

REED Returns More Than Money

UNEP's US\$9.6 million Rural Energy Enterprise Development Programme is an initiative offering enterprise development services and start-up financing to 'clean energy' enterprises in five African countries (AREED), in Brazil (B-REED) and in China (C-REED). Since beginning in 2000, REED has financed 44 enterprises that are now returning capital each year to an investment fund that is then re-invested in new enterprises.

But the returns are also more than financial and are matched – and in many cases exceeded – by the non-financial returns of economic development, environmental improvement and better access to modern energy services for poorly-served communities. Although quantifying these returns is difficult, they are real and measurable to some degree.

A recent study by Oxford University researcher Philip Napier-Moore quantified some of the non-financial impacts of REED investments. The study included a cost-benefit analysis of eight successful enterprises, where costs are essentially 'inputs' made by REED and the benefits are observed 'outputs' that can be reasonably attributed to the REED intervention. The comparisons can be shown in a chart (see next page) with a Benefit-to-Cost Ratio (B/C) figure that ranges from 1.0 (benefits=costs) to nearly ten (benefits are ten times the costs) across the eight enterprises.

"Care was taken to account for only those impacts that could be observed to date to avoid projecting any future benefits," says Napier-Moore.

With a B/C ratio of 7.0, AREED enterprise Biomass Energy Technology Limited (BETL) is a good example of the non-financial returns and spinoff activities that can flow from this type of enterprise development. The company coordinates the sourcing and supply of agricultural and other biomass wastes as fuel for the Tanga Cement Company Ltd



Fuel switching to gas for indoor cooking (above) and biomass for cement production (left) has economic, social and environmental benefits.

(TCCL), which displaces up to 15% of the 44,000 tons of heavy fuel oil TCCL uses yearly to provide heat for its cement kilns. This substitution saves TCCL money, reduces greenhouse gas emissions, and generates a 43% gross profit margin for BETL on monthly deliveries of up to 1200 tonnes at \$40-\$60 per tonne.

Income from collecting and transporting biomass, however, is potentially the most significant social impact of BETL's activities. Each tonne of biomass supplied to TCCL generates income for the Tanga-based transporter, Nassoro Fehdi, who has used his profits to buy an additional truck and employ an extra driver. At the company level, BETL has employed one new staff member who is currently undergoing professional accountancy training.

Women in urban areas can earn \$60 per month collecting 40 bags of charcoal residues a day for the waste contractor used by BETL. This is 25% more than the minimum wage in Tanzania and constitutes low-level job creation with a genuine impact on poverty.

Positive environmental impacts from BETL operations include local benefits arising from a waste disposal mechanism and the global benefit of reduced greenhouse gas emissions that would otherwise be produced from the combustion of heavy fuel oil at the cement processing facility.

The improved investment climate is also encouraging the growth of LPG supply networks, he says. Further, as LPG becomes more accessible to Gha-

REED support is generously provided by the United Nations Foundation, UN Fund for International Partnerships, the Blue Moon Fund, SIDA the Nature Conservancy, and the governments of Sweden, Germany and the Netherlands.

na's households, it displaces traditional fuels - even in outside urban areas - and creates the potential for substantial social and environmental benefits.

UNEP's Lawrence Agbemabiese says it is imperative to document and quantify social and environmental returns. "To continue to provide the services and seed capital to our current markets, we must show the necessary financial and non-financial returns to attract socially responsible investors and traditional investors."

For the full report, go to www.ared.org

Contact: Lawrence Agbemabiese, UNEP, email: lagbemabiese@unep.fr

REED Toolkit On-line

The *REED Toolkit* is now online. The Toolkit is a step-by-step guide for turning a clean energy business idea into a clean energy business reality, including topics ranging from defining business objectives to preparing financial analyses and determining a distribution strategy. The *Toolkit* helps entrepreneurs gather the essential information needed for a business plan and compile it into a compelling form that is capable of attracting capital and guiding the growth of the enterprise.

