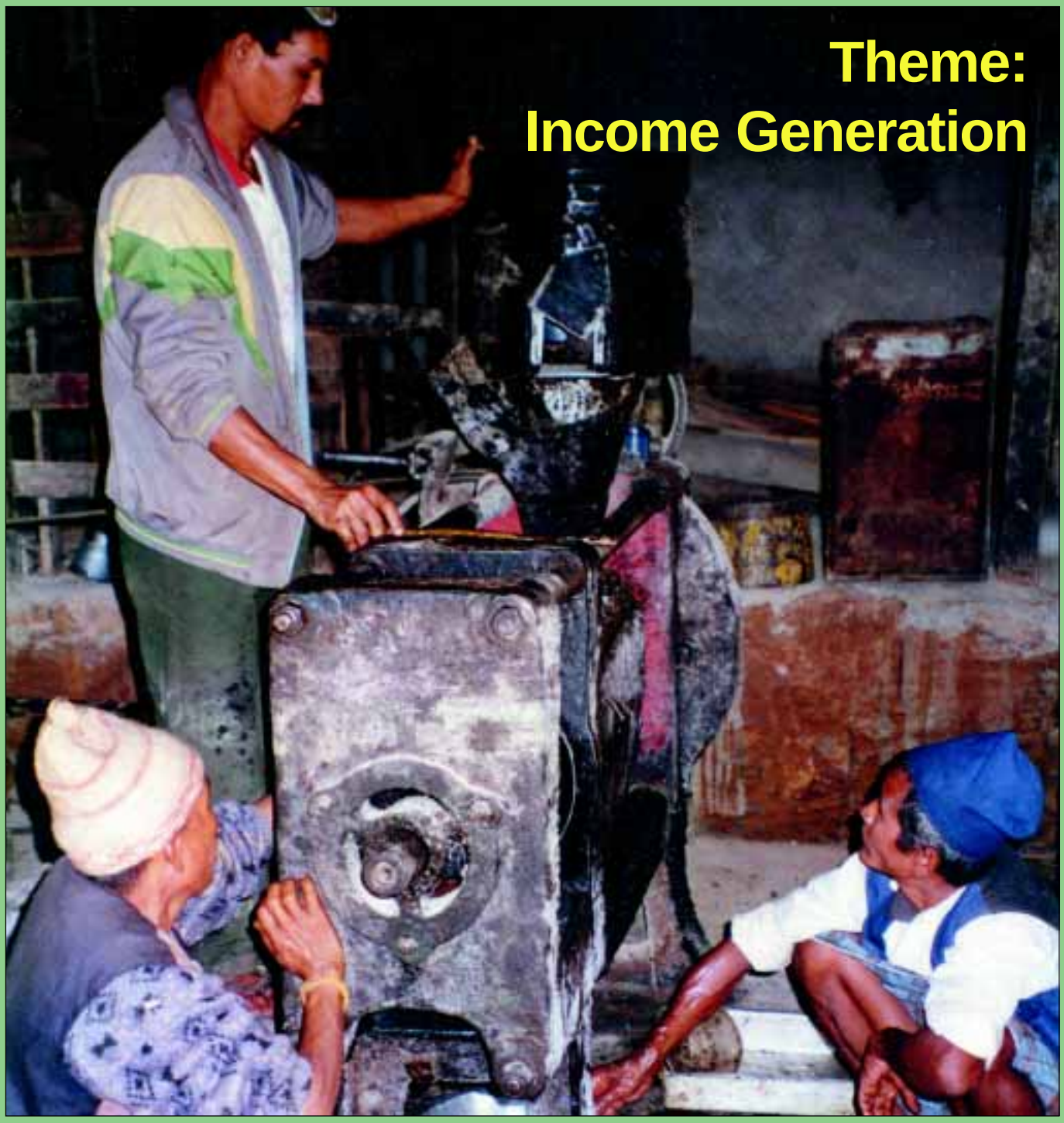
SUSTAINABLE ENERGY NEWS

Newsletter for INFORSE International Network for Sustainable Energy. No. 30, August 2000



Sustainable Energy Contact List - 2000 Included (Excl. Europe)

Sustainable Energy News
ISSN 0908 - 4134
Published by:
INFORSE

INFORSE Secretariat:
Blegdamsvej 4 B, 2200
Copenhagen N, Denmark.
Ph: +45-35-247700
Fax: +45-35-247717
E-mail: inforse@inforse.org
http://www.inforse.org/

International Network for Sustainable Energy (INFORSE) *is a worldwide NGO network formed at the Global Forum in Rio de Janeiro, Brazil, June 1992.*

Editorial Address:
Sustainable Energy News
Gl. Kirkevej 56, DK-8530
Hjortshøj, Denmark.
Ph: +45-86-227000
Fax: +45-86-227096
E-mail: ove@inforse.org
http://www.inforse.org/

Editors:
Gunnar Boye Olesen
Judit Szoleczky
Michael Kvetny
Lars Yde (technical editor)
Niki Fowler (text advice)
Mads Izmodenov-Eskesen (Layout)

Advisory Board:
Sécou Sarr, ENDA, Senegal
M.C. Mapako, BUN, Zimbabwe
Raymond Myles, INSEDA, India
Emil Bedi, FAE, Slovakia
Emilio La Rovere, LIMA, Brazil
Roque Pedace, Rejima, Argentina
D. Sukkumoed, SENT, Thailand

Deadline for next issue: *15.10.2000*
Next issue: *November 2000*

The newsletter is quarterly.
Feel free to use the information, but please state the source.

Annual subscription rate:
DKK 150 (approx. US$ 25).
Plus bank cost at check : DKK 50 (approx. US$ 10).
The newsletter is free of charge to NGOs as long as possible.

Printed by:
Fjerritslev Tryk, Denmark

Sustainable Energy News is sponsored by:
Forum for Energy & Development (FED), Denmark.

Photo on the front page:
Extracting mustard from seeds in Nepal. A micro-hydro plant runs the mill.
Photo by REDP.
See Theme article on pages 6-7.

A Key to Local Income

Solar water heater from Solar Dynamics, Barbados.
Photo by Oliver Headley.

Renewable-energy technologies can provide a more stable and a more affordable energy supply to communities that are outside the reach of reliable energy supply systems. This is particularly needed in many of the rural areas in developing countries. For these parts of the world, available energy can be the key to the success of several income-generating activities.
Sustainable energy services means making enhanced use of locally available renewable energy sources and of locally produced technologies. This generates local income, often in the form of local jobs. It also reduces the demand for energy imports and increases the security of the energy supply.

We have dedicated a large part of this issue to examples in which sustainable energy creates income and jobs. Several of the examples show ways to provide energy for rural activities in developing countries. Obviously, some types of renewable-energy technologies are better suited than others to support various activities. Where available, micro-hydro power is a good source of electricity for activities with concentrated energy demands. Similarly, solar energy is often favourable for drying/heating purposes. One conclusion from these and other examples is that it is important not to limit the promotion of renewable energy to a single solution, e.g., to electricity-producing solar cells.

The importance of sustainable energy to development is increasingly understood in official channels. The G8 countries stated at their recent meeting in Japan that they are committed to "*encourage and facilitate investment in the development and use of sustainable energy, ... To this end, the increased use of renewable energy sources in particular will improve the quality of life, especially in developing countries*."

The new World Bank loan for renewable energy in India (see p. 12) points in the same direction. The task now is to advance from the nice words and scattered initiatives to a general priority for sustainable energy in national governments, in development banks, and in international organisations. Maybe next year's meeting of the Commission for Sustainable Development can be a step in that direction, if it is not captured by lobbyists for nuclear power and for other centralised technologies (see back page).

Michael Kvetny
Editor

and

Gunnar Boye Olesen
Editor

Theme: Income Generation

This theme describes a number of ways in which renewable energy and energy efficiency create new income opportunities, especially for rural communities and/or in regions with unemployment problems.

In many cases, local renewable energy is the best, or the only, way to provide a reliable energy supply for rural development. This is a sometimes overlooked role of renewable energy. To fulfil that role, renewable energy technologies must be able to provide stable and more concentrated energy supply than, for instance, when used only for lighting or cooking.

The articles within this theme are just a few of many examples and considerations on the topic. We invite our readers to send additional examples as well as comments. We will use those materials in a follow-up in a coming issue, and will make the information available on the Internet.

The Editors

Theme Contents:

Mango Drying for Export Income

By Youssef Arfaoui, Forum for Energy and Development, INFORSE, Denmark

Solar Dryers make the difference between waste and value of surplus mango-fruits in Uganda. They create new possible exports to Europe.

Good Export Income with a Good Solar Dryer

Fruits and vegetables are abundant in Uganda. They can provide farmers with a good income, with the right processing. They can be dried using a solar dryer, then transported and sold in the big cities, exported, or saved to be used during the dry season's food shortages.

Solar Dryers Developed from Local Materials

Solar drying is well known in Uganda, but the drying techniques are unsafe and inefficient. The solar drying is done in the old traditional way by spreading the fruits/vegetables on a carpet /sheet and exposed to the sun in free air. The food is exposed to various risks, such as termites, ants, birds, chickens, and dust. Drying takes a long time.

MS - Uganda (Danish Association for International Cooperation), together with Hoima Nursery Schools Development Association (HNSDA), Gukvatamanzi Farmers' Association and its other partners in Uganda, has introduced locally made solar dryers to small-scale and community-based farmers to help them to create income. The solar dryers are now produced by HNSDA. The solar dryer that has been developed has been proven to dry mango fruits efficiently.

