Special Edition no.1 / June 2004 ISBN 2-915700-01-X Published by 45°Nord SARL 6€

Converting the World to Renewable Energies

This publication was made possible with support from the Global Environment Facility (GEF) and the German Environmental Foundation (DBU)

Global Environment Facility

DBU

planets-voice documents n° 1/2004
special edition 'renewable energies'

Published by the company "45° Nord"
SARL Coopérative à capital variable
SIRET: 428886188 RCS Grenoble
Responsible publisher: Michael Schweres
Legal deposit: June 2004
ISSN: in progress
Commission paritaire: in progress
ISBN 2-915700-01-X Printed in France

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Download this publication (English, French, Spanish) at: www.planets-voice.org;
it is also available on cd-rom.
The French and English editions are printed on paper by Netprint – F 38326 Eybens Cedex

Price including tax: 10 € special edition and cd-rom; 6 € the special edition
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Why not?

The German government, which is organizing the Bonn conference, is placing a very optimistic bet. It's hoping to get a concrete and voluntary international action plan signed in 4 days for the development of renewable energies. An option which is being presented as a positive weapon to reduce gas emissions that cause the greenhouse effect as well as a way of fighting against poverty. This hope may seem excessive if we look back at the unfortunate outcome of the Kyoto Protocol … and yet, why not?

While the price of a barrel of oil lingers around $40… let us fall into step with the forecasters who announce a durable increase in the price and remind us – we always need reminding – that fossil energy resources are not infinite. Oil, gas, uranium, and other reserves … will they outlast the 21st century? But that's not really the right question. We are certain that the world's energy needs will increase by 60% from now until 2030, and already today, nearly two billion people still do not have access to an electric network. A turn to renewable energies is unavoidable, even if this means shaking up the existing system. Renewable energies only represent about 15% of our planet's energy consumption; some experts think that they could cover half of this consumption by 2050. So, why shouldn't we wager on the intelligence of politicians and economists?

Research needs to be expanded now. There are too many countries that haven't conducted operational analyses of their resources i.e. wind, geothermics, biomass, etc. Progress in the field of energy efficiency must be made, the transportation of electricity remains costly, and energy storage still causes serious problems… So, why shouldn't we call upon the creativity of scientists and politicians?

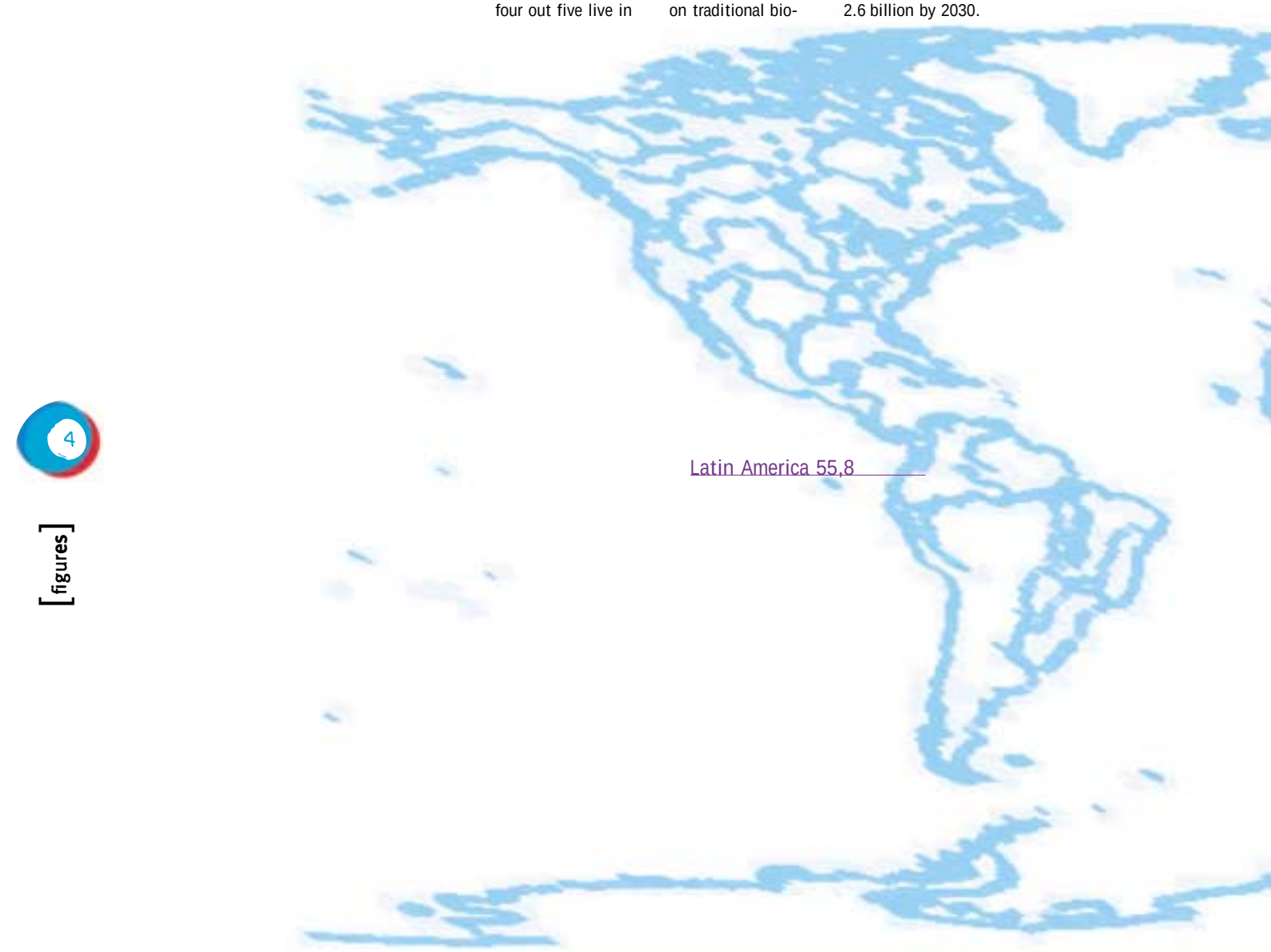
Initial investment, so that everyone can have access to energy, is indeed high, but not unattainable. So, why shouldn't we wager on the capacity of both private and public backers to provide durable investments? They are starting to learn a lesson from unfortunate past experience and are starting to take into account the expectations of the populations concerned.

On all continents, scientists, communities, NGOs, local officials, etc. have spoken in favor of and committed themselves to renewable energies for years now. They are conscious of the need to preserve the environment and their technical, financial and social ingenuity has traced paths that others could follow. This special edition, written by journalists from the North and the South, presents a selection of examples and viewpoints which evoke most of the questions that need to be quickly answered. The editorial staff at Planets-voice therefore wanted to provide these actors with the possibility of entering into the international debate that has been opened in Bonn and which is not likely to come to a close any time soon.

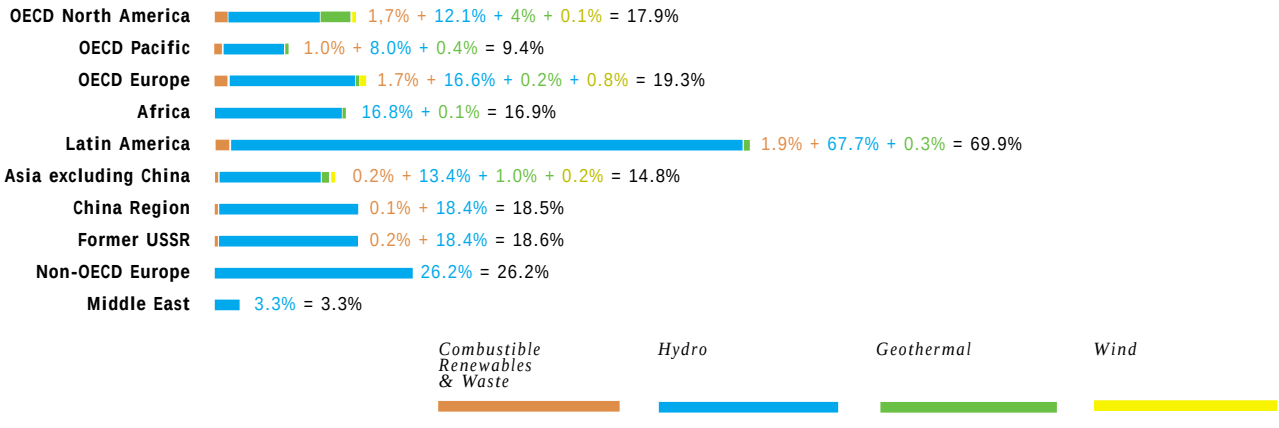
Louisette Gouverne and *Michael Schweres*

Energy & Poverty

Some 1.64 billion people - 27% of the world's population - have no access to electricity in 2000. More than 99% of people without electricity live in developing countries, and four out five live in rural areas. In the absence of vigorous new policies 1.4 billion people will still lack electricity in 2030.
Experts say that lack of electricity and heavy reliance on traditional biomass are hallmarks of poverty in developing countries. Some 2.4 billion people rely on traditional biomass for cooking and heating. That number will increase to 2.6 billion by 2030.