The *REED Toolkit* takes a general approach to business development, covering topics that must be addressed in any clean energy business plan. Each step in the process is designed to make the final business plan as compelling as possible, whether the plan is to sell electricity generated from hydropower to a national utility, or to manufacture energy-efficient cook stoves.

The *Toolkit* is available in English, French and Portuguese and can be downloaded from <http://www.ared.org> (English and French), and www.b-reed.org (Portuguese).

REED Gets Swedish Boost

REED has received substantial new support from the Swedish International Development Agency (SIDA). The support will help the REED Programme to shift gears to a more targeted approach that creates specific opportunities to find and nurture new entrepreneurs and supports a consistent pipeline of new investments.

Benefit-to-Cost (B/C) Ratios of Selected REED Investments

Enterprise Name	Business Area	REED/E+Co Investment	Country	B/C Ratio
Anasset	LP Gas retail	\$38 000	Ghana	4.5
BETL	Alternative fuel retail	\$50 000	Tanzania	7
GTEL	Energy-efficient lighting retail	\$70 000	Ghana	9.9
SHLN	Grid-connected mini-hydro	\$250 000	Honduras	2.2
Sodigaz	LP Gas retail	\$183 088	Mali	2
Tecnosol	Solar-home-system retail	\$100 000	Nicaragua	4
USISS	Solar food-drying	\$19 665	Mali	1

The REED support will also help SIDA to further the Swedish organisation's knowledge and experience with enterprise-led development and test a new development approach that can be used elsewhere.

SIDA's two year support includes a direct contribution of \$350,000 in the REED programme, which will also trigger \$300,000 in new seed investment money from the United Nations Foundation (UNF). "Together, SIDA support leverages three dollars of investment funds for every SIDA dollar directed towards enterprise development services," says UNEP's Eric Usher. This can also help local partners provide this type of support to other SME investment facilities managed either by E+Co or others, adds Usher.

Contact: Eric Usher, UNEP, email: eric.usher@unep.fr

New Regional Manager for E+Co

Kofi Nketsia-Tabiri has been promoted from project officer for KITE, E+Co's AREED partner in Ghana, to E+Co Africa Regional Manager. Kofi will lead the E+Co Africa team to raise a planned \$15 million for investment capital and \$4.1 million for services to entrepreneurs and operating costs. With this capital, E+Co plans 125 investments in modern energy enterprises in nine Sub-Saharan countries over a four-year period.

"This is an exciting time for AREED and I am pleased to lead this excellent team," says Nketsia-Tabiri.



Lots of Flow in AREED Pipeline

AREED continues to expand, including new forays with local financial institutions. With the UNIBANK of Ghana providing \$30,000 of growth capital to an AREED enterprise, E+Co and AREED are expanding their reach and presence to local financial institutions in Ghana, Senegal, Tanzania and Mali. E+Co and AREED will continue developing such relationships with E+Co Investment Officers promoting prospective enterprise investments to senior officials of local banks.

AREED has been active in all five countries of operation. Following is a brief summary of each country's activities.

Tanzania

The early stages of AREED in Tanzania were challenging, due to the lack of well-developed and established renewable energy policy, regulations, and businesses, coupled with a challenging environment for the development and growth of small and medium enterprises in the energy sector.

Persistent effort, however, has paid off with AREED now considered a key investment resource for clean energy entrepreneurs in Tanzania. Two investments worth \$150,000 have been made in Biomass Energy Tanzania Limited (BETL) and Mona Mwanza Electrical and Electronics (MONA). BETL is supplying biomass wastes for thermal heating needs in the cement production process for Tanga Cement Company Limited, while MONA is marketing, installing and servicing solar PV systems.

Contact: Oscar Lema, TaTEDO,
email: energy@tatedo.org

Senegal

Fourteen projects are in the AREED Senegal pipeline, with five entrepreneurs receiving advanced enterprise development services and a total of seven enterprises presented for investment in 2004.