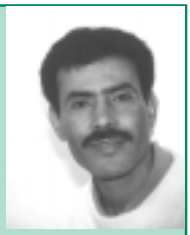
Mango trees are abundant in many parts of Uganda, but the fruits are not seen as important by rural communities. Due to the poor keeping qualities of the fruits, the long distance to big cities, and the conditions of roads, it was impossible for the farmers to make use of the mango as a source of income. Very often it is also not possible to use all the fruits for private consumption.

The dried fruits processed in the dryers have been tested and exported to the UK. It is now known that they have a big market in the UK and all over Europe.

After the introduction of the dried mangoes to the UK, the farmer groups could not meet the increased demand of a UK-based importer and still guarantee the same high quality. Presently, a small-scale export trade has been established. The dried fruit is now produced and exported from Kampala by several farmer groups like the Gukwatamanzi Farmers Association, which has 60 members, the Christian Rural Services of Nebbi West Nile, which has 40 members; and the Uganda National Farmers' Association.

Continue p. 4 ...

Local fruit market in a village in Uganda
Photo by Youssef Arfaoui.



Youssef Arfaoui *received his M.Sc. in Mechanical Engineering in Denmark in 1990.*

Youssef has been a Project Consultant at the Forum for Energy and Development (FED), Denmark, since January, 2000. He has prepared renewable-energy training materials/programs for FED and for INFORSE members, e.g., in Grenada, Ethiopia, Somalia, Nepal, and Tanzania. He speaks Danish, Arab, French, English, and some German.

Between 1996-99 he was MS energy advisor at the Engineering Unit of the Ministry of Health in Uganda. Between 1984-96 he had a wide range of construction-engineering and teaching experience in Denmark.

The new solar dryers just arrived. It opens up export opportunities in the community in Uganda. Photo by Youssef Arfaoui.

... continued from p.3

Affordable Price for a Solar Dryer Makes a Difference

Low prices, affordable for the small farmers and community groups, have helped the use of solar dryers to increase considerably in the last few years. The dryers are now used by a number of farmers to produce cash-crops. The second-quality selection of the dried fruit, which can not be exported, can be stored for later private consumption. School children are also able to have dried fruit as part of their lunches during the school hours. A large number of fruits and vegetables can be dried, including peas, corn, cabbage, broccoli, peppers, herbs, melon, plums, beets, onions, squash, tomatoes, asparagus, celery, bananas, and, of course, mangoes.

The use of solar dryers is still not widespread in Uganda. They have to be introduced to all parts of the country, especially to community-based farmers/groups.

More information:
- MS Uganda, 54 B, Kira Road, PO Box 6331, Kampala, Uganda. Ph:+256 41530764, fax +256 41530765 e-mail: co.msuga@ms.or.ug.
- On the Delux dryer: HTDC, e-mail: htdc@swiftuganda.com.

The Basic Design:

The fruit dryer is designed from basic material found in the community and is constructed by local craftsmen.
The sun shines through the clear glazing onto the fruit, heating up the air space under the glazing. The distance between the shelves provides air spaces under the screen in which the warm, moist air can move. The air moves passively upward along the slope, carrying away the moisture from the trays of fruits.

The dryer consists of:

1- Wooden frame, constructed as a box with shelf for the fruit trays.
2- Trays, wooden frame with chicken net of plastic materials, which allow the air circulation.
3- Transparent plastic (acrylic glazing), used as glazing, keeping and increasing the heat capacity.
4- Used oil around the dryer's legs to protect the wood from being eaten by termites and to prevent access of ants and termites to the fruits.

Deluxe Super Solar Dryer

Using a PV-powered vent

A solar-powered fan is built into the dryer, so as to provide a steady, gentle air flow in a small food dehydrator. This style lends itself to very large units. This type of solar dryer has been tested by the research unit of The Ministry of Health - Health Technology Development Centre (HTDC), Kampala.

Problems for Uganda's Farmers

Uganda's favourable soil conditions and climate have contributed to the country's agricultural success. Technological improvements have been delayed by economic stagnation, and agriculture still uses mainly unimproved methods of production on small, widely scattered farms, with low levels of capital outlay.

Other problems facing farmers include the disrepair of the nation's roads, the nearly destroyed marketing system, increasing inflation, and low producer prices. These factors contribute to low volumes of export of the traditional cash crops, as well as to a decline in per-capita food production and consumption. The production of the cash crops cotton, tea, and tobacco virtually collapsed during the late 1970s and early 1980s. In the late 1980s, the government encouraged diversification in commercial agriculture that would lead to a variety of non-traditional exports.

Despite serious problems, agriculture continues to be a significant source of income. Roughly 20 % of regular wage earners work in commercial agricultural enterprises. An additional 60 % of the work force earns some income from farming. Agricultural output is generated by about 2.2 million small-scale farmers with an average of 2.5 hectares of land each.

Fruits like mango, bananas, pineapple, oranges/ clementines and other crops, such as peanuts, tomato, pepper, and squash, are very common in the country. All can be dried to generate income.

Barbados Employs the Sun to Heat Water

By Oliver Headley, Prof. Director, Centre for Resource Management and Environmental Studies (CERMES), University of the West Indies, Barbados

Oliver Headley, Prof., and Director of CERMES holds PhD of Chemistry. He finished universities in Jamaica and UK. He has been working with solar energy since 1969. He got several awards for his scientific achievements e.g., Guinness Award '82 and Gold Medal from the Amir of Bahrain in 1996.

Over 31,000 solar water heaters are installed in homes, businesses, and hotels in Barbados; about 100,000 are in use in Puerto Rico. The payback periods range from 1.5 to 5 years in most Caribbean countries.

Barbados Pioneers

The solar water heater industry of Barbados is the best known example of the exploitation of a renewable-energy technology in the Caribbean. The two pioneers of this industry in the 1970s were Mr James Husbands of Solar Dynamics and Mr Peter Hoyos of SunPower.

The Barbados solar water-heater industry benefited from the competition between the two dominant companies, which control about 90% of the market. A crucial factor in creating the market was the provision of fiscal incentives by the Barbados government under the leadership of (then) Prime Minister Tom Adams. A householder could apply the cost of his water heater against his income tax for the year. The success was remarkable: 23,388 solar water heaters were installed in Barbados over the period from 1974 through 1992, and the solar companies presently employ 130 people. Another measure to promote solar water heaters was the provision of training programs particularly aimed at architects to encourage owners to include solar hot-water systems in new buildings and in retrofitting old buildings.

Economic Bonus for Household and Country

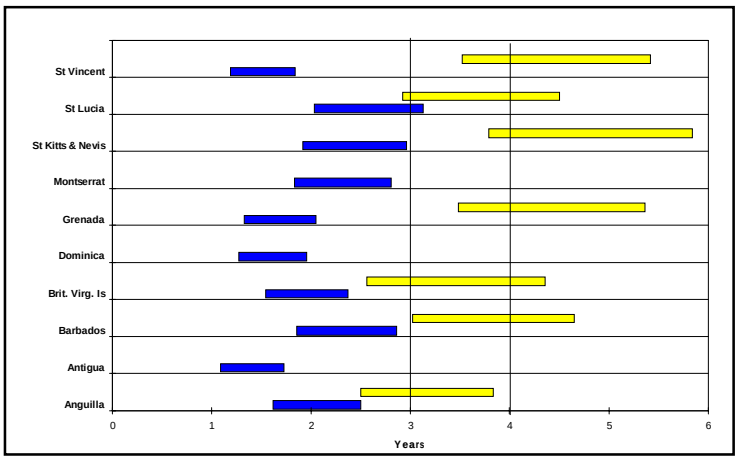
Presently, solar water heaters are quite attractive to users. With an electricity consumption for hot water of 4000 kWh per year, two years' consumption by a consumer who is using an electric water heater, including an initial cost of US $500, costs the same as that of a consumer with a solar water heater, including an initial cost of US $1500. After this period, the solar water heater saves the consumer US $520 per year. For tourism, which is now the biggest industry in the region, hot water is essential, and solar water heaters are even more cost-effective for this industry than for households.

In terms of avoided imports of fossil energy, the solar water heaters reduce annual imports by 33,000 tonnes of fuel, a saving of about $6.5 million US if one assumes a price of $25 US per barrel. These are the savings that the solar water heater industry achieves for Barbados, with its population of about 260,000. If solar water heating were applied over all the territories of the anglophone Caribbean, with a population of 5 million, to the same extent as in Barbados, savings would be $125 million US per year.

Any payback period greater than 3 years for a household and 4 years for a hotel is likely to discourage the use of solar water heaters. On islands where cheap LPG is the alternative fuel, the economics are not so persuasive, as the below graph shows.

More Information: Oliver Headley, Centre for Resource Management and Environmental Studies (CERMES), University of the West Indies, Cave Hill Campus,PO Box 64, Bridgetown, Barbados.
Ph: 246 417 4339 or 246 417 4316, fax: 246 424 4204,
e-mail: oheadley@hotmail.com.

The Barbados solar industry also installs PV electric systems. On the above photo, is the largest PV system in Barbados, which runs the lights at Harrison's Cave, the island's most popular tourist attraction.



Typical intervals of simple pay-back periods for solar water heaters on 10 Caribbean islands. *For each island:*
*- The **blue bar** shows pay-back (break-even) periods for replacing an electric water heater*
*- The **yellow bar** is for replacing LPG (Propane/Butane gas) water heater. The quickest payback (left end of bar) is for a hotel using 137,000 kWh/year for hot water, while the right end of the bar is for a family using 4,000 kWh/year. It shows that the criteria of 3-4 years pay-back can be fulfilled when replacing electric water heaters, but on many islands not when replacing gas for households. Other main assumptions of chart:*
- Water is heated from 25°C to 65°C.
- The capital cost of a household solar water heater is US $1,800.
- The capital cost of a hotel solar water heater is be US $40,000.

