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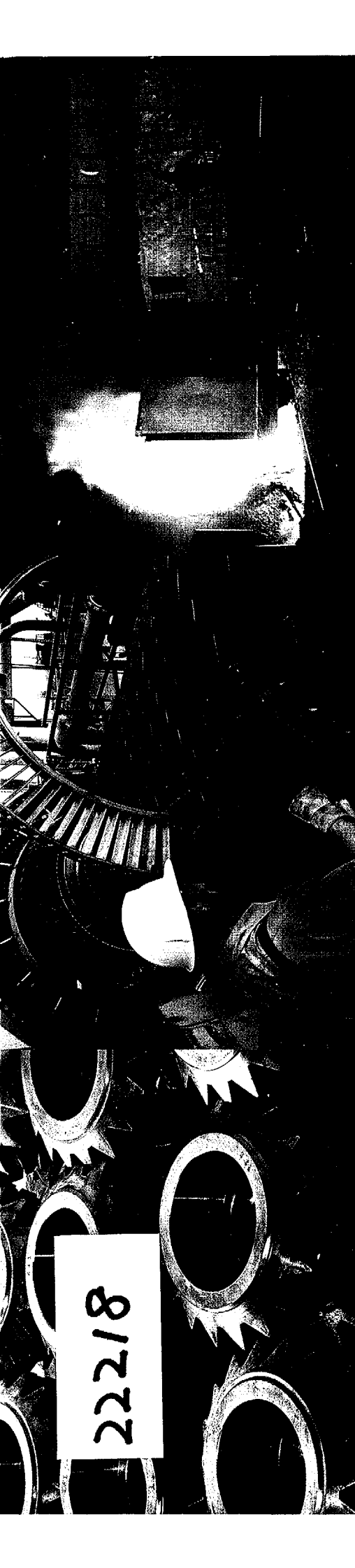
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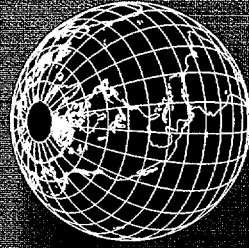


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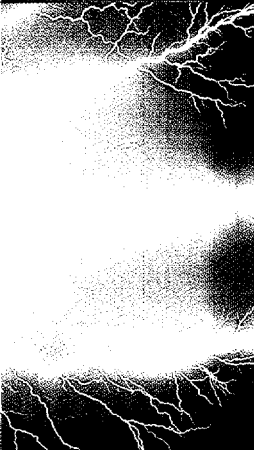
# UNIDO and climate change

## INDUSTRY AND THE KYOTO PROTOCOL:

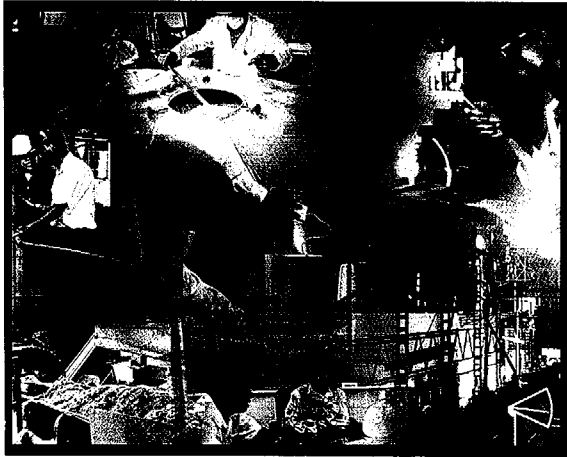
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# Introduction



The United Nations Industrial Development Organization (UNIDO) is the United Nations (UN) specialized agency given the task of promoting industrial development, mainly in the world's developing and least developed nations. UNIDO helps governments, business associations and companies solve their industrial problems.

UNIDO's work addresses three broad dimensions of industrialization:

- Competitive Economy;
- Sound Environment; and
- Productive Employment.

These "3E's" are the essence of UNIDO's services, intended to: enhance the competitiveness of enterprises and of the countries in which they operate (Economy); address and prevent ecological problems from industrialization (Environment); and stimulate the creation of jobs in the manufacturing sector (Employment).

Integration is now the key to the delivery of UNIDO's services. The Organization ensures that support rendered to client countries is provided in a complementary and coherent manner and leads to synergy at the level of

both the immediate and ultimate beneficiaries, be they enterprises, private and public support institutions, or ministries and other public bodies.

The drive for integration of UNIDO services reflects the urgent need to bring global considerations into the Organization's activities such as energy efficiency, cleaner production, investment promotion, quality control and standardization, and technology transfer.

Bringing the issue of climate-change into the mainstream of UNIDO's activities and combining it with well-tested approaches and methodologies pioneered by the Organization will both broaden the impact of its technical assistance projects and place it in a stronger position to assist the processes surrounding the Climate Convention. This approach is important as the mitigation of greenhouse gas (GHG) emissions and the formulation of climate-change policies and strategies are best addressed in an overall sectoral context, whether that be for industry, energy, transport or any other mitigation sector.

UNIDO has long been engaged in energy efficiency, industrial policy advice, cleaner production, technology transfer, industrial investment promotion, economic and financial evaluation of investment projects, and support for the implementation of international environmental

protocols and conventions. This experience places the Organization in a unique position to provide industrial sector technical support to assist the inter-agency capacity-building effort that is underway to enable developing countries to be in a position to benefit from the Convention processes.

This brochure highlights UNIDO's industrial sector work and experience that can be used in the design of climate-change programmes and projects. The Organization can assist Member States to strengthen their capacities to ensure a meaningful participation in the project-based Kyoto Mechanisms: the Clean Development Mechanism (CDM) and Joint Implementation (JI).

## The greenhouse effect

Atmospheric concentrations of greenhouse gases such as water vapor, carbon dioxide (CO<sub>2</sub>), nitrous oxide and methane affect the radiative heat balance and surface temperature of the earth. Unlike other pollutants, regardless of where greenhouse gas emissions occur, they are diffused throughout the atmosphere and have an impact everywhere. The concentration of CO<sub>2</sub>, which is responsible for over half of the greenhouse effect, has





been increasing in the atmosphere mainly due to burning fossil fuels and the destruction of forests. Considering present trends, the concentration of CO<sub>2</sub> is likely to double before the year 2100.

The effects of this increase on the global climate are estimated using complex computer models designed to simulate the present climate and its natural variations and to predict future changes, whether natural or man-made. Current best estimates indicate that a doubling of CO<sub>2</sub> would produce a rise in average global surface temperature of between 1 and 3.5 degrees centigrade. However, the predictions are sensitive to small changes in the properties of clouds and their influence on radiation. The treatment of these and other feedback mechanisms will have to be improved in order to reduce the uncertainties and provide firmer scientific guidance for remedial action. The oceans will almost certainly reduce and delay any global warming because of their capacity to absorb large amounts of heat and about half of the carbon dioxide emitted into the atmosphere. This may largely explain why it is not yet possible to obtain a clear signal that can confidently be ascribed to greenhouse warming rather than to natural climate fluctuations.

