

A Marshall Plan For Energy And Water Supply In Developing Countries

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Foreword

Whether or not poverty and environmental degradation are direct causes of terrorism and conflict is debatable. But few would question the view that the persistence of poverty and extreme deprivation is incompatible with the enduring spread of freedom and democracy in the developing world, goals that are increasingly central to U.S. foreign policy. And the alleviation of poverty depends in large measure on the ability of developing countries to obtain the clean energy and water supplies necessary to enable them to promote economic growth and improved public health.

Against this background, the Atlantic Council of the United States convened a working group in September 2004 to discuss a proposal for launching a new initiative – loosely modeled on the Marshall Plan – for the development of energy and water resources in appropriate developing countries. This report summarizes the conclusions of the working group and reflects the group's consensus as to the desirable elements of such a plan. The report underlines the view that without the availability, accessibility and affordability of clean energy and water provided by market-based approaches, the political stability in many developing countries that is a prerequisite for economic growth and sustainable democratic governance will not be achieved.

In a second phase of this project, the working group will apply the criteria identified in this report for selecting 6 to 12 countries to be considered for participation in an initial pilot program. The Atlantic Council plans subsequently to establish a broader working group to include key experts from the European Union, Japan, selected developing countries and international financial institutions to narrow the list of initial participating countries and propose an action plan for the project. A steering committee would be established to provide oversight of the development of reports, recommendations and plans emanating from the participating countries and to facilitate the commitment and support of financial institutions, governments and private corporations.

The Council would like to thank all those who made this promising beginning possible: the project chairman, Richard Lawson for his vision and invaluable guidance; the rapporteur, John Lyman, for his skill in distilling the views of the participants into a consensus report; and all the members of the working group for their generous gift of time and expertise. The Council also thanks the generous donors who supported this work: the Otter Island Foundation, the Office of Coal and Power Systems, and the National Energy Technology Laboratory at the U.S. Department of Energy.

Christopher J. Makins
President, Atlantic Council

Executive Overview

Today, hunger, poverty, and desperation remain prevalent throughout much of the developing world. If we are to live in a 21st century more prone to peace than violence, the developed countries must move expeditiously to address the developing countries' energy and water problems. The availability, accessibility and affordability of energy and water are vital to the economic development that is required to alleviate global poverty and to address environmental degradation.

The challenge ahead is to ensure adequate supplies of clean energy and water to the billions of people currently deprived of these necessities. Without a radical change in policies in the developing and developed countries, there will still be about the same number of people without access to electricity (1.5 billion) and the same number of people continuing to rely on non-commercial biomass fuels (2.5 billion) in 2025 as today. This will occur even if the developing countries consume almost 60 percent of the growth in global energy supplies and increase their share of global energy supplies from 30 percent today to over 40 percent in 2025.

Similarly, by 2025, over 60 percent of the world's population will continue to live in countries with significant imbalances between water requirements and supplies, largely in Asia, Africa and Latin America. Today, over one billion people lack access to safe drinking water and 2.4 billion lack access to improved sanitation.

Energy and water issues are inexorably bound together. Energy production is a major user of water as well as essential to the supply of water. Both energy and water problems stem from many of the same issues:

- Insufficient financial resources
- Inefficient usage
- Inadequate institutional arrangements
- Lack of coordination between energy and water sectors
- Lack of political commitments
- Inadequate human resources
- Insufficient community involvement
- Inadequate operations and maintenance
- Insufficient information and communications.

While the UN and individual countries are addressing a number of energy and water issues relating to sustainable development, it would be timely for the United States to undertake a private/governmental initiative to develop a Marshall Plan for Energy and Water for Developing Countries. The plan would be developed as follows:

1. Public and private institutions should utilize a proven means of bettering the world through economic cooperation and development.
2. A senior executive corps in the service of creating a better world should provide the human resources for the transfer of techniques, procedures and know how.

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3. An extensive list of institutions should be developed, that could be utilized to provide capital to support energy and water infrastructure development.
 4. Assistance should be provided on a country-by-country basis with specific time frames for assistance in each country.

