CLEAN ENERGY FINANCE

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IDB To Finance Argentina's Largest Wind Farm

The Inter-American Development Bank is preparing to approve its first wind energy project in Argentina. The 50 Megawatt Chubut Wind Energy Project, located in the windy Patagonia region, will be the largest wind farm in Argentina, more than doubling the country's current installed wind power capacity. The project is designed to meet the needs of about 19 percent of the Patagonia region's residential demand or approximately 6 percent of aggregate demand. It will use wind turbines of between 750 kW and 900 kW for a total installed capacity of 50,000–55,000 kW. A 132 kilo-volt inter-connection line extending six kilometers will also be constructed to access the nearby Patagonia transmission system.

Total project costs are estimated at US$ 50-53 million. Debt financing through an A/B loan structure is being sought from the Inter-American Development Bank (IDB). The A-loan, to be provided from the IDB's ordinary capital, is expected to be up to 25 percent of total project costs. The B-loan, to be provided by private commercial sources (e.g., a syndicate of commercial banks or private placement), is expected to be approximately US$ 21.2 million or 40 percent of total project costs. The financial plan proposes a 14-year term for the A-loan and a 10-year term for the B-loan, with a combined average life of 8.4 years. Discussions with potential equity providers, including a European electric utility company, are in the final stages.

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India Wind Power Rebounding After Late-Nineties Decline

By Dr. Saroj Mishra

After a late-1990s slump, the fortunes of wind power in India appear to be reversing, if recent evidence is any indication. Wind machine orders are up over the past year, particularly for on-site captive power at industrial facilities. Improved technology, micro-siting, and capacity utilization have brought down installed capacity prices. In order to ensure good performance and growth of the sector, the national Ministry of Non-conventional Energy Sources (MNES) has introduced strict performance standards for wind-power projects. And some states are providing new incentives for improved capacity utilization.

The government's industrial policies in the early 1990s allowed the private sector to generate and sell power from renewable energy. This, along with state government and other excessively generous incentives such as excise tax exemption, 100 percent depreciation, concessional customs duty on wind energy equipment, five-year tax holidays, and liberalized foreign investment procedures, induced large-scale private sector investment and led to record wind power growth. Most Indian states provided financial incentives, such as sales tax exemptions, lowered wheeling fees, and permission to engage in third party power sales. Concessional financing from the Indian Renewable Energy Development Agency (IREDA) also helped in the growth of the industry.

The MNES began promoting wind energy demonstration projects in the 1980s and sought to establish the technical and economic viability of wind power while attracting private sector participation. National and state government policies supported wind energy growth and helped this sector to achieve an installed grid- connected power generation capacity

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Global Financiers of Clean Energy Projects and Enterprise

1. Private Institutions

Nuon is the largest energy and water utility in the Netherlands and one of the largest clean energy providers in Europe. It has set an ambitious goal of generating 10 percent of domestic power sales from renewable energy sources by the year 2010. Nuon has expanded its domestic investment philosophy to overseas markets, where it is pursuing clean energy equity investments in both industrialized and developing countries, including a wind farm in China, a rural electrification and photovoltaic solar home system business in South Africa, and its recently-announced $53.5 million equity investment in the Green Mountain Energy Company in the United States. *Contact: Dr. Annemarie Goedmakers, Director, NUON Renewable Energy Business Unit, Postbus 9039, 6800 EZ, Arnhem, Netherlands, Tel: +31 (26) 377 2143; Fax: +31 (26) 377-2186*

Triodos Bank is a Dutch bank that offers financing to businesses with social and environmental objectives. In 1996, it organized and capitalized (and now manages) the Solar Investment Fund (SIF) to provide loans and guarantees to intermediary institutions (e.g. credit unions, utilities, non-governmental organizations, and equipment distributors) which in turn sell or lend to buyers of photovoltaic solar home systems. Triodos is also a co-investor/manager in the Solar Development Group (see page 8). In addition, it manages The Wind Fund, which invests in wind project in the U.K., and the Triodos Greenfunds, which finance wind projects in The Netherlands. The bank is preparing to launch Triodos Venture Capital to provide equity to renewable energy companies in Europe. *Contact Hans Schut, Project Manger, Triodos Bank, Utrechtseweg 60, P.O. Box 55, 3700 AB Zeist, The Netherlands; Tel: +31 (30) 693-6500; Fax: +31 (30) 693-6566; email: <hans.schut@triodos.nl>*

Energy Investors Funds Group (EIF) is one of the world's leading investors in the global private power, environmental, and infrastructure industries. EIF has six private equity funds under management, offers customized separate accounts, and is currently raising funds for a U.S. power fund. Two of the funds focus on developing countries and those in economic transition. One of them, sponsored by the International Finance Corporation (IFC), is the Renewable Energy and Energy Efficiency Fund (REEF, see page 8). The second, co-sponsored by the European Bank for Reconstruction and Development (EBRD), is the Central and Eastern European Power Fund, which invests in new and refurbished power projects and district heating systems. All of EIF's funds can and do invest in renewable energy and energy-efficiency projects, particularly hydroelectric and wind power projects. Assets under management are $635 million of equity and debt, with a combined underlying asset value of approximately $4.5 billion. *Contact: John Buehler, Principal, EIF; Tel: +1 (415) 380-0532; Fax: +1 (415) 380-0532; email: <jbuehler@eifgroup.com>*

