Postgraduate Programme
RENEWABLE ENERGY

NEWSLETTER

No. 1/2002 – Vol 21

EDITORIAL

Dear Reader—spring has finally arrived and sunlight is filtering through the first leaves of some bushes at the Wechloy Campus here in Oldenburg. This newsletter was intended to be published in fall 2001. Edu Knagge's many duties (see last newsletter!) prevented him from working on this issue, so I took over and started work on the collection of e-mails and articles collected by our friend and colleague only after the Winter Term 2002 was finished. This explains the delay and I learned (by doing) what time and effort it requires to complete an issue of the PPRE Newsletter and only after some weeks of sifting thorough quite a few e-mails and some MB of attached files things got into place.

So, what do you have to expect from this issue?

Well, we will try and present some *News from Oldenburg*, keep you informed about messages that arrived from the *PPRE Alumni* and then you might like some articles sent from some of your former colleagues. An overview on *publications* and useful *web sites* will complete the newsletter – at the end like always an updated list of alumni and their e-mail addresses.

In 2002 PPRE will pass 15 years of programme and the number of absolvents will pass the 0 mark. The curriculum will be changed due to changes in the field of renewable energy.

Happy reading and good wishes from Oldenburg

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Published by:
Carl von Ossietzky
University of Oldenburg,
Faculty of Physics,
Department of Energy and Semiconductor Research,
Postgraduate Programme
Renewable Energy—PPRE,
D - 26111 Oldenburg
phone: +49-441-798.3775,
fax: +49-441-798.3990,
e-mail: edu_at_uni-oldenburg.de

Editors of this issue:
Edu Knagge & Konrad Blum
Typesetting&Layout: LaTeX
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NEWS FROM OLDENBURG

Web sites of Energielabor and PPRE

You can browse through the fully functional new web site of "Energielabor" at *http://www.energielabor.de*. The web site is quite innovative - you can see all the salient features online, even there are web cams (web cameras) through which you can see the control room and wind turbine. The innovation is sponsored by *overspeed* a local Oldenburg company founded by Dr. H.-P. Waldl.

Info on PPRE can (in the near future) not only be found at the "classical" web addresses *http://www.physik.uni-oldenburg.de/ehf/ppre/* but also at *http://www.ppre.uni-oldenburg.de* and the aliases *www.ppre.de, www.ppre.org* and *www.ppre.info*. We are now reorganising the web site of PPRE and you will find more up-to-date info there about

- Curriculum and classes
- Alumni and newsletter; e-maillists etc.
- Admission and application info
- Links to interesting other sites

We expect your feedback – you will help us to keep the new web site of PPRE active, lively and informative.

PPRE Anniversary Publication Project

A group of PPRE001/02 students (on initiative of Mr Anand Shukla) have started a publication project which will lead to a volume titled *Renewable Energy for a Sustainable Futur – Country Studies*. The publication will consist of individual articles that will all follow the same format and the following topics have to be covered:

Brief country profile (Location, geography, climate, demography, economic status etc.)

Background of RETs in the country

Country experience – 1) Energy scenario and RETs in the country (Wind, Solar, biomass etc) & their promotion through government initiatives, 2) subsidies to state energy development agencies to procure and disseminate solar hot water systems, PV street lighting and community lighting systems, solar cookers, etc., 3) Setup demonstration projects of large RETs, e.g. windpower, microhydel, solar-pond, etc, 4) supported resource assessment and R&D for all RETs, 5) established manufacturing facilities for some RETs, e.g., PV cells, 6) initiatives led to the establishment of a RET manufacturing industry; 7) creation of human and institutional infrastructure; and 8) awareness of the potential role of RETs in the energy-economy of the country, 9) maintenance facilities, 10) R&D linkage with product development was poor/good, 11) credit availability to RET-buyers is a major tool to address the high initial cost barrier associated with RETs)

Major manufacturers

The graduate with a Science degree asks, "Why does it work?" The graduate with an Engineering degree asks, "How does it work?" The graduate with an Accounting degree asks, "How much will it cost?" The graduate with a Liberal Arts degree asks, "Do you want fries with that?"

The rationale for renewables 1) Decentralized RETs can provide higher quality of cooking and lighting energy services to rural households. 2) Decentralized RETs are technologically and economically appropriate to meet low and dispersed rural energy demands. 3) RETs are cleaner at the house-

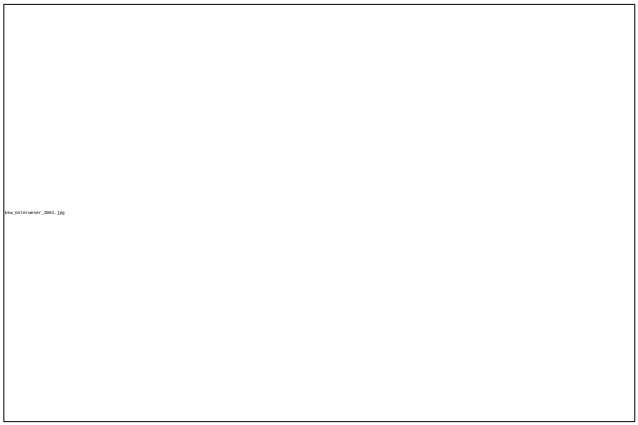

Figure 1.1: PPRE00/01 group at KKW Unterweser

hold, regional and global levels leading to direct and indirect benefits in terms of human health, regional air quality and global climate change. 4) Electricity shortages 5) The current scarcity of conventional electricity places a premium on grid-connected RETs with short gestation periods.

Estimated potential and installed capacity of major RETs in the country (last five years achievements) *Technically mature RET systems* grid connected electricity generating technologies (Wind, Solar PV& Cogeneration), stand alone electricity generating technologies (Wind, Solar PV, biomass based cogeneration systems), stand alone thermal systems (Solar water heating systems, solar cookers, cogeneration, biogas)

New and emerging RET systems grid connected electricity generating technologies (Solar thermal, Geo-thermal, Tidal, Ocean Thermal Energy Conversion), stand alone (or decentralized grid-interactive) electricity generating technologies (Hybrid systems, Fuel Cells, Biomass Gasifier-based Cogeneration), stand alone thermal systems (Solar pond, Geo-thermal)

Policy and Institutional Frameworks *Policy measure and incentives* *Fiscal and promotional incentives*

Innovative Financing 1) Business opportunities 2) Research and Development 3) Technology import and collaboration

Key issues for renewable energy sector

What is the difference between Mechanical Engineers and Civil Engineers? Mechanical Engineers build weapons, Civil Engineers build targets.

Current issues 1)Under pricing of conventional energy 2) Electricity, LPG, kerosene etc are priced lower than cost; this restricts the commercialization of decentralized RETs which would otherwise be economically competitive 3) High initial cost of RETs 4) Most RETs cost more than conventional options, though lifecycle costs may be lower in many cases

Technically mature-grid connected RETs *issues* 1) Sales & maintenance infrastructure 2) Power

evacuation network 3) Incentive structure 4) Technological upgradation 5) Institutional relationships

Technically mature-stand alone RETs *issues* 1) Market support infrastructure (dealers, doorstep credit, maintenance systems, performance information) 2) Product Development (niche markets, piggybacking) 3) Institutional development (entrepreneurship & local bodies)

Emerging technologies *issues* 1) Commercialization activities - demonstration projects and incentives packages (solar pond, hybrids) 2) Linkages with users during demonstration and proving phases 3) Linkages with other teams during developmental phase 4) Identification of priority applications, and long-term development and commercialization goals

Lessons and Challenges Successful case studies in renewable energies in the country (1-2 cases)

Conclusion

References

PRESENT PPRE

At present the 20 students (see figure 2.4) of PPRE01/02 have finalised their first term and are now working in their practical training period.

