

15022
Sept. 1995

The Business of Sustainable Cities

Ismail Serageldin
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Joan Martin-Brown
Editors



Public-Private Partnerships for Creative Technical and Institutional Solutions

An Associated Event of the Second Annual World Bank Conference
on Environmentally Sustainable Development
co-sponsored by The World Bank and EarthKind
and held at the International Monetary Fund
Washington, D.C.
September 22-23, 1994



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Vincent McCullough, Editorial Consultant

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*Environmentally Sustainable Development Proceedings Series No. 7
The World Bank, Washington, D.C.*



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for Reconstruction and Development / THE WORLD BANK
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First printing September 1995

This report has been prepared by the staff of the World Bank. The judgments expressed do not necessarily reflect the views of the Board of Executive Directors or the governments they represent.

Cover photographs by Mega-Cities Project, Inc.
Front: Innovative rapid surface metro system in Curitiba, Brazil, designed to imitate a subway system.
Back: One of four Curitiba tubes brought to New York City by Mega-Cities Project in 1993 for a six-week demonstration of a rapid metrobus system.

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Library of Congress Cataloging-in-Publication Data

The business of sustainable cities : public-private partnerships for creative technical and institutional solutions / Ismail Serageldin.

Richard Barrett, and Joan Martin-Brown, editors.

p. cm. — (Environmentally sustainable development proceedings series ; no. 7)

“An Associated Event of the Second Annual World Bank Conference on Environmentally Sustainable Development, co-sponsored by the World Bank and EarthKind and held at the International Monetary Fund, Washington, D.C., September 22-23, 1994.”

ISBN 0-8213-3319-4

1. Urban ecology—Developing countries—Congresses.
 2. Sustainable development—Developing countries—Congresses.
 3. Community development, Urban—Developing countries—Congresses.
 4. Urban renewal—Developing countries—Congresses. 5. Municipal services—Environmental aspects—Developing countries.
- I. Serageldin, Ismail, 1944– . II. Barrett, Richard, 1945– .
III. Martin-Brown, Joan, 1940– IV. International Conference on Environmentally Sustainable Development (2nd : 1994 : World Bank)
V. Series.

HT243.D44B87 1995
307.1'16—dc20

95-17525
CIP

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Foreword

One of the principal questions that emanated from the historic 1992 Rio Earth Summit (the United Nations Conference on Environment and Development, or UNCED) revolved around the role of business in promoting Agenda 21. In September 1994 the World Bank Vice Presidency for Environmentally Sustainable Development (ESD) and EarthKind, a global nongovernmental organization, brought together industry and city leaders from around the world to focus on the role of business in the creation of environmentally sustainable cities.

As an Associated Event of the Second Annual World Bank Conference on Environmentally Sustainable Development, this forum, entitled "The Business of Sustainable Cities: Public-Private Partnerships," spotlighted success stories that demonstrate creative technical and institutional solutions. Together, business, municipal, financial, and nongovernmental leaders examined proven models for success that are available today. As leaders in their fields they underscored the positive potential of business to move in an environmentally sustainable direction.

Through such exchanges the North and the South and the public and private sectors can learn from one another and thus avoid industrial patterns and processes that undermine the great life support systems of the natural world. Such partnerships are indispensable if we are to have sustainable cities. This forum advanced this objective.

Jan A. Hartke
President
EarthKind

Preface

Ultimately, to be sustainable, cities must function for people, protect their health, provide shelter, and offer opportunities for employment and cultural expression. Leaders around the world are seeking new answers to these requirements by revisiting traditional approaches and pursuing innovative solutions.

In this report international, national, nongovernmental, and public and private business and industry leaders and officials present their approaches to urban energy, transportation, and solid waste services that advance environmentally sustainable development. In each case the approach improves the quality of life in cities and presents new entrepreneurial opportunities.

As detailed in this publication, new efficiencies and more effective services in these sectors are not only possible but proven, and they are well worth examining in a time of diminishing fiscal resources and increasing human needs in sprawling cities. Of vital importance, these innovations in delivering energy, transportation, and waste management services reduce or avoid adverse environmental and health effects.

In many cases they invite privatization and demonstrate cooperative approaches between public and private entities, as well as encourage alliances among business, industry, and municipal leaders.

The evidence in this report points to new directions in investments and technology choices that are responsive not only to the goals of Agenda 21 and the work of the Commission on Sustainable Development, but also to the 1996 World Conference on Human Settlements, HABITAT II.

As we prepare for the 1995 World Bank ESD conference—on “Effective Financing of Environmentally Sustainable Development”—the messages of this forum on “The Business of Sustainable Cities” are that effective financing is necessary and that the options are there for investing in cities in ways that link public and private institutions. Such options point not to some distant horizon but down the street and around the corner—to cities that can flourish and to neighborhoods where people can thrive.

*Ismail Serageldin
Richard Barrett
Joan Martin-Brown*

Acknowledgments

The editors wish to acknowledge the contributions of all participants and the following individuals who made this forum come together successfully: Abdellatif Amri, Barbara Briggs, J. Flynn Bucy, Sefik Cardak, Alison Cave, Anjali Chadha, Benaifer Devine, Barbara Eckberg, Shelton Gallun, Alicia Hetzner, Sarwat Hussain, Vincent Jayasuriya, Diane MacEachern, James McKinney, Adoracion Morao, Tracy Packard-Ferrell, Wendy Robinson, Aissatou Seck, Saydeh Shammass, Cicely Spooner, Fulvia Toppin, Harold White, and Magdalen Zee-Wu.

The editors also wish to thank Vincent McCullough, editorial consultant; Alicia Hetzner; Alison Strong; Virginia Hitchcock; and James McKinney for their work in bringing this report to publication. This report was desktopped by Rachel Sengers and Julie Harris. Tomoko Hirata designed the cover.

To provide a concise, useful report, the papers and presentations at this forum have been distilled into a thematically organized summary. Supplementary quotations from the presenters in the sessions appear in the margins.

The full program of the forum is included as appendix A. Readers who wish to obtain the complete papers for these sessions may contact the presenters directly as they are listed in appendix B.

1. Welcoming Opportunities

Ismail Serageldin

By 2025 more than two-thirds of the developing world's population will live in cities. Seventeen cities of more than 10 million people will be in developing countries. These urban populations will be straining the limits of ecosystems and existing urban services. The situation is already dire. Today, 25 percent of urban dwellers in the developing world do not have access to safe water supplies. Fifty percent lack adequate access to sanitation facilities. By 2000, more than 600 million urban people will suffer from inadequate sanitation and 450 million from unsafe drinking water.

Can the trends in urban growth—accompanied by increasing urban environmental problems and assaults on human health—be halted or reversed? What role does the private sector play in promoting sustainable urban development? What are the success stories of public and private partnerships in managing the urban environment? What is the scope for new partnerships between the public and private sectors, between national and international institutions and private sector associations? And how can the creativity and innovativeness of nongovernmental organizations and the private sector be harnessed for the causes of the poor and the environment?

These are some of the questions we shall be addressing in this forum on “The Business of Sustainable Cities: Public-Private Partnerships for Creative Technical and Institutional Solutions,” which is cosponsored by the World Bank and EarthKind. We shall be considering these questions from the viewpoints of urban development—*energy*, *transport*, and *solid waste manage-*

ment—and of innovative and successful public-private partnerships for managing the urban environment.

The problems of the urban environment are known as the brown agenda: urban pollution; inadequate systems of water supply, sanitation, drainage, and waste disposal; emissions from large and small industries; inefficient cooking and heating systems; and polluting transport systems. But these are just part of the agenda. The full agenda is to meet the needs of and protect people. Ultimately, sustainable cities must function for people—protect their health, provide shelter, and offer opportunities for employment and cultural expression.

With the cities of the developing world projected to triple in size over the next generation, it is essential that the world community move from rhetoric to action on this critical set of issues. For countless millions of kindred souls, the right actions can spell the difference between shortened, miserable lives and a modicum of decency and hope. Meaningful actions absolutely require the private sector and critically need innovation.

This also means that international lenders, donors, and development agencies must examine new ways for national and local institutions to encourage recycling, waste reduction, reuse of materials, and the introduction of renewable energy sources in the marketplace. In addition the instruments of governance and the processes of mediation can engage businesses in efforts to ensure that beneficiaries participate more fully and share equitably in the gains of economic progress. Ultimately, planning,

By 2025 more than two-thirds of the developing world's population will live in cities

— Ismail Serageldin

Without the involvement of people and the support of the business sector, the best-intended government programs fail. What is needed are public-private partnerships

— Ismail Serageldin

implementation, and management of transport, energy, and solid waste strategies must be appropriate for human health and environmental quality.

There are other critical dimensions. For the World Bank, the idea of environmentally sustainable development finds its expression in a triangle that, not by coincidence, is also the logo for the Environmentally Sustainable Development vice presidency. One corner of this triangle is economic and financial sustainability; the second, ecological sustainability; and the third, social and cultural sustainability. Any proposal, technically sound though it may be, must also be judged successful against these criteria. Projects must be economically and financially sustainable in terms of economic development, capital maintenance, and the efficient use of resources and investments. In this, the business community clearly leads the way; but its leadership is now also sought to advance ecologically sustainable solutions that preserve ecosystem integrity; respect the limits of carrying capacity; and protect species, biodiversity, and natural resources.

Equally important is the social and cultural equation. This requires the essential contributions of governance and the civil society. Equity, social mobility, social cohesion, participation, empowerment, cultural identity, and institutional capacity building are as essential to environmentally sustainable development as economic and ecological concerns.

These social dimensions are essential to any concept of environmentally sustainable development, because without them society becomes dysfunctional and breaks down. In such circumstances the long-term economic, social, and political costs are very high.

The private sector, whether informal or formal, national or transnational, has major roles to play in these three areas.

A corporate social conscience is compatible with enlightened self-interest. Environmental responsibility is compatible with profits; in fact, it provides more opportunities than constraints. One *can* do well while doing good.

People should be the beneficiaries of development, not its victims. Their active involvement in the economic development process is the key to this outcome. Their welfare cannot be left to the public sector alone. Without the involvement of people and the support of the business sector, the best-intended government programs fail. What is needed are public-private partnerships.

The poor tend to be the hardest hit by degradation of the urban environment and the least equipped to protect themselves. The challenge is to make economic productivity a viable option and to make empowerment and participation more than empty catchwords.

Practical progress is required at three levels. First, public-private partnerships should involve in the project design stage those affected by transport, energy, and solid waste management. Second, local knowledge needs to be better used in the design and implementation of programs. Third, there is a need to build capacity to assess social impacts in all three of these sectors. The key for the private sector is to increase the involvement, participation, and empowerment of the poor and in partnership with government.