MeesPierson is a Dutch commercial bank providing general credit facilities as well as structuring and arranging complex financial transactions. It concentrates particularly on asset-backed and project finance. MeesPierson's **Global Energy Finance Group** provides a complete package of commercial and investment banking services, including structuring, arranging, underwriting, and participating in corporate transactions and project financing. The bank intends to be particularly active in the arranging and structuring of project financing for wind power projects. *Contact: MeesPierson at P.O. Box 243, 1000 AE, Amsterdam; Tel: +31 205279111; website: <http://www.meespierson.com/>*

Global Environment Fund, not to be confused with the multilateral Global Environment Facility (GEF), is a venture capital fund manager with over $250 million under management in four funds and private asset

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You are invited to submit information for future issues of CEF. Your comments, suggestions, and criticisms are invited as well. Please contact Michael Philips at:

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INTERVIEW with Kurt Hoffman, Shell Foundation

Kurt Hoffman is Deputy Director of the Sustainable Energy Programme (SEP), the major grant-making program of the Shell Foundation, a UK-registered charity, established by the Royal Dutch/Shell Group in June 2000. Information on the Programme, its grant recipients, and procedures for applying for grants, can be obtained at<http://www.shellfoundation.org/sep>. Mr. Hoffman was interviewed in November 2000 by Clean Energy Finance editor Michael Philips.

CEF: Why was the Sustainable Energy Programme established and how much grant funding will you be awarding each year?

Hoffman: The reason it was established was to provide a mechanism or vehicle for the Shell Group at the international level to demonstrate their general commitment to sustainable development, and their specific desire to be involved with identifying solutions to the problems and issues raised by the impact of energy on society, which is of course core to the Group's business. We found that at the operational level we did quite a bit of grant-making through operating units in different countries. This was good corporate grant-making, but it did not have the strategic focus on environmental and energy issues. So the new program is an international program and it's really meant to address the set of issues the Group faces at the global level in energy and environment.

As for the budget of the program, there is a target budget of between $20 and $30 million per year. But we're starting small. We started at around $4 million last year And we'll only get to the target if we do a good job. And the good job is all about supporting projects that have an action dimension to them and deliver sustainable solutions.

CEF: The SEP, as well as the larger Shell Foundation, obviously exists at the pleasure of the Royal Dutch/ Shell Group. Yet many of the projects that your initiative is supporting will make the world less reliant on your parent company's principle product, petroleum. Of course, your activities do not *yet* have a major impact on the petroleum markets. But is there an inherent tension, sort of like a pesticide company supporting organic farming?

Hoffman: When we talk about sustainable energy, we're not just talking about renewable energy in the sense of replacing fossil energy with renewable energy, although that's one of the things we're interested in. We're also talking about improving the whole of the energy mix, from coal to a limited extent, through other fossil fuels and then moving forward to renewables and then hydrogen. But also within that is a focus on energy and poverty issues, where it's not so much about introducing renewables. It's really how you harness energy to alleviate the problem of poverty in developing countries. So there're two dimensions. But certainly a number of the projects focus on delivering cleaner energy. The word "tension" is probably not the right one because Shell of course has invested at a commercial level in it's own renewables business. And it's really part of the Group's long-term strategy to be in a position to respond to the full range of energy demands from society. So by covering the full range, we're really addressing the whole of the Group's interests.

It's really how you harness energy to alleviate the problem of poverty in developing countries.

CEF: While some of your grants go to sustainable energy activities in Northern countries, many, if not most, of your grants are supporting sustainable energy activities in developing countries. Why the emphasis on the developing world?

Hoffman: That comes from this energy and poverty focus that I mentioned. If you go out and ask energy experts what are the two big energy issues, they say energy and the environment, and that's essentially a Northern country issue, or it originates there. And the second is energy and poverty, which involves two billion people lacking access to modern energy services. So the reason we're in developing countries is largely, though not exclusively, to tackle that second one.

CEF: Over the last ten years or so, multilateral and bilateral agencies have been taking a number of steps to support renewable energy and energy efficiency in the developing world. What do you think of those

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INTERVIEW *(Continued from Page 3)*

efforts? And do you see your efforts as supporting and complementing them or as providing something extra, perhaps pushing them, and doing things that those institutions are not currently doing?

Donors influence the agendas of governments and NGOs.

Hoffman: There are two answers to that question. Firstly, you find among some of the multilaterals—especially the World Bank and the IFC, as well as groups such as Winrock International and some of the foundations—an understanding that to tackle the problems of energy development in developing countries and indeed renewable energy, you need to shift away from aid-based projects, wherein you are giving away solar panels for health clinics, for example, to looking more for market-oriented mechanisms to carry the introduction of these new energy sources forward. And that's an entirely good thing. There's an awful lot of that shift going on now. The market approach is difficult, but we're fully behind it because we do feel that if you want to have a large impact on these problems in developing countries, market-oriented solutions need to come into play. That doesn't mean big profits. It just means you need to harness people's economic incentives on both the supply and demand side.

Where we want to push the role of the multilaterals, and some of the more environmentally-oriented donors, is to get them to recognize that environment is not the only problem linked to energy in developing countries. Issues like poverty and income generation are equally important. We need to always be aware that donors influence the agendas and they influence the agendas of governments and NGOs. So when you have the donor community putting a lot of effort on the environmental issues, you tend to remove some of the focus on energy and poverty issues. With our energy and poverty program, we're always going to be reminding the multilaterals and our donor colleagues that you shouldn't forget the poverty side as well.

