



Private capital plays a major role in the transfer of environmentally sound technologies to industrial enterprises of all sizes in the developing world.

*Finding the money to pay for environmentally sound technologies (ESTs) is a critical issue. It is a problem for smaller enterprises in the industrialized economies, especially as they shift their focus to cleaner production. It is also a major challenge for companies of all sizes in the developing countries, and one which is inextricably linked to the issue of transferring technologies. Various solutions have been proposed to overcome the funding gap, and finance is available, but the gap remains worryingly large.*

Finding the finance for ESTs – for both pollution control and cleaner production – is a major problem for developing countries. The market for ESTs generally is still in its infancy, and the United Nations Commission on Sustainable Development (CSD) has noted that “projects or transactions specifically geared toward the transfer of ESTs are few and far apart”. In fact, the majority of ESTs are being transferred, and funded, within the context of large infrastructure projects, rather than to small and medium-sized enterprises (SMEs), even though such enterprises make up a big part of the industrial sector.

Companies in developing countries face even bigger obstacles when it comes to financing cleaner production approaches. Cleaner production is either unknown, or not yet considered a viable approach to local industries’ acute and chronic pollution problems. This is partly because very few countries have demonstration projects to show what can be achieved. Another problem is that the return on investments in cleaner production can take time and often companies (particularly SMEs) do not have the financial flexibility to wait for such a return. Additionally, the loans needed by many companies are simply too small to interest the major lenders. Programmes can also be put off course by economic and social policy decisions, such as subsidized prices of energy, raw

materials or products, and support for uneconomic, and often polluting, enterprises. Weak environmental legislation (if it exists) and weak enforcement compound the problem.

The CSD has proposed a range of solutions, including more use of international capital flows, foreign direct investment, privatization, public-private partnerships, financial intermediaries, build-operate-transfer arrangements, venture capital funds and leasing arrangements. Funding is also available through the World Bank and other financial institutions, intergovernmental organizations and individual donor governments.

## What is the cost?

According to the World Bank, the costs of introducing ESTs can be high; sometimes too high, especially for small companies. Certainly, industries and companies in developed countries have invested huge sums in pollution control and – increasingly – prevention, and continue to do so. Capital investment in pollution abatement accounted for about 5 per cent of total industrial investment in Germany, Japan and the United States in the late 1970s and early 1980s, and had risen to as much as 17 per cent in Japan in the early 1970s.

But the World Bank says that the burden need not be as heavy for industries in developing countries, at least for large plants, because emissions can often be reduced significantly at

no extra cost by installing technologies already in common use in industrialized countries. In fact, industries in developing countries have the advantage of making new investments, rather than replacing old equipment. Because it is difficult, sometimes impossible, to accommodate basic changes in production processes in existing plants, industrialized countries have tended to control emissions mainly by adding on technologies. But when a new plant is being built it is usually more cost-effective to adopt cleaner production processes that recycle residuals or generate less waste.

Ideally, end-of-pipe controls will be utilized less in developing countries as their industrial sectors expand, because each new investment provides the opportunity to incorporate cost-effective cleaner production technologies enabling them to leapfrog narrow, end-of-pipe approaches. Low-waste processes combined with end-of-pipe controls should allow developing countries to reduce emissions from large industrial plants, while expanding output, at lower costs than those incurred by industrialized countries.

The cost of end-of-pipe and in-plant controls to reduce emissions and effluents, and to implement cleaner production practices, varies among sectors and according to individual circumstances, making it difficult to put a figure on the total bill. However, the World Bank has calculated what the cost could be to developing countries of introducing end-of-pipe ESTs on the scale of the major industrialized countries. If spending on pollution controls in developing countries were to approach 2-3 per cent of investment, they could appreciably reduce industrial pollution and avoid post-pollution clean-up costs. The extra costs, according to the World Bank, would amount to US\$10-15 billion a year (or just 0.2-0.3 per cent of gross domestic product) by the end of the decade. While high in absolute terms, the World Bank says these costs are small “in relation to the additional incomes generated by good economic management”.

## Private sector financing

Improved access to private capital is a major key in transferring ESTs to developing countries, particularly to SMEs. United States Vice-President Al Gore stressed this at the Third Annual World Bank Conference on Environmentally Sustainable Development in 1995. “Our single best opportunity to make sustainable development happen is to make investments in sustainable practices and technologies attractive to private business and private investment.”

In many developing countries the availability of private international capital has increased dramatically in recent years. This inflow of capital has been mostly to those countries where the need for ESTs is greatest. In many cases, private sector flows are much greater than official development assistance flows; and the latter are unlikely to grow rapidly, if at all. However, this should not be a problem. The CSD suggests that direct public sector support for financing the transfer of ESTs is less important, and effective, than a regulatory regime that encourages or compels companies to buy, sell, develop and/or use ESTs. “While directly intervening in the marketplace may help to channel millions of dollars in favour of EST transfer, changing the very conditions under which business investment decisions are made has the potential to channel billions.”