Micro Hydro Making Business

Nepalese Micro-hydro power plants facilitate small/home businesses, leading to increased standards of living

By Kiran Singh and Satish Gautam, Rural Energy Development Program , Nepal

Extracting mustard from seeds in Nepal. The mill runs by a micro-hydro plant. Photo by REDP.

Program for Rural Energy

The Rural Energy Development Program (REDP) was initiated by the Government of Nepal with assistance from the UNDP to enhance rural livelihoods through interventions in the energy sector.

The REDP helps the communities in the hilly districts of Nepal to plan, install, and manage rural energy systems such as micro hydro, solar home systems, biogas plants, and improved cooking stoves. REDP has been in operation since August, 1996, and has worked with 70 Village Development Committees of 15 districts.

31 micro hydro plants generating more than 500 kW electricity have been commissioned. A further 29 plants will add another 500 kW by the end of the year. Similarly, more than 400 solar home systems and biogas plants have been installed in different villages with REDP's support. Likewise, more than 2500 households have installed improved cooking stoves.

Income-Generating Activities

Emphasis is placed on using the electricity in ways that support the REDP's goal of enhancing rural livelihood. Such uses include domestic appliances and electricity-based micro enterprises. The communities have either installed or are in the process of installing agro-processing mills, e.g., grinders, hullers, and oil expellers, as well as sawmills, photo studios, rural bakeries, etc.

Light to Work

Better illumination from electric bulbs and tube lights also allows flexibility for longer working hours for rural people compared to kerosene lamps. Many community members have started working late hours under the electric light, which was not possible before. Some of the activities undertaken by villagers include crafting bamboo baskets, thanka-painting, and carpet-weaving in the evening. Other villagers simply have the opportunity to continue their traditional business in the evenings too.

Chicken Raising Enterprise

In almost all settlements, broiler farming has become a very popular micro enterprise with the advent of electricity. People generally raise chicken in rural Nepal for their own consumption and not as an enterprise. With electricity, they can buy fast-growing broiler chicks from the towns, raise them for several weeks, and sell them for higher profits.

Energy Service Business

One of the main reasons cited by studies on poor operation and maintenance of micro hydro schemes in Nepal is the lack of available technical expertise in the vicinity. The REDP has been supporting the private sector through soft loans and training in all programme districts to establish Rural Energy Service Centers. The concept is not only to develop capability at the district level to provide repair and maintenance services, but also to provide survey, feasibility, and consulting services for rural energy systems.

Reducing Working Time

Micro hydro has been able to effect a major reduction in hard household work, e.g., grinding corn, de-husking rice, and extracting oil. In an example from Western Nepal, the time spent on grinding maize and wheat for two daily meals of a family was reduced from two hours to ten minutes.

Fossil-Fuel Savings

In all settlements in which micro hydro plants have been installed, electric bulbs have replaced kerosene lamps. Better illumination and smoke-free environments are two major advantages in favor of electric lamps. In an example from Central Nepal, residents of a rural bazaar reduced their monthly kerosene consumption from an average of 8.22 liters per household to approximately 1.15 liters after the installation of micro hydro. On average, each household is saving slightly over Rs. 91 every month ($US 1.30). Besides the savings in kerosene, the community also appreciates the quality of light from electric bulbs compared to that of wick-lamps.

Micro Enterprise of Chicken Raising

Mr. Madhusudan Lamichhane and his family are squatters in Piughar, Tanahun in Western Nepal. The family does not own any land and used to work as laborers for living before Lamichhane decided to raise chickens for the local consumers in 1998. He took a loan of Rs. 450 in mid-1998 from the saving and credit program of his community organization to buy 25 chicks. He raised them for several weeks, and sold them to his villagers. Then he bought 50 chicks and then 75 chicks and so on. After a 12 kW micro hydro plant electrified the village in December, 1998, Lamichhane took a loan of Rs. 15,000 from the community to raise 100 chicks. In the ensuing eight months, Lamichane has earned Rs. 8000 in profit and does not need any more loans to run his business.

Photo by REDP.

Essential to Mobilize

Rural energy technology broadens the scope of socio-economic uplifting of people residing in the remote and scattered settlements. This is more so in those areas that are not likely to be connected to the national grid in the foreseeable future. However, the sustainability of these technologies depends upon a holistic development approach that emphasizes increased awareness and enhanced capabilities. Residents need not only to implement and manage the rural energy systems, but also to undertake various income-generating enterprises based on local needs and potential. For this, it is essential that the community mobilize and create enabling policy as well as an institutional environment for planning, implementation, technical support services, and social guidance.

More information: REDP, PO Box 107, Pulchowk, Kathmandu, Nepal.
Ph: 977-1-520048, fax: 977-1-521547,
e-mail: redpktm@mos.com.np.

Cloth Making Micro Enterprise

Mr. Krishna Nepali of Katuje Bazaar is from an occupational caste called Damai, which is engaged in making clothes for higher-caste customers. After his village was electrified, Nepali need not rely solely on daylight to finish his orders. Both Nepali and his wife work till late in the evening and have managed to double their income. Recently, Nepali bought another sewing machine so that he and his wife could work together and finish their orders in half the time.

Kiran Man Singh is an Agricultural Engineer from India (1972) and MBA from the Philippines (1980). Kiran has been working at RDP as program manager since 1996. Formerly, he worked in Nepal at USAID, at the Agricultural Development Bank, and at the Centre for Rural Technology.

Satish Gautam is MSc in Renewable Energies from Oldenburgh, Germany (1995); and BSc in Electrical Engineering, India (1990). He has been energy development advisor at REDP since 1996.

The REDP Program is exhibited in the EXPO 2000 and got 2nd prize of the Energy Globe Award 2000 in the Public Investment Category.

Energy Service Business

Mr. Prakash Subedi had been manufacturing components and installing biogas plants. In January 1998, he took a soft loan from the District Energy Fund created with the REDP's support and established the Alternative and Rural Energy Service Center (ARESC) at Damauli, Tanahun in western Nepal. Subedi also participated in training organized by the REDP on the survey and installation of pico-hydro plants (< 5 kW). Since then, the ARESC has undertaken site surveys in 30 places in the Tanahun district as well as several in the neighbouring Gorkha and Lamjung districts for the installation of pico hydro. The ARESC charges Rs. 5000 ($US 70) for survey and design and Rs. 15,000 ($US 210) for installation of pico hydro.

The success of Prakash Subedi has been phenomenal. In 1999, ARESC manufactured different components for 2500 biogas plants for other installers and installed more than 400 plants on its own.

Recently, the government has pre-qualified ARESC to supply and install solar home systems. ARESC has already installed 200 such systems in western Nepal.

ARESC directly employs 24 people and uses the services of 26 others whenever necessary.

Micro hydro-power plant. Photo by REDP

Mini- and Micro-Hydro in Nepal *by Kamal Rijal, ICIMOD*

In Nepal, about 1,000 mini and micro-hydro power plants have been installed. Almost all of them are below 20 kW. In addition, there are about 400 units of pico-sized plants called 'Peltrics' for electricity generation between 0.5– 3 kW. The power from the pico-plants is used by 5-10 adjacent households, mainly for lighting. The Government provides subsidies of from 50% to 75% for the electrical component of micro-hydro power. The higher level of subsidy is applicable to remote mountain areas. Most of the plants are installed by local entrepreneurs on their own initiative; some apply for loans available from the Agriculture Development Bank/Nepal (ADB/N) at an interest rate of 17%. Nepal now has a sizeable indigenous micro hydropower (MHP) industry. At present, there are eight different manufacturers located in Kathmandu, Butwal, and Biratnagar. The quality of the design as well as of production have improved significantly during the last two decades. Nepal has a long tradition of using water mills, known as "ghattas". In neighbouring China, about 43,000 mini and micro hydropower plants of less than 500 kW were installed by the end of 1996. The Chinese plants' total generating capacity is 6,500 MW.

Kamal Rijal is Mechanical Engineer and PhD in Energy Economics. He is a renewable energy specialist at the International Centre for Integrated Mountain Development (ICIMOD),
Info: ICIMOD, P.O. Box 3226, Jawalakhel, Kathmandu, Nepal.
Ph: +977-1-525313; fax: +977-1-524509, e-mail: krijal@icimod.org.np.
http://www.icimod.org.sg. Full article is available via: www.inforse.org.

Power Controller to Support Economic Growth

Stand-alone wind or hydro power often can provide the necessary energy for continued rural development. With a proper control system, local stand-alone installations can provide the same quality of electricity supply as good, grid-based systems.

By Steen Carlsen, M.Sc., Denmark

The first 6-kW prototype of the power controller developed by Steen Carlsen. The power house was built by the villagers of Quico 4,000 m high in the Andes in Peru.

Migration from Rural Areas

A common, severe threat to most third-world countries is the common migration from rural areas to cities. This leads to growing slums, unemployment, and environmental strain in cities. The obvious remedy for the migration is to give people in rural areas better income opportunities and improved standard of living. A part of such improvement involves providing electricity to the villages.

Electrification of Rural Areas

The use of electrical power in villages can be divided into:

- Power used in private homes.
- Power used for public community facilities; e.g., water supply, public showers, street lighting.
- Power used for workshops, crafts, and small industry; e.g., lathes, welding machines.

In private homes, and home businesses the main benefits from electrification can be obtained by one-phase loads such as:

- Electrical light to replace kerosene (kerosene fumes often lead to lung diseases) and batteries.
- Refrigerator to store food and medicine.
- Radio, TV, and computers.