These enterprises include ENERGECO, a company marketing solar driers that allow farmers to preserve food for sale between harvests. Sud Solar System is a group that markets, installs and maintains solar photovoltaic equipment and is engaged in a 'solar web village' project to power

information and communication technology (ICT). ENERGIE R seeks AREED support to produce and market solar lights (fluorescent strip lights, compact fluorescent lamps, etc.) and solar regulators, while GIE Foyers Amerliores plans to extend the manufacturing and marketing of Diambar furnaces and accessory products (such as incense burners, grilling ovens, etc.).

MOTAGRISOL is another new enterprise seeking AREED support to produce and market solar mills the company has been developing for nine years. MOTAGRISOL has developed a strong relationship with Senegal's Ministry of Development and National Solidarity, which has signed a contract for the delivery of 50 solar mills.

Bejal Farm is also being considered for investment after the company was rejected in 2003 because the use of sustainable energy was only a minor element of the investment plan. The entrepreneur's efforts and an impressive business plan, however, have allowed AREED to reconsider the application. Bejal Farm uses renewable energy in a poultry farm to improve production.

According to Secou Sarr of AREED local partner Enda, the new enterprises demonstrate both the need and the diversity of new energy enterprises. "To address the energy challenge in Africa, we must encourage the widest variety of new enterprises and new ideas, and REED is a good tool to help us do this," he says.

Contact: Secou Sarr, Enda,
email: energy2@enda.sn

Ghana

With eight investments in Ghana totaling \$603,828 and 53 enterprises in the pipeline, Ghana is one of the most active AREED countries. The pipeline includes about 40 new enterprises promoting LPG and biomass enterprises, such as a briquette and charcoal production company utilizing specialized kilns and timber industry waste.

Solar enterprises in the pipeline include solar-powered information and communication technology (ICT) centres in rural communities, solar driers, and photovoltaic panels and solar accessories for domestic and water pumping applications. Energy efficiency enterprises include energy efficient light-

ing systems and energy efficiency for motorized and industrial equipment.

The Ghana AREED portfolio in the LPG sector is particularly robust with six investments totaling \$305,000. LPG is a growing sector, providing an affordable and reliable alternative for many low-income households in Ghana. As a result of the strong portfolio and the market for additional capital, E+Co and KITE are developing a business plan to create a Clean Energy Fund in Ghana. "Several local financial institutions are being identified to participate and significant progress in the funds development is expected in 2006," says E+Co's Kofi Nketsia-Tabiri.

In terms of the pipeline, two enterprises are nearly through. RKA started the production of western type gas stoves in Ghana in 2002 and has since been producing 3-burner tabletop gas cookers for the Ghanaian market. The company is seeking AREED investment to add 4-burner tabletop cookers, which are in high demand on the Ghanaian market.

Fee HI Company Limited retails its LPG products to households, commercial customers and automobiles at Ashaiman, a suburb of Accra. The company has recently been approved for AREED financial support to establish a second LPG re-filling plant at Akim Oda to serve the increasing number of domestic and commercial consumers in the Eastern Region of Ghana.

Bansim Binara Enterprise (BBE) is a start-up Liquefied Petroleum Gas (LPG) distribution company being established in Ghana's Northern Region, one of the most deprived regions of the country with high deforestation and more than 600 km from the national refinery. BBE will operate an eleven metric tonne LPG stationary filling plant that will refill customer cylinders, ranging between 5kg and 30kg in size.

BBE is being established to improve the LPG supply chain in the region where the comparatively low level of development of the LPG market has been a major disincentive for entrepreneurs to venture into the market.

Contact Mr. Frank Ottaibill Atta-Owusu, KITE, email: faowusu@kiteonline.net

Mali

AREED has three investments in Mali worth \$316,000, one investment waiting for the AREED and E+Co committee approval, and a pipeline with

14 promising enterprises receiving various stages of enterprise development services.

One enterprise recently approved is ECO'HOME, receiving \$120,000 to market energy efficient lighting products. Awaiting approval is SEECO-SINSINSO, a new joint venture initiative created by electricity company SEECO and micro credit institution Sinsinso. The company plans to market solar home systems in off-grid rural areas such as Banamba, situated 143 km from the capital of Bamako.

