

## Both ENDS Information Package Nr. 2

### SUSTAINABLE ENERGY

Both ENDS is an NGO that, among other activities, provides services to NGOs in Africa, Latin America, Asia and Eastern Europe. Both ENDS works on issues relating to the environment, development and social justice. As one of its services, Both ENDS provides access to information that is of interest to NGOs.

Through contact and collaboration with hundreds of organisations worldwide, Both ENDS receives much useful information and documents on specific issues. To provide access to part of this information Both ENDS has decided to compile information packages on some of these issues.

These information packages have been written mainly for Southern NGOs. They contain a brief introduction to the subject and give an insight into the activities, points of view and the ideas prevalent among some NGOs and institutions that have developed specific expertise on the subject. Most of them will be able to provide more specific information. In addition, the information packages include suggestions for further reading and, for those who have access to internet, some addresses of relevant Websites are included.

The packages will be updated from time to time to include newly available information.

As these packages provide a compilation of part of the information available, NGOs can always contact Both ENDS for additional information or contact one of the other organisations mentioned in this document. If you have any suggestions

or comments related to this information package, please get in touch with us.

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The information packages can be obtained free of charge by Southern NGOs.

The following information packages are also available at Both ENDS:

- Desertification
- Energy
- Tourism
- Dams and Environment
- Oil
- Coastal Zone Management
- Mining
- Gender, Environment & Development
- Trade and Environment
- Local Forest Management
- Multilateral Financial Institutions
- Analog Forestry
- River Management
- Gene-Technology
- Urban Agriculture
- Environmental Education

## SUSTAINABLE ENERGY

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## Introduction

### Sustainable energy for the world's other half

Energy is a crucial element in sustainable development. Improving access to energy services, while minimising its environmental impact, is a critical and urgent challenge in less developed countries. By recognising people's demands, resources and restrictions, the right conditions for informed choices can be created, enabling communities to participate in shaping their own future.

More than one-third of the world's population, most of them located in less developed countries, has no access to modern energy services. Table 1 shows an estimate of the percentage of people, in the so-called South, without access to electricity. They are dependent on traditional biomass fuels - wood, charcoal, dung - often obtained from the resource-scarce areas and used in inefficient and polluting ways. These damage people's health, reinforce the cycle of poverty and contribute to environmental degradation.

Table 1. Population without electricity in selected countries – 1989

Country	Population without electricity [%]
Bangladesh	90%
Brazil	29%
India	48%
Indonesia	71%
Nigeria	59%

Source: Modified from Greenpeace report 2001: *Power to Tackle Poverty*

Global warming caused by burning fossil fuels, mostly produced in developed countries, threatens people's lives all over the world. The poorest countries, however, will be worst hit by the local impacts of climate change - intensified floods, hurricanes and drought - because of the relative lack of resources available to them to adapt to the changing conditions.

With the current renewable energy technologies- solar power, energy from

wind and water - it is possible to enhance access to high quality energy services in a sustainable and cost-effective way to the poorer countries, where 80% of the population lives. Power to improve people's quality of life does not have to come at the cost of climate change.

This information package mainly focuses on decentralised renewable energy systems that have a positive effect on poverty alleviation at the local/community level, as a means to enhance sustainable development in developing countries.

Basic energy needs in less developed countries, as well as how energy relates to poverty, are discussed in the first chapter. The following chapter examines who could make it possible - focusing on the role of major players. Chapter 3 describes environmentally friendly sources of energy that are appropriate for developing countries. Local initiatives of successful sustainable energy projects in developing countries are described in the chapter 4. The next chapter briefly shows some bottlenecks towards the implementation/dissemination of these technologies, which still have to be overcome. Finally, chapter 6 presents the main sources of information useful for southern NGOs - including a list of organisations, essential browsing and relevant publications in the field of sustainable energy.

### 1. Energy as a basic living condition

Energy provides essential services for human life and should be considered a basic need such as food, water and shelter. More than half of the population in most less developed countries do not have access to energy and hence lack essential services like :

- ♦ **Cooking and heating** - for food and warmth.
- ♦ **Lighting** - access to good lighting gives people the chance to study or work in the evening.
- ♦ **Communication** - electricity for radios and television provides access

to information for people living in remote areas.

- ♦ **Water pumping** - provides access to clean water supplies for drinking or cooking as well as water for irrigation purposes in agricultural activities.
- ♦ **Other Agricultural needs** - sufficient energy to process basic food crops. For instance, without mechanical power, de-husking rice or milling grain for flour are extremely time consuming.
- ♦ **Power for health centres/ schools** energy is needed to power vital equipment in health centres and schools, such as refrigeration for vaccines and other basic facilities.

Increased energy access is a vital prerequisite for economic development. Two million people around the world are struggling to meet their own energy needs at acceptable costs. If energy needs cannot be met, economic growth is likely to slacken with adverse effects on the quality of life in developing countries.