A larger economic advantage of electrification is, however, the possibility of setting up workshops, crafts, and small industry, which demand larger machines that need 3 phases.

Replacing Petrol & Diesel

Today, increasing numbers of villagers in many developing countries buy small 1-5 kW portable generators. Along with the generators come regular outlays for fossil fuels, that drain the economy and contribute to CO_2 emissions.

Many of these villages have local wind- and/or micro hydro power potentials, which can replace or supplement petrol- and diesel-driven generators. The prospective lifetime for small hydro sites is typically on the order of +50 years, and, in the third world, costs are generally around 2000 $/kW.

Over Voltage Kills Bulbs

Small stand-alone renewable energy installations have been known for decades, but many of them have severe problems with voltage variations. Often the voltage variations range from below 180 V to over 250 V. If a standard incandescent bulb is exposed to a voltage just 5% above its rated voltage, its lifetime drops from the nominal 1200 hours to just 670 hours. If voltage rises to 10% above the nominal, the bulb's lifetime drops from 1200 hours to a mere 385 hours. Costs of bulbs have been a severe expense for many users of stand-alone power systems. Voltage variations not only have killed bulbs, but have also reduced the use of radios, telefax, computers, and other types of machinery, all of which are important to a competitive infrastructure.

Control the Power

Many of the problems of voltage variations can be avoided by using a power controller. Its main task is to control and to maintain stable voltage, independent of variations in consumption and in wind / water-flow.

A power controller can be designed to monitor the voltages of all 3 phases. If the voltage of one of the phases raises, an electronic load-controller increases the amount of power transferred to other load(s). The controller adjusts the power dissipated in the other load(s), until the voltages match the preset level. In this way, the power controller maintains all 3 phase-voltages within, e.g., 2% (over a power consumption range from 0-100%).

The surplus power dissipated in the other load(s), can be utilized for:

1 Heating (e.g., of houses, hot water, greenhouses);
2 Cooling (e.g., of cold-stores, freezers, and/or refrigerators);
3 Water pumping (with buffer tanks or for irrigation).

Increasing Distance from Generator to User

One factor that can contribute to problems with varying voltages in small stand-alone systems is long distances between the power source (e.g., the hydro power turbine) and the consumers. Long distances increase the resistance of the wires, which leads to bigger voltage variations with load variations. If a power controller is equipped with a remote sense circuit, the controller can be installed far from the site, at which the voltages must be con-

The power controller used in stand-alone micro hydropower system. Fixed voltage is supplied to the house(s).Surplus power is supplied to a heating cartridge.

Steen Carlsen is an electronic engineer and has developed a power controller for stand-alone systems up to 100 kW. In 1998, the power controller received The Danish Environmental Award for Joint Ventures for Adapted Environmental Technology.

trolled. This increases the maximum allowable distance between turbine and consumers, hence raises the number of potential wind- and micro hydro power sites that are economically exploitable.

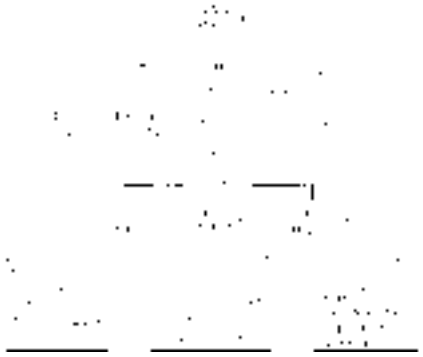
Motor as Generator

Traditional stand-alone systems are equipped with synchronous generators. A standard asynchronous electromotor can operate as a generator, when it is connected to a public grid (i.e., the utilities). Some power controllers are designed so they appear as a public grid to an asynchronous motor. This allows the motor to operate as a generator. Standard electromotors are cheap and robust, don't require much maintenance, and are usually available locally.

Stand-alone or Stand-together

A power controller can be configured to allow a stand-alone system to be synchronized to other 3-phase supply systems. This enables a group of villages, to join their "stand-alone" installations, and form a "stand-together" group or cooperative, allowing exchange of electrical power between the villages.

The ability to synchronize the installation to another 3-phase system(s) allows a remote "stand-alone" installation to become grid-connected and to sell its surplus electricity production to the utilities, if/when the public grid later is extended to include the site.



System blocks for a stand-alone micro system using a power controller to maintain fixed 3-phase voltage - and to control water intake.

More information: Steen Carlsen, Carlsen Power Electronics, Science Park, Gustav Wieds vej 10, 8000 Aarhus C, Denmark. Ph: +45 86190319, fax: +45 86201222, e-mail: Carlsen@power-electronics.dk.

Record Wind Employment

By Gunnar B. Olesen, OVE, INFORSE.

The rapidly increasing installation of windturbines has lead to a similar increase in the jobs in the wind industry and its suppliers. The year 1999 was another record year of installation of windpower, with 3,192 MW installed in Europe and 3,922 MW installed worldwide.

This record gave a similar record in employment related to the windpower industry. In Europe, Germany, Denmark, and Spain are the leaders in windpower development, having generated the majority of the around 55,000 existing jobs in European windpower manufacturing and installation. Around half of these jobs are in Germany, where most of this development still takes place. In Denmark, there are more than 15,000 windpower-related jobs. Almost 2/3 of the windpower-related jobs in Denmark spring from the thriving export trade in Danish windturbines.

In addition to employment in windpower manufacturing and installation, increasing numbers of jobs are springing up in the operation and maintenance of windturbines, in the production of spare parts, etc. The 3,200 MW of installed capacity in Europe in 1999 created around 1,600 new jobs throughout the lifetimes of these windturbines. With a lifetime of 20 years, this increased employment by about 32,000 job-years.

The increasing production of windturbines is shifting jobs from the traditional energy sector to that of windpower. An estimate of the total reduced employment because of this is 10,000-20,000 job-years throughout the 20-year lifetime of the new windturbines. The net employment effect of European windturbines installed in 1999 is thus an approximate gain of 70,000 job-years, after adjustment for jobs displaced from other sectors.

If windpower development continues as envisioned in Windforce10 (see Sustainable Energy News no. 27 and the INFORSE-Europe website), employment in the windpower sector can be expected to grow to around 300,000 permanent jobs throughout Western Europe by 2020, and maybe to half of that in Central and Eastern Europe.

Assembly wind mill hub. Photo by NEG MICON.

While most windpower employment currently is limited to a few countries, experience has shown that if a country creates a market for windpower of 100 MW installed capacity/year or more, that market will provide for local production and local jobs.

The figures given in this article are based on continuing work in INFORSE-Europe to develop a European follow-up to the Windforce10 Campaign. The numbers are estimates, and must be treated as such.
See more on the European part of Windforce10 on the INFORSE-Europe website: http:// www.orgve.dk/inforse-europe/

Heat-Saving Jobs and Companies

By Adam Gula, Prof., Foundation for Energy Efficiency, (FEWE) Krakow, Poland

A successful project shows how jobs and companies can be created to save heat in Polish municipalities.

Adam Gula is a professor at the Faculty of Fuels and Energy, University of Mining and Metallurgy, in Krakow. He is also the director of the Polish Foundation for Energy Efficiency (FEWE). He has been one of the leading figures introducing energy efficiency in Poland. He is co-founder of FEWE and he was active in the foundation of INFORSE on behalf of the Polish Ecological Club.

Large Low-cost Potential

Estimates show that about 30-40% of heat in the residential and tertiary sectors in Poland is wasted. Reducing this energy waste would lead to reductions of CO_2 emissions and economic benefits to energy consumers, as saving heat means saving money. At the same time, it is obvious that energy is wasted most where there is no money for measures to save it. However, some heat-saving measures do not require big capital expenditures and are affordable for most building owners or users within their present financial resources. One example is that of repairs and draft tightening of windows, which costs 5-8 times less than installation of new, double glazed windows and – if done by an appropriately trained person – yields comparable energy savings with windows typical in Polish post-war buildings. Such work can be done by retrained unemployed people, resulting in significant savings and in new jobs.

A Push is Needed

As a rule, Polish municipalities do not have any plans or policies that would stimulate such development, e.g., by creation of small or medium-sized local enterprises offering these types of services. On the other hand, there exists a great human potential to create such small entreprises in Poland, based on the existing workshops or maintenance teams of housing administrations, which would only need some re-training and restructuring. A particular value of such entreprises would be that the jobs could be offered to people who are not necessarily highly skilled, which is the major problem in most of the high unemployment areas. However, it would require a push and an example to be followed.

Project in 6 Towns

At the end of 1997, the Polish Foundation for Energy Efficiency (FEWE) obtained a grant from the United States Agency for International Development (USAID) for a three-year project aimed at demonstrating that the development of business providing low-cost heat-saving measures for buildings brings benefits to the local communities in several dimensions:

- social (creation of new jobs, new economic activity, improved housing conditions)
- economic (reduction of energy bills, avoidance of supply-side investment costs)
- environmental (locally, by reduction of emissions from low chimneys)

Six cities were selected for the project: Krapkowice, Luban, Olsztynek, Nowy Sacz, Trzcianka, and Bialystok. They represent different regions and population sizes (18,000–300,000). The involvement of the city government was an essential factor in the selection process. It was assumed that the USAID grant of $US 533,000 would be supplemented by $US 190,000 from the cities' own funds. Additional support of $US 25,000 has been provided by the Small Grants Program of GEF for the City of Bialystok.

In each of the cities, the project consisted of three main steps:

- Complete audits of five typical buildings, identifying possible measures, their cost-effectiveness, and listing recommendations for low-cost improvements.
- Actual implementation of the recommended measures in two buildings (a typical 4-5 story residential block and a school of a typical size), with on-job training of local technicians. The training was one of the two major goals of the project. For this purpose, in each city, 8-14 local workers were selected, typically from among unemployed people.
- Pre- and post-demonstration data collection and analysis, to measure the actual savings.

