ITDG

PRACTICAL ANSWERS
TO POVERTY

Powering Poverty Reduction

ITDG position paper for *Renewables 2004*
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Executive summary

'In bringing together the key decision-makers from the fields of energy, environment, development and planning, the conference will address key challenges in sustainable development such as access to energy for the poor and the protection of the global climate.'

Renewables 2004[1]

The ministerial conference *Rewenables 2004* being held in Bonn on 1-4 June provides an opportunity to reach 'win-win' results on reducing poverty and protecting the environment. The conference must commit to clear poverty-focused targets for increasing poor people's access to energy. The international community needs to make appropriate, affordable and decentralised energy services available to the poor if it is to achieve the Millennium Development Goals. Failure to grasp this opportunity will further marginalize the world's poorest people from the benefits of energy technology and put further pressure on the planet's dwindling resources.

More than a third of humanity, 2.4 billion people, use biomass – wood, dung, crop waste – for their basic energy needs; cooking. By 2030 this will *increase* to 2.6 billion.[2] The burning of this fuel in poorly ventilated homes is responsible for the deaths of 1.6 million people a year, mainly children and women[3]. In Africa 80 per cent of the population rely on primarily on biomass for their domestic needs.

More than a century after the invention of the light bulb, a quarter of humanity, 1.6 billion people, have no access to electricity. Some 99 per cent of these people live in developing countries. Four our five of them live in rural areas. On current trends this will still be 1.4 billion people without electricity by 2030.

Modern renewable energy technologies can expand the energy choices available to the millions of people living without electricity or clean fuels. They can also offer a mix of decentralised energy sources to increase energy security as well as economic and social benefits. However, purely market driven and supply-led approaches to energy delivery, which promote mainly Northern renewable technologies, often do not reach the poor, leaving them with insufficient resources to escape poverty.

The Bonn International Conference is an ideal forum to challenge the current international bias towards purely market-driven policies for renewables. ITDG is calling for international policies that consider the needs of the poor and ensure that appropriate, workable and affordable renewable services are promoted.

[1] Rewenables 2004 conference announcement
[2] World Energy Outlook, International Energy Agency, Paris, 2002
[3] World Health Report 2002, World Health Organisation, Geneva, 2002

Pro-poor Policy Agenda:

1. Put energy at the heart of poverty reduction strategies
2. Provide aid support to sustainable energy options for the poor
3. Develop financing mechanisms to reach the grass roots
4. Increase national capacity for sustainable energy
5. Leverage private sector partnerships to target the poor
6. Engage the poor as active partners in delivering change
7. Best practice knowledge sharing

Why *Renewables 2004* must address poverty

Goals for a sustainable energy future in developing countries must be focused on achieving the Millennium Development Goals by 2015.

Energy is the lifeblood of human society and economics. It cooks the food we eat. It heats our schools. It lights our hospitals. It powers our industries. It keeps us warm – or cool – in our homes. And for a majority of the industrialised world, turning on a light switch is something that rarely, if ever, requires conscious thought. Yet over 1.6 billion people today have no modern energy services. Eighty per cent of people in sub-Saharan Africa have no electricity. Access to basic, clean energy services is essential for sustainable development and poverty eradication, and provides major benefits in the areas of health, literacy and equity. The Millennium Development Goal of halving poverty will not be achieved without improved energy services to increase production and income, create jobs and reduce drudgery. Improving health and reducing death rates will not happen without energy for the refrigeration needed for vaccination campaigns and electric lighting for maternity services. The world's greatest child killer, acute lower respiratory infection, will not be tackled without dealing with smoke from cooking fires in the home. Children will not study at night without light in their homes. Water will not be pumped or treated without energy.

Failure of centralised energy to reach millions of the poor

'In all but the largest developing countries, the planning and implementation of large hydro projects are dominated by foreign consultants and contractors. The low-income majorities in these countries see few if any benefits from large hydro projects.'

International Rivers Network [4]

Achieving the Millennium Development Goals means reaching the poorest and most isolated communities. Most of these people are in rural areas, though there is an increasing marginalised urban population who have no access to basic services. For many millions of poor people, centralised services have failed to deliver.