The GHG emissions that cause global warming can be controlled by means of reductions by "source" and removals by "sinks". The GHG sources include emissions from fossil fuel combustion, industry, and transport, while GHG sinks include storage in the atmosphere, uptake by ocean and by growing vegetation. GHG reduction projects therefore include afforestation, fuel substitution, renewable energy technologies, energy conservation and adaptation to climate change. In terms of technological options to limit greenhouse gas emissions, UNIDO addresses three main categories:

- Improvements in energy supply, cogeneration, conversion and end use by industries;
- Substitution of fuel by energy sources that are lower in greenhouse gas emissions; and
- Reduction of greenhouse gas emissions in non-energy related industrial processes.

Climate change became an international issue in 1979 at the First World Climate Conference. In 1988, the United Nations Environment Programme (UNEP) and the International Meteorological Office (IMO) set up the Intergovernmental Panel on Climate Change (IPCC). The

IPCC functions as an independent scientific and technical body to assess current knowledge on climate change, examine its environmental, economic and social impacts, and formulate responses and strategies. Its experts concluded that action to reduce the atmospheric concentration of greenhouse gases is urgently required even in the face of the scientific uncertainty concerning the extent of climate change impacts. As the IPCC noted, "The challenge is not to find a policy today for the next 100 years but to select a prudent strategy and to adjust it over time in the light of new information".

## The Climate Convention and the Kyoto Protocol

As a consequence of the IPCC conclusions, the United Nations Framework Convention on Climate Change (UNFCCC) was adopted in May 1992. Under the principle of common but differentiated responsibilities, the Convention sets out specific obligations for particular categories of states.

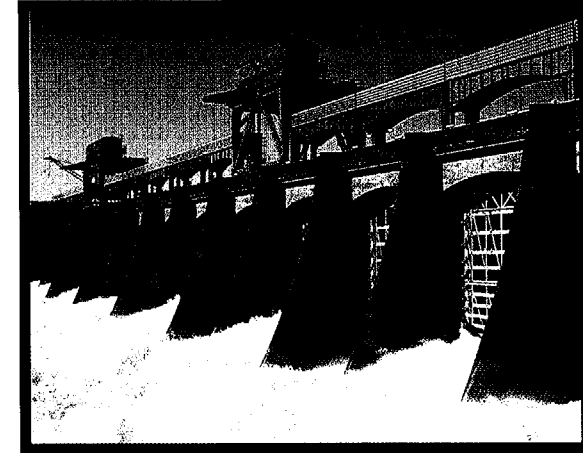
A further step in the evolution of the Climate Convention process was taken in December 1997 when the Kyoto

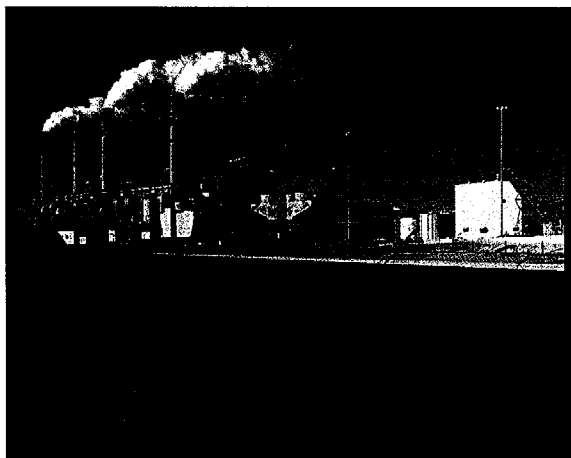
Protocol was adopted at the 3<sup>rd</sup> Conference of the Parties to the Climate Convention. The Protocol establishes binding emissions reduction and limitation objectives for Annex I Parties (OECD + Economies in Transition) with a view to achieving at least a 5 per cent aggregate reduction from 1990 emission levels in the period 2008 to 2012.

## Industry and climate change

The industrial sector is an incubator for entrepreneurial development and for the accumulation of human capital that propels developing nations from a low-income, predominately agriculture-based economic structure to an industrial one, a critical prerequisite for growth in productivity and GNP. Industrial employment and the income generated are vital for poverty alleviation and economic development in developing countries.

Energy is one of the driving forces of industrialisation but energy production and use is a major cause of pollution that includes greenhouse gas emissions. Industrial energy use in developing countries has risen more than fourfold over the last 30 years and improvements in energy efficiency have failed to keep pace with rising





manufacturing output. In many developing countries, there has been structural change in the manufacturing sector, away from traditional labour-intensive light manufacturing toward more energy-intensive production and processing of raw materials. Industry's share of energy consumption ranges from 27% in Africa to 38% in Latin America and 49% in Asia. A small number of raw materials processing industries account for most of this consumption, including iron and steel, non-ferrous metals, chemicals, non-metallic mineral products (cement, ceramics, glass, etc.), and pulp and paper. These sectors are also responsible for a large proportion of greenhouse gas emissions.

There is a large potential for the adoption of energy efficient technologies in developing countries as the role of manufacturing in the economy is expanding. For economies in transition, reduction in GHG emissions is closely linked with opportunities for industrial restructuring. The environment and, more specifically, climate change considerations are thus intrinsic to industrialization and industrial policy, validating the key role that industry should play in the mitigation of GHG emissions and in climate change abatement.

Industrialized countries are the largest emitters of GHGs, and they will continue to have the highest emission rates

per capita. Developing countries will, however, overtake the developed countries in the quantity of their emissions early in the next century, although per capita emissions in those countries will still be far lower. Under the principle of common but differentiated responsibilities, the participation of developing countries, and especially newly industrialising, rapidly growing economies, becomes crucial to any effective programme of GHG reduction.

The Kyoto Protocol provides a historic opportunity to address the impact that economic activity has on the environment and climate and to change the patterns of energy generation and consumption. There are, however, significant barriers to the implementation of the Protocol's objectives. These are largely economic and relate to loss of competitiveness, reduction in economic output and high abatement costs.

The abatement strategies and mechanisms of the Kyoto Protocol, once they become operational, should not jeopardise the developing countries' aspirations for economic growth and industrialisation. Rather they should provide opportunities for greater competitiveness and modernisation through the transfer of resources and technologies, and support the transition to an environmentally sound, energy-efficient development path. In this respect, the Protocol presents a window of



opportunity for both industrialised and developing countries to address a host of priority development issues, including trade imbalances, technology transfer, environmentally sustainable industrialisation and development financing.

The combination of mining activities, raw materials handling, and processing operations places the Cement and Lime industries among the category of industries with a major impact on the environment and climate.