The renewable energy sector has also an important relation with gender aspects. The involvement of women is crucial in energy planning, development and the introduction of new technologies, since they are the main consumers, suppliers and managers in the household sector. Therefore, the integration of women by active participation at all levels of energy policy design is needed.

## 2. The role of major players - promoting sustainable energy

### 2.1. The role of MDBs

The World Bank and other Multilateral Development Banks [MDBs] are a major source of public funds for energy investments. Although MDBs have different backgrounds and face different problems, some general remarks can be made:

- ♦ MDBs are increasingly promoting privatisation and private sector participation in the energy sector,

both local and international investments. [see more in the next section - Private companies]

- ♦ MDBs are promoting geographic integration of energy networks.
- ♦ MDBs are formulating and implementing policies on sustainable energy and
- ♦ MDBs have been criticised for their lack of attention for sustainable energy and inadequate stakeholder participation in discussions on energy policies and investments.

Besides the World Bank, the principal MDBs are: 1) the Inter-American Development Bank (IDB), which gives loans to Latin America and the Caribbean, based in Washington; 2) the African Development Bank (AfDB), which gives loans to the African countries and which is based in Abidjan, Ivory Coast; 3) the Asian Development Bank (ADB), which is based in Manila, The Philippines, and the European Bank for Development and Reconstruction (EBRD), which is based in London, and gives loans to Central and Eastern Europe and former Soviet Union. The European Investment Bank (EIB) also gives loans to Central and Eastern Europe, next to its regular lending in the European Union; the EIB also invests in developing countries. The EIB is based in Luxembourg. Together with the World Bank, these regional banks are important official channels for capital flow from industrialised to low-income countries. In addition, there are other multilateral and financial institutions that play an important role but are less significant in terms of the total size of their financial impact.

### 2.2. The role of private companies

Under the influence of the MDBs energy policies, privatisation has been spreading among low-income countries. Private investments have been captured by a small number of countries. In fact the "top ten" low income countries account for more than three-quarters of all private energy investments between 1990 and 1997, as shown in table 2.

Table 2. Top ten countries attracting private participants in electricity, 1990-97

Country	Total of investments with private participation (US\$ millions)	Number of projects
Brazil	17.644	20
China	15.015	60
Argentina	12.011	63
Philippines	10.901	39
Indonesia	9.569	13
India	9.219	29
Pakistan	6.924	20
Malaysia	6.330	9
Colombia	5.873	16
Thailand	5.645	39
TOTAL	99.130	308

Source: *Private Participation in Infrastructure Database, World Bank.*

Table 2 only shows the amount of investments per country, not as a percentage of "all private energy investments between 90-97". The concern is that the World Bank seeks to implement privatisation as an end in itself, rather than as a means to promote sustainable energy. Another concern surrounding energy privatisation is the fact that the large profits created by the increased economic liberalisation are not equally distributed. However, private companies, in partnership with NGOs and other institutions, have been the key to successful dissemination of renewable technologies (see e.g. Kenya and Indonesia - chapter 4)

### 2.3. The role of NGOs on decentralised energy

International NGOs have been effective partners of local NGOs, offering specialised training, facilitation and mobilisation of outside resources. NGOs often play an important role on capacity building, user's demand analysis, distribution and maintenance of the implemented energy systems. Public awareness campaigning on energy efficiency and consumption are also often seen as the role of NGOs. There have been several successful initiatives on sustainable energy issues by local Southern NGOs in developing countries. Success has been based on long-term commitment, flexibility,

motivation, an integrated approach, and an emphasis on organising and facilitating rather than technical promotion. Some examples of those initiatives are shown in the chapter 4.

### 3. Sustainable energy sources

Renewable forms of energy are providing low-cost and reliable power to communities in various parts of the world. Although renewable forms of energy are also available on a larger scale, in this section we describe some small-scale systems that are:

- ♦ Economically feasible for poor communities,
- ♦ Replicable [with some local modifications],
- ♦ Simple to administer and understand, for the local communities,
- ♦ Stimulating local economic growth by encouraging local manufacture and increasing income generation,
- ♦ Improving health quality,
- ♦ Fulfilling the various energy need of the communities,
- ♦ With less impact on environment than large scale energy systems.

#### 3.1. Solar energy

An immense amount of energy from the sun strikes the surface of the earth every day. This energy may be captured and used in the form of heat in "solar thermal" applications, or it may be converted

directly into electricity to power electrical devices using photovoltaic cells [PV].

### 3.1.1. Solar thermal

Solar thermal application consists in using the heat of the sun directly on many applications including hot water for homes, cooking, residential heating and crop drying. In recent years, solar thermal energy can be used to generate electricity by boiling water and using the steam to drive a turbine, which generates electrical power.

Small-scale applications generally use flat plate collectors, while utilities use "concentrating" devices to increase the temperature of the water.

In the section 4.1 - best practices - we describe a successful application of the solar thermal systems: cooking with solar energy.

