate petrol for outboard motors, and publishing lists of tyres that do not contain health and environment harming HA oils. Other examples include the testing of environment adapted paints and the drawing up of health and environment criteria for stern tube oils. At present, Green Chemistry is working primarily with chemicals used in shipping.

BIOGAS WEST
Since 2001 the Biogas West Project\textsuperscript{124}, of which Region Västra Götaland has been the main sponsor, has brought together players from the entire biogas value chain in western Sweden, from biogas producers in agriculture to gas distributors and car makers. The objective is less environmentally harmful transportation. Biogas West is based on a unique cooperation between municipalities, businesses and authorities. There are about 30 actors in the network at present. Biogas West also runs extensive in-formation activities to encourage more actors to take part. Biogas West aims to create a good investment climate and market development in western Sweden, in production and distribution of biogas as well as in vehicles powered by gas. The project further aims to contribute towards the development of competencies and concepts with technological advantage that is exploitable for export. The vision for 2020 is for 150 filling stations, 200 000 vehicles, and the replacement of 170 million litres of oil with biogas.

\textsuperscript{124} www.brgbiogas.se
These investments in vehicle gas (biogas and natural gas) are a result of the European Commission’s goal of replacing over 20 per cent of today’s fuel (petrol and diesel) with alternative and renewable fuels. This means that more than 20 million cars will be powered by natural gas, biogas and other renewable forms of fuel by 2020. The project has received an investment grant from the Sw. EPA Climate Investment Programme.
8. The CEFE-programme

8.1 Background of the CEFE Program

By implementing environmental laws, regulations and policies, the integrated competences of industrial pollution control and environmental management have been noticeably improved in China. A large number of industrial sectors and enterprises made great achievements in environmental protection and human safety. Meanwhile, the environmental awareness of both industrial managers and general public increased rapidly.

However, two phenomena raised the attention in the industrial management: firstly, the environmental management bodies and the local enterprises were not in good terms with each other to a certain extent, and control and command were the main measures for the environmental management bodies to regulate the environmental performance of the enterprises. Secondly, the majority of the enterprises, which were capable to further improve their environmental performance, have settled for just meeting the requirements and standards. Because necessary incentive mechanisms are lacking in the current environmental management scheme, such enterprises with potential competences would rather choose the state of “being-unpunished” instead of manifesting their capacities to go beyond.

From 1980s in USA, series of environmental initiatives and partnership programs were proposed and applied. The “National Environmental Performance Track (NEPT)” Program was launched by the US EPA in 2000. It was designed to encourage and reward top environmental performance. With the partnership between the government and the facilities, the members of NEPT Program receive a range of incentives to motivate further improvements.

Under these circumstances, Chinese government decided to learn from experiences from the USA. From 2000, SEPA began to design a new incentive environmental program, open to all industrial sectors and enterprises in China. In 2001, the cooperative project between SEPA and USEPA, “Sino-US Partnership in Industrial Pollution Prevention and Energy Efficiency”, was launched with the purpose of introducing the American principles and approaches of the incentive management to promote industrial pollution prevention in China. In the first stage of the project, the feasibility of establishing policy system for voluntary partnership program was studied, and in the second stage of the project in 2003, SEPA issued the China Environmentally Friendly Enterprise (CEFE) Program, and started the application and assessment of CEFE all over the country in 2004.

1. ORIENTATION OF THE CEFE PROGRAM

CEFE is the highest national honor awarded by the Chinese government to the industrial enterprises in China that demonstrated excellent environmental perform-
ance beyond current national environmental regulations and standards. The Program honors model companies to set benchmarks for environmental performance in the corresponding sectors, representing the direction that similar enterprises and firms could also achieve by minimizing their eco-footprints. The CEFEs form the industrial leading group at the forefront of environmental protection in China.

2. OBJECTIVE OF THE CEFE PROGRAM
By spreading the CEFE Program, a group of enterprises distinguished by their wiser use of resources, less generation of pollutants and harmony in economic growth and environmental protection will be set up as the industrial models in China. This will promote the implementation of the strategy of industrial sustainable development in China. The honor of CEFE can be regarded as a kind of “green-license” that encourages Chinese enterprises to stride into the international market.

3. ENTRY CRITERIA AND INDICATORS OF THE CEFE
Available criteria and indicators were designed for the CEFE Program after studying the successful experience of voluntary partnership programs in USA and investigating 4 Chinese large-scale corporations that exhibited top performance in environmental protection. Companies were drawn from three heavily polluting, energy-intensive industrial sectors: chemical engineering, petrochemical engineering, and steel.

**Entry criteria**
There are 4 basic criteria for qualifying a CEFE, covering the 4 aspects of legal compliance, environmental management, pollution prevention and self-commitment. Table 4 compares the entry criteria of the CEFE Program and the NEPT Program, in which it can be seen that 3 basic criteria are the same.

<table>
<thead>
<tr>
<th>CEFE Program, China</th>
<th>NEPT program, USA</th>
</tr>
</thead>
<tbody>
<tr>
<td>History of sustained compliance</td>
<td>History of sustained compliance</td>
</tr>
<tr>
<td>Environmental Management System</td>
<td>Environmental Management System</td>
</tr>
<tr>
<td>Implementation of Cleaner Production audit</td>
<td>Community outreach and performance reporting</td>
</tr>
<tr>
<td>Commitment to continuous environmental improvement</td>
<td>Commitment to continuous environmental improvement</td>
</tr>
</tbody>
</table>

**Indicators**
Every enterprise can apply for the CEFE so long as its environmental performance meets the 4 criteria. SEPA and local EPBs will organize the assessment and in situ inspection according to the following quantified and semi-quantified indicators.
**Environmental indicators**

Table 5 lists the environmental indicators of the CEFE.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 pollutants discharge</td>
<td>safely reach the national or local pollutants discharge standards or the indicators of gross pollutants discharge amount</td>
</tr>
<tr>
<td>2 gross energy consumption per unit of products</td>
<td>keep at the domestic advanced level in the corresponding sector</td>
</tr>
<tr>
<td>3 water consumption per unit of product</td>
<td>keep at the domestic advanced level in the corresponding sector</td>
</tr>
<tr>
<td>4 main pollutants discharge amount per 10 thousand RMB Production Value</td>
<td>keep at the domestic advanced level in the corresponding sector</td>
</tr>
<tr>
<td>5 comprehensive of recovery rate of solid waste</td>
<td>keep at the domestic advanced level in the corresponding sector</td>
</tr>
<tr>
<td>6 environmental management system</td>
<td>establish standard EMS</td>
</tr>
</tbody>
</table>
Management indicators
Table 6 lists the management indicators of the CEFE

Table 6. Management Indicators of the CEFE

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Cleaner Production</td>
<td>implement Cleaner Production and equip the advanced process for cleaner production</td>
</tr>
<tr>
<td>2 Implementation rate of the EIA (environmental impact assessment) and the “three synchronization” mechanism for newly-constructed, reconstructed and expanded projects</td>
<td>100%, checked and accepted by the corresponding environmental office</td>
</tr>
<tr>
<td>3 Percentage of time that environmental equipment is operational</td>
<td>95% and above</td>
</tr>
<tr>
<td>4 Percentage of industrial solid wastes and hazardous wastes that are safely disposed</td>
<td>100%</td>
</tr>
<tr>
<td>5 Environment within the enterprise</td>
<td>tidy and beautiful with over 35% area covered by trees and grass</td>
</tr>
<tr>
<td>6 Construction of the discharging pipes and the installation of on-line monitoring instruments</td>
<td>accord with the standardized requirement for the ends of the discharging pipes, install and keep in stable operation of on-line monitoring instruments for inspecting the key pollutants in the main ends of the discharging pipes</td>
</tr>
<tr>
<td>7 Declaration and registration of pollutant discharge</td>
<td>declare and register the pollutants discharge and obtain the discharge permit</td>
</tr>
<tr>
<td>8 Pollution discharge fees</td>
<td>pay the required pollution discharge fees in time</td>
</tr>
<tr>
<td>9 Environmental accident and prosecution</td>
<td>no repeated environmental prosecution and pollution accident in the preceding 3 years</td>
</tr>
<tr>
<td>10 Environmental management system</td>
<td>bring the environmental management into the daily standardized management, set the holistic management branch and mechanism, keep full records of the environmental performance including basic technical data and materials and the monitoring data tested by the enterprise itself or other qualified institution</td>
</tr>
<tr>
<td>11 Percentage of the local public and the enterprise’s employees satisfied with its environmental performance</td>
<td>90% and above</td>
</tr>
</tbody>
</table>

8.2 Evaluation of the CEFE indicators

8.2.1 General Principles
The general principle of indicator selection is simply to decide which aspects that are important to assess and then to select the best way to gauge these aspects. For the environmental evaluation of products parameters gauging the potential impacts of physical emissions, like greenhouse gases, acidifying gases etc, are used. To gauge the performance of organizations two categories of indicators (parameters) are in principle necessary:
1) Management performance indicators
2) Operational performance indicators
The state of the environment surrounding the organization is described with a third category, environmental condition indicators. The three categories of indicators are illustrated in figure 11.

The ISO standard 14031 “Environmental Management – Environmental Performance Evaluation – Guidelines” gives general guidelines for environmental performance evaluation of organizations and advice how to select indicators. According to the standard, an organization should base its selection of indicators and its planning of the environmental performance evaluation on

- the significant environmental aspects that it can control and over which it can be expected to have an influence,
- the environmental performance criteria,
- the views of interested parties.