At a later date, the Atlantic Council would plan to establish a broader working group that would include key experts from the European Union, Japan, developing countries and development banks. This working group would establish a steering committee to provide continuing oversight to the process and to the development of reports, recommendations and plans emanating from the participating countries. The Atlantic Council would assume a major role in coordinating the work of the steering committee. Oversight by such a steering committee is seen as critical to obtaining the commitment and support of major international financial institutions, supporting governments and private corporations.

The participating countries would assume responsibility for the development of work schedules, national costs and personnel associated with the development of their individual country reports. They would also assume responsibility for the implementation of plans within their respective countries.

This program is envisioned as leading to a Plan that would create a framework for building a network of institutions capable of raising the investment capital required to assist in the development of clean and affordable energy and water programs in selected developing countries.

A Marshall Plan For Energy And Water Supply In Developing Countries

The Challenge

Today, hunger, poverty, and desperation remain prevalent throughout the developing world. If we are to live in a 21st century more prone to peace than violence, the developed countries must move expeditiously to address the developing countries' energy and water problems. The availability, accessibility and affordability of energy and water are vital to the economic development that is required to alleviate global poverty and to address environmental degradation.

The challenge ahead is that without a radical change in policies in the developing and the industrial countries, in the year 2025 there will still be about the same number of people without access to electricity (1.5 billion) and the same number of people continuing to rely on non-commercial biomass fuels (2.5 billion) in 2025 as today¹. This will be the case despite a relatively rapid growth in energy consumption in the developing world. Forecasters generally agree that the developing countries will consume almost 60 percent of the growth in energy supplies over the 2000-2025 time frame and that their share of global energy supply will rise from 30 percent to 43 percent in 2025. Despite this redistribution in energy consumption, per capita energy use in the developing world will still be only one-sixth that in the industrial countries.

In today's world of modern communications, the discrepancies in living standards are more readily apparent to even the most impoverished. These conditions can only lead to growing resentment and increasing friction between the 'haves' and the 'have-nots'. Major initiatives are called for, and the industrial world does not have the luxury of postponing such initiatives.

While economic development will not take place without adequate supplies of energy, water supply is also critical for sustaining life and health. Societies cannot exist and flourish without both energy and water. Today, over one billion people lack access to safe drinking water and 2.4 billion (40 percent of the world's population) lack access to improved sanitation².

Moreover, water is scarcest where it is needed the most, namely in the developing countries. To meet the needs of water supply and sanitation by 2015 for the half of the world's population currently deficient the following is required:

¹ *World Energy Outlook 2002*, International Energy Agency.

² Johannesburg Summit, "Secretary General calls for Global Action on Water Issues," Press release March 22, 2002.

- Access to some form of improved water supply for an additional 1.5 billion people (100 million each year); and
- Access to safe drinking water through improved sanitation services for about 1.9 billion people (125 million each year).

By 2025, over 60 percent of the world's population will live in countries with significant imbalances between water requirements and water supplies, largely in Asia, Africa and Latin America.

Energy and water issues are inexorably bound together. Energy production is a major user of water as well as essential to the supply of water. Both energy and water problems stem from many of the same issues: insufficient financial resources, inefficient usage, inadequate institutional arrangements, lack of sector coordination, lack of political commitments, inadequate human resources, insufficient community involvement, inadequate operations and maintenance as well as insufficient information and communication. Meeting energy and water requirements for all developing countries will take vast investments that go well beyond the developing countries' ability to finance by themselves. Societal development will not occur unless these investments are undertaken. In turn societal development is a prerequisite for the developing countries to attain a level of economic development to enable them to seriously consider climate and other environmental concerns.

The Response

While the United Nations (UN) and individual countries are addressing a number of energy and water issues relating to sustainable development, it would be timely to undertake a private/government initiative to develop a Marshall Plan for Energy and Water Supply for Developing Countries. Like the proposal by Secretary of State George C. Marshall in his 1947 Harvard speech, this plan should be against "hunger, poverty, desperation and chaos." As in the original Marshall Plan, the proposed recipients of assistance should be responsible in the first instance for deciding on their approach to addressing their concerns -- in this case, on the development and utilization of energy and water resources critical for economic development³.