### 3.1.2. Photovoltaic cells [PV]

Solar photovoltaic cells [PV] convert sunlight directly into electricity. Large research efforts have been made in order to produce more efficient and cheaper solar panels, making them suitable for implementation in poor communities. Solar home systems combine a PV panel with a battery, which works as a storage, and a controller, to provide power for lighting and other home applications such as television, refrigerator, and radio. Figure 2 shows some examples of different solar panels. Some examples of successful use of PV systems are described in chapter 4.

## 3.2. Wind energy

Uneven heating of the Earth's surface causes the wind to blow. Many societies have since long taken advantage of this energy to travel great distances and perform diverse tasks such as grinding, sawing and pumping water. Modern wind turbines using advanced technologies are able to produce electricity for homes, businesses, and other uses. Wind power, already one of the most appealing sources of energy today, will continue to prosper; new turbine designs, currently under development, reduce the costs of

wind power and make wind turbines economically more viable for low-income communities.

Small-scale wind power can charge a battery for lighting and small appliances. Its viability depends on an average wind speed of at least four meters per second - preferably five to seven meters per second- making this a suitable technology for regions where wind blows steadily.

## 3.3. Small hydropower

Small-scale hydroelectric systems capture the energy in flowing water and convert it to electricity. The potential for small hydroelectric systems depends on the availability of suitable water flow. Where the resources exist this can provide cheap, clean and reliable electricity. If they are well designed, small hydroelectric systems blend with their surroundings and have minimal negative environmental impacts. The effects on the environment must therefore be evaluated during the planning of the project to avoid problems such as noise or damage to ecosystems. The installation of a hydroelectric facility disrupts the flow of a river and forms an obstacle to the free circulation of aquatic fauna, particularly fishes, which periodically come to spawn in the upper reaches of rivers. The solution is to create "fish ladders" and to maintain a permanent reserve flow between the intake and the tail race. An example of a small-scale hydro in Vietnam is described in the section 4 - Best Practices.

## 3.4. Biomass

The term "biomass" refers to any organic material, which can be converted to energy by burning. Some of the most common biomass sources are wood or organic residues, such as timber waste, wood chips, corn, rice hulls, peanut shells, sugar cane, grass clippings, leaves, manure, and municipal solid waste.

In residential applications, biomass can be used for heating or for cooking. Wood is the most common source of fuel, although many different materials are used. New designs for woodstoves can improve the efficiency of the cooking or

heating system, decreasing the amount of wood that is necessary.

### 3.5. Biogas

Apart from biomass, another form of bio energy is known as **Biogas**, which refers to agricultural, sewage, landfill and even industrial organic wastes; these produce methane gas that can be collected and burnt to produce electricity.

### 3.6. Geothermal energy

Geothermal power makes use of heat from the interior of the earth. This is the same energy, which rises naturally to the earth's surface in the form of hot springs, geysers, and volcanoes. Geothermal systems are located in areas where the earth's crust is relatively thin. Drilling into the ground and inserting pipes can bring hot water or steam to the surface. In some applications, this heat is used directly to heat homes or is provided for businesses. In others, the steam is used to drive a turbine to generate electricity. Geothermal resources are also used to provide low-cost heating for greenhouses and are used in various industrial processes such as vegetable drying. Geothermal energy contributes to the development of important third-world countries such as The Philippines, Indonesia, Mexico, and some countries in central and south America, and in eastern Africa.

## 4. Good practices/ renewables in action

Local communities worldwide are using renewable energy technologies. This chapter shows some successful examples of renewable energy systems implemented in developing countries.

### 4.1. Solar cooking into Rural Sri Lanka

EMACE, an NGO, initiated a solar cooker project after noticing the people's dependency on fuel and its effects on the forest cover of Sri Lanka. Solar cookers have a great potential in areas that have little resources but ample sunshine. Using locally found material, efficient solar cookers could be made for

as little as \$5 [figure 3]. Its basic principle is that the heat from the sun is concentrated on a small cooking area, making it possible to cook food for either a family or a village without using fuel. There are hundreds of different solar cooker designs currently in production. The model for sale in Sri Lanka costs USD 20, but the design is easily emulated in the village for a fraction of the costs. For example, all kinds of waste materials can be used to reflect sunlight, even the silver foils of cigarette packs. In this way the poorest families in urban areas as well as in the deforested countryside have access to very cheap energy. The same design can also be used to purify small amounts of water by pasteurisation, reducing the rate of water related illnesses such cholera and dysentery.