### Types of indicators used for EPE

**Two main types of EPE indicators**

<table>
<thead>
<tr>
<th>The Enterprise</th>
<th>The Surrounding</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Environmental Performance Indicators (EPI)</strong></td>
<td><strong>Environmental Condition Indicators (ECI)</strong></td>
</tr>
<tr>
<td><strong>Management Performance Indicators (MPI)</strong></td>
<td>Environmental conditions</td>
</tr>
<tr>
<td>They assess the efforts of the management</td>
<td>Interested parties</td>
</tr>
<tr>
<td><strong>Operational Performance Indicators (OPI)</strong></td>
<td>Inputs</td>
</tr>
<tr>
<td>They assess the performance of the enterprise’s operations</td>
<td>Outputs</td>
</tr>
<tr>
<td>Decision flow</td>
<td>Information flow</td>
</tr>
</tbody>
</table>

Figure 11. Categories of indicators used to evaluate the environmental performance of an organization.

Interested parties can be employees, customers, residents living in the neighbourhood of the site of the organization etc.
Table 7. Illustrates possible choices of management performance indicators for a selection of possible management aspects.

<table>
<thead>
<tr>
<th>Important management aspect</th>
<th>Examples of possible indicators</th>
</tr>
</thead>
</table>
| Implementation of policies and programmes               | • Number of achieved objectives and targets  
• Number of initiatives to prevent pollution  
• Number of products with environmental labels                                                                                                                                 |
| Conformance with requirements and expectations           | • Degree of compliance with regulations  
• Time to respond to or correct environmental incidents  
• Frequency of review of operating procedures  
• Number of emergency drills and percentage of drills with a satisfactory result.  
• Costs for fines and penalties                                                                                                                                 |
| Financial performance to environmental performance      | • Costs associated with environmental aspects of products or processes  
• Savings achieved through reduction of resource usage or through pollution prevention                                                                                                                                 |
| Community relations with respect to environmental issues | • Number of inquiries or comments about environmental matters  
• Favorability ratings from community surveys.                                                                                                                     |

The operational performance indicators can assess not only the operations of the organization on site. Raw material consumption and the properties of the products are aspects within the control of the organization. The impacts of raw material acquisition and of the use of products are thus operational performance aspects, which should be assessed if they are important. Table 8 gives examples of operational performance indicators.

<table>
<thead>
<tr>
<th>Location of impact</th>
<th>Examples of indicators</th>
</tr>
</thead>
</table>
| Site of organisation | Energy and/or resource use per year or per unit product  
Potential impacts or selected emissions per year or per unit product  
Quantity and type of waste per year or per unit product  
Number of emergency events or non-routine operations per year  
Availability of equipment for environmental monitoring and protection, as a percentage of the annual operating time |
| Raw material acquisition | Energy use for and/or emissions from the supply of starting materials                                                                                     |
| Product use        | Energy use for and/or emissions from the use of the product(s)  
Service life of the product(s)                                                                                                                                 |
EXAMPLES
Below we give two examples, on how two widely different companies have chosen their indicators in order to show how the identified important environmental aspects may guide the selection of indicators

**The household appliance manufacturer**

**Basic information**
- Company: Electrolux AB (Sweden)
- Multi-national company with sites in about 60 countries
- About 70 000 employees (2005)
- Environmental performance evaluation on the corporate level and at each site.

**Most important environmental aspects**
The greatest environmental impact of household appliances occurs during the use of the products. The second most important aspect is the supply of materials (figure 1). The company has identified the following major impact categories:

- Global warming (electricity use)
- Ozone depletion (cooling medium in refrigerators and freezers)
- Water use (for dish washers and washing machines)

![Figure 12. General impact of household appliances over the life cycle (Electrolux Sustainability Report 2005)](image)

At the corporate level the company has condensed its environmental performance evaluation into two indicators:

- Green range. Share and relative profitability of the products with leading environmental performance (low energy and water consumption).
- Fleet average. Relative improvement in energy efficiency of the entire product groups.
Figures 13. and 14 illustrate the use of these indicators.

**Figure 13.** Indicator Green range for household appliances of Electrolux (Electrolux Sustainability Report 2005).

**Figure 14.** Indicator Fleet average of Electrolux. Relative improvement since 2001 of the energy use of household appliances produced by the company. Average for all products. (Electrolux Sustainability Report 2005).

Figure 14 seems to indicate that it may be good business to produce low-energy appliances.

The company has also selected environmental performance indicators to assess each individual production site. This selection also bears out, that the company considers energy and material use to be the most important aspects. The following indicators are used:

- Direct material balance. The percentage of the input material, that is utilised for the products
- Percentage of the sites with ISO 14001 certificate
- Energy consumption per added value
- Water consumption per added value
- Carbon dioxide emissions per added value
- Added value = Total production cost – Direct material cost
The operational indicators of the company also include the following social indicators:

- Health and Safety in the workplace
- Absence rate due to illness (Swedish sites)
- Gender diversity. Percentage of women on each management level

**The producer of specialty chemicals**

**Basic information**

- Company: ICI (United Kingdom)
- Multi-national company with sites in more than 60 countries
- About 32 000 employees (2005)
- Sustainability reporting on the corporate level

**Most important environmental aspects**

This company has another situation than the household appliance manufacturer. In this case the company considers the environmental impacts from the manufacturing at their various sites to be the most important aspects within their control. Based on a survey with the help of external expertise they have selected a range of environmental impact categories and indicators for them. They have also set an improvement target for each category that is assessed by an indicator. Table 8. gives the indicators and the improvement targets. It is worth observing, that the company does not use individual emissions as indicators. Instead the emissions are aggregated to potential impact assessments, just as it is done when the potential environmental impacts of products are assessed with life cycle assessment. This is a necessity when many different emissions contribute to one impact category. The greenhouse gas effect of the company’s operations, for instance, are caused not only by carbon dioxide but also by the re-release of methane, nitrous oxide and various organochlorine compounds.
Table 8. Environmental performance indicators used by ICI

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Unit</th>
<th>Target comp. to year 2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy use</td>
<td>Gj/ton production</td>
<td>- 5 %</td>
</tr>
<tr>
<td>Greenhouse gases</td>
<td>kg CO₂ equiv./ ton production</td>
<td>- 5 %</td>
</tr>
<tr>
<td>Ozone generators</td>
<td>kg ethylene equiv./ ton production</td>
<td>- 25 %</td>
</tr>
<tr>
<td>Hazardous substances to air</td>
<td>kg benzene equiv./ ton production</td>
<td>- 50 %</td>
</tr>
<tr>
<td>Acid gases</td>
<td>kg SO₂ equiv./ ton production</td>
<td>- 50 %</td>
</tr>
<tr>
<td>Water use</td>
<td>m³ / ton production</td>
<td>- 10 %</td>
</tr>
<tr>
<td>Aquatic oxygen demand</td>
<td>kg / ton production</td>
<td>- 25 %</td>
</tr>
<tr>
<td>Hazardous non-product output</td>
<td>kg / ton production</td>
<td>- 25 %</td>
</tr>
<tr>
<td>Non-hazardous non-product output</td>
<td>kg / ton production</td>
<td>- 20 %</td>
</tr>
<tr>
<td>Land assessment</td>
<td>Possible contamination of sites</td>
<td></td>
</tr>
<tr>
<td>Biodiversity</td>
<td>Ecology survey</td>
<td></td>
</tr>
</tbody>
</table>

Like the household appliance manufacturer the chemical company considers health and safety of their employees (and contractors) to be an important enough aspect to warrant several indicators. The following indicators are used by the company and reported in the annual sustainability report:

- Employee fatalities
- Employee classified injury rate, cases / 100 000 hours worked
- Employee work related illness rate, cases / 10 000 employees
- Employee/Supervised Contractors total reportable case rate, cases / 200 000 hours worked
- Other Contractor total reportable case rate, cases / 200 000 hours worked
- Contractor fatalities
- Contractor classified injuries, cases / 100 000 hours worked

8.2.2 The requirements and implications of CEFE program

THE BASIC CRITERIA

The basic criteria and the implications we would derive from them are summarized in table 8.2.4. In table 8.2.5 we have compiled the information we have received about the actual evaluation procedure for each criteria. There is no grading of the criteria. All of them have to be met.
Table 9. The basic criteria and their implications

<table>
<thead>
<tr>
<th>EFE criterion</th>
<th>Implication</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. History of sustained compliance with laws and regulations for three years</td>
<td>The company has to apply for a certificate of performance by the local EPB. Thus the local EPB must keep records of the performance of the enterprises in their district.</td>
</tr>
<tr>
<td>2. Environmental Management System</td>
<td>Requirements according to ISO 14001 Legal requirements Environmental policy with objectives and targets Environmental management structure Training of staff Operational control Emergency preparedness and response Monitoring and measurement Communication Corrective and preventive action Continual improvement Periodic system audits</td>
</tr>
<tr>
<td>3. Commitment to continuous environmental improvement</td>
<td>Environmental policy with objectives and targets</td>
</tr>
<tr>
<td>4. Implementation of Cleaner Production Audit</td>
<td>Mandatory under the Cleaner Production Promotion Law (2002), but only for heavy polluters. This requirement may then be viewed as covered by criterion #2 for heavy polluters. The criterion also implies that the process and the entire value chain of the products including raw material supply and waste disposal should be assessed and improved.</td>
</tr>
</tbody>
</table>

Table 10. Review procedure of the basic criteria

<table>
<thead>
<tr>
<th>EFE criterion</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. History of sustained compliance with laws and regulations for three years</td>
<td>The local EPB lists the applicable rules and regulations and checks the compliance. They can make inspections on site. If they detect any non-compliance the application will be refused.</td>
</tr>
<tr>
<td>2. Environmental Management System</td>
<td>The local EPB asks for a certificate. They check some of the aspects, but some of them have so far been ignored, e.g. training, emergency preparedness and response, communication, operational control. If the fulfillment is unsatisfactory, the company will be asked to improve, before they can obtain the EFE.</td>
</tr>
<tr>
<td>3. Commitment to continuous environmental improvement</td>
<td>Must include all major environmental impacts, as determined by the company. The company decides what it can achieve consulting with SEPA and with experts. The result is checked three years later. If they have failed to reach the improvement targets, the EFE title may be withdrawn.</td>
</tr>
<tr>
<td>4. Implementation of Cleaner Production Audit</td>
<td>A CP audit is carried out irregularly by a certified auditor. The company shall report on its measures. The report will be checked by the EPB. Then an expert will make an on-site inspection. Cleaner production applies to the processes within the company only. When a company applies for the EFE, the audit must not be older than three years. The result of the measures taken by the company are reviewed by a certified expert. SEPA reviews the results of the company with the aid of another expert and may require the company to introduce a better technology. This expert has to be paid by the company.</td>
</tr>
</tbody>
</table>
THE MANAGEMENT INDICATORS
There are altogether twelve indicators called management indicators by SEPA. We have divided them into management performance indicators (MPIs) and operational performance indicators (OPIs) in accordance with the standard ISO 14031. The MPIs are compiled in table 8.2.6 and the OPIs in table 8.2.7 with comments on the evaluation where this is clarifying and information is available. The numbering in the tables is the original numbering by SEPA.