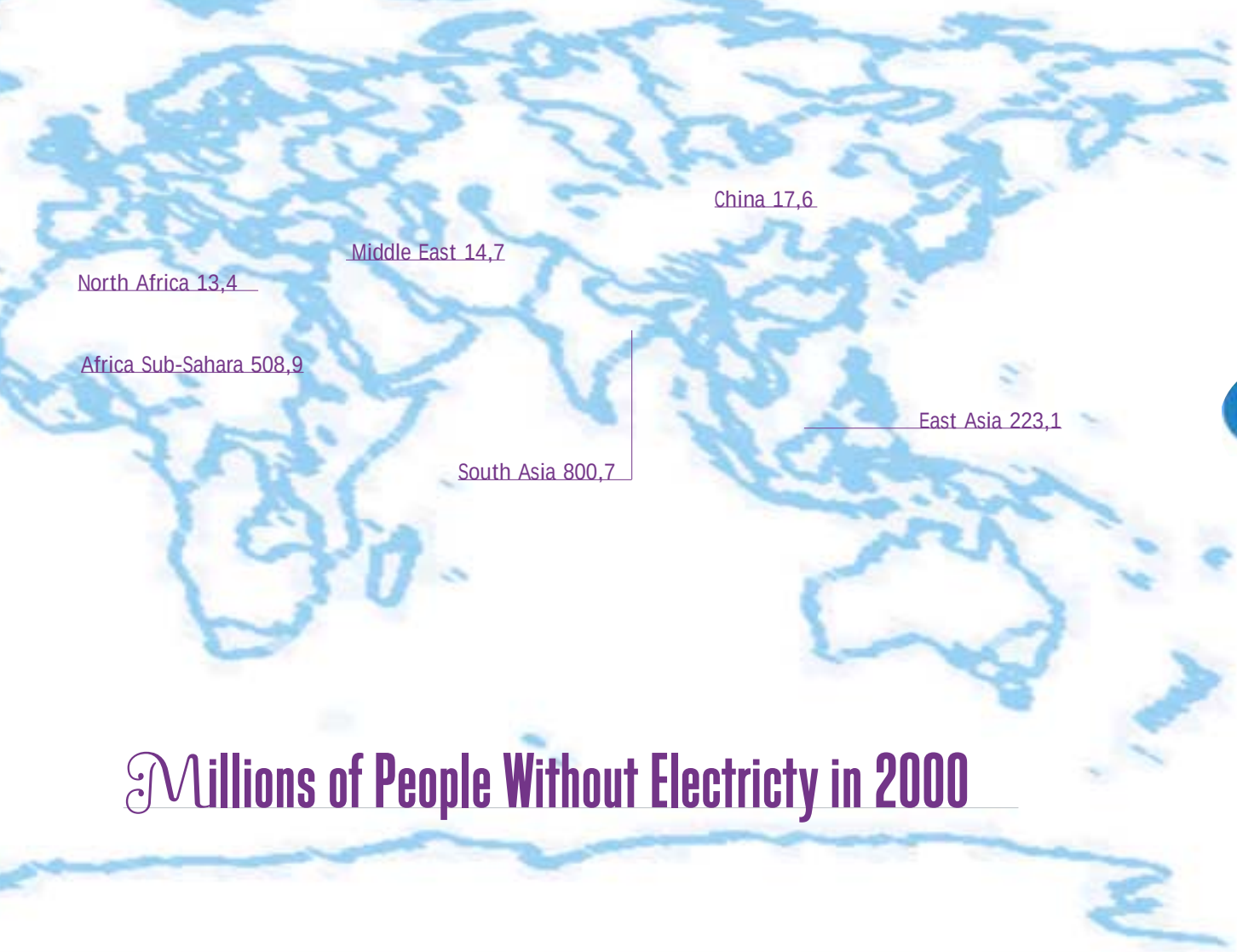


Electricity Output of Each Renewable Energy Source in 2001 in %



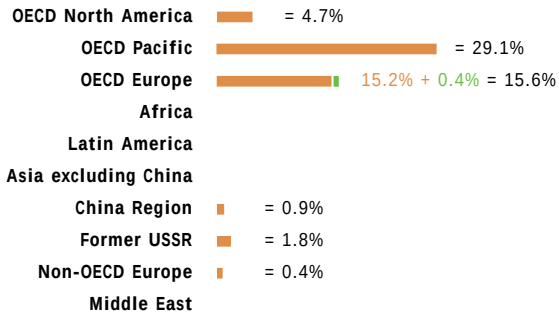
A Very Small Part of Renewable Energies

On all the continents, and excluding hydraulic energy, renewable energies still only represent a very small part of the production of electricity and heat; a virtually non-existing production, hardly visible on global regional statistics. In 2001, the production of electricity from renewable sources - excluding hydroelectricity - represented 257,213 Gwh for a total world production of 15,476 million Gwh (half of which was in North America and Europe, OCDE countries). As for the production of heat from renewable fuels, geothermic or solar energy, it only reached 525,357 TJ for a total world production of 12,027 million TJ (of which 60% was in the former USSR). Most renewable energies use indigenous resources enhancing a country's independence from external supplies of primary fuels. Renewable energies could be a key element in providing electricity to the rural poor. Their use in place of fossil fuels can substantially reduce greenhouse gases and other pollutants.

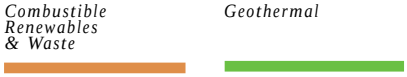


Millions of People Without Electricity in 2000

Heat Output in Each Renewable Energy Source in 2001 in %



source: *IEA Analysis - World Energy Outlook*



[Oil prices on the rise]

A Push for Growth

"The time of a finite world has come", concludes Philippe Chalmin*, economics professor at the Université Paris-Dauphine (France), when commenting on the rise of raw material prices. According to him, the new oil crisis should favor growth models in the long run.

Does the current price hike in raw materials and especially in fossil energies resemble the preceding oil crises and will it last?

Yes, we can still talk in terms of oil crises like in the 70's by comparing the rise in the price of the barrel. However, the context has changed. Today's rise is taking place in a market that can't be manipulated anymore. Prices are determined in an unstable context on derivative markets. In order to explain this oil price, which is around $40 in May 2004, I'd like to "break it up" into several parts. The first part represents the market's supply for the short and medium term where the offer and demand equation comes into play; at this stage, we can note that there is enough oil, so prices will settle somewhere between $20 and $25.

However, since two thirds of this oil comes from regions that present geo-strategic risks, a risk premium is integrated into this price i.e. the time needed to see when no more oil will come out of the Persian Golf. This risk is evaluated at various levels by the market. At present, this price could be at $10. Thus, the price of Brent is close to $35. The third phenomenon is the energy situation in the United States. In a context consisting of underinvestment and exhaustion of natural resources, in particular of gas, the bench mark for crude oil on the American market is quoted at $40/barrel on the main futures market for oil. I can also add a fourth factor to how this oil price is determined. If we look at oil quotes for the year 2010, we can see that amazingly it is still at $30. I explain this new price by the Chinese factor. Indeed, China's imports are going to rise dramatically and will soon influence this market.

Who's going to benefit from this price hike?

The producing countries who will see their income increase, but will they know how to use it? In the Golf countries, the rise in oil prices hides the absence of an economic strategy, and allows for Putin's Russia to show a high rate of growth… Moreover, this increase more or less affects developed consumer countries depending on their energy choices. We are less surprised by this new oil crisis than by the preceding ones. I also think that humanity will profit from this on the whole. Indeed, it's not a good thing for non-renewable raw materials to be inexpensive, because this incites us to waste them. We don't make an effort to find substitutions, or to make savings, thus leads us to indebting our grandchildren. Careful, I didn't say that we will be lacking these raw materials. The mistake that was made in the 1972 report "The limits to growth", which said that we wouldn't make it through the end of the 20th century, shouldn't be committed again. In any case, I do think that by the end of the 21st century, we will be nearing the end of our oil resources. By then, we should have already turned from non-renewable to renewable energies.

* Philippe Chalmin is in charge of the Cyclope report, which deals with raw materials markets (Cyclope 2004 - Economica).

According to you, and unlike with the preceding oil crises, will this price explosion trigger favorable investment in renewable energies?

Renewable energies, in my opinion, will take the agricultural path. We can't imagine mankind at the end of this century without taking into account the technical progress represented by biotechnologies. And if we opt for bio-fuels, the energy efficiency assessments of different plants need to be seriously studied.

Moments like this, when raw materials are expensive, are necessary. The 1974 crisis instigated many changes; for example, in France, it lead to the establishment of a nuclear program, and at a more general level, it pushed car manufacturers to produce vehicles that use less gas. The difference, this time, is that we have a better idea of what the planet's resources are. We will certainly first look for new oil and we will try to improve the productivity of this production. However, I say that the time of a finite world has come, but I'm not saying stop growth. There are other growth models. The effect of high prices on the spread of progress must not be underestimated. The best incentive for humanity is to have periods that remind it that a certain product is expensive and thus, that it shouldn't be wasted.

Interview conducted by the editorial staff of planets-voice

The Energy Conversion Challenge

The already high and steadily growing use of conventional energies is less and less compatible with the notion of sustainable development, which promotes durable, safe and environmentally friendly sources of energy.

In order to protect the climate, the use of fossil fuels must be reduced. Along with increased energy conservation and a more rational approach to energy consumption, a strong rise in the use of renewable energies is thus inevitable.

A range of initiatives has led to the development of renewable energies. Even though the exclusive use of these energies can hardly be foreseen, many countries could still manage to convert part of their resources, i.e. 50% or more, within this century. Unfortunately, we are still far from this figure. The use of renewable energies to date (in Germany roughly 8% of electricity needs are covered by renewable energies) is negligible in comparison to their technical potential and is, above all, concentrated on profitable water power sources and conventional firewood. Newer systems, e.g. the direct use of solar energy or wind power, are just starting to become economically meaningful at the energy level. However, as the use of renewable energies spreads, in-the-field developments will lead to reduced costs and technical advances, which will in turn considerably improve their economic viability, especially if conventional energy prices increase at the same time.

Economically speaking, cost can be a factor in determining the choice of different renewable systems. The most feasible techniques should thus, as a priority, be implemented in the most feasible locations. For the long term, a wide range of energy prospects and possibilities which can reduce costs should be taken into account. However, we must be careful to not only further technological options that are relatively cheap today, but also develop those which will open significant new development prospects for the future.

Increasing investment in the development of renewable energies is opening up new economic sectors and new jobs. This growth can – depending on energy substitutions and the initial additional expenses – in part counter economically failing activities in other fields. In brief, a greater fundamental structural change in production, employment and trade will ensue, which also corresponds to the demands of sustainable development from an economic point of view. The use of renewable energies can and must be promoted by various political policies. In addition to the state of technology and the range of applications, research and development, technology transfer, price regulations, subsidies and flexible international mechanisms should also be highlighted. Moreover, it is important to diminish existing institutional and market distorting barriers in order to prevent possible economic conflicts and to guarantee strong social acceptance of renewable energies. The transition to renewable energies is a long and difficult road. Clear political strategies such as long-ranging, well-oriented and consistent incentives are the best way to avoid set-backs in the development of renewable energies. Considered from an economic point of view, the break from a conventional fossil and atomic energy economy is not only problem free, but necessary in the long run.