### 4.2. Asia/PV systems in Indonesia

In order to accelerate the process of rural electrification, the government has asked the Solar Electric Light Fund [SELF] to start a long-term project, which aims to install one million SHS over the course of the next ten years. Its international orientation has enabled SELF and its local partners to share their experiences and knowledge of project development in different countries. SELF's Indonesian project is being managed by PT Sudimara Energi Surya, a private solar energy service company with extensive experience in the sales and marketing of solar home systems. Sudimara is the only company in Indonesia selling SHS on credit. At present, Sudimara sells 300 systems every month through a network of 50 Solar Service Centres located in three provinces - West Java, Central Java, and Lampung in south Sumatra. As the leading SHS company in Indonesia, Sudimara is poised to become the largest participant in a recently approved World Bank and GEF-sponsored loan package to finance solar home systems in Indonesia. SELF and Sudimara will be collaborating on putting these funds to work to electrify rural Indonesian homes with solar PV.

### 4.3. Africa /PV systems in Kenya

Kenya has a healthy solar PV market. In the 80s several small demonstration and training initiatives, supported by relief agencies, NGOs and church organisations, stimulated interest in the technology among potential customers. Local technicians were trained to install PV systems for higher income customers. They realised that PV systems could fill a niche in the energy market which was dominated by diesel generators. The cost of a PV system-between \$500 and \$1000- was often less than the initial cost of a generator.

Today, equipment worth between \$ 2 million and \$ 4 million is sold each year. The market is driven by a strong rural demand and has grown exponentially. There are now more PV systems installed in rural Kenya - approximately 150.000 - than conventional connections under Kenya Power and Lighting Company's Rural Electrification Programme, that has only 60.000.

Most of the growth in the commercial PV market in Kenya has been in straight cash sales of systems to rural customers. Some customers have made partial payment on signing the contract with the remaining amount to be paid upon completion of installation. Others have benefited from hire purchase and instalment payment schemes. In general, formal credit is not available to the great majority of low income and rural areas, but informal credit agreements have been used successfully.

Two ingredients have contributed to the PV successful growth in Kenya:

- ♦ *Strong local demand*- solar power is the most economic option in many rural areas and a significant number of people can afford the systems. Demand for light, radio and television drove farmers, teachers and businessmen to seek alternatives.
- ♦ *Adequate infrastructure*- local installers and retailers in rural areas help guarantee performance and after sales service, supporting people's confidence in using the technology. Local manufacture has reduced prices and ensures the availability of spare parts .
- ♦ However, the biggest challenges still remain:
  - ♦ *Poor quality of equipment and services*- sometimes the up-front cost of the systems are reduced by using low quality or under capacity equipment. These problems stem from a lack of quality control and installation standards. But, since there is a competitive market, customers have been able to switch to more reliable suppliers.
  - ♦ *Lack of credit*- Before poorer people can afford solar systems, some form of credit system with low interest rates is required.
  - ♦ *Unnecessary high consumer prices*- high taxes on components and high transaction costs among dealers and distributors have contributed to high prices .

#### 4.4. Biomass in India

In Pura village, near Bangalore, an energy project replaces fuel wood by biogas systems. Biogas is extracted from agricultural waste by composting and capturing the fumes. A clean and cheap source of energy was made available, simultaneously producing useful compost and easing the pressure on the surrounding woodlands. But in Pura, villagers could not maintain the biogas systems after the energy specialists left. This was a classic case of a programme designed by outsiders, without sufficient understanding of the local situation. Collecting firewood in Pura is relatively easy, so villagers had little need for biogas for cooking. When, after the failure of the first biogas systems, the villagers were properly consulted on what they actually wanted and needed, their answer was "clean water and a reliable energy supply". So the biogas system was adapted to power a community electricity supply and a small motor to pump clean water direct to homes. Families now pay an affordable fixed monthly rate for the water and energy connection.

This case shows the importance of:

- ♦ Involving local community at the planning stage



- ♦ Understanding the nature of the service required rather than just a technology that works well.

#### 4.5. Family-sized hydro in Vietnam

Family-hydro systems are widely used in Vietnam. Made up of a generator and 50W to 1kW water turbine that sits in the system but does not block its flow, they can be bought in Hanoi and other markets throughout the country. For less than \$30 it is possible to buy a turbine and generator that will deliver about 80W, enough for several light bulbs and a radio. A family-hydro also charges batteries, which then runs lights and even a television.

Of the 78 million people in Vietnam, 12 million live in areas that will not be connected to the national grid in the foreseeable future because of the high costs of extending the system. Many of them live in hilly regions of the country where there is a vast potential for small hydro systems. Even in lowland areas, family-hydro systems are being used, since a drop of one or two meters is sufficient. Often, turbines can be installed in the small streams and irrigation canals next to the rice farmer's home.

The systems are cheap and easy to install, and the majority of families have set up the equipment themselves without any expert help. At present there are over 120.000 systems in use in Vietnam, up from just 3.000 in 1993. This tremendous growth has been driven entirely by local demand, without any government support.