CEF: You have some prohibitions in your charter against supporting capital schemes or private sector projects. Given such prohibitions, what do you see as the role for the Sustainable Energy Programme in supporting the market approach?

Hoffman: Yes, it's quite a challenge. Basically, what we say is that markets are the answer, but there are many obstacles to markets operating at the moment; information-based obstacles, for example. There's not enough validation of existing interventions to demonstrate to financiers and investors and entrepreneurs that this is a good business to get into. Small entrepreneurs that might be thinking about entering the PV panel maintenance may not have the business skills and management skills and so on. So there are a number of obstacles to the markets operating. One thrust of our Programme is to work with public interest groups who are trying to tackle the obstacles to getting the markets to operate. And once they get operating, then we pull out and it goes forward.

CEF: To what extent do you see the lack of financial resources to be one of the barriers to increased sustainable energy investment? Do you see, for example, there being insufficient equity or insufficient affordable debt for businesses and entrepreneurs?

Hoffman: That's a two-edged question really, because when you talk to the people who are trying to provide financing, you find that they claim that what we really need are good projects and good entrepreneurs; and that if we find good projects, the financing will be there; and that the problem is that the system, for a number of reasons, is not throwing up enough projects to attract the financing. That's one dimension of it. It's not a problem of finance there; it's a matter of the supply-side bringing forward project managers and entrepreneurs who can put the projects together.

We're responding to the market which says that biomass is the poor country's oil...

But at the same time, if you actually look on the macro level at the scale of the potential demand for sustainable energy and the level of the supply infrastructure that you need to meet that potential demand, you're talking about the need for tens of thousands of small- and medium-sized enterprises, and a bunch of big ones, to engage in the business

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INTERVIEW *(Continued from Page 4)*

commercially. And they will require a lot more finance than is available. So there are two dimensions to that problem.

CEF: Let's talk about some of the projects that you're supporting. Which ones are you most excited about? Which ones are the most noteworthy so far?

Hoffman: There's a couple that we think are indicative of where we would like to be heading. First is the basket of projects that we're supporting in the area of biomass gasification. We're responding to the market there which says that biomass is the poor country's oil, and there's been lots of interest over the years in trying to make gasification of biomass into a commercial proposition. We think that the technology is ready but there are a number of other questions about the business model—how do you actually commercialize these technologies on the village level? So we are quite excited about the handful of projects that we've put together in the biomass area because we're trying to answer a specific set of questions about what is the right way you commercialize these technologies.

Another challenging area that we're just learning about as a precursor to making a much bigger investment is the area covered by the two city transportation projects that we have, one in Latin America, where we're working with the World Bank and others to support the "Clean Air Initiative," and the second, called "ALTER-Europe," which includes a number of cities in Europe. Both of those are city network projects designed to introduce air quality improvement standards, projects, and activities within cities. We're involved with these projects in order to learn the best ways to work with cities to tackle transport problems, which constitute one of the last big environmental areas where nobody has much of a clue regarding how we address the gridlock and the pollution problems and the quality of life issues and so on.

And there's a third project. It's being done with Professor Kurt Smith at the University of California at Berkeley and it deals with household air pollution. Poor women and children using firewood and crop residues for indoor cooking inhale particulates that come from the smoke. They suffer premature deaths from acute respiratory disease. That's a big health issue that has largely gone unnoticed. The figure that is bandied about is two million women and children die prematurely every year. Again, that project is the first step towards what we hope will be a much larger program of cooperative work with multilaterals like the World Health Organization to find solutions to that problem.

CEF: Within your developing country focus, do you have the desired balance between grant recipients in Northern and Southern countries or are you seeking to increase the proportion of your grants to organizations in Southern countries?

Hoffman: I think we're feeling our way. The project portfolio you see now on the Web is what we call the "Launch Portfolio." We put it together conscientiously but with a bit of serendipity in the topics. The country mix came about as we found the projects. We will tend to be more balanced in the future between North and South, but it will evolve. It will change from one period to the next.

CEF: Lastly, what do you see as the long-term structure of the Sustainable Energy Programme? What do you see it doing, for example, in 10 years?

We'll be experimenting and innovating with ways to tackle issues like transport in cities and indoor air pollution.

Hoffman: I hope the Programme will be associated with the development of quite concrete and sustainable solutions to problems. The Programme will support a number of projects where we'll be experimenting and innovating with ways to tackle issues like transport in cities and indoor air pollution. And once we've come up with something that works—a set of mechanics that work and a stakeholder engagement approach that works—then we want to disseminate that approach as widely as possible. We want to generate evidence that will convince the policymakers and the people with *larger* amounts of money to invest in those solutions. We want to be associated in 10-years time with having helped develop solutions to a number of the key energy and environmental problems. ♦

ARGENTINA *(Continued from Page 1)*

Project sponsor Granjas Eólicas S.A. ("GESA") is a limited liability company based in Buenos Aires, Argentina, established in 1999 to initiate development activities related to the Project. During the past two years, GESA has completed wind measurements on-site to confirm wind availability and has also obtained the required generation and transmission permits to proceed with project construction. Environmental permits from the pertinent local authorities have also been secured. Negotiations related to the project's ownership arrangements are currently underway. The project is in the IDB's pipeline for approval by its Board of Executive Directors in mid-2001.