Dr. Jochen Dieckmann, Economist and DIW researcher (Deutsches Institut fuer Wirtschaftsforschung – German Institute for Economic Research)

1981: Dr. rer. pol. (Economics) at the University of Muenster
Since 1983: scientific member of the DIW (Deutsches Institut fuer Wirtschaftsforschung – German Institute for Economic Research)
1988/89 Akademie der Wissenschaften zu Berlin (Academy of Sciences, Berlin)

photo: *A. Maslennikov*

India's Wonder Tree

Biodiesel in India from the seeds of the indigenous *Pongamia pinnata* tree, found in tropical areas worldwide, has now "moved from a position of disbelief to one of credence as an inexpensive and reliable alternative", says its main promoter, an idealistic, soft-spoken professor from the internationally respected Indian Institute of Science (IISc), Bangalore.

From January 2005, India will be compulsorily adding five percent biodiesel to all diesel used, potentially cutting 2m tonnes or US1bn from its oil import consumption of 40m tonnes.

Professor Udipi Shrinivasa's thrust however, has been on providing economic income and electricity to India's 700 million rural farmers, largely left out of the technological progress that urban cities like Bangalore are laying claims to. Villagers have been using pongamia oil for lighting lamps, making lubricants and soaps for centuries and are hence familiar with both tree and crushing-processes.

"The infrastructure for growing the tree and locally marketing the seed is already in place. It is nothing new", Shrinivasa points out.

IISc's 'SUTRA' (sustainable transformation of rural areas) programme began demonstrating in 1994 that straight vegetable oils (SVO), in this case of pongamia, are a cheap, village-made alternative that can power a simple 7.5KVA genset to either pump water for drinking and simple irrigation or power two light bulbs per house or even run home-industries like grain and food-processing that benefit women's self-help groups immensely.

SUTRA has also demonstrated an easy, low-cost option to the villager to grow this hardy tree. Its roots extract moisture from deep-penetration, thus surviving drought, its foliage and residual crushed seeds provide excellent bio-fertiliser besides offering a stable income from an emerging seed-market already fetching the same rates as local cereals.

Pongamia plantations are also indirectly helping soil cover, retaining water-tables, mitigating greenhouse gases and combating climate change.

The SUTRA initiative has caught on with remarkable speed in numerous villages in the southern States of Karnataka, Andhra Pradesh, Tamilnadu, northern areas in Rajasthan and elsewhere. Tribal villages are especially happy with it.

The challenge for India is in its widescale propagation, needing 18m hectares of plantations to produce 200m tonnes of oil annually that would feed five times the country's current diesel consumption. Owning the world's largest amount of arable lands (180m ha), most of which is used only during three months of monsoons, proper land-use provides the best method of implementation.

Fortunately in this too, there is a positive story emerging. The federal government of Karnataka for instance is providing 10,000 saplings to each 'gram panchayat' or administrative village-cluster besides giving fifty kilograms of rice each as incentive to farmers growing Pongamia.

The future for various oilseeds is immense. Methane from seed-starch,

photo: *A.R. Nayeem*

photo: *A.R. Nayeem*

photo: *A.R. Nayeem*

Gangaiah, who operates this oil-extraction unit in Andhra Pradesh is employed by a 'no-nonsense' village women's self-help group

power-generation for engines designed for residual petroleum fuels like furnace oil, injection-molded components from proteins separated from de-oiled cakes are currently under research.

Industry is also taking note. Daimler Chrysler company's Mercedes-Benz 'C' Class automobile in India is currently doing a cross-country 'test –run' on biodiesel. The company has a public-private partnership to produce biodiesel from the indigenous Jatropha tree in India.

"Renewable Energy is now poised to shift into renewable tryglycerides", feels Shrinivasa.

Keya Acharya
is a Bangalore based freelance Journalist

The hardy *Pongamia* in the Rajasthan deserts, western India.

Taiwan Promotes Renewable Energy

Beginning 2004, Taiwan government pledges 16.8 billion Taiwan new dollars (U.S.$491 million) over the next four years to promote industries related to energy conservation and renewable energy. The pledge was given to reach a goal- to make renewable sources share 10% of Taiwan's installed capacity of power supply in 2010.

Premier Yu Shyi-kun made the announcement in late July, 2003. According to the Cabinet (Executive Yuan), the investment aims to establish related regulations, promote market demands by offering incentives, strengthen R&D on clean energy, promote green architecture and sustainable living, and review the institutional structure of policy-making bodies involving energy use.

A related long-range scheme is to develop about 6500 megawatts of energy from renewable sources by 2020. If the goal is achieved, Taiwan's installed capacity of power supply from renewable sources will be boosted to about 12% from current 4.1%.

According to Taiwan's Energy Commission, when 12% of power generation capacity comes from renewable energy, it means roughly 5% of the total energy supply in Taiwan is from renewable sources. Compared with a global proposal to ensure that renewable energy accounts for up to 15% of the world's energy supply, brought up at the United Nations World Summit on Sustainable Development (WSSD) in Johannesburg, South Africa, in 2002, the 5% goal for Taiwan falls far behind. Taiwan relies mainly on thermal power generation. In 2001, low-cost fuel, such as that derived from coal, contributed to 37.8% of the country's gross power generation. Meanwhile, oil and gas accounted for 11.2% and 10.2%, respectively.

Taiwan is the first country in Asia to announce a plan to turn the country into a "Nuclear-Free Homeland". In 2001, the power generation capacity of domestic nuclear power plants accounted for 14.5% of Taiwan's total power-generation capacity. The government must make available alternative power generation methods that can be used to fill in the void after existing three nuclear power plants and the fourth one under construction are phased out.

photo: *Yu-Tzu Chiu*

Yu-Tzu Chiu is planets-voice correspondent and Environmental Reporter of the Taiwan Daily Taipei Times

A newly built public park along a beach in southern Taiwan, wind turbines were established to take advantage of strong sea breezes. Facilities of lighting at the park at night will be powered by wind energy.

[Beijing will host Olympics Games in 2008]

Green Olympics Initiative in Beijing

John Spears is an expert in renewable energy systems and sustainable design. He is a Certified Energy Manager (CEM) and was awarded the Environmental Professional of the Year in 1995. He has been working in China since 1998 developing sustainable communities and passive solar health care clinics. He currently is leading the US effort to assist Beijing in "Greening" the Olympics in 2008.

To accomplish the goal of a "Green Olympics," Beijing is committed to a zero net emissions games, where Beijing will minimize emissions of air pollution associated with hosting the Olympics. By achieving this goal, Beijing plans to strengthen public awareness of environmental protection and promote the development and application of new technologies, and improve environmental quality of Beijing.

John Spears, President and CEO of International Center for Sustainable Development (ICSD), is helping Beijing to achieve this ambitions target. He is currently leading the US effort to assist Beijing in "Greening" the Olympics in 2008. ICSD launched Beijing 2008 Green Olympics Initiative in 2002. Renewable energy is an important component in this project.

As an internationally recognized expert in renewable energy systems, Spears plans to show case the renewable energy concepts, such as fuel cell vehicles and station powered by wind or solar energies, in Beijing Olympics Games. He has been working in China developing passive solar health care clinics since 1998.

In July 2003, ICSD organized several video conferences with the Chinese counterparts on further details about the collaboration on Beijing 2008 Olympics.

[Asia]

Solar Energy Transforms Lives of India's Tribal

47 years old Ulra Ram had never thought he would ever see a television.

He had reasons to think that. Forests and hills surround the Sendra village where he lives. Communication for all its five hundred residents of Muria tribe is a distant dream forgets about electricity.

"Just three years ago people were not coming out of homes here after sun set " but now things are different, said cheerful Ram. Even children now play safe on street in the evening" he said.

photo: *Jatindra Dash*

Solar light in Sendra village

Thanks to the solar project launched by Central Electronics Limited (CEL) a federal government undertaking, the village roads and homes are lit after sunset.

With hundreds of neighbors, Ram, his wife and three young children come to the village common area to watch the community television.

Sendra is not alone; the project funded by the Ministry of Non-Conventional Energy Sources and the Ministry of Tribal Affairs in 2001 has transformed the lives in at least 90 tribal populated inaccessible villages in Dantewada district of central India's Chhatishgarh state.

Located at the distance of about 700 km from Raipur, the state capital, once in dark Sendra is now flooded with light having 113 two point solar home lighting systems, 26 four point solar home lighting systems, and six street lighting systems.

"Initially we thought officials want to destroy our culture. Now we realized that we should have benefited from this before, 24 years old Basam Vinod said.

Vinod lives in Edapalli another electrified village located at about 12 kilometers from Sendra. It has 300 residents all belong to Muria tribe. "Life style of these villages have changed" district collector KR Pisda said.

We provided training to selected local tribal youths so that they can repair the systems in case of fault, Chief managing director of CEL B.A.Mylar Rao said. "Although they are illiterate they are doing that even if experts are placed in near by areas".

The project was completed in 2002. Under it 2,098 solar lanterns, 2069 solar home systems of two light points each, 412 solar home systems of four light points each, 116 solar community TV systems and over a thousand solar street lighting systems have been installed in the regions.

India's 80,000 villages have no electricity. 18,000 of them are in remote and far flung areas. Government has decided to lit all of them with solar energy, India's Tribal Affairs Minister Jual Oram said.

Jatindra Dash works as correspondent to the New Delhi based Indo-Asian News Service (IANS) at Bhubaneswar, Orissain, India

Experts from both American and Chinese energy industry and government agencies attended these meetings, and discussed the opportunity and obstacles to use renewable-based hydrogen vehicles and other related issues in Beijing.

Spears is also devoting to developing US-China Hydrogen Coalition, involving China in the partnership for advancing the transition to hydrogen, and developing a hydrogen technical roadmap for China.

Spears already proposed the following projects to Chinese side:

Use small sport utility vehicle-sized fuel cell vehicles operating on hydrogen for marathon and long bicycle road races.

Use fuel cell buses as an alternative to diesel or natural gas fueled conventional buses to transport athletes to and from events.

Establish a renewable hydrogen dispensing station. Wind or solar energy will be used to power an electrolyzer to make hydrogen for a dispensing station. The hydrogen will be used to fuel the fuel cell SUVs and buses.

Spears believes that with high visibility, these buses would add to public awareness and education on clean transportation technologies. There are more than 1 million vehicles in Beijing, which is one of the main sources causing air pollution.

Other related project include: establish a stand alone remote relay or satellite uplink station where solar or wind resource are used to create electricity powering an electrolyzer to make hydrogen. The hydrogen would be stored and used to run a fuel cell that would provide power to the station. This concept can showcase the use of renewable-based hydrogen in a remote location that may not have a grid connection; establish fuel cell power plant for stationary power.