Between 1992 and 2020, developing countries are expected to increase their output from US\$9 trillion to US\$34 trillion: an average growth of about 4.5 per cent a year. Clearly, large amounts of capital will be needed to support this fourfold rise. Most foreign direct investment is not directed specifically towards transferring ESTs to developing countries. However, this may change. As developing countries raise their environmental standards, they are less inclined to be a dumping ground for older, more polluting technologies. Large foreign investors can no longer afford the risk of their operations being performed poorly and

ESTs, especially cleaner production technologies, are becoming more economically attractive. So the prospects for more financial support for developing countries to transfer ESTs are good. The World Bank has said that the pattern of existing finance needs to be changed, and what is important is what happens to the US\$1.5 trillion already invested each year throughout the developing world.

Privatization should also boost demand for ESTs and open the door to finance. Turning public enterprises into private companies is a major feature of the economic restructuring of the developing countries and transitional economies. The development banks, led by the World Bank, are supporting privatization through policy and project lending, as well as technical assistance. Many state-owned or state-run candidates for privatization have left behind significant environmental risks or ‘pollution stocks’. They may still be a source of continuing pollution problems, or using natural resources at an alarming rate. Privatization can provide the investment needed to turn these enterprises around, but those that pollute and fail to meet strict environmental standards will be pushed out of business.

Privatization can produce positive environmental effects, such as more efficient use of natural resources and more rapid adoption of ESTs. The World Bank is advising many governments to assume responsibility for most or all damages resulting from past practices, thus providing the new owner with a ‘clean slate’, and also providing a market for end-of-pipe technologies and their suppliers.

There is considerable scope for including EST criteria in the structuring, negotiating and financing of privatization programmes and tenders. Instead of awarding tenders to the highest bidders, governments could weight decisions with investments in ESTs and cleaner production, and environmental improvements in mind. This might also help to overcome political obstacles where foreign ownership is

#### BOX 4.1

### *Privatization as a catalyst*

The Polish government's sale of the Odra cement plant in 1993 provides a good illustration of how privatization can be an effective catalyst for addressing environmental issues and introducing ESTs into a company's operations.

Odra, one of 19 cement plants in Poland, was the first to be privatized under the country's sweeping, multi-track privatization programme. It consisted of a limestone quarry and a cement plant on the outskirts of the town of Opole in Silesia, nearly 325 kilometres from Warsaw, and was a heavy emitter of cement dust.

A German company bought 80 per cent of Odra's shares; the other 20 per cent were reserved for sale to employees. The new owners agreed to a major environmental investment programme, including: converting the plant to a more environmentally sound dry process technology; installing a municipal waste system to convert the waste to fuel for use in the plant; and expanding Opole's municipal landfill. The key technology was the BRAM fuel-from-waste system. This transforms household waste into flakes about 2.5 square centimetres in size, which can be substituted for fossil fuels in specially equipped cement plants. Such a plant can cut its fossil fuel requirement by half.

an issue. However, putting this idea into practice will require significant technical assistance from donors.

### Public-private partnerships

Public-private partnerships are another effective way of financing the transfer of ESTs. The involvement of the public sector – national, regional and local government as well as international aid agencies and development banks – in projects with the private sector can be crucial to ensuring that ESTs are used. There are four main reasons for the public sector to get involved:

- there is often a need to mitigate political and commercial risks, perceived or actual, in order to unlock private capital and technology;
- there may be a need to show that environmentally sound technologies deliver real,

# Bank Austria

## FINANCIAL RESPONSIBILITY AND AN ENVIRONMENTAL ROLE

Banks today need to do more than exercise financial responsibility on their clients' behalf; they have an increasingly important role in supporting the private sector to achieve sustainable development goals.

As a signatory to UNEP's Statement by Banks on the Environment and Sustainable Development, Bank Austria is fully aware of its wider responsibilities and is determined to meet them.

Bank Austria is the country's leading credit institution, formed initially from the merger in 1991 between Zentralsparkasse and Landerbank, and strengthened considerably in 1997 when it acquired a majority interest in the privatized Creditanstalt-Bankverein, Austria's second largest bank. The bank has enjoyed strong and consistent growth: in the first nine months of 1997, net operating income was 10,465,000 Austrian schillings, a 23.5 percent increase. It is already positioned as a bank of European dimension.