#### 4.6. Small wind systems in Timor and Costa Rica

The eastern part of Indonesia is fairly dry and only one harvest of rice is possible each year. Reliance on rain-fed cropping patterns has kept farm incomes low and has impeded socio-economic development in the region. In an effort to increase agricultural productivity and increase rural incomes, the Ministry of Public Works initiated an irrigation project using 1.5 kilowatt wind-electric water pumps. The utility-scale wind farms in Guanacaste, Costa Rica, are operating with an average 40% capacity, one of

the best performance records in the hemisphere. At 5.5-7 cents/kWh as production costs, wind energy is more than competitive with petroleum-fired plants, which get paid 13 cents/kWh in some cases in those countries. Small wind systems are economical in many locations. They help provide power autonomy and security in a region that lacks rural electrification and that is often hit by natural disasters.

### 5. Constraints/ bottlenecks

The general barriers to transfer and adoption of new renewable energy technologies in the developing countries described below are political, socio-economic, cultural and technological in nature:

#### 5.1. Lack of awareness & information

Experience shows that the failure to achieve widespread adoption of renewable energy technologies is partly due to a lack of easy access to technology information, ignorance and absence of adequate mechanisms for technology transfer.

Little can be achieved in the rural areas unless people understand what is being proposed.

#### 5.2. Lack of maintenance services

Availability of skilled manpower is a serious obstacle to the introduction, adoption and diffusion of renewable energy technologies such as PVs. Most energy technicians and users are not yet familiar with, or adequately trained, to handle PV systems. Many developing countries neither have trained personnel in renewable energy technologies nor the capacity to make these technologies locally appropriate.

#### 5.3. Lack of credit facilities

In many countries lack of credit has been identified as an important barrier to make renewable energy accessible for rural communities. The Commercial and Development Banks are hesitant to advance loans to sustainable energy consumers. They have been reluctant to

lend to the private sector to invest in sustainable energy technologies.

#### 5.4. Costs of new energy technology

One of the barriers to the transfer and adoption of renewable technologies is the high price of the initial investment, such as solar panels. Many renewable energy technologies have failed because the investment of the technology is either beyond the financial capabilities of needy households, or users have found the technology to be inappropriately high-tech and 'gold plated'.

However, while widespread use of PV cells has been limited by their high cost, they have found this approach effective where developing rural infrastructure for non-renewable energy is also very expensive. According to figure 4, the worldwide market has grown exponentially over the last ten years as PV costs have dropped dramatically.

## 6. Sources of information

The following is a list of organisations, web sites, books and other useful contacts, which can give more specific information on issues relating to sustainable energy and development.

### 6.1. Organisations and contacts

#### ASIA

#### India

##### **Tata Energy Research Institute (TERI)**

TERI believes that efficient utilization of energy, the sustainable use of natural resources, the large-scale adoption of renewable energy technologies, and the reduction of all forms of waste would move the process of development towards the goal of sustainability.

Darbari Seth Block, Habitat Place, Lodhi Road, New Delhi, 110 003, India  
Tel.: +91-11-468.2100/2111  
Fax +91-11-468 2144/2145  
E-mail: [mailbox@teri.res.in](mailto:mailbox@teri.res.in)  
Website: <http://www.teriin.org>

##### **CPR Environmental Education Centre**

CPR Environmental Education Centre is an autonomous Centre of the Ministry of Environment and Forests, which aims at promoting conservation of nature and natural resources. Propagation of eco-friendly technologies for sustainable development is one of their areas of emphasis.

c/o The C.P. Ramaswami Aiyar Foundation; #1, Eldams Road, Alwarpet, Chennai (Madras), 600 018, India  
Tel.: +91-44-4341778/6526/4337023  
Fax: +91-44-4320756  
E-mail: [cpreec@vsnl.com](mailto:cpreec@vsnl.com)  
Website: <http://www.cpreec.org>

##### **The Rural Centre for Human Interests (RUCHI)**

RUCHI follows an integrated approach to solve problems of rural communities and undertakes research in science/applied science to promote social action. Its current programmes include watershed management, non-conventional sources of energy development, and extension of construction technologies, documentation, care for the aged and promotion of self-help groups. It publishes a quarterly newsletter called 'Headstart', publications on government programmes and also folders, booklets and posters on various technologies.

Contact persons: B.G. Banerjee, Dharamvir Singh  
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E-mail: [dsingh@ruchi.unv.ernet.in](mailto:dsingh@ruchi.unv.ernet.in)  
Website: <http://www.differentindia.org/rcfhi.html>

##### **CUTS (Centre for Sustainable Production and Consumption)**

3, Suren Tagore Road, Calcutta, 700 019, India  
Tel.: +91-33-4601424  
Fax: +91-33-4407669  
E-mail: [cutscal@vsnl.com](mailto:cutscal@vsnl.com)  
Website: <http://www.cuts.org>

##### **Energy Environment Group (EEG)**

EEG aims to create public opinion on issues of social and ecological relevance by publishing the newsletter 'Reports'. S

PO Bag 4, H-12 ODS, Lajpat Nagar IV,  
New Delhi, 110 024  
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Fax: +91-11-6420664  
E-mail: [eeq@sdalt.ernet.in](mailto:eeq@sdalt.ernet.in) or  
[dsharma@ndf.vsnl.net.in](mailto:dsharma@ndf.vsnl.net.in)