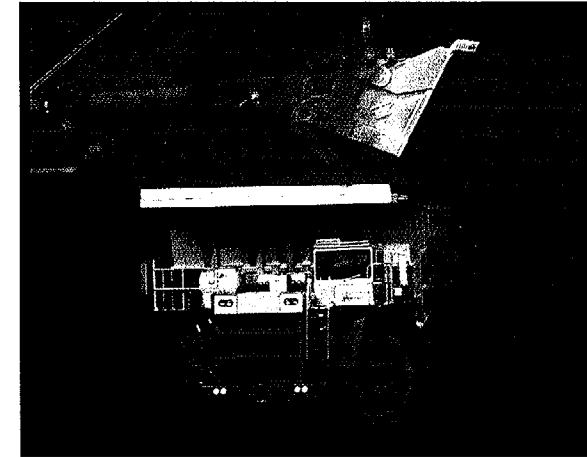
Large quantities of carbon dioxide (CO<sub>2</sub>) are emitted from these two closely linked industries, firstly by virtue of the nature of their raw materials, particularly calcium carbonate (CaCO<sub>3</sub>), which, through the decarbonation reaction, produces carbon dioxide. Secondly, the thermal energy required for decarbonation and clinkerisation (cement processing) is obtained from the combustion of a variety of fossil fuels that emit carbon dioxide.

Nitrogen oxides are also produced in the cement clinker burning process with high flame temperatures (about 2000 °C) in the sintering zone of the cement rotary kiln. Some sulphur dioxide (SO<sub>2</sub>) is also discharged through exit gases, from sulphur contained in both the raw materials and in the fossil fuels required for combustion.

Significant avoidance and/or reductions in climate-relevant emissions, particularly carbon dioxide from the cement/lime industries can be achieved at varying levels through: the efficient utilization and conservation, and/or partial replacement of carbonate raw materials by mineral waste materials which contain the main chemical constituents of cement; partial replacement of primary fossil fuels by secondary fuels; and partial replacement of clinker by interground additives and fly ash.

A combination of both raw material conservation and efficient thermal/electrical energy utilization constituted an integral part of UNIDO's technical assistance activities in some medium/large scale cement plants and small-scale lime production units in some developing countries, particularly in Africa.

A specific example was assistance to the Beni-Suef Cement Company in Egypt, which involved UNIDO in the commissioning and taking-over of a new plant from the Kobe Steel Company of Japan. Through guidance in the operation and maintenance of the plant, an absolute record in capacity utilization of any Egyptian cement plant was achieved, implying related efficient practices in the utilization of both carbonate raw materials and energy (thermal/electrical) and hence avoided carbon emissions through their conservation.



UNIDO's assistance in the modification of a small-scale demonstration lime kiln in Cacaveli, Togo resulted in a 300% increase in the output of the kiln, and a 50% reduction in the specific consumption of fuel-wood for combustion. Another good example of avoided carbon emissions through significant conservation of carbonate raw materials, and important savings in thermal energy requirement through improved kiln firing methods.

# UNIDO and the Climate Convention/ Kyoto Protocol



UNIDO has embraced sustainable industrial development as the key principle in assisting its Member States to develop and promote a dynamic and competitive industrial sector. UNIDO also recognises the urgent need for global action for climate change abatement and the key role of the industrial sector in greenhouse gas emissions control. Co-operative approaches are needed to devise the most effective and efficient solutions. UNIDO believes that the problem should be addressed in the context of enabling its Member States to exercise their right to industrial development, which is a sine qua non for poverty alleviation and economic development.

UNIDO sees its role as essentially that of assisting developing countries and countries with economies in transition to realise their aspirations for sustainable industrial development and economic growth while addressing the challenge of global warming. This can be achieved by making use of the opportunities for co-operation with industrialised countries that are presented by the market-based mechanisms of the Kyoto Protocol. As international co-operation on the scale envisaged by the Protocol is unfamiliar to the majority of UNIDO's constituency, many Member States will require technical assistance and support to operate its Mechanisms.

The Mechanisms established by the Kyoto Protocol, particularly the Clean Development Mechanism (CDM), provide new incentives for industrialised countries to transfer environmentally sound technologies to the developing world. Prior to the acceptance and use of these Mechanisms by the Convention Parties, however, a host of methodological and institutional issues need to be resolved. The Buenos Aires Plan of Action – the major output of the 4th Conference of the Parties, held in November 1998 – sets out a two-year work programme for the resolution of outstanding issues, most of which concern the Kyoto Mechanisms.

UNIDO support to its Member States to utilise the opportunities for sustainable industrial development offered by the Kyoto Protocol requires the Organization to focus on the industrial development aspects of the Buenos Aires Plan of Action concentrating on the following four areas of engagement:

- Methodological aspects of project identification/development;
- Transfer of climate relevant technology and information;
- Capacity-building/training; and
- Policy advice.

The remaining sections of this brochure will provide a review and analysis of these issues, linking them to the activities that have been undertaken by UNIDO on its own or in cooperation with other United Nations system organizations in support of the participation of non-Annex-I countries in CDM and JI.

## **a) Methodological aspects of project identification and development**

The CDM offers numerous opportunities for investing in GHG abatement in industry in developing countries. However, emission reductions generated in the context of such projects only count if they are “real, long-term, measurable and additional.” These are the conditions for awarding a project CDM status.

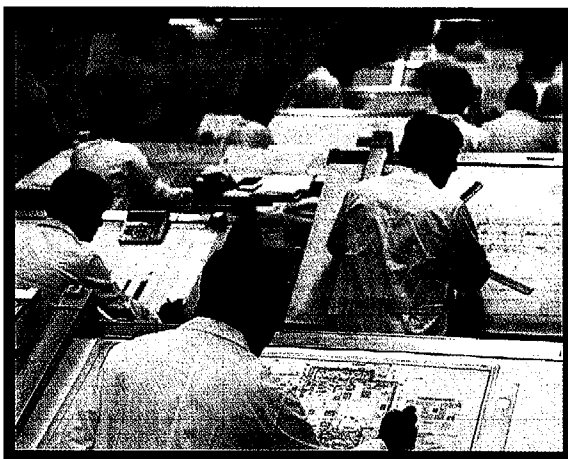
The identification and design of CDM projects may be hindered by a lack of understanding of and agreement on such methodological issues. To yield emission reductions that could be recognized as additional, projects have to have a clearly defined, unbiased baseline. This is notoriously difficult to establish, as it involves a decision on what would have happened to the facility in the

absence of CDM investment. Moreover, an activity proposed in the context of a CDM project should be additional to the established baseline. Given the complexity of this exercise and its cost in terms of data collection and analysis, there is a need for a clear set of standardized guidelines and tools for baseline setting for industrial projects. This will enable consistency and transparency of project design across project types and sectors and will enhance credibility of the project with stakeholders.

