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Financing Decentralized Renewable Energy: New Approaches

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Renewable energy is a feasible technological option in sustainable energy. Rusting monuments to past failures attest that this "autonomous" technology must operate within a frame of sustainable energy development where many systems interact – the power sector, financial markets, social systems, institutional structures, policy frameworks, business climates, political environments, service infrastructures, cultural settings and so on. In the matter of financing renewable energy, a novel approach is needed. Unique financial instruments are required to complement new scale economies, cost profiles, risks, and benefits. The World Bank Group is reflecting that shift in perspective through its new renewable energy operations, the Solar Development Corporation, the Renewable Energy and Energy Efficiency Fund, and other mechanisms. At the sectoral level, sustainable renewable energy development demands a return to basics. Sound sectoral reform and rational incentives are necessary to make the power sector a friendly environment for renewables. It is in these areas that the World Bank can make its most important contribution to sustainable energy.

The message is becoming clearer; success takes time and demands the patient laying down of an institutional groundwork to support innovative delivery mechanisms.

Community biogas digester providing methane to run an electricity generator for lighting and water supply in a village near Bangalore, India.

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Lessons Learned

The poor are willing and able to pay for reliable energy services. This is the kernel of decentralized renewable energy's prospects for financial success in the developing world. To date, the biggest market for solar photovoltaic (PV) equipment has been government and donor programs, which are typically equipment-oriented, short-lived, and undermine the private sector. Give-away programs and market distortions lower the value consumers place on a product or service, and extinguish the incentives for local entrepreneurs. To avoid this, governments, donors and the private sector must work together to ensure coherent, market-expanding interventions which complement a country's rural development strategy. Any planning process should be demand driven, transparent, and governed by practical economic considerations where meeting basic needs has first call on scarce resources. Life-line services for the poorest are also important, but special attention is required to create market incentives for equipment care and rational energy use.

Renewables have become an increasingly viable business in the 90s. Consumer's willingness to pay for lighting services has been the factor sustaining their expansion in the fastest growing markets. Credit for renewable energy is an unknown concept in many rural areas, so credit channels must be developed in parallel with development of projects in order to tap the full potential of rural markets. Delivery networks to connect rural consumers are also vital—Kenya, the Dominican Republic and South Africa are exceptions among developing countries in having this infrastructure. It has also been observed that nascent renewable energy businesses can more easily take root in already thriving retail networks not least because the latter absorb some fixed distribution costs.

Commercial banks in developing countries can be an important constituent in the sustainable "mix" of supporting infrastructure for renewable energy. But these potential partners are risk averse, and therefore require specialized training, persuasion, and risk sharing to equip them to support renewable energy development. Greater financial sophistication is needed to enhance energy service, choice, and access in rural areas. Capital markets should be capable of providing a broader base of financial resources that respond to the needs of rural electricity services markets. In Indonesia, the World Bank/Global Environmental Facility's Solar Home Systems (SHS) Project is helping to establish a means to provide loans to buyers of SHS equipment. It is anticipated that as experience and confidence grows, banks will be willing to accept an increasingly large share of accounts receivable as security, and that second tier lenders will buy off these accounts receivable.

Appropriate legal infrastructure and enforcement mechanisms are also essential if renewable energy businesses are to thrive. Legal mechanisms must protect the viability of credit, businesses, and foreign investment, and safeguard the rights of all players in the market. An effective, fair legal framework lowers risks and their associated costs for everyone.

Renewable energy development should be integrated with energy strategies and reform efforts to support economic efficiency and development effectiveness. Power grid expansion plans must be credible, transparent, and public to allow remote power markets to respond effectively. Vacuous government promises of future grid electrification thwart the renewable energy market as do low (often subsidized) energy prices that favor conventional energy, or very high import duties on renewable energy equipment.

Solar PV panels providing electricity to a small community in Gujarat, India.

Good power sector reform is good renewable energy development policy. The interplay between renewable energy and energy sector reform can be mutually enriching in well designed projects. Renewable energy, because it is modular, less sensitive to scale economies, and decentralized, is well suited to private investment and can serve as a base from which to implement reform. In Cape Verde, for example, a World Bank financed solar electrification and wind power loan is helping to lead the reform process and introduce the private provision of energy services in rural areas. Off-grid electrification concessions will be awarded to private sector entities and the public sector role will be that of a customer, for example, as purchaser of public lighting services.

