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PROMOTING ENERGY EFFICIENCY IN
DEVELOPING COUNTRIES: THE ROLE
OF NGOS

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**PROMOTING ENERGY EFFICIENCY IN DEVELOPING COUNTRIES:
THE ROLE OF NGOS**

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ABSTRACT

Developing countries need energy growth to spur economic growth. Yet energy activities contribute significantly to local water pollution and global greenhouse gas emissions. Energy efficiency offers the means to achieve the twin goals of sustainable economic/social development and environmental protection. Energy efficiency increases industrial competitiveness and frees up capital so it can be applied to other uses, such as health and education. The key to improving energy efficiency in developing countries will be acquiring and applying Western technologies, practices, and policies and building national institutions for promoting energy efficiency. Relevant energy-efficient technologies include the use of better electric motors, adjustable speed controls, combined cycle power cogeneration, improved lighting, better refrigeration technologies, and improved electric power transmission and distribution systems. Western countries can best help developing countries by providing guidance and resources to support nongovernmental organizations (NGOs) staffed by local experts; these institutions can capture the energy efficiency potential and ensure environmental protection in developing countries.

**PROMOTING ENERGY EFFICIENCY IN DEVELOPING COUNTRIES: THE ROLE OF
NGOS**

PROBLEMS FACING DEVELOPING AND EAST EUROPEAN COUNTRIES. Developing countries are the major growth centers of energy demand. By the year 2025, in the "current trend scenario" (5-6% growth rate), they could account for 60% of the world's total primary energy demand. The dramatic growth in energy demand presents a number of problems and dilemmas for the developing countries, as articulated by the discussions surrounding and following the Rio de Janeiro UN Conference on Environment and Development (UNCED). The central theme of the debate is how to reduce greenhouse gas emissions, reduce transboundary air pollution and, at the same time, promote sustainable energy development for countries whose energy use per capita is very small (although rapidly increasing) in comparison with the developed countries. At 250 kWh per capita, for example, the average Indian consumes only 1/40 of the electricity consumed by the average U.S. resident.

The countries of Central and Eastern Europe (CEE) remain the least energy-efficient in the world. Per capita energy use in Poland, for example, is twice that of Austria--but Poland's economic output is only one-third of Austria's.

Energy growth is needed for the economic growth of the developing countries and for the transformation of the countries of Eastern Europe to a market economy. Energy is needed to grow and refrigerate food, to pump water, to develop industry and to transport goods.

Yet energy activities are the most significant contributors to local water pollution and to global greenhouse gas emissions that affect climate change. For example, fossil fuel combustion is thought to be responsible for 65-90% total carbon dioxide emissions. Although developing countries currently account for only a quarter of the global CO₂ emissions from commercial energy, this situation will change. The developing countries' overall expansion of energy demand and the increasing carbon-intensive composition of the energy mix will lead to a substantial growth in carbon emissions and global pollution, compounding the climate change problem. Emissions of SO_x and NO_x compounds and particulates will also increase, thus contributing to acid precipitation and a general decline in air quality, particularly in urban areas. Other environmental impacts from energy sector expansion (e.g., hydropower) include resettlement, deforestation, saltwater intrusions and increased waterborne diseases that affect humans.

In Central and Eastern Europe, more than 40 years of communist rule and emphasis on heavy industry have resulted in an environmental disaster. The region suffers from particulates, sulfur dioxide, heavy metals, and surface and water pollution runoff. The region produces 8% of global energy-related carbon dioxide emissions.

The power sector merits special attention because of its dramatic growth rates, in excess of economic growth, and large capital requirements. Since 1950, electricity generation capacity in developing countries has expanded at an unprecedented rate, driven primarily by a desire to improve standards of living, staggering population growth, expansion of industrial and transportation infrastructures, and rural-urban migration. This expansion is the result of an ever-growing demand for electricity; the growth in demand currently averages 7% annually. The reason is clear: gathering fuel wood and running the local waste digester for fuel gas is not an attractive way to get energy for economically well off--flipping a switch is. And, of course, development of the industrial sector depends on electricity.