Real progress lies in empowering the weak and the marginalized to become the producers of their own welfare, not the recipients of charity or the beneficiaries of aid. Partnerships among community groups, nongovernmental organizations, the private sector, and local government are essential to advancing this agenda. This is a challenge that not only must be accepted but in which inspiration can be found. ■

2. Keynotes: Old Values, New Visions

Economic and industrial development has not been bright for most developing countries in the past fifteen years. Although economies are beginning to improve, in most developing countries—except perhaps those in Southeast Asia—stagnation first and moderate growth later have been accompanied by continuous concentration of production, population, and resources in urban areas. This concentration has led to deteriorating social and physical infrastructure in developing-country towns and cities. Most of these urban areas contain settlements of 50,000 to 250,000 people. When populations reach 1 million and beyond, the systems begin to break down.

Nineteenth-century philosopher Henry David Thoreau said that cities are places where millions of people are lonely together. This is even more true today, as the twenty-first century approaches. Many city dwellers do not feel connected to one another, to their environments, to nature, or to anything else. This is a dangerous situation. Urban dwellers often see themselves as separated and all too frequently become caught in a downward spiral of poverty, drugs, violence, and despair. In such conditions preserving the environment may seem almost irrelevant. Yet without business that is sustainable in cities, urban dwellers will be forever caught in a trap of pollution and decay.

Clearly, a new approach is required to improve the welfare and the quality of life of concentrated populations. Such an approach should include developing a new ecologically friendly industrial culture for entrepreneurship that promotes clean industrial production technology and other measures to prevent environmental pollution. All this presupposes

the full participation of public and private organizations and all segments of the population concerned. In this context the participation of municipalities in environmental management is becoming extremely important. Their responsibilities range from policy development and institution building to actions to induce the application of clean technologies and the elimination of pollution problems.

Environmental problems were discussed in depth at the United Nations Conference on Human Environment that met in Stockholm in 1972. At that time clean industry basically meant treating waste, emissions, and effluents to minimize their effects. Conventional pollutants generated by industrial processes were “neutralized” through end-of-pipe technology, and industry essentially reacted to structural standards and regulations imposed from the outside. At the Rio de Janeiro Earth Summit in 1992, clean industry meant preventing pollution—precluding production of pollutants by industrial processes. Clean industry is now setting the agenda for environmental management. Proactive responses are therefore required.

The earlier strategy of environmental protection in cities was to move industries from city centers to special areas where pollutants would have less effect on daily life. The new model suggests restoring industries to the centers of cities if possible—through the application of clean technologies. The challenge is to improve the quality of life while keeping industries in the cities.

Several factors have contributed to the fundamental change in the definition of clean industry. First, clean industrial development no longer requires just the

*The challenge
[of clean industry] is
to improve the quality
of life while keeping
industries in the cities*

— Mauricio de Maria
y Campos

*We are all in the same
boat, and there is
no solace in the fact
that it is somebody
else's end of the boat
that is sinking*

— Jan A. Hartke

protection of environmental quality. It also requires conservation and efficient use of nonrenewable resources. In the past, industries could waste renewable and nonrenewable resources and not be too worried about pollution problems as long as they installed pollution abatement technology and equipment. Now the focus is on sparing use of resources as well as the impact on environmental quality. Second, cleaner industrial production processes often are less costly to implement, operate, and maintain over the long term because of the reduced costs for raw materials, energy, pollution control, waste treatment, and cleanup, and continued regulatory compliance. Clean industry is good business.

It is not only large-scale industry that contributes to environmental degradation. The community impact of small and medium-size industries can be much greater than that of industrial behemoths. In India, for example, more than 2 million small enterprises account for about half the country's industrial output and 60 to 65 percent of its industrial pollution.¹

It can be much more difficult to eliminate this kind of pollution than that of a relatively few large enterprises. Doing so requires investment and technology decisions that are more complex and often less accessible. These decisions demand much organization as well as social and political engineering. In Agar, India, environmental issues are a fundamental part of the pioneering program of the United Nations Industrial Development Organization (UNIDO) to assist 300 small glass-makers in upgrading their technology. UNIDO is also considering a program to assist some 300 small foundries that were told by India's supreme court to clean up or close up. This experience could be applied to small-industry groups else-

where, particularly in such sectors as leather tanning, textile finishing, some agro-industries (sugar and coffee processing), and brickmaking.

The challenge is to ensure that the new era of industrialization, primarily in cities, will not worsen urban environmental deterioration. There is now a recognition of the new meaning of clean industry, marking the shift from cure to prevention. Industries are being asked to reduce as far as possible the production of wastes, wastewater, and emissions and only then to treat the (much-reduced) remaining pollutants before returning them to the environment.

UNIDO and the United Nations Environment Programme (UNEP), with support from the Dutch and Danish governments, are helping to establish seven cleaner-production centers in developing countries. The cleaner-production centers can make an important contribution to improving the quality of urban life through supplying information, assistance, and training. Municipalities can assist the cleaner-production centers to serve industries in the cities, and the cleaner-production centers can help the municipalities meet their commitment to a better urban environment.

Cleaner production has the potential to address environmental concerns while increasing industrial productivity. It requires, however, that all providers of technical assistance enter into new partnerships with federal and local government policymakers, industry associations and enterprises, and nongovernmental organizations (NGOs). It also requires a return to a pragmatic approach in which all members of the community—public and private, organizations and industries, big and small—can participate in a partnership for development with a clean face. ■

3. Sector Framework and Sectoral Linkages

Development must be not only sustainable but inclusive of all people—in the neighborhood, community, city, and country, and, above all, at the local level. Each city must be looked at individually in the social and environmental context in which it has evolved. There is no single blueprint—no master plan—for dealing with the problems of cities in developing countries. Often, because of the urgency of meeting the needs of burgeoning populations, governments, municipalities, and development institutions think about providing new infrastructure. But if that is done without taking into account the cultural and social history of the city, severe social dislocation can result. In Jakarta, for example, 60,000 rickshaw operators were put out of work by a change in transport policy.² In India, animal-drawn traffic has not been taken into consideration in urban transport policy, even though it could contribute greatly to the future energy efficiency of cities. That said, there are many good practices in each area of urban policymaking (energy, transport, solid waste, and others) that can be adapted or transferred from industrial to developing countries and between developing countries.

Power to the People

The problem is that local decisionmakers often lack the tools to reliably predict the outcomes of their decisions. Or, decisions are handed down from state or federal agencies with no consideration of the effects on the city or locality. Yet for each action there are consequences. It is not simply a question of what effect transport policy will have on city traffic

or by how much solid waste management can reduce pollution. Each decision in urban management must try to balance issues of environmental quality, economic vitality, cultural values, and equity.

The California Energy Commission has developed a program that could help urban planners in developing as well as industrial countries. Called Planning for Community Energy, Economic, and Environmental Sustainability—or PLACES—this computer-based program is a local decisionmaking tool that links diverse factors such as land use, air quality, and energy. PLACES is designed to bring everyone into the decisionmaking process—residents, city planners, nongovernmental organizations, and others involved (or planning to be involved) in the community, including businesses and financial institutions.

The program can be used to project the possible environmental degradation from site designs of different densities and from other possible geographical layouts. It looks at the ramifications of site designs for local energy production and use as well as the possibility of small-scale energy development—from projects that enhance the distribution system to those that rely on alternative sources of energy—solar, photovoltaic, and others. A municipality that plans to increase housing in one part of the city, for example, needs to be aware of the consequences of that plan for energy use and to make decisions about the type of roadway and transit system to build.

The PLACES program can give people and private businesses some idea of the most effective orientation of buildings and the most effective energy conservation

Sustainability has to be inclusive, dealing with all people in the locality, region, state, and country

— Gregory Newcomb

and efficiency measures for those buildings, to make optimum use of energy and save money. PLACES can go into detail on issues such as the outcomes of tree planting. It also can explore such microclimate concerns as wind patterns and how they affect the way a community ought to be organized or laid out.

When a new rail transit line is built, users are expected to pay, but when a new road is constructed, road pricing is rarely imposed. In developing countries, it is the more affluent groups that have the free use of that expensive infrastructure

— Pierre Laconte

Transitions in Transit

In urban bus and transit services, policy-makers have three broad options. The first is the system that prevails in the United States, where the municipality provides services through a local transit authority. The second (more prevalent in Europe) is the system of contracting services out to operators, either public or private. In France, for example, 90 percent of urban transit operators are private. But Europe is still something of a moving target.³ Because of the European single market, operators in any member country can enter the markets of the other countries. In the third system, which is really no system at all, there is no organizing authority and anyone can enter the market, as in many African countries. The problem with no system is that it can lead to chaos in city traffic. Even where there is a regulating authority, open competition can lead to problems. In the United Kingdom, attempts at deregulation led to buses competing at the same stops for the same passengers going to the same destinations. The result: a massive oversupply on the busiest routes and undersupply on the less busy.

Where are the best practices in urban bus and transit services to be found? And what lessons can developing countries draw from some of the worst? One example of good practice is in public transit financing in France. In 1972 legislation established Vision Transport, a scheme

under which all employers with more than nine employees had to contribute 1 to 2 percent of their payroll toward running transit systems.⁴ That created a huge surplus, which is one reason why the private sector has entered the market. As a result, the supply of public transit has increased by at least 50 percent.⁵ In France, too, the same authorities are in charge of both roads and transit delivery. For example, in the city of Nancy, which has one of the best systems, the mayor is president of the intermunicipal transport syndicates and of the road agency. When the same people are in charge of these two sectors, they are better able to strike the right balance between investments and operating subsidies, if they are needed.

In Zurich each inhabitant uses the tram an average of two times a day throughout the year, for 600 trips per person per year.⁶ With outdated rolling stock, how is that possible? Because there is demand management of the entire transport system. That means that trams have priority on the streets. Indeed, many streets are open only to pedestrians, buses, and trams. Moreover, Zurich promotes the use of the city's trams and buses using private firms. For example, the public transport company launched a campaign with Nissan urging people to take the tram or bus to work.

In Germany, too, trams play an important role in urban transport. All rolling stock for both tramlines and railways can run on the same tracks. Recently, agreement was reached to allow commuter trams to run on the Amtrak-like infrastructure, and that has multiplied the use of the rail system by five times. As a result, Germany's two biggest rail manufacturers are building much lighter engines and rolling stock, and the cost per seat on these trains

compares favorably with that on buses. German cities are among the most innovative in urban transport and public-private partnerships. In many cities formal contracts have been signed by public transport authorities and private taxi companies. The fine print in the contract can vary, but the principle is the same: passengers can buy a transit ticket that allows them to take a taxi in off-peak hours.