There are several approaches to baseline setting that broadly fit into three categories:

- “Top-down” (e.g. allocations based on establishing a baseline for an entire sector);
- Project specific (estimated for each individual project); and
- Standardized (defined as benchmark, default technology, or technology matrix).





To assist in examining the issue of baselines for industrial projects, UNIDO will study possible options through a pilot project in the cement sector.

The main objective of the project is to increase the availability of technical, economic and environmental data for the sector that can be used within a set of industry-wide technology matrices. The matrices will be used to test the application of project and sectoral baselines and their usefulness for computing the potential for reductions in greenhouse gas emissions for projects under the Clean Development Mechanism (CDM) and Joint Implementation (JI).

In order to develop the matrices, the project will undertake developing and emerging economy country field studies and will generate inventories of current installed cement technologies, as well as tables of national emissions averages for the sector in 14 countries.

The same study will also assess various approaches to analyzing project baselines and other ideas in project design such as the determination of system boundaries, leakages and spill over effects for projects in energy efficiency in industry and power generation. It will also provide a comprehensive review and analysis of the monitoring, reporting, verification and certification

issues, aiming at contributing to standardization of approaches and methodologies to ensure accuracy in germination of the impact of project activities on GHG reduction as well as their non-GHG socio-economic impact. The study will provide case-study illustrations of baseline setting method for each type of industrial CDM projects, drawing on AIJ and other experiences.

The final objective of the study is to bring the above elements together into a set of methodological guidelines on baselines setting for industrial projects, with particular emphasis on case studies and illustrations from the AIJ experience. A software tool that will enable project developers to perform financial and economic appraisal of CDM investment options and estimation of project baselines and additionality will supplement the guidelines.

## b) Transfer of climate relevant technology and information

Developing countries are undergoing industrialization – a period when basic infrastructure development is occurring to support economic growth. This requires the intensive use of energy, and consequently, energy consumption in developing countries has, on average, been growing by 5.5 per cent per year in recent years<sup>1</sup>. Very efficient energy technologies have been available in the developed countries for many years (e.g. for the production of energy-intensive basic materials) that could be used to support the industrialization efforts in developing countries.

Huge investments in infrastructure and industry are expected to be made in these countries over the next several decades, and this will have a lock-in effect on both global emissions and local environmental impact for many years to come. If these investments push industry in developing countries along the same path of energy use, GHG emissions will escalate. From the perspective of global warming it is therefore important to focus international technical assistance on transfer of advanced industrial technologies to developing countries.

Transfer of technologies requires careful planning, appropriate funding and extensive follow-up. It also requires an absorptive and adaptive capacity as well as a legal and regulatory framework, which at present are lacking in many developing countries. It has been widely recognized in the literature on the subject that there exist certain barriers that are particularly related to the transfer and application of clean technologies. Developing countries are concerned about their lack of technological and management capacity, low inflows of technology and related financial resources. Developed countries and economies in transition seem to be more concerned about barriers that restrict technology transfer and investment. Both groups agreed during COP4 that there is an urgent need to create an 'enabling environment' in advance of the operations of the Kyoto Protocol Mechanisms.

For developing countries this will require urgent attention to a range of capacity building measures that will identify and eventually remove barriers to the transfer of environmentally sustainable technologies. As one resolution states "...priority should be given to the need to build capacity in developing countries, to identify and analyse technology and technology information needs and technology transfer..."<sup>2</sup>



1 Levin, M. (1997), "The Role of Energy Efficiency In Reducing Growth in Global Energy Use and GHG Emissions: A Regional and Sectoral Analysis", ABARE Outlook 97 Conference, February 1997.

2 Decision 4/CP.4, item 7 (Buenos Aires Plan of Action)



## Technical capacity

Industry is regarded as one of the key mitigation sectors by a vast majority of the countries participating in a recent survey conducted for the UNFCCC Secretariat mentioned above<sup>1</sup> on the technology and technology information needs of the non-Annex II Parties. However, little attention has been given so far to the specific needs of the industrial sector in developing countries as regards climate-relevant technologies or consideration given to the institutional and structural characteristics of industry in those countries.

For example, small and medium industries face higher transaction costs with regard to access to and the assessment of technology-related information as well as higher abatement costs than larger plants. Because of the non-competitive and fragmented market structures typical of developing countries, it has not been profitable for market intermediaries to develop in order to arbitrate on energy efficiency or climate-relevant technology options.

The above highlights the importance of developing integrated programmes of technology transfer that include technology information, methodologies and tools for technology assessment, and investment-related support

services. Such integration has not been sufficiently addressed in most technology transfer or information-based programmes. UNIDO attempts to bridge this gap by developing and implementing programmes and projects dealing with the transfer of climate-relevant industrial technology that are built on linking technology transfer with mitigation and adaptation policies and strategies with the following possible steps:

- Assessment of mitigation needs, opportunities and climate-relevant technologies for industry (i.e., screening of mitigation and adaptation needs, inventory and screening of climate-relevant technologies);
- Assessment of technological options and selection of technology (i.e., detailed comparative evaluation of technical specifications, economic and technical feasibility, environmental benefits and other benefits (and costs) of technological options);
- Assessment of institutional capacity (building alliances and networks of various stakeholders) and governance capacity (ability to develop, implement and enforce policies and strategies related to the objective of reducing GHG emissions in industry);

<sup>1</sup> Survey of Environmentally Sound Technologies under the Climate Change Convention: Survey of Experiences, Needs and Opportunities among the Non-Annex II Countries", IVAM, 1998.

- Development of integrated technology transfer programmes (i.e., programmes that will include regulatory and policy framework, knowledge management and technology assessment tools and methodologies, institutional capacity building, financial and technical assistance related to the needs of industry with the objective of reducing/ attaining a lower GHG emissions path of industrial production).

For many countries, coal is the most cost-effective energy resource, but coal combustion is a major source of greenhouse gas emissions as well as a cause of local and regional air pollution. UNIDO is promoting the use of clean coal technology, such as increased application of coal beneficiation, gasification and fluidized bed combustion, which increases operating efficiency and reduces emissions.

China is an excellent case in point, for coal has always been China's primary energy resource, and yet poor coal quality and the lack of sufficient emissions control technology have led to inefficient coal combustion, wasted resources, high levels of pollution and serious health problems. It is not surprising that some enterprises have turned to imported fuel as an alternative.