As with the criteria there is no grading or ranking of the indicators. All of them must be fulfilled.

<table>
<thead>
<tr>
<th>Table 11. EFE management indicators (Management performance indicators)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EFE indicator</strong></td>
</tr>
<tr>
<td>1. Cleaner Production</td>
</tr>
<tr>
<td>2. Implementation rate of the EIA (environmental impact assessment) and the “three synchronization” mechanism for newly-constructed, reconstructed and expanded projects</td>
</tr>
<tr>
<td>6. Construction of the discharging pipes and the installation of on-line monitoring instruments</td>
</tr>
<tr>
<td>7. Declaration and registration of pollutant discharge</td>
</tr>
<tr>
<td>8. Pollution discharge fees</td>
</tr>
<tr>
<td>9. Environmental accident and prosecution</td>
</tr>
<tr>
<td>10. Environmental management system</td>
</tr>
<tr>
<td>11. Percentage of the local public and the enterprise’s employees satisfied with its environmental performance</td>
</tr>
</tbody>
</table>
THE SWEDISH ENVIRONMENTAL PROTECTION AGENCY
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Includes occupational health and safety.

12. Commitment to continuous improvement
Evaluated as (and equivalent to) criterion #3.

Table 12. EFE managements indicators (Operational performance indicators).

<table>
<thead>
<tr>
<th>CEFE-indicator</th>
<th>Requirement</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Percentage of time that environmental equipment is operational</td>
<td>95 % and above</td>
<td></td>
</tr>
<tr>
<td>4. Percentage of industrial solid wastes and hazardous wastes that are safely disposed</td>
<td>100 %</td>
<td></td>
</tr>
<tr>
<td>5. Environment within the enterprise</td>
<td>Tidy and beautiful with over 35 % area covered by trees and grass</td>
<td></td>
</tr>
</tbody>
</table>

THE ENVIRONMENTAL INDICATORS
The EFE system has six environmental indicators. Five of them are operational performance indicators according to the ISO 14031 standard, whereas the sixth indicator is a management performance indicator. The prescribed requirements of all six indicators must in principle be fulfilled. The quantitative requirements have some degree of tolerance, however, usually 15 -20 %. The indicators, their requirements and evaluation are compiled in table 13 8.
**Table 13. EFE environmental indicators.**

<table>
<thead>
<tr>
<th>EFE indicator</th>
<th>Requirement</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Various discharged pollutants</td>
<td>National or local discharge standard. Some standards consider specific pollutants, such VOC, benzene etc. Values are given either as concentrations or as amounts per tonne of product.</td>
<td>The EPB surveys the records of the company. One or two cases of non-compliance can be tolerated, but not more during the last three years</td>
</tr>
<tr>
<td>Waste gas, wastewater, solid waste, radioactive waste, noise</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Comprehensive energy consumption per unit of product</td>
<td>Advanced industrial level in China.</td>
<td>Difficult to find data in China. If no general data is available, data is collected from an advanced enterprise as a model. National data are used. Up to 15 % above the level can be tolerated.</td>
</tr>
<tr>
<td>3. Water consumption per unit of product</td>
<td>Advanced industrial level in China.</td>
<td>May be exceeded by 15 %.</td>
</tr>
<tr>
<td>4. Discharges of main pollutants per 10000 RMB production value. COD, ammonia-nitrogen, petroleum, heavy metals, sulphur dioxide, fumes, dust, special industry pollutants.</td>
<td>Advanced industrial level in China. The production value is the annual value of all products and services of the company. Fumes are particles below PM10. Special pollutants are other major pollutants than those mentioned specifically.</td>
<td>The enterprise must be below the level on all major pollutants, with a 15 – 20 % tolerance range. If other pollutants than those mentioned are considered to be major pollutants, they may not exceed the advanced level either.</td>
</tr>
<tr>
<td>6. Environmental management system</td>
<td>A complete established standard environmental management system</td>
<td>Must be met. * MPI equivalent to basic criterion #2,</td>
</tr>
</tbody>
</table>
The product indicators

There are three indicators assessing the requirements in the products of an EFE enterprise. They are described in table 14.

<table>
<thead>
<tr>
<th>EFE indicator</th>
<th>Requirements</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Substances in the products or production process</td>
<td>No substances forbidden by Chinese laws, regulations or standards or by international conventions signed by the PRC.</td>
<td></td>
</tr>
<tr>
<td>Product safety and quality</td>
<td>Comply with national, industry or enterprise standards. Standards are set by the state.</td>
<td></td>
</tr>
<tr>
<td>Environmental performance of products</td>
<td>Environmental label or assessment with selected indicators from the product environmental indicator list according to the state testing standard. The environmental labelling is of type 1. A LCA of the product is not required.</td>
<td>Environmental labels for some of the consumer products (type 1, Chinese system) are required.</td>
</tr>
</tbody>
</table>

8.2.3 A test case to compare the EFE factory assessment with a LCA assessment of a product – The one-product company

As a test case we have carried out a fictitious assessment of an enterprise with the environmental indicators prescribed by the EFE system. Our test enterprise is a cement factory, which turns out no other product than cement. We have carried out a LCA of the product cement assuming that the factory is located in China and thus supplied with Chinese raw materials and with electricity from the Chinese grid. The system boarders of the LCA are upstream extraction of raw materials from nature and down-stream cement ready for delivery at the factory gate. The factory operations are thus part of the production chain of the cement, and data for the EFE indicators may be collected from the inventory of the LCA.

Table 15 is a comparison of the values of the EFE indicators for the cement factory and the values of the same indicators for the product over the entire life cycle.
Table 15. Comparison of the CEFE environmental indicators for the cement factory to the same indicators applied to the product cement. Data per tonne of cement ready for use at the factory gate.

<table>
<thead>
<tr>
<th>CEFE Environmental Indicator</th>
<th>Factory</th>
<th>Product cement incl. raw material and energy supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Various discharged pollutants</td>
<td>Emissions to air: 997 kg (993 kg CO\textsubscript{2} + 20 other compounds)</td>
<td>Emissions to air: 1290 kg (1280 kg CO\textsubscript{2} + 35 other compounds)</td>
</tr>
<tr>
<td>Waste gas, wastewaters, solid waste, radioactive waste, noise</td>
<td>Emissions to water: No reported (probably only sanitary wastewaters)</td>
<td>Emissions to water: 0,85 kg (50 compounds)</td>
</tr>
<tr>
<td>Solid waste: No data (probably small amounts, spills and packaging waste)</td>
<td>Stable waste: 170 kg</td>
<td>Radioactive waste: 0,4 dm\textsuperscript{3}</td>
</tr>
<tr>
<td>Radioactive waste: None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Comprehensive energy consumption per unit of product</td>
<td>1200 kWh total</td>
<td>2100 kWh total, primary energy</td>
</tr>
<tr>
<td></td>
<td>1100 kWh coal</td>
<td>2000 kWh fossil energy</td>
</tr>
<tr>
<td></td>
<td>96 kWh electricity</td>
<td>100 kWh renewable energy</td>
</tr>
<tr>
<td>3. Water consumption per unit of product</td>
<td>No data, probably small</td>
<td>Approximately 100 kg (incomplete and uncertain data)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Discharges of main pollutants per 10 000 RMB production value</td>
<td>g per ton of cement</td>
<td>g per ton of cement</td>
</tr>
<tr>
<td>COD</td>
<td>N.d.</td>
<td>COD</td>
</tr>
<tr>
<td>NH\textsubscript{4}N</td>
<td>N.d.</td>
<td>NH\textsubscript{4}N</td>
</tr>
<tr>
<td>Total N to water</td>
<td>N.d.</td>
<td>Total N to water</td>
</tr>
<tr>
<td>HC+NMVOC to air</td>
<td>76</td>
<td>HC+NMVOC to air</td>
</tr>
<tr>
<td>HC to water</td>
<td>N.d.</td>
<td>HC to water</td>
</tr>
<tr>
<td>Heavy metals to air</td>
<td>1</td>
<td>Heavy metals to air</td>
</tr>
<tr>
<td>Heavy metals to water</td>
<td>N.d.</td>
<td>Heavy metals to water</td>
</tr>
<tr>
<td>SO\textsubscript{2}</td>
<td>0,2</td>
<td>SO\textsubscript{2}</td>
</tr>
<tr>
<td>Particles to air</td>
<td>83</td>
<td>Particles to air</td>
</tr>
<tr>
<td>5. Recovery rate of waste, solid waste, wastewater, wastegas</td>
<td>No data</td>
<td>No data</td>
</tr>
<tr>
<td>6. Environmental management system</td>
<td>Yes</td>
<td>Not relevant</td>
</tr>
</tbody>
</table>

It is obvious from table 15 that the EFE indicators as applied to our test enterprise capture only part of the environmental impact of cement manufacturing. Part of the reason for this is that the acquisition of raw materials is energy consuming. This is only partially and indirectly accounted for by the EFE indicator #3. Nor are the main environmental impacts of cement manufacturing assessed by the EFE indicators. This is illustrated in table 16, which compiles the environmental aspects of cement manufacturing as identified by the LCA.
Table 16. Environmental aspects of the production of cement. The remark “possibly” means, that the assessment is based on literature data, not measured data from the factory.