Another example of good practice is Singapore's integrated transport system. The system consists of a publicly operated subway and fleets of privately run buses. How are the two integrated? Passengers buy a (magnetically striped) ticket for a fixed amount to cover several journeys. Each time passengers enter or leave the subway or ride a bus, they pass their ticket through a machine that automatically deducts the cost of the journey. Because the entire system is computer-linked, there are no disputes when it comes to dividing up public and private income.

Even problems can be turned into opportunities. Take a look at Istanbul, one of the most overcrowded cities. The municipal authorities built a light rail that crosses the entire city. A subway was also planned, but construction ran into trouble and is behind schedule. Meanwhile, the city authorities had taken delivery of a string of subway cars. What did they do? They converted the subway cars into streetcars that run on the transit line. The line, which now carries 150,000 passengers daily, is extremely profitable.⁷

One of the aims of urban transit and bus services, whether in partnership with private enterprise or not, is to make a profit, or at least to recover costs. But what of road traffic, particularly the private automobile? Everywhere, road traffic is increasing, along with congestion,

and the death toll on roads is horrendous. (In the past ten years in OECD countries alone, 1.2 million people died on the roads, roughly twice the population of Washington, D.C.)⁸ When a new rail transit line is built, users are expected to pay, but when a new road is constructed, road pricing is rarely imposed. In developing countries, it is the more affluent groups that have the free use of that expensive infrastructure. There is scope for some sort of road pricing, which might take account of such costs as land consumption, pollution, and energy consumption.

Waste Not, Want Not

There are four main issues related to the linkages in urban areas between household and other kinds of waste, such as industrial, commercial, and medical waste. First, hazardous substances are increasingly contaminating household waste. Second, industrial waste is a sort of no-man's-land. City managers expect industrial firms to manage their own waste, but in reality they do not. Third, when hazardous materials enter an organized household collection system, they can sometimes create life-threatening problems. Finally, there is a general lack of awareness of these issues among policymakers and the public.

Before long, half the world's population will live in urban areas, and industrial and commercial activities in cities are increasing—all this at a time that lifestyles and industrial processes are increasingly dependent on chemicals. Thus, producers and users of products are generating increasing quantities of hazardous waste: inks, paints, solvents, cleaners, lubricants, surplus pesticides, empty containers from households, oils from motor repair and service shops, adhesives from textile and wood-working firms, mixed

In the long run, cleaner production is the most cost-effective way to operate processes and to develop products

— Jacqueline Aloisi de Larderei

chemicals and chemical containers from commercial and school laboratories, drugs and infectious waste from hospitals and other medical establishments—the list goes on. It is hard to estimate the share of hazardous waste in the urban waste stream of developing countries, but a recent survey in Alexandria, Egypt, found that a third of all waste was industrial and most of it was contaminated.⁹ One of the problems is that industries in urban areas are small and cannot effectively manage their own waste, even though city managers feel that they should. As a result, nobody is dealing with the problem.

When these hazardous wastes enter a collection and treatment system designed for nonhazardous household waste, they can endanger workers during collection and handling. If urban waste is composted (a practice increasingly used in developing countries to recycle precious organic waste for reuse in agriculture), toxic compounds can be added to the soil and contaminate the food chain. If incinerated, urban waste can result in air pollution. If improperly disposed of in landfills, the waste can contaminate the surface and ground waters.

One reason for this perilous state of affairs is the low level of awareness of the problems among decisionmakers and the public. Another is the lack of training and education among municipal engineers for effectively addressing the joint issue of household and industrial waste management. Even so, there has been improvement in some countries, mainly those in which regulations have been introduced or tightened.

So, what are the solutions to these problems? As with issues in urban transport and energy, there is no general recipe. But there is a mix of ingredients that can be varied according to a particu-

lar city's problems and needs. The first step is to identify and quantify the major hazardous elements in the waste stream, through surveys and sampling. Rapid assessment materials are now readily available, and UNEP and the World Health Organization (WHO) recently produced a document on the rapid assessment of hazardous waste.

The second step is to evaluate the potential impacts of hazardous wastes so as to set priorities. A comprehensive hazardous waste or urban waste management system—collection, sorting, pre-treatment—must be put in place in partnership with the private sector. Part of this system should be to identify and, if possible, eliminate the hazardous waste at the source—through cleaner production. That means conserving raw materials and energy and reducing the quantity and toxicity of all emissions and waste before they leave a process. The goal of cleaner production is to avoid generating waste in the first place. In the long run, it is the most cost-effective way to operate processes and to develop and produce products. At the same time, waste management systems need to separate the toxic waste stream from the nontoxic. That means separate collection of such items as used oils, solvents, pesticides, and containers, many of which can be recycled.

None of these steps will lead anywhere, however, unless public awareness is heightened. People generally litter and dump waste because they are unaware of alternative solutions or of the hazardous conditions that dumping creates. Policymakers, too, need to be aware of the alternatives, and there must be more training and education for waste managers and their staff.

All this has a cost, of course, but so does doing nothing, for which the costs

are damage to people's health and to the environment and, ultimately, the economy. The costs of solutions are local, national, and global, but they can be shared through global partnerships. As in other areas of urban development, solid waste managers in industrial and developing countries are coming together to share information, problems, and solutions. The rub is that many policymakers in developing countries do not know how to start, join, or develop such partnerships. UNEP has published a docu-

ment that may be of help. *Partnerships for Sustainable Development: The Role of Business and Industry* examines sixteen partnerships spanning sixteen countries—from Brazil to the United Kingdom, from Kenya to the United States.¹⁰ It also shows how people come together to define the environment they want. But these partnerships are not short-term affairs. They require commitment and dedication over years, perhaps decades. They also require a step-by-step approach to sustainable development. ■

4. Energy: Efficiencies, Effectiveness, Equity

Imagine what we would have achieved by today, if starting in the nineteenth century with the industrial revolution in steam engines, we had squeezed every ounce of horsepower out of the wood and coal burned instead of building more and bigger power plants

— Charles Condy

For the past thirty years, developing-country governments and development agencies have clung to the belief that continually growing energy supplies are necessary to expand industry, provide jobs, and raise living standards. Today, this notion of equating energy consumption with economic prosperity is under attack.

Since 1960 developing countries have more than quadrupled their energy consumption and doubled per capita use—but at a price. Many countries have been left reeling from oil price shocks and are struggling with foreign debt, yet still face severe energy shortages. (More than 2 billion people still are not connected to their country's electricity grid.)¹¹ At the same time, energy use has caused untold damage to the environment and to people's health. Witness China, a country dependent on coal and coal-fired power plants. It is estimated that 14 percent of the country (its rain forests, crops, and ecosystems) has been damaged by acid rain, and its cities have fourteen times the amount of suspended particulates as cities in the United States.

According to a United Nations study, if current trends continue, carbon emissions in the developing world will rise from 1.8 billion tons in 1990 to roughly 5.5 billion tons in 2025. But that need not be so. In fact, by adopting new technologies and alternative sources of energy, developing countries could dramatically alter the future landscape. Demand-side management plans, too, can dramatically cut present and future energy consumption.

With new technologies, developing countries could avoid spending billions of dollars on dirty, smoke-belching power

plants (and billions more later to repair the environmental damage from these plants). These technologies have been available in industrial countries for twenty years. They include thermal storage, energy-efficient lighting, distributed generation systems, variable-speed motors and drives, and electronic controls for motors and pumps so that they run only when needed.

The potential savings from these technologies are enormous. A study by Lawrence Berkeley Laboratory estimates that developing countries could avoid spending \$1.7 trillion on new power plants, oil refineries, coal mines, and all the attendant infrastructure by spending \$10 billion a year over the next thirty-five years to improve energy efficiency and conservation. A report by the U.S. Office of Technology Assessment estimates that by cutting costs and using energy more efficiently, developing countries could save almost half their annual electricity production.¹²

Some country studies are even more revealing. In India, for example, there are 8 million (mostly old and inefficient) irrigation pumps, which consume almost a quarter of all the energy produced in the country. Replacing them with efficient motors and pumps would slash electricity consumption in agriculture by half. And the cost of doing that? A penny per kilowatt-hour.¹³ Another study shows that energy use in Indonesia could be cut by more than 10 percent simply by improving operating procedures.¹⁴ So, how do developing countries achieve these lofty goals? First they must adopt a program of energy efficiency and conservation and make achieving energy

efficiency a national priority. Then they must apply all the cost-effective renewable energy technologies possible.

Seeing the Light: The Solar Revolution

Alternative and renewable energy sources have a potentially crucial role to play in developing countries and in the business of sustainable cities. The technology is proven—whether wind power, hybrid diesel-photovoltaic systems, grid-connected photovoltaic power plants, biomass cogeneration, solar thermal electric plants, household solar hot water, or domestic solar electricity.

More than 2 billion people around the world, most of them living in rural parts of developing countries, remain unconnected to national power grids because it has been too costly to extend the grids to their villages.¹⁵ Now, thanks to a growing number of solar rural electrification projects, more than 1 million of them have access to enough electricity to power a few lights, a television, and a radio. Solar energy technologies are easy to install. Moreover, because they are modular, they can be expanded incrementally to meet additional heat or electricity requirements. For many small-scale applications, solar energy is the most practical and cost-efficient means of providing energy.

Solar energy can improve the quality of life in villages, helping to stem the flow of urban migration. Solar energy thus kills two birds with one stone: avoiding the costs, both monetary and environmental, of extending power grids to rural areas, and reducing the pressure on already overcrowded cities to provide electricity, housing, water, and other basic needs for the steady influx of rural migrants. What benefits the countryside benefits the city.

Increasingly, solar power is being seen as the only means of bringing electricity to people who might otherwise have to wait decades before being connected to the national grid—in places such as Nepal, where 90 percent of the people have no electricity; Zimbabwe, where 90 percent of energy produced goes to industry and only 2 percent of rural people have access to the grid; Sri Lanka, where nobody lives more than 15 kilometers from a power line but 70 percent of the population have no electricity; and China, where 126 million people have no electricity and energy and environmental crises loom because of the country's dependence on coal (box 1).¹⁶

The solar revolution is not a priority of most development officials, but it is beginning to creep from the countryside to the cities. Indeed, the market for solar power in developing countries could be even greater in urban than in rural areas. In many developing-country cities, half the residents have no access to power. They seem prepared to pay more for solar power that works than for subsidized central power generation that does not.