Conventional approach to electrification, through centralised power plant and power line distribution, often by-passes rural communities because they are located too far away from the grid. Four out of five people without electricity live in rural areas of the developing world, mainly in South Asia and sub-Saharan Africa. Rural population densities are generally low, levels of demand are limited and the cost of providing an energy supply is high compared with densely populated areas. Electricity companies – public or

[4] Twelve Reasons to Exclude Large Hydro from Renewables Initiatives, International Rivers Network, et al, November 2003

private – have little or no incentive to provide services to these areas. According to the International Energy Agency, on current trends, while 75 million people per year will gain access to electricity over the next twenty years, there will be no resultant major change in the number of people lacking electricity. Investment in conventional power generating capacity in developing countries over the next three decades to meet this meagre target will be $2.1 trillion. Where centralised approaches have failed to reach the poorest communities, there is a need for a new approach based on small-scale, decentralised sustainable energy options.

Expanding energy choices for the poor

'Poor people often have a limited choice of technologies that convert energy to useful services. The technologies most readily available to them are typically inefficient or low quality, so they end up paying much more per unit of useful energy service than the rich.'[5]

UK Department for International Development

The main energy issues in rural and many urban areas in Africa, Asia and Latin America are accessibility and affordability of modern energy services. The poor have limited choice and they tend to depend on one type of fuel due to lack of secondary options. In the case of lighting, they often spend more on candles and kerosene lamps than their wealthier neighbours who can afford high quality lighting for less money because of the 'up-front' costs. Wealthier people can afford the luxury of energy mixing for best utility, and will often mix biomass, electricity and liquid and gaseous fuels in various combinations and end uses. Providing clean modern energy services to poor communities will require the expansion of choice of energy options, including conventional and non-conventional sources. Within this context, renewable energy technologies the most cost effective solution and can be a powerful option for providing services for millions of currently un-served people.

However, it is essential that renewable energy technologies *expand* the choice of energy for poor people. If renewables are promoted to the exclusion or detriment of expanding other options for the poor, then we are restricting development options for the poorest people on earth. For example, should we encourage limiting the poor to the use of biomass fuels for cooking, because it is the renewable choice, when we know biomass fuel collection limits women's other economic and social activity, and that smoke from tradition biomass fuel use leads to higher death rates in poor communities? Also can we expect poor communities to continue to use traditional fuels, when people in the industrialised world predominantly use clean (non-polluting) gas or electricity?

[5] Energy for the poor: Underpinning the Millennium Development Goals, Department for International Development, London, 2002

Priority concerns for energy and poverty

It is essential to deliver energy services which meet the priority needs of the poor.

It is essential that delivery of energy services to the poor meets the real development needs of the poor. Therefore successful delivery of energy should not be judged by the number of houses with a light bulb, but by the real essential services delivered and the real needs met. Priorities for energy for poverty reduction are:

Sustainable energy for cooking and heating…

More than a third of humanity, 2.4 billion people, burn biomass (wood, crop residues, charcoal and dung) for cooking and heating. Biomass energy accounts for approximately 80% of the current global renewable energy supply. Burnt on open fires and rudimentary stoves, the smoke produced from these fuels is the fourth greatest risk factor for death and disease in the world's poorest countries, and is linked to 1.6 million deaths per year. Many home-based enterprises, such as beer brewing or street foods production, increase a family's dependence on biofuels and exposure to smoke. Simple, low-cost solutions to deadly indoor air pollution are available, including cleaner fuels, more efficient and better-ventilated stoves and switching to cleaner fuels (including kerosene, LPG, biogas).

Getting electricity to the rural poor…

Many of the 1.6 billion people who lack access to electricity live in rural areas that are far from transmission grids. Electricity is needed to power small industry and enterprise, run health clinics and light schools. Without it rural poverty will not be eradicated. The options for decentralised rural electrification are either through diesel –powered generators or renewable energy sources (eg micro-hydro, wind, solar PV or bio-diesel). Renewable energy has distinct advantages over diesel as it has much lower running costs, uses local energy sources, does not run out, is much cleaner and does not contribute to global warming, though with battery-based solutions such as solar PV their use is limited to low-power applications.