<table>
<thead>
<tr>
<th>Environmental aspect</th>
<th>Impact category to which the aspect contributes significantly</th>
<th>Cause of impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factory operations</td>
<td>Energy, fossil</td>
<td>Coal for the cement kiln</td>
</tr>
<tr>
<td></td>
<td>Global Warming Potential</td>
<td>Cement kiln</td>
</tr>
<tr>
<td></td>
<td>Acidifying Potential</td>
<td>Cement kiln(NOx and possibly HCl)</td>
</tr>
<tr>
<td></td>
<td>Photoch. ozone creat. potential (possibly)</td>
<td>Cement kiln, estimated emissions of NMVOC ¹)</td>
</tr>
<tr>
<td></td>
<td>Eutrophication potential</td>
<td>Cement kiln, NOx</td>
</tr>
<tr>
<td>Electricity generation for raw material extraction and for the factory operations</td>
<td>Energy, fossil</td>
<td>Coal power plants</td>
</tr>
<tr>
<td></td>
<td>Global Warming Potential</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Acidifying Potential</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Photoch. ozone creat. potential (possibly)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Eutrophication potential</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Waste generation</td>
<td></td>
</tr>
<tr>
<td>Raw material extraction</td>
<td>Waste generation</td>
<td>Coal mining and possibly iron production</td>
</tr>
</tbody>
</table>

¹ Non-Methane Volatile Organic Carbon.

There are three reasons why the EFE environmental indicators fall short of assessing all the main environmental impacts of cement manufacturing:

1. The lack of an indicator for material resource use.
2. A selection of specific emissions as environmental indicators instead of impact categories (compare with the chemical-company example in section 1).
3. The assessment is limited to the factory operations.

Point #2 is further illustrated by table 17, where we compare the scope of the EFE environmental indicators to the most common impact categories used in LCA as applied to the cement case.
Table 17. Scope of the EFE environmental indicators as compared to the LCA impact categories in the cement case.

<table>
<thead>
<tr>
<th>Resource depletion</th>
<th>Energy and materials</th>
<th>Only part of the energy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Water</td>
<td>Yes, part of</td>
</tr>
<tr>
<td></td>
<td>Land (including wetland)</td>
<td>No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Human health</th>
<th>Toxicological Impacts (excl. work env.)</th>
<th>Partially</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Non-toxicological impact(excl. work env)</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Impacts in work environment</td>
<td>No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Environmental effects</th>
<th>Global warming</th>
<th>Partially</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ozone depletion</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Acidification</td>
<td>Partially</td>
</tr>
<tr>
<td></td>
<td>Eutrophication</td>
<td>Partially</td>
</tr>
<tr>
<td></td>
<td>Photo-oxidant formation</td>
<td>Partially</td>
</tr>
<tr>
<td></td>
<td>Ecotoxicological impacts</td>
<td>Partially</td>
</tr>
<tr>
<td></td>
<td>Habitat alterations and impact on biological diversity</td>
<td>No</td>
</tr>
</tbody>
</table>

8.2.4 A general assessment of the EFE system

The EFE system, as based on the four basic criteria, is an ambitious program and potentially a powerful tool. The following general observations can be made about the system in its present form:

1. The scope and potential of the basic criteria seem to be limited at some points by some of the indicators.
2. The criteria can be better used if they are specified with sub-criteria, for instance with specified requirements in the environmental management system (as is done in the NEPT program of the US EPA).
3. If the basic criteria are strictly defined and implemented, additional management indicators may be superfluous.
4. The requirements should encourage progress and improvement beyond standards, not just assess history and achievements measured by today’s standards.

Point #1 is illustrated by table 18, where we compare the basic criteria to some of the indicators.
### Table 18. Examples, where the scope of some criteria could be narrowed by indicators.

MI = management indicator. EI = environmental indicator.

<table>
<thead>
<tr>
<th>Basic criterion</th>
<th>Indicators emphasizing some requirements of the criterion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic criterion #2</td>
<td>MIs #3, 4, 9 Operational control</td>
</tr>
<tr>
<td>Environmental management system</td>
<td>MI #6 Monitoring and measurement</td>
</tr>
<tr>
<td></td>
<td>MIs #7, 8 Legal requirements</td>
</tr>
<tr>
<td></td>
<td>Not emphasized: E.g. Emergency preparedness</td>
</tr>
<tr>
<td>Basic criterion #3</td>
<td>Els #1 – 5 require Chinese standards.</td>
</tr>
<tr>
<td>Continuous environmental improvement</td>
<td>Not emphasized: Setting of improvement targets.</td>
</tr>
<tr>
<td>Basic criterion #4</td>
<td>Els #2 and 3 emphasize only energy and water resources,</td>
</tr>
<tr>
<td>Implementation of cleaner production</td>
<td>not material resources.</td>
</tr>
<tr>
<td></td>
<td>EI #4 emphasizes some specific pollutants, e.g. COD, SO2,</td>
</tr>
<tr>
<td></td>
<td>not potential environmental impacts, like acidification,</td>
</tr>
<tr>
<td></td>
<td>eutrophication or toxicity.</td>
</tr>
</tbody>
</table>

### 8.3 Proposals for new indicators/criteria

Evaluation indicators and requirements for China Environmental Friendly Enterprise are proposed as following.

1 CRITERIA

**Complied with environmental protection laws and regulations, accorded with national policies**

- No criminal record against environmental protection laws and regulations;
- Accord with national and regional policies about industrial development and environmental protection;
- Consistent with local development plan and environmental protection plan.

**Environmental equipments are used regularly, and emission of pollutants reach discharge standards stably**

- Operation rates of environmental equipments are stable and more than 95%;
- Pollutants emission reach discharge standards stably in preceding 3 years;
- Discharge outlets are standardized and installed on-line monitoring instruments keep in stable operation;
- Total pollutants discharge of each kind reach national and local requirements for Gross Amount Control.
Low consumption of resources and energy and remarkable performance in implementation of Cleaner Production

- Actively carry out Cleaner Production audit;
- The implementation of Cleaner Production measures and programs have remarkable performance;
- Establish effective system of the continued implementation of Cleaner Production;
- Cleaner Production indicators reach domestic advanced levels in corresponding industrial sector.

2. INDICATORS

Production technology and equipment are technically advanced

- No use of law-prohibited or abandoned technology or equipment;
- Use international- or domestic-advanced technologies and equipments;
- Research and develop environmental friendly technologies and products.

Pollutants emission and negative environmental impacts are in low level.

- Reduce pollutants production and emission and reach the best level in corresponding industrial sector
- Safely disposal rate, plus reasonable utilization rate, of general solid wastes and hazardous wastes reach to 100%;
- No obvious accumulative damage to the function of local environmental and ecosystem during production;
- Improve environmental quality through voluntary activities.

Have complete environmental management systems and measures

- Beautiful factory and tidy work environment;
- Complete environmental management systems;
- Have established high-security and operational prevention measures for environmental accidents and risks;
- No pollution or ecological damage accident in preceding 3 years.

Implement effective measures, and obtain great achievements both in economy and environmental protection.

- Implement CEFE plan to get remarkable results;
- Actively promote circular economy;
- Have achieved excellent economic performances compared with enterprises in corresponding sector or the local.

Open environmental information and make efforts in public communication

- Have regular open channel in environmental information;
Employees and residents are satisfied with enterprise environmental performance;
No repeated environmental prosecution in preceding 3 years.

Initiatively undertake the company’s responsibility for society, especially in environmental protection aspects.

- Actively promote environmental protection of relatives.
- Purchase of raw materials and components comply with Green Purchasing system;
- Products within the scope of environmental labeling authentication accord with the standards;
- Undertake the responsibilities and obligations about recovery, recycling or disposal of wasted products;
- Actively participate in social public welfare program about environmental protection.

Have good reputation, no adverse records

- No violations of laws and regulations or bad credit record;
- Actively take social responsibility and obligations;
- Obtain high-level honour or recognition in environmental protection.

The CEFE-project seeks to enhance SEPA’s capacity and competence on the industrial environmental management in general and the promotion of environmental friendly enterprises through a close policy dialogue with the Swedish EPA. In particular two main problems will be addressed: 1. the policy instruments for promoting environmental progress in industry and the industrial pollution control need to be improved and diversified, and 2. SEPA’s capacity to promote environmentally friendly enterprises through the CEFE-program needs to be enhanced. According to the project plan an evaluation of the existing CEFE-system should be made and proposals for improving the management of CEFE should be developed.

8.4 Management and organization evaluation of the CEFE program

8.4.1 The purpose with the initiative
1) To sort out the logical chain and tasks to be executed in the CEFE work with certificates.
2) To evaluate the ongoing work and, thereby, make clear the different roles of different actors in the work. Everything with the aim to increase efficiency and to deliver a better service to the enterprises interested in the certificate.
8.4.2 Activities and Methodologies

A consultant, Anders Ingelstam, Acumenta AB, was contracted to design and lead the process. The consultant was asked to a) together with CEFE-staff, make an analysis of the actual situation, b) Present possible areas of improvement for a more efficient organization. The design of the work was built on three steps:

1 – Workshop #1 in Beijing (November-07), where the actual situation was described and analysed, and the vision - the improved state; was drafted.
2 – During the period between workshop 2 and 3, participants were asked to think of and analyze the distribution of roles in the existing system and give their personal opinion on how it should be distributed in the future to reach higher efficiency.
3 – Workshop #2 in Beijing (December-07). Here the possible ways to do the change, the division of lab our and in which order the different measures could be done – Building a plan of action.