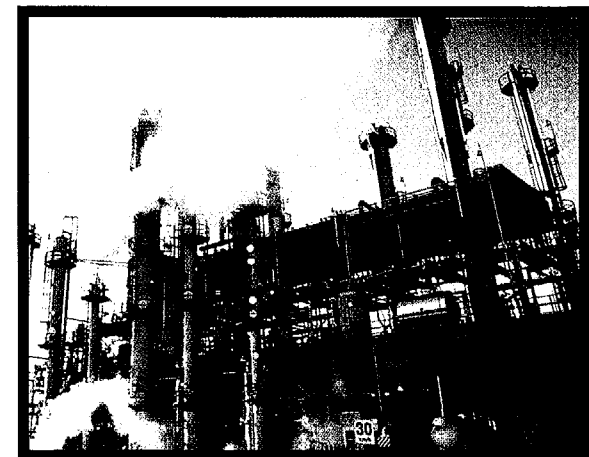
UNIDO offered an interesting solution: the development of circulating fluidized bed combustion (CFBC) technology.

## Information capacity

The survey showed that developing countries vary greatly in terms of capacity for assessment of their climate-relevant technology and technology information needs. Decision-making on environmentally sound technologies appears to be constrained by the lack of information, and hence all sources of information are

Circulating fluidized bed combustion boilers provide an efficient and cost-effective way of meeting the rapidly growing energy needs of China's industry while limiting atmospheric emissions and optimizing the use of national energy resources. UNIDO has been working with China to develop capacity to design and manufacture a first generation of CFBC boilers of 10 to 100 MW.

The use of CFBC technology reduces emissions of greenhouse gases and other atmospheric pollutants and enables boilers to operate at greater efficiency, thereby reducing the volume of coal needed. The Dalian Chemical Industries Corporation in Liaoning Province was among the first to install CFBC boilers with the help of UNIDO. The company achieved annual savings of some US\$ 360,000 by replacing imported boiler fuel oil with cheaper domestic coal.





needed <sup>1</sup>. According to this survey in terms of types of information, there is a need for inventories of technology options of suppliers, comparative assessment of alternative technologies, inventories of policy options and inventory of financial institutions.

The need to improve existing technology information centres and networks has been a recurring subject of discussions at past consultations of the Parties to the UNFCCC and sessions of SBSTA and SBI. The above-mentioned survey identified some 127 national technology information centres, but at the same time 40 per cent of respondents did not report the existence of such centres. The survey concluded that there is currently no single international centre capable of addressing all sectors and providing a full range of services to all users <sup>2</sup>.

This suggests that while many such centres already exist, access to them still needs to be improved. New centres may have to be created to address the needs of countries with no regional, national or local centres and no access to international networks. Submissions by the Parties to SBSTA <sup>3</sup> highlight the need for developing options to enhance the capabilities of existing technology information centres and networks, pointing out that many such centres have already been established.

<sup>1</sup> There is also a need for more information on financing opportunities for the transfer of climate-relevant technologies as well as a certain reluctance to consider information from vendors and suppliers.

<sup>2</sup> FCCC/SBSTA/1997/10

<sup>3</sup> FCCC/SBSTA/1998/MISC.51

UNIDO sees information activities as an integrated component of technology identification assessment and selection, rather than stand-alone 'static' services. UNIDO's experience shows that access to information per se is a necessary but not a sufficient condition for effective transfer of technology. To ensure the selection of an appropriate technological option decision-makers in industry require experts, tools and methodologies for technology assessment, as well as endogenous capacities for utilizing them.

### **Technology services and centres**

There are a number of technology-related services required for the operation of technology transfer mechanisms. Such services are best available nationally, not regionally or internationally, but regional or international centres may provide input to the processes.

UNIDO's experience covers a number of areas such as technology management, commercialization of technologies, creation of new technology-based enterprises, promotion of new generic technologies, and strengthening international, regional and national innovation systems.



- Examples of technology centres established
  - Centre for the Application of Solar Energy (CASE) in Perth, Australia;
  - International Centre for Small Hydro Power, in Hangzhou, China;
- Examples of energy and environmental networks established
  - National Cleaner Production Centres (NCPC) programme in co-operation with UNEP (currently 14 countries worldwide);
  - Environmental Technology Advisory Centre and Network (ETAC) in the Philippines;

UNIDO is seeking to develop the technical capacity of national sources of expertise and to interlink them into national and regional knowledge networks. These networks will provide the level of support and knowledge needed for industry to benefit from the Convention and the Protocol while pursuing their path of sustainable industrial development.

#### **The Knowledge Network for Industrial Technology Transfer (KNITT)**

KNITT facilitates the development and application of new knowledge to 'enable' industrial activities under the project-based mechanisms of the Kyoto Protocol in developing and transition economy countries. KNITT consists of inter-linked national networks each supporting the application of locally relevant knowledge to the processes of assessment, transfer, adaptation, adoption and diffusion of industrial greenhouse-gas mitigation technologies in their countries. KNITT is supported by and draws upon the knowledge and expertise available to network members in the more developed countries.

UNIDO's experience and know-how in technology transfer has been consolidated in several manuals and guidelines such as the "Manual on Technology Transfer Negotiations", "UNIDO BOT Guidelines" and "Principles of Technology Monitoring at the Enterprise Level".

UNIDO proposes to build upon its strengths with technology transfer, technology centres and networks to support the climate change and the Kyoto protocol processes. In doing so, the Organization will concentrate on the provision of integrated sets of services drawing upon appropriate programme components. UNIDO will





bring its wide experience in and knowledge of industrial and technology issues to the table to assist its Member States to benefit from the expected increases in technological and financial flows arising from the Kyoto Mechanisms.

### **c) Capacity-building/training**

Capacity building in relation to climate change and industry is understood by UNIDO as strengthening the ability of industry and its support institutions to devise and implement solutions to the challenge of GHG emissions reduction as part of a wider effort to achieve sustainable industrial development.

UNIDO will help with strengthening and building national institutional and know-how capacities for introducing, managing and monitoring programmes and projects. This will also provide a framework for assisting the recipient country to meet its obligations under the UNFCCC and to make full use of market-based opportunities opened to it by the Kyoto Protocol.

Creation and maintenance of strong institutional (governmental institutions, NGOs, business organizations,

confederation of industries, academia), training and human resource capacity (i.e., technical and managerial skills) for developing and implementing a mitigation policy and strategy for industry, is key to the success of the climate change initiative, globally as much as locally. Contacts with industry and its representatives in recipient countries have shown that UNIDO Member States will require technical assistance and support in augmenting their capacities to identify and formulate industrial GHG-mitigation projects and to operate the Kyoto Mechanisms.

Capacity building for implementation of the Kyoto Mechanisms will constitute the major part of the present work programme for UNIDO services. The CDM has an explicit mandate to authorize transactions starting in the year 2000 and hence 1999 should be devoted to preparatory activities that could enable African and other vulnerable developing countries to compete for programs projects within the framework of a market-driven mechanism. Given this time frame, the exhaustive list of the capacity building needs for industry and the lead-time for energy efficiency projects, UNIDO's effort in this area will be focused on assisting potential CDM host countries with developing a national work programme for building institutional and technical capacities for CDM.