**Action for Food Production (AFPRO)**

25/1A Institutional Area, Pankha Road, D-Block, Janakpuri, New Delhi, 110 058, India

Tel.: +91-11-5555412/413

Fax: +91-11-5500343

Website:

<http://www.jxj.com/suppands/renenerg/companies/42249.html>

**Philippines**

**Philippine Centre for Appropriate Technology and Training**

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E-mail: [inforse@phil.gn.apc.org](mailto:inforse@phil.gn.apc.org)

**The Legal Rights and Natural Resources Center-Kasama sa Kalikasan (LRC-KSK/Friends of the Earth Philippines)**

No. 7 Marunong Street, Central East District, Diliman, Quezon City, Philippines

Tel.: +63-2-9281372 or 4361101

Fax: +63-2-9207172

E-mail: [lrcksk@info.com.ph](mailto:lrcksk@info.com.ph)

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**Indonesia**

**PELANGI** *Policy Research for Sustainable Development*

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E-mail: [pelangi@pelangi.or.id](mailto:pelangi@pelangi.or.id)

Website : <http://www.pelangi.or.id>

**Yayasan Bina Usaha Lingkungan (YBUL)**

YBUL aims to show that sustainable development can only be achieved if it goes hand in hand with income generation. YBUL wants to prove that environmental conservation can pay for itself. One of YBUL's programmes is the Renewable Energy Network Indonesia

(RENI). RENI has played a key role in the implementation of the solar home system programme described in this information package.

Jln. Mendawai III No.2, Jakarta 12130, Indonesia

Tel.: +62-21-7206125/7206231

Fax: +62-21-7396481

E-mail: [ybul@indo.net.id](mailto:ybul@indo.net.id)

**Sri Lanka**

**EMACE**

EMACE stands for **E**nvironment & Science, **M**anpower & Skills, **A**dult & Parenthood Development Assistance, **C**hildcare & Women's human rights, **E**ducation & Culture. It aims to protect the rights of Sri Lanka's most vulnerable people by helping women and children attain adequate means of income generation, health care, education, security and environmental sustainability, while actively influencing industries and government policies towards greener practices.

15 Mihiri Place, Asiri Uyana, Katubedda, Moratuwa, 10400, Sri Lanka

Tel.: +94-1-612837 or +94-74-214804

Fax: + 94-1-610080

E-mail: [emace@slt.lk](mailto:emace@slt.lk)

Website: <http://www.ict-uk.org/emace>

**AFRICA**

**TaTEDO** (Tanzania Traditional Energy Development and Environment Organisation)

This is a coalition of individual volunteers, artisans, farmers, community-based organisations and micro-enterprises. TaTEDO aims to develop a rational use of renewable energy systems by providing relevant information, knowledge and skills geared towards environmentally sound practices and the socio-economic development of Tanzanian communities.

Address: P.O. Box 32794, Dar es Salaam, Tanzania

Tel./fax: +255-22-

74400/2700771/2700438

E-mail: [tatedo@raha.com](mailto:tatedo@raha.com)

Website: <http://www.see-net.co.tz/htmlpages/tatedo.html>

### **Global Village Cameroon**

GVC operates at the national and regional levels to enhance environmental protection and sustainable development. GVC focuses mainly on energy and environmental degradation while working to promote poverty alleviation. GVC works with community-based organisations in Cameroon, particularly those in urban areas. GVC assists local populations to access proper living conditions in the pursuit of sustainable development. GVC also aims to promote the creation of an environment that enables affected populations to participate actively in decision-making processes

B.P. 3499 Yaounde, Cameroon  
Tel.: + 237 224 331  
Fax: + 237 226 262  
E-mail: [global@cenadi.cm](mailto:global@cenadi.cm)  
Website: <http://www.kabissa.org/gvc>

### **Energy Alternatives AFRICA**

PO Box 76406, Rose Avenue, Ngong Rd,  
Nairobi 00509, Kenya  
Tel.: 254-2-714623  
Fax: 254-2-720909  
e-mail: [energyaf@iconnect.co.ke](mailto:energyaf@iconnect.co.ke)

### **Econews Africa**

PO Box 76406, [1st Floor, No. 27 Uchumi Road, Off Ole Shapara Avenue, Nairobi South "C"](#), Kenya  
Tel.: +254-2-604682/605127  
Fax: +254-2-604682  
E-mail: [econews@tt.gn.apc.org](mailto:econews@tt.gn.apc.org)  
Website: <http://www.econewsafrika.org>

## **LATIN AMERICA**

**CEUTA - Centro de Estudios Uruguayo de Tecnologías Apropriadas** is the Uruguayan Centre for Appropriate Technologies working as an independent, non-profit foundation dedicated to the study and promotion of technologies for sustainable development. It works on training, technical consultancy and research through international co-operation, projects and contracts with national institutions. CEUTA maintains an information and library service in addition to four working programmes: Renewable

Energies, Agro-Ecology, Medicinal Plants and the training programme.