Investment requirements to meet the projected high demand in energy are likely to far exceed available financial resources. In the power sector alone, investment during the 1990s could amount to about US \$800 billion in 1989 prices, or US \$1 trillion in current prices for generation (60%), distribution (20.5%), transmission (10.9%) and other general equipment (9%) to meet a demand that is projected to double. About 384 GW of additional capacity would be required, of which 2/3 would be added in the Asia region. About 80% of the expected new power capacity would be met by coal and hydro.

Funding by multilateral and bilateral sources can only account for at most 38% of the total required. As a result, foreign capital requirements would average some US \$38 billion in current prices per year over the decade. This level of financing is about 15 times higher than the current amount provided by the World Bank (US \$2.7 billion). It is therefore hard to see how these ambitious expansion plans for electricity supply systems in the developing countries can possibly be financed.

BENEFITS OF IMPROVING ENERGY EFFICIENCY. Energy efficiency offers the most promising of all means available to the developing countries for achieving the twin goals of sustainable economic and social development and environmental protection. At current energy prices and with the present state of technology, about 20-30% of commercial energy consumed by the existing capital stock in developing countries could be saved. The macroeconomic impact of energy efficiency is substantial: first, because of the possibility of delaying large capital-intensive investments in energy supply which could be used instead for health and education programs and, second, because of the savings in imported fuels. In the power sector alone, energy efficiency measures and technologies could reduce the need for additional generation capacity in the least developed countries by 115 GW in the 1990s. This would reduce the need for additional investments in power supply expansion by US \$240 billion in 1989 dollars.

Energy efficiency and conservation have a number of important benefits:

- (1) **High Economic Rate of Return.** Energy efficiency produces a high economic rate of return and economizes on investment capital by providing an alternative form of energy supply. The cheaper way to supply energy is by releasing portions from existing supply capacity than by adding new capacity. This is extremely important in all developing countries, since they suffer from critical shortages of investment capital.
- (2) **Macroeconomic Savings.** International energy prices are projected to increase in real terms during the 1990s. For energy importers, this could lead to an adverse impact on the foreign trade balance. Potential savings from energy efficiency are large, even relative to the size of economies. If 20% of commercial energy could be saved, total gross savings for developing countries would amount to about \$30 billion per annum or about 7.5% of the total value of merchandise imports. This is about 60% of the net flow of resources out of the developing countries for debt service in 1988.
- (3) **Positive Environmental Impact.** Achieving the same level of economic output with less energy implies less pollution. Higher energy efficiency leads to less combustion of fuels by final energy consumers both directly, and indirectly though less fuel being consumed by the energy supply industries. Furthermore, higher efficiency can delay investments in new energy supply capacity, for example, coal mines and hydroelectric power.

- (4) Improved Quality of Life. Low income populations in developing countries depend on biomass for most of their energy needs. Improvements in energy efficiency have a positive impact on the quality of life for low-income households by reducing expenditures on wood fuels and the time taken to collect them. Improvements on the order of 20-300% can be achieved through the use of improved wood stoves and charcoal methods. Household expenditures on fuel, which can reach 10-20% of household income, can be significantly reduced through energy savings.

SUSTAINABLE DEVELOPMENT AND TECHNOLOGY. The developed and developing worlds depend on one another both economically and environmentally. The developing countries need western technologies and management practices to achieve economic development as well as environmental protection. In recognition of this need, many developing countries have changed their economic policies profoundly to make the technology transfer and cooperation more attractive. Governments of every stripe have been trying to cut budget deficits, reduce the economic role of the state (through privatization) and liberalize internal and external trade. Controls on capital flows have been eased; a great many countries indeed now seek foreign investment actively.

The developed countries need the developing countries because global environmental problems require global solutions and the most efficient solution found anywhere in the world. Helping developing countries use sustainable technologies is also good business and in the self-interest of governments and utilities of the industrialized world. The developing world represents a new market for their products and services. Power industry estimates of the total size of the market over the next 20 years run as high as US \$1 trillion, just in the developing countries (*The Washington Post*, April 20, 1993).