Spears said Chinese side is interested in these demonstration projects. Spears believes if these proposed projects are adopted in 2008 Olympics Games, the concepts of renewable energies application will be gradually accepted in China, and as the scale of application increases, renewable energies will eventually become affordable in China in future.

Sun Yu
was environmental reporter in China working for English/Chinese editions of China Environment News

Solar Fencing: Resolving Conflicts between Farmers and Elephants

For many Zambian small-scale farmers, the sun is often seen as a formidable foe, withering crops and dashing hopes. But for some peasant farmers in Zambia, harnessed sunlight is proving to be a powerful ally and source of security for their crops.

photo: *Singy Hanyona*

Singy Hanyona is a Zambian-based environmental journalist and Editor of Green Times, the first and only environmental Newspaper in Zambia.

The Zambian branch of the US-based Wildlife Conservation Society of Newyork (WCS-Zambia) has embarked on a solar installation training programme for small-scale farmers. The farmers are being trained on how to erect solar fences, how to install a battery, energizers, and solar panels (photovoltaic). The farmers are seeing renewable energy as an important source of power, and as an alternative to electric power lines, diesel fuel and fuel wood. The programme, being implemented around four national parks in the vast Luangwa in the eastern province, is targeting more than 12,000 small-scale farmers' households.

The programme is being implemented in conjunction with the African College for Community-Based Natural Resources Management (CBNRM). Already, in different units in the valley, the College has installed 11 solar fences with 15 garden farmers groups involved in vegetable production.

Currently, the programme is assisting over 450 households with fresh vegetables and extra income. WCS-Zambia Technical director Gilson Kaweche says the programme is aimed at 'transforming poachers of wildlife, into farmers'. Poaching (the illegal killing of wildlife) is one of the major causes of wildlife depletion in Zambia.

Kaweche told us the US$ 280,000 programme, which combines livelihoods food security and wildlife conservation, is using solar power fencing for the transformed farmers. Kaweche says with support from the World Food Programme (WPF), over 90 farmers have now voluntarily surrendered fire arms and over 12,000 snares, through the programme. "They are now practicing more rewarding ways to earn income than poaching, contributing to an annual saving of over 2,500 wild animals annually from the fate of poaching", he said.

The farmers have been organized into 800 producer groups and linked to a regional trading centre based on their commitment to adopt solar fencing around their vegetable gardens.

The following are the benefits of solar fencing for the farmers:

- It promotes food security by allowing dry season gardening.
- Reduces conflicts and threats from living with wildlife.
- Protects granaries from being devastated by wild animals, especially elephants.
- Supports alternative income from vegetable and fruit sales.

It is now 10 years after the Zambian government adopted the first National Energy Policy (NEP) -1994. Zambia has now begun the process of reviewing the Policy, with emphasis on the use of renewable energy technologies (RETs). Zambia currently has about 2,100 photovoltaic solar systems with 88 estimated installed capacity.

The wide use of solar technologies in Zambia has been necessitated by the government's waiving of duty on solar panel imports, so that the end users benefit. Government issued Statutory Instrument No. 114 that led to removal of duty and sales tax on solar systems.

[Still needing exploration and development]

Potential Energies in Uganda

The Global Environment Facility, the World Bank and the Government of Uganda have earmarked US$ 439 million US$ to develop renewable energy to supply power to poor households not included on the national grid. The money is expected to widen the use of photovoltaic energy in Uganda as a measure to start reduction of dependence on wood fuel, which still contributes 90 per cent of the country's energy consumption.

But pilot studies in the last two years show that while households are receptive to photovoltaic energy, a financing mechanism will need to be put in place to make it affordable to the poorer households. Renewable energy; hydroelectricity, photovoltaic energy, biomass generation using molasses from a sugar factory and geothermal power development, are receiving increasing attention from the World Bank, the African Development Bank and the GEF.

According to Sheila Aggarwal-Khan, the Programme Officer for Medium-Sized Projects of GEF, the GEF council has already approved funding for the Uganda photovoltaic pilot project for rural electrification. Of the US$ 439 million to be invested over a number of years, GEF has promised US$30 million, which money will go towards developing mini-grid generation and distribution to serve isolated areas, with the possibility of subsequent upscaling. Kakira Sugar Works, which benefited from the money, is set to generate 16 Mega Watts, of which it will off load 9 Mega Watts into the national grid.

Photovoltaic or solar power is targeted at households and institutions; health clinics, schools, water pumping and as a support for a wider use of Information and Communication Technologies around the country. Solar photovoltaic (PV) technology has been shown to be highly applicable in the country. With a solar radiation of 4 to 5 KWh/m, Uganda's levels of sunshine are favourable for all solar technology application.

The applications in operation include water heating, cooling and crop drying.

Government has scrapped off taxes on solar equipment prompting a number of investments in the area, although prices are still beyond the incomes of the majority of the population. A Chinese solar equipment manufacturer, Suntop Way International is exploring possibilities of building a factory in Uganda.

Wind energy has been mooted as an area to invest in; the average wind speeds are 3 meters per second and 6 meters per second in flatter areas.

The African Rift Geothermal Development Facility (ARGeo), supported by GEF is a major energy source, which is projected to generate 450 Mega Watts for Uganda. Preliminary drilling in the low-lying Western Rift Valley is slated for late 2004. With temperatures of up to 200 degrees, these underground heat springs would generate more power than Uganda currently produces from its two dams on the Nile with a combined capacity of about 300 Mega Watts. Experts say that geothermal energy would be an important boost to the agro-processing industry where it would replace wood in drying fish, tea, food crops, curing tobacco and processing sugar.

Despite the potential, the new renewable sources of energy contribute to only 1 per cent of energy consumed in the country. With the exception of biogas and solar little is known about what it would take to harness these sources of energy. With only 300 Mega Watts of electricity, the majority of the 36 million Ugandans rely on cutting and burning trees – an activity contributing only $20 million into the rural economy, but decimating the country's forest cover.

Mr. Frank Muramuzi, chairman of the National Association of Professional Environmentalists says that to remove the poor from wood, PV equipment needed to be more affordable. "The equipment cost $500, but there are families which cannot afford to pay that, so government needs to put in place a credit system which makes it less burdensome for them to pay."

David Kaiza is working as Journalist for The Eastafrican in Kampala, Uganda

Zambia Goes "Nuts" for Local Fuel

The supply of liquid fuels in the Zambezi region of northwestern Zambia is often erratic and expensive, but the oily Jatropha nut can provide a viable and locally produced alternative fuel for use in lamps and diesel engines.

The thorny Jatropha plant is found in abundance in the region and used as hedging and a natural division between properties. The nuts from the plant, however, are mostly wasted. Entrepreneur Henry Ngimbu, who saw the potential to displace imported fuels with locally produced Jatropha oil. He started Rural Challenge International (RCI) in 2001 and began producing Jatropha oil with its by-product of "pressed cake" fertilizer using a manual oil can then lead to rural electrification and help families escape poverty," says Program Manager, Gina Rodolico.

There is also potential to replicate the investment with other farmers and create sufficient scale to negotiate higher prices for rural products. With training to rotate crops and use organic fertilizers, the project will also advance the practice of sustainable land management. With a $12,000 loan for equipment and working capital, RCI is expanding the company's current micro scale Jatropha oil production activities into a larger commercial venture.

The investment in local manufacturing has the potential to provide not only a cheaper and more reliable fuel supply, but also to create jobs and expand local economical activity. USAID provided US $ 550 000 Jatropha plant, with seed to the project for renewable energy enterprise development.

Citigroup Foundation has also committed US$ 50,000 in matching Enterprise Finance for the project.

source: *Humana Solar Project.*

Singy Hanyona is a Zambian-based environmental journalist and Editor of Green Times, the first and only environmental Newspaper in Zambia

Malawi's Economy Axed by Charcoal Production

Deforestation in Malawi is taking its toll on the economy. The country is said to be losing MK36 billion (US$338 million) a year as a result of power cuts, which is blamed on environmental degradation.

The Minister of Energy and Mining Hetherwick Ntaba said on April 27th, this year that because of power interruptions [which is still being experienced throughout Malawi], the country is losing MK100 million a day.

According to environmental experts, the problem of power cuts are caused by silt, which makes it impossible for the turbines at the main power stations located in Malawi's largest river, the Shire River, to generate power. It is because of deforestation along the Shire River and other rivers that run into the Shire, debris are carried away when the rivers are flooded and these cause problems at Nkula Hydro-electric power stations and other stations in the Shire River. Hydro-electric power is Malawi's largest source of the power system, with a total capacity of 355.3 MW.

Malawi is the leader in the Southern Africa Development Community (SADC) region in terms of deforestation with a rate of 2.8 percent per year, which is about 125,043 ha per year. John Ngalande, Deputy Director of Forestry, said the demand for charcoal in towns and cities was the main cause of deforestation in the country; « People are of the opinion that by using charcoal and fire wood, they will save a lot of money».

According to him only 4 percent of the 12 million Malawians use electricity and 93 percent use biomass as a source of energy. « One way of addressing the problem, » said Ngalande, « is to develop the economy of the communities by way of small businesses ».

The other way of confronting the problem is to enforce the existing laws. However, since the reason for encroaching upon the forests is poverty of the people, no legal action can be realistically taken. The UNDP estimates that 65 percent of the Malawi population live below the poverty line and the majority live on less than US$1 a day.

Raphael Mweninguwe is environmental reporter in Malawi

An Emphasis on Renewables

Kenya remains an energy intensive country with a mixed consumption and production profile. Geothermal and solar projects are.....

There is one item that always reads zero each time discussions on energy issues come up in Kenya-Nuclear power. And so there are no demonstrations in Nairobi about some perceived enthusiastic power producer seeking to install a Pebble Bed Modular Reactor (PBMR) or such other plant. But Kenya remains an energy intensive country with a mixed consumption and production profile. The energy sector is dominated by biomass fuel with charcoal and wood-fuel accounting for more than 68 per cent of the national consumption. Petroleum takes 22 per cent while the remaining 9 per cent of energy needs are met by electric power.

While countries like the UK are setting targets of 2010 to raise their consumption of renewable energy to 10 per cent, Kenya has already attained that threshold through its Geothermal power projects. Of the 1235MW of intalled capacity in the country 121MW comes from the Geothermal plants strategically located along the Rift Valley. "The capacity is even greater', says the Director of African Energy Policy Research Network, AFREPREN, Dr Stephen Karekezi, "the country has the potential of producing 2000 MW, twice the current total installed capacity."