Santiago de Chile 1183, Casilla de Correos 5049, Montevideo 11200, Uruguay  
Tel.: +598-2-9028554  
Fax: +598-2-9014004  
E-mail: [ceuta@chasque.org](mailto:ceuta@chasque.org)  
Website: <http://fp.chasque.apc.org:8081/ceuta>

**ITeM - Instituto Del Tercer Mundo** aims to contribute to the strengthening of civil society by promoting informed and democratic decision-making, respect for human rights, freedom of speech, education and access to information by broad sectors of the population and social organisations.

Jackson 1136, Montevideo 11200, Uruguay  
Tel.: +598-2-4196192  
Fax: +598-2-4119222  
E-mail: [item@item.org.uy](mailto:item@item.org.uy)  
Website: <http://www.item.org.uy>

**Deca Equipo Pueblo** is a Mexican NGO, founded in 1977. It works closely with social organisations and citizen coalitions in the promotion of democracy, social development, defence of human rights and economic justice.

Francisco Field Jurado 51, Col. Independencia, Deleg. Benito Juárez, Mexico DF, CP 03630, Mexico  
Dirección Postal: A. P. 27-467, México DF, CP 06760, Mexico  
Tel.: +52-5-5390055/5390015  
Fax: +52-5-6727453  
E-mail: [administrador@equipopueblo.org.mx](mailto:administrador@equipopueblo.org.mx)  
Website: <http://www.equipopueblo.org.mx>

**CENSAT Agua Viva** (Asociación Centro Nacional Salud, Ambiente y Trabajo) CENSAT is an organisation made up of young men and women who work together for progressive change. CENSAT supports modes of production that meet the basic needs of people and protects the environment. CENSAT seeks to change living and working conditions that alienate the people from their environment; they also develop strategies to replace the use of

inappropriate technologies. CENSAT supports the confluence of popular national and regional interests and joins environmental actions with civic, peasant and youth organisations, women's groups, and indigenous peoples, teachers, Unions, cultural groups, intellectuals and municipal governments.

Censat Carrera 19 No. 29 - 12 O. 202,  
Apartado Aéreo No. 16789, Santa Fé de  
Bogotá, Colombia  
Tel./fax: +57-1-  
2442465/2440581/3377709  
E-mail: [todos@censat.org](mailto:todos@censat.org)  
Website: <http://www.censat.org>

#### CENTRAL AND EASTERN EUROPE

**Energia Klub (EK)** aims to minimize the environmental and social problems stemming from energy production and use. To this purpose, EK advocates the creation of a sustainable and nuclear-free energy sector that is decentralized, diversified and founded upon the Least Cost Principle. By decentralized is meant a sector based on the coordination of many small units using local resources. By diversified is meant resting on many pillars, which can include many elements ranging from renewable energy resources use, through energy efficiency, to resolving import dependency issues.

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15, Hungary  
Tel.: +36-1-2097223/3868090  
Fax: +36-1-4668866  
E-mail: [level@energiaklub.hu](mailto:level@energiaklub.hu)  
Website:  
<http://www.energiaklub.hu/englishweb/in dexeng.htm>

**CEE Bankwatch Network** has become one of the strongest networks of environmental NGOs in Central and Eastern Europe. Members of Bankwatch Network are Bulgaria, Byelorussia, Czech Republic, Estonia, Georgia, Hungary, Lithuania, Poland, Romania, Slovak Republic and Ukraine. The Network is focusing mainly on energy and transport, while working to promote public participation and access to information about activities of IFIs in the CEE region. Members of the CEE Bankwatch Network attend the annual meetings of the IFIs

and are engaged in an ongoing critical dialogue with their staff and Executive Directors at the national, regional and international levels.

Kratka 26, 100 00 Praha 10, Czech  
Republic  
Tel./Fax: +420-2-74816571  
E-mail: [energy@bankwatch.org](mailto:energy@bankwatch.org)  
Website: <http://www.bankwatch.org>

#### Foundation for Alternative Energy (FAE)

c/o Emil Bedi  
P.O.Box 35, 850 07 Bratislava, Slovakia  
Phone/fax: +421-7-836964  
E-mail: [bedi@bratislava.telecom.sk](mailto:bedi@bratislava.telecom.sk)  
Website:  
<http://www.fns.uniba.sk/zp/fond/eng>