The wind farm will offset... carbon dioxide and other greenhouse gasses that would otherwise have been released into the atmosphere.

The wind farm will generate approximately 200 GWh per year, which represents approximately 19 percent of total residential electricity consumption or 6 percent of aggregate consumption in the Patagonia region. During the 30-year operational life of the wind farm, electricity production is expected to cost an amount that compares favorably to the long-run equilibrium price projected in the market based upon sponsor analysis. Based upon a wind resource analysis presented by GESA, the expected net capacity factor of the turbines is on average 43 to 50 percent. The wind farm will offset approximately 130,000 to 175,000 tons of carbon dioxide per year and other greenhouse gasses that would otherwise have been released into the atmosphere by conventional fossil fuel-fired power stations.

GESA has signed a 30-year renewable lease contract for the 300 hectares of land necessary for the project with an option to lease an additional 5,500 hectares of land adjacent to the site, which allows for the potential future expansion of the project.

The project will sell electricity to the Patagonia power pool. According to the IDB, the project will provide power to the pool at a lower price than the existing fossil power plants in the region. It will thus help lower consumer electricity costs and improve competitiveness of power supply services in Patagonia. The pool will accept Chubut's power on an "as-available basis". According to a GESA analysis, the wind resource is stable and significant.

The project will receive both energy payments and capacity payments from the Patagonia pool, as well as federal and provincial incentive payments legislated for wind energy in Argentina. In addition, the project could potentially receive payments for greenhouse gas emission offset credits, although no analysis has yet been undertaken on this.

Energy demand in the Patagonia region of Argentina is forecast to grow around 4 percent in 2000 and 2001 and expand on average of 5-7 percent per year from 2002. However, major capacity additions to the Patagonia system are not contemplated in the foreseeable future. As a result, the Chubut project will end up displacing some of the fossil capacity in the region.

Based upon a wind resource analysis presented by GESA, the expected net capacity factor of the turbines is on average 43 to 50 percent. The resulting permanent operational capacity of the wind farm is forecast at 25 MW. The wind farm will offset approximately 100,000 to 160,000 metric tons per year of carbon dioxide and other greenhouse gases that would have been released into the atmosphere by conventional fossil fuel-fired power stations. The project will be located near the town of Comodoro Rivadavia in the province of Chubut in the Patagonia region of southern Argentina. ♦

For more information on the project, contact Ms. Lori Kerr, Investment Officer at the Private Sector Department of the Inter-American Development Bank at <lorik@iadb.org>, 202-623-3184; or Mr. Jorge Polo, President, GESA, at (+54-11) 4792-6046.

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of 1,175 megawatts (MW) by 1999-2000. India now stands fifth in the world in wind power capacity, with the southern state of Tamil Nadu accounting for about 65 percent of total capacity.

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Initially, financing institutions other than IREDA were not willing to invest in wind power projects due to lack of exposure and experience in this sector. In 1993-94, the World Bank provided financial assistance of $145 million ($43 million for wind energy) to IREDA for a project designed to help commercialize small hydro, solar photovoltaics, and wind power. The objective of the wind power component was to accelerate wind energy use by providing financial and technical assistance to prospective sponsors of wind farms. This opened the window for large-scale financing and catalyzed the growth of the industry in the mid-1990s. Under this program, IREDA disbursed more than Rs 1,195 million at an interest rate of 13.5-14 percent (which was lower than the commercial rate of interest of 16-18 percent), thus adding an installed capacity of 49.9 MW.

The growing interest among wind project sponsors encouraged other financial institutions (FIs) to begin financing wind projects. These included the Industrial Development Bank of India (IDBI), the Industrial Credit Investment Corporation of India (ICICI), the Gujarat Industrial Investment Corporation Limited (GIIC), the Power Finance Corporation (PFC), the Industrial Finance Corporation of India (IFCI) and the Rural Electrification Corporation (REC). IREDA loans were structured with 10-year maturities and a one-year up-front grace period. The other FIs typically provided seven-year loans with no grace period. But in spite of IREDA's more attractive terms, other FIs attracted more than 70 percent of the business in the sector because of their established loan approval procedures, easy accessibility, single-window facility, and their countrywide presence.

The availability of domestic debt still drives the industry. Most projects' debt-to-equity ratios are in the standard 60-75 percent range. Project sponsors typically provide their equity share through the purchase of the wind generators.

The growth trend continued up to 1996, after which it declined as a result of new government policies. The delay was due in part to the expiration of, or delay in renewing, state incentives. But it was mainly due to the introduction of minimum alternate tax, a mechanism that requires companies to pay a minimum income tax despite the availability of a number of tax incentives. A government tax investigation had revealed that some companies invested in wind purely for the tax benefits, mainly the 100 percent depreciation allowed for wind power investments. These companies indulged in dubious practices during the sale and lease of machines, and had no incentive to ensure that their wind machines worked properly. Investments spurred by tax incentives contributed to the growth of the wind industry, but resulted in the failure of the sector to produce power at the estimated capacity levels. Capacity factors were less than 15 percent—that is, the actual electricity generated was only 15 percent of the installed capacity of the wind machines (30-35 percent is the usual target for wind machines).

Wind power shows great promise for new investment and should open up more financing opportunities for more financial institutions.