World Bank Strategies Respond to Change

Two recent World Bank papers reflect the changed emphasis of the Banks Groups' strategy. Local and global environmental concerns, falling costs, accumulated field experience, and new economic renewable energy applications have all been catalysts in shifting our approach. ***Fuel For Thought,*** the draft energy and environment strategy paper for the Bank Group is introducing additional commitments to the institution's work. Sectoral-level energy and environment reviews will be undertaken as an advanced planing tool to guide energy sector development along the most efficient and environmentally sound path. The Bank Group will mainstream environment-friendly technologies and practice into its operations, and will apply new lending mechanisms to

maximize learning and mesh the imperatives of new energy options with the financing required for their success. The Bank will improve analysis standards for environmental problems, and monitoring of projects aimed at solving them. Climate change mitigation will gain a stronger mandate, and the Bank Group will cultivate new partnerships to address this issue. To help put these objectives into practice, the Bank Group will improve its specialized skill base in energy and environment development.

The approach set out in the World Bank's ***Rural Energy and Development; Improving Energy Supplies for Two Billion People*** emphasizes a commitment to alleviating energy poverty and improving the quality of life in the rural developing world. This strategy is based on a number of principles.

- ***Provide for consumer choice.*** A better choice of renewable energy sources should be provided to rural consumers. Informed consumers will choose the most effective solution according to their own preferences.

- ***Ensure cost effective pricing.*** Distortions in prices that are created by subsidies and taxes should be eliminated. They create a disincentive for entrepreneurial solutions to rural energy supply, and give consumers the wrong signals.

- ***Overcome the high first-cost barrier.*** Credit mechanisms, lower-cost equipment, and lower service standards can all contribute to removing this obstacle.

- ***Encourage local participation.*** Participation of local communities, investors and consumers in the design and delivery of energy services is essential. Decentralized approaches need to be part of the solution.

- ***Implement good sector policies.*** Macroeconomic policies should not discriminate against rural energy. Governments should support markets.

World Bank Financing Options For Renewable Energy Finance

The unique challenges of renewable energy have given rise to new Bank Group financial instruments designed to lower transaction costs and barriers to market entry, spread and absorb risks, build service networks in rural areas, and develop specialized skills to manage local businesses and credit mechanisms.

The **Global Environment Facility (GEF)** is one such instrument. It backs investment projects that provide global environmental benefits and local development gains for developing countries. In the case of climate change, the GEF provides roughly $1 billion in well-leveraged grant financing to mitigate greenhouse gas emissions. One of the main focal points of this component is lowering barriers to the success of renewable energy and energy efficiency technologies.

The **Solar Development Corporation (SDC)** which is being established by the World Bank, the IFC, and four major foundations is a very different financing mechanism which is intended to become a free-standing, commercial enterprise. Its primary objective is the development of viable, private sector business activity in the distribution, retail and financing of off-grid PV applications in developing countries.

The **Energy Sector Management Assistance Program (ESMAP)** is a global technical assistance program jointly sponsored by UNDP, the World Bank and bilateral donors. ESMAP activities have substantially expanded the range of renewable energy investment operations entering

the World Bank's project pipeline. They have introduced innovations in renewable energy lending such as the solar PV concession systems for Argentina. ESMAP-financed micro PV lantern demonstration projects in Africa are successfully attracting private sector provision of energy services to the very poorest consumers.

The **Asia Alternative Energy Program (ASTAE)** was established in 1992 to promote renewable energy and energy efficiency in the World Bank's power sector lending operations in Asia. Since its inception, ASTAE has supported a broad portfolio of alternative energy projects and activities throughout Asia. The cumulative pipeline of ongoing and prospective alternative energy projects (FY93-00) is about US$1.2 billion in 31 Bank/GEF loans and grants in 10 countries. Renewable energy projects will involve the installation of over 0.7 GW of environmentally sustainable electricity generation capacity, while ongoing and proposed energy efficiency projects will offset more than 0.8 GW of capacity.

A post-Kyoto financing option, the P**rototype Carbon Fund (PCF)**, is also under preparation by the World Bank. The PCF will be similar to a closed-end mutual fund. Its objectives are to supply high quality carbon offsets at a competitive price, and to ensure that buyers and sellers of offsets receive a fair share of the value added. The negotiated price of the carbon offsets would cover the cost of additional emissions reductions measures over the baseline technology as well as a margin representing equitable benefit sharing between the investor and host, of the gains from the offset. Final approval of the Fund will depend on the pace of the post-Kyoto discussions.