Other AREED investments are expanding. SODIGAZ, for example, is the first Malian operator in butane gas sector, previously dominated by multinational companies. The manager, M. Diawara, looked for AREED assistance in 2003 to double the company's capacity to stock gas, as well as to invest in gas bottles for use by customers and to generally improve logistics. AREED assisted the company with \$175,000. Thanks to AREED post-investment monitoring and evaluation, SODIGAZ is now developing plans to expand its network of distributors, with AREED support.

"An interesting outcome of AREED in Mali has been the development of a network to exchange information among AREED entrepreneurs, and to encourage the financial sector and the government to support and invest in energy enterprises," says Ibrahim Togola of the Mali Folkecenter, which manages the AREED project in Mali. The solar drier producer USISS, for example, now works directly with local women's associations that produce fresh mangoes and onions, which has improved the supply chain considerably.

Contact: Ibrahim Togola, Mali Folkecenter, email: ibrahim.togola@malifolkecenter.org

Zambia

The Zambian AREED experience demonstrates the challenges and risks of rural energy development, with several businesses failing to meet the terms of their AREED contract. The energy efficiency business of Chavuma, for example, has been struggling due to a history of poor customer repayments, which in some instances had to be resolved through legal action. New orders are pending, including one with a major brewery, but the viability of the business rides on the entrepreneur's ability to improve his customer finance model.

The technology of another company, TSADC Solar Ovens, has not performed as expected in cloudy conditions, which has impacted sales and revenues.

The company is trying to recover by modifying its technology.

However, the Zambian pipeline continues to develop new entrepreneurs, including a mini hydro

development, a solar PV business, and two irrigation companies.

**Contact: Francis Yamba, CEEZ,
email: yamba@eng.unza.zm**

B-REED
www.b-reed.org



Generating Income is Priority

More than a third of the world's families do not have access to modern energy services. The challenge, however, is not to simply expand the availability of these services, but to link them with opportunities to generate income. For many households in the developing world, access to modern energy services is simply not affordable.

“All too often, the link between energy and socio-economic development is implied rather than empirical,” says E+Co's Lucio Felix.

To develop that link, E+Co has published *A Guide for Entrepreneurs on Income Generating Activities: Applications of Clean Energy Technologies for Productive Uses*. The Guide details the types of energy services with a strong impact on the development of income-producing activities and what entrepreneurs need to address these opportunities. Some of the business ideas covered in the Guide include telecommunication boutiques, refrigeration, water pumping/irrigation and grinding. “Productive uses of energy generate revenue to help cover the costs of the equipment, reduce the financing risk, and increase the penetration of clean energy technologies,” says Felix.

Felix and the B-REED team have been working with several farming businesses to advance the productive use concept in Brazil to boost agricultural production, focusing on photovoltaic (PV) irrigation and solar drying. Through an innovative partnership with Village Energia Ambiental, a family-owned Brazilian company specializing in clean energy and sustainable agriculture, B-REED has been helping households in Coqueiral create their own micro-enterprise, and training farmers to become entrepreneurs and work as a group by sharing equipment and selling collectively to the market. Village provides flexible finance for reliable PV systems to power irrigation pumps and household appliances.

“Village has empowered farmers to create profitable micro-enterprises that can increase income and improve their quality of life,” says Felix. This model, he adds, is “human resource intensive” and a significant challenge to scale-up.

With less than a year in operation, the pumps are working properly and the first harvest has been completed. “Crop size was a little smaller than expected so the farmers are working with an agronomist to improve yields and assess alternative crops,” says Felix. He adds, however, that most farmers have already purchased solar home systems, which clearly shows that productive use and income-generating activities can help accelerate rural electrification.

New Clean Energy Investment Fund for Central America

An innovative investment fund will soon help small and medium-sized enterprises invest in renewable energy, energy efficiency and cleaner production projects in Central America. The Central American Renewable Energy and Cleaner Production Facility (CAREC) has raised an initial US\$15 million to invest in what is called “mezzanine-finance – a financing vehicle between debt and equity. “Mezzanine financing products include preferred shares, which are used to increase the amount of funding that does not have to come from a loan,” says E+Co's Gina Rodolico. Lenders think of mezzanine financing as a form of equity where it increases the amount of other people's money in a transaction improves the risk profile.