Participants

Names and countries of origin of the present students are listed in table 1.1. Their individual e-mail addresses can be found at the end of the table of alumni and participants (page 60). To reach the whole group with a single e-mail just send a message to *students0102_at_ppre.de*.

Table 1.1: PPRE01/02 Particpants

NAME	COUNTRY
MOHTAD, Ibrahim	Bangladesh
BELLE EBOTE, Vivian	Cameroon
NANJI, Henri Nota	Cameroon
SANCHEZ, Santiago	Ecuador
SHUKLA, Anand	India
GADDE, Butchaiah	India
HEANG, Bora	Cambodia
OCHIENG, F. Xavier	Kenya
DHITAL, Ram P.	Nepal
POUDEL, Om P.	Nepal
MAZIMPAKA, Ernest	Rwanda
ABD-EL-MESIH, Bahy Saad	Egypt
UMAÑA, Alejandro	Colombia
PILALAS, Loukas	Greece
TRIANTAFYLLOS, Panagiotis	Greece
MANSSEN, Thomas	Germany
WINTERFELDT, Jörg	Germany
AVELLANEDA, Jordi	Spain
SHAH, Sayed Faruque	Germany
KOMILOV, Asliddin	Usbekistan

Winter Term

The winter term 2001/02 started like in the past years with an introductory section. The twenty new PPRE students had to get familiar with the university and PPRE. They had to cope a lot of lab work and spent hours on visits in the facilities of the uni. This phase was completed with the traditional wind energy field trip (see figure 2.4). The regular weekly programme of PPRE for the past winter term is depicted in figure 1.2.

Summer Term

After two months of practical training in industry, research institutes and university, students will meet again at 22nd April. Then they have to decide on the subject (and supervisor) of their thesis project. Case study project and lab course will keep them rather busy...

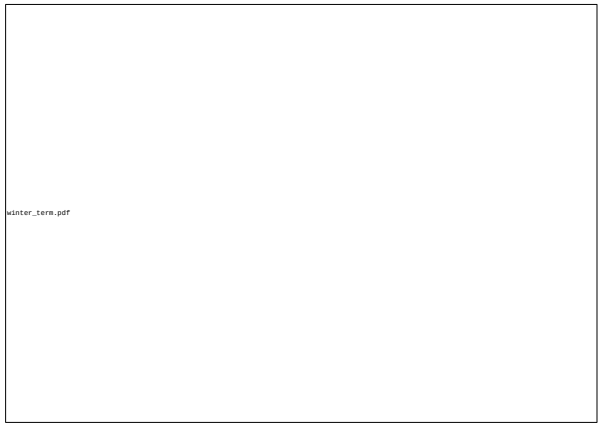

Figure 1.2: Winter term of PPRE

Figure 1.3: Summer term of PPRE

NEWS FROM PPRE ALUMNI

Ali Salim Al-Alawi (Oman–PPRE96/97) Ali wrote: "How are you? I want to tell that I have moved to Australia to do my Ph.D. in Renewable Energy at the Center for Renewable Energy and Sustainable Technologies, Curtin University of Technology, Perth, Western Australia."

Recently Ali contacted us because he wanted to exchange ideas about how to use a PELTON turbine to regain some of the hydraulic energy wasted in reverse osmosis plants.

<ali_at_ece.curtin.edu.au>

Awa Celestine Anyam (Cameroon–PPRE98/99) got to know about his article in this newsletter (see page 38): 'Happy hearing that you are going to published my article on Micro-Hydro. Presently no more additions are to be made on what I had sent to you. We are presently working on our third project in the design and construction of a solar cooker using reflector for cooking in a small boarding school. Its finance by G.T.Z in Yaounde and the German Embassy. I may be able to send you details later on the output etc.'

<c_anyam_at_yahoo.com>

Gimba Hassan (Nigeria–PPRE90/91) Our friend moved from Zambia to Cambridge, Mass. and he complaines that he did not receive any newsletters from PPRE recently...

<gimbah_at_MIT.EDU>

Yundong Mu (China–PPRE-00/01) wrote us: 'Yes, I am in Vancouver. I got a chance here after the PPRE course finished. My current job is nothing related with RE but computer. I am doing programming work and taking the computer course meanwhile.
I think I can find some chance later on to continue my specialty.
I am missing Oldenburg and you people there!'

<muyundong_at_hotmail.com>

Tang Hui (China–PPRE-00/01) told Edu: 'I am now working for WindSolar AG (*<http://www.windsolar.com>*), on big wind farm project planning. We collect information, contact with chinese government for permission of wind farm, analyse the investment and design the farm. Because China is totally different as Germany, it is very unsure, if we can really get the permission and build up a wind farm, even we have several projects in schedule now. For me the important thing is experience and the working procedure from my German colleague.

I think I will go back to China after a period. If you know some renewable company, which want to develop chinese market and want people like me, do please let me know.'

<tang_hui00_at_hotmail.com>

Raveendra Sellahewa (Sri Lanka–PPRE92/93) sends regards and writes: 'It's more than half a decade since I finished my studies at Oldenburg but still I am happy to know what's happening there. Haven't heard anything from Edu for a while and not even received the latest News Letter. Hope you all are doing well at Oldenburg. Kind regards to all.'

<rsellahewa_at_hotmail.com>

Jingjing Wang (China–PPRE-94/95) Jinjing is now in Canada and writes: "I am doing well here in Montreal, and Spring is coming. Actually

An engineer was crossing a road one day when a frog called out to him and said, "If you kiss me, I'll turn into a beautiful princess." He bent over, picked up the frog and put it in his pocket. The frog spoke again and said, "If you kiss me and turn me back into a beautiful princess, I will stay with you for one week." The engineer took the frog out of his pocket, smiled at it and returned it to the pocket. The frog then cried out, "If you kiss me and turn me back into a princess, I'll stay with you and do ANYTHING you want." Again the engineer took the frog out, smiled at it and put it back into his pocket. Finally, the frog asked, "What is the matter? I've told you I'm a beautiful princess, that I'll stay with you for a week and do anything you want. Why won't you kiss me?"
The engineer said, "Look, I'm an engineer. I don't have time for a girlfriend, but a talking Frog? Now that's cool."

there is no real Spring in Canada, only Winter and then suddenly Summer. But what important is that the sun is shining almost everyday. I heard that you are having a cold Spring in Oldenburg. Tut mir Leid!"

<jjwtong_at_hotmail.com>

Ramesh M P (India–PPRE-88/89) writes: "There may be some exciting news for you from my side this year. I am moving to Chennai (formerly the City of Madras) to a Centre for Wind Energy Technology as the Executive Director. Now that is a news that affects me most, but you will perhaps be glad that one of your students will now be in charge of Wind energy related activities at a research and development institute."

<ramesh_at_css.cmmacs.ernet.in>

Johnny Nahui Ortiz (Peru–PPRE93/94) A short note to let you know that I was pleased to receive today the PPRE Newsletter. As always, it's a pleasure to hear news from Oldenburg. In a few days, I will leave for Lima-Peru to initiate a "new life", hopefully more involved in RE. I plan on working with local and regional NGOs in Latin America. If I can be of any assistance to anybody at my new location in Latin America, please do not hesitate to contact me at the above address.