It was also initially decided that the methodology used throughout the process should encourage capacity development of the involved. Therefore the process was designed to boost participation and cooperation between the different stakeholders involved in the process.

8.4.3 Description of the present situation

The present situation was described through an exercise where each participant tried to, in brief, on small papers, describe the current situation. The group was encouraged to write both positive and negative aspects of the situation in the CEFE-work. The next step was to make a SWOT-analysis together, sorting the different descriptions into Strengths, Weaknesses, Opportunities and Threats. The Weaknesses, which are internal problems that can be handled, were then grouped into different groups, or families, and then sorted within these groups into so called problem trees. The problem tree gives us a chance to see how different problems relate to each other. Sometimes one problem is caused by another, which means that if we sort out and solve the ‘Cause-problem’ we will also get rid of the underlying problem. It also means that if we don’t deal with the Cause-problem, all attempts to solve the underlying problem might be in vain.

The problem groups identified were:

- Human resources
- Organization
- Communication
- Procedure
The result of the exercise was:

**Human resources**

- Limited HR at SEPA and EPB
  - Lack of systematic training
  - Lack of training (and directions)
  - Shortage of HR, competent staff

**Organization**

- Unclear leadership
  - Organization unclear
  - SEPA vs EPB, unclear roles
    - Who is taking decisions?
    - Who can I ask for help?
  - CEFE vs technical support
**Communication**

- CEFE vs other programs
- Poor communication
- Lack of education and marketing

  - EPB:s and other departments understand little
  - Little understanding in society about CEFE
  - Lack of agreed view on CEFE especially at higher level

**Procedure**

- Complicated process
- Procedure to be shortened
- Bad indicator system
- Application vs verification process not very clear
- Low efficiency
- Lack of sector specific indicators
These problem trees do of course relate to each other, as reality never can be caught in static boxes. However, the trees give us a structured description of the general situation and the areas where improvement is possible to happen.

As mentioned it was only the weaknesses from the SWOT that was used for the problem trees. The other observations from the group were:

**Strengths (Should be used)**
- Good and skilled people involved
- The influence of CEFE is today getting bigger
- The support from SEPA is growing this year
- We have something to offer the enterprises
- We have clearly identified where the challenge is, both for SEPA and for the enterprises
- We have methods to promote and help enterprises who want to improve
- The CEFE program is moving - there is a momentum
- Some actors are ready to take a social responsibility
- Some enterprises are willing to go further than today’s indicators
- Enterprises are responding and improving their environmental management because of CEFE
- We have unity in the team

**Opportunities (can be exploited if we are aware of them)**
- Enterprises can use us as advisors
- We have identified our capacities
- We offer a platform for dialogue between SEPA and Enterprises and between enterprises
- We can help to create a good future
- We can show a new resource/profit/capital to the enterprises

**Threats (to be avoided and managed)**
- CEFE/SEPA relations with other authorities is not clear
- Poor enforcement of legislation
- Not enough political support from Central government (gives legitimacy problems)
- Lack of inter-ministry joint action on environmental issues
- We have a weak system of incentives
- Difficult to keep up the momentum

**8.4.4 Possible steps and measures to take**
In this exercise the participants choose three problems from the problem trees they wanted to develop. These suggestions should be seen as starting points for a more detailed action plan, but the consultant think that there are many good ideas to be elaborated in this list.
Problem group #1 – Human resources
Problems that were discussed and addressed:
   a) There are today insufficient HR at both SEPA and local EPBs in relation to the CEFE-program
   b) There is no planned program for functioning and systematic staff training in the CEFE-program
   c) There is not enough staff with the right skills.

Possible steps and measures to take:
   i) Setting up a HR-department at SEPA
   ii) Setting up a training department at SEPA who could offer different programs and trainings both for own staff and for responsible staff at participating enterprises.
   iii) Assign a expert pool at SEPA management
   iv) Make CEFE more visible to public through marketing efforts
   v) Establish and use a CEFE-website to communicate both with enterprises and the public.

Problem group #2 – Organization
Problems that were discussed and addressed:
   a) The organization today is unclear
   b) The management and leadership are somehow unclear – who takes the decisions?
   c) We don’t always know who is responsible for technical support.
   d) The division of roles between SEPA and local EPBs is not clear

Possible steps and measures to take:
   i) Make sure that a Red letter head document is written with clear instructions for the CEFE-program
   ii) Set up a clearly identified and acknowledged leading group for the CEFE-program.
   iii) EPBs form local leading groups on provincial level
   iv) Together with staff the leading groups set up a plan for CEFE-work both on short-, mid- and long-term perspectives.
   v) SEPA points out responsibilities in CEFE-program, based on suggestions from the staff and the workshops.
   vi) SEPA appoints the necessary technical groups/institutes for the execution of the CEFE-program.
   vii) A clear division of labour between the different technical groups/institutes.
   viii) Also on the provincial level people should be assigned as responsible for technical support.
   ix) Consultants should be on the county level to support enterprises in the program and during the application process. These consultants should be paid by the enterprises themselves.
When all this is done, it must be communicated widely to members, potential members and the public in general.

One idea discussed was the possibility to make CEFE a separate office (See graph on page 7). That would be a measure taken to make CEFE clearer and easier to marketing to external actors.

**Problem group #3 – Communication**
Problems that were discussed and addressed:

- a) Information and communication is not flowing efficiently from the program to other stakeholders
- b) CEFE-program itself does not have a clear position in relation to other governmental programs.
- c) Staff not skilled enough when it comes to marketing
- d) CEFE-program does not reach out to the general public with information.

Possible steps and measures to take:

- i) Make sure that a Red-letter head document is written with clear instructions and position for the CEFE-program.
- ii) Strengthen CEFE investigation and research
- iii) Arrange study tour to Sweden to learn from good practices (e.g. Svanen)
- iv) Establish a publishing platform for information from the CEFE-program
- v) Make sure that responsible persons are trained to work with information and communication
- vi) Do Public Relation work directly with Media and general public

**Problem group #4 – Procedure to enter the program**
Problems that were discussed and addressed:

- a) Low efficiency in the processes and procedures
- b) Both the application process and the verification process are non-transparent and lack logic.
- c) There are no sector specific indicators

Possible steps and measures to take:

- i) Make sure that a Red-letter head document is written with clear instructions, responsibilities and position for the CEFE-program.
- ii) Strengthen the role of the Leading group (see above under Organization) when it comes to monitoring the system.
- iii) In the Red-letter head document, state the guaranteed maximum number of days/weeks for the processing of the application.
- iv) Set up a quantitative objective of how many enterprises that should be CEFE-certified every year.
v) The timetable and format should be set up in Guidelines for the process.
vii) Set up a possible channel to appeal against negative decision on certification.

Consultants recommendations

There should be no doubts that the suggested Plan of Action presented above was elaborated and developed by the participants of the Workshops. Therefore it is a reflection of the reality in the CEFE-program and is also deeply rooted among the different stakeholder groups on different levels in the program.

These recommendations should be seen as suggestions on how to move the process further, and thereby get closer to the stated objectives for the initiative. The recommendations are coming from the consultants’ side and are more process related compared to the Plan of Action, which is about content and concrete actions.

The consultant recommends that:

1) the responsible in the CEFE-program make a presentation of the findings and the Plan of Action to the higher responsible level at SEPA.

2) SEPA should reflect on and decide its role in the CEFE-program. There are different possibilities; SEPA could be the active leader of the program or SEPA could give a clear mandate to a more or less independent CEFE-organization to operate the program (Compare with the Swan-label and figure on p.7). The latter alternative could still include a strong involvement of SEPA.

3) SEPA should decide on a Plan of Action including priorities and a time table based on this report.

4) SEPA-officials make sure that the time and resources to implement the Plan of Action gets earmarked and available through a close discussion with CEFE-staff.

5) SEPA/CEFE-organization establishes a more close relation with the organization of the Chinese eco-label the Environmental Certification Centre of SEPA the China Environmental United Certification Centre Co, Ltd, in order to exchange experiences, cooperate and coordinate criteria and indicators were possible.

6) SEPA/CEFE should find a way to institutionalise the dialogue achieved in this process (“a platform for dialogue”). To keep up speed and quality in the CEFE-program it is crucial to have a continuous dialogue between CEFE, Local EPBs and the Enterprises involved in the program. The CEFE-initiative is not only interesting, but also important for the environmental situation in a sustainable future China.
8.5 Proposals for improvement of the promotion and management

8.5.1 Procedure

APPLICATION

- By voluntary principle, enterprises could apply to provincial environmental protection departments for CEFE establishment, as inter-regional large-scale enterprises directly to the state environmental protection administration. Enterprises should have certain influence in industry or region. The formal application documents about enterprises main information and programme should be submitted, which would be put on records by MEP. Implementation programme for enterprises to achieve CEFE assessment criteria could be formulated by the enterprises themselves.

- Enterprises should carry out the programme stepwise, and to be practical and realistic, with advice or guidance by experts and concerned departments.

- Relevant information should be open to the public in the process, and dynamic information should be reported to the provincial environmental protection department regularly.

- Information should be opened more than once a quarter, including plan, schedule, stage achievement, through influential local or industrial media and network.

- Accorded with the appraisal requirements by self-examination, recommended by provincial environmental protection departments or industry associations, enterprises could submit written application for awards to MEP. And application documents should be referred in accordance with the requirements.

- The documents should include application form, work report, technical report, relevant reports by foreign or domestic media, and other testification information.

- Submission deadline is the end of March annually.

EVALUATION AND DENOMINATION

- MEP would solicit opinions on the enterprises from provincial environmental protection departments or industry associations or large company groups.

- The application list would be promulgated on the MEP website, paper and other main media, soliciting opinions from the public supervision for a period of one month.