The IFC's **Renewable Energy and Energy Efficiency Fund (REEF)** is expected to be the first global fund dedicated to investing in private sector renewable energy and energy efficiency in developing countries. Now in fund-raising mode, the fund will provide $150-210 million of private and IFC capital for financing on/off-grid projects of less than 50MW.

The **Photovoltaic Market Transformation Initiative (PVMTI)** is now in its first stage of operation by IFC. This $30 million GEF fund will be used to accelerate the growth of PV markets in India, Kenya, and Morocco by providing leverage to private companies on a competitive basis.

Finally, the **Small and Medium Scale Enterprise Program (SME)** is a $21 million activity of IFC supported by GEF. It finances biodiversity and/or climate change projects carried out by small and medium scale enterprises in GEF-eligible countries. Contingent, concessional loans are provided to financial intermediaries (FIs). These FIs then finance the SMEs. Two PV projects and one efficiency project have been approved to date.

New Approaches to Rural Renewable Energy Delivery

The traditional failed approach to promoting renewable energy is well known. A donor contacts a government with a proposal and money; the government selects recipient communities and the contractors; the contractors provide installation and perfunctory training and then return to the capital city; and the unserviced, undervalued equipment fails or is sold. However, new strategies and modest successes have risen from these past gaffes.

In the new, market-oriented approach to RE development, consumer-side financing has generally depended on some form of cash sales, credit provision, leasing, or fee-for-service. Such

financing plays an important role in the development of viable renewable energy markets, but this is only one part of connecting consumers with needed energy services.

Renewable energy development has grown in sophistication over the last decade and three commercial models (classified by intermediary) for delivering rural energy services have emerged. The ***dealer model*** is perhaps the most well-known, and depends on either cash or credit based sales. In Kenya, the market developed when PV dealers began selling systems through existing small rural sales points such as general stores. Now more than 100 thousand households use PV systems, usually purchased piece by piece and in low watt increments (12 watts is almost standard) that lower the first-cost barrier. The dealer model is also being pursued in the Indonesia World Bank Solar Home Systems Project, although in this case, sales are credit based i.e. first costs are lowered and deferred through a credit mechanism arranged for customers by dealers through the banking system.

The ***concession model*** for PV system delivery employs a very different set of incentives and is characterized by a different risk profile. The model depends on regulation by contract more than market forces, but helps ensure that large scale-economies are achieved. In Argentina, for example, franchise rights for rural service territories will be granted to concessionaires that offer bids with the lowest subsidy to service rural households and community centers. Concessionaires can select from a range of off-grid technologies, although solar PV is anticipated to be the most cost-effective choice in the majority of cases. Users pay a connection tariff and monthly service fee (set by the government), and a declining subsidy is provided to the concessionaires based on the provisions of their contract. Concessionaires will be provided with partial financing of their start-up costs through the project.

The small electricity ***retailer model*** is a new, community-based approach to renewable energy delivery employed by the World Bank in projects for Sri Lanka and Laos. Under this model a community, organization, or entrepreneur develops a business plan to serve local demand for electricity. The plan is submitted to the project's offgrid electrification Committee and if approved, a loan is given. The retailer deploys the system and through a fee-based service arrangement recovers the cost, repays the loan, and earns a profit. This approach ensures significant local involvement and consumer choice. In this, as in the other models being pursued, a challenge is to keep transaction costs from escalating and to realize scale economies.

Conclusions—the Right Mix

Twenty years of experience with renewable energy development offer a simple but important message;—there is no magic fix for the challenge of renewable energy finance. Responding to the challenge involves patiently cultivating the ***right mix*** of supporting institutions, reforms, policies, markets, and infrastructure, based on the country and circumstance.

For renewable energy to succeed, broad institutional groundwork is needed including—good pricing policies, efficient power sector management, viable lending institutions, credible regulatory policies, and solid legal frameworks. Success will also depend on conducive frameworks for market and investment growth. Renewable energy development must be approached from a systems perspective because it both contributes to and depends on the effectiveness of the entire development process.

The greatest contribution the Bank Group can make is in its policy and institution strengthening efforts. With these the Bank creates an enabling environment for renewable energy by:

- establishing rational, efficient reforms in the power sector
- removing price distortions
- instituting frameworks for credit, investment and capital market development
- promoting policy, institutional and technical capabilities in developing countries

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