Following a request to UNFCCC from non-Annex-I countries (developing countries) for a comprehensive plan for technical assistance to facilitate capacity-building for participation in the Kyoto mechanisms, UNFCCC, UNCTAD, UNDP, UNEP and UNIDO combined their efforts to develop an inter-agency project on capacity-building for the Kyoto mechanisms. The proposal was submitted for funding to the United Nations Fund for International Partnerships (UNFIP) early 1999, and a subset of the project activities and the funding proposal itself were approved. UNFIP will thus provide initial financing of 1.5 million dollars, and additional funding is being sought by UNFCCC.

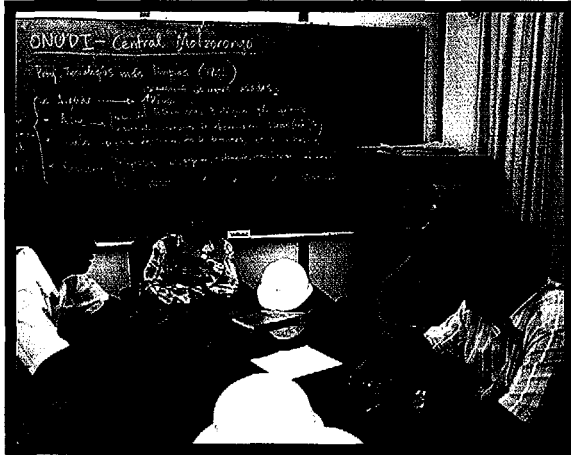
The aim of the project is to provide support for building and/or strengthening the capacities of national stakeholders in priority mitigation sectors and in lead institutions and organizations governing and facilitating international cooperation for climate-change mitigation and national climate-change programmes and projects.

Specifically, the project will provide technical assistance for the identification and design of potential CDM projects and for strengthening national investment promotion mechanisms and systems to enable CDM host countries to identify potential partners for GHG mitigation projects that will yield transferable emissions reduction units.

UNIDO will contribute to the implementation of these objectives by providing training in the financial and economic appraisal of CDM investment opportunities and in methods of baseline and additionality assessment. Using its methodologies and expertise, UNIDO will assist participating countries in the identification and design of CDM projects in industrial end-use energy efficiency and in the subsequent promotion of these investment opportunities through its network of investment promotion services (IPS) around the world. UNIDO's IPS offices will present projects identified as CDM investment opportunities to potential investors and will link national offices with the UNIDO international investment promotion system.

The project will facilitate learning-by-doing in applying project formulation methodologies and in building national capacities for CDM investment promotion and project identification and design. It will also help to reduce the transaction costs that are associated at the initial programme design phase with the identification and formulation of projects, national and international screening, registration and approval, and at the implementation stage with monitoring, reporting, evaluation, verification and certification.





UNIDO's inter-disciplinary and sectoral nature makes it possible to advance coherent policy recommendations on energy efficiency and to help ensure that objectives and modalities of global cooperation for climate change abatement are present in national economic policies. Therefore, policy dialogue with representatives of industry and its governing institutions and objective analysis of policy and operational issues involved in the implementation of the Convention and the Protocol are the first steps towards developing technical assistance programmes and projects. In carrying out these programmes and projects, UNIDO seeks to work with various stakeholders at the national level (industrial associations, NGOs, government offices, academia, etc.) and in close cooperation with other international organizations and UN agencies and programmes. It carries out its climate change abatement programmes and projects at the country level through the unified office of the UN Resident Coordinator.

Operationalizing the Kyoto Mechanisms depends not only on the availability of clear guidelines, technical knowledge and expertise but also on a set of institutions that can ensure that the application of the methodology is technically correct and that keep administrative procedures transparent, simple and honest. Building and/or strengthening institutional capacity for the

implementation of the Kyoto Protocol projects with a view to minimizing transaction costs and facilitating project operations is an area of focus for UNIDO.

UNIDO views its extensive experience in developing institutional infrastructure for industrial governance and environmental management in developing countries as a relevant foundation on which assistance to its Member States in establishing the institutional framework necessary for cooperative implementation of GHG abatement can be based.

Moreover, UNIDO's experience (as an implementing agency under the Montreal Protocol in helping Member States to establish national ozone offices; in setting up and upgrading investment promotion agencies and maintaining a network of Investment Promotion Offices; and in helping national and regional certification and accreditation bodies achieve international recognition) can also be used to help the recipient countries create the institutional capacity needed to support CDM operations.

### **Special needs of Africa**

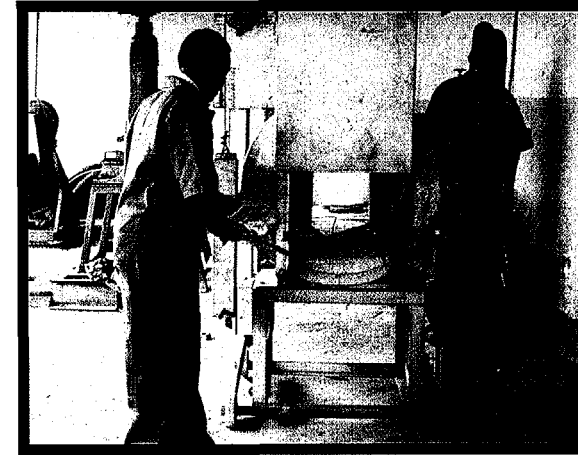
The African perspective on the Kyoto Mechanisms for climate-change abatement stems from the continent's

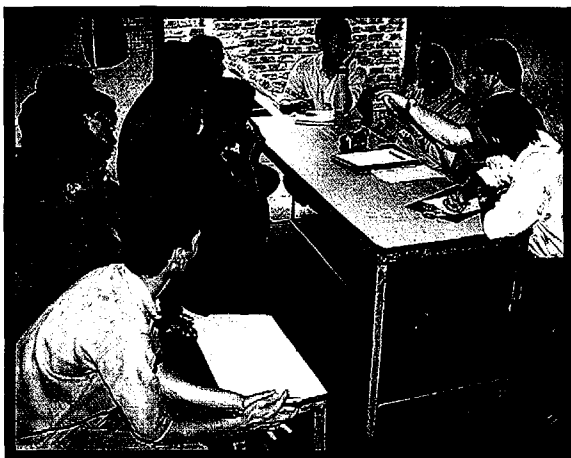
priorities with regard to sustainable economic and social development. In practical terms, the primary objectives of sustainable development in Africa are: the eradication of poverty; industrialization and economic growth; and environmental management. In developing strategies to achieve these primary objectives, African countries will continue to depend at least partially on external assistance in the short and medium term. The Kyoto Mechanisms, particularly the CDM, are seen thus far in the African context as tools for advancing the broader objectives of sustainable development. The participation of Africa in global cooperation for climate-change abatement cannot be conceived outside of this broader developmental context.