The Plan should be based on several key principles:

- Public and private institutions should utilize a proven means of bettering the world through economic cooperation and development.
- A senior executive corps in the service of creating a better world should provide the human resources for the transfer of techniques, procedures and know how.
- An extensive list of institutions that could be utilized to provide capital to support energy and water infrastructure development should be developed.
- Assistance should be provided on a country-by-country basis with specific time frames for assistance in each country.

³ See *www. Marshall Foundation.org*

The Plan's overall goals would be to:

- Strengthen governmental and private sector efforts to help meet key developing countries' needs for energy and water. Such efforts would facilitate economic development and contribute to improving health and welfare in developing countries.
- Organize a voluntary professional "Energy and Water Senior Executive Corps" to help participating countries define and meet those needs.

The Plan over time could create a framework for building a network of institutions capable of raising the trillions of dollars in investment capita required to meet the rising demand for energy and water⁴. In addition, a framework would be created for the provision of modern energy and water services to many of the 2 billion people who now lack them.

Proposed Actions

A U.S. working group, identified in Annex 1, representing the business community and public policy organizations, was organized to explore the concept of such a plan. The first meeting of the group was held in Washington, DC on September 8, 2004. The working group strongly supported the need to implement a Marshall Plan for Energy and Water for Developing Countries. The Plan was envisioned as entailing the 'have' countries in the developed world providing capital, technology and know how to the 'have not' developing countries. The goal would be to ensure that the developing world's economic aspirations are addressed so that political stability can be enhanced and that the movement towards greater freedom and democracy for people around the world will continue to flourish. Such a future will not happen by accident. It will require leadership by governments, institutions and individuals.

It was agreed that the group should proceed to:

- a) Reach full consensus on the need for action;
- b) Develop a framework for the Plan;
- c) Reach agreement on the major areas needing attention; and
- d) Identify countries suited to the adoption of new approaches.

Initial conclusions of the working group are as follows:

1. Develop a broad consensus in support of the urgency and value of creating a Marshall Plan for Energy and Water in Developing Countries.

⁴ Energy investments figures are from *World Energy Investment Outlook 2003 Insights*, International Energy Agency. The World Commission on Water estimates that water investments over the next 20 years need to rise from \$75 billion a year to \$180 billion a year. The World Bank Development Committee, "Water—A priority for responsible growth and poverty reduction. An agenda for investment and policy change," March 17, 2003, presentation at the World Water Forum.

2. Consider a radical restructuring of institutional arrangements and policies to address adequately the energy and water issues plaguing the developing countries.
3. Address the problems on a country-by-country basis, even though there are substantial transnational issues to be resolved.
4. Apply the concept initially to a sub-region within a country rather than an entire country.
5. Energize new players, and encourage additional sustained efforts by business.
6. Foster new connections:
 - Between big companies and local communities,
 - Between energy and water needs, and
 - Between demand and supply.
7. Encourage industrial countries to reconsider their policies to ensure the eventual balancing of worldwide resources.
8. Focus initial approach on 3-4 countries most likely to benefit from the Plan.
9. Challenge each participating country to develop its own plan of action within a coordinated framework. Technical assistance from business executives and industry expert volunteers would be critical to developing practical, implementable plans.
10. Define a framework for increasing World Bank and regional development banks efforts to improve the efficiency and effectiveness of developing countries energy and water systems.
11. Create a “Marshall Energy/Water Fund” to function as a self-revolving pool of capital for reinvestment in energy and water projects as needed. Participation and administration of such a fund would require building a global constituency for the Plan.
12. Expect the role of the private sector to evolve over time.

The Interface between Energy and Water

Affordable energy and water supplies are both fundamental to enabling countries to develop socially and economically. Without adequate supplies of both, the other major problems affecting health, agriculture and biodiversity identified at the September 2002 World Summit on Sustainable Development (attended by 104 heads of state and government) will not be solved. Energy and water are critical to alleviating global poverty and to enabling countries to develop the capability to address environmental degradation.