Since renewable energy and energy efficiency provide ideal vehicles for reducing carbon emissions, CAREC will also seek to include opportunities for selling carbon emission reduction credits. This additional revenue stream is expected to add to the potential return on many clean energy deals.

Investment Summary

Country	Investment Name	Technology Applied	Description of Business	Financing US\$
Ghana	AB Management	Energy efficiency	Install power factor correction equipment	\$122,400
Ghana	Anasset	LPG	Retail LPG	\$38,000
Ghana	Fee Hi Ventures	LPG	Operate LPG filling plant	\$33,500
Ghana	Gladymanuel	Energy efficiency	Market compact fluorescent lighting	\$70,000
Ghana	Lambark Gas	LPG	Retail LPG	\$109,945
Ghana	M 38 LPG Filling Plant	LPG	Retail LPG	\$59,000
Ghana	RKA	LPG	Manufacture LPG stoves	\$173,400
Ghana	BBE	LPG	Distribute LPG	\$46,000
Ghana	Translegacy Venture Limited	LPG	Fabricate and market LPG stoves	\$20,000
Mali	Bagani	Biofuel	Jatropha-powered multifunctional platforms	\$15,170
Mali	Eco'Home	Energy efficiency	Market compact fluorescents products	\$112,782
Mali	SEECO	PV	Market and finance rural PV systems	\$89,000
Mali	Sodigaz	LPG	Distribute LPG	\$183,088
Mali	USISS	Solar thermal	Produce and market solar dried foods	\$19,665
Senegal	AME	Solar thermal	Repair and install solar water heaters	\$41,563
Senegal	Foyers Améliorés	Biomass	Manufacture and sell cookstoves	\$19,455
Senegal	Aprocer	Biomass	Manufacture high efficiency cookstoves	\$49,000
Senegal	EnergieR	PV	Manufacturer solar electronics	\$37,000
Senegal	LNDB	LPG	Wholesale LPG distribution	\$100,000
Senegal	Motagrisol	PV	Manufacturer PV powered milling equipment	\$117,000
Senegal	Prosoleil	Solar thermal	Market solar water heaters	\$22,000



**REED has
invested
US\$2.5
million
in 43
enterprises**



Senegal	VEV	Wind	Repair and install wind pumps	\$22,395
Tanzania	BETL	Biomass	Source biomass waste for cement production	\$25,000
Tanzania	FADECO	Solar thermal	Produce and market solar dried fruits	\$27,000
Tanzania	Resco	PV	Market solar PV systems	\$63,000
Tanzania	Mona Mwanza Electrical 2	PV	Install and maintain PV systems	\$50,000
Zambia	Chavuma	Energy Efficiency	Install energy efficient motor controllers	\$22,300
Zambia	Chavuma2	Energy Efficiency	Install energy efficient motor controllers	\$40,500
Zambia	KBPS	Biomass	Manufacture charcoal from renewable eucalyptus waste	\$75,300
Zambia	Rasma Engineering Co.	Energy Efficiency	Manufacture and market energy efficient stoves and ovens	\$20,000
Zambia	RCI	Biomass	Manufacture and distribute Nyemba Oil fuel and by-product pressed cake/fertiliser	\$8,000
Zambia	TSADC	Solar Thermal	Solar bakery	\$10,000
Zambia	Ubwato Enterprises	Energy Efficiency	Manufacture and market energy efficient stoves	\$15,700
Brazil	ASCIMA	PV	Solar water pumping for irrigation	\$47,500
Brazil	Ceramica Bandeiras	Biomass	Wood fuel for brick manufacturing	\$146,939
Brazil	Hidrosol	Solar Thermal	Market and maintain solar water heating systems	\$17,400
Brazil	Operarias do Mel	Solar Thermal	Purchasing, packaging and marketing of Solar Dried Bee Pollen	\$27,000
Brazil	Ouro Branco	Biomass	Wood processing plant	\$50,000
Brazil	Solar Moveis	Solar	Commercializes low-cost solar food dryers	\$18,333
Brazil	Carbo Charcoal	Biomass	Manufacture charcoal from biomass for steel industry	\$160,000
Brazil	Ecofogao	Biomass	Manufacture high efficiency wood stoves	\$15,000
Brazil	Village Ambiental	PV	Solar water pumping for irrigation	\$55,000
Brazil	Engenho	Biomass	Manufacture fuel from biomass	\$250,000