Energy to power production…

The livelihoods of many small producers relying on energy are under threat because of inefficient production methods and diminishing natural fuel resources. For enterprises relying on heat, such as bakeries or brickyards, up to half of the production costs are on fuel. Options at the industrial level include more fuel-efficient kilns, turning waste into energy (such as sawdust, agro-waste or charcoal dust), and fuel diversification. Greater fuel efficiency will reduce costs, hence increasing long-term profitability, as well as improving the environmental impact of the enterprise.

Many enterprises in rural areas require motive energy to drive sawmills, pump water or grind grains. This can be achieved directly through water or wind turbines, or diesel or biofuel motors.

Energy to modernise public services…

More emphasis is required on energy services for public services like remote health centres, schools and water supply. Whether it is refrigeration for vaccines, lighting for maternity suits, pumping drinking water or lighting for evening study, there is no doubt that the impact in terms of quality of life of poor people in remote areas is very significant. In key areas such as these, having local control can increase security of health provision. Public services are central to achieving the Millennium Development Goals on health and education, and modern energy will be an essential input to modernising and expanding service provision.

Sustainable energy for the urban poor…

Urbanisation is one of the defining trends of the developing world today. Many poor people living in cities depend on wood and charcoal for fuel, which contributes to both air pollution and deforestation. In the short to medium term, fossil fuels will continue to be the main alternative fuel for poor urban households. However, innovative technologies like solar water heaters, waste-to-energy and biogas need to be developed to deliver sustainable long-term solutions.

Climate change a northern problem with a southern victim

'*The WSSD was not successful in bringing the world closer to achieving the goals of poverty eradication, increasing gender equity, providing all people with clean and affordable energy services or avoiding dangerous climate change. This failure was a tremendous let-down to billions of people*.'[6]

CURES Declaration

Another great challenge faced by the world is the prospect of a catastrophic climate change if present trends of fuel consumption continue. Heat-trapping gases such as carbon dioxide and methane, that keep more of the sun's warming energy in the earth's atmosphere, cause climate change. This is primarily caused by the industrialised world's fossil fuel consumption, although developing country emissions are rising quickly. Per capita emissions of developed country citizens are far higher than those of people living in developing countries: the average American produced 20 tonnes of CO2 in 1998, compared to an Indian average of less than one tonne.

The Intergovernmental Panel on Climate Change projects a substantial global temperature rise and sea level increase, and more extreme weather events such as floods, hurricanes, drought and heat-waves. Those most vulnerable to these changes live in the developing world.

Developing countries will feel these impacts most acutely, even though they also have the least responsibility for climate change. A range of effects consistent with climate change has primarily triggered the current famine in Southern Africa. Unexpected weather events are growing more extreme and more frequent, as recent years have shown in events ranging from the Orissa Cyclone in India and floods in Mozambique to Hurricane Mitch in Central America. Rising sea levels are increasing salt levels in the country's low-lying cropland and making it unusable.

Our aim must be to achieve global climate equity; allowing the South to develop its way out of poverty, whilst reducing the devastating impact of Northern over-consumption. Models such as 'contract and converge' (C&C) offer a way towards equality. In the C&C approach, Northern countries 'contract' their greenhouse emissions, while poorer countries are allowed to increase their emissions up to a point where both Northern and Southern governments have an equal per capita emissions rate. This approach admits that poor countries will require to continue to use fossil fuels for development purposes for the time being, but at the same time must be assisted to leapfrog to cleaner energy technologies as rapidly as possible. This provides the opportunity for developing countries to expand the choice of energy options available to poor communities.

[6] The future is renewable: Declaration for the International Conference for Renewable Energies (Renewables 2004), Citizens for Renewable Energy and Sustainability (CURES)

Need for appropriate local renewables for poverty alleviation

Locally manufactured renewable energy technologies, using local resources, managed within the communities themselves can empower communities to develop in a sustainable manner.

Energy is fundamental to the great challenge facing the world at the beginning of the 21st century: how to eliminate the obscene levels of poverty without further polluting the planet or worsening climate change. These two goals need not be in conflict – indeed, they can be achieved in tandem. There is a huge potential for renewable energy to provide clean, appropriate and efficient energy to many of the world's poorest people. Millions can be lifted out of poverty without costing the earth, with the help of clean sustainable energy.