Bank Austria understands that as one of the main contributors of private sector credit, the financial services sector is inextricably linked by lending and investment practices to economic activities that may damage the natural environment – and the signals which financial institutions send to their clients about the relationship between environmentally sound management practices and credit lending rates are an important component in building sustainable development.

At the same time, Bank Austria recognizes that investing in the environment can be good business. Investment in the provision of environmental goods and services can offer extremely attractive returns, while emerging environmental markets offer very high growth rates – and one of the most important new drivers of sustainable profitability is companies with the ability to create new 'green' technologies and opportunities.

For Bank Austria, therefore, supporting improved corporate environmental performance is both honouring a commitment to contribute to sustainable development and a means of achieving a healthy bottom line.

Mr. G. Randa,  
Chairman and CEO



## BOX 4.2

*An innovative approach to financing ESTs*

Public-private sector partnerships are at the heart of Sustainable Project Management (SPM)'s, innovative approach to financing and implementing projects involving environmentally sound or eco-efficient technologies.

SPM was established in 1994 under the auspices of the then Business Council for Sustainable Development, and is now involved in more than 20 projects worldwide, including some with the United Nations Development Programme (UNDP) and the World Bank. The projects focus on urban infrastructure dealing with water, waste and energy efficiency, and the organization concentrates on small to medium-scale schemes typically costing US\$5-50 million. These have traditionally been the exclusive responsibility of municipal authorities, but according to SPM, this system is overwhelmed by the massive influx of people to cities, the lack of funds to improve and develop services, and the difficulty in obtaining new ESTs.

SPM lays down four key criteria for each project:

- it must fully involve the public and private sectors together from the outset;
- the development costs must be shared equitably between the public and private sectors, and external sources of funding such as UNDP or national development agencies;
- the project must be inherently profitable for its operating company to attract private sector participation;
- projects must use environmentally sound technologies (ESTs).

The aim is to avoid the traditional situation in which the private sector waits for the public sector to identify a project and put it out to tender, a process which often involves the appointment of outside advisers to help the public sector to define a framework with which the private sector

can live. Says SPM Executive Chairman Hugh Faulkner: "Thus, only when the project is half cooked by expensive chefs does the private sector get involved. After that, the process involves a long, drawn out game of seeing how the private sector could extract maximum return."

With an SPM project, the private and public sectors sit down at the same table at the outset and work through every stage together. This includes identifying financial and technology partners, the technology options, the actual choice of ESTs and, importantly, deciding issues of capacity building, training and technology transfer or cooperation. The partners form a joint operating company to run the project.

SPM does not invest in any project. Its role is to identify suitable schemes, identify potential private sector investors, bring them together with public sector parties, act as honest broker in their negotiations, and help put together the financial and technology components of the package.

cost-effective benefits to the end-user before the technologies can be widely diffused using market mechanisms;

- there may be a need for financial innovation for EST transfer that requires, at least initially, public sector leadership;
- some ESTs may not be competitive with alternatives from a business standpoint, but there may be strong public interest reasons why they should be subsidized.

Short term, the aim of public-private partnerships is to leverage public resources to mobilize private capital and harness market forces as much as possible. The expectation is that the private sector will be willing and able to undertake the process of transferring ESTs without public sector involvement in the long run.

Several countries have used build-operate-transfer arrangements as an alternative to foreign borrowing or public financing. The private sector is responsible for financing and building the project, and it is transferred to public ownership once it is up and running. Such projects are found particularly in the power, transportation and water sectors. In 1993, there were some 400 such projects, valued collectively at more than US\$400 billion. Build-operate-transfer arrangements have both advantages and drawbacks. Using private sector financing provides new sources of capital, which reduces public borrowing and direct spending. Projects which might otherwise have to wait and compete for limited resources can move forward much faster. Using

“ Each of us could and should have made greater progress with the implementation of Agenda 21 ”

Jacques Santer,  
President of the European Commission

“ To attack Nature is to attack mankind ”

Jacques Chirac,  
President of France

“ We now possess the knowledge and means to durably protect Man’s natural sources of life for the future ”

Helmut Kohl, Chancellor of Germany

“ The Rio promise on the transfer of environmentally sound technologies has remained largely unfulfilled ”

Sarwono Kusumaatmadja,  
Minister of State for Environment,  
Indonesia

“ If the current trends continue, the next generations would face an ecological disaster ”

Ali Akbar Velayati,  
Minister for Foreign Affairs,  
Islamic Republic of Iran

private sector capital and know-how reduces project construction costs and schedules, and improves operating efficiencies. The private sector, not the public sector, assumes project risk. The fact that the private sector is engaged financially provides additional assurance of the project’s feasibility. In turn, governments can build environmental impact and environmental performance parameters into the design and operation of the projects.