Technology and management practices are the reason for the industrialized world's unprecedented economic growth for nearly two centuries. Scientific and technological innovations have produced a steady flow of more efficient and less polluting commercial products, services, and processes. These range from highly efficient gas turbines on the supply side to a seven-fold increase in the energy efficiency of end-use devices like lights, appliances, buildings, windows, vehicles, motors, power electronic devices, and office and manufacturing equipment. Energy-efficient programs, resource planning and policy making, data collection, and analysis methodologies have all played an integral role in promoting energy efficiency in United States and the industrialized world.

NONGOVERNMENTAL INSTITUTIONS. In recent years, the nongovernmental organizations (NGOs) have emerged as an important "third sector" in the economy. NGOs are groups and institutions that are entirely or largely independent of government and characterized primarily by humanitarian or cooperative, rather than commercial, objectives. Long considered peripheral and largely inconsequential, NGOs have been an increasingly visible and forceful presence on the national and international development scene. They have not only championed and financed the

causes of energy and environmental protection in many developing countries, but have also been active advocates of policies in these and other areas.

The NGOs provide a forum for public involvement and for an open information exchange and discussion, and they can be an effective support mechanism behind the twin goals of economic development and environmental protection. The advantage of an NGO over a public agency or business in the cost-effective delivery of services is a combination of flexibility of nonbureaucratic structure, an ability to mobilize volunteer labor, and an independent social commitment. Finally, NGOs can be the channels through which appropriate technology transfer and exchange between the West and the developing world occur.

NGOs play a major role in influencing the United States's government policies. A broad array of environmental, consumer, and citizen NGO groups presented the Sustainable Energy Blueprint to the incoming Clinton/Gore Administration and the new Congress. The Blueprint outlined a comprehensive path to a sustainable energy future. It called for strengthening the U.S. economy by creating one million new jobs by the year 2000 through investments in sustainable energy technologies and policies, reduction of overall energy use at least 10% by 2010, reduction of U.S. greenhouse gas emissions by 25% from 1990 levels by the year 2005, tripling the current contribution of renewable energy technologies by 2010, and reducing the production of long lived radioactive waste. President Clinton's recent commitment to reducing U.S. greenhouse gas emissions by 25% and the increase of funding for renewable technologies reflect the impact of NGO input.

In the developing countries and the countries of Eastern Europe, the role of NGOs as catalysts of change is especially critical because of the evolving environmental and energy policies. NGOs have natural advantages in helping to form partnerships between governmental institutions and the private sector, which could be difficult because of conflict, mistrust, and inexperience of the new governments. NGOs' independence gives them a degree of neutrality and flexibility.

Battelle, Pacific Northwest Laboratories, with funding from the U.S. Agency for International Development, the Department of Energy, the Environmental Protection Agency, and the World Wildlife Fund, has created a number of NGOs, called Energy Efficiency Centers, in the countries of Eastern Europe in order to help develop local expertise in support of energy efficiency in each country. Energy Efficiency Centers are active in Poland, Czech Republic, China, Bulgaria, and Russia. These low-cost, flexible institutions provide policy advice, coordinate private sector activities, and conduct training and public education programs. The Centers conduct policy analyses on energy pricing, privatization strategies, and other policy options to promote energy efficiency and support transition to a market economy. The Centers identify investment opportunities and possible partners for joint ventures, and encourage Western investment in key technology areas. The Centers help U.S. industry understand and access large new markets. Finally, these institutions advise consumers and enterprises to help them develop energy efficiency practices.

The sustainable development of all countries depends on more vigorous individual action to protect the environment. By entering into partnerships with the NGOs, governments, foreign donors, and the private sector can be assured that a fair, open participatory process is undertaken to improve economic and environmental conditions of the developing world.

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ELIZA I. WOJTASZEK applies 20 years of engineering and policy expertise to problems in communications, power systems, and electrical utilities, including generation, distribution, storage, energy efficiency, and market strategies. On national and international projects, she participates in joint ventures with industrial partners to investigate energy efficient technologies, distributed utility systems for generation and storage, modeling and control of power systems, and renewable energy technologies to supply electricity.

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