Even the country's main power producer the Kenya Electricity Generating Company (KENGEN) is now shifting focus on Geothermal. The Company's managing director Edward Njoroge says," We have seen the need to change strategy and lessen our dependence on hydro power." The target is 350MW,or thirty per cent of installed capacity by 2015 and for that the government has set aside an initial amount of $13M.

Other than Climate Change concerns the worries over large hydro-projects in the country stem from the perennial droughts that often lead to power outages. The country is however not just a runaway success, solar power which could provide another viable source of energy remains way too expensive for the ordinary Kenyans half of whom live on less than a dollar a day. Currently a PV solar panel costs about $250, the equivalent of the country's per capita income. Karekezi says, "We should not emphasise solar energy at this time, it can only help richer farmers in rural areas."

Kenya's equatorial position however puts in a good stead to tap the solar resource. The PV solar sector currently sells over 20,000 modules a year without any direct government support or involvement. The chequered success of this market has been followed with interest outside the country, and is one reason why Kenya has been selected, alongside others, to participate in the World Bank PV Market Transformation Initative (PVMTI).

Wind energy in the country remains almost untapped. Kenya's land mass is two-thirds arid and semi-arid with fierce winds blowing and forth but there is no accurate data as yet on the exact potential and risks if any involved in its production.

A recently launched government energy policy give a significant emphasis on renewables but the implementation will have to contend with the economic realities and the domestic political realities.

Joe Ageyo is environmental journalist working for Kenya-TV

Converting Pig's Waste into Energy

A tripartite waste recycling plant that extracts biomass energy from the effluent from a pig farm on the outskirts of Lagos has been reconverted into venture by a non-governmental organization.

Although the idea is not entirely new , as far as recycling technology is concerned, the biogas plant is developed by the Ifelodun/ Ojokoro Co-operative Agricultural Multi-purpose Society Piggery at Oko-Oba in Agege area, Lagos, Western Nigeria and is being promoted by Friends of the Environment (FOTE). Other partners in the scheme are the Energy Commission of Nigeria (ECN) and the Federal Institute of Industrial Research, Oshodi (FIIRO). The plant encountered a few problems after its test run began, but the group said that everything seems to be getting better now.

The Oko-Oba pig farm has an animal population of about 3,000 pigs and is run by 65 farmers. Shrimps head, spent grains from factories and abattoir waste such as blood are cooked to make food for the pigs.The initiative involves the disintegration of the pig droppings, collected in an enclosure, to which are added bacteria. The disintegration process occurs as the bacteria digest the biomass (the dung itself), giving off gas and leaving behind spent, odourless manure.

The plant is basically a 18 feet deep hole or digester, where the chemical reaction takes place. The evolved gas rises in order to be trapped in a gas holder, made of fibre-glass, which can be controlled to avoid gas escaping. There are two overflows or openings. While the first one on a lower level is for introducing the fresh waste, the second allows out the spent one. ECN and FOTE provided the funds for the project while FIIRO gave technical support. Mrs. Joanna Maduka, the FOTE chairperson said: "We need other agencies to support us. We want to make it a commercial project. Use it as a training ground for future programs. We want to propagate it."

Chinedu Uwaegbulam is staff reporter of the Guardian in Nigeria

Zambia Taps on Small-Hydro Potential

The U.S. Trade and Development Agency (TDA), has provided US $ 280,000 to the Zambia Electricity Supply Corporation (ZESCO) for the construction of an 80 Mega Watts small-hydro power plant . This is in a bid to liberalise the energy sector; and allow for operation of independent electrification agencies.The funds are the completion of feasibility study for the production of electricity at the Itezhi-tezhi Dam in the Southern Province, using small-hydro technology. ZESCO, is contributing $82,000. ZESCO is the national electricity utility in Zambia. The estimated potential for small hydro power in Zambia is 45 Mega Watts, but only about 10 per cent is exploited. (SH)

Waste Water Produces Clean Energy

A sewage treatment plant uses a lot of electricity. However, in Amann, Jordan, a future treatment plant will also produce energy for its consumption.

The town of Amann has decided to equip itself with a new waste water treatment plant. In this region, the purification of water is of vital interest and the volume of water to be treated is high: 277,000 m3/day. The engineers who designed the installation, which is to be commissioned in 2005, found a way to reduce the operating costs of this type of installation. Yearly production has been targeted at 21,900,000 kWh in the long run thanks to the turbining of waste water upstream and downstream from the station. Degrémont, the company that is going to build and operate the new sewage treatment plant in Jordan, entrusted the turbining design to a mini-hydraulics laboratory in Switzerland called MhyLab. This laboratory decided to use the height difference between the town of Amann (site of the pre-treatment plant) and the sewage treatment plant in As Samra (103.5 m), in order to produce electricity between the outlet of the treatment plant and the run-off into the Oued Duleil (47.8 m).

The engineers like to remind us that there is great potential for electricity production in a treatment plant, and most sites do not use this potential. Indeed, the digestion gas (biogas) that is produced can be transformed into electricity thanks to a TOTEM (Total Energy Module) and surplus hydraulic pressure can be turbined. When the conditions to use these two potentials are combined, a sewage treatment plant can produce more electricity than it consumes. The MhyLab engineers realized that the height difference and flow were financially interesting at the Amann site. They decided to recover the surplus pressure at the entrance to or at the outlet of the sewage treatment plant by replacing the dissipating valves with turbo generators thus allowing for the production of electricity. They distinguish between two types of energy recovery. In the first type, raw sewage is turbined at the outlet of the sewage pipes that transport the waste water from the town upstream from the treatment plant. In the second type, treated water from the treatment plant is turbined at the outlet of a pipe or at a stream or river, like in a conventional hydro-electric installation.

The town of Amann will make significant energy savings using the principle which was decided upon. Indeed, sewage treatment plants use a great amount of energy. The driving force needed for the sifters, mixers, pumps, fans, etc. consume great quantities of electricity. It is estimated that in a Western conurbation, which is well equipped with public installations, sewage treatment plant operation represents 16% of total electric consumption to satisfy all public needs.

Raymond Chenal, consultant engineer, MhyLab initiator

Renewables - Biggest Structural Change since the Industrial Revolution

The use of renewable energies will be a total break from global thinking for the energy sector, says Dr. Herrmann Scheer, Member of the German Parliament "Bundestag" and President of EUROSOLAR.

Various European countries have taken the initiative to promote and encourage renewable energies. Is this sufficient enough to truly introduce a change in the use of energy and are there enough means available for this?

No, not in the least sufficient. The European Commission has not even begun to apply its own declarations of intent which are in the 1997 White Paper on "Renewable energies". At that time there was talk about 1 million photovoltaic installations and we're far from this goal; most European countries will not be able to reach the production target of 12% for the generation of electricity from renewable energies set for 2010 either, unless they come up with new strategies! Another example is the so called biological fuels or "biofuels" – the European Union has decked itself out with a directive which leaves everything up to the individual member states, and so of course little gets done. The EU also missed out on a great opportunity. The outdated agricultural policy could have been redefined and thus could have made the "ordinary farmer" into a "nutritional" farmer, or an "energy" farmer, or even into a "raw materials" farmer.

Are there differences in the measures taken by industrialized countries and developing countries to help make the breakthrough of renewable energies a success?

Of course, measures, such as supply benefits for renewable energy production, eco taxes for fossil or atomic energy or a renewable energy law – like the one just voted in Germany – are needed in industrial nations, however are only conditional for developing countries.

For an overall change in energy consumption, political institutions must also be used. It's absurd to have an International Energy Agency (IEA) and International Atomic Energy Agency (IAEA), yet, to date, not to have an International Agency for Renewable Energies. Other much needed measures include energy taxes, action by the World Trade Organization and climate conventions. In world trade, energies are amongst the least taxed products, whereas technologies which use renewable energies and tend toward high energy efficiency are taxed up to 80%. The World Bank and international development banks give less than 10% of their energy credits to the development of renewable energies. International climate conventions are piecing together an emissions stock exchange concept, instead of seriously taking care of reducing and eliminating emissions. The ever increasing aerial traffic is one of the biggest climate killers, so why is plane fuel tax free? World market prices are applied to energy and raw materials. That's why energy consumption in developing countries needs millions in subsidies, so that people, who live with only 10, 5 or even 2 percent of our average European incomes, can even buy energy. Every year, over 300 billion dollars in worldwide subsidies are provided for fossil fuel, that's more than the amount that was allotted to the promotion of renewable energies in the last 20 years – this disparity has to be overturned.

So, the consequent development and use of renewable energies will put a hem on the current energy market. Will decentralization put an end to big distributor networks and energy monopolies?

Of course, and this will be the biggest structural change since the industrial revolution. For the energy sector, it will be a total break from "global thinking". That's why conventional energy providers are amongst the biggest opponents of development. The use of energy has always been decentralized; energy or raw material extraction in our system is on the contrary highly centralized. This has lead to the uncoupling of the areas that consume and produce energy at the world level – this trend must be reversed. Industrialized countries are equipped with the infrastructure needed to, for example, provide the most remote area with electricity. Renewable energies give developing countries the opportunity to avoid all the mistakes that a traditional atomic-fossil energy economy makes. For a developing country, what's the use of building an extremely expensive infrastructure to provide power to remote areas when the existing power station was already built using World Bank credits and also supplies energy to the next town because no money is available. This lack of infrastructure is causing increasingly dramatic migration from rural areas and is directly responsible for the fact that over 2 billion people live without electricity. Sun, wind, water and biomass are natural environmental energies that can be locally "harvested". By by-passing significant network hook-up costs, many people in developing countries can be fitted out with energy relatively quickly – a photovoltaic installation can be set up and made operational within a few hours. And the use of locally produced renewable energies instead of costly, imported energies is an enormous economic advantage for developing countries.

It is said that renewable energies can only be developed and are only viable through subsidies? So, what should a "calculated" energy bill look like?

This remark is both wrong and cynical. No one can expect renewable energies to compete with an industry and energy systems that for decades now have been providing energy at a certain price thanks to public money, subsidies, regional monopolies and other market manipulating mechanisms which reflect everything but the reality. A "calculated" energy price includes all incidental and follow-up costs. The exorbitant costs for military task forces or even wars in oil producing countries, in order to secure thousands of kilometers of pipelines, or to clean up ecological catastrophes after tanker averages aren't included in any oil or electricity calculations. If the hundreds of billions of worldwide dollars, with which atomic power and fossil energy have been subsidized, were to be included in the price of energy, then renewable energies wouldn't need to be particularly promoted.