Solutions to energy and water needs require countries to deal with many of the same issues. First, planning and executing a plan to address the resources, technologies and human capabilities needed to build the required infrastructure entail very long lead times. This process necessarily will usually transcend several if not many domestic governments.

Secondly, virtually all countries are already and will remain highly dependent upon trade and international cooperation to meet their energy and water requirements. Hence, a more stable

peaceful world is seen as both a prerequisite for solving energy and water problems as well the goal of the social and economic development that is dependent upon solving the same problems.

Thirdly, the factors that constrain both energy and water supply in developing countries call for the following major issues to be addressed:

- Insufficient financial resources
- Inadequate institutional arrangements
- Inadequate human resources
- Lack of sector coordination
- Lack of long-term political commitment
- Insufficient community involvement
- Inadequate operation and maintenance
- Insufficient information and communication.

Fourthly, energy and water are highly dependent upon one another:

- In the United States, up to 80 percent of the cost of pumping, transporting and processing water is for the energy used. Further study might indicate similar results in developing countries.
- A growing dependence upon water from transnational basins and international rivers will increase the need for storage and pumping, which in turn will increase energy consumption.
- The production of electricity requires the withdrawal of almost as much water as agriculture in the United States, and will be a growing issue in developing countries with the very rapid growth in electricity.
- Nuclear power water requirements are huge, as are those of thermal power plants.
- The treatment of municipal and industrial wastewater requires energy for pumping and plant operations.
- The production of primary energy such as coal and petroleum requires substantial withdrawal of water.
- The pumping of water from underground aquifers for agriculture is dependent on reliable inexpensive power.
- The availability of reliable and adequate municipal water supplies is dependent upon energy.

Major Energy Challenges

Meeting rising energy requirements is fundamental to ensuring economic development and rising per capita incomes in developing countries. Solutions must address a number of very difficult challenges:

- Strong energy demand growth of 2.7 percent a year in the developing countries for the next 20 years is tightening world oil supplies.

- This has led to an upward pressure on oil prices that is likely to persist.
- There will be a growing reliance on the Middle East, which remains politically unstable.
- There will be a significant shift in oil and gas trade towards Asia, which could lead to greater friction with the industrial countries.
- The IEA estimates that roughly \$8 trillion dollars of investments will be needed in the developing countries to meet energy needs through 2025⁵. This would still leave about 2 billion people without access to electricity. Closing this gap would require a further \$2 trillion.
- Capital investments at this level are well beyond the capabilities of the developing country governments to raise on their own.
- All potential economic sources of energy must be utilized in an environmentally responsible manner:
 - Additional supplies will require greater transnational movements.
 - Greater coal demand must be accompanied with the use of clean coal technologies and more efficient and effective mining and burning.
 - When economically possible, alternative energies such as wind, solar and biomass conversion to gas should be encouraged.
 - New transportation fuels such as hybrid cars, hydrogen fuel, and improved diesel fuels should be encouraged.
 - Nuclear plants using new designs and standardized equipment should be developed that will lead to safer operations and lower capital cost and maintenance.
- New technologies need to be developed to increase supply options and to improve efficiency of demand as well as of production.
- Energy conservation and efficiency improvements must be encouraged:
 - Energy intensity, as measured by energy consumption per GDP, has been improving but, in developing countries, it remains over double that in the industrialized countries. This partly reflects structural differences related to their stage of economic development, but it also reflects the inefficient production of power and inefficiencies in the utilization of power.
 - The electric power industry needs to become economically viable:
 - Many power companies do not cover costs.
 - Tariff structures often fail to fully reflect cost, including a return on capital.
 - Non-payment of bills, lack of metering and losses due to theft are common.
 - Transmission structures are often inadequate.
 - National grids that allow the efficient movement of power often do not exist.
 - Management and technical manpower need training and know-how.
 - Realistic pricing of all energy is necessary. Uneconomic pricing reduces supplies and encourages uneconomic consumption. Higher prices could encourage new supply alternatives. Pricing policies should recognize that adjustments will have to be made over time for the poorest segments of the population.