We should not assume that renewable technologies mean northern technologies (such as photovoltaic cells or high efficiency wind or hydro turbines) - these are high cost, and can tie poor countries further into a dependency culture. Renewable energy technology need not solely comprise the hi-tech solutions of industrialised countries. Promotion of such technologies will usually focus on the segments of the markets which can afford their products, and are not interested in markets that have little buying power. None-the-less, there are markets there among the lower income communities, which can be made to work by offering different options.

Often appropriate locally-developed technologies for delivering energy services are by far the most appropriate solution. Also we should not assume that local technologies mean poor quality. Quality assurance can be controlled for local technologies and 'lower-tech' solutions are often the appropriate solutions for poor people, as they can be maintained locally and managed locally. There are a number of case examples illustrating good practice, including micro hydro power, small wind battery chargers, biogas units and clean cooking technologies. Decentralised local renewable energy options can:

- make efficient use of local energy and human resources to providehydro, solar, biomass, wind etc.
- avoid the negative environmental and social impacts of large-scale projects, and remove dependency on costly supplies of fossil fuels or grid power
- make use of and develop indigenous manufacturing and technical capability
- be controlled by local communities and their organisations, enabling them to identify their own needs

When implemented in an appropriate manner, renewable energy services can contribute significantly to empowering communities towards development. Relatively small investments are needed to produce or improve technologies that are within the reach of low-income communities. It is clear that market-based solutions have to be complemented by intelligent subsidies, which better targeting the poor. For example, in some countries there are blanket subsidies on options like solar panels, which clearly benefit mainly the rich. A lot more could be done for the poor, if subsidies were better targeted.

There are many examples of good practice in this field. Success stories should be replicated, especially through South-South transfer of technologies and experience. The case examples in this paper provide clear illustrations of successful use of locally produced renewable energy technologies for poor communities.

Pro-poor Policy Agenda

'When financial concessions are offered to multinational companies they are treated as incentives, while the financial aid given to rural poor is termed as subsidy'[7]

1. Put energy at the heart of poverty reduction strategies: There is general agreement on the need for a 'joined-up' approach to energy and poverty reduction. It is essential that energy strategies for poor people are incorporated into national and international development frameworks. In particular, national Poverty Reduction Strategy Papers (PRSPs) in developing countries should explicitly state the energy services required to achieve their poverty reduction goals.

2. Provide aid support to sustainable energy options for the poor: Development assistance must recognise that the principal energy need of the poor is for cooking. Bi-lateral and multi-lateral agencies should therefore provide increased support for clean cooking strategies in order to achieve the target of halving deaths of children aged under five years.

The total grant funding from aid sources to subsidise the access of one billion people to electricity would average approximately $300 per electrical connection. The majority of this funding would need to be spent in Africa and South Asia. Assuming an average household size of five people, the total cost would be of the order of $4.6 billion a year until 2015. A similar calculation shows that $500 million per year will be required to put clean cooking technologies in every home by 2015[8]. The annual global subsidy for conventional energy is $250-300 billion. Increased aid can deliver this figure – and it would be highly undesirable for it to be added to the existing burden of debt of the poorest countries. Bonn Renewable 2004 provides an opportunity for governments to commit to this level of grant funding and make a significant impact on the lives of the world's poorest and most vulnerable communities.

3. Develop financing mechanisms to reach the grass roots: A critical factor in making sustainable, decentralised energy options accessible to poor people is affordability. The up-front cost of new technologies, whether an improved cook stove or a micro-hydro power plant, is extremely high for poor people. Appropriate financing and subsidies can give low-income communities, households or entrepreneurs the ability to invest in new energy technologies. Achieving this aim will require a sustained effort by the international community, as well as new local partnerships involving NGOs and private sector. There are models illustrating good practice that can be

[7] Mr. Joe Madiath of Gram Vikas, an NGO from Orissa at the Renewables Asia Regional Workshop in preparation to the Bonn International Renewable Energy Conference-2004, 7–8 February 2004, New Delhi, India.