Many countries in Africa presently have visions of becoming newly industrialized countries (NICs) early this century. While emissions reduction is not currently a priority of the majority of African countries, following a cleaner production path could result in the avoidance of future emissions and, more importantly, in sustainable industrial development. The CDM could be a tool for achieving such visions. African Member States have developed a keen interest in the CDM and would like to see it succeed on the continent where AIJ failed to get started.

Ensuring that the CDM serves the purposes of African countries will require a careful balancing of different sets of priorities and maximizing the environmental and equity objectives at the same time. This implies the broadening of African participation through programmes and projects that address the mitigation of future emissions by utilizing cleaner, energy-efficient technologies and renewable sources of energy. Africa's current status as a net carbon sink will constitute an obstacle to hosting CDM mitigation projects. The criteria for CDM projects in the African context will therefore have to consider the additionality of the benefits of projects to the objective of sustainable industrial development as well as in relation to emissions reduction.

At COP4, a group of African countries stressed that the infrastructure and economic situation of several African countries are too weak to enable them to get actively involved in the project-based emissions trading through the CDM. Efforts therefore should be made to improve Africa's ability to host CDM projects. In this regard, UNIDO will continue focusing on the special circumstances of Africa in its work on the implementation of the Kyoto Mechanisms.





As a first step towards developing national work programmes for building institutional and technical capacities to support Clean Development Mechanism (CDM) and technology transfer activities, UNIDO is undertaking a preparatory project for sub-Saharan Africa countries.

The project will firstly provide an overview of what has been undertaken to support industry interests in relation to the Climate Convention in six African countries (Ghana, Kenya, Nigeria, Senegal, Zambia and Zimbabwe). It will also identify potential support institutions and capacity deficiencies as well as prepare indicative industrial sector technology and technology information needs.

On the basis of the studies, a framework/template for preparing national (industrial) capacity building project documents will be developed, indicating the full range of capacity and supportive policies needed to provide the 'enabling environment' that will be required for industrial CDM projects.

The second phase of the project will see the application of the framework in the same six countries in the preparation of detailed country-specific capacity-building project documents for submission to the Global Environment Facility. The third phase will be the implementation of measures identified through phases 1 and 2.

Phases 2 and 3 will be replicable for other countries in the region.

UNIDO sees its role in Africa as focused mainly on building national capacities for operating the CDM as a policy tool for meeting the objectives of the UNFCCC and national developmental goals. To that end, UNIDO is prepared to offer technical assistance and technical expertise in industrial pollution and waste management and to help the continent to bring about relevant industrial policy changes to ensure greater efficiency in the use and generation of energy. UNIDO sees itself as a partner of the private industrial sector in facilitating its integration into the UNFCCC and Kyoto Protocol process through awareness-raising and capacity-building measures (including capacities in the methodological aspects of CDM project identification and development). Considering that the major source of capital for energy-related infrastructure investment in Africa is the private sector (foreign and to some extent domestic), UNIDO views its programmes and services in investment promotion and international partnership-building as relevant to assisting Africa to achieve its environmental and development objectives under the CDM.

## d) Policy advice

UNIDO's climate-related policy level assistance addresses the needs of the Parties to the Climate Convention and Kyoto Protocol as well as the Operational Programmes of the Global Environment Facility (GEF), which includes the removal of barriers to energy efficiency and the accelerated introduction of renewables and other low GHG-emitting energy technologies.

This assistance is implemented in two steps:

- In order to assess the need for improvement of energy use in industry, UNIDO first conducts an assessment review and analysis for each energy intensive industrial sub-sector. This will identify market imperfections that obstruct the implementation of energy efficiency projects and programmes and suggest an appropriate mix of economic and regulatory policy instruments that can be used to overcome such obstacles;

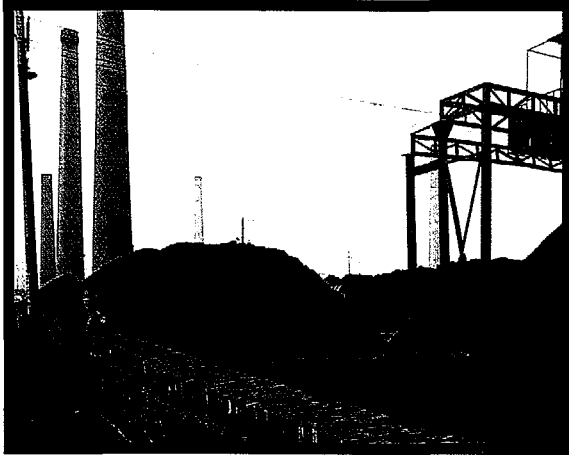
### **Sectoral assessment studies for the industrial sector**

A set of sectoral studies will be carried out focusing on assessment of emission baseline scenarios and GHG mitigation options for energy-intensive industrial sub-sectors (building materials, iron and steel, chemicals, pulp

and paper, glass industry). Barriers to greater energy efficiency, transfer of low-emission technologies, and energy-efficiency investments will also be examined. Special attention will be paid in the studies to the formalization of national mitigation strategies, policies and options for the industrial sector. Broader assessment of social and economic impacts of GHG mitigation in industry and the potential contribution of CDM mitigation projects to sustainable development will also receive attention.

- The second step is to assist a government or institution of the recipient country in developing and implementing an energy efficiency and CO<sub>2</sub> minimization programme at the national or sectoral level. This will help to achieve energy savings, thereby bridging the gap between energy demand and supply and address greenhouse gas emissions and climate change, broader national and global environmental concerns. Based on a careful assessment of energy use in industry, UNIDO can support its Member States in designing a strategic framework within which specific needs of energy intensive sub-sectors can be addressed. Such a strategic framework will be based on an understanding of the energy conservation potential of different technological options taking into account the existing and evolving macro economic context.





The assistance might include:

- a) Marginal energy efficiency improvements in existing plants (a strategy which is central to traditional policy-induced energy efficiency efforts). UNIDO could identify technological winners and ways to finance their utilization. Approaches driven by standards and regulatory efficiency will also be explored as well as voluntary agreements and labelling schemes;
- b) Production of qualitatively better products with lower energy intensity in production and use. Competitive market structures and effective regulatory regimes that recognize quality and performance standards produce this outcome. It requires the implementation of market-based reform initiatives, improving the skills of regulators, industry managers, technology developers as well as consumer education; and
- c) Stimulating technology transfer and R&D in appropriate renewable energy technologies and energy efficient industrial technologies. This outcome requires government intervention to eliminate or reduce subsidies to fossil fuels, remove restrictive import barriers and give priority to institutional R&D capacity.