Interview conducted by the editorial staff of planets-voice

Herrmann Scheer

since 1980: Representative in the Bundestag, **since 1988**: President of EUROSOLAR, European Association for Renewable Energies, **1998**: World Solar Prize, **1999**: Alternative Nobel Prize, **2000**: World Prize for Bio-Energy, since **2001**: Chairman of the World Council for Renewable Energies

First U.S. Offshore Wind Farm Caught in Political Blades

Among the challenges faced by offshore wind energy projects in the United States, the political hurdles may be the toughest to overcome.

photo: *Cape Cod Website*

photo: *Industry*

Wind turbines proposed off the coast of Cape Cod, Massachusetts, have stirred a maelstrom of public debate for more than two years. The project would be the first of its kind to generate wind energy in federal U.S. waters, although other offshore wind farm proposals are springing up along the Eastern seaboard.

Cape Wind Associates has plans to construct 130 wind turbines along 24 square miles of Nantucket Sound. While the structures would appear as half-inch specks from the closest Cape beaches, the project has been fiercely opposed by property owners, state politicians, some local industries and wildlife protection groups. Citing economic and environmental risks as well as aesthetics, the Alliance to Protect Nantucket Sound is actively seeking to halt the project. Public opinion in this affluent community remains divided.

A chief concern is the lack of a comprehensive framework for regulating offshore wind energy development in the U.S. This was acknowledged by the U.S Commission on Ocean Policy in an extensive report released in April. Unlike offshore oil and gas development, no rules exist around lease and royalty payments for renewable energy projects in federal waters. In lieu of a "coordinated federal regime," the U.S. Army Corps of Engineers is the lead agency responsible for reviewing and issuing permits.

The Alliance supports a moratorium on offshore wind projects in the pipeline until an "adequate process" is put in place, according to assistant director Audra Parker.

"It is sound to recommend that a comprehensive framework be developed," said Alan Nogee, energy program director at the Union of Concerned Scientists. "But there is no rationale for delaying moving forward on the project."

Indeed, the Cape Wind project must jump through the regulatory hoops of 17 government agencies. Under the National Environmental Protection Act (NEPA), a rigorous review is required of developments on federal lands "significantly affecting the quality of the human environment." Many, including presidential candidate John Kerry, are awaiting the release of the draft Environmental Impact Statement in the coming months before taking a decisive position on the Cape Wind project.

"We don't believe the adverse effects are huge," said Kert Davies, research director at Greenpeace U.S.A. "We're carefully watching the studies being done in Denmark, U.K. and Germany." Davies cited design improvements that have helped to decrease mortality from birds caught in windmill blades. However, the evidence of threat to migratory birds has been mixed.

"The existing review process is tougher than the process that New England's fossil fuel plants had to go through," said Mark Rodgers, communications director at Cape Wind Associates. "NEPA is one of the toughest tools the government has. This is a comprehensive public interest process."

Ultimately, one of the biggest hurdles may come from the federal government itself. While European nations have taken substantial steps toward renewable energy, U.S. policy under the Bush administration has favored continued reliance on fossil fuels.

Groups like Greenpeace are advocating for renewable energy development. "The opposing arguments don't fly when we're faced with global climate change, and someone else is bearing the burden of coal and nuclear plants," said Davies.

Li Miao is a US freelance journalist who has worked for the San Francisco Chronicle and the KQED Public Radio

Government to Install Solar, Biomass, Wind and Earth Energy Systems (canadian association for renewable energies) NRCan has set a target to install 1,000 new solar thermal and biomass systems on commercial facilities by 2008. Green heat technologies have strong potential, but come with "a high first-cost which limits demand," says its SDS tabled in Parliament. It will install 1,000 MW of new wind by 2007, purchase 450 GWh of green power by 2006, establish five new MIP agreements to support green power distributors, and increase the use of renewables in federal operations through voluntary commitments. The SDS also sets a target for 25,000 earth energy ICI systems by 2008.

Green Power in Canada Grew 2% Last Year

(canadian association for renewable energies) Green power generation in Canada increased by 2% last year over 2002, and accounts for 4% of total energy consumption, according to a regulatory agency. Wind, biomass and small hydro account for most capacity; wind increased by 81 MW, of which 75 MW was one windfarm.

Ontario Needs Renewables and Conservation, says Study

(canadian association for renewable energies) The Ontario government must turn to renewables to play a large role in energy supply, says a report prepared by two environmental groups. By 2020, the province could reduce energy consumption by 40% through conservation and, while recommended measures would cost $18 billion over 15 years, 95% would be recovered through energy savings.

Off-Grid Renewables Will Reduce Costs by 10% by 2006

(canadian association for renewable energies) Costs for renewable energy systems in off-grid communities will drop 10% by 2006, under a target set by NRCan. Within two years, five remote communities will implement a renewables project, says energy minister John Efford. The SDS also includes a target of 25,000 new earth energy systems by 2008 in commercial buildings, 1,000 solar thermal and biomass systems, 1,000 MW of wind turbines, five new MIP agreements to promote green power, and the purchase 450 GWh of green power by 2006

Sweet Energy

The use of gasified sugar cane bagass and trash is a viable technology to generate 100% more electric power than the conventional burning of the same fuel and prevent the emission of greenhouse gases. However, it is still too far from reaching the economic feasibility point and the final decision on whether to invest in this technology will be postponed till a more friendly commercial scenario is found. At least in countries such as Brazil, where the intensive utilization of hydropower dropped the costs of generation and keeps this option on the top of investors preference.

These will some of the results a cooperative of big sugar cane producers will release in a seminar to be held in Sao Paulo State (Brazil) probably in June in cooperation with the Global Environment Facility (GEF) and the Swedish company Termiska Processer AB (TPS). Coopersucar - a network of 32 producers that invoices annually almost US$ 1,5 billion, is one of the world's largest sugar and alcohol producers and has around 2,000 employees, most of them based in Sao Paulo - was made responsible for the project since 1997 and now, close to the conclusion of the project, is sure this is a serious alternative for those countries with important production of biomass.

"We have proved the feasibility of the process. Now what we need is a firm decision to invest and give commercial scale to the production of equipments. If it is done in Brazil, for instance, we can substantially cut its prices by 50%. We have all the necessary conditions to produce it locally and drop investments by half", said Manoel Régis Lima Verde Leal, an engineer head of the project and technical responsible for the resources section of Coopersucar´s research center.

The initial budget of US$ 7,39 million (US$ 3,75 million funded by GEF and US$ 3,64 million provided by Coppersucar) was then updated to more than US$ 10 million, with supplementary donations by Brazilian sugar cane producers, European Commission and the Swedish Energy Agency.

In 1997, Coopersucar was hired by GEF to run the bagasse and trash project in association to another gasification project, then run by Shell, Chesf (a big Brazilian state owned company of the hydropower field) and other partners in the country's Northeastern state of Bahia with the use of planted forests. Coopersucar´s role was then to produce and compare its own results with the ones of the Bahia´s project. This went bankrupt due to a series of political in definitions by Shell and Chesf what led GEF to delegate to Copersucar the responsibility of finding alone its own data.

From the technological and electric points of view, the outcome is the best, said Manoel Régis Lima Verde Leal. "Using conventional technology to burn bagasse we can generate up to 4,500 MW in the harvest season, from May to November. If we take in account also sugar cane trash, then this potential raises to 6,000 MW during 12 months. When it comes to the gasification process this potential easily doubles to 12,000 MW", affirmed.

The Coopersucar/GEF project was not designed to raise environmental data, but it was subsidiary produced anyway. According to Lima Verde Leal findings, the gasification option does also produces CO_x and NO_x (both considered greenhouse gases) and particles, as much as the power generation natural gas process. But it was possible to cut by 90% the production of CO_2, in comparison to the conventional burning for generation purposes of bagasse.

An adequate economical scenario. **Recycling bagasse and trash is strategic for environmental quality in Sao Paulo, Brazil's far largest sugar cane producer state due to the practice of burning these components in open air, which causes the emission of NO_x, CO_x and solid particles. It also has a decisive role in power generation, what has become a hot issue since the country discovered five years ago that its installed capacity was not enough to sustain economic growth. According to Manoel Régis Lima Verde Leal, the gasification process proved to be of vital localized importance for the power field. He ewplains what is needed to reach the economic feasibility point in this project. "Local production of equipment. Our findings indicate that the production in countries like Sweden, traditional in this field, would raise the costs to US$ 74 per MWh. If it was done in Brazil, it would be US$ 60, what is still too expensive, since we generate locally hydropower at US$ 30 per MWh. This would not be a short term process. But in the mid term we could reach an adequate scenario."**

The environmental benefits would be a plus in the decision making process, he adds. "It was not our original duty with this project to raise such a discussion but it is too evident not to be considered." (CT)

Carlos Tautz is a Rio based Brazilian Journalist and Columnist writing on social and environmental development

Using Geothermal Energy

A city from the western part of Romania discovers how rewarding it can be to use geothermal energy.

"The heating bill is now only a fraction of what it used to be", says Viorel Iuhas, vice-mayor of Beius, the second large city of the Bihor county. Indeed, the price of a Gcal fell to only EUR 10, confirms Transgex SA, the company operating the geothermal water resources. The price of heating using fossil fuel exceeds EUR 75 for a Gcal. However, geothermal heating for a city of 12,000 inhabitants came neither simply, nor cheap.

Back in 1996, Transgex, a state company from Oradea, the capital city of Bihor county, discovered a geothermal reservoir at Beius. A 2,500 m deep well was drilled using money from a state subsidy. A pump, and control and metering equipment were installed with the financial support of the Inco-Copernicus programme of the EU. Finally, production tests were conducted jointly by Transgex and VAG Ltd, from Iceland, in 1999. The well's capacity was estimated at 5,558 Gcal/month, enough to cover three quarters of the thermal energy needs of Beius, of 8,000 Gcal/month.

In 2000, armed with proof that geothermal operations are commercialy viable, Transgex was privatised. The company invested EUR 350,000 in a distribution pipeline, and in the retechnologisation of the existing heating substations. Starting with the winter 2001-2002, Transgex provided dwelling and tap water heating for most of the public institutions in the city, and for two thirds of the existing 1,500 flats.