The work has been completed in five of the six cities. The sixth, Bialystok, is in the post-demonstration phase. The project ends in August, 2000.

Blowing-in insulation in an attic space. Photos by FEWE, Poland.

The results are very encouraging and prove that the project has addressed very important local problems. Over 80 local technicians have been trained by the project, and at least six small companies will be established by the trainees. An indicator of the success of the project is that, by the end of 1999, the cities had already exceeded their total contribution of $US 190,000. Another indicator of success is that three other cites, Miedzna, Brzozow, Bierun, decided to train their technicians similarly, covering the costs of the training from their own resources. In a follow-up project, technicians have been trained in Lviv in Ukraine, as well.

More information: FEWE, ul. Florianska 55, 31-019 Krakow, Poland. Ph: +48-124213911, fax:+ 48-12411 9943 e-mail: adamgula@ceti.pl.

New Members in Brazil

A new network of NGOs, "RENOVE", and 7 new members of INFORSE help to spread the use of renewables in Brazil

By Emilio Lèbre La Rovere, INFORSE Coordinator, and Claudia do Valle Costa, researcher, LIMA, Environmental Sciences Laboratory, Rio de Janeiro, Brazil

The New NGO Network: RENOVE

More than 30 participants from a number of institutions including 17 different NGOs met in Praia do Forte in the state of Bahia, Brazil, from June 15 to 17, 2000. They decided to create a new network, RENOVE, Brazilian Network of NGOs for Renewable Energy, to foster development of renewable energy in Brazil.

The event was convened by Winrock International (WI), as a follow-up to an initial workshop that was held in Fortaleza in May, 1997 and to a report prepared by LIMA on Brazilian NGO activities in the field of renewables (see SEN 29, p.7).

The meeting attendees approved the establishment of RENOVE, the formal institution responsible for the network, and the modalities of its functioning. A Council of Directors and an Executive Secretary were appointed, and the first steps were taken to ensure that the new institution would begin working swiftly towards its goals.

7 New INFORSE Members

Following a presentation of INFORSE activities and the distribution of SEN issues by the Latin America INFORSE coordinator, seven institutions participating in the meeting eventually became INFORSE members (see the new Contact List in this issue).

Update on New Projects

The meeting included updates on new projects started by Brazilian NGOs in the field of renewables. Besides the data collected in the LIMA/WI report (see SEN 29, p.7), it is worth mentioning the activities carried out in the northeastern region of Brazil (the poorest of the country) by 2 NGOs :

IDER *(Institute for Sustainable Development and Renewable Energy), which is based in Fortaleza the capital city of the state of Ceará, Northeastern Brazil)*

IDER has structured a renewable energy program that it has been implementing since 1996. The program is done jointly with a number of partners including WI, BNB (the regional development bank), COELCE (the state utility), UFCe (main local university), PRODEEM (a renewable energy programme of the Brazilian Ministry of Mines and Energy), and SELF (Solar Electric Light Fund). As of the end of 1999, more than one thousand PV systems had been installed for different applications : residential electricity needs (623); water pumping systems (155); rural telephony (132); public lighting (71); schools (27); manioc powder mills (23); health care centres (14); and small textile units (3).

400 Wp PV system installed in Pedreira in the Amazon region, Brazil. It supplies electricity for lighting, TV and video equipment at the local school. Joint project by Winrock and a local NGO, PSA-Health and Joy Project, 1999. Photo by Aurélio Souza Assistant, WI.

IDER has developed a methodology for project implementation comprising eleven steps: identification of candidate municipalities and communities; selection of communities; survey and assessment of needs; identification and registration of families (before the project and two years after the equipment installation); development of the energy project; training; development of productive uses of energy; establishment of revolving funds; equipment installation by the communities themselves; monitoring (one-year minimum); evaluation of social and economic impacts.

Highlights of IDER's experience include the involvement of children and young adults in the installation of the PV systems and the revolving funds allowing for proper maintenance (including two battery replacements) at affordable costs (as low as US$ 30 upfront and US$ 10/month) based upon previous expenses with energy (candles, batteries, diesel oil).

FTV *(Fundação Teotônio Vilela) - a foundation based in Maceió the capital city of the state of Alagoas, Northeastern Brazil.*

FTV has been active in the field of renewable energy since 1995 through a partnership with BNB called the Sunlight Program. Some 1,600 PV residential systems were installed by micro-companies who bought the equipment and rented them to the families. A condominium (groups of 30 families) system will be tested now.

Another partnership with PRODEEM has installed PV systems for other applications: schools (51), water pumping (15), and health care centres (4).

New programs are to be started shortly, including a cooperation with APAEB, another member of RENOVE, in the state of Bahia (see Sustainable energy News No. 29, p.7).

For further information, please contact the authors at INFORSE Regional coordinator, LIMA, Federal University of Rio de Janeiro, CP 68565, Brazil.
Ph: +55 21 5608995,
fax: +55 21 2906626
e-mail: emilio@ppe.ufrj.br; or ccosta@lima.coppe.ufrj.br,
http://www.lima.coppe.ufrj.br/; or
Tanya Andrade, WI Brazil,
Winrock International,
e-mail: tandrade@winrock.org.br

$130 Million Loan to India from the World Bank

Funding US$300 Million to the 2nd Indian Renewable Energy Project

India will expand the development of renewable energy projects and private sector energy efficiency investments with the help of US$130 million in financing from the World Bank and a US$5 million grant from the Global Environment Facility (GEF).

This new project, The India Second Renewable Energy Project, aims to reduce power supply shortages and greenhouse gas emissions. It will provide a line of credit channelled through the Indian Renewable Energy Development Agency (IREDA) for private sector financing of small hydro power stations, grid-connected stations as well as stand-alone micro-hydro schemes.

To improve energy efficiency, the project will finance integrated energy management schemes to be offered by energy service companies to industrial and commercial end-users such as paper mills, steel mills, and chemical plants. It will also finance the purchase and installation of energy-efficient equipment by end-users.

The project further includes a technical assistance component that will prepare a pipeline of energy-efficiency investments; strengthen IREDA's ability to appraise, manage, and promote energy efficiency services; and assist Indian states in promoting end-use efficiency, including development of appropriate policy incentives.

Loan Conditions

Total project budget is US$300 million. IREDA will contribute US$25 million and private developers are expected to provide US$140 million. The World Bank loans are a 20-year loan with 5-year grace period (US$80 million) and a 35-year interest-free loan with 10-year grace period (US$50 million).

More information:
http://www.worldbank.org/sarprojects/,
or contact Ricardo Castro, SAREXT,
The World Bank Group, MC8-833, 1818 H Street NW, Washington D.C. 20433, USA.
Ph: +1 202 458 5157,
fax: +1 202 522 0321,
e-mail: rcastro3@worldbank.org.

Energy Sector in Transition: Asian Perspective

International Conference Including INFORSE Workshop 25-27 October 2000, Ubol Rachathanee, Thailand

The expected participants, around 70 persons, are the NGOs and academic persons in East and Southeast Asia, policymakers mainly from Thailand, and some resource persons from developed countries. Moreover, the Regional INFORSE Workshop invites NGOs and academicians to discuss future co-operation and working plans.

East and Southeast Asia are among the most dynamic regions of the world. Many changes are taking place in the energy sectors of these regions. Their energy consumption has been rapidly increasing in these emerging economies, leading to more energy generation as well as to related social and environmental problems.

The privatization process has been going on both in the first and the second generation of newly industrialized countries, including South Korea, Taiwan, Singapore, Thailand, Malaysia, Indonesia, and the Philippines. All of these changes will have significantly effects on the future of sustainable energy in these regions, not only in terms of bias against alternative technological development, but also in terms of unfavorable market regulation of renewable energy and energy-efficient technology.

The Thai-Danish Cooperation on Sustainable Energy, in collaboration with the Danish Organization for Renewable Energy (OVE) and with the International Network for Sustainable Energy (INFORSE), will therefore hold the above international conference with the objectives of discussing and analyzing the changes taking place in the energy sector as well as the potential for strategic direction towards more sustainable energy development for this region.

The situation of sustainable energy development; presentation of scenarios for liberalization and sustainable energy development based on the experiences of various countries, including Thailand, the Philippines, Vietnam, Canada, and Denmark; and the options for various aspects of sustainable energy development will be constructively discussed at the conference. The invited speakers include:

- Michael Kvetny, INFORSE, Denmark
- Raymond Myles, Integrated Sustainable Energy and Ecological Development Association (INSEDA) , India
- Grainne Ryder, Probe International, Canada
- Tetsunari Iida, Green Energy Law Network, Japan
- Athena R. Ballestero, Greenpeace Southeast Asia, Philippines
- Witoon Permpongsacharoen, Towards Ecological Recovery and Regional Alliance, Thailand
- Peter du Pont, International Institute for Energy Conservation-Asia Office, Thailand

More information:
Suphakij Nuntavorakarn, SENT, INFORSE Regional Coordinator, 92/2 Soi Pitchayanan 22, Tiwanon Road, Muang, Nonthaburi Province 11000 Thailand. Ph: +66-2-968 8113/ -968 8239, fax: +66-2-968 8113
e-mail:tonklagroup@usa.net.

Local people's peaceful protests against big dams start to be more violent in the last years in Thailand.

On the photo: Villagers pray for the spirit of the river to protect them as the water rise in the occupied Rasi Salai Reservoir. Photo by:IRN, Nov.'99.