Solar energy production is not only nonpolluting. It is also the best form of energy conservation. If urban households can get their low-load electricity from neighborhood solar enterprises, much more conventional power will be available for urban commerce and industry, as well as for office blocks and apartment buildings.

Industry will continue to rely on hydropower and fossil fuels, but it can also be a strategic ally in alternative energy planning. Businesspeople well know the cost of electricity and will be the first to endorse cost-effective alternatives as they are introduced—first for low-load domestic applications and later for commercial and industrial needs.

Despite the billions of dollars that development institutions have poured into power generation in the past decades, the lights are going out all over the developing world as power shortages reach crisis proportions

— Neville Williams

Box 1. Bringing energy to China's powerless

China badly needs to develop new and clean energy sources. Coal currently accounts for 76 percent of commodity-based energy resources and 61 percent of energy consumption. Along with oil, coal accounts for the 600 metric tons of carbon dioxide (10 percent of the world's total) spewed into China's environment each year. The burning of coal is also responsible for 87 percent of the country's emissions of nitrous oxide. And although China mines about 900 million tons of coal each year, there is a growing gap between energy consumption and production. That gap could rise to 700 million tons of coal equivalent by 2000.

Unless China develops a national energy policy aimed at promoting economic growth, raising living standards, and protecting the environment, it faces environmental disaster and an economic slowdown. Since 1980 China's economy has been growing at 10 to 14 percent a year, but growth in the energy supply has been much slower, at 4 to 6 percent a year. As China's population increases (to more than 1.2 billion by 2000) and its economy continues to grow, so too will energy demand. Any national energy policy should focus on increased energy production, higher levels of energy efficiency and conservation, and, above all, the development of clean, alternative sources of energy. Over the long term, the aim should be for less reliance on fossil fuels.

China has been developing clean energy technologies since the early 1970s. It began with solar research and development, then moved into wind, biogas, geothermal, and tidal energy. These technologies have now reached the point at which they are considered economically viable, socially acceptable, and technically appropriate. Solar has the greatest immediate and long-term potential, particularly in urban areas. Geothermal and wind energy are limited to specific areas, such as Inner Mongolia, where 120,000 sets of 100-watt wind generators have sprung up. Biogas, including the use of urban waste, needs more research.

Solar resources are abundant in China. Some 71.5 percent of the country (home to half the population) is classified as a rich or fair "solar zone." Northwest China and Tibet, where skies are clear for much of the year, are superbly suited to solar energy. Given all these advantages, are governments, municipalities, and the public rushing to install solar equipment? No. Solar energy accounts for only a tiny proportion of China's energy use—0.42 million tons (coal equivalent) of energy in 1991, or 4/10,000 of all energy used. Why such low growth?

Attracting large-scale investment into solar manufacturing has proven difficult. And without sufficient investment, China's solar energy industry has been hard-pressed to maintain product standards and quality control, which has done little to enhance the consumer's view of the business. But the biggest obstacle is that people balk at the high up-front cost of solar energy compared with conventional sources. One answer to that may be revolving credit funds.

In the past few years the Solar Electric Light Fund, a Washington, D.C.-based NGO dedicated to bringing solar electricity to developing countries, established a revolving credit fund to promote the widespread use of solar technology in Gansu and other provinces of western China. Funds from international development agencies (such as the United Nations Development Programme, the World Bank, and the Global Environment Facility) and donations from other international and domestic sources will be channeled into this fund. Chinese farmers and herdsmen may purchase household solar systems on credit. The user makes only a small down payment, followed by annual installments that are no more than would otherwise be spent on kerosene or candles. The money from down payments and installments is plowed back into the fund and then made available to others to purchase systems.

Source: Anhua Wang, presentation on alternative energy options.

But how does the cost of solar energy stack up against conventional power generation? Kilowatt-hour cost comparisons are meaningless when solar energy provides reliable power and conventional power generation does not. Centrally supplied power from conventional sources often is unreliable in many developing countries. This happens not because of inappropriate technology, but due to badly managed government-owned utility systems that lack administrative autonomy and to inadequate revenues resulting from large subsidies for electricity that are mandated by the government. For example, families without grid power spend a large share of disposable income on dry cell batteries to run their radio-cassette players at a cost, according to energy economists, of \$60 per kilowatt-hour.¹⁷ The kilowatt-hour cost is not what matters to them. Playing their radio is.

For alternative energy supplies to offset urban energy shortages, three things are needed:

- An urban decentralized energy plan that concentrates on residential power supply.
- Independent power production—city by city, town by town, and neighborhood by neighborhood—through private companies, public-private joint ventures, or publicly owned cooperatives or enterprises.
- Increased financing from governments and multilateral institutions. According to the World Bank, solar energy can, in principle, supply five to ten times the total electricity demand of developing countries today while using less land than is currently used by hydroelectric projects. But Bank financing "in the pipeline" for solar and renewable forms of energy is less than 1.5 percent of its energy sector lending.

Thailand and Demand-Side Management

In some of the faster-growing economies, runaway energy consumption has begun to threaten economic growth. The governments of these economies increasingly are looking to demand-side management to curb soaring energy demand while continuing to encourage economic growth. Thailand achieved growth while giving virtually no consideration to energy efficiency or conservation, other than through pricing policies. But now the Thai government is taking tough measures to keep energy demand under control, including demand-side management.

Electricity demand in Thailand has doubled over the past seven years and now stands at almost 10,000 megawatts a year. According to the Electricity Generating Authority of Thailand, power needs will increase by at least 1,000 megawatts a year between 1992 and 1996, requiring a total investment in new power plants of about \$10 billion. This figure represents a staggering 60 percent of Thailand's foreign debt ceiling, leaving too little for other much-needed projects such as roads, hospitals, schools, water treatment, and environmental management.

The government wants to reduce growth in energy consumption from 13 percent a year to less than 10 percent.¹⁸ To achieve this goal, it embarked on an ambitious conservation plan (which was to be implemented through the 1992 Energy Conservation Promotion Act). The government also issued a policy directive to the electricity authority to develop a demand-side management

plan. This plan, which runs from 1993 to 1997, is expected to reduce peak demand by 238 megawatts and to reduce energy consumption by 1,427 gigawatt-hours. The six-part plan covers:

- *Residential sector.* These programs focus on increasing the efficiency of residential lighting and home appliances, such as refrigerators and air conditioners.
- *Commercial, government, and state enterprise sectors.* At the core of these programs are retrofitting electrical equipment for office buildings and promoting the design of energy-efficient modern buildings and the use of thermal energy storage rather than conventional chillers.
- *Industrial sector.* Because motors account for much industrial consumption, two programs will promote high-efficiency motors and variable-speed drives. Efficiency testing facilities also will be set up.
- *Load management schemes.* These include load control for residential and commercial air conditioning, new standards for the design of electrical systems for buildings, and a study on electricity pricing, such as time-of-day rates.
- *Education campaigns.* The public will be educated about energy efficiency through demonstrations for schoolchildren and cooperation among government agencies, the private sector, and the mass media.
- *Evaluation and monitoring.* Using customer participation, the electricity authority will monitor savings from the programs, and use the results to fine-tune the programs. ■

Solar power does not work too well in theory but is working very well in the real world, thank you

— Neville Williams

5. Transport: Getting There . . . at What Cost?

*In São Paulo
\$5 billion is lost
yearly because
of deficiencies
in the urban
transport system*
— Francisco Cristovam

Many publicly owned urban transport systems in developing countries are breaking down. Because of a lack of investment and maintenance, such systems (buses, subways, streetcars, and urban railways) are dirty, inefficient, and unreliable, as well as economic liabilities. At the same time (and in part because of the poor state of public transport), road traffic steadily increases. This is perhaps the biggest single problem in urban areas everywhere. More traffic means more congestion, pollution, noise, and deterioration of city streets, buildings, and public places—not to mention more traffic accidents.

Having failed as urban transport managers, many governments are searching for new ways to bring in the private sector. But that decision begs many questions. What form should that partnership take—public ownership with private operation, or outright privatization? Should urban bus transport be treated the same as urban railways? Will commercialization or privatization increase the quality, regularity, and reliability of services? Will it mean more investment? The answers depend on the urban setting.

Privatization is straightforward where services can be provided competitively. Many urban bus services, for example, have been wholly privatized. In Buenos Aires, Argentina and the Republic of Korea bus transport has been in private hands for years and has been running quite efficiently. In Buenos Aires some 250 private companies operate 15,000 buses and carry 10 million passengers a day. In Sri Lanka deregulation led to rapid growth in the number of private bus operators.

But not all municipalities and cities opt for total privatization of their buses. Indeed, some cities are tailoring their partnership with the private sector to suit their particular needs. São Paulo is a case in point.

São Paulo Looks to the Future

São Paulo is already one of the world's megacities, with a growing population of more than 10 million. The city is served by 10,000 buses (carrying 150 million passengers a month), a subway, and an urban railway. In addition, more than 1 million cars a day choke the streets.

For years, São Paulo's transport systems have been hard-pressed to keep up with population growth and the increase in road traffic (400,000 more cars each year). According to the São Paulo Municipal Transportation Authority, deficiencies in the transport systems cost the city \$5 billion a year in passengers' lost working hours due to delays, low fuel efficiency, traffic accidents, and environmental damage.

The public bus service lost \$46 million in 1992.¹⁹ Roughly one-third of its 3,000 vehicles were not only off the road but beyond repair.²⁰ Seventy percent of the city's passengers were already served by private companies, so privatization seemed appropriate. However, São Paulo did not privatize. Instead, it opted for an innovative partnership with private investors.

In 1993 tenders were invited to provide bus services to passengers under an arrangement in which the public authority retains control of finances. Passengers pay the public transport authority, which

in turn pays the contractor according to costs. Eighteen companies were awarded contracts.

There are also plans to introduce road corridors exclusively for buses and to install 10,000 electronic turnstiles, all privately financed. Although it is still too early to judge, the Municipal Transportation Authority forecasts that measures now implemented and planned will reduce the system's operating costs to 50 percent of the 1992 level. It also expects that the introduction of express lanes and bigger buses (which will mean fewer buses) will increase speeds and reduce air and noise pollution, improving the health of people and quality of life in São Paulo.

Unbundling Railways in Buenos Aires

Unlike urban bus systems, urban railways and subways do not easily lend themselves to total privatization. There can be but one operator, and to avoid the abuse of monopoly power, authorities usually wish to control the operation. That is why many have turned to concessions or leasing arrangements with the private sector. Such arrangements also eliminate the need for a regulatory authority, since the regulatory requirements are spelled out in the contract.