On the other hand, applying the build-operate-transfer concept is a complicated undertaking compared with conventional financing of public sector projects, and although many projects have been proposed, relatively few have been implemented. Poorly prepared studies and proposals have led to increased costs, delays and frustrations. Differences over the costs of construction, equipment and financing can cause the negotiations to be protracted. The legislation

## BOX 4.3

*Funding renewable energy technologies*

Renewable energy technologies promise considerable economic and environmental benefits for developing countries. But they need funding. The United States-based World Resources Institute (WRI) argues that these ESTs have been given “short shrift” in development assistance and it has urged a major rethink by donors to ease the way for developing countries to shift to renewables.

Donors, says the WRI, got it badly wrong during the 1970s and 1980s, by supporting one-off projects which focused too much on equipment and engineering services and not enough on capacity-building to manage change. Too often, immature technologies were promoted; no attempt was made to match energy end-use needs with local resources; and renewable energy research centres worked independently of the private sector. As a result, many donors became disillusioned and many aid recipients came to view these ESTs “as second-class technologies that

industrialized countries were unwilling to adopt themselves”.

WRI makes four recommendations:

- international donors and lenders must ‘mainstream’ applications of cost-competitive renewable technologies;
- multilateral and bilateral agencies and developing countries should implement joint strategies for technology commercialization;
- donors should give higher priority to long-term strategies for building markets for renewables than to competing for exports;
- multilateral and bilateral agencies should target programmes for renewable energies preferentially to countries which allow them to compete fairly with other technologies.

Renewable energy technologies that combine lower costs with increased output

are excellent candidates for a coordinated multilateral programme that could:

- match the technology with renewable energy resource characteristics in both OECD and non-OECD countries;
- help utilities and other would-be developers identify appropriate applications for the technology;
- structure individual countries’ needs into an aggregate stream of orders;
- issue a competitive notice for bids from potential suppliers in any country;
- award contracts based on a maximum allowable price that would fall over time.

The WRI points out that no existing multilateral institution is ready so far to play such a catalytic role in commercial development.

and regulations needed to streamline the implementation of build-operate-transfer projects do not exist in most countries. These projects are complex from both a financial and legal point of view and require committed government support and involvement. This includes the government establishing the right process for identifying suitable projects and selecting bidders. The basic structure needed is now better understood, and standard solutions are being worked out, so that many of the problems which bedevilled projects in the past are being resolved.

Another example of public-private partnerships is publicly sponsored investment funds that focus on ESTs where, for example, governments will launch and seed a fund to attract private investors, including venture capitalists.

The total amount involved so far is small. However, the potential leverage of these funds, and their effectiveness in transferring ESTs, are “large”, according to the CSD.

Another approach is leasing, which has many advantages, particularly for SMEs. There is considerable scope for developing leasing facilities for ESTs. The key attribute of leasing is that the initial arrangements are made with the sellers of the technology, whereby they agree to support sales of their technology (rather than finance purchases). Ultimately, leasing should evolve into a private sector function, but initially it may need encouragement through public-private partnerships.

One important category of partnership is the publicly funded intermediary for EST transfer. It





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Garanti Bank, headquartered in Istanbul, Turkey, operates a nationwide network of 207 branches serving corporate, commercial and retail clients. Garanti is proud of its record of excellence in all banking areas – the bank holds the ISO 9001 Quality System Certificate. It has been chosen as the 'Best Bank' in Turkey by *Euromoney* for three consecutive years – and in 1997 was nominated as the most respected company in Turkey by the *Financial Times* in its annual survey. Garanti is also proud of its commitment to investing in Turkey's future through supporting initiatives for sustainable growth as outlined in Agenda 21.

Agenda 21 stressed the importance of the partnership of the private sector in working to promote sustainable development. Garanti Bank recognizes the key role that the business community has to play in Turkey in combining the objectives of rapid economic growth and environmental protection. While we acknowledge that Turkey's development needs are huge, Garanti also seeks to ensure that our investments are directed into areas compatible with long-term sustainability. Garanti seeks to ensure that a portion of its revenues are directed into working for the conservation of Turkey's nature and natural resources.

Since 1992, Garanti Bank has supported programmes for the protection of Turkey's biodiversity through its support of The Society for the Protection of Nature (DHKD), Associate Member of the World Wide Fund for Nature (WWF). DHKD/WWF take action to conserve the great diversity of Turkey's habitats, fauna and flora through work that combines field-work with policy, public awareness and education.

Due to the growing importance of the protection of nature in Turkey and all over the world, Garanti seeks not only to protect Turkey's wildlife and habitats from extinction by supporting the efforts of DHKD but also to raise public awareness on the importance of the conservation of the natural environment through its printed materials, advertisements, credit cards and even in the design of its branches.