The Irrationality of Pak Mun Dam

By S. Nuntavorakarn, INFORSE Coordinator, SENT, Thailand

Evaluation shows that the World-Bank-funded dam causes drastic reduction in fish population. The $1 million fishladder is useless. The protests start to be more violant.

1st Evaluation Process

After a decade of negotiations and protests against the Pak Mun Dam, the first ever official evaluation of a power project in Thailand has been conducted. In 1998, the World Commission on Dams was established to address central issues of controversy with respect to large dams. Pak Mun Dam was selected as one of the cases to be studied. Academicians, scholars, and also the Tonkla Group for Alternative Economics Studies, a member of SENT, submitted the studies on development effectiveness. The studies covered various aspects of the dams - economic, hydropower, fishery, environmental, and social.

The dramatic conclusions of the evaluation are that:

- The dam can only generate 53% of planned capacity.
- The benefit of the irrigation is zero, mainly because of the restrictive rules imposed during the dry season.
- The cost grew from the original estimate of 135 million USD to 233 million USD.
- The number of the fish species in the watershed declined from 265 to 96.
- The expected harvest of fish dropped from 220 kg/ha/year to 10 kg/ha/year.
- Total fishery income from the watershed fell from 30,000 THB to 3,000 THB.

Desperate Local Struggle

In March, 1999 about 5,000 villagers occupied the dam site and established a village there. In May, 2000 the villagers occupied the rest of the dam and the fish ladder. In the beginning, the local people demanded the fair compensation for the permanent loss of fisheries. Now, instead, they desperately demand to open all of the dam's spillways to let the fish go upstream to spawn and recover the ecological system.

Under the pressure, the Government had set a Committee to consider the demands of local people. The Committee reached the consensus that the Electricity Generating Authority of Thailand (EGAT) should open all spillways for 4 months as a testing period. But EGAT has denied and still confirmed the importance of the dam for the power system. Even though, the dam has contributed to only 4% of the northeastern power system and less than 1% of Thailand power system.

Villagers Participation in Water Management?

The local people struggle for their rights to participate in the decision-making on the management of the Mun River, one of the most important local resources. This concept of the people's participation in resource management is one of the most important basic concepts for sustainable development and sustainable society.

Open the Gates NOW! Last News in July:

After more than a year of intensive peaceful demonstrations, on July 16-17, the police used batons, shields, and tear gas against the protesters in Bangkok outside of the Government's House. Almost 50 people were injured, and 225 villagers were arrested.

On July 24, several protestors in Washington, DC started fasting in solidarity with the villagers. 74 organizations from 21 countries have written to the Thai Prime Minister.

More information: International Rivers Network, http://www.irn.org/; or SENT, Thailand (See address on p. 12)

The Mun is the most important river in Thailand's northeastern region, with a catchment area of 117,000 square kilometres (3 times the size of the Netherlands).
The construction of this 136-MW dam was started in 1990 and it was fully operational in 1994.
The expected benefits included irrigation potential for the area of 64,000 acres and increasing fish yield from the dam's reservoir area.
This run-of-the-river dam had been expected to have less impact on the environment and on the local community because it does not need a big reservoir like most large dams. More than 20,000 people have been effected, however.
The dam has blocked the migration of fish, and a $1 million fish ladder, promoted by the World Bank's fisheries experts, has proved useless.
The dam seems to be costing more than its worth.

Low-cost Water Heater

A simple solar batch water heater can provide hot water for half the price of a normal solar water heater, and still keep the water warm during the night.

Mr. A. Jagadeesh of the Nayudamma Centre for Development Alternatives (NCDA) - INFORSE-member - has developed such a system. It uses two stainless steel drums, reflectors, and a cover of clear polyethylene. The cost of a 100 litre solar heater of this design is about $ 150.

Information: A Jagadeesh, NCDA, see below or Home Power, April/May 2000, http://www.homepower.com.

PV in India

- not such a rosy picture

By A Jagadeesh, renewable-energy specialist, NCAD, India

India has solar photovoltaic (SPV) systems with a capacity of 28 MW (March 1998). They are mainly for communications, street lighting, home lighting, and pumping. This is far behind other renewable energy sources in India. The main impediment to wider use of SPV systems is the heavy initial investment. The capital cost per kW for SPV is 300,000 Rupees (Rs., $US 7,500), while that for wind is around 35,000 Rs. ($US 900) and for biomass power, 40,000 Rs. ($US 1000). Another challenge is the quality of the storage batteries used in the SPV standalone systems. The performance of SPV street lamps is far from satisfactory. Accumulation of dust and smoke on the solar panels is also a serious problem.
PV projects will not be sustainable unless the beneficiaries somehow share a sense of ownership in the projects and take responsibility for carrying out the modest maintenance tasks that the systems require. Until there are major breakthroughs in the efficiency and costs of solar cells, the technology will not gain widespread acceptance in developing countries like India.
(shortened by the editors)

Info: Nayudamma Centre for Development Alternatives, 2/210 1st floor, Nawabpet, Nellore, 524 002, Andhra Pradesh, India. Ph:+91 -861-321580/-324806, fax:+91 -861-330692/-331848, e-mail: a_jagadesh@yahoo.com.

PICO Hydro-Electric Project

Pico hydropower generation can meet the electricity needs of the poor and low-income groups. It satisfies small demands in a decentralised manner at low cost.

In Mankulam, an isolated village in Kerala State in India, an INFORSE member, the Malanadu Development Society (MDS), has installed 2 pilot units of 200 watt pico hydro power plants. The plants have been operating well for the past year. Based on this, the MDS is proposing to install 30 Pico-hydropower generation units for 30 poor & low income group families in the village. The complete installation cost of each unit would come to about Rs. 10,000 (US$ 250)- thus the entire cost of the 30 units would come to Rs. 300,000 (US$ 7,500). The beneficiaries have agreed to contribute small amounts to the proposed Pico-hydropower generation project. Apart from improving the quality of life, the Pico project would have good economic as well as environmental impact. It is estimated that about 1,000 litres of kerosene would be saved annually after the installation of the proposed 30 units.

The MDS, in partnership with INSEDA, is also ready to train people for installation and operation of Pico hydropower, e.g. as a part of South-South or South-North-South Cooperation, through INFORSE Network.

Information: INFORSE South Asia Region (see back page)

A meeting between the Folkecenter team and the leaders of Tabakoro, Niamala, and Zambala, the villages in which the Rural Solar Electrification project will be implemented. The government priorities stated by the Malian President in the areas of education, health, and water supply were found to mirror exactly the needs expressed by rural people. The meeting was part of the feasibility study in 1998 for the present project.

Solar Solutions to the Rural Exodus in Mali

The First Steps of the Mali Folkecenter

By Tom Burell, Jane Kruse(1st from the right), and Ibrahim Togola (3rd from left,1st row), respectively of The Danish and Mali Folkecenters for Renewable Energy.

Danish Government to Fund Rural Solar Electrification

The Danish Folkecenter for Renewable Energy, together with the Mali Folkecenter, received funding of 2.3 million DKK from the Danish Ministry of Foreign Affairs for a project to combat rural exodus. The project started in June, 2000, and will be implemented in the villages of Tabakoro, Niamala, and Zambala, in the Sikasso region of Mali, 200 km south of Bamako. The total population of the 3 villages is about 3000. The villagers provide 45,000 DKK towards the project. As a percentage of the total cost, this may seem small, but the contribution will give the villagers a sense of responsibility and a feeling of ownership. The money will be collected from the villagers by the village associations.

The Mali Folkecenter is working hand in hand with the villagers to ensure successful completion of the project, with technical support provided by the Danish Folkecenter. Each of the villages has a school and a clinic. The project will last for 3 years, and consists of installation of solar panels in 3 villages for water pumping, for lighting in schools, and for lighting as well as for refrigeration of medicines and vaccines in the clinics. Electrification of the schools for evening adult literacy classes also serve adult students from the surrounding villages.

The project will help to reduce the rural exodus by encouraging diversification of economic activities as well as improvement of health conditions and quality of life. Long-term sustainability will be ensured by the sale of pumped water (at a price all villagers can afford), which will provide funds for social measures and for maintenance of the solar installation. A comprehensive training program will give the villagers the skills they need for management and repairs.

Solar Training School - Looking to the Future

An essential part of the project is the creation of a Solar Training School, where Malian engineers, technicians, and students can get hands-on experience and the concrete skills needed for installation of solar systems. Trainees will learn by installing a total of 10 solar lighting systems in other village schools in the area, gaining the competence necessary for future work. The project will show that solar power need not be expensive (typically less than 1 USD per villager for a

school lighting system), and may inspire other village communities to pay for their own installations. This, surely, is the way to achieve widespread use of solar technology. The solar training school will build capacity, creating a knowledge base that can be drawn on in the future, and will help to support adult literacy training for hundreds of people. It is an investment in the people, for the people.

Other Projects

Since October, 1999, when the Malian Folkecenter obtained authorization to work in Mali as an NGO (see article in issue No. 27), it has obtained funding from the UNDP for household biogas installations and from the GTZ (German Corporation for Technical Cooperation) for the training of municipality staff in environmental legislation.

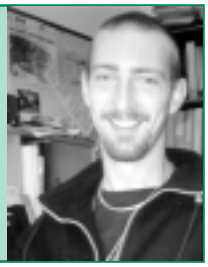
Digging a hole for construction of the digester of a family biogas plant. The Mali Folkecenter is the coordinator of this project, working in cooperation with the Malian Rural Polytechnic Institute. The project will consist of five installations, of which two have been completed. Funding is from the Global Environment Fund (Small Grant Program) of the UNDP.