In many developing countries there is a single owner and operator (a state-owned enterprise or government agency) of all rail systems—city subways, commuter railways, intercity networks, and freight. Too often, these are overstaffed and inefficient operations, generating heavy losses that require heavy subsidies and losing market share. No single private company is comfortable investing in such monoliths. Thus, before the private sector will participate, state-owned operations have to be split into components

(“unbundled”) along geographical lines or by type of service.

By 1989 Argentine Railways was in dire straits. It was losing money heavily, and government subsidies as high as 1 percent of GDP (or 9 percent of the public sector budget) were needed to keep it operating.²¹ Sixty percent of its 35,000 kilometers of track was in poor shape, and 60 percent of its trains and 45 percent of its cars and other rolling stock were out of service.²² Argentine Railways was massively overstaffed. Revenues covered only 60 percent of the wage bill for its 92,000 workers, and on some urban lines half the passengers did not pay their fares.²³ Moreover, market share had hit bottom. Traffic in all three areas of Railways' business (freight, intercity, and commuter traffic), was less than half that of thirty years ago.²⁴ Railways carried less than 10 percent of all freight and less than 6 percent of city passengers.²⁵ Taxicabs were carrying more passengers daily (800,000) than the subway (750,000).²⁶

The government had two options. It could let the system grind to a halt in approximately five years, or it could unbundle and restructure the services and bring in private capital. Outright privatization did not seem viable because privatization plans could languish in Congress and Railways could be beyond saving. Concessions or franchises seemed the only answer.

Operational responsibility for many services was transferred to the private sector through concessions, loss-makers were closed down, intercity passenger services were transferred to local governments, and surplus assets were sold. Through an adjustment loan, the World Bank supported the early reforms by financing the severance pay of some 30,000 railroad workers; in all, the work force has been cut by 72,000.²⁷

Eventually, fewer than 20,000 people were working for the railways in public and private companies.

Five freight concessions and seven suburban concessions—including the Buenos Aires subway—were granted. It was deemed crucial that the subway

remain in service because of the projected high growth in passenger and freight movement in the city, which road transport would not be able to handle. The government also recognized that it would have to pay a transitional subsidy to the private operators of the commuter and subway lines. The subsidy, to be phased out over seven years, will total \$1.2 billion, but official estimates put investment by the private operators over the next ten years at \$1.5 billion.²⁸

The new operators estimate that commuter traffic will double in the next ten years and that subway traffic will increase by 60 percent. Traffic has grown by about 15 percent on the lines already transferred. Revenues on some lines have skyrocketed. On the Belgrano South line they are up 97 percent, and most passengers are paying their fares.²⁹

If the privatization of Japan's national railway is any guide, the future of unbundled rail services in Argentina could be bright. In Japan the gains from unbundling were enormous. Freight volumes, which were falling before restructuring, have risen, and rising unit costs have fallen.

Getting the Prices Right: The Dutch Model

But whether these public-private partnerships will yield the expected benefits in Argentina remains to be seen. Such arrangements should not be viewed as a panacea for urban transport problems. Privatization and commercialization can improve the financial position of the public transit system and increase investment. They can also lead to less investment. Services can improve, or they can deteriorate. Fares can increase and send passengers fleeing for the exit. In Eastern Europe, for example, fare

Box 2. Will the electronic car take to the road?

Should automobile technology be concentrating on new and better ways to reduce carbon emissions? Or should it be developing what some call the electronic car, powered by electricity and made of advanced super-lightweight and super-strong (carbon-fiber-based) materials?

There have been huge strides in reducing emissions in industrial countries in the past twenty years, but according to the U.S. Environmental Protection Agency vehicles are still responsible for more than 80 percent of carbon monoxide pollution and 44 percent of nitrous oxide emissions.* Urban air quality has improved, but many cities still fall short of legislated air quality standards, particularly in developing countries where there are minimal, if any, emission controls. Even with further technological advances over the next ten years, it is unlikely that all harmful and polluting emissions will be eliminated.

The basic technology of cars has changed little since Henry Ford rolled his Model T's off the production lines in 1910. The motor car is still steel-bodied, it is still driven by the internal combustion engine, and it still loses 85 percent of the gasoline it guzzles in waste heat. But will the electronic car ever replace it?

The electronic car, which is particularly well suited to urban driving, is being developed down two paths—the battery-driven car and the electric hybrid. Battery-powered cars now have a range of only 80 to 100 miles, but that may double in the next few years. Rather than storing all the energy needed in a battery, the hybrid has a small on-board engine (an advanced diesel or two-stroke engine or a small gas turbine) and generator. Its emissions would be extremely low, and its efficiency levels more than twice those of today's automobiles. Moreover, these cars incorporate regenerative braking. Every time a driver hits the brakes, the generator is engaged and electricity is produced to charge the battery. In urban driving, which is usually in fits and starts because of congestion, that is a big bonus.

One hurdle to developing the electronic car is the lack of investment. Another is the resistance of the world's big carmakers. But some policy measures may be changing that. In California, for example, 2 percent of all cars sold in 1998 will have to produce no emissions at all—that is, they will have to be battery-run. That figure will rise to 10 percent by 2003. New York and Massachusetts have adopted similar standards, and other states are considering doing the same.

What does all this mean for developing countries and their cities? It is hard to say, but policymakers may be asking themselves a few questions. Should their countries be developing an internal-combustion-powered car industry based on steel (and investing in oil refineries and all the rest of the automotive infrastructure) when industrial countries may be about to move in quite a different direction? Many of the companies developing the alternative technologies are seeking partnerships not only to develop the cars but also to produce them, particularly in the fast-growing car markets of Asia and Latin America.

* From Dale McKinnon, presentation on innovations in emissions.

Source: Christopher Flavin, presentation on innovation in emissions reduction.

increases accompanied the commercialization of public transit systems, in part because of rising energy prices. The result was a rapid decline in the passengers and freight carried and a shift to road transport, which raises a fundamental question about the privatization of urban transport systems. Will private sector involvement do anything to halt (or even reverse) the increase in road traffic?

The problem is that road users are heavily subsidized. Road users do not pay the full cost of building roads nor of maintaining them. Until they do, some

transport economists think that regardless of who operates subway and commuter lines, urban traffic will continue to increase and continue to destroy the urban environment and afflict public health (box 2).

Some suggest the Dutch model as a solution. In the Netherlands railways, streetcars, subways, and bus lines all operate with heavy subsidies, while road users are increasingly heavily taxed. Is this the way forward toward an environmentally sustainable transportation system? The jury is still out. ■

6. Waste or Valuable Resource?

Solid waste management in most developing countries is the responsibility of the municipal sanitation department. It is one of the most expensive services that towns and cities provide. Adequate services can consume up to 2 percent of gross national product, and even inadequate services can eat up 20 to 50 percent of city revenues.³⁰ Moreover, municipalities typically collect only 50 to 70 percent of solid waste and all too often fail to dispose of it in an environmentally safe way.³¹

Many cities in developing countries cannot keep pace with urbanization, population growth, and the increasing generation of garbage. In 1964 Gabarone, Botswana, had a population of 3,855. Rapid growth in commerce and industry swelled the population. The city had planned for a population that would grow to 120,000 by 2000. But today, Gabarone has 180,000 residents and generates almost ninety tons of solid waste each day, compared with thirty to forty tons in 1985–89.³²

Most cities fall woefully short of equipment and facilities to meet the growing need for solid waste management. Even where investments have been made, it is often only a few years before services degenerate because of lack of spending on repair and maintenance. Of the forty garbage trucks purchased in Conakry, Guinea, in 1988, for example, only eleven were in operation five years later.³³ Of the thirty trucks bought in Dar es Salaam, Tanzania, in 1987, only three were still on the road in 1992.³⁴ Given the many failed investments, governments and development specialists are turning to the private sector for solutions.

Solid wastes are usually defined as all nonhazardous solid or semisolid materials discharged by homes, industry, and commerce, as well as from public streets, drains, and open spaces. Increasingly, urban waste is becoming contaminated by hazardous materials, not only from industry but also from hospitals, homes, and research and school laboratories.

Broadly, solid waste management can be split into two activities: collection and disposal. Within these areas are many options for private sector involvement—through contracts, franchises, concessions, or outright privatization (with some government regulation). In almost every developing-country city and town, the private sector can collect urban solid waste more cheaply and more efficiently than can public authorities. Waste disposal, which has large externalities and economies of scale, calls for more direct government involvement. But even in disposal, there is plenty of scope for collaboration through metropolitan or regional entities operated under contract with the private sector, as in Caracas, São Paulo, and other cities in Latin America.

Private Sector Preference

What does the private sector have that the public sector does not? Perhaps most important is management flexibility. In refuse collection, for example, the public sector is often overstaffed, with older workers who are less productive—and even ghost workers, who never put in an appearance. (In one African nation ghost workers make up an estimated 20 percent of the public sector work force in refuse collection.)³⁵ The private sector, by

contrast, hires according to performance and need, often using casual and contract workers and relying heavily on overtime to boost productivity. Many municipalities, however, are committed to using full-time staff, with little flexibility. In Bogotá, Colombia, refuse collectors worked a daily shift of only 6.5 hours, which was one of the prime reasons for privatizing garbage collection.³⁶

Freedom from red tape is another big plus for private operators. If a vehicle breaks down, a private firm is free to repair it immediately or to rent another truck. Not so for many municipal sanitation departments. In many cities obtaining approval for spare parts purchases can take two or three weeks.³⁷ Every check for spare parts must be signed by the local government treasurer, which makes for more delays; even minor repairs can take up to two weeks; and trucks (even new ones) are often cannibalized to keep the others running.

In many Latin American countries high turnover of professional and skilled staff is a problem in public sector waste management. In some countries professionals are often political appointees and rarely stay in their positions for more than two years. Private firms are better able to maintain continuity of professional staff. For one thing, they usually pay more. Private sector supervisors may be paid up to three times more than government supervisors. One Asian city pays private sector drivers 25 percent more than their public sector counterparts.³⁸

Private firms have some clear advantages over government-run services and, if done properly, privatization can save municipalities money and make a profit for the private firm. In the past, however, private investors have been reluctant to put money into solid waste management. And where they have, successes have

been few and far between. Why have private investors shunned solid waste management? What are the prospects for rekindling private sector interest in solid waste management? And what form should private sector participation take?

Why Private Firms Balk

Among the biggest deterrents to private sector involvement in solid waste management are a slew of hidden costs, ranging from the high cost of capital to import duties on equipment and bribes, which local governments and municipalities do not have to pay.