Garanti's management, shareholders and employees are proud to support the Bank's environmental initiatives that have been recognized by UNEP and WWF. In 1996, Garanti became one of just three institutions to be nominated to the prestigious UNEP Global 500 Roll of Honour. In 1997, DHKD commended the environmental contribution of Garanti through the award of their "Prize for the Environment".

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aims to help in the development of projects oriented towards transferring ESTs by providing pre-investment support such as funding feasibility studies, finding partners and preparing bankable proposals to mobilize private capital, as well as match potential buyers with sellers.

The ‘technology triangle’ concept is another form of public-private partnership. It involves collaboration between government agencies and institutions, the private sector and science and technology institutions. The objective is to stimulate the development, transfer and diffusion of ESTs through collaborative partnerships and capacity-building.

### Funding technology transfer

The CSD has proposed a number of measures to increase the possibilities of funding the transfer of ESTs to developing countries. Some of the measures refer to the financial markets and can apply also to encouraging more take-up of ESTs by companies in the industrialized countries. They include:

- in banking, moving beyond liability-based environmental impact assessments to broader assessments encompassing the potential for ESTs;
- in capital markets, making information available on environmental performance (for example, resource use or waste produced), to make the cost advantages of ESTs transparent;
- in fund management, making fund managers aware of the strategic investment advantages of ESTs;
- in privatization, encouraging the use of EST criteria in tendering programmes.

### Supporting smaller enterprises

Small and medium-sized enterprises (SMEs) account for a large percentage of economic activity and hence have a major environmental impact. However, their small size and their isolated nature makes influencing their

behaviour difficult, particularly with regard to ESTs. The major concern of SMEs is the short-term financial bottom line. It is necessary to explain the cost benefits of taking preventive environmental action: saving money, reducing costs and increasing efficiency. Focusing on environmental terminology or international environmental issues is rarely helpful. Getting smaller enterprises to adopt ESTs should start with promoting ‘easy’ changes that can be quickly implemented and show a result, before working up to more complicated and costly efforts. Often SMEs need low-cost, easy-to-install technologies – good housekeeping and awareness can reduce waste by up to 50 per cent – yet EST suppliers may try to sell them big expensive technologies that are not applicable to their needs.

“Even though some multinational organizations, multinational banks and governments have made some efforts to address this problem, these efforts are falling short due to the sheer size of the potential market, and the limited amount of funds that can be allocated to it”, states the CSD. The CSD is concerned by the fact that the SME market for ESTs has been left “largely without an active pool of informed buyers, and without financial sources and instruments through which these technologies can reach new potential investors”. It says governments can use financial instruments, such as openly traded debt conversion and joint implementation emissions certificates, or secondary markets for debt related to investments in ESTs, as well as providing loan guarantees and ‘seed’ money to stimulate these investments. Moreover, “new vehicles must be created for brokers to continue to be attracted by this market, and to continue to promote the transfer of ESTs as a marketable and profit-making investment”.

While government can play an important catalytic role, the consensus is that the problem of funding ESTs will only be solved by strong private sector participation. Transnational corporations should become ‘mentors’ to their local suppliers,

**BOX 4.4***Implementing a national strategy*

A World Bank-financed environmental strategy study carried out in Bulgaria in 1991-1992 found that past economic and management policies were a major cause of environmental degradation. It set out an action plan, including:

- developing environmental legislation and regulations;
- strengthening environmental institutions;
- improving the system of environmental monitoring;
- establishing mechanisms for funding environmental protection.

These measures led to improved environmental quality and lower pollution levels in the worst areas.

A follow-up study recommended a further set of priority issues:

- industrial air pollution;
- leaded gasoline;
- water and food contamination from heavy metals and toxic organic compounds.

This helped to form the basis for a pollution abatement project, as well as a debt-for-environment swap funded by Switzerland which allowed Bulgaria to invest 20 per cent of its Swiss debt in a Pollution Abatement Fund, to be used for environmental projects, audits and feasibility studies.

both by urging them to implement environmental management systems and by using their buying power and credit worthiness to allow suppliers to access funds for ESTs. Governments can help by creating the right framework conditions.

### Other funding sources

Private finance aside, most developing countries can tap into a variety of other funding sources: regional and international development funding agencies; intergovernmental agencies; and non-governmental agencies and donor countries. Some examples include:

- Japan's Green Aid Plan which has funded projects involving technology demonstration

(for example, desulphurization technology) in China, Indonesia, Malaysia, the Philippines and Thailand;

- the United States Agency for International Development which sponsors the Environmental Technology Fund, a series of small matching grants to help smaller enterprises in the United States take their ESTs to the Asian region and demonstrate them;
- the Asian Development Bank's US\$150 million fund for investments in companies which contribute to sustainable development in Asian markets;
- the Nordic Investment Bank's loans for projects involving the transfer of ESTs in China, Estonia, Indonesia, Mauritius, Tunisia and Turkey;
- the Islamic Development Bank, which finances major projects including technology transfer and capacity-building, for example: sewerage systems for eight cities in Tunisia; a rubbish composting plant in Syria; disposal of solid wastes in Saudi Arabia.