- MEP would commission institution of technical support organizing experts to carry out technical assessment of the enterprises. The assessments should be formed after investigating in the locales, auditing the files and surveying public opinions.
Based on application files, local and industry views, public opinions, and technical assessments, MEP would examine and carry out on-site acceptance, and the acceptance results would be promulgated. The CEFE candidate list would be audited finally. The enterprises passed the audit would be denominated annual “CEFE”, and awarded certificate.

SUPERVISION AND INSPECTION
Enterprises would be supervised and inspected dynamically in the rechecking period within 3 years from the date of obtaining the certificate, and spot-checking would be once a year. Enterprises would be corrected in time or withdrew the title if there were environmental of-fence or indicators inconsistent with the requirements of CEFE. Enterprises passed the re-checking would not be rechecked within the following 5 years, and could re-apply voluntarily from then on. The enterprises should report to the MEP annually, and open environmental information to public.

MEP would warn enterprises or rectify them in the time limit if there were environmental of-fence, and withdraw the title on one of the following conditions:
- repeatedly warned or rectified in the time limit, or in particularly serious cases;
- serious pollution accidents;
- changing products, stop production or bankruptcy;
- environmental pollution accidents caused significant international influence;
- denominated through fraud, bribery, or other improper means.

8.5.2 Rewards
- CEFE established by special funds of national finance support, no fees charged.
- The denominated enterprises can enjoy preferential policies following:
  - reduced frequency of normal environmental inspections, or be free of inspections.
  - priority for cleaner production and environmental protection funds;
  - priority for publicizing themselves free on MEP website about environmental protection;
  - listing or refinancing may be exempted from environmental inspections;
  - priority for tax or credit.

Enterprises denominated would get the CEFE logo use right. The logo is a registered official sign by MEP, and the application is a voluntary act. Enterprises can apply for the logo use right within the following 3 years after denomination, explaining the scheme. The logo can be used in the allowable range after the approval.
8.5.3 Requirements

The units and individuals participating in the establishment of CEFE should be based on the principle of fairness, justice and openness, and be responsible.

- MEP should set down measures and regulations for the establishment of CEFE, organize assessment committee, denominate and commend the enterprises.
- Provincial environmental protection departments should guide the enterprises to develop the establishment of CEFE, suggest and assist to implement preferential policies for the enterprises.
- Units and experts of technical support should comply with the technical measures and regulations to ensure that the technical assessment is scientific, objective, impartial, effective, and be responsible for the conclusions, and keep state secret and enterprises commercial secret.
- The enterprises should be responsible for potential influence of environment or society, and accuracy and authenticity of application files.

The units and individuals participating in the establishment of CEFE would be criticized and dismissed from the CEFE evaluation qualification if there were favouritism or bribery, leaking commercial and technical secret, providing false certification, giving incorrect data and causing serious consequences. The enterprises would be transferred to the judicial authority while causing significant economic loss or committing a crime.
9. Implementation and dissemination of the projects findings

9.1 About CEFE Project Dissemination and Implementation Plan

In order to realize the sustainability of the CEFE Project, maximize its influence and effect and enable the people to use the project achievements, the Project Group has worked out the implementation plan for recommended CEFE-related measures. Under the support of the Swedish Party, the Chinese Party will carry out related dissemination activities, prepare and propagate the information on this project and the CEFE plan and organize related training activities so that local environmental protection bureaus and enterprises can learn the CEF plan more deeply.

In accordance with the policy suggestions and measures for promoting the development of environment-friendly enterprises as proposed in the project report, it is hereby proposed to implement the action plan for environment-friendly enterprises in three stages from 2009 to 2015 so as to practically fulfil various tasks and measures for ability construction of environment-friendly enterprises (for the detailed implementation plan and task divisions among all institutions, refer to Table 1).

1. First stage (2009-2010): preparation period

1.1 In accordance with the work requirements for the Eleventh Five Year Plan for environmental protection and related policies, laws and regulations, sufficiently adopt the advices and suggestions from the enterprises and local environmental protection bureaus and organize related organizations and experts to further revise and improve the “Evaluation Index System for the Creation of Environment-friendly enterprises”.

1. Formulate the special plan for environment-friendly enterprises and the implementation scheme. The national administrative department in charge of environmental protection and all local environmental protection bureaus shall enhance the guidance and formulate the specific, scientific and highly operable special plan and implementation scheme for promoting environment-friendly enterprises in strict accordance with the national requirements for promoting the development of environment-friendly enterprises.

1.3 In the light of the existing training, further improve the “Training Materials for Creating National Environment-friendly enterprises (For Experiment)” and make preparations for the next step of training.
1.4 Build the network application platform for environment-friendly enterprises, revise work flow, simplify application procedure and increase examining and approving speed and efficiency.

1.5 Establish the periodic communication platform for environment-friendly enterprises so that enterprises, local environmental protection bureaus, technical support departments and the Ministry of Environmental Protection can communicate continuously and effectively.

1.6 Establish the propaganda and exchange platform for environment-friendly enterprises, integrate the forces of all social parties and conduct overall process and multi-level propaganda for the creation activities of environment-friendly enterprises through network, TV and newspaper.

1.7 Establish and use the environment-friendly enterprise mark. Related institutions and China Environmental Labelling Certification Centre establish a closer cooperation relationship and consider the possibility of disseminating environment-friendly enterprises as an enterprise environmental label; establish the general mark of environment-friendly enterprises and encourage enterprises to use the environment-friendly enterprise mark.

1.8 Systematically sort out the various available managerial systems and policies for promoting environment-friendly enterprises and preliminarily propose the frame system of laws, regulations, policies and systems for promoting the development of environment-friendly enterprises that need to be formulated and issued in the next three years.

2. Second stage (2010-2012): critical period

2.1 Improve all preferential policies for promoting the development of environment-friendly enterprises. In 2011, formulate and improve a series of preferential policies for promoting the development of environment-friendly enterprises. For example, (1) through consultation and cooperation between the Ministry of Environmental Protection and all ministries and commissions, study and formulate more operable subsidy policies to go together with preferential taxation and loan policies; (2) establish the green examination and approval channel for environment-friendly enterprises and effectively enhance the enthusiasm of enterprises for participation in the activities; (3) establish the public funds for encouraging the creation of environment-friendly enterprises or adopt the more feasible mode of operation such as reimbursement of pollutant discharge fees and grant some fund subsidies to the enterprises participating in the creation; (4) for the enterprises awarded the title, recommend the cleaner production demonstration projects or other demonstration projects for which the state provides fund subsidies in accordance with related national regulations.

2.2 Formulate and improve the laws, regulations, standards and specifications for promoting environment-friendly enterprises. (1) Establish the system of environ-
mental protection laws and regulations for promoting the development of environment-friendly enterprises, accelerate the study and formulation of the associated laws and regulations for recycling and pollution control of various solid wastes and gradually establish the extended producer responsibility system. (2) Scientifically formulate and implement the cleaner production standard system, strengthen the formulation work of national industrial pollution discharge standards and promote enterprises to adopt environment-friendly technologies and techniques. Organize and formulate the environmental pollution control specifications for waste recycling, establish and improve the cleaner production standard system, organize and formulate the cleaner production audit guidance and guide all places and industries to carry out cleaner product audit. (3) Formulate the technical policies for promoting environmental friendship, formulate and improve the technical policies for prevention and control of pollutions from the industries that highly consume resources and energies and heavily pollute the environment and disseminate the production technologies and pollution control technology of environment-friendly enterprises.

2.3 Continue to deepen the experimental spots and demonstration of environment-friendly enterprises. The environmental protection departments of all provinces, autonomous regions and municipalities directly the Central Government shall actively carry out experimental spots and demonstration work of environment-friendly enterprises in their own regions under the guidance of the Ministry of Environmental Protection. Firstly, determine the index system and acceptance standard for environment-friendly enterprises and standardize the experimental spot and demonstration work; secondly, organize and formulate technical guidance for various environment-friendly enterprises and guide various experimental spots and demonstration construction; thirdly, strengthen management of various experimental spot and demonstration organizations including spot supervision and inspection, ensure the continuous improvement of experimental spot and demonstration organizations, reduce total discharge of pollutants and improve environmental quality; fourthly, promptly summarize the national environment-friendly enterprise experimental spot experience and disseminate advanced models.

2.4 In pursuance of environment-friendly enterprise training requirements, cooperate with local environmental protection bureaus and trades societies and continue to carry out various training activities for national environment-friendly enterprises in developed regions and underdeveloped regions as well as different fields like representative industries.

2.5 Establish the technical innovation system and consulting service system for environment-friendly enterprises. Organize and investigate material consumption, energy consumption, waste production and discharge conditions in different regions and different industries and study the development potential and approach of environment-friendly enterprises. Increase the support for technical research and development and dissemination and enhance the technical support and innovation
ability of Chinese enterprises. Actively support the establishment of environment-friendly enterprise information system and technical consulting service system and promptly release the information on enterprise technologies, management and policies to the society. Take full advantage of available forces of environmental scientific research and service institutions and social groups and carry out environment-friendly enterprise information consultation, technical dissemination, propaganda and training work.

2.6 Implement the green procurement policy. Cooperate with related departments and make efforts to establish China’s government green procurement system as soon as possible and encourage the use of recycled products, Environmental Labeling Products, organic foods and the products made by the enterprises that have passed ISO14001 Environmental Management System certification or cleaner production audit. Formulate green procurement implementation policies, carry out market product survey and optimal product selection, set procurement goal, conduct follow-up investigation and finally provide easily useable green public procurement tools to the purchasers.

2.7 Further improve the environment-friendly enterprise network platform and propaganda and exchange platform.


3.1 Continue to improve various laws, regulations, policies and systems for promoting the development of environment-friendly enterprises, continue to improve the evaluation index system for environment-friendly enterprises, continue to carry out experimental spot and demonstration work for environment-friendly enterprises and continue to strengthen training and propaganda for environment-friendly enterprises.