To cover the rest of the needs, a second well is now under finalisation, says Iuhas. Drilling for this well started in 2002, funded by the state, as part of a more than EUR 1 million research project. To finalise the heating infrastructure of Beius, Transgex estimates that it will have to spend some more EUR 550,000. The second well will supply geothermal energy for the remaining parts of the city still using fossil fuel, as well as for the new blocks under construction, and for other facilities, such as a heated swimming pool, says the vice-mayor.

The exploration of Romania's geothermal resources began in the early 60's. The oil crisis of the early 70's and Ceausescu's policy of "energetic independence"gave a significant impulse to the use of geothermal energy. Romania has eight geothermal areas, of which the most important is in the west of the country. Most of the geothermal systems in place were completed between 1975 and 1989, mainly for greenhouse heating, dwelling and tap water heating, but also for some industrial applications and for health and recreational bathing. According to data from Geofluid and the University of Oradea, the total geothermal capacity of the 115 existing wells is 480 MW. To date, only 152 MW are used, from 96 wells.

Unfortunatelly, most of the existing geothermal systems operating in Romania are obsolete. Being over 20 years old, they lag behind in technology, confirms the Strategy for the valorification of renewable energy sources, published early this year by the Romanian Government. The main obstacle for the development of the geothermal energy in Romania is the lack of funds. This is probably the main reason why the governmental strategy is rather cautious, estimating that there will be little increase in the total use of renewable energy sources in Romania in the near future. The total percentage of renewables (including large hydro power plants, etc.) will reach 11.2 % in 2015.

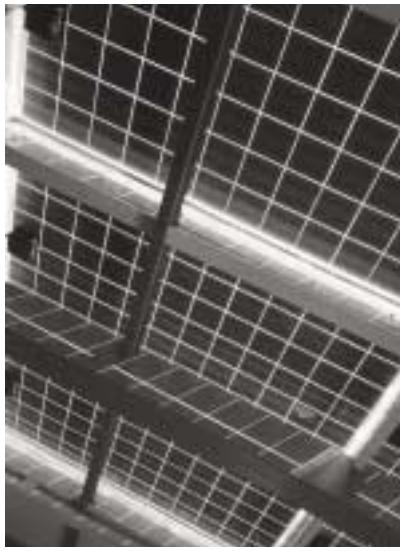


photo: *A R Savulescu*

Alexandru R. Savulescu is Chief editor of "Perspective" (Romania)

Romania: A Vision for Sustainable Energy Solutions

A paper developed by Earth Friends, a Romanian NGO, suggests that this country could progressively reduce to zero its CO_2 emissions by the year 2050. Presently, Romania, a signatory of the Kyoto Protocol, has a CO2 emission of more than 100 million tonnes per year, according to Ion Zamfir, from Earth Friends. "Romania's Vision 2050 for Sustainable Development in Energy is based on the gradual replacement of fossil fuel use and nuclear energy by renewable sources, such as hydro, biomass, wind, and solar", says Zamfir. Earth Friends is a member of the International Network for Sustainable Energy (INFORSE), a network of about 60 NGOs working for sustainable energy solutions to protect environment and reduce poverty. (ARS)

Navarra, leading region in the development of renewable energies

The region of Navarra, in northern Spain, in the year 2000 covers 50% of its electricity consumption with renewable energy sources (32% eolic and 18% mini-hydro). In the next few years, additional contributions from these sources plus biomass and solar energy are expected to cover 100% of power consumption.

Navarra has followed a model of renewable planning based on the energy and environmental objectives that has enabled the region to implement rational and environment-friendly policies that have been politically and socially agreed by consensus. A semi-public company - EHN - has been at the helm of this project that has involved a significant part of the industrial fibre in which, more that 1,300 persons are currently employed in the eolic energy sector. (pv)

An out of the Ordinary Village

Upon entering this small municipality near Göttingen, you can't miss its grand plan: The inhabitants are going to produce all of their electricity and heating needs themselves out of renewable raw materials - decentralised and Co_2 neutral

Through their action research project, the economics, life and social scientists from the interdisciplinary center for sustainable development at the University of Göttingen want to prove that environmentally friendly energy production in rural areas is not only feasible, but profitable as well. The reserachers' goal is to make a bio-energy village handbook, so that other villages and rural areas in the world can set up their own production means for their electricity and heating needs, thus helping them to stand on their own two feet.

A biogas installation is at the heart this project. It will be supplied with energy crops that the farmers cultivate themselves as well as with liquid manure. A central plant will convert gas into electricity which will be distributed via the public network. Each household can remain with the electricity provider that it wants. The resulting heat will be distributed to the village over the local heating network. In the winter, an additional heating plant, run on wood shavings, will also heat water for heating and household use. For peak load times, a mineral oil furnace will be used, and will constitute a last tribute to the times of fossil fuel. In all, the village will save up to 350,000 liters of fuel oil per year.

Over 70 percent of households will take part in this ambitious project. A decisive factor was to make sure that no household would have to spend more money for its heating needs than before the conversion. Over 210,000 euros will be saved per year. This money will no longer go to energy multinationals, but rather will increase the revenues of the local people. Moreover, the power company will finance three part-time jobs which will be needed to run the energy installation.

Building will start early this summer and the people from Jühnden will be able to produce their own electricity as of November. And as of next winter, the local heating network will heat the first bio-energy village in Germany.

Hans Wille is a free-lance journalist and science author from Hamburg

Organic Fuel from the Schnapps Factory

While the EU is fighting against the German brandy monopoly, medium-sized Schnapps manufacturers are now producing bioethanol from sugar beets and grain in old distilleries. The tax-free "Organic Fuel" is mixed with fossil fuel. This is how the German government has decided to fulfill the EU directive to reduce CO_2 emissions. The sugar industry is in the process of building three bioethanol installations. (HW)

photos: *H. Wille*

photo: BMU-Germany

The Necessity of Electric Energy Storage

The sun and the wind provide the surface of the earth with an abundant and inexhaustible amount of energy. Man has succeeded in capturing this energy and in transforming it into electricity: photovoltaic cells for sun and wind turbines for wind. However, both of these electricity production methods depend entirely on weather conditions. For example, as soon as the wind falls below a certain value, wind turbines can no longer be used; on the contrary, if it exceeds a value that's critical for installation safety, everything has to be stopped, and suddenly, there's no more production.

If, in a country or a region, the share of wind turbine production is great (for example 20% of consumed power), big back-up plants are indeed needed, and need to be immediately operational. The only installations where significant electrical energy storage is possible are large-sized hydraulic plants, but they may be located far from a wind turbine farm. Even in a very big interconnected network, like in Europe, several hours are needed to readjust power after a significant drop in the power supply.

The solution to this problem could well come from electro-magnetic accumulators, such as an inertia wheels. Under each wind turbine, in the foundations, an electro-magnetic accumulator is installed, with a great enough capacity to allow the network to conduct the necessary ballasting. Moreover, this type of system would allow for current peaks to be "smoothed out", and consequently would limit the power of the installations for the same energy production.

Raymond Chenal

Offshore Wind Could Power Every Home in Europe by 2020

A Greenpeace report undertaken by Garrad Hassan envisions a very different Europe for 2020

"Sea Wind Europe" is a report commissioned by Greenpeace from the international energy consultants Garrad Hassan. The report states that nearly a third of Europe's total electricity demand could be met solely from clean, renewable offshore wind power by 2020. This would be sufficient to supply electricity to every single one of the 150 million EU households.

The report recommends key policy measures that would be needed to achieve the development, starting with a clear statement of vision from the European Union through, for example, an ambitious EU renewable energy target for 2020.Added to this

- Up to 3 million jobs would be created.
- A market for European industry worth hundreds of millions of Euros would be created
- Declining industries and many deprived industrial regions would stand to benefit the most, with the manufacturing, steel and offshore engineering sectors heading the list
- The electricity produced would be cheaper than nuclear power and coal.

Sea Wind Europe makes a critical assessment of a very large-scale vision for offshore wind in the 15 European Union2 countries. Using maps the report shows what the scale of this development would look like in European waters. Sea Wind Europe assesses: the potential offshore wind resource; the rate of development required to build the large capacity desired by 2020; the capacity of the manufacturing industry to supply this; the practical challenges to be met - including where to site wind farms and transmission of the electricity; the potential costs; the relative price of the electricity; the attitude of the public; and crucially, the policy measures needed to ensure that it could happen.

The GEF—A Strong Commitment to Renewable Energy

"We need to find the most innovative and cost-effective solutions, if we're going to provide energy to the more than 2 billion people who don't have access to modern energy services." says Len Good, Chief Executive Officer and Chairman of the Global Environment Facility (GEF)

About 6 percent of the World Bank's energy portfolio is devoted to developing renewables—how much money does the GEF spend to promote renewable energies?

The GEF has a solid renewable energy portfolio. Currently, we have about 110 renewable energy projects in 50 countries and our contribution to this portfolio is about $900 million. But from my point of view, the real issue is the leverage that we get from cofinancing provided by the countries themselves, by the World Bank and bilateral donors, and others. The renewable energy projects we support are valued at close to $7 billion. This means that $900 million in GEF grants is generating about $6 billion in co-financing.

Let's have a look at all these financial matters—is it easier to attract co-financing for big industrial energy projects or do you get more support for smaller renewable energy projects?

There are some large renewable energy investments in the GEF portfolio, such as the 'concentrating solar power' projects, which combine renewable energy with conventional natural gas for heat generation. This is cutting-edge technology and GEF has about $200 million invested in four projects in Mexico, Egypt, Tunisia, and India. I can give you other examples of large renewable energy investments that we are funding. But one of the lessons we are learning is that the issue is not necessarily finding money for those big projects. Many countries face another important problem: the regulatory frameworks in which their utilities operate provide only for conventional kinds of fossil fuel capacities, which are all geared to conventional Northern fossil fuel technologies. In some cases, we must accommodate the special needs of renewable energies on-grid, but we must also be able to use renewable energy sources off-grid if we're going to provide energy to the roughly 2 billion people who lack access. We are increasingly looking at regulatory frameworks, capacity building, information availability, awareness raising, and industry support and participation. These kinds of issues are often more important than the investments per se.

Is the energy sector in developing countries—like the water sector in the past—a growing field for public-private partnerships?

Yes, absolutely—GEF is a strong supporter of this type of partnership. We need private capital, know-how, and participation to finance development in the South. But we must be very careful—models that work in the North cannot always be applied to the South.