Some months later Johnny wrote: 'I am presently serving as the Executive Director for the Latin American Research Center, an NGO based in Lima and focused on Energy Efficiency and Renewable Energies aspects within the Latin American region. Last month I went to lecture at the Federal University of Rio de Janeiro in Brazil and will keep conducting similar activities in the region...

I am glad to hear that the PRE program does continue in pretty good shape, perhaps we will be able to host somebody here for his/her practical training sometime in the near future...'

Johnny remarked also: 'We have recently established a local network of people interested in Renewable Energy to promote research and training in solar, wind, biomass and hydropower. At this point, we are seeking potential funding sources to propose a joint int'l postgraduate program in Renewable Energy for South America. I believe the University of Oldenburg was going to establish a postgraduate program in Chile, is that already working?. Would it be possible for us to consider a cooperation program with the University of Oldenburg? if you have any suggestions to help us establish the above int'l program, please let us know.'

<jnortiz_at_amauta.rcp.net.pe>

Kelleh Gbawuru Mansary (Sierra Leone-PPRE91/92) is now enrolled at Southeastern University/US in information technology.

<kellehgbawuru_at_hotmail.com>

Roseline Akwanwi Ambe (Cameroon-PPRE99/00) sends greetings to all present PPRE students and staff.

<*akwanwi_at_yahoo.com*>

Joel Kioko (Kenya-PPRE-90/91) still working with Kenya Bureau of Standards, sent regards to Edu from Kenya, telling that "life here is difficult, but manageable" and recommended a candidate for PPRE application.

<*joelkioko_at_hotmail.com*>

Liu Hui (China-PPRE98/99) Our colleague (see fig.2.1) writes: 'I am considering to resign from Gofly Green Energy Corp., because I want to go around in China and give PV and wind training. Professor Cui is just back from his journey to Beijing and several other places in China, he said PV training is very needed in China now.'

A second e-mail told us 'I have changed my job in last Dec. I left the green energy company, now I am working in the Agenda 21 Research Institute of Shanghai Jiao Tong University. It is institute dealing with sustainable development research.'

And some time later: 'As I told you, from last Dec. I have been working in Agenda 21 Research Institute, recently I continue my idea on renewable energy education in China, I contacted some people, inculding World Bank officals, State renewable energy officals, one school in Shanghai Jiaotong University, we reached to a common sense that renewable energy education will do a lot to improve China renewable energy development. As to the result, our university would like to start it from applying to be World Bank renewable energy training base first, and then Master of Science renewable energy education. Next week I will go to Beijing and meet the responsible people there and discuss more deeply. I wonder if PPRE has interest to attend this project, if so, please give me a statement, and your recommended role to play in this project. So here I can build it into the whole project, and of course it will help for the whole project's success.'

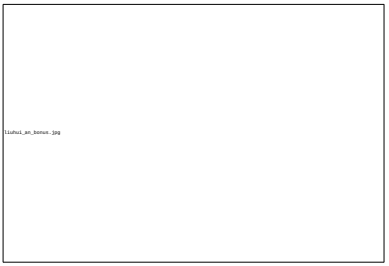

Figure 2.1: Liu Hui at hub height during Installation of AN Bonus 600KW wind turbines

<*liuhui0508_at_online.sh.cn*>

Jan Lam (Netherlands-PPRE-98/99) Jan has started a solar company in Mali. He wrote: 'Since December 00 I am trying to put up a commercial company who is selling energy service, for now only electricity, in the Southern region of Mali. At present the electricity is generated through SHS's. In the future we will also put up microgrids if there is an economic demand for power. Shareholders of the company are NUON of the Netherlands and EdF of France. We have a concession of the Malinese Government to work in this region for twenty years. More on this in a later letter. It might also be a useful place for PPRE students to do their practical period.'

And (in November 2001): 'Thank you for your mail, good to hear from you again and greetings from Mali. We are doing quite well, most of the turmoil the world is facing is passing here unnoticed.

Thank you also for your reminder on the external practical training for PPRE students. We are very interested to host one or two students. The company they would work in is called 'Societe de Services Decentralises' and is

operating under the local name 'Yeelen Kura' which is Bambara for New Light. The company is registered under the Malinese law and intents to provide long term energy services on a commercial basis to the rural areas of southern Mali, the cotton region. The company's main office is located at Koutiala, some 400 km by road from Bamako.

Initially, these services will be provided by SHS's while later on local grids will be established in communities with a sufficient commercial basis. Eventually other services e.g. for cooking (solar cookers, butane gas outlets) solar water pumping stations, etc.

After the initial recruitment and training activities the company was officially launched in May of this year and has now about 200 clients divided over 12 villages. The services provided are currently 100, 200 and 400 Wh/day which are used for domestic lighting, radio and small TV sets. We expect to increase the number of (solar) clients to 1700 in one year time.

To get better insight in the functioning of the solar systems we need to set-up data measuring and logging systems in order to compile energy production and user profiles. The installation of 4 such loggers and the setting up of an evaluation method of the data would be the main task for the student(s). Of course we can continue supplying data to the student(s) after the training period so the whole exercise can be used as a basis for a thesis. If this idea sounds interesting to you we could work out a ToR and send it before the end of this year to Oldenburg.

The student(s) need to have a keen interest in SHS and the issue electricity supply in remote area's with a limited economical basis. Also a basic knowledge of the French language is required, English is of little use here. We can offer an insight in the functioning of our company and the problems surrounding our work. Of course we will also give the necessary support during their daily activities. Furthermore can we offer transport from Bamako to Koutiala vv and accommodation in both places. Unfortunately our financial means are limited and I can not promise as yet any compensation for travel costs from Oldenburg to Bamako vv.

Please give my best regards to all friends in Oldenburg.'

Recently he has taken a student from present PPRE01/02, Ernest Mazimpaka (Ruanda) for practical training for Solar Home Systems.

<ssd_at_afribone.net.ml>

Rolf Georg (Bolivia-PPRE-92/93) Rolf send notice that he finished PhD and has left PPRE-L discussion list because of some frantic exchange about rules etc. in the list some time ago.

<rgeorgz_at_mara.scr.entelnet.bo>
<georgrolf_at_hotmail.com>

El-Fadil Ahmed Adam (Sudan–PPRE90/91) writes:
'Since 03 April 2002 I have arrived at Stuttgart to conduct three months of research at the University of Hohenheim. The proposed research plan is mainly dealing with solar drying of tropical fruits and vegetables. Detailed information you will get it in the course of the coming time.'

<fadiladam_at_hotmail.com>

Richard Morris (Australia-PPRE96/97) Richard and his wife Sandra returned to Germany early in 2001. They have a baby boy, Leon Alexander, since April 2001. Richard is now working with Alstom Ballard as an engineer in a fuel-cell pilot project for CHP stations. He and Matthias

Beltz (Matthias is also PPRE96/97) visited Oldenburg in Summer 2001 and gave short courses on their respectice subjects in PPRE00/01.

<r_s_morris_at_hotmail.com>

Christopher Oludhe (Kenya–PPRE88/89) is interested in 'working together on wind. I have just returned from Paris, France on a meeting concerning SWERA (Solar and Wind Energy Resource Assessment project, 5-7th Dec. 2001). We had fruitful discussions with Risoe and many other institutions.'

<coludhe_at_uonbi.ac.ke>

Wang Di (China–PPRE99/00) wrote: 'Right now, I am working for NEG Micon China in the sector of wind power industry, being involved in the development of wind farm projects up to the capacity of 300 MW. Many thanks again for you, Igor, Edu and all the PPRE people.'