New Investments From B-REED Pipeline

B-REED recently approved new investments, including an \$18,000 local currency loan to Solar Moveis to manufacture and commercialise a low-cost, high-efficiency solar food dryer. The loan will finance more sophisticated carpentry equipment, computer and management software, marketing brochures, and provide a small amount of working capital. The company received technical support from Instituto Eco Engenho, a local B-REED partner, to select the most appropriate solar technology.

A \$250,000 International Finance Corporation and B-REED loan to Ouro Branco will finance 70% of the total cost to install a turnkey 580 kilowatt (kW) electricity generator, burning wood residues from the company's wood flooring manufacturing operation. The project to develop an investment fund in this niche sector will be carried out by PTZ, a leading provider of turnkey biomass generation units and an emerging strategic B-REED partner. The biomass generation unit will save nearly \$200,000 per year that is currently spent on diesel fuel and electricity.

B-REED is also expanding into solar hot water with a \$17,000 loan to Hidrosol. The loan will be used

to purchase inventory and office equipment, and expand marketing activities. Part of the loan will also be used to partially finance a solar water-heating technology training centre for architects and engineers.

Another new enterprise, Carbo Charcoal, will use a \$160,000 B-REED finance package to produce and market charcoal from wood fuel. The Company's key marketing strategy is sustainability, with all wood to be purchased having a certificate from the Environmental Institute of Parana (IAP), the state environmental organization. The Company will also take advantage of the abundance of low cost wood from the *bracatinga* tree, the most common source of wood in the region, typically planted by small rural producers as a supplementary source of income and an alternative to wood from native forests.

The utilization of the Isomovel charcoal production oven affords two other environmental benefits: 30% greater productivity than traditional ovens, and the reuse of the gases produced in the pyrolysis transformation process, where water vapour is virtually the only gaseous emission.

Contact: Lucio Felix, E+Co,
ecoweb@energyhouse.com

C-REED
www.c-reed.org



The China Rural Energy Enterprises Development (CREED) project (www.c-reed.org) aims to create a clean energy path in China's Yunnan province and surrounding areas in West China. CREED offers

seed capital and enterprise development services (EDS) provided by E+CO, and household credit and income-generation support provided by The Nature Conservancy (TNC) China Program.

Discussions are underway for the first CREED enterprise, a \$75,000 investment in Dali Lida Practical Energy Research Institute (DLLD), a small hydro equipment manufacturing company. Other projects in the pipeline include some industrial biogas projects, and a rural solarwater heater manufacturer.

Building on a larger multi-year effort by TNC, CREED has also

started the *GreenVillage Credit* project to explore a new financing approach for economic development and environmental protection in the remote mountainous communities of the Northwest Yunnan.

GreenVillage Credit provides local villagers with the household credit to purchase cleaner energy systems (such as solar water heaters, fuel-efficient stoves, biogas digesters integrated with a greenhouse for raising livestock or vegetables etc) and a loan for activities that can generate income. The approach improves the capacity of local communities to capture opportunities to generate income and thus improve the affordability of cleaner energy services. *GreenVillage Credit* is currently available in three villages of Northwest Yunnan and will eventually be available in six villages covering a total of 500-600 households.

Contact: Aki Maruyama, UNEP,
aki.maruyama@unep.fr

Contacts

E+Co

www.energyhouse.com
eco@energyhouse.com
Tel: +1 973 680 9100
eco@energyhouse.com

UNEP

www.unep.fr/energy
lchaljub@unep.fr
Tel: +33 1 4437 1429

Visit

www.ared.org
www.b-reed.org
www.c-reed.org