The way companies used the Indian tax code to finance questionable wind projects provides a cautionary lesson to any government wishing to use the tax code to promote wind power or renewable energy generally. The transactions were broadly divided into three categories. In the first, a company sold its assets (on which depreciation is allowed) to a finance company. In most cases, this finance company was owned by the company itself and entered into a lease transaction through which it claimed depreciation on the assets. In the second case, the company used the help of willing finance companies to claim depreciation. In this case, the finance company bought its assets on a hire-purchase basis and sold them to a third company, invariably a shell company owned by the one initiating the transaction. The third company leased the assets back to the original owner, and the finance company was paid a hire-purchase management fee for its services. In the third case, the company simply borrowed money against an existing asset and signed a lease deed with a finance company, entitling the latter to claim depreciation on the assets. Such a deal enabled a company to raise money against an existing asset.

Technical problems also contributed to the late-1990s decline. Wind machine performance was negatively affected by grid fluctuations—specifically, variations in

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grid voltage and frequency and imbalance in grid phase currents. Higher reactive power withdrawal by wind electric generators (WEGs) led to increased transmission and distribution losses, overloading of substation transformers, and associated power evacuation problems. At times, insufficient capacity of power evacuation facilities obstructed continuous operation of machines. State electricity boards have since taken corrective measures to address these problems. Wind companies have also taken steps to introduce power conditioning equipment that was not readily available during the wind boom.

Indian power officials hope that a combination of grid improvements, wind machine technical improvements, strict performance guidelines, limited state financial incentives, the removal of the tax depreciation loophole, and the availability of affordable domestic debt will keep the current wind power revival going. A recent assessment by MNES puts the wind power potential at 45,000 MW. The increase from the previous estimate of 20,000 MW is because of the improved designs of WEGs, higher unit sizes, and increased hub-heights. Wind power shows great promise for new investment and should open up more financing opportunities for more financial institutions. With government policies favoring the sector, along with the availability of commercial opportunities, wind power should remain a major source of renewable power in India for many years to come. ♦

Dr. Saroj Mishra is a Program Officer with Winrock International India.

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accounts focused on public and private equity investments in emerging markets. Two of its funds, Emerging Markets Funds I and II, invest in renewable energy, among other environmentally-oriented projects. *Contact: Wendell Robinson, 1225 Eye Street NW, Suite 900, Washington DC 20005; Tel: +1 (202) 789-4500; Fax: +1 (202) 789-4508; email: <reception@globalenvironmentfund.com>*

2. Funds Established by Multilateral Development Banks

Dexia-FondElec Energy Efficiency and Emission Reduction Fund is a 70 million euro equity fund established by the European Bank for Reconstruction and Development (EBRD) to improve energy efficiency and reduce greenhouse gas emissions in Central and Eastern Europe. The fund is capitalized by the EBRD, Dexia Group, and several Japanese firms; and is managed by FondElec, a private equity fund management firm. The fund is focusing on energy service companies (ESCOs), district heating systems, and combined heat and power (CHP) projects. *Contact: Lawrence McGrath or Francisco Hoyos at FondElec Group, Inc., 333 Ludlow Street, Stamford, CT 06902 USA; Tel: +1 (203) 326-4570; Fax: +1 (203) 326-4578; email: <lmcgrath@fondelec.com>*

Prototype Carbon Fund (PCF), opened in January 2000, is a $145 million fund sponsored and managed by the World Bank to purchase carbon emissions reductions in renewable energy and other carbon offset projects in developing countries and distribute the carbon emissions reduction credits to PCF investors, which so far include six Northern country governments and 15 private companies, including British Petroleum, RaboBank, Deutche Bank, and six Japanese electric utility companies. All PCF-supported projects must have the approval of the host country's government. Near-term projects include a waste methane recovery project in Latvia, capitalization of a renewable energy fund in Costa Rica, a rural renewable energy project in Uganda, and a 36-megawatt sugarcane bagasse power project in Guyana. The PCF's geographic focus is Africa, Latin America, and Central and Eastern Europe. *Contact: Chandra Sinha at the PCF, c/o The World Bank, 1818 H Street NW, Washington, D.C. 20433 USA; Tel: +1 (202) 458-7475; email: <chandra.sinha @worldbank.org>; website: <http://www.prototypecarbonfund.org>*

Renewable Energy and Energy-Efficiency Fund (REEF) was established by the International Finance Corporation (IFC) to invest in renewable energy and energy-efficiency projects in developing countries and those in economic transition. The principal fund manager is Energy Investors Funds (EIF). The REEF, with $100 million in equity and $100 million in debt, will consider investment in projects with total capitalization requirements of between $1,000,000 and $100,000,000. REEF's investments may take a variety of forms including common and preferred stock, partnership and limited liability company interests, and convertible or subordinated debt with equity warrants/options. REEF may also make loans to projects or project sponsors on a bridge or permanent basis. Equity transactions will typically be structured so that the entrepreneur retains the majority of shares and/or management of the company. To date no deals have been closed. The first three commitments are expected in early 2001. *Contact: Ken Locklin, EIF; Tel: +1 (202) 783-4419, +1 (202) 371-5116; email: <klocklin@eifgroup.com>*

Solar Development Group (SDG) consists of a private investment fund and a foundation whose common purpose is to accelerate the delivery of off-grid PV and other renewable energy sources to rural areas of developing countries. It is in the process of being established with core funding and investment capital from World Bank, International Finance Corporation