**Energy conservation and greenhouse gas emissions reduction in Chinese Town and Village Enterprises (TVE).**

Chinese TVE consist of community enterprises owned by townships and villages, multiple cooperative enterprises, joint ventures and individual private enterprises. In 1995, there were about 22 million TVE in China, employing 129 million people.

The coke making, brick, cement, and metal products TVE industries provide more than half of total Chinese output of these products. They also account for one sixth of China's total emissions of CO<sub>2</sub>. Their average relative energy consumption is 30% to 60% higher than state-owned-enterprise sector. The quality of their products is low leading to additional energy inefficiencies in product use. TVE are major contributors to local air and water pollution and health hazards for employees. Of total energy consumption, 20% is in the form of, largely coal-based, electricity, 10% as fuel oil and 70% in direct coal combustion.

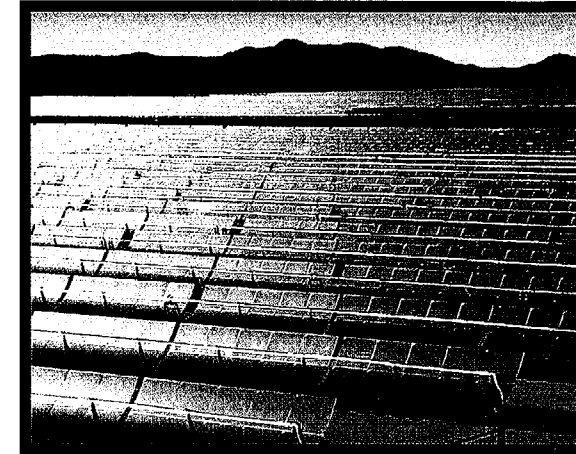
A project funded by the GEF has been designed by UNIDO to reduce greenhouse gas emissions in China by removing barriers to the increased utilization of energy efficient technologies and products in these 4 TVE industries. The project addresses key barriers to the production, marketing and utilization of energy efficient technologies and products.

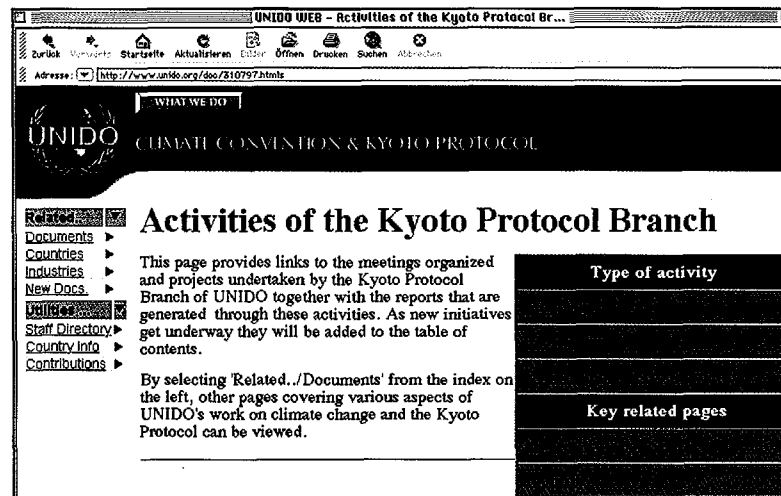


Slowed growth in rural China in the 1990s, no apparent incentives for local officials to alter their established investment priorities and increased pressures on available funds for economic development means that investments, not characterized by immediate returns and expansion of jobs, are not being favored by local managers or officials. In developed countries attention is now paid to innovative measures that lower the transaction costs of doing business instead of those that primarily reduce production costs. The process that leads from technology assessment through project negotiation and financing to implementation and, adaptation and replication, requires that a rich array of niche organisations (firms and inter-firm groups) are available to service productive capacity.

The project will establish the institutions and institutional framework to remove barriers to energy efficiency investment. It will then pilot this 'barrier removal' framework to remove policy and project-level barriers in eight TVE. Energy efficiency and product quality improvement investments (funded almost entirely by commercial sources) will demonstrate both the effectiveness of the framework to potential investors and the energy efficiency improvements to the TVE. Finally the project will facilitate the national replication of energy conservation measures in the 4 TVE industries, resulting in annual savings of greenhouse gas emissions of 56 M tonnes.

At the county/township level, the barrier removal framework establishes incentives and monitoring systems strengthening ongoing efforts to enforce relevant existing laws and regulations. Under this framework, the approval of dedicated funding from project resources is made conditional to the removal of pre-defined policy barriers. At the central level, the project establishes an infrastructure for project support, control and replication which is to be maintained throughout the duration of the project.





The above screen shows the main Web page of UNIDO's Kyoto Protocol Branch (URL <https://www.unido.org/doc/310797.html>) that provides a quick, hyperlinked, reference to the various activities of the Branch.

To go directly to the types of activity listed in the Branch index select the following URLs:

**Meetings**

(<https://www.unido.org/doc/310795.html>);

**Projects**

(<https://www.unido.org/doc/310793.html>);

**Report & other documents**

(<https://www.unido.org/doc/310794.html>).

To go directly to the key related pages listed in the Branch index select the following URLs:

**Kyoto Protocol Service Module**

(<https://www.unido.org/stdoc.cfm?did=31>);

**Identify**

(<https://www.unido.org/doc/310660.html>).

Additional Branch activities will be added as the programme develops.

The mention of company names or commercial products does not imply that any such company or product is endorsed or recommended by UNIDO.

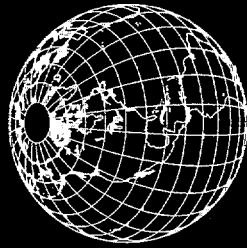
The "UNIDO and climate change" brochure was prepared by the Kyoto Protocol Branch of UNIDO.

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Industrial Development Organization

## List of abbreviations

AIJ	Activities Implemented Jointly
BOT	Build-Operate-Transfer
CaCO <sub>3</sub>	Calcium Carbonate
CASE	Centre for the Application of Solar Energy
CDM	Clean Development Mechanism
CFBC	Circulating Fluidized Bed Combustion
CO <sub>2</sub>	Carbon dioxide
COP4	Fourth session of the Conference of the Parties
ETAC	Environmental Technology Advisory Centre
GEF	Global Environment Facility
GHG	Greenhouse Gas
GNP	Gross National Product
IMO	International Meteorological Office
IPCC	Intergovernmental Panel on Climate Change
JI	Joint Implementation
KNITTT	Knowledge Network for Industrial Technology Transfer
NCPC	National Cleaner Production Centres
NGO	Non-Governmental Organization
NICs	Newly Industrialized Countries
OECD	Organization for Economic Cooperation and Development
R&D	Research and Development
SBI	Subsidiary Body for Implementation
SBSTA	Subsidiary Body for Scientific and Technological Advice
SO <sub>2</sub>	Sulphur Dioxide
UN	United Nations
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNIDO	United Nations Industrial Development Organization



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