There are also a number of examples of successful new funding initiatives:

- a United States private sector company has finalized an agreement with the Republic of Korea to deliver sensors for car fuel efficiency and pollution prevention;
- a Thai government/USAID (the United States development agency) initiative to alleviate air pollution in Bangkok led to the building of the world's first three-wheeled electric vehicle factory in the Thai capital;
- the Finnish government has supported investments in ESTs in power schemes in China, pollution prevention and control projects in India, and energy and water saving measures in Thailand.

### The World Bank

The World Bank is the largest external financier of environmental investments in the developing world. In fiscal year 1995, pollution management

and urban environmental projects accounted for over 60 per cent of its total lending for the environment. In 1996, the World Bank committed US\$1.63 billion and leveraged a further US\$1.64 billion from other sources for 20 new environmental projects, bringing its active environmental portfolio to 153 projects, totalling US\$11.4 billion. These projects included direct investment in pollution prevention and treatment facilities, support for research into new technologies, and a clean technology initiative to identify the opportunities for introducing cleaner technologies in China, India, Indonesia, the Philippines and Viet Nam. It should be noted, however, that such investments are small compared with the World Bank's funding of non-environmentally focused projects such as large hydro-electrification schemes.

The World Bank has put a strong emphasis on achieving efficiency gains in the energy sector, but says "these alone will not be enough to meet future demand in an environmentally acceptable way". Therefore, it has provided increasing support for clean energy sources (natural gas and clean coal for power generation) and technologies, including: improving the quality of automotive fuels (the total phase-out of lead in petrol); emission control ESTs (particularly to remove particulates from coal emissions); and the development of renewable sources of energy.

In 1995, the World Bank launched the Solar Initiative, aimed at accelerating the pace at which commercial and near-commercial renewable energy applications reach the marketplace, through basic research, development and technology demonstrations. Both large-scale, grid-connected power and industrial applications for solar and renewable energy, as well as small-scale, rural-based applications have been brought into the World Bank's mainstream lending programme. The World Bank has identified a number of solar energy investments in various countries, among them three geothermal projects in the Philippines, a solar photovoltaic and wind

#### BOX 4.5

### *Pollution prevention in India*

The US\$330 million Industrial Pollution Prevention Project (IPPP) in India builds on the success of the previous Industrial Pollution Control Project (IPCP). The change of name reflects the shift in focus from pollution control to pollution prevention in the Indian industrial sector.

The former IPCP achieved substantial success. It initiated more than 80 innovative environmental schemes. Twenty effluent treatment plants were financed, providing cost-effective treatment to more than 3,500 small and medium-scale industries, and together handling about 150,000 tonnes a day. State pollution control boards were set up under the IPCP, with the objective of getting industries to meet their statutory requirements.

The IPPP is designed to support the Indian government's policy of pollution prevention and waste minimization, by encouraging the use of clean technologies and through providing incentives to companies to prevent pollution. It is providing more effluent treatment plants at industrial estates in four states and helping the most polluting industries to adopt cost-effective waste reduction and resource recovery or pollution abatement measures. It also helps to disseminate information on innovative, cleaner manufacturing practices: for instance, through a cleaner technology network.

farm project in India and a biomass energy project in Mauritius. Two of the Philippines projects together add 640 megawatts to the country's existing 1,000 megawatts of installed geothermal capacity. As well as reducing carbon dioxide, sulphur dioxide and nitrogen oxide emissions, increased geothermal energy production will reduce the country's dependence on imported oil.

Elsewhere in the energy sector, the World Bank has focused on coal, pushing for the commercialization of technologies such as coal washing (standard practice in industrialized countries) and integrated coal gasification (now entering commercial application in Europe and North America), and assisting countries in identifying and preparing clean coal projects. It also assists technology transfer through project financing. In Indonesia, for example, it financed the construction of three 600-megawatt coal units that use low-sulphur coal and are fitted with



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For too long, we have been wasting our planet's natural resources and polluting our environment. Today, we are all dismayed at the results and deeply concerned that further damage and pollution will ruin our water supplies and all the other resources we need to assure a sustainable future.

All of us – leaders of the international community, as well as ordinary people – are alive to the dangers. We know we share a common fate.