Interest rates on local-currency borrowings for the solid waste business are high. In one Caribbean nation, for example, the cost of capital to private firms was roughly 60 percent a year in 1993, compared with the 43 percent paid on treasury notes.³⁹ This discrepancy is not untypical. Such differences can be found in many countries. Most private companies report paying rates 40 to 100 percent higher than the interest paid on treasury notes.⁴⁰ On short-term loans, private firms pay as much as 90 percent, compared with the rates of less than 40 percent that local governments can obtain.⁴¹

Only a few countries exempt solid waste management equipment from import duties. Most do exempt such imports from customs duties for local governments but not for private firms. As a result the capital costs of private companies in the country can be 45 percent higher.⁴²

Private firms also bear hidden costs in the form of bribes. In one country, for example, a private firm trying to get a contract (or payment on an existing one) has to employ a "skater"—someone who skates the papers or bill from desk to desk to obtain the necessary approvals. For

The cost of solid waste systems in developing countries ranges from 0.5 percent to 2 percent of GDP

— Sandra Cointreau-Levine

small firms, these and other costs of corruption can amount to 5 to 10 percent of a contract's value; for larger firms with bigger contracts, they can top 30 percent.⁴³

Governments and municipalities might not be able to eliminate some of these hidden costs, but they must take them into account if they want the private sector to participate in solid waste management. Unless agreements, contracts, and franchises allow operators to make a decent profit, there will be no private sector involvement.

How to Do It Right: Competition, Transparency, Accountability

In the right environment, private sector participation can mean higher productivity per worker and per vehicle. To maximize those gains, contracts and concessions must be awarded through competitive tendering, which is transparent and accountable. But sometimes what appears to be competitive requires a closer look. One city in Asia has fourteen private sector garbage collectors who were able to renew their contracts year after year, despite competitive bidding. Moreover, all the bids fell within a narrow range (differing by only about 1 percent), and several of the companies were owned by the same people.⁴⁴ A city in Africa awarded a contract for a pilot refuse collection project not to the lowest and most experienced bidder but to a firm whose bid was \$300,000 higher. The difference virtually eliminated the savings forecast from private sector involvement.

Successful private sector involvement also requires contracts that are long enough to allow depreciation of investment, large enough to allow economies of scale, and competitive enough to encourage efficiency. Moreover, the service should be divided among several

competing private companies and perhaps the local authority. Places as different as Bogotá, Colombia, and Phoenix, Arizona, have adopted this approach, which appears to work well. The cities are divided into refuse collection zones, with collection service in some of them awarded through contracts to the private sector and coverage in others retained by the local authorities.

Contracts or franchises involving investment in vehicles should run for a minimum of five years, and those involving investment in facilities, such as incineration plants, for at least ten years. Shorter periods lead to higher prices because contractors are forced to depreciate over periods shorter than the asset's economic life. If the private sector has limited capacity to invest in solid waste management, low-cost borrowing through subsidized credit lines could be arranged. Alternatively, the contract could be extended beyond the standard depreciation period. For example, when low-cost borrowing is possible, the loan for a garbage truck would match its depreciation period, typically five years. But when such borrowing is not available, the contract should be extended to seven or eight years to allow a longer payback period.

Performance terms need to be carefully and clearly spelled out in the contract. Vagueness may mean problems further down the road. Many contracts simply require "cleaning" the zone, which is meaningless. Contracts should specify the quantity and frequency of waste collection. They should also include environmental requirements, such as covering each load with a tarp, and set standards for worker safety protection, including provision of gloves, boots, and uniforms.

The key control point of the solid waste system is the unloading. To monitor

the performance of public services compared with private in urban areas, records of all load volumes and weights are essential. To keep such records, a separate monitoring office within local government may be necessary, or, as in Bogotá, a private consulting firm could be hired. All private sector waste collectors and transporters should be charged a tipping fee at their unloading point. Clandestine dumping has to be outlawed, with rigorous enforcement of the law.

Private sector involvement in waste management also requires municipal strengthening. Local governments need technical assistance and training to prepare comprehensive and secure contracts and estimates, and to monitor service delivery. Very often, training is needed on the technical aspects of solid waste management and on procurement procedures. When preparing estimates for tendering, the government needs to carefully consider the full costs that the pri-

vate sector will have to bear (including debt service, insurance, registration, fair wages and benefits for workers, uniforms and protective gear, and marketing) and still allow an acceptable profit margin. Private sector firms also need to detail hidden costs and seek contingencies for increases in those costs over which they have no control—for example, when labor and fuel costs are controlled by government.

Some municipalities in developing countries are leery of tying themselves into a ten-year (or even five-year) contract without some evidence that residents—and public finances—will be better off. It is important to proceed with caution. Privatization is not a panacea, but with competition, accountability, and transparency at each step, solid waste management in most developing countries can be carried out more efficiently and more cheaply by the private sector. ■

7. Global Partnerships: Incentives and Impediments

*From my perspective
sustainable
development involves
four dimensions,
and none can be
sacrificed for the other:
social equity,
ecological integrity,
a new economic
paradigm,
and participation*
— Alicia Bárcena

Think globally, act locally—these are the watchwords of a new breed of transnational organization that aims to quicken the pace of environmentally sustainable development and of improvement in the well-being of city dwellers in developing countries. Although global partnerships can take many forms, they are essentially international networks of local partnerships under the umbrella of an independent, nongovernmental organization. The partners include local people and community organizations, the private and public sectors, and sometimes development agencies, research centers, and the media. Besides involving the private sector (especially the small entrepreneur) in the development process, most of these partnerships seek to transfer successful innovations and workable practices from one culture or country to another.

Some global partnerships see themselves as the missing link between transnational and multinational corporations and the transnational and multilateral agencies of governments, the United Nations, and the World Bank. Private business stimulates a massive flow of ideas and knowledge around the globe, but grassroots leaders and community organizations trying to solve urban problems often have no way of knowing what has worked elsewhere. Global partnerships of nongovernmental organizations bridge that information gap.

All too often, grassroots organizations are seen as parochial and narrow-minded, governments as corrupt and bureaucratic, the private sector as motivated by greed, and academics as denizens of ivory towers who know little of the real world. Because NGO partner-

ships are independent and nonprofit, they can neutralize the mistrust that often exists among the various players. Moreover, most NGO partnerships are narrowly focused. They do not try to be all things to all people. One may concentrate on spreading the word on good city management, another on the best way to involve small entrepreneurs in municipal services.

Are such partnerships the way to speedier development? Most are but a few years old. However, new approaches are needed if there is to be rapid improvement in urban environments. Clearly, conventional solutions cannot do it on their own. The \$100 billion to \$150 billion invested annually by developing countries in infrastructure is far short of what is needed, and foreign aid is unlikely to fill the gap in the near future.⁴⁵ The former planning director of São Paulo, Jorge Wilhelm, estimated that it would cost the equivalent of thirty years of the city's annual budget to correct deficiencies in the physical and social infrastructure.⁴⁶ And time is on nobody's side. The world, especially the developing world, is becoming increasingly urbanized. From 1950 to 2050 the urban population of developing countries is expected to grow from 200 million to 3.15 billion, almost four times the projected urban population of industrial countries in 2050.

Partners in Grime

Global partnerships tend to share the same view of urban development. First, that most urban institutions are weak, and that past government policies and

programs have often made the situation worse, not better. Second, that few projects succeed without early involvement of people and communities; lip service to participation is not enough. Third, that some of the best ideas and innovations come from local experience—from the people, community groups, and small-scale enterprises. And fourth, that more could be done to involve the private sector in general, and the small entrepreneur in particular.

One global partnership that tries to address some of the institutional weaknesses in urban management is the U.S.-based International City/County Management Association, an association of professionals, city managers, directors, and others interested in promoting better local government. Although the association dates to 1914, only in the past six years has it become international (at the request and with the help of the U.S. Agency for International Development), providing technical assistance to developing-country municipalities. The great strength of this partnership is that many of its members are urban management practitioners; thus, it is more readily accepted by city managers in developing countries.

Its first program, a pilot, provided administrative and technical assistance to strengthen local governments in Honduras. Programs have since spread to other countries, including Botswana, Mexico, and countries in Central Europe and the former Soviet Union. The association is providing technical assistance to Nuevo Laredo, a town just south of the U.S.-Mexican border that is home to many *maquiladoras*—the mainly U.S.-owned manufacturing and assembly plants. With joint U.S.-Mexican funding, Nuevo Laredo is building a 50-million-gallon-a-day wastewater treatment plant, one of the

first among border towns. The association is helping the town to develop, implement, staff, and provide enforcement for a program to provide pretreatment capabilities to the *maquiladoras*.

Essentially, the association is in the business of transferring the best practices in city management to developing countries. For that purpose, it has set up an international municipal management institute in Tempe, Arizona, which covers such things as public works, finance and budgeting, service delivery, organization, administration, community relations, citizen participation, and local economic development.

How to Replicate

The notion of replicating or amending and then transferring (locally, nationally, or internationally) proven practices and successful innovations is not new. In agriculture and rural development, replicability has long been one of the standards by which projects are judged. What is new is the application of the idea to urban problems.

Agricultural problems are often peculiar to certain soils, types of agriculture, or climate zones. In urban development the problems and solutions are far more similar—whether in Los Angeles or Mexico City, whether in solid waste or transport. These similarities engender much greater scope in urban management for replicating and transferring innovations among cities in industrial and developing countries. That was part of the thinking behind the Mega-Cities Project. It concentrates on the twenty-three cities that are expected to have populations of at least 10 million by 2000. Most of these are in developing countries.

The Mega-Cities Project created a global partnership to move from the

We must be cheerleaders to raise the enthusiasm of environmental managers because theirs is a very difficult and thankless task

—Troy A. P. Davis

*Problems are so often
linked with city size
and management
capacity that in many
ways Bombay,
New York City,
Rio de Janeiro, and
Shanghai have more
in common
with one another
than with the smaller
cities and towns
in their own countries*

— Janice E. Perlman

present city to the possible city. It begins not with problems, but with what has worked and what can be replicated. The Mega-Cities Project differs from traditional information exchange in that it acts as a catalyst for social change and policy transformation. It incorporates the four conditions that, according to John Kingdon, are necessary for pressing problems to reach the public policy agenda.⁴⁷ First is a political window of opportunity—new elections, new commission, new mandate, and so on. Second is favorable public opinion for action on the issue. Third is a tried and tested solution to the problem. And fourth is a broker to link the solution and the decisionmakers.