Does it still make sense to finance big on-grid technologies? Most developing countries do not have the infrastructure needed to distribute electricity to rural populations. Are there new solutions?

The GEF is working on both off-grid and on-grid applications. For example, there is the 'integrated combined cycle solar-thermal' project, which is bringing together renewable energy and conventional technologies. This is a large on-grid project. There are also solar-photovoltaic on-grid projects, such as our projects in the Philippines and Malaysia, and we have wind plants in a number of countries that are on-grid. However, because the access issue is so important, off-grid applications currently represent the largest number of renewable projects in the GEF portfolio.

Interestingly, in developing countries, a renewable energy source, such as PV systems, can often be more cost-effective in off-grid applications than conventional electricity generating technologies. In practice, however, people actually making use of these systems face a number of barriers. These include the lack of a reliable supply chain for the hardware and limited consumer awareness about solar PV. Another barrier is the assumption the people in villages make regarding how soon the conventional grid might reach them. This can affect their willingness to invest in PV systems.

Since PV-based solar home systems cost about $400 or $500, and will run just a few lights and a radio, we have worked a lot on the "affordability" aspect by creating local financing instruments, such as micro-credits. GEF provides funds for what we call ESCOs or Energy Service Companies. We've also learned that it's very important to introduce solar-PVs not only for home use but also for productive uses—for example, irrigation pumps in agriculture or refrigeration in schools and hospitals—so that solar-PV can help generate revenues.

What's most important is that we are learning lessons that help us modify our strategies. So, we are working a lot on a technology that we call mini-grids, a sort of grid that's in-between a conventional grid and a home-based system. People accept this more easily because they see it as a sort of precursor of the conventional grid. We run these mini-grids on small hydropower plants or biomass that often comes from the agricultural production of the villages. These mini-grids can be financed and organized in many different ways. Communities themselves can develop this type of system as a public utility; private companies can also be invited to build up this type of grid.

The editorial staff of planets-voice conducted this interview.

Green Revolution

It is a steady yet silent revolution that is changing the lives in rural India. It is a developmental initiative sans heavy toll in terms of ecological imbalance and pollution. The change is being brought by the renewable green energy generation in India, especially in the Communist-ruled eastern Indian state of West Bengal where development was sacrificed at the alter of political stability.

And much of the credit for rapid strides in renewable energy development in Bengal is the initiative of one man who heads the state government run West Bengal Renewable Energy Development Agency (WBREDA). He is Mr. S P Gon Choudhuri, Director, WBREDA, who was awarded the Green Oscar last year.

But when in 1996, he started the experiment in Bengal there was neither much financial support from the state or the federal government nor political interest. Gon Choudhuri's experimental models on the concept of generating cost-effective energy locally were commissioned at Sagar Island (solar power plant) in the Gangetic delta under South 24 Parganas district, at Gosaba (biomass plant) in the same district and in the Himalayan region of Kalimpong in Darjeeling district in north Bengal (micro hydel). These three were all off-grid projects with generation and consumption activities in the same place. The three projects worked wonderfully and changed the lifestyle of the local people. It also caught the fancy of the people in power at the state level as well as at the federal government. The latter in 2001 decided to implement the West Bengal model nationally. Now the federal government is working on implementing renewable energy projects in 20,000 Indian villages. Eighty per cent of WBREDA funding comes from the federal government, ten per cent from the state government and ten per cent from beneficiaries.

So, while the Agency had started to work with Rs 30 lakh (67,000 US $) in 1994-95, its budget for the year 2003-2004 is a whopping Rs 50 crore (11 million US $). The renewable energy use thus registered a growth of hundred per cent in West Bengal.

"Political people are very keen now to promote the growth of renewable energy. Initially they were indifferent but now they are supporting us," says Mr Gon Choudhuri. "While the government supports us because they can see it as the most cost-effective means of rural electrification which can help them serve the unserved and in turn garner the support of people in elections, the green groups are happy because it is eco-friendly," says Gon Choudhuri.

"India got its independence from British rule in 1947 but even after five decades electricity in India is confined to the people of urban and semi-urban areas. About half a billion people in India do not have access to power which is almost half the total population of the country, owing the heavy cost of line extension from the grid system, low number of users who can pay for it in remote zones and erratic transmission. Under this circumstance this is the only option to serve the people," says Gon Choudhuri.

He said in West Bengal currently the number of users of renewable energy is highest in India at 56,000. Bengal is followed by Andhra Pradesh in south India with 39,000 users.

"We are targeting to serve at least 3,00,000 families by 2012 while additionally we want to feed the grid system with 500 megawatt of power," says Gon Choudhuri.

Presently in West Bengal there are 20 off-grid solar photovoltaic plants ranging from 25 kilowatt to 120 kilowatt. Off-grid biomass gasifier power plants number six generating 20 kilowatt to 500 kilowatt besides five wind diesel hybrid and wind solar hybrid power plants and ten micro hydel projects in hilly regions. There are also 35 rice millers in Bengal using rice-husk based and eco-friendly power plants generating eight megawatt of power and trying to reap financial benefits under the Kyoto Protocol's Clean Development Mechanism (CDM).

"In the rural areas where renewable energy is being used the people are one step ahead because they were using kerosene lamps and when they started using electricity they jumped to the most progressive renewable energy system which is also green power," says Gon Choudhuri.

Presently only three per cent of total generation is from renewable energy in India.

Sujoy Dhar is executive editor of the feature agency Trans World Features and Chief Copy Editor of Asia's premier news agency United News of India (UNI)

photos: *Sujoy Dhar*

What is the most significant impact of renewable energy development in India?

« While renewable energy is green energy and therefore eco-friendly, in a country like India where majority of the population lives in villages, I think it is the energy security aspect that matters most. In rural India, where the far-flung villages are not connected by any grid system, this is the only source of energy which can bring development. Energy security (read uninterrupted supply) is an important thing because so far renewable energy is concerned the people in villages can bank on its availability while in case of conventional energy they depend on the costly grid system. Though the villages are electrified on paper, in reality the supply is abysmally erratic » says Gon Choudhuri..

Renew the Thinking

One key question for the Renewables 2004 conference will be how to secure financing in order to stimulate further growth in renewable energies, particularly in developing and transition countries.

To date the development banks have provided little support for this sector. Over the last ten years the World Bank has devoted six percent of its energy portfolio to renewables, with the rest going to fossil fuel investment. The figures are similar in the other development banks.

Such investment tendencies only increase CO_2 emissions of course. The recently agreed International Finance Corporation and European Bank for Reconstruction and Development loans for the Baku-Ceyhan pipeline will help to produce a quantity of oil that will contribute 160 million tons of CO_2 to the atmosphere every year.

Climate impacts like this, together with human rights abuses and few social benefits, provoked one of the key recommendations of the World Bank's Extractive Industries Review, finalised last year. It suggested that the Bank develop "… a robust portfolio for renewable energy, aggressively increasing investments in renewable energies by about 20 percent annually and thereby moving toward a better balance between support for fossil fuel projects…". The Review is equally valid for other development banks as they too finance many detrimental extractive projects.

Changing the development banks' policies in this area will not be easy. The banks have been financing fossil fuel industries for decades now and large oil and gas projects provide highly profitable returns. Moreover, the oil majors want to maintain the bonanzas which public money has long provided.

Viable alternatives are being offered by the renewables industries with support from some governments and large investors. CERES, a coalition of institutional investors and public interest groups representing more than USD 400 billion in assets, recently wrote a letter to World Bank President Wolfenshon stating their "strong support for the recommendations of the Extractive Industries Review". They especially pointed out that "climate change could have a devastating impact on the global economy and thus the health of our own investments."

The evidence suggests that the Bonn conference should deliver a call to the shareholding governments of the World Bank and the other international financial institutions insisting that they change their fossil fuel route.

photo: *BMU-Germany*

Petr Hlobil is Campaigns Coordinator at the CEE Bankwatch Network

The CEE Bankwatch Network is an international non-governmental organisation (NGO) with member organisations currently from 12 countries of CEE and CIS region. The basic aim of the network is to monitor activities of International Financial Institutions (IFIs) in the region, and to propose constructive alternatives to their policies and projects in the region.

Patient Investors Wanted

Few foundations or NGOs work with the world's poorest to develop their access to energy with respect for the environment. The "Fondation Energies pour le Monde" (a French organization) draws a lesson from 14 years of experience.

The "Fondation Energies pour le Monde" (Fondem), created in 1990 in Paris, brings together public partners (French ministries) and private partners (companies from the energy and financial sectors). The projects that it has backed has allowed for 500,000 people in 28 countries to be provided with energy services (Africa, Madagascar, Haiti, Asia) for a total cost of nearly 9 million euros. The foundation works with rural populations from the south who are left out by private companies who turn their back on these non profitable electric zones.

The director of Fondem, Yves Maigne, explains that they act at three different levels. "We support social applications, by installing for example pumps for drinking water, or by supplying a health center or a school with electricity. We also take an interest in applications that generate revenues, for example the supply of a cold room, of a sewing or woodworking workshop and lastly, we help with domestic applications". The projects that are supported by Fondem favor renewable energies, and if need be, generator sets are also installed. The same difficulties are encountered everywhere. The transportation of electricity is expensive and electricity storage continues to pose a problem.

The promotion of renewable energies in this context encounters a structural problem: they are highly capitalistic. They require heavy investment in terms of initial costs and time. One to two years is often needed to study a possible site for wind turbines. Yves Maigne highlights another difficulty: "even if for instance, the operating costs are a lot less for a solar installation than for a generator set, funds still need to be foreseen for maintenance needs; this mean that the payment capacity of its users has to be higher than the calculated operating costs". This preliminary work constitutes an important factor for the foundation and its local partners. They have to be certain that the energy project is adapted to the population. This is one of the most important factors in guaranteeing the best use of the installation over time.

The foundation is thrilled that international financial backers have at last understood that they need to be implicated in renewable energy projects in rural areas. Cooperation will only be successful if all partners are aware of this capitalistic aspect and only if the countries themselves organize their energy sectors by taking into account rural zones. Lastly, Yves Maigne highlights another blocking factor: the lack of a competent private sector in these countries that could set-up these installations and ensure their after-sales service. "We look for trained local operators who may be interested by a sufficient number of installations. It's up to us to find the right market scale to attract patient investors as well."

Louisette Gouverne

barns' style