[8] Warwick, H and Doig, A., Smoke the killer in the Kitchen: Indoor Air Pollution in Developing Countries, ITDG Publishing, London, 2004

replicated. Lessons can be learnt from these success stories to create 'smarter' financing models.

ITDG supports the G8 Renewable Energy Task Force and the UN Development Programme to call for changes in existing financing mechanismsin order to target poor people specifically; these programmes include the Global Environmental Facility (GEF) and the Clean Development Mechanism (CDM). The World Bank should continue to have a leading role through its people focused initiatives such as CommunityDrive Development and the Social Investment Fund.

4. Increase national capacity for sustainable energy: Developing countries need support in creating an environment in which renewable and sustainable energy technology can be effectively developed. The most urgent areas for capacity building in countries are:

- Basic national assessments of local resources for renewable energy in order to plan for renewable energy development. Donor agencies should see this as a priority for external assistance.
- Technical standards for quality assurance in the renewable energy sector, to ensure reliability and consumer confidence in the technologies. Standards of service of electrical utilities may not be appropriate in areas of very low demand, and a lower quality provision (for example based on battery charging) may provide a great improvement in energy service at a lower cost than conventional grid extension.
- Business and technical training and strengthening of Business Development Service providers to support small and medium sized enterprise (SME) activity in renewable energy service and equipment supply.
- Encouragement to local finance institutions to target renewable energy as a sound investment.

5. Leverage private sector partnerships to target the poor: While developed countries are leading the way in increasing the viability of renewable energy technologies, there is a clear need also to support the development of local technical skills and knowledge needed in developing countries. The private sector – particularly in the technology and banking sectors – needs to be encouraged to form local partnerships to supply services which are accessible and appropriate to the poor. Again, mechanisms such as the CDM and the GEF should lead international policy by creating opportunities and reducing risks for the private sector to work along side entrepreneurs in developing countries.

6. Engage the poor as active partners in delivering change: People living in poverty must have their say in the prioritisation of energy options if energy policy and services are to meet their needs and provide long term solutions. In energy sector planning, as elsewhere, the poor themselves are too frequently the invisible stakeholders. Evidence shows that if the primary stakeholders are involved in the design and implementation of development initiatives, these activities are much more likely to bring prolonged benefits.

Local communities possess invaluable local expertise that should be taken into account in defining and implementing any energy project. Projects characterised by high levels of community engagement and involvement in infrastructure investment decisions will typically generate a greater sense of community empowerment, ensure that improvements are tailored to a community's specific needs, and create a much higher probability that the improvements will be well maintained by the community after installation.

If the energy sector is linked with the poverty reduction strategy, by placing more priority to the end-use development aspect, there will be greater benefit for the poor and the renewable energy system will be more sustainable.

In addition, participation of the local government, as well as the beneficiaries, at the time of plan formulation/project development can develop the sense of local ownership and increase the probability of government support.

7. Best practice knowledge sharing: learning from past experience will be a critical factor increasing the wide scale uptake and success of decentralised renewable energy technologies for poverty reduction. An increase in South-South transfer of technology, know-how and experiences will be essential for effective expansion and increased benefit across the developing world. The case examples presented in the following section provide effective illustrations of technologies, policies, financing mechanisms and impact.

Case examples

1. Climate, biomass cooking and health (Kenya, Sudan, Nepal)
2. The success of community hydro-power in Kenya influencing energy policy
3. Micro hydro Revolving Fund in Peru
4. Integrated water and power supply project, Zimbabwe

Case 1: Climate, biomass cooking and health[9]

More than a third of humanity, 2.4 billion people, burn biomass (wood, crop residues, charcoal and dung) for cooking and heating[10]. Burnt on open fires and rudimentary stoves, the smoke produced from these fuels is the fourth greatest risk factor for death and disease in the world's poorest countries, and is linked to 1.6 million deaths per year[11].