Environmental resources may be scarce in cities and financial resources even scarcer, but there are human resources in abundance. The Mega-Cities Project sees the world's cities as laboratories for the next generation of urban innovations, which will be disseminated in a four-way flow. For example, a tree planting project began in Rio de Janeiro, where for the first time the municipality paid workers for self-help. The scheme was transferred from Rio to Jakarta and then to Los Angeles. Indeed, the first transfers of innovations were from developing to industrial countries.

Like the Mega-Cities Project, most global partnerships have adopted a bottom-up approach—getting people, neighborhoods, and community groups to identify needs and participate in solutions. Apparent solutions to urban problems often fail if they are imposed from outside (whether by government, development banks, or others) rather than demanded from within. Real participation in decisionmaking frequently leads to grassroots innovations. Invariably, there is quicker local acceptance of

change and a commitment to the project's success if local people are kept informed and treated as intelligent human beings. In Madras, for example, a partnership called City Services involved everyone in decisions on a proposed water recycling plant. Even though no industrial process in Madras needs fresh water, industry was swallowing up 40 percent of the city's fresh water, a gross misallocation of resources. When the problem was explained and a possible solution offered, people accepted the project much more readily.

City Services was set up by the Swiss-based Business Council for Sustainable Development and the United Nations Development Programme. Together they identified three areas of urban infrastructure with pressing problems—water, waste, and energy. City Services reckoned that many small-scale private sector projects never got off the ground because not enough effort was being put into the earliest stages of the project cycle. Small entrepreneurs had neither the time nor the money for long prefeasibility discussions with mayors and city departments about the possibility of delivering services through the private sector, about the question of tariffs and fees, and so on. This is precisely what City Services does: it packages municipal projects for the small businessperson.

Too New, Say Some

So why, if global partnerships hold so much promise, are there not more of them? One of their strengths is also a weakness—their independence. Because they are not lobbyists or a club for big business, and probably because they are new, large companies are reluctant to support them. Similarly, they are not the pet projects of any particular government.

and no national government provides funding. Another problem stemming from their youth is that they have not yet fostered a spirit among members of belonging to a global network or family—working locally but developing relationships with people in other countries and a willingness to learn from them. All that may change when these new organizations become more established and successful, but some partnerships see a more serious impediment to their development—institutional inertia, in both the public and the private sectors.

Administrative bureaucracies tend to be process-driven, not objective-driven. That is the real problem. Rules and processes make it difficult for these institutions to form partnerships with organizations trying to do something innovative. In short, there is a very low threshold for risk-taking in some institutions. Moreover, there is little sense of urgency. There is no

great pressure to deliver the goods in a timeframe that would be acceptable to private sector firms.

None of these are issues of bad faith, incompetence, or even unwillingness. They run more deeply. They are issues of organization and structure—and they must be addressed if these new organizations are to be given a chance to develop their potential. As one pioneer of global partnerships wrote:

Throughout history, cities have been the crucibles of culture and the source of major advances in civilizations. The boldness of our quest for deliberate social change and the transformation of urban practices (from the neighborhood level all the way to the city, national, and international levels) is at the heart of whether we continue to project nineteenth-century solutions into tomorrow's world, or finally make the leap into the twenty-first century.⁴⁶ ■

*Involving the people
is not an impediment
to progress; it may be
a precondition
to progress*

— J. Hugh Faulkner

8. The World Bank's Perspective: Pitfalls and Prospects

In a final session three senior World Bank officials offered the Bank's perspective on public-private partnerships in energy, transport, and solid waste management as an answer to sectoral and cross-sectoral problems. Trevor Byer spoke on energy, Richard Barrett on transportation, and Carl R. Bartone on solid waste.

Energy

One of the biggest environmental problems facing cities in developing as well as industrial countries is motor vehicle exhaust emissions. The economic loss from traffic congestion can also be huge. In Bangkok, for example, it is estimated that a third of the city's GDP is lost to congestion-induced delays. These are issues of growing concern to the World Bank, issues to which it is giving increasing attention. Will the automobile play the kind of role in developing countries that it has played in North America? Will it reign supreme while some forms of public transport are considered unfashionable, even undesirable? And will that mean poor public transport policies? At the very least, developing-country cities should be moving toward lead-free gasoline and possibly toward natural gas for fleets of buses and taxis.

Another issue on which the World Bank's energies are being brought to bear is the extensive use of biomass for cooking, particularly in Africa and South Asia, and the particulates that it throws into the atmosphere. Not only is cooking with biomass fuel inefficient, but it damages the health of the cook and of others, especially when done indoors. And where biomass is taken from forest cover,

it damages that natural resource. Simply shifting to kerosene for cooking would improve energy efficiency by a factor of eight to ten and eliminate the danger to health. However, in most developing countries, this would incur significant foreign exchange costs.

Some speakers implied that the developing world could achieve close to zero growth in energy use if demand-side management and investment in energy efficiency were stepped up substantially. That is not a vision that the World Bank shares. There is great danger in thinking that the energy problems in the developing world can be solved by looking only at the demand side. That is like looking through just one lens of a pair of glasses.

Over the coming decades, energy consumption in the developing world will increase substantially, although, thanks to improved energy efficiency, perhaps not to the levels of industrial countries. But that improved efficiency will not be achieved simply through technology. Many things have to be fixed. Many governments need convincing that prices have to be freed and the policy environment improved.

There has been much criticism of the World Bank for its supply-side focus on energy. The Bank has taken heed and increasingly is using the other eye—not just the demand-side or supply-side eye, but both eyes. It has introduced new policies for its power and energy efficiency operations, and a report on the success of those new policies over the first eighteen months has been presented to the Bank's board of directors.

The Bank is also addressing its skill mix. Given the new focus, it needs people

with experience in energy efficiency, particularly in the area of regulation. In developing countries, reform without regulation is a recipe for failure. Another area where the Bank has intensified its efforts is building the enabling environment—one in which the private sector takes the lead and the government simply regulates.

The Bank also has strongly pushed solar energy initiatives. And it has strengthened its units covering alternative and biomass energy—in the Asia technical department, for example, as well as in divisions covering industry and energy.

There are constraints on the World Bank, however. One of the biggest is its procurement rules. A dynamic private company operating with Bank financing would find the Bank's procurement rules and processes a nightmare. Another barrier to private sector participation is that the Bank and other multilateral lending institutions cannot lend directly to the private sector without government guarantees. And the last thing governments are prepared to do today is to dole out guarantees on loans to private investors.

Transport

Does the past hold the answer to the future? Unlike many cities in industrial countries that scrapped streetcars twenty-five to fifty years ago, Zurich has retained its system. Streetcars have priority on the streets, and the whole system works with nonpolluting efficiency despite old rolling stock. Streetcars can be a solution in some situations, but there is no single answer to the urban transport problems of cities in developing countries. Argentina, Brazil, and Malaysia all found different solutions, through public and private partnerships.

The disappointing aspect of private sector involvement in transport is that much of it came about as a result of the desperation of public authorities. Unable to maintain their fleets and keep them on the streets, they had no choice but to go hat in hand to the private sector. But it is important to recognize that the private sector can be a partner even where a city's transport system is functioning well.

More could also be done to promote nonpolluting forms of transport—and not just electronic cars and the like. In Europe and Japan the bicycle is encouraged as a mode of transport. In Finland and the Netherlands planners give cyclists a high priority.

There is an important link between transport and land-use planning. For years, that was seldom recognized, but things are changing. The California Energy Commission's Planning for Community Energy, Economics, and Environmental Sustainability (PLACES) is a step in the right direction. In effect, this program says to planners, if you want to plan and build a new community this way, these are the implications not just for household energy, but for transport, sewage lines, and so on.

One of the fundamental problems in cities is the private car and the type of energy it uses. Transport-related environmental problems stem mainly from the failure to address the real costs that cars impose on society. And those costs are increasing daily. The question now being asked is whether current urban traffic patterns are sustainable—globally, regionally, and locally.

The auto industry is a major consumer of resources—60 percent of the world's natural rubber output, 20 percent of steel, and 10 percent of aluminum products. Moreover, a significant amount of greenhouse gases is due to vehicle emissions.

The transport sector in the United States alone contributes 31 percent of all carbon dioxide emissions. Worldwide, motor vehicles contribute 14 to 16 percent of fossil fuel carbon dioxide and 25 to 30 percent of nitrogen oxides. The picture is worse in urban areas. Road traffic accounts for 90 to 95 percent of carbon monoxide and lead emissions and for 60 to 70 percent of nitrogen oxides. Even on the most conservative estimates of growth in population and in the use of the automobile in developing countries, the future looks bleak.

Although the implications of the motorization of the world are global, regional, and local, the issues are best tackled locally. No longer can drivers use private cars in the way of the past. New roads gobble up land. The infrastructure costs are enormous. And in developing countries there are problems of equity—between those who cannot afford motor vehicles and those who can.

Other problems are also more severe in many developing countries. First, the cars are usually in very poor condition, and the quality of fuels is lower. Leaded fuel is used extensively in many countries. Second, motor vehicles tend to be concentrated in a few large cities, with some cities having 50 percent of the national vehicle fleet. Moreover, because of the warm climates in most developing countries, many people, particularly children and the poor, spend much of their time in polluted street environments, and their health suffers as a result. In Mexico City, for example, it is estimated that more than 12,500 deaths a year can be attributed to the high particulate levels from motor vehicle emissions. In addition, 11.2 million working days are lost each year in Mexico City, and 140,000 children require remedial education because of lead inhalation.

Although there is no single solution for all cities, urban transport policies should have the same broad objectives. For sustainable development, those policies need to restrict the consumption of fossil fuels (thereby reducing emissions) and move toward nonpolluting energy systems. Also needed are restrictions on the consumption of land and other natural resources, a more holistic approach to planning, and greater efficiency in energy use. All these measures will improve health, social conditions, and amenity values in cities.

For both industrial and developing countries, the overriding priority is fuel pricing reform. Until the real external costs are reflected in the price of gasoline, it will be difficult to create viable public transport systems. In developing countries the main concerns relate to health, public transport, and nonmotorized transport. The most important priority (after fuel pricing reform) is to introduce cleaner fuel technologies. These measures, along with better traffic management and demand management in the biggest cities, will do much to improve transport efficiency and to reduce pollution. Improved traffic management can also help reduce accidents and speed the development of public transport. A key issue for developing countries is to keep public transport affordable. Subsidizing some routes may be necessary because the alternative—no transport—will hurt the very poor.

In all countries authorities need to recognize the important role that the private sector can play. Experience shows that public ownership leads to inefficiencies and to subsidized networks. By contrast, a strong commercial approach without government interference can result in well-managed and efficient transport operations.