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(IFC), Global Environment Facility, charitable US foundations and other multilateral and private investors. SDG has a target capitalization of US$ 50 million, with approximately $30 million of investment capital devoted to an investment fund (Solar Development Capital) and $20 million of grant funds devoted to a Foundation (Solar Development Foundation). The foundation is currently operational providing business development support to established or newly emerging companies involved in commercial, off-grid energy delivery, including the distribution, sales, lease-hire, or financing of PV systems. The fund will make equity or quasi-equity investments in local off-grid energy enterprises and will provide financing to local financial institutions that service such companies. Both the investment fund and the foundation are managed by Stitching Triodos PV Partners, a joint venture of Triodos Deelnemingen BV, Environmental Enterprises Assistance Fund (EEAF) and Global Transition Consulting Inc. (GTC). *Contacts: Candace Smith, COO Triodos PV Partners Tel: +1 (703) 522-5928, Fax: +1 (703) 522-6450, email: <sdcf@mindspring.com>; Hans Schut, Fund Manager, Triodos Bank, Tel: +31 (30) 693-6500, Fax: +31 (30) 693-6566, email: <hans.schut@triodos.nl> See the GEF website: <http://www.gefweb.org/Documents/Project_Proposals_for_Endorsem/project_proposals_for_endorsem.html> (scroll to August 21 entry)*

IFC Small and Medium Enterprise Program (SME) was established by the International Finance Corporation (IFC) and capitalized by the Global Environment Facility (GEF). The SME Fund provides debt to "intermediary organizations" in developing countries that either implement environmentally beneficial projects or on-lend to other enterprises that implement such projects. Funds are provided at below-market terms with a portion of the principle forgiven if the projects are successful. The SME Fund has helped finance photovoltaic solar home programs in the Dominican Republic and Vietnam and an energy service company in Tunisia. Following a pilot phase, the SME Fund was capitalized by the GEF at $16.5 million. The $8.25 million second tranche of that was approved this year by the GEF for ongoing operation of the fund. *Contact: Douglas Salloum, SME Program Manager, IFC, Tel: +1 (416) 690-1250; Fax: +1 (416) 690-9757; email: <dsalloum@ifc.org>*

Photovoltaic Market Transformation Initiative (PVMTI) is a $25 million GEF-capitalized fund developed by the International Finance Corporation (IFC) to finance and provide technical assistance to solar photovoltaic enterprises in developing countries, initially India, Kenya, and Morocco. So far, the fund has commitments of $9 million in India and $3 million in Kenya. The Morocco program is expected to start up soon now that the national electric utility, ONE, has approved its own participation. The PVMTI fund manager is Impax Capital, along with IT Power. *Contact: Ian Simm, Impax Capital Corporation Ltd., Broughton House, 6-8 Sackville Street, London W1X 1DD, UK; Tel: +44 (207) 434 1122; Fax: +44 (207) 434 1123; email: <info@impax.co.uk>; website: <http://www.impax.co.uk>*

3. Government Institutions

Most industrialized countries have institutions providing long-term finance for private sector development in developing countries. The institutions are created, and often managed, by their national governments. Usually, but not always, they prefer supporting projects and enterprises that have involvement by firms from their home country. *For overviews of 12 of these institutions, see the website of the European Development Finance Institutions (EDFI) at <http://www.edfi.be>.*

Finnish Fund for Industrial Cooperation LTD (FINNFUND), established by the Finnish government in 1979, provides equity and debt to private ventures in developing countries and those in economic transition. Its **Private Energy Market Fund** began operations in late 1999. Capitalized by FINNFUND, Ekono Energy, and several investment funds, the fund makes both equity and quasi-equity investments in energy projects and enterprises in developing countries and Central and Eastern Europe (CEE). Its near-term investments will be in CEE and Asia. The investment targets are expected to be combined heat and power (CHP) plants, power plants that use biofuels and other new fuels, and companies focused on improving energy efficiency. The fund is managed by Emerging Power Partners Ltd. which is owned by FINNFUND and Ekono Energy. *Contact: Herkko Lehdonvirta, managing director of Emerging Power Partners Ltd. through FINNFUND, P.O. Box 391 (Ratakatu 27) FIN-00121 Helsinki, Finland; Tel: +358 9 348 434; Fax: +358 9 3484 3346; email: <finnfund@finnfund.fi.>; website: <http://www.finnfund.fi>. FINNFUND's Asia regional office is in Kuala Lumpur, Malaysia at Tel: +60 3 238 6355; Fax: +60 3 238 6360; email: <finnfundkl@po.jaring.my>*

Deutsche Investitions und Entwicklunggesellschaft mbH (DEG) is a German government financial institution that finances the establishment, expansion, and modernization of private enterprises in developing countries and those in economic transition. It provides financial support in a variety of ways but tends to focus on joint ventures with German or European enterprises. It takes minority equity positions (if it can exit in 5-10 years). Its debt is typically euro-denominated at commercial fixed or variable rates for 4-10-year terms, with the size of up-front grace periods dependent on anticipated cash flow. Investments are typically secured with asset collateral. DEG can also provide guarantees in

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order to allow enterprises to borrow in local currency. DEG has supported wind projects in Brazil and Ghana, and a 36 megawatt run-of-river hydro project In Nepal. *Contact: Business Relations, Belvederestrasse 40, D-50933 Köln (Cologne) Germany; Tel: +49 (221) 498-6401; Fax: +49 (221) 498-6290; email: <businessrelations@deginvest.de>; website: <http://www.deginvest.de/german/frameset_nc_1.html>*