⁵ *World Energy Investment Outlook 2003*, International Energy Agency, 2003.

Major Water Challenges

Equally important to ensuring economic development and rising per capita incomes is the provision of adequate water supplies. This includes potable water and sanitation, as well as water needed for agricultural irrigation and industrial uses.

- Only 2.5 percent of the earth's water is fresh, and almost 70 percent of that is locked up in glaciers, ground ice, permafrost and permanent snow cover.
- Fresh water lakes and rivers account for less than 0.3 percent of total fresh water.
- Ground water accounts for nearly 30 percent of global fresh water resources.
- Underground reserves in arid areas replenish at very slow rates, usually less than 0.5 percent per year. If water is pumped too rapidly from aquifers, it is in effect mined and will deplete rapidly. This is a major issue for many developing countries.
- In the United States, when water is withdrawn for irrigation, almost 60 percent is consumed. When water is withdrawn for power plants, only 2 percent is consumed, but over time this repetitive process consumes substantial reserves.
- In the United States, power plants withdraw almost the same daily volumes of water as agriculture. Together, power and agriculture account for 80 percent of daily water withdrawals.
- In the United States, the absolute level of water withdrawals stopped increasing around 1980 even with economic growth and a rising population. As a result, per capita consumption in the United States since has fallen by over 20 percent. It may be possible to achieve similar results in many developing countries.
- With rapidly growing electric power production in the developing countries, similar trends could be expected over time.
- Water is scarce where it is needed the most in developing countries. Sub-Saharan Africa is particularly at risk. The risk is also growing in countries like China and India as ground water replenishment and river flows are reduced from the shrinkage of ice and snow cover in the mountains.
- Water supply and availability transcend national boundaries. Over 30 countries in the world receive more than one third of their water from outside their borders and over half these countries are in the developing world.
- In the developing countries, 70 to 90 percent of water withdrawal is for agriculture. The higher value/benefit generating uses in industry, domestic households and for drinking obtain disproportional low levels of water supply.
- Subsistence farming is marginal and contributes little to the economy but is a major cause of high water consumption. Subsistence farmers will require assistance during the transitional period.
- Water lost through lack of treatment or inadequate infrastructure amplifies the problem.
- In large cities in Asia, Africa and Latin America, roughly 40 percent of water is unaccounted for as meters do not work and pipelines leak.

- Water conservation is essential, as is the recovery and reuse of water from municipal wastewater treatment plants.
- Clean potable water must be available to all households at minimal costs. At the same time, consumers requiring clean water above *threshold levels* should pay water rates consistent with the costs of providing their supplies.
- Both technology and an understanding of water cycles are important to achieving a balanced water system.
- Providing adequate water supplies is a very long-term proposition. Planning and construction of the infrastructure must be started up to 20 years before needed.
- Climate change is likely to increase the incidence of some infectious diseases, such as malaria, dengue, cholera and yellow fever.
- In most developing countries there exists an urgent need to provide adequate water treatment plants to improve health conditions and to eliminate severe shortages of potable water.
- Major water-borne diseases are huge detriments to economies and societies:
 - Diarrheal diseases lead to 2.2 million deaths per year.
 - Worldwide, 300 million people suffer from malaria every year. In Sub-Sahara Africa alone, there are 1 million deaths each year.
 - Worldwide, 200 million people suffer from schistosomiasis every year, of which 20 million suffer severe effects.
- Political bodies are inherently reactive, whereas water supply shortfalls require long-range proactive decisions.

Epilogue

The urgency and complexity of making significant progress in addressing the need of developing countries for adequate and affordable supplies of clean energy and water will require a radical restructuring of institutional arrangements and policies. A broad consensus in support of the value of creating a Marshall Plan for Energy and Water Supply in Developing Countries is required if the billions of people currently without adequate energy and water are to experience major progress over the coming decades. Industrial countries as well as developing countries will have to reconsider policies and establish new frameworks for improving the efficiency and effectiveness of developing countries' energy and water systems. The creation of a "Marshall Energy/Water Fund" to provide the necessary financial resources requires building a global constituency for such a Plan.