Solid Waste Management

There is evidence that private sector delivery of solid waste management services in cities can be successful—in terms of both efficiency and quality. The private sector can provide lower-cost services, higher coverage, better technology, and better services in general. There are many factors in this success.

First, competition counts. In a competitive environment with accountability and with transparency in bidding and contracting, better services can be provided and at lower cost.

Second, in any effort to build public-private partnerships, political will is crucial—to create policy, to foster an environment friendly to the private sector, to introduce or modify a legal and regulatory framework, and to assume some of the sovereign (but not commercial) risks. Sovereign risks include exchange rate volatility and decisions on fuel pricing—factors over which the private sector has no control. Some form of guarantee in those areas (perhaps through indexing) may be necessary to adjust contract prices.

Third, there is a tremendous need to build local technical capacity. Authorities must have the capacity to manage the contracting of services with the private sector and the technical capacity to understand the costs of service delivery.

Fourth, there should be a strategy of unbundling services to develop competition, for example, by dividing a city into collection districts and bidding them out separately. One caveat: unbundling does not always work. There may be a need to consolidate services in some areas, particularly in environmentally sound disposal.

Although the focus is often on solid waste management, there is also a need for public-private partnerships in waste

generation. Public and environmental authorities must work more closely with industries, moving toward cleaner technologies and introducing environmental audits and waste reduction programs.

There are many green (and brown) technologies on the shelf, but municipal authorities often are unaware of them. The private sector can be a key agent in technology transfer.

There are other areas, too, where public-private partnerships can have huge payoffs. One example is recycling, which is much needed ecologically and can create jobs. Cities provide ready markets for many recycled products. For example, urban presses can use recycled newsprint.

There can be pitfalls as well as benefits in involving the private sector in delivering solid waste services in cities. The watchwords here are competition, transparency, and accountability. Attaining each of these requires a legal and regulatory environment and the political will to pursue the building of partnerships, as well as the needed managerial and technical capacity.

Whatever the hurdles to be overcome or the pitfalls to be avoided, the World Bank is optimistic about the future of the world's cities. There are revolutionary changes taking place that may fundamentally alter the reasons for urban development and the way cities and towns are managed. The revolution is in technology, values, and participation.

The revolution in technology (fundamentally in communications) has allowed the number of telecommuters in the United States to reach 7 million, and more companies are experimenting on a large scale. If telecommuting became the norm, urbanization would be slowed, if not reversed. The dire predictions for the megacities might not come true. There is a revolution, too, in values—of what is

*At the end of the day
is urban organic waste
a lost resource for the
renewal of rural soils?*

— Joan Martin-Brown

If these institutions are going to change . . . the people working at the grassroots need to make their voices felt in governments. Governments need to make their voices felt in the UN and the World Bank

—Richard Barrett

considered minimally acceptable to improve people's quality of life. These values include environmental and human rights issues. The third revolution—in participation—is turning the organization of society upside down, reversing centuries of guidance, control, and direction from the top. It is organizations of people—and it is the move from profit to non-profit, from institution to community and grassroots participation.

Institutions such as the World Bank are not unaffected. Indeed, they must change. The World Bank must transform from an institution in a command position to one that is there to listen and to connect all those involved in the development process—to bring together communities, institutions, and the public and private sectors, to solve problems of people and improve their quality of life. ■

Notes

1. This chapter is based on the presentations by Mauricio de Maria y Campos, "Old Values, New Visions," and by Jan A. Hartke, "Imagining the Possible."

2. From the comments of F. Ranil Senanayake.

3. From Pierre Laconte, presentation on framework and sectoral linkages in transportation.

4. Laconte.

5. Laconte.

6. Laconte.

7. Laconte.

8. Laconte.

9. From Jacqueline Aloisi de Larderel, presentation on framework and sectoral linkages in solid waste.

10. United Nations Environment Programme, *Partnerships for Sustainable Development: The Role of Business and Industry*. Prepared by the Prince of Wales Business Leaders Forum (London: Flashprint Enterprises, Ltd., 1994).

11. From Charles Condy, presentation on energy efficiency and demand-side management.

12. Condy.

13. Condy.

14. Condy.

15. From Vichit Punyahotra, presentation on energy efficiency and demand-side management.

16. Punyahotra.

17. Punyahotra.

18. From Neville Williams, presentation on alternative energy options.

19. From Francisco Cristovam, presentation on private sector financing and operation of transport systems.

20. Cristovam.

21. From Jorge H. Kogan, presentation on private sector financing and operation of transport systems.

22. Kogan.

23. Kogan.

24. Kogan.

25. Kogan.

26. Kogan.

27. Kogan.

28. Kogan.

29. Kogan.

30. World Bank, *World Development Report 1994: Infrastructure for Development*. (New York: Oxford University Press, 1994); Sandra J. Cointreau-Levine, "How to Do More with Less: Reducing Solid Waste Service Costs."

31. World Bank, *World Development Report 1994*.

32. From Francis L. Masenya, presentation on private sector participation in waste collection and disposal.

33. From Sandra Cointreau-Levine, field notes from solid waste assignments in developing countries, 1978–94.

34. From Mohan Munasinghe, "Protecting People from the Hazards: Municipal and Industrial Solid Waste, Overview," in Ismail Serageldin, Michael A. Cohen, and K. C. Sivaramakrishnan, eds., *The Human Face of the Urban Environment: Proceedings of the Second Annual World Bank Conference on Environmentally Sustainable Development*. ESD Proceedings Series no. 6 (Washington, D.C.: World Bank, 1995).

35. From Cointreau-Levine, presentation on pitfalls and prospects for public-private partnerships.

36. Cointreau-Levine, presentation.

37. Cointreau-Levine, field notes.

38. Cointreau-Levine, presentation.

39. Cointreau-Levine, field notes.

40. Cointreau-Levine, field notes.

41. Cointreau-Levine, field notes.

42. Cointreau-Levine, presentation.

43. Cointreau-Levine, field notes.

44. Cointreau-Levine, field notes.

45. Per Ljung, as quoted by Janice E. Perlman in "A Dual Strategy for Deliberate Social Change in Cities," Mega-Cities Project, Inc., New York.

46. Quoted by Perlman in "A Dual Strategy for Deliberate Social Change in Cities."

47. John W. Kingdon, *Agendas, Alternatives, and Public Policies* (Boston: Little, Brown and Co., 1984).

48. Perlman. ■

Appendix A

Program: The Business of Sustainable Cities: Public-Private Partnerships for Creative Technical and Institutional Solutions

An Associated Event of the Second Annual World Bank Conference
on Environmentally Sustainable Development
co-sponsored by The World Bank and EarthKind
and held at the International Monetary Fund
Washington, D.C.
September 22–23, 1994

Inaugural Session

Welcoming Opportunities

Ismail Serageldin, Vice President,
Environmentally Sustainable Development, World Bank

Old Values, New Visions

Mauricio de Maria y Campos, Director General,
United Nations Industrial Development Organization (UNIDO)

Imagining the Possible

Jan A. Hartke, President, EarthKind

Sector Framework and Sectoral Linkages

Presiding: Joan Martin-Brown, Adviser to the Vice President,
Environmentally Sustainable Development, World Bank

Moderator: F. Ranil Senanayake, Co-Executive Director,
Environment Liaison Center International

Video: "Curitiba: City of the Future"

Energy

Gregory Newcomb, Deputy Division Chief,
Energy Facility Siting and Environmental Protection Division
California Energy Commission

Transportation

Pierre Laconte, Secretary-General,
International Union of Public Transport

Solid Waste

Jacqueline Aloisi de Larderel, Director, Industry and Environment,
United Nations Environment Programme (UNEP)

Concurrent Sessions

Energy: Efficiencies, Effectiveness, and Equity

Presiding: Jan A. Hartke

Moderator: Michael Totten, Director, Center for Renewable Energy
and Sustainable Technology

Energy Efficiency and Demand-Side Management

Charles Condy, President, Proven Alternatives, Inc.
Vichit Punyahotra, Deputy Minister of Energy
Mary Harris, Vice President, RCG/Hagler, Bailly

Alternative Energy Options

Neville Williams, President and Founder,
Solar Electric Light Fund
Anhua Wang, President, Gansu PV Company

Transportation: Getting There . . . At What Cost?

Presiding: Richard Barrett, Assistant to the Vice President,
Environmentally Sustainable Development, World Bank

Moderator: Walter Hook, Executive Director,
Institute for Transportation and Development Policy

Private Sector Financing and Operation of Transportation Systems

Francisco Cristovam, President, CMTC
Jorge H. Kogan, President, Dytecna
James A. Dunstan, Allen, Allen, and Helmsley

Innovation in Emissions Reduction

Dale McKinnon, Technical Director,
Manufacturers of Emission Controls Association
Christopher Flavin, Vice President, Research, Worldwatch Institute

Solid Waste: Waste or Resource?

Presiding: Joan Martin-Brown

Moderator: Edgar M. Miller, Director of Policy and Programs,
National Recycling Coalition

Pitfalls and Prospects for Public-Private Partnerships

Sandra Coutreau-Levine, Consultant, World Bank

Private Sector Participation in Collection and Disposal

Francis L. Masenya, Chief Health Inspector,
Gaborone City Council
Theodore R. Siegler, Vice President, DSM Environmental Services
Eduardo H. Passalacqua, Professor and Consultant

Innovation in Solid Waste Management

Ricardo E. Giesecke, General Director, Solid Waste Micro Enterprises
M.C. Vasuki, Chief Executive Officer, Delaware Solid Waste Department
Giovanni Pinchera, Chairman, Municipal Environment Agency of Rome

Concluding Session

The Power of Global Partnerships: Impediments and Incentives for Business

Presiding: Joan Martin-Brown

Moderator: Alicia Bárcena, Executive Director, Earth Council
J. Hugh Faulkner, Executive Director, Business Council
for Sustainable Development
Troy A.P. Davis, Executive Director, International Network
for Environmental Management
Frank Ohnesorgen, Director of Latin American Programs,
International City/County Management Association
Janice E. Perlman, Executive Director, Mega-Cities Project, Inc.

***Perspectives—Reports and Commentaries on Sector Break-out Sessions:
Pitfalls and Prospects***

Presiding: Jan A. Hartke

Moderator: Elkyn A. Chaparro, Senior Adviser to the Vice President,
Finance and Private Sector Development, World Bank

Energy

Trevor Byer, Adviser, Industry and Energy Department,
Finance and Private Sector Development, World Bank

Transport

Richard Barrett

Solid Waste Management

Carl R. Bartone, Senior Environmental Specialist, Urban Development
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Appendix B

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ISBN 0 821 133198