For further information, please contact us in Mali or in Denmark.
- Tom Burell and Ibrahim Togola, Regional Director, The Mali Folkecenter, B.P. E4211 Bamako, Republic of Mali.
Ph: +223 200617, fax: +223 200618,
e-mail: mali.folkecenter@datatech.toolnet.org.

- Jane Kruse, Information and Training Program, The Danish Folkecenter for Renewable Energy, one of the founding members of INFORSE, P.O.Box 208, 7760 Hurup Thy, Denmark. Ph: +45 9795 6600, fax. +45 9795 6565, e-mail:energy@folkecenter.dk.

Tom Burell will work in Mali on the Folkecenters' project for the next 3 years on behalf of the Danish Folkecenter.

He has a BSc of physics from England and has studied renewable energy technology at the Danish Folkecenter.



Malian Folkecenter installing a 75W solar power system for the electrification of the school in the village of Tabakoro. It now provides lighting for evening classes in adult literacy

Mali: in Need of Rural Electrification

Mali is located in the center of West Africa and has an area of 1,241,000 km^2. 80% of the 12 million inhabitants live in the southern third of the country, as the northern two-thirds are desert. Adult illiteracy can reach over 90 % among rural women. In Bamako, the capital of Mali, about 25% of people have access to electricity, but in rural areas, the figure is less than 1%.

Rural Exodus: Draining Rural Communities of Young Talent

Rural exodus is the well-known phenomenon whereby people leave their villages to try and find work in the cities, and it is a problem that needs tackling in many developing countries. It generally occurs because villagers and inhabitants of rural areas, especially young people who represent the future of such communities, feel there are no opportunities where they live. In Mali, it means that people move to the cities during the dry season, mainly to the capital Bamako, to find work. It reduces the human resource base of the villages, robbing the community of many of its most dynamic members, and contributes to all the problems associated with urbanisation: overcrowding, crime, delinquency, drug abuse, prostitution, and the spread of AIDS.

The Folkecenter for Renewable Energy and Mali-Folkecenter are committed to reducing the rural exodus in Mali and West Africa by using alternative energy solutions to improve the conditions of daily life for rural people. This project is an important first step down the long road to sustainable development.

European News

Edited by Gunnar B. Olesen, OVE, INFORSE-Europe Coordinator

EU's Climate Dialogue with NGOs and Industry

The EU Commission has launched the European Climate Change Program (ECCP), which includes 5 working groups involving industry and NGOs. The aim of the program is to prepare the 15 EU countries' ratification of the Kyoto Protocol. The activities started in June of 2000 and will continue until May, 2001.

The Climate Network Europe is coordinating the NGO participation. INFORSE-Europe is involved in the working groups dealing with energy supply and energy demand, which cover renewable energy and energy conservation. NGOs are invited to take part in the discussions of NGO proposals and of the positions being formulated by the working groups. Key issues will be how to maximise the use of renewable energy and energy efficiency in the EU. A meeting of NGOs is planned for the end of August in Brussels. The first NGO proposals will be presented immediately afterwards.

Information: http://europa.eu.int/comm/environment/climat/home_en.htm
To be involved in NGO activities, contact INFORSE-Europe, e-mail: ove@inforse.org.

Internet Education Continues Starts again in September

Following the first DIERET (Distance Internet Education for Renewable Energy Technologies) course with 29 participants, INFORSE-Europe plans to run the course again in the fall of 2000. Applicants, in particular from NGOs in Central and Eastern Europe, are invited to apply. The course is intended to start in September. Participants of the course will receive material via e-mail and on a CD. They will be asked to do a number of exercises, and will receive a diploma certifying that they participated in the course.

Contact: INFORSE-Europe, e-mail: bedi@bratislava.telecom.sk.

ECO-Forum Strategy Workshop, September 14-16, Kiev

The European ECO-Forum, a coalition of about 200 ECOs (Environmental Citizens' Organisations) that follows the Environment for Europe process, will organise its strategy at its next meeting, to be held from September 14 to 16 in Kiev. On the agenda will be energy efficiency and nuclear energy, as well as common activities towards the Pan-European Environmental Ministers' Meeting in Kiev in 2002. ECO's that are not able to attend the meeting can join relevant email list(s). INFORSE-Europe co-ordinates the energy group of the ECO-forum.

More information: www.eco-forum.org, contact INFORSE-Europe (see back page), or the ECO-Forum secretariat in Moscow, e-mail: velias@mail.ru.

Windforce10 for Europe September 25 - 27, Kassel

INFORSE-Europe will present plans to cover at least 12% of Western Europe's electricity demand with windpower by 2020. The presentation will be made at the conference "Windpower for the 21st Century", September 25-27 in Kassel, Germany. The proposal will follow the Windforce10 proposal from November 1999, but will be more detailed regarding national distribution and costs. The paper will be available at the INFORSE-Europe website at the time of the conference: *www.orgve.dk/inforse-europe/* .
Information: INFORSE-Europe (see back page) and WIP-Renewable Energies, www.wip-munich-de.

Ukrainian Solar

Among the many European news items received by Sustainable Energy News is that this solar heating plant has just been installed by the Ukrainian company UkrHelioprom. The system is at a Ukrainian factory named "Oxygen", and it provides hot water for the staff of the factory from April till October. It is made with locally produced solar collectors. Contact, e-mail: ukrgelio@ikr.carrier.kiev.ua.

Actions Against Russian Nuclear Waste

In the last week of July and the first week of August, 60+ representatives of NGOs and scientific organisations organised the 'All-Russian Anti-nuclear Camp 2000', near the Mayak plutonium producing and reprocessing plant at Chelyabinsk in the Ural.

The 60+ participants protested against plans to store imported radioactive waste at Mayak, and against the lack of official recognition of radioactive contamination of areas in and around the plant. The participants carried out peaceful protests at a central square in Chelyabinsk. The protest was brutally stopped by the police. The participants also measured radioactivity levels as they travelled around the area. They found radioactive spots with more than 10 times the background level of radioactivity as far as 60 km from the plant.
More info: www.ecoline.ru/antinuclear/

More Nuclear Power in Russia?

At the end of May, MINATOM, the Russian ministry for nuclear energy, presented its new 50-year plan. It included plans for 23 new nuclear power plants to be built before 2020. The funding for the plants is not in place, but MINATOM also asked the Russian government to allow import of foreign nuclear waste, an activity that might give substantial funding to the Russian nuclear sector.
More info: www.ecoline.ru/antinuclear/

OOA Closed

The Danish Anti-nuclear organisation OOA, which was formed in 1974 as the first nationwide organisation in the Danish energy movement, decided to stop its activities by end of May, 2000. With no nuclear power being discussed in Denmark and with the Swedish Barsebäck nuclear power plant scheduled for closure, OOA's activists felt that the primary mission of the organisation had been fulfilled, and that it was time to close. The website of OOA will be maintained and the "smiling sun" will be available through the WISE office in Amsterdam.
Information: www.ooa.dk

EVENTS

September 4-7, 2000
RE&EE 2000 Kuala Lumpur, Malaysia
Business & Investment Forum Renewable Energy, Energy Efficiency, Asia & Pacific
Info: ECO Energy Sdn Bhd, 35 2nd Floor Jalan Ara SD 7/3a, Bandar Sri Damansara, 52200 Kuala Lumpur, Malaysia. Ph + 60 3635 8187, fax +60 3 635 8068, reee2000@eco-energy.com.my, *http://www.eco-energy.com.my/reee2000.*

September 8-10, 2000
ENVIRON 2000 A Powerful Millennium Festival, Leicester, UK
15,000 visitors expected. All powered by wind and sun on the event. Solar powered live music and spa vehicles, cinema, and market.
Info: Ruth Stockdale, ENVIRON, Parkfield, Western Park, Leicester LE3 6HX UK. Ph: +44 116 2220254, fax: +44 116 255 2343, e-mail: rstockdale@environ.org.uk, http:// www.environ.org.uk.

September 12-14, 2000.
Int'l Conference on Biomass Fuels in a Sustainable Energy Development, Cuba
Info: Antonio Valdés, Agency for Science and Technology, Calle 20 no. 4112 and / 41 and 47 Playa Ciudad Habana, Cuba. Fax +53 7 249460, e-mail; acyt@ceniai.inf.cu.

September 12-15, 2000
Solar Energy in Architecture and Urban Planning, Bonn, Germany
6th European EUROSOLAR Conference
Info: EUROSOLAR, Kaiser-Friedrich str. 11 Bonn, 53113 Germany. Ph: +49-228 362373, fax:+49 228-361279, inter_office@eurosolar.org, http://www.eusolar.org.

September 14-16, 2000
ECO-Forum Strategy Workshop, Kiev
Info: ECO-forum Secretariat, e-mail: velias@mail.ru, http://www.eco-forum.org
See article on page 16 in this issue

September 18, 2000
10th Anniversary of FEDERANE, Bruxelless
Seminar Renewable Energy: the right choice for Europe. Under the High Patronage of the European Parliament. Exhibition of projects.
Info: Rue du Beaou Site, 1000 Bruxelles Belgium. Ph: +32 2646 82 10, fax: +32 2646 8975, e-mail: fedarene@euronet.be, http://www.fedarene.org

September 18-25, Oct. 9-16, Nov. 13-20, 2000
China's Small Hydro Power Study Tour
Info: Hangzhou International Center on Small Hydro Power, P.O. Box 202, Nanshan Road 136, Hangzhou, 310002 China. Ph: +86-571-7070070, fax: +86-571-7023353, email: hic@mail.hz.zj.cn, http://www.digiserve. com/inshp

September 27-29, 2000
Energy Efficiency in Household Appliances and Lighting, Naples, Italy
2nd Int'l Conference and Exhibition
Info: Italian Association of Energy Economists (AIEE), Via Giorgio Vasari, 4 00196 Rome, Italy. Ph: +3906 3227.367, fax: +3906 3234.921, e-mail: aieeconference@mclink.it.