#### WORLDWIDE

##### The World Bank

Website: <http://www.worldbank.org>

##### United Nations Development Programme UNDP

Website: <http://www.undp.org>

6.2. Websites and networks on sustainable energy

##### ENERGIA (International Network on Women and Sustainable Energy)

ENERGIA was founded in 1995 by an informal group of women involved in gender and energy work in developing countries. *ENERGIA's* objective is to empower women through the promotion of information exchange, training, research, advocacy and action aimed at strengthening the role of women in sustainable energy development. *ENERGIA's* approach is to identify necessary activities and actions through its membership and then to encourage and, wherever possible, assist members and their institutions to undertake decentralised initiatives. *ENERGIA News* is the principle vehicle for this approach. Website:  
<http://www.sms.utwente.nl/energia/home.html>

##### Asia Alternative Energy Program

If you are looking for information about existing and proposed World Bank/GEF-supported renewable energy and energy

efficiency operations in Asia, best practices and lessons learned for alternative energy development, ASTAE's background and strategies, and recently developed alternative energy products, have a look at:

<http://www.worldbank.org/astae>

**The Freeplay Foundation** was founded in 1998 by the Freeplay Energy Group. This was an extension of the Group's commitment to empowerment and development, working with governments, aid organisations, donor bodies and NGO's in order to provide innovative, affordable and practical energy solutions. It seeks new applications for Freeplay's unique "wind-up" and solar powered technology and making those applications real and tangible. Website:

<http://www.freeplayfoundation.org>

#### **World Renewable Energy Network (WREN)**

**WREN** is a major non-profit organisation registered in the United Kingdom with charitable status and affiliated to UNESCO. It maintains links with many United Nations, governmental and non-governmental organisations, supporting the use and implementation of renewable energy sources that are environmentally safe and economically sustainable. Website:

<http://www.wrenuk.co.uk>

#### **International Network for Sustainable Energy (INFORSE)**

INFORSE is a worldwide network of 200 NGOs in more than 60 countries. All of these organisations work to promote sustainable energy and social development. INFORSE acts as an independent initiator of programmes and projects and is actively engaged in international awareness rising. Moreover, INFORSE provides a meeting place for organisations at all levels, including donors. Website: <http://www.inforse.org>

#### **Solar Cookers International;**

This website gives general information and contact addresses on using solar energy for cooking: <http://www.solarcooking.org>

**Solstice** is the online resource for information about renewable energy, efficiency, and sustainable development.

Launched in June 1994, it was one of the first efforts to use the potential of the World Wide Web to deliver information about these critical environmental issues. Tip: they have a very interesting slide session about Women and Renewable Energy. Website:

<http://solstice.crest.org/renewables>

#### 6.3. Other useful contacts

**PV GAP** is a non-profit organisation that certifies the quality of PV systems and components. PV GAP also promotes the development and utilisation of internationally accepted specifications that promote the integration of quality into all aspects of PV energy delivery. The organisation encourages international reciprocity of national specifications for manufacturers, testing laboratories and the accreditation of training programs in installation, operation and maintenance for PV practitioners.

Secretariat, c/o IEC Central Office, 3 rue de Varembé, Box 131, CH-1211 GENEVA 20, Switzerland

Tel.: +41-22-9190216

Fax: +41-22-9190300

Website: <http://www.pvgap.org>

#### 6.4. Further Reading

IT Publication, 1994. ***The Power Guide: An International Catalogue of Small-scale Energy Equipment***

This handy manual outlines the use of renewable sources of energy for small-scale demands in remote conditions. It also provides a valuable catalogue of suppliers and sources for further information.

Vanderhulst, P. et al. ***Solar Energy - Small-scale applications for developing countries***. TOOL Consult, Amsterdam, 1990.

This well-illustrated book is aimed at people who are interested in finding out what they can use solar energy for in their everyday lives. Thermal applications, such as water heating, drying and cooking, and small photovoltaic systems, are discussed.

Foley, G. ***Electricity for Rural People***. Panos, London, 1990.

This book explains rural electrification from a technical, economic and social perspective. Written for non-technical decision makers, governments and NGOs.

Tellam, I. ***Fuel for Change - World Bank & Energy Policy***. Zed Books, London & Both ENDS, Amsterdam, 2000.

This book brings case studies from a wide variety of countries in both Third World and the transitional economies of Eastern Europe and examines the World Bank's new energy policies.

Johansson, T. et al. ***Renewable Energy - Sources for Fuel and Electricity***. Island Press, Washington, 1993.

This is a comprehensive reference work on alternative energy to appear in more than a decade. It has a varied menu on renewable energy issues.

#### 6.6. Conferences 2002

#### **International Conference on Renewable Energy for Rural Development**

Dhaka, Bangladesh

19-01-2002 to 21-01-2002

Information: E-mail: [sadrul@me.buet.edu](mailto:sadrul@me.buet.edu)

#### **World Renewable Energy Congress VII**

Cologne, Germany

29-06-2002 to 05-07-2002

Information: Website:

<http://www.wrenuk.co.uk/wrenvii.html>

#### **Earth Summit 2002**

Johannesburg, South Africa

02-09-2002 to 11-09-2002

Information: Website:

<http://www.johannesburgsummit.org> or

<http://www.earthsummit2002.org/>