Finias Magessa (Tanzania-PPRE00/01) Finias directs your attention to a new website: 'Dear friends, Please have a look on the following website *http://www.see-net.co.tz/*. It is still under construction and you are invited to provide your inputs and comments as far as a website layout and contents is concerned. Please feel free to share your experience with us. The website is of a Tanzanian NGO specialised in RETs and environment practices, in which I am an employee too. It is my every hope that you will be able to contribute. Thank you very much for your time and kind collaboration..'

He recently wrote: 'I am currently working on a Integrated Renewable and Environment Project. We are building local capacity in designing, installing, maintaining and handling small PV systems. We are also currently installing a small wind turbine for demonstration and awareness creation on wind electricity. Two weeks ago we had a training Workshop which involved the use of WAsP programme with resource personnel from RISO Denmark. We were analysing data for four sites in Tanzania which are under examination on their potentiality to generate electricty from wind. My organization, TaTEDO is a partner in the project.'

<fmagessa_at_hotmail.com>

Nebiyu Yimer (Ethiopia-PPRE-96/97) Nebiyu tells us about his work: 'ESBI Alberta Ltd is part of the ESB International engineering firm which is based in Ireland. The parent company ESB (Electricity Supply Board of Ireland) is an electric utility company with some 1.5 million customers. In 97, ESBI Alberta was appointed by the provincial government to be the Independent Transmission Administrator (TA) for the province's interconnected electric supply system (a result of the ongoing deregulation of the electricity market). The title of my position is transmission planning engineer. The transmission planning group is responsible for developing and publishing the province's transmission system development plan; analysing system performance and modelling; assisting with the development of transmission system access tariff filing, etc.'

<yimer_at_hotmail.com>

Aravind PV (India–PPRE00/01) is now working with Section of thermal power engineering, Faculty of Design, Engineering and Production, Delft University of Technology , Delft, Netherlands, as a PhD student.

<p_v_aravind_at_hotmail.com>

Figure 2.2: Wisdom near Solar street light (PV panel is on top of the mast in the background)

Wisdom Ahiataku-Togobo (Ghana–PPRE96/97) Wisdom, after taking part in a UN conference in New York and a workshop in South Africa, visited Oldenburg in spring and summer 2001. He was here at the same time as Oo (see page 15) with an re-invitation scholarship from DAAD, giving classes to present PPRE00/01 on the *Application of Solar PV in rural communities of developing countries* (and other subjects) and visiting partner institutions in Germany and Europe. Wisdom is still working with Ministry of Energy and Mines in Ghana and was involved in the conference “Knowledge Networks for Sustainable Energy in Africa (KN-SEA)”, June 29-30 2001 in Accra, Ghana, which was sponsored by the World Bank. See also his picture when visting a site, where solar street lights have been erected (figure 2.2).

<*wisdom_at_NETAFRIQUE.COM*>

Ernst Steinmeier (Mexcio–PPRE95/96) ‘Hi, here is Ernst Steinmeier from Mexico... Long time no see, na? I have just receied the last newsletter from 1/01, thanks! I have a proposition for all of the ppre that are out there scattered all over the world... It is obvious that we are a rather economically poor number of people, so any strong investment coming from a single participant in his or her country is rather uncommon. The idea is as follows... I was paging a Wind energy generator catalog were all the models with their different specifications and capacities are available. My attention was caught with the E-66, a machine from Enercon with a generating capacity of 1.5 MW. The cost of this "creature" almost reaches 1.5 million dollars. And of course there are other costs involved like freight, mounting, remote data monitoring services, insurance, etc, etc. What I am looking for is a group of ppre´s who may be willing to invest on one of these machines. If we could get together we can invest each with different amounts, and the income due to the production of the generator shared in proportion of the investment made.

We would also need a "german" contact or organizer who would get a percentage of the income for his administrative services. Part of his services would be to make all the necesary contracts for the installation of the generator, manage the payments for such an installation, make insurance contracts, manage municipal permits, and deposit the proportional shares of the producion in the accounts of the shareholders. And I am sorry Edu, but everything points to you! And as I understand your family posesses some land east of Oldenburg, perhaps you can provide us with the land and receive part of the share depending on the cost of the land. So basically what we are looking for is individuals who want to participate and invest in such projects. The objective is to raise 2.2 Million Dollars, which in my opinion is aproximately what the hole project will cost. See what you can do edu. I suggest this gets posted in the PPRE-L list. And to start off I will make the initial proposal. Count me in with $ 20,000.00 US dollars, and I am willing to travel to germany to deposit when

An unemployed man goes to apply for a job with Microsoft as a janitor. The manager there arranges for him to take an aptitude test (Section: Floors, Sweeping and Cleaning). After the test, the manager says, “You will be employed at minimum wage, $5.15 an hour. Let me have your e-mail address, so that I can send you a form to complete and tell you where to report for work on your first day.” Taken aback, the man protests that he has neither a computer nor an e-mail address. To this the MS manager replies, “Well, then, that means that you virtually don’t exist and can therefore hardly expect to be employed.” Stunned, the man leaves. Not knowing where to turn and having only $10 in his wallet, he decides to buy a 25 lb flat of tomatoes at the supermarket. Within less than 2 hours, he sells all the tomatoes individually at 100% profit. Repeating the process several times more that day, he ends up with almost $100 before going to sleep that night. Thus it dawns on him that he could quite easily make a living selling tomatoes. Getting up early every day and going to bed late, he multiplies his profits quickly. After a short time he acquires a cart to transport several dozen boxes of tomatoes, only to have to trade it in again so that he can buy a pickup truck to support his expanding business. By the end of the second year, he is the owner of a fleet of pickup trucks and manages a staff of a hundred former unemployed people, all selling tomatoes. Planning for the future of his wife and children, he decides to buy some life insurance. Consulting with an insurance adviser, he picks an insurance plan to fit his new circumstances. At the end of the telephone conversation, the adviser asks him for his e-mail address in order to send the final documents electronically. When the man replies that he has no e-mail, the adviser is stunned, "What, you don’t have e-mail? How on earth have you managed to amass such wealth without the Internet, e-mail and e-commerce? Just imagine where you would be now, if you had been connected to the internet from the very start!" After a moment of thought, the tomato millionaire replied, "Why, of course! I would be a floor cleaner at Microsoft!"

the time so requires. So start making a list edu...’

<steinmeier_at_infosel.net.mx>

Comment from Edu: *Good thinking from Ernst. Actually I am not sure whether this amount of money can be raised among our alumni only, so I think it will be better to invest in shares of already existing windfarms here in Germany. As I have been active in the wind field for quite some time, I could use my contacts to check out good sites for you. So if there is sufficient interest and also money available among the PPRE-Alumni, why not invest it properly in the booming windenergy market? Maybe other alumni working on profitable projects in the RE-field have other suggestion?? I am looking forward to concrete figures from your side and let you know about any progress in due course!*

<edu.knagge_at_uni-oldenburg.de>

Al-Mas Sendegeya (Uganda-PPRE99/00) We got via PPRE-L an info request from Al-Mas: ‘Dear Friends, Is there anyone with an idea about a hybrid systems consists of a Biogas and a Solar Cooker? Please I request you to avail me with such info, I need it for my students who are accomplishing their academic project involving both subjects. I will be very grateful to receive your kind and immediate response.’