Billions of people would lead healthier lives if their exposure to high levels of smoke were reduced. Public awareness of the health risks of smoke is a crucial first step. The most effective way to reduce smoke in the home is to switch to a cleaner fuel, such as LPG, kerosene, or to a modern biofuel such as biogas. However, the vast majority of people at risk are too poor to change to a cleaner fuel, or have no access to modern fuels. In these homes, the answer will be to reduce exposure, by using cleaner, more efficient and better-ventilated stoves. A combination of solutions will be required to meet the needs of the wide range of communities, while minimising the environmental impact, as demonstrated below.

Experience in Sudan, Kenya and Nepal
ITDG is working in three different locations to develop locally appropriate solutions to indoor air pollution. The programme uses a participatory approach to enable the community to select solutions that suit their own needs. Their choice of technology, in each location, was influenced by cultural aspects, cost of both the technology and the fuel, geographical location, access to fuels and climate.

In the displaced persons' settlement in Kassala, Sudan, the community identified LPG as an appropriate solution once microfinance was made available to cover the initial cost of the stove. The scheme is popular, and already others outside the project are using the 'revolving fund' credit system to buy stoves. Fuel costs are much lower for LPG than for charcoal and wood in Kassala, so repayments can be offset by reduced fuel costs.
In the communities around Kisumu town in Kenya, wood fuel is much cheaper than LPG and is often 'for free', so most households have elected to continue using biomass. Smoke hoods and eaves spaces with fuel-efficient stoves are proving effective.

In the cold mountain village of Gatlang in Nepal, solutions have been more difficult to identify, as energy is needed to heat the house as well as to cook the food. It is remote, making LPG or kerosene unavailable. Home insulation has been chosen for retaining room heat whilst reducing the need to burn fuel wood for space heating. Smoke hoods are currently being developed, along with improvements to the traditional stove to reduce fuel use.

[9] Warwick, H and Doig, A, Smoke the Killer in the Kitchen: indoor air pollution in developing countries, ITDG Publishing, London, 2004
[10] The World Energy Outlook 2002, International Energy Agency, Paris.
[11] World Health Report 2002, World Health Organisation, Geneva.

Case 2: The success of community hydro power in Kenya influencing energy policy

ITDG East Africa, in collaboration with Nottingham Trent University and the Kenyan Government, has installed two community hydro-power schemes in two remote areas of Mount Kenya, Kathama and Thima. Between them they serve over 200 households. The projects provide lighting, radio and telecommunications for the households, and income generation from chicken farming (electric lighting provides warmth, thereby increasing productivity) and battery charging. By replacing kerosene wick lamps, thereby saving 18 tonnes of kerosene each year, the equivalent of 42 tonnes of carbon is saved.

The local communities were involved in the projects from their inception. They provided building materials, land for the turbine house, labour and financing towards the scheme. They also manage, operate and maintain the schemes on their own. They have paid their monthly charges for power supply, and shared their experiences with other communities across the country. The hydro schemes have proven to be cost effective, as households now pay less for a better quality of lighting, and the project has been financially self-sustaining for the past three years.

Appropriate Technology development
These small-scale projects have acted as a tool for learning and understanding the practical problems associated with the energy policy in relation to decentralised energy schemes:

- the schemes have demonstrated the viability and provided understanding of operational and technical features of such small schemes in Kenya,
- the schemes have contributed to ongoing development of national standards and codes of practice for low cost off-grid small hydro power schemes.
- through the training of Kenyan manufactures and artisans to manufacture the hydro turbines for project, the training of component manufacturers of turbines has been recognised as a priority

Influencing Policy
The aim of the project was to demonstrate the viability of small-scale community managed hydropower in Kenya, where less than 4% of the population have access to the electricity grid. By directly involving the Kenyan Ministry of Energy from the start, the successful implementation of this project has influenced national policy.

This project has contributed to the reform of Kenya's new energy policy and Electric Power Act. The key constraint to the replication and expansion of such projects in Kenya is policy restriction to a monopoly structure in the power sector, prohibiting independent private power producers. The project has demonstrated the viability of micro hydropower in reaching communities far from the national grid, and government has drafted policies recognising

the approach. The current project has been operating with special permission from the government, but other schemes are expected to follow once the revised policy becomes operational.

Case 3: Micro hydro Revolving Fund in Peru

ITDG has been using Inter-America Development Bank funds in Peru since 1994 to implement a "Revolving Fund" of soft loans, along with technical assistance on the construction of micro-hydropower schemes in isolated rural areas.