The Industrialization Fund for Developing Countries (IFU), **Investment Fund for Central and Eastern Europe (IØ)**, and **Investment Fund for Emerging Markets (IFV)** are the Danish government's international investment funds. The three funds share the same boards of directors and management. IFU, the oldest and largest of the three, provides equity, debt, and guarantees, and assists in mobilizing supplementary financing from other sources for projects in all but the poorest developing countries. It generally participates as an equity partner, providing up to 30% of the equity. It can also provide loans up to 25% of total project cost including working capital. It invests in both large and small projects, including pilot projects, and offers advisory services in the preparatory and initial phases of investment projects. IØ works along the same lines as IFU but only in Central and Eastern Europe. It is among the biggest foreign investors in Poland and has an office in Warsaw. IØ administers a special **Environmental Investment Facility (MIØ)** in cooperation with the Danish Ministry of Environment and Energy. IFV operates in the poorest developing countries, which are not eligible for IFU or IØ financing. It co-finances start-ups as well as expansions and privatizations, provided that Danish companies participate with financing and management. IFU has regional offices in India, China, Zimbabwe, and Mexico. *Contact: IFU at Bremerholm 4, DK 1069 Copenhagen K, Denmark; Tel: +45 (33) 63 7500; Fax: +45 (33) 32 2524; emails: <ifu-cph@inet.uni2.dk>, <io-cph@inet.uni2.dk>, <ifv-cph@inet.uni2.dk>; website: <http://www.ifu.dk>*

Export-Import Bank of the United States (Ex-Im Bank) is the U.S. Government export credit agency. The Bank facilitates short-, medium- and long-term financing to creditworthy international customers to purchase U.S. goods and services, and short- and medium-term export credit insurance to enable U.S. firms to extend credit directly to international customers. There is no minimum project size. The Bank is interested in, and has actively supported, clean energy projects, including the establishment of a $100 million sustainable energy window for China. In addition, it has a policy that allows it to provide concessional financing on a case-by-case basis to renewable energy exporters, among others, in order to match the concessional terms provided by other export credit agencies. Another U.S. agency, **Overseas Private Investment Corporation (OPIC)**, provides political risk insurance, loan guaranties, and direct loans for small businesses. Under its U.S.-Africa Sustainable Energy Program, cosponsored with the U.S. Department of Energy to advance clean energy, OPIC has given the region priority in its programs, including a small grant fund for small businesses and non-governmental organizations. *Contact: Craig O'Connor, Environmental Liaison Officer, Ex-Im Bank, 811 Vermont Ave. NW, Washington DC 20571 USA; Tel: +1 (202) 565-3946; Fax: +1 (202) 565-3380. At OPIC, contact Sam Smoots, Tel: +1 (202) 336-8645; email: <ssmoo@opic.gov>; website: <http://www.opic.gov/>*

Netherlands Development Finance Company (FMO) is the Dutch development bank specializing in providing finance to the private sector in emerging markets. The FMO was founded in 1970 as a joint operation by the State and the private sector. The State owns 51% of the shares; the other shareholders are by leading Dutch banks (42%), the two largest trade unions, and approximately 120 Dutch companies and individuals. Projects do not have to include a Dutch partner. In addition to providing both equity and debt, the FMO implements a number of special Dutch government programs: Small-scale Enterprise Fund; Seed Capital; Investment Promotion and Technical Assistance for Developing Countries; Investment Promotion and Technical Assistance for Central and Eastern Europe. *Contact: FMO, Koningskade 40, 2509 AB The Hague, The Netherlands; Tel: +31 (70) 314-9696; Fax: +31 (70) 324-6187; e-mail: <fmo@wxs.nl>; website: <http://www.fmo.nl>*

French Global Environment Facility (FFEM), established in 1994, is modeled after the multilateral Global Environment Facility (GEF), but is funded and administered by the French government's Agence Française de Développement. It is less like a development finance institution (although France has one of these as well—PROPARCO) and more like the GEF in that it provides grants to cover the incremental costs of projects with global environmental benefits. As such, it supports energy projects that reduce greenhouse gas emissions. It gives priority to projects that are scientifically, technologically, or institutionally innovative. So far, its overall geographical focus has been on Africa. Like most bilateral donor agencies, the FFEM prefers but does not require the involvement of companies and consultants from its home country. Candidate projects for FFEM funding must come through one of the following French agencies: Ministry of Foreign Affairs and Cooperation; Ministry of Economic Affairs, Finance, and Industry; Ministry of the Environment; Ministry of Research; or Agence Française de Développement. *Contact: Catherine Garreta, 35 rue Boissy d'Anglas, Paris cedex 08, France; Tel: +33 (1) 40 06 32 55; Fax: +33 (1) 40 06 32 48; website: <http://www.ffem.net/>* ♦

Resources

"Promoting Energy Efficiency and Renewable Energy: GEF Climate Change Projects and Impacts," by Eric Martinot and Omar McDoom, Washington, DC: Global Environment Facility, June 2000. Available at <http://www.gefweb.org>. Mr. Martinot can be contacted at <emartinot@worldbank.org>.