September 25-27, 2000
Wind Power for the 21st Century - Int'l Conference, Kassel, Germany
Info: German Wind Energy Promotion Association, FGW Ph:+49 4027809182, fax: +49 402780 9176, fgw-hh@t-online.de, www.wip-munich.de.
See article on page 16 in this issue

September 27-06 October, 2000
SOPAC Annual session, Tarawa, Kiribati
Reducing vulnerability of Pacific communities to climate variability; energy, coastal issues.
Info: SOPAC,Fiji, Fax: +64-4-4635186, e-mail: john.collen@vuw.ac.nz http://www.sopac.org.fj

October2-4, 2000
Commercial Opportunities in Renewable Energies, London, UK
Info: CWC Associates, Ph: +44 20 7704 9155, fax:+44 2077048440, www.globalenergyintel.com e-mail: juliane.jung@cwconferences.co.uk,

October 2-6, 2000
Adoption of Technology for Sustainable Project Development, Workshop, ARTEFACT, Glücksburg, Germany
For decision makers in north-south cooperation
Info: Werner Kiwitt, ARTEFACT, Gremsbergalle 35, 24960 Glücksburg, Germany. Ph: 4631-6116-0, fax: 4631-6116-28, e-mail:artefact@pin-net.de, http://www.artefact.de

October 9-11, 2000
Commercial Opportunities in the Generation of Power from Renewables, 2000 Summit, London, UK
Info: CWC Group, The Business Design Center, 52 Upper Street, London, NI 0QH, UK. Ph: +44 20 77046161, fax: +44 20 77048440, e-mail: bookings@thecwcgroup.com, http://www.thecwcgroup.com.

October 10 - 12, 2000
ENEF 2000, Banska Bystrica - Slovakia
Int'l Energy Efficiency Conf.,& Exhibition
Info: ASENEM - Association of Energy Managers, Magnetová 2, 831 04 Bratislava, Slovakia. Ph: +421 88 414 4011, fax: +421 88 414 4012, e-mail: epsbb@psgnetbb.sk, http:// www.meen.sk

October 16-27, 2000
COP- 4, UNCCD, Bonn, Germany
Info: United Nations' Convention to Combat Desertification, Conference of Parties fax:+49-228-815-2899, secretariat@unccd.de

October 17-19, 2000
Energy Efficiency Business Week, Conf. and Exhibition Prague, Czech Republic
Info: SEVEn, Slezska 7, 120 56 Prague 2, Czech Republic. Ph: +420-2-2425-2115, fax: +420-2-2424-7597, e-mail: seven@svn.cz, www.svn.cz.

October 18-20, 2000
7th COGEN Europe Conference, Brussels, Belgium
Info: European Association for the Promotion of Cogeneration, rue Gulledelle 98, 1200 Brussels, Belgium. Ph:+32 27728290, fax:+32 2 772 5044, e-mail: info@cogen.org, www.cogen.org

October 22-25, 2000
Int'l Conference Sustainable 2000 Building, Mastricht Netherlands
Building solar suburbs. Renewable Energy in a Sustainable City
Info: PO Box 1558, 6501 BN Nijmegen, Netherlands. Ph: +31 243234471, fax: +31 2436011 59.

25-27 October 2000
The Int' Conf. on Energy Sector in Transition: Asian Perspective for Sustainable Energy Development, Thailand
Info: SENT, 92/2 Soi Pitchayanan 22, Tiwanon Road, Muang, Nonthaburi Province 11000 Thailand. Ph: +66-2 968 8113 /- 968 8239, fax: +66-2 968 8113, e-mail: tonklagroup@usa.net.
See article on page 12 in this issue.

October 23-25, 2000
ALTERNER Conf. Renewables for Europe, take off campaign, Toulouse, France
Info: Energia TA, Piazza Savonarola 10, 50132, Florence, Italy. Ph: +39-055-5002174, fax: +39-055-573425, e-mail: eta.fi@etalflorence.it, or www.wip-munich.de.

October31 - November 2, 2000
Forum on Sustainable Energy in a Compatitive Market, UN-ECE Sust. Energy Committee Meeting, Geneva
Info: e-mail: slav.slavov@unece.org, http://www.unece.org

November 1-4, 2000
UIE 2000 Lisbon, Portugal
International Conference on Electricity for a Sustainable Urban Development
Info: FCT , University of Coimbra, Portugal, Polo 2 da UC, Pinhal de Marrocos 3030 Coimbra Portugal. Ph: +351 239 79 62 00, fax.: +351 239 79 62 47, amartins@dee.uc.pt, http://www.edp.pt/uie

November 13-24, 2000
COP-6, UNFCCC, The Hague, Holland
Info: United Nations' Framework Convention on Climate Change, Conference of Parties, fax: +49-228-815-1999, secretariat@unfccc.de

November 23-26, 2000
CERE 2000, Beijing, China
Int'l Environment & Renewable Energy Conf.
Info: China International Science Center, No. 1 Sandaojie, Jianguomenwai, Chaoyang District, Beijing 100022, P.R. China. Ph: +86-10-65157760, fax: +86-10-65158442, e-mail: cisc@midwest.com.cn , www.ciscexpo.orgcn.net

November 28- December 1, 2000
CIEE 2000, Shanghai, China
China Int'l Energy Exhibition and Conference
Info: Worldwide Exhibition Service Co., Rm. 2706, Nanzheng Building, 580 Nanjing Rd. (W), Shanghai 200041, P.R. China. Ph: +86-21-52340650, fax:+86-21-52340649, e-mail: weszhou@online.sh.cn

November 28 - December 1, 2000
From Fossils to Photons, Renewable Energy Transforming Business Brisbane, Australia
38th Annual Conference of the ANZSES.
Info: Australian and New Zealand Solar Energy Society, (ANZSES), solar2000@icms.com.au, http://www.solar2000.aust.com/

Contents

INFORSE Regional Co-ordinators

Africa, Eastern
BUN - Zimbabwe
Private Bag 7768, Causeway,
Harare, Zimbabwe.
Ph: +263-4-793395/6
Fax:+263-4-793313
E-mail: mmapako@internet.co.zw
bunzim@hotmail.com
att. Max Mapako, L. Katsvairo

Africa, Western
ENDA-Energie
54 rue Carnot, B.P. 3370, Dakar, Senegal.
Ph: +221-8-225 983 or 222 496
Fax: +221-8-217 595 or 235 157
E-mail: energy2@enda.sn
http://www.enda.sn/energie/
att. Youba Sokona, Masse Lo, Secou Sarr

Eastern Asia & Pacific
SENT
92/2 Soi Pitchayanan, 22 Tiwanon road,
Muang, Nonthaburi Province11000 Thailand.
Ph: +66 -2-9688113/ -9688239
Fax: +66 -2-9688113
E-mail: tonklagroup@usa.net
http://www.ata.or.th/sent
att. Decharut Sukkumnoed,
Suphakij Nuntavorakarn

Asia, South
INSEDA
3rd floor, St. Soldier Tower, Vikas Puri,
New Delhi 110018, India.
Ph: +91-11-551 0344 or 552 6521
Fax: +91-11-552 9646
E-mail: rayinsda@giasdl01.vsnl.net.in
att. Raymond Myles

Europe
OVE - Europe
Gl. Kirkevej 56, 8530 Hjortshøj, Denmark.
Ph: +45-86227000, Fax: +45-86227096
E-mail: ove@inforse.org
http://www.orgVE.dk/inforse-europe
att. Gunnar Boye Olesen

FAE
P.O. Box 35, 85007 Bratislava, Slovakia.
Ph/fax: +421-7-63 836 964
E-mail: bedi@bratislava.telecom.sk
http://www.seps.sk/zp/fond
att. Emil Bedi

Latin America/Brasil
LIMA
CP 68565 Rio de Janeiro, 21945-970 Brasil.
Ph: +55-21-5608995 Fax: +55-21- 2906626
E-mail: emilio@ppe.ufrj.br
http://www.lima.coppe.ufrj.br
att. Emilio Lebre La Rovere

Latin America/Argentina
REJIMA
Mario Bravo 1029 piso 4 depto.A,
1175 Buenos Aires, Argentina.
Ph/fax: +541-963-0722
E-mail: apedace@correo.uba.ar
marceloalvarez@ciudad.com.ar
att. Roque Pedace, Marcelo Alvarez

INFORSE Secretariat:
Blegdamsvej 4 B, 2. sal,
2200 Copenhagen N, Denmark.
Ph: +45 -35247700 , Fax: +45 -35247717
E-mail: inforse@inforse.org
http://www.inforse.org

Protest Against Designation of Nuclear as Sustainable Energy

The expert group that is preparing for the UN Commission for Sustainable Development's 9th Session (CSD9) has proposed to consider nuclear energy technologies for sustainable development, with due consideration of the means of producing nuclear energy, including technology transfer.

INFORSE and other NGOs are protesting against this proposal. In a petition to the CSD chairs and members, they state:

" We consider any focus on nuclear energy to be against both the spirit of Agenda 21 and the mandate of the UN CSD as well as contrary to the interests of developing countries....

... Therefore, we, the undersigned NGOs active in development, environmental and human rights issues urge you to preserve the integrity of the CSD process by ensuring that all non-sustainable energy technologies, particularly nuclear energy, are excluded from CSD9 .....".

Full text of the NGO statement: www.inforse.org
Minutes of the expert group: www.un.org/esa/sustdev/csd9/csd9_2001.htm