This Fund consists of a financial model based on loans subsidized through technical assistance and an interest for individual clients (micro rural entrepreneurs). It is a loan fund applied for one energy technology, “the micro-hydro power”, covering the installation of new systems, rehabilitation and/or repair of existing systems. The scope of work is nationwide, although the northern zone of the country (Cajamarca, Amazonas, Lambayeque) is a priority.

The amount of loans ranges from US$ 10,000 to US$ 50,000, with an interest rate of 10%. The payback period is 1 to 5 years, and the grace period varies, depending on the client’s financial situation. The types of guarantee vary according to the status of the client, collective or individual. In the case of collective clients, they must demonstrate a positive cash flow, including short-term and medium-term investment plans. In the case of individual clients, they must give collaterals for an amount equivalent to or greater than 30% of the loan received; electromechanical equipment may form part of the guarantee.

It must be highlighted that the last agreement with the IBD considers an active program of promotion of small enterprises’ initiatives and creation of employment using the generated energy in all population centers benefiting from implementation of micro hydroelectric power plants.

Within the framework of this fund, four activities are developed in each project:

- Promotion and its benefits,
- Technical and financial assistance,
- Organization for sustainable management, and
- Recovery of loans.

To date, this model has allowed placing 22 loans for a total amount of about US$ 800,000.00 and levering over US $3 million which have enabled an additional installed capacity of over 1.5 MW to be put into operation in remote areas, benefiting more than 15,000 rural inhabitants.

Case 4: Integrated water and power supply project, Zimbabwe

The Nyamarimbira integrated water supply project is situated in the Eastern Highlands of Zimbabwe. The project is cross-sectoral, with water supply for consumption, for agriculture and for electricity. The project has a well maintained and managed water and energy infrastructure.

Feasibility studies indicated that the flow from the river would be enough to install two micro-hydro schemes along the water line. The 45kW plant now directly benefits 300 households, and 500 pupils and teachers of Tsatse primary school. The teacher, a key project leader, saw benefits not just from the lighting, but also from children learning about the new technology. The project also incorporates a community owned mill. This is used for grinding maize which is used to make sadza, the staple diet for the people in the Eastern Highlands of Zimbabwe. Women are expected to benefit from reduction of drudgery (and timesaving for other labour) in milling as alternative mills are some distant away and expensive.

The water coming out of the powerhouse is directed to the settlements via a PVC pipe, to four storage tanks where it will be treated for drinking water. Previously, it took women and children about an hour to make the trip to collect water, and they walk on average 6km a day to do it. Now no one should have to walk more than 200m to reach water for domestic use. Water for irrigation comes from a separate network of hydrants, with 51 project members are utilizing the water for irrigation purposes. The project management committee has developing tariffs to ensure that the poorest can access benefits.

The community has contributed a significant amount of their own labour in constructing the plant. The scale of the physical works in this inhospitable area is astonishing. A diversion weir over mountainous, rocky terrain took 52 days to build, used more than 300kg of pipes and material which had to be carried up to the site. A 14km pipeline was installed, for which trenches had to be dug – sometimes ten feet deep. But it is the fact that this has been done without compensation that proves the level of community commitment.

From the start, there has been as much (if not more) focus on institutions than on technology, with the emphasis on building on existing capacity and institutions. At the community level, an elected project management committee (PMC) took charge of the day to day running of project affairs.

About ITDG

ITDG – the Intermediate Technology Development Group – helps people to use technology in the fight against poverty. We work in partnership with communities to develop practical answers to their problems, based on local knowledge and skills and putting people's needs first.

ITDG is a charity registered in the United Kingdom which works directly in four regions of the developing world – Latin America, East Africa, Southern Africa and South Asia, with particular concentration on Peru, Kenya, Sudan, Zimbabwe, Sri Lanka, Bangladesh and Nepal.

ITDG has a unique approach to development – we don't start with technology, but with people. The tools may be simple or sophisticated – but to provide long-term, appropriate and practical answers, they must be firmly in the hands of local people: people who shape technology and control it for themselves.

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