This report is an overview of the 72 energy efficiency and renewable energy projects in which the Global Environment Facility (GEF) participated through mid-1999. Few of these projects have been completed to date, and the report is not an evaluation of their effectiveness. Rather, it categorizes the projects into different project types and describes the various approaches undertaken by the project sponsors. It examines, for example, how various projects have engaged the private sector, what kind of consumer financing approaches they used, how they sought to change or improve government regulations, how they distributed their products, how they worked with non-governmental organizations, and how they took steps to ensure that their demonstration project would more likely be replicated instead of completed as one-off projects.

The authors wait until the appendices to provide their best information about the various approaches, including financial approaches, taken by GEF projects. In a good section on financing techniques, there is a brief discussion of the dealer credit approach in the Indonesia solar home system (SHS) program, wherein commercial financiers extend credit to SHS dealers, who in turn lend to their customers. The authors state that, "An apparent problem in Indonesia is proving to be that financiers consider dealers uncreditworthy, and dealers consider their customers uncreditworthy." Alas, the Indonesia SHS program has since been cancelled by the World Bank.

A section on "declining cash grants" discusses how energy service company (ESCO) concessions in Argentina are given a cash grant from GEF funds for each system installed during the first five years of the project. "The cash grants decline in later years of the project, gradually reaching zero by the end of the project." The theory behind declining cash grants is that as the project advances, businesses will be able to offer cheaper systems to their customers, and thus smaller cash grants are needed to maintain the same overall retail price. Even where retail prices do not change over time, declining grants help stimulate customers to buy now because they know the cash subsidy will be smaller in the future.

The report's categorization of GEF projects may not be terribly helpful to clean energy project developers wanting to know what works and what doesn't. But the report is useful in that it lays out a comprehensive compendium of approaches taken by past developers. Unfortunately, it does not suggest what approaches generally seem to work best. Granted that each country is different and each project faces its own set of social, economic, and environmental circumstances, are there any lessons about project design and implementation from this set of 72 GEF projects that we can say should be applied in the design of new projects? This is perhaps asking too much given the fact that few of these 72 projects have been completed. And of course, reaching conclusions and making judgments about projects without having conducted on-site evaluations is not the most professional course of action. Still, one yearns from such a comprehensive overview to learn how to prepare better GEF projects, or at least to know what steps *not* to take.

"Towards A Streamlined CDM Process for Solar Home Systems," by Remko Ybema et al, Sponsored by Netherlands Energy Research Foundation (ECN), Sunrise Technologies Consulting, and IT Power, November 2000. The report, along with a second volume of case studies, is available at <http://ecn.nl/unit_bs/kyoto/mechanisms/cdmshs.html>. Mr. Ybema can be contacted at <ybema@ecn.nl>.

Promoters of photovoltaic solar home systems (SHS) in rural areas of developing countries have long suggested that SHS are not only an appropriate means for delivering electricity to unelectrified areas, but are a good fit for the Kyoto Protocol's Clean Development Mechanism. But according to the authors of this study, the cost of monitoring and verifying the carbon emission reductions from each SHS project make Certified Emission Reductions (CERs) from such projects prohibitively expensive compared to other sources of CERs, such as other renewable energy and energy-efficiency technologies. The authors propose the establishment of a streamlined procedure for SHS projects to qualify for CERs.

In this study, funded by the Dutch organization NOVEM, along with the Netherlands Agency for Energy and Environment (ECN), and the Shell Foundation, the authors assert that there are sufficient SHS project successes around the world to allow one to establish standardized baseline, validation, and monitoring procedures; and they provide supporting evidence from eight case studies of SHS programs in

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Africa, Asia, and Latin America. They acknowledge that the case studies "reveal a substantial variation in the carbon abatement from SHS installations both within and between individual countries." Nevertheless, they call for uniform global emission reduction values for all SHS programs "regardless of individual project characteristics or location." Then, over time as more accurate information becomes available on SHS program performance, the authors call for carbon emission reduction values to be gradually introduced for more fine-tuned SHS CERs.

The study found that the average emission reduction from a SHS program in Nepal amounted to 79 kilograms of CO_2 per year while the average emission reduction in an Argentina program was 504 kg CO_2 per year (although the Argentina program has not really been implemented yet). The authors state that over 70 percent of the individual solar systems in the programs they reviewed had annual emission reductions in excess of 200 kg CO_2, and they thus suggest the 200 kg figure serve as "a conservative but safe global emission reduction value" for SHS projects.

One factor that should help determine a more fine-tuned CER value, according to the authors, is whether a given SHS Program provides some form of consumer financing. They thus suggest that corrections be made for the expected "availability" of the solar systems, and propose that a relatively low availability factor should be used for solar systems sold on a cash basis, with a higher factor for systems sold on a credit basis, with the highest factor proposed for systems installed on a fee-for-service basis.

Perhaps the main problem with trying to affix a carbon emission reduction value to a given solar program is that there are very few successful solar home programs in existence, and even fewer with even minimal data on their climate impact. Few programs have turned out to be financially sustainable; few have been able to provide ongoing maintenance of the solar systems; and in many cases, households continue to use the kerosene that the solar systems were intended to displace, thereby directly reducing the carbon reduction benefits of the solar systems. Still, the authors of this study have taken a good step toward laying out a framework for standardizing future SHS program emission reductions. Hopefully, there will be a better SHS program track record on which to base that standardization. With the lack of agreement at the Sixth Conference of the Parties in The Hague in November, the subject may be moot for the time being. ♦

CLEAN ENERGY FINANCE

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