3.2 Start to implement some systems and policies for promoting the development of environment-friendly enterprises, complete the capital construction of network platform and propaganda and exchange platform for environment-friendly enterprises and complete the construction of technical innovation system and consulting service system for environment-friendly enterprises.

3.3 In 2015, it is necessary to assess the implementation of the Twelfth Five Year Plan for construction of environment-friendly enterprises, evaluate whether the objective is achieved, policies are complete and tasks are completed, and summarize related experience to lay a foundation for the next step of dissemination and implementation for environment-friendly enterprises.
### Table 1 Division of Major Tasks for CEFE Project Implementation Plan

<table>
<thead>
<tr>
<th>Department in charge</th>
<th>Major tasks</th>
<th>National environmental protection department (department in charge of project)</th>
<th>Local environmental protection departments</th>
<th>Local governments</th>
<th>Research support institutions</th>
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<td>· Revise and improve the “Evaluation Index System for the Creation of Environment-friendly enterprises”</td>
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<td>· Formulate special plan for environment-friendly enterprises and the implementation scheme</td>
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<td>· Further improve the “Training Materials for Creating National Environment-friendly enterprises”</td>
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<td>· Build network application platform for environment-friendly enterprises</td>
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<td>· Establish communication and exchange platform for environment-friendly enterprises</td>
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<td>· Establish and use the mark of environment-friendly enterprises</td>
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<td>· Systematically sort out the various available managerial systems and policies for promoting environment-friendly enterprises</td>
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<td>· Propose the frame system of laws, regulations, policies and systems for promoting the development of environment-friendly enterprises that need to be formulated and issued in the next three years</td>
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<td>· Improve various preferential policies for promoting the development of environment-friendly enterprises</td>
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<td>· Study and formulate subsidy policies, policies, preferential taxation and loan policies for promoting environment-friendly enterprises</td>
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<td>· Establish the green examination and approval channel for environment-friendly enterprises and effectively enhance the enthusiasm of enterprises for participation in the activities</td>
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<td>· Establish the public funds for encouraging the creation of environment-friendly enterprises</td>
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<td>· Recommend the cleaner production demonstration projects or other demonstration projects for which the state provides fund subsidies</td>
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<td>· Formulate and improve the laws, standards and specifications for promoting environment-friendly enterprises</td>
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<td>· Establish the system of environmental protection laws and regulations for promoting the development of environment-friendly enterprises and gradually establish the extended producer responsibility system</td>
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<td>· Scientifically formulate and implement the cleaner production standard system and promote enterprises to use environmentally friendly technologies and techniques.</td>
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<td>· Formulate technical policies for promoting environmental friendship and disseminate the production technologies and</td>
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<td>pollution control technology of environment-friendly enterprises</td>
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<td>· Continue to deepen experimental spots and demonstration of environment-friendly enterprises</td>
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<td>· Improve environment-friendly enterprise indicator systems, acceptance standards and standardize experimental spots and demonstration work</td>
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<td>· Organize and formulate technical guidance for various environment-friendly enterprises and guide various experimental spots and demonstration construction</td>
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<td>· Strengthen management of various experimental spot and demonstration organizations</td>
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<td>· Promptly summarize the national environment-friendly enterprise experimental spot experience and disseminate advanced models</td>
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<td>· Cooperate with local environmental protection bureaus and trades societies and continue to carry out various training activities for national environment-friendly enterprises in developed regions and underdeveloped regions as well as different fields like representative industries</td>
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<td>· Establish the technical innovation system and consulting service system for environment-friendly enterprises.</td>
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<td>· Establish and implement the green procurement system</td>
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<td>· Further improve the environment-friendly enterprise network platform and propaganda and exchange platform</td>
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### Department in charge
**Major tasks**

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<th>National environmental protection department (department in charge of project)</th>
<th>Local environmental protection departments</th>
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- · Continue to improve various laws, regulations, policies and systems for environment-friendly enterprises
- · Continue to improve the evaluation index system for environment-friendly enterprises
- · Continue to carry out experimental spot and demonstration work for environment-friendly enterprises
- · Continue to strengthen training and propaganda for environment-friendly enterprises
- · Start to implement some systems and policies for promoting the development of environment-friendly enterprises
- · Complete the capital construction of network platform and propaganda and exchange platform for environment-friendly enterprises
- · Complete the construction of technical innovation system and consulting service system for environment-friendly enterprises.
- · Assess the construction of environment-friendly enterprises, evaluate whether the objective is achieved, policies are complete and tasks are completed, and summarize related experience
9.2 CEFE programme dissemination

Based on the programme requirements, the Environmental Development Centre has edited the training materials named "training materials for the creation of the national environmental-friendly enterprise (testing version)" and worked together with the local EPBs and industry societies to carry out the training activities in the areas of the developed (Guangdong) and under-developed (inner Mongolia) districts. The activities have gained a very positive reaction and been applauded by the trainees.

The trains consisted of two main contents: first content is lectures, which were conducted by the technical experts from the Environmental Development Centre and industry society, who gave the explanations concerning the significance of the creation activity, the evaluation criteria, the characters of the environmental-friendly enterprises, the working procedures for the creation process, and how to prepare the application materials and documents, etc; the second content is site-visiting the national environmental-friendly enterprise, which gave the successful experience introduction and showed the environmental-friendly production site.

The train has successfully combined the theory and practice together, making the training course more practical and effective.

Guangdong is the province with high-level economic and industrial development; the enterprises in Guangdong have more positive and advanced awareness concerning the environmental protection, by the strong push from the EPBs, that’s why the EFEs’ creation activity in Guangdong has gained much more remarkable achievements and overwhelming attentions. The numbers of EFEs in Guangdong is rating specially high in the nation-wide and the technical guideline and promotion activity has been attached importance within the creation process, therefore, Guangdong was the venue where the first province to hold the EFE training activity.

After the first working consultation and communication conference for the creation of the EFEs in China, the Environmental Development Centre working together with Guangdong EPB held the first training class in Guangzhou, the trainees were in the range of hundreds of the enterprises which were positively participating in the creation activity, in the industries of electrics, grids, automatics, paper, etc. during the training, the trainees have visited the EFE like Zhuangjiang Beer Company and Dong-feng Nissan Passenger Vehicle Company.

Inner Mongolia is developing with a continuous increasing speed in the recently yeas, the creation activity has obtained a great support from the local administrative department and enterprises. At the June of 2008, though the sufficient preparation work, the national EFEs promotion and communication training workshop was held in the Hulun Buir, Inner Mongolia, organized by the Environmental
Development Centre and EPB, more than 80 enterprises has participated in this workshop, in the industries of power plant, mining, dairy, etc.

By carrying out the training activities, the project team mastered a better pictures that enterprises generally do not know exactly what the EFEs’ intensions and characters are, what’s the special benefits, and what is the right application process, wherever in the developed or underdeveloped districts. This situation thanks to the preliminary stage the EFE conception stands in China, it is rather new for many enterprises. Therefore, the EFE creation work needs the high-level capacity on the environmental protection and management. Because of the resource shortage in the locals, the environmental departments at the national level should offer more supports on the techniques and management to train the relevant staff especially in the local. The trainings which already been launched was just the start, with the increasingly needs from the nationwide, the administrative departments must pay attentions to the set activities of training, and make the annual working plan on that, editing and updating the training materials, in order to smooth the streamline the EFE application work.

9.3 CEFE programme promotion strategy
Based on the project activities and findings, the project team has proposed the CEFE programme pro-motion and implementation plan.

9.3.1 Improve and complete the preferential policies
To research and improve the incentive mechanism enables the creations of environmental-friendly enterprises to not only combine with the existing environmental means, but also with the economic instruments to develop more feasible and attractive preferential policies. Such as through the coordination and consultation between the ministry of Environmental Protection and ministries, to study and formulate a more practical incentive policies, taxation, loan policy with the establishment of environment-friendly business green channels for approval, effectively enhance the enthusiasm of enterprises to participate in activities. Set up the public funds which to encourage the creation of environment-friendly enterprises, or to return of the sewage charges as the certain compensation for the enterprise which taking part in the creation activities. For the enterprises which already obtain the titles, will get the priority recommendations for the clean production demonstration programme or the projects with funds-supported in accordance with the relevant national regulations.

9.3.2 Complete the evaluation criteria and the application procedure
The goal is to amend the workflow, simplify the reporting procedures, and fasten the approval by strengthening the establishment of the environment-friendly networks to improve the efficiency of declaration, examination and approval. According to the Eleventh Five-Year’s working plan on environmental protection and related policies and regulations, the completion of evaluation criteria is based on
the fully consideration of the comments and suggestions from enterprises and local EPAs, so that the evaluation criteria can reflect the progressiveness of the national environmental-friendly enterprises, and give full play as the technical guidance.

9.3.3 Introduce the market mechanism

Enlarge the dissemination and increase the public awareness regarding the environmental-friendly enterprises by encouraging the usage of environmental-friendly logo. Introduce the market mechanism during the environmental-friendly creation process, to enable the tile of environmental-friendly enterprise become the strong impetus in the market competition. The organization which is responsible for creating activities should be marked with the China Environmental Certification Centre to establish a closer partnership, to promote the cooperation in establishing the criteria and disseminating the experiences, given the environmental-friendly enterprises as a possibility to promote the dissemination of the environmental label.

CEFE project should set up a communication mechanism, to guarantee the smooth and continuous communication among enterprises, technical support institutions and environmental protection departments, which is the key to ensure the quality and quantity of the environmentally friendly enterprises. business model to create the quality and quantity of the key. The creation of Environment-friendly enterprise has played a significant role in China’s sustainable development by serving as a motivation mechanism.

9.3.4 Establish the communication mechanism

The establishment of national environmental-friendly enterprise as a motivated mean is a reward and honour for enterprises. To maximum the enthusiasm of the business, the governmental department must attach importance to the dissemination and publicity of the creation activity. In strengthening the basic technical work, through the efforts of the management department to integrate the strengths of the whole society, by the media like television and newspapers, to carry on the multi-level propaganda in the entire process, and strive to create a positive atmosphere in the society.