He also wrote: ‘I am pleased to inform you that I have been called by one researcher at Makerere University to join him in his research activitities. Currently, he has designed a project proposal about designing a "Model to be adopted to disseminate PV systems in rural areas in Uganda". The project will include designing and installing PV systems in different rural locations in Uganda. Testing and launching of the dissemination model will be the main activity of the project. The ultimate objective of the project is to increase the understanding of the process needed to achieve successful PV - electrification programmes and to define and test a framework for the design, management and implementation of a rural electrification programme using PV systems in Uganda.’

<salmas_at_techmuk.ac.ug>

Sebastián Sancho Dobles (Costa Rica-PPRE96/97) Sebastian writes: 'Perhaps there is still sometime left to include some info of my movements in the newsletter. I got another email account which is the following: <*sesado_at_usitmail.com*>. I quit my job yesterday, so then I will be working as freelance from April onwards. In the mean time I am helping two engineering firms in wind resource analysis in Costa Rica, so far we are in early stages, therefore further information still to come. Other plans are moving to Spain again in April with the idea of exploring how to get involved in the RE field, otherwise my saxophones will play an important role in my living...!'

And recently he wrote: 'Thank you for your email. I am super fine! Well, may be Edu has given you my latest news. Anyway, I tell you more or less what´s going on: I am working in Salerno, Italy, since July last year. By one of this life´s chances I got an offer from Lahmeyer International (consultants) to work overseas in a wind measuring campain in most of the southern regions in Italy. My work is more field related in measurement systems installation and maintenance, and when I have some time in the office I do wind data processing-analysis for wind farms energy production. It´s quite hectic this job. So far we have installed 45 systems, therefore everything has to be almost automatised. Nevertheless, wind measurement needs a lot of attention. Anyway I feel very happy with this work.'

<*sesado_at_usitmail.com*>

Jordi Avellaneda (Spain–PPRE01/02) took part in a training course at Mumbay/India: 'Dear PPRE colleagues, this is Jordi, writing to you from the Indian Institute of Technology of Bombay. Today is Saturday and the first week of the International Training Programme on Solar Energy is just gone. The experience is really nice not only for the course itself but also for the experience of the participants, the way the indian people treat us (really amazing) and the opportunity of visiting a very different country than mine or Germany. I have received news from some of you. I am really grateful. I know things are going on fine at Oldenburg. I wish you all good luck in your wind energy exam and see you back in Oldenburg on January, 21st...'

<*ave_at_cconline.es*>

Mzumbe Musa (Tanzania–PPRE99/00) wrote about his new position: 'I am now working for a private company called FREDKA International Ltd, based in Dar Es Salaam. It is an energy and business consulting company. I have worked with it during UNDP project removing barriers to the transformation of solar PV market in Tanzania which we are finalising now. I am working with the company on another one and a half years solar PV project which started October last year.'

<*mmzumbe2_at_hotmail.com*>

Quoc Khanh Nguyen (Vietnam–PPRE00/01) sent us many of the jokes printed in this issue. Some other jokes were submitted by R.P. Dhital and some funny pictures were sent by F. Petrucci.

<*khanh_2000_at_hotmail.com*>

Wesly Ureña Vargas (Costa Rica–PPRE98/99) is still working with Lahmeier International in Bad Vilbel / Germany

<*gewuv_at_lif.de*>

FUNNY THOUGHTS

1. "I sit here all day trying to persuade people to do the things they ought to have sense enough to do without my persuading them... That's all the powers of the President amount to." - *Harry S. Truman*
2. "One of the best ways of avoiding necessary and even urgent tasks is to seem to be busily employed on things that are already done." - *J.K. Galbraith*

Md. Saiful Islam (Bangladesh–PPRE00/01) wrote recently: 'I have left ISFH/Hameln few months ago. Now I am doing PhD at 'Katholieke Universitei' (Dept. of Electrical Engineering) in Leuven, Belgium (my detail contact addresses are with Edu). Anyway, over there my topic was passive solar thermal and I didn't find it interesting.

Currently I am working on grid connected PV and soon I will start working on offshore wind energy project here in Leuven.'

<saiful70_at_yahoo.com >

Satish Gautam (Nepal-PPRE-94/95) Satish wrote some time ago: "Things are okay on this side of the world. We plan to complete 70 micro hydro schemes generating 10 kw by the end of the year. Likewise, over 1000 solar home systems and biogas plants will also be installed. BTW, Ram Prasad Dhital and Om Paudyal, our District Energy Advisors have informed that they have been accepted by PPRE for 2001/02. Thank you and congratulations, they are both very hard working officers and they will not dissapoint you. They will bring a rich experience at the grassroots. They are both looking forward to the course."

Satish Gautam also submitted an article on 'Women and Energy' (see page 47).

<redpktm_at_mos.com.np>

Fernando Petrucci (Argentina–PPRE97/98) Fernando is still working in Wind energy and visited Germany in spring 2001: "Here a little dream came true for me. Now work shall begin. I am scheduling to come to Germany by mid of April and plan to visit Oldenburg." See also article on page 51

More recently (Nov 2001) he wrote:'I just attended a one-week wind energy seminar in Mar del Plata (a nice coastal city in Buenos Aires Province) sponsored by CDG. German specialists from ISET, BWE, Plenum, DeWind, TÜV gave us interesting presentations. The same seminar is taking place in Rio this week.'

And when looking at the preview of this Newsletter, Fernando wrote: 'This is a very nice initiative to have an online Newsletter, which, I guess, can be permanently updated. By the way I would just like to comment that the webpage *http://www.ppre.de/newsletter/first_version.pdf* took rather long to be displayed on a Pentium 200 MHz PC. Nevertheless I hope it can be optimazed.'

<fepe_at_arnet.com.ar>

Oo Abdul Rosyid (Indonesia–PPRE95/96) Oo send us info about SURED: Please find an enclosed file from the PPRE alumni to be published in the next PPRE Newsletter. The article (see page 24) tells about a seminar on Sustainable Resources Development (SURED), conducted in Yogyakarta - Indonesia, On 12-16 March 2001. The seminar was attended by the PPRE alumni in South Asia and China regions.

Recently he informed us that he returned back to Germany for PhD study in Uni-Magdeburg. He just started to work as a scientific co-worker (als Wissenschaftlicher Mitarbeiter) in Uni-Magdeburg in relation with PhD research, which is about hydrogen energy.

<rosyid_id_at_yahoo.com>

Isaac Ennison (Ghana-PPRE-90/91) The situation of Ghana's energy supply system, particular in the electricity sector calls for proper energy planning. In 98 the country experienced an electricity crisis due to the low level of the hydro dam which is the county's main source of electricity. This was the third time in the country's history. The first two times occured in 84 and 94. To deal with the situation the government has intalled a thermal plant which run on crude oil currently. It is expected that the thermal plan will in the future run on gas. The high cost of crude oil leads to shut downs at times. The water level of the hydro dam has gone down again currently raising fears of another electricity crisis.

The current situation calls for proper energy planning for the country. Ghana has launched an economic programme which is expected to propel the nation's economy to that of a middle income level by the year, which is equivalent to that of Mexico, Malaysia etc. Analysis performed by me and also by other researchers have shown that Ghana will require almost ten fold the generation capacity of the hydro dam, i.e. about 10,000 MW to meet Ghana's economic aspiration by the year.

The study being proposed is to develop electricity demand forecast methodologies based on energy modelling and other means for the nation. Proper planning of the integration of the various energy options of renewables and non-renewables will then follow. This will be based economics, environmental and other factors.

Isaac's latest mail from February 2001:'I have been in touch with Wisdom, the Ghanaian who completed the Renewable Energy course some few years ago in Oldenburg, at most of our meetings and conferences on energy. The main project on energy here in Ghana is the Strategic National Energy Plan sponsored by the Denmark Government. In addition there is an ongoing Regional Project on Sustainable Energy sponsored by the International Atomic Energy Agency (IAEA) handled locally by the Ghana Atomic Energy Commission and other local stake holders in energy.

I have not given up my research into affordable solar power systems. After a lot of brain storming in semiconductor systems, I have shifted to electrochemical systems. My study is concentrated on energy storage with endothermic systems. I will up date you with results if some thing positive turns out.'

<iennison_at_yahoo.com>

S A Patil (India–PPRE98/99) Last month, I have been transferred to Pune from Kolhapur Division. However, my official address for correspondence will remain same. Due to change in residence address, I have opened a new e-mail account with rediffmail. In this context, please note my new e-mail address for all future correspondence - <samx1_at_rediffmail.com> Prior to my transfer, I was busy in studying possibility of setting power project on biomass in a small remote hemlet in south Maharashtra. The area did not had access to computers and so no e-mail bussiness for long time. Furthermore, a small presentation on my M.Sc. thesis was done by me in IIT, Mumbai. The methodology of study was appreciated. However, the study on effectiveness of collecting tar by use of adsorbent was felt necessary. I may cover this issue in my future studies. I have been transfered to Pune. I have been posted in 'Power Group'. The group is concerned with Grid connected Power Projects. My new job responsibilities are - Small Hydro Power, Energy from Waste and Solar PV Power Plants. I believe, PPRE will definitely help me in undertaking projects related to this field.

<samx1_at_rediffmail.com>

Eric Fischer Rempe (Brazil–PPRE87/88) is now working as guest professor with CIM/GTZ at CEFET-PR Unidade Curitiba in Brazil and is organising in cooperation with TU Berlin a network on 'Sustainable Development of Regions and Cities in Latin America'. Details can be found at *http://www.tu-berlin.de/abz/netz/*

<efischer_at_cefetpr.br>

Mzumbe Musa (Tanzania–PPRE99/00) Mzumbe Musa works with KARADEA Solar Training Facility in Karagwe-Kagera / Tanzania. He wrote: "We conducted a two week coffee solar drying training from 18-29 June 2001. The course participants were artisans from Karagwe, a rural coffee farming district in north-western Tanzania. Partipants learned on how to build indirect solar dryers. Up on completion of the course we expect those artisans to build solar dryers for other people in the district. This is a part of dissemination of solar drying project implemented jointly by KARADEA Solar Training Facility (Tanzania), National Institute for Research in Rural Engineering, Water and Forestry (Tunisia) and KARAGWE FÖRENINGEN (Sweden). The project is funded by SIDA. We also conducted a three week 'PV installation course' for solar technicians from East African countries-Kenya, Uganda and Kenya from 2- July, 2001."

<mzumbe_at_africaonline.co.tz>

Alemu Tadesse (Ethiopia–PPRE99/00) sends regards from the USA.

<alemu_t_at_yahoo.com>

Thomas Schwarz (Germany–PPRE89/90) informed that he is now working in Ulm / Germany, with solar company Phönix Sonnenstrom AG (*www.sonnenstromag.de*).

<Schwarz_at_sonnenstromag.de>

Bertha Abdu (Nigeria–PPRE-91/92) sends regards to PPRE00/01 students (see fig. 2.3): Big congratulation on your graduation. Wish you all the best in all your undertakings. Cheers.
Bertha (92 graduate)

She also states: 'I am the one who was called *Bertha Danja Laufun* and I am now married to Mr Lonis Abdu. I am doing fine. Regards to all.'

<abdulonis_at_yahoo.com>

Saioa Tardón (Spain–PPRE-00/01) is now working as a PhD student in solar cell research in the group of Prof. Bauer at CvO University Oldenburg

<saioa73_at_hotmail.com>

Christophe Tiako (Cameroon–PPRE98/99) married last November in Detroit US. He and his wife Gislaine Tsemo send warm regards to all PPRE alumni.

<chriti_at_yahoo.com>

Liz von Hauff (CANADA–PPRE00/01) writes: 'I am working on my phd at the university in Jena in a research group in the field of theoretical membrane physics. The goal of the group is to model and describe using physical methods membrane characteristics and behaviour. Knowledge in this field could be applied in areas like drug therapy applications, or membrane fusion (important to understand origin of life), etc. There are three of us in the theoretical group and we are working with a larger experimental group of about ten.'

Figure 2.3: After PPRE00/01 graduation on 7th September 2001

latest news from April 2002: Liz is returning 'home' to Oldenburg to start her PhD-studies within the research group of Dr. Vladimir Dyakonov with respect to organic solar cells.

<liz_at_spintriplet.com>

Yang Na (China–PPRE98/99) wrote to Edu: 'How are you? Hope you have a happy Christmas and good luck to this year. Your kindness and zest to us gave me deep impression. I and my husband always pay great attention to the news concerning Germany. The days in Germany gave us good memory.
My work is fine and quite stable. I can not specify what kind of job I do every day as my work involes many aspects which including project evaluation, bid documents prepared, procurement equipment for the wind turbines.'

<yangna_at_public.hh.nm.cn>

Chayun Budiono (Indonesia–PPRE92/93) sent us some info on possible changes in US energy policy & legislation: 'Subject: Two Senators Urge More Renewable Energy — United Press International (February 27, 2002) WASHINGTON, Feb 26, 2002 – Senators and energy industry officials said Tuesday that legislation going before the Senate should include provisions for increasing the use of renewable energy sources, such as solar and wind power.'

<chayun_at_INDO.NET.ID>

Ruben Vasquez (Chile–PPRE-97/98) returned home after two years postgraduate studies in energy he did in Lausanne, Zwitzerland. He wrote to Edu: 'Since I'm back in chile I have been working in a renewable energy company named 'Captasol'. As we take part in differents meeting is that we met a Real state company which is trying to sell a big piece of land placed at the south of chile. This land is several thousand hectares with more than half of older native forest. We do not want to someone destroys this forest (japanese pulp company or forestrys companies)'

<rubenvasquezc_at_hotmail.com>

Raul Niño (Venezuela–PPRE-00/01) writes: 'My name is Raul Nino, I am a former participant from Venezuela and I am currently working for The Netherlands Energy Research Center (ECN) in Petten, Netherlands, as part of the Wind Energy Unit.

Every year ECN organises an international training course on the Implementation of Wind Energy and the time for applications had just started.

The next couse will take place from 8th-19th April 2002. A complete description of the course can be found at:

www.ecn.nl/edu/11ewinde

I think is a great opportunity for those who want to learn more about the whole process for developing a wind energy project. And if you can not get funding from your country they also have grants for sponsoring eight people.'

<raul_nino_at_hotmail.com>

Francis Sichali (Malawi–PPRE97/98) wrote to Edu: 'I have since quit government and presently work for a private consultancy on rehabilitation of rural health centres and will be glad if other participants within the region can furnish me with windmill companies for water pumping. On Solar pumping we are OK only that other clients want to try windmills as well. I will write more when the projects take off.

Regards to everybody. Newsletter is it ready? I need a copy.

<fmasichali_at_yahoo.co.uk>

Melis Teka (Ethiopia–PPRE-94/95) reported: 'Sometimes ago already I have informed you that I am working as energy specialist in Environmental Protection Authority in Ethiopia since 1999. In my work I have done a study for "energy crisis in rift valley area". This area is mainly a place for tourism, livestock rearing and other agricultural activities. The youth groups are extremely extracting the biomass as charcoal for income generating and for other means. In the area the Ostrich Park critically exists. Here, the extraction of charcoal is not efficient. Due to this crisis the lives of the area is extremely endangered. Therefore, I want make a proposal, which could be intervene with the application of solar technology as an option for lighting purpose in the area and the introduction of improved kiln for charcoal production.' (see page 34)

<tekamelis_at_hotmail.com>

Gerd Heilscher (Germany–PPRE87/88) for the last years working as head of 'ISTenergiecom' and 'Solarstrom AG', now announced that his company has formed a new alliance with 'meteomedia AG'and now offers new and interesting services for solar energy users under the company name 'meteocontrol GmbH' at Augsburg / Germany. Details can be found at

windows_fenster.jpg

Two engineering students were walking across campus when one said, "Where did you get such a great bike?". The second engineer replied, "Well, I was walking along yesterday minding my own business when a beautiful woman rode up on this bike. She threw the bike to the ground, took off all her clothes and said, "Take what you want.". The first engineer nodded approvingly, "Good choice; the clothes probably wouldn't have fit."

Figure 2.4: PPRE01/02 students at an ENERCON E-66 near Wilhelmshaven

<http://www.meteocontrol.de/>.

<heilscher_at_meteocontrol.de>

Muiruri John Kimani(Kenya–PPRE89/90) is now working as Coordinator, with Conflict Management Initiative, German Development Cooperation (GTZ), Nairobi, Kenya.

Mazharul Islam (Bangladesh–PPRE00/01) informed us recently that currently he is involved with the 'renewable energy and energy efficiency program' of Bangladesh Power Development Board. His new e-mail address is:

<anjan_at_citechco.net>

Udayan Pandya (India–PPRE-92/93) is also sending good wishes to the PPRE00/01 absolvents: 'Dear friends, I would like to congratulate all of you who are graduating from PPRE. I wish you all for promoting, supporting, inovating renewables all over the world where ever you all get opportunities in what ever capacities. Any body comes to Ahmedabad (India) is most welcome.'

In another mail Udayan tells us: 'I want specific information from you. If you remember, I am a trustee of a charitable trust called SNEH (Society for Nature, Education and Health) and they are interested in installing low cost solar lanterns in North-East India. We need about 100 PV panels of about 10W each (12V as well as 6V). Could u please suggest from which manufacturer and what price. Can we think something jointly ? Prototype of model (lantern) is ready. This is purely on experimental basis and we want to make a field test of low cost systems for rural folks for which we will also coordinate with a local agency.'

<mail2udayan_in_india_at_rediffmail.com>

Others who sent good wishes on the occasion of graduation were:

Syed Ehteshamul Huq Masum (Bangladesh–PPRE99/00) *<smasum_at_bttb.net.bd>*,

Binu Parthan (India–PPRE97/98) *<bp_at_itpi.co.in>*,

Sham Sundar Subbarao

Figure 2.5: Oliver Risse (project manager of company SUNTECHNICS) checks Germany's largest PV installation in Hohenfels

<sham_india_at_yahoo.com>

Oliver Risse (Germany–PPRE-00/01) sent the following message last November: 'PPRE and Umwelt-Campus Birkenfeld engineer started the biggest PV power plant in Germany! (See fig. 2.5)

read: *http://www.heute.t-online.de/ZDFheute/artikel/0,1251,WIRT-0-10661,00.html*

We expect Oliver to give a class in PPRE01/02 on his PV systems experience, maybe in Mai 2002.

<olr_at_suntechnics.de>

Godofredo Magpoc Jr. (Philippines–PPRE95/96)
My company is preparing to work (design and installation) on various decentralized energy supply systems (140 sites per year for the next 5 years). While solar home systems and wind-diesel hybrid systems are common, I haven't heard of anyone doing work on solar-diesel systems.

If anybody has information on solar-diesel systems please send me an e-mail.

<gbmagpoc_at_NAPOCOR.COM.PH>

Senda Hurmuzan Kanam (Indonesia–PPRE93/94))
wrote because he wanted updated addresses of his German classmates Matthias Rommel and Oliver Siefert and told us that he became father of a second child, a son.

<senda_at_bppt.go.id>

Gajanana K Hegde (India–PPRE96/97) wrote last fall: 'I came back from Mongolia last weekend where I was the lead consultant to UNEP (division of technology, industry and economics) for the first Mongolian National training program in CFC free refrigeration. One week training program was very well received by the participants and the Government of Mongolia. It was a valuable experience for me to do the entire program through interpreters as hardly anyone speaks English there.'

Latest news: Gajanana will also move to Australia in Summer 2002, to start his PhD project at the Center for RE and Sustainable Technology, Curtin University of Technology, Perth, Australia ((Ali Salim Al-Alawi (Oman PPRE-98/99) is at the same institute)

<akh67_at_yahoo.com>

Alejandro Umaña (Columbia–PPRE01/02) is taking part in this years ECN-Wind-Course. (see Raul's message 19)

<kask_at_hotmail.com>

Ainea Kimaro (Tanzania–PPRE88/89) writes: 'Many greetings from Ainea, and many thanks for keeping me posted with all the happenings taking place in the field of Renewable Energy at Oldenburg and

An architect, an artist and an engineer were discussing whether it was better to spend time with the wife or a mistress. The architect said he enjoyed time with his wife, building a solid foundation for an enduring relationship. The artist said he enjoyed time with his mistress, because of the passion and mystery he found there. The engineer said, "I like both." The two others queried, "Both?" Engineer: "Yeah. If you have a wife and a mistress, they will each assume you are spending time with the other woman, and you can go to the lab and get some work done."

worldwide. One of recent outstanding achievement in which I have participated is the design, installation and testing of a single biodigester 150,000l that produces over 60,000l of bio-gas daily since 300 days ago. So, let us believe in the innovation. Perhaps the next good news will come from a solar crop drying project that we are working on at the Kigali Institute of Science and Technology in less than 3 months from now. In conjunction with these brief lines, could you stretch your kindness further and pass on to me the e-mail address of Mr. Oliver Siefert.'

<ainea_2000_at_yahoo.com>

Alger Gil Guerrero (Mexico–PPRE00/01) started to work with Lahmeyer International in the field of Wind Energy after his graduation.

<ge_233_at_lif.de>

Ekkehart Naumann (former PPRE director 87-93) Consultant for Sustainable Development – Renewable Energy Specialist – Tel: (+263) (0)91 3377 Harare, Zimbabwe — Tel: (49) (0)171 9824815 (Germany)

<ENaum_at_AOL.COM>

Sham Sundar Subbarao (India–PPRE99/00) At CART (Centre for Appropriate Rural Technologies), Mysore, we are carrying out a small project on biodiesel. Myself along with three undergraduate students have got involved in a project 'vegetable oil as substitute to diesel'. The experimentation involves bringing the properties of vegetable oils equivalent to that of diesel by a process called trans-esterification. We are very much successful. To start with we have tried on coconut oil. Further investigation and engine testing is going on.

This year at CART, we have involved undergraduate students in innovative renewable energy and appropriate technology projects including

1) vegetable oil as substitute for diesel.

2) design and fabrication of see-saw pump (manual water lifting device).

3) design and fabrication of biomass and solar dryer.

4) software for solar home system design.

5) field installation of hydraulic ram at a remote place.

6) performance study of wood gasifier.

7) fabrication and installation of portable hydraulic ram (Brauer Ram).

One more good news : At our campus we are installing a wood gasifier to supply 80kW of power. The gasifier will become operational from next month. It will be using coconut shell and other biomass as fuel. The plant will be supplying 40 % of the energy requirement of our main campus. Grate! we will be using 40 % renewable energy at our main campus.

NETWORKING

AFREPREN Newsletter

The AFREPREN Newsletter can be subscribed (copies are received as e-mail attachment in WORD format)

A pastor, a doctor and an engineer were waiting one morning for a particularly slow group of golfers. The engineer fumed, "What's with these guys? We must have been waiting for 15 minutes!". The doctor chimed in, "I don't know, but I've never seen such ineptitude!" The pastor said, "Hey, here comes the greenskeeper. Let's have a word with him" "Hi, George. Say, what's with that group ahead of us? They're rather slow, aren't they?" The greenskeeper replied, "Oh, yes, that's a group of blind firefighters. They lost their sight saving our clubhouse from a fire last year, so we always let them play for free anytime". The group was silent for a moment. The pastor said, "That's so sad. I think I will say a special prayer for them tonight". The doctor said, "Good idea. And I'm going to contact my ophthalmologist buddy and see if there's anything he can do for them". The engineer said, "Why can't these guys play at night?"

from:
Mr. Stephen Karekezi, AFREPREN/FWD, P. O. BOX 30979, Nairobi, Kenya (Tel: +254 2 566032/571467; Fax: +254 2 561464; Email: <StephenK_at_africaonline.co.ke> or <*Skarekezi_at_form-net.com*>)

International Network on Technical Information

Technology transfer and Information sharing is crucial in the network strategy, which allows the diversity of knowledge to play its appropriate role in participatory approaches for development. An integrated, online information system with organizations and networks, annotated links to websites, publications and databases will make information more accessible and easier to disseminate.

INTI is the International Network for Technical Information (<*http://inti.free.fr*>) which was founded in 1998 initiated by leading european organizations with technical advosory services (GATE,ITDG SKAT etc.) to facilitate sharing technical information in a efficient way. Presently, it links 11 european organizations which are providing technical information mainly in the fields of agriculture and nutrition, energy, water and sanitation, building, textiles and training. The main objective of the network is to have a synergy effect through conjunct power to improve the services provided through co-operation and mutual support.All member organisations of INTI are linked with each other, without a central facilitation. Accordingly, all INTI members aspire:

> to improve the exchange of information in the field of technical enquiries and to increase knowledge and skills,
>
> to save resources by the exchange of materials,
>
> to link development work,
>
> to increase the impact of the question and answer services.

Generally, INTI is not restricted to European groups but is open to all information services whose technical focus is on so-called appropriate technologies. To improve the services of the INTI following activities will be currently maintained:

- The member institutions meet once a year.
- A quarterly circulated email-newsletter informs every member institution about planned activities, new media, changes in the respective organisation or enquiry process and interesting news on used electronic media and software used of each.

INTI technical briefs This listings of INTI technical briefs gives an overview of the work done and the experience available in each partner organization. The responsiblity of the content and the copyright remains with the

organization given for each title. Also distribution condition are subject of individual organizations regulations.

INTI newsletter The INTI newsletters acts as a platform for information exchange amongst the partners. It does not deal with technologies as such but provides information about the partner organizations.

An expanded network is needed to promote technical information sharing further at the national, regional and international levels. Effective instruments are essential to facilitate the access to information such as; creating a global network of Technical Knowledge Resource Centres supported by a common electronic communication plattform. Innovative ideas from readers would be highly appreciated.

For further details contact:

Dishna Schwarz
GTZ-GATE
<dishna.schwarz_at_gtz.de>

DAAD Alumni Network - South East Asia and China

SECOND SEMINAR AND WORKSHOP ON SUSTAINABLE RESOURCES DEVELOPMENT (SURED II)

'Sustainable Development of Land, Water, Energy and Biotic Resources' 12-16 March 2001, in Yogyakarta-Indonesia

Oo Abdul Rosyid[1], *Chayun Budiono*[2], *and M. Augustus Leon*[3]

[1]PPRE 95/96, rosyid_id_at_yahoo.com
[2]PPRE 92/93 chayun_at_indo.net.id
[3]PPRE 93/94, retsas_at_ait.ac.th

To strengthen cooperation between the German universities of Karsruhe, Stuttgart and Oldenburg, and their alumni from the South-East Asia and China regions, a series of seminars/workshops have been conducted and planned in the region. The seminars are financially supported by the German Academic Exchange Service (DAAD) through the consortium of the Universities of Oldenburg, Karlsruhe and Stuttgart.

'Sustainable Resources Development (SURED)' is the theme of the seminar, and this includes Land and Water Resources Development, Infrastructure Planning, Urban Transportation, Energy Use and Development, and Sustainable Use of Biotic Resources. Environmental aspects play a major role in sustainable development, and hence form the core of the theme.

What does SURED stand for?

'SURED' stands for 'Sustainable Resources Development', which is the theme the regional alumni network promotes. The SURED programme supports the German alumni from the Universities of Karlsruhe, Stuttgart and Oldenburg, focussing on those who pursued their courses in English (such as Resources Engineering, Infrastructure Planning, and Renewable Energy). While the main objective of the programme is to develop and strengthen working relationships between the German universities and their alumni from the developing countries in the SE Asia-China region, it also aims at strengthening the co-operation between alumni groups, German universities, selected universities of the region, the GTZ (German Agency for Technical Cooperation), German Commerce Associations and German Enterprises working in the region.

Major activities of SURED include: the promotion of information

exchange between the target groups, the organisation of regional seminars/workshops, information and consulting through the internet, and publishing a newsletter.

Participants: apart from members of the above-mentioned target groups, engineers and experts working in the field of sustainable development of land, water and energy resources are also invited as participants. Representatives of various government departments and institutions working in these areas, including in education and training, are also invited.

The Second SURED Seminar

While the first SURED seminar was conducted in March 00 in Yogyakarta, the 'Cultural Center' of Indonesia, the second seminar was held during 12-16 March 2001, also in Yogyakarta. The seminar was organized by the German alumni from the University of Gadjahmada (Indonesia) and the University of Karlsruhe on behalf of the Alumni Network of South East Asia and China. About 35 participants attended the five-day second SURED seminar. Opening ceremony was held at Gadjah Mada University. Dr. Ing. Agus Maryono on behalf of the organizing committee welcomed the participants, followed by Prof. Dr. Dieter Prinz, Head of the SURED programme, Dr. Birgit Barden of DAAD, and Prof. Ichlasul Amal, Rector of Gadjah Mada University.

Keynote speeches were given by Dr. Gatot Hari Priowirjanto (Director, Dikmenjur), and Mr. Augustus Leon (Asian Institute of Technology, Bangkok). Prof. Prinz then presented an overview paper, and explained the deliberations of the seminar in the coming days.

The presentation session was started at the conference hall of Hotel Ambarukmo Palace afterwards, where the participants presented their papers.

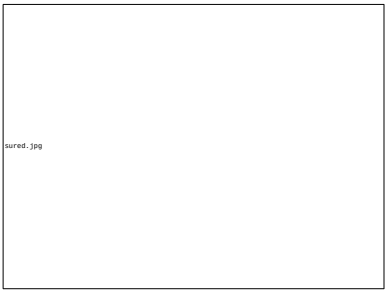

Figure 3.1: Mr. Rosyid and Mr. Chayun at the SURED seminar

Figure