We also share a common purpose – to check pollution, use resources sensibly, and arrest the ruinous degradation and decline that is threatening our existence. Our Group of Companies is ready to participate in this task because it is vital to every one of us.

*Mr. Panagiotis Ag. Papadakis, President*



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electrostatic precipitators that remove 99.5 per cent of the particulate from the flue gas. China and India are particular target countries, since they are expected to double their use of coal every ten years and the need for clean technologies is urgent.

In Central and Eastern Europe, the World Bank has promoted efficient resource use and pollution prevention. Most of the demand for environmental investment comes from the energy sector and inefficient, polluting industries which, the World Bank says, “should be restructured, or in some cases, shuttered”. In this region, there is a strong demand for grants, not loans, but the World Bank only provides grants for technical assistance projects to help prepare project feasibility studies. There is also the problem that “the demand for environmental credit is still rather limited – partly because of policy and institutional constraints, and partly because of competing investment priorities”.

Moreover, many environmental problems in Central and Eastern Europe would be best addressed by small investments, from several hundred to several million dollars. The World Bank acknowledges it is “ill-equipped” to provide loans of this size, except through financial intermediaries. One approach has been to set up credit lines as environmental funds, capitalized both from domestic sources (environmental taxes and charges, and general government revenues) and external sources (loans from international institutions, donor grant financing and debt-for-nature swaps).

The World Bank is moving more towards pollution prevention and to promoting cleaner industrial technologies. One example is the Industrial Pollution Prevention Project (see Box 4.5) in India. Another is the Technology Development Project in China, to support reforms in technology and institutions that promote the development of cleaner technologies. Working with foreign suppliers to adapt existing know-how, two engineering research

#### BOX 4.6

### *ESTs help Pakistan pulp and paper mill*

The International Finance Corporation (IFC) is encouraging private investment in various projects involving ESTs. These include water supply and wastewater treatment, solid hazardous waste management, and manufacturing projects that include cleaner production techniques and pollution control equipment. One project involves Pakistan’s main pulp and paperboard mill and paper converter in Lahore, the country’s second largest city.

Most of the world’s pulp is produced from wood. However, non-wood sources, such as wheat straw, rice straw, bamboo and bagasse, which represent a major source of fibrous raw materials, are used extensively in developing countries. The Lahore company uses these. But both wood and non-wood paper production can pollute the environment. These problems can be avoided by proper mill design and operation, and adequate effluent treatment and disposal.

The company began to improve its environmental pollution control systems in 1987 and 1990 by investing in primary effluent treatment facilities. The IFC helped pay for these. Now it is providing a US\$35 million loan package to help the company finance a major upgrade that will make it one of the first straw pulp mills in the world to meet the World Bank’s environmental standards.

New chlorine mixing and oxygen treatment in a new bleaching line will significantly reduce the use of elemental chlorine and hypochlorite in the bleaching process. A new chemical recovery plant will recover the process black liquid. While the plant’s operations will be expanded, the use of chemicals and water will be reduced. Air emissions will be clean and low-odour.

One incentive for the company was the Pakistan government’s plans to step up efforts to combat pollution through new legislation that set standards for emissions and liquid effluents, and by putting more emphasis on enforcing previous laws. The IFC believes that replicating the Lahore project could make a substantial contribution to the cleaner production of pulp in countries such as China, Egypt and India which also use straw, bagasse and bamboo as raw materials in place of scarce wood resources.

institutes will develop clean coal-burning technologies. Other institutes will develop pollution prevention technologies.

The World Bank has also urged two other approaches to financing sustainable development. One is for governments to rethink their taxation policies. “The purpose of taxes should be to change behaviour, not just to raise more revenues.

**BOX 4.7***Collaborating on the border*

Border regions can offer a special opportunity for governments and businesses to cooperate in working together to finance the solution of environmental problems. The North American Development Bank, created by the United States and Mexican governments specifically to finance environmental infrastructure projects in the border regions of both countries, is an example of one such collaboration.

The border between the United States and Mexico stretches 3,380 kilometres and the area is home to more than 9 million people. Because of the North American Free Trade Agreement (NAFTA), border cities have attracted industrial investors. According to Alfredo Phillips, the bank's managing director, the resultant increase in industrial activities necessitates more investment in environmental protection.

He told the Third Annual World Bank Conference on Environmentally Sustainable Development in 1995 that the growing commercial and economic activity in the United States-Mexico border region has had a particular impact on its environment as polluted air, water or solid waste from one side contaminates the other. The threat to water supplies is especially serious. "Water in some border areas may soon become more valuable than oil", said Phillips, and this will require new infrastructure to tackle the issues of water supply and wastewater treatment.