By refining and deepening the CEFE project, the project team has developed a plan of action. This plan reflects the actual situation of CEFE project, and by considering the different participant’s stand, this plan has a strong representation.

9.4 Key points of the implementation plan

9.4.1 The target:

- the highest honour in the field of environmental protection;
- the strong power in domestic society;
- encourage the enterprise to improve the capacity in pollution control, clean production and environmental management;
• obtain the acknowledgement from the consumers, and make the preferential policies more practical;
• take more social responsibility;

9.4.2 The implementation proposals
• making the motivation measures
• Performance evaluation
• tracking management
• Dissemination and training

9.4.3 Implementation steps
• carry out the dissemination and publicity plan for the creation of environmental friendly enterprise at the international level;
• establish the enterprise alliance;
• establish the administrative office concerning the creating activity;

9.4.4 Information and human resource
• strengthen the communication by the establishment of a information communication platform, improve the technical support;
• improve the capacity building
• establish the publicity website: www.Cefe.com/hr
• design the training materials and curriculum;

9.4.5 Evaluation criteria and working procedure
• revise and issue the new criteria
• issue the clarified working procedure including the process of application, receiving, technical check, the in-time feedback and conclusion, rewards, follow up and evaluation;

9.4.6 Communication and dissemination
• the means of communication and dissemination
• the main measures for the information publicity
• encourage the participation of the enterprises.
## 10. Annex

### ANNEX 1

<table>
<thead>
<tr>
<th>Environmental quality objective</th>
<th>Economic instruments involving costs for those concerned</th>
<th>Economic instruments subsidising or reducing costs for those concerned</th>
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<td>Reduced Climate Impact</td>
<td>• Energy tax</td>
<td>• Carbon dioxide differential vehicle tax</td>
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<tr>
<td></td>
<td>• Carbon dioxide tax</td>
<td>• Exemption from tax on biogas motor fuels</td>
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<tr>
<td></td>
<td>• Tax shift (higher taxes on energy and use of private cars)</td>
<td>• Energy system conversion programme</td>
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<td></td>
<td>• Carbon dioxide differential vehicle tax</td>
<td>• Local climate investment programme</td>
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<tr>
<td></td>
<td>• Road charge for heavy-duty vehicles</td>
<td>• Local ecologically sustainable development investment programmes</td>
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<td></td>
<td>• Rail track charges</td>
<td>• Electricity certificates</td>
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<td></td>
<td>• Electricity certificates</td>
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<td></td>
<td>• Emissions trading</td>
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<tr>
<td>Clean Air</td>
<td>• Parking fees</td>
<td>• Environmental classification of petrol and diesel</td>
</tr>
<tr>
<td></td>
<td>• Environmental classification of petrol and diesel</td>
<td>• Differential taxation of petrol and diesel</td>
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<tr>
<td></td>
<td>• Differential taxation of petrol and diesel</td>
<td>• Subsidised public transport</td>
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<tr>
<td></td>
<td>• Environmental classification of petrol and diesel</td>
<td>• Lower tax on alkylate-blended petrol</td>
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<tr>
<td>Natural Acidification Only</td>
<td>• Sulphur tax</td>
<td>• Funding for liming of lakes and watercourses</td>
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<td></td>
<td>• Nitrogen oxides charge</td>
<td>• Environmental differentiation of shipping lane and harbour duties</td>
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<tr>
<td>A Non-Toxic Environment</td>
<td>• Pesticides tax</td>
<td>• Differential taxation of petrol</td>
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<tr>
<td></td>
<td>• Batteries charge</td>
<td></td>
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<td></td>
<td>• Tax on cadmium in artificial fertilizers</td>
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<td></td>
<td>• Producer responsibility for car tyres</td>
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<tr>
<td></td>
<td>• Producer responsibility for end-of-life electrical and electronic products</td>
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<tr>
<td>A Protective Ozone Layer</td>
<td>• Environmental sanction charge (fine)</td>
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<tr>
<td>A Safe Radiation Environment</td>
<td>• Tax on thermal effect of nuclear reactors</td>
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<td></td>
<td>• Charge to fund disposal of certain radioactive waste</td>
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<td></td>
<td>• Funding of future expenditure on spent nuclear fuels</td>
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<tr>
<td>Zero eutrophication</td>
<td>• Tax on nitrogen in artificial fertilizers</td>
<td>• Environmental grants for measures to combat nitrogen leaching, and for the creation of protection zones</td>
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<tr>
<td>Good-quality Groundwater</td>
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<tr>
<td>A Balanced Marine Environment</td>
<td>Water pollution charge</td>
<td>• Grants for disposal of oil waste from ships</td>
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<td>Flourishing</td>
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<tr>
<td><strong>Lakes and Streams</strong></td>
<td>Rural settlements and fisheries charge</td>
<td>• Funding for fisheries management</td>
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<tr>
<td><strong>Thriving Wetlands</strong></td>
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<td>• Environmental grants for creation and management of wetlands in agricultural areas</td>
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<tr>
<td><strong>Sustainable Forests</strong></td>
<td>–</td>
<td>• Environmental grants for investments to increase the ecological value of forests</td>
</tr>
<tr>
<td><strong>A Varied Agricultural Landscape</strong></td>
<td>–</td>
<td>• Environmental grants for conservation of grazing pastures and natural hay meadows; valuable habitats and cultural heritage in agricultural areas; endangered breeds of domestic animals; a varied and open agricultural landscape; organic production; environmentally sound cultivation of kidney beans (on the island of Öland) and sugar beet (on the island of Gotland). • Investment grants for agricultural, horticultural and reindeer enterprises • Funding for adjustment and development in rural areas</td>
</tr>
<tr>
<td><strong>A Magnificent Mountain Landscape</strong></td>
<td>–</td>
<td>• Funding for preventive measures and compensation for injuries to reindeer • Funding for preventive measures and compensation for injuries to other animals • Grants for management of reindeer enclosures</td>
</tr>
<tr>
<td><strong>A Good Built Environment</strong></td>
<td>• Tax on natural gravel • Landfill tax • Municipal waste disposal charges • Producer responsibility for packaging, waste paper for recycling, and cars • Car-scraping charge</td>
<td>• Grants for measures to reduce radon in private homes • Investment grants for ecological building • Car-scraping premium • Deposit (refund) system for drink containers (consumer benefit from producer responsibility for packaging) • Local climate investment programmes (Klimp)</td>
</tr>
</tbody>
</table>

For more detailed information about these instruments see e.g. The Swedish Environmental Protection Agency and the Swedish Energy Agency report (2005) “Economic Instruments in Environmental Policy”.
ANNEX 2

“Sustainability tool” for the daily work within the Regional Council of Kalmar County.

Necessary steps, and some examples of activities and working methods during this journey:

<table>
<thead>
<tr>
<th>Commission</th>
<th>A clear commission to the secretariat, to include all dimensions of sustainability in the work for regional development and in the regional development plan.</th>
<th>Regional Council</th>
</tr>
</thead>
</table>
| Awareness  | • education of process leaders  
               • general sustainability education (regional key persons from public, private and academic sector)  
               • discussion leaflets  
               • sustainability ambassadors  
               • regional examples | Broad co-operation - local authorities, county adm board, county council, regional council and university. |
| Understanding | • Exchange of knowledge and experience  
                       • Building new competence  
                       • regional examples  
                       • external environmental audit of the RUP\textsuperscript{125}  
                       • thematic seminars (local and regional key persons)  
                       • analyses (strengths/weaknesses/opportunities/threats)  
                       • sustainability group | |
| Common ground | • Dialogue  
                       • study circles, during the revision of RUP (private citizens and NGOs)  
                       • local and regional workshops (own organisations, private citizens, municipalities, NGOs)  
                       • idea seminars  
                       • using existing networks (local and regional authorities, trade and industry, university)  
                       • local and regional councils | Consensus in the regional partnership (municipalities, regional authorities, federations of private enterprises, federation of farmers, chambers of commerce, European Social Fund, university, trade union etc) |
| Common view concerning long term objectives | | |
| The Regional Development Programme for Kalmar | Approved by the Regional Council in |

\textsuperscript{125} Regional Development Programme
<table>
<thead>
<tr>
<th>County: Kalmar County</th>
<th></th>
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<tbody>
<tr>
<td><strong>Delimitation and division of responsibilities</strong></td>
<td>See annex</td>
</tr>
<tr>
<td>Regional public bodies</td>
<td></td>
</tr>
</tbody>
</table>
| **Operative internal work** | Tools and methods  
- education of staff  
- responsibilities  
- routines  
- checklists | Each organisation |
| **Development objectives, strategies and priorities** |  
- where/when missing  
- according to the own commission |  |
| **Transformation to “daily work”** |  
- priorities in activity plan  
- demands on projects supported by RC |  |
| **Operative external work** | Extended co-operation with new organisations | Each organisation |
| **Dissemination** |  
- national seminars  
- reports |  |
Promoting Environmentally Friendly Enterprises in China

A Sino-Swedish bilateral environment co-operation project

China is today facing a variety of challenges regarding industrial pollution. Over the past 15 years the rate of economic growth in China has been high. This rapid growth has generated heavy pressure on the environment, with consequent damage to health and natural resources. Air and water has been polluted. Waste management and biodiversity protection are other challenges.

Between September 2006 and January 2009 the project China Environmentally Friendly Enterprises (CEFE) has been carried out. The project is a co-operation between the Chinese Ministry of Environmental Protection (MEP) and the Swedish Environmental Protection Agency within the framework of the Programme for Co-operation on Environment and Sustainable Development between MEP and the Swedish EPA.

The aim of the project is to enhance the MEP:s capacity and competence in the industrial environmental management in general and the promotion of environmentally friendly enterprises in particular. This final report from the project contains an overview of the findings of the project.