Annex 1: Working Group Members

Chairman: Richard L. Lawson*

Rapporteur: John R. Lyman*

Project Director: Donald L. Guertin*

Associate Director: Eliane Lomax*

Charryl Berger*, Los Alamos National Laboratory
Robert G. Card, The Card Group
Guy Caruso*, Energy Information Administration
Reid Detchon*, Energy Future Coalition
Elizabeth C. Economy, Council on Foreign Relations
Robert Fri*, Visiting Scholar, Resources for the Future
Sherri W. Goodman*, The CNA Corporation
David Hawkins, Natural Resources Defense Council
David Jhirad*, World Resources Institute
Thomas Kuhn [*alternate* John J. Easton], Edison Electric Institute
Christopher J. Makins, Atlantic Council
Tatsuo Masuda, Japan National Oil Corporation
Charles R. Perry*, Perry Management, Inc.
John A. Riggs*, Aspen Institute
Emmy Simmons*, USAID
Matthew Simmons*, Simmons & Company International
Paul Sullivan*, National Defense University
Carl Volz*, Caterpillar
Daniel Yergin, Cambridge Energy Research Associates

* Attended September 8, 2004 meeting

Annex 2

Proposed Criteria for Selecting Countries

Based on the input from the September 8 meeting and subsequent e-mail exchanges, it is recommended that a three-step process be used for selecting the 10-12 potential initial candidates. The first phase would entail using a shortened list of more critical criteria (9-10 items) which should significantly narrow the field. The second phase would entail a longer list of more subjective items that will entail much more research to rate. The third phase would entail ensuring a manageable group of geographically diverse countries that might be receptive to participating.

	<i>First Phase - narrows list</i>	<i>Second Phase - selects 10-12</i>
Political ⁶	Good Governance: Rule of Law Transparency of Policies Uniform Application of Policies Constructive relations w/ Neighbors Leadership Stability	Government Follow up Institutions directed to Development Culture to Support: Labor Laws Ownership Regulations Property Rights
Economic	Non-OECD member or affiliate ⁷ WTO membership	Barriers to Business Fiscal Responsibility Investment & Trade Policy Credit Rating Exchange Rates
Energy and Water	Current Energy & Water Policies Realistic Pricing Improving Efficiencies Level & Mix of Energy Resources Level & Mix of Water Resources	Level of Water Stress Shared Water Resources Political Sensitivity to Issues Support of Infrastructure
Human Resources and Education		Competent Corporations Number & Quality of Experts Restrictions on Foreign Personnel Level of Workforce Education Number & Quality of Engineers Quality of University & Technical Training

<i>Third Phase</i>
<ul style="list-style-type: none"> ✓ Focus on countries or regions of manageable size. Sub-segments of large countries like India, China and Indonesia could be considered, if managed primarily by single government structure. ✓ In final selection process (3-4 countries) ensure mix of regions: <ul style="list-style-type: none"> ▫ No more than one country from each of Euro-Asia/Middle East, Africa and Latin America. ▫ No more than two countries from Asia or sub-units in Asia. ▫ Include at least one Muslim country. ✓ Confirm that countries initially listed (6-12) would be receptive to participating in Plan before narrowing list to 3-4 countries.

⁶ A number of governmental and non-governmental organizations have indices relevant to these criteria.

⁷ With the exception of Mexico and Turkey, which represent low per capita income transitional economies.

Annex 3

List of Formal Presentations At the September 8, 2004 Meeting

Energy Issues in Developing Countries, with Forecasts from the "International Energy Outlook 2004"
Guy Caruso, Administrator, Energy Information Administration, U.S. Department of Energy

Water In the Developing World
Charryl Berger, Program Director, Office of Energy and Environmental Initiatives, Los Alamos National Laboratory

Market-Based Incentives for Energy Delivery in Developing Countries
David Jhirad, Vice President for Science and Research, World Resources Institute

Developing Countries' Water Supplies in Desert Areas
Charles R. Perry, President, Colorado River Municipal Water District