Phillips pointed out that long-term financing for water and sanitation projects was not always available, so alternatives were needed. The North American Development Bank has a start-up capital of US\$750 million, and when fully capitalized will be able to provide support for projects totalling US\$8-10 billion, the estimated cost of infrastructure schemes needed along the border over the next ten years.

The bank "offers much-needed support to public entities and private entrepreneurs who want to invest in infrastructure services within the border region". The North American Development Bank and its borrowers fund projects with a variety of creative financial schemes, such as co-financing, asset securitization, syndication and loan guarantees. Combining the resources of the World Bank, the Inter-American Development Bank and other financing institutions allows for a greater spread of risk and more favourable borrowing terms.

Individuals and enterprises should be encouraged to act more responsibly towards the environment through clear tax signals." The other is actually to reduce the need for additional finance. "Many of the resources invested in environmental concerns", it says, "have been unnecessary". Why? Because policy makers in this area "paid inadequate attention to cost-effectiveness". The

World Bank's proposal: "We must pay greater attention to reducing the costs of solutions."

The International Finance Corporation (IFC), part of the World Bank group, is also a major funder of projects involving ESTs. It too is adopting some new approaches. In sub-Saharan Africa, for example, the IFC is now supporting private sector investments in commercially and economically viable environmental schemes, such as the collection, treatment and disposal of hazardous wastes, the collection, recycling and disposal of solid waste, and the treatment and disposal of industrial and municipal wastewaters. Interestingly enough, the IFC says that while "there is no shortage of finance for 'good projects' in the region, there *is* a shortage of good projects".

### International funding

Various international environmental bodies also make funds available to invest in ESTs. One such source of funding resulted from the Montreal Protocol on Substances that Deplete the Ozone Layer, which calls for the complete phase-out of fully halogenated chemical emissions. As described in Chapter 5, the Montreal Protocol's Multilateral Fund helps developing countries to eliminate ozone depleting substances by converting to alternatives through, among other things, switching to new technologies. Industrialized countries gave US\$510 million for the period 1994-1996 and, in November 1996, agreed to provide US\$540 million for 1997-1999.

The Global Environment Facility (GEF) is an international body that was set up to implement pilot projects in four focus areas (climate change, biodiversity, international waters and ozone). Jointly run by UNDP, UNEP and the World Bank, it has funds for projects in developing countries that aim to protect the global environment. It believes that:

- more technologies are needed to offer options for reducing emissions at least cost;
- GEF funding should encourage promising but unproven technologies when the

technology, economics or market conditions are not yet 'right';

- successful technologies will be those that show potential for widespread use and could eventually attract investment from conventional sources.

## Self-financing in Europe

The European Bank for Reconstruction and Development (EBRD), set up specifically to help Central and Eastern Europe, is involved in both project-based lending to, and equity participation in, joint ventures, privatized companies and financial intermediaries. But one of its senior officials, Timothy Murphy, made it clear at the 1995 World Bank conference that "the first important lesson from our work is that most financing of environmentally sustainable development will have to come from within the countries themselves". The role of the EBRD and other development banks was, he said, to help develop mechanisms that facilitate this process.

He explained that, given the other demands on national financial resources, it would be wise to reduce the need to pay for environmentally sustainable development through direct central government funding or loans from multilateral development banks that require sovereign guarantees. Much of the money would have to come from the private sector or other competitive sectors. He argued that it is better to finance environmentally sustainable development from the profits of the industrial sector, or from the revenues of the municipal and utility sectors, rather than rely on central governments or external agencies. "Economic growth should generate sufficient resources for a proportion of profits and

of locally and nationally collected taxes to be devoted to environmental ends", he said.

Murphy noted that there is currently a "window of opportunity" for many industrial sectors in the region, including paper, chemicals and metals. As demand for their products increases, so opportunities are provided to bring their environmental performance up to international standards. However, he stressed that market forces alone cannot achieve the required results, and that there remains a major catalytic role for the EBRD, other development banks, donor organizations and commercial sources of finance to accelerate reform in the region.

## The good news – and the bad

Financing ESTs, and particularly their transfer to developing countries, remains an entrenched problem and a source of North-South friction. According to the World Bank, this is due to an over-reliance on public funds, or official development assistance, while flows of private capital have been regulated, rather than channelled and catalysed. It insists that approaches to financing "must change".

The World Bank has advocated three central pillars in a reform programme: increasing the level of finance; changing the pattern of existing finance; and reducing the need for additional finance. It adds: "The good news is that almost all these ideas are being tried out somewhere. The bad news is they are not being tried in enough places." Until they are, and until the issue of financing ESTs is resolved, the uptake of new environmentally sound and cleaner production technologies will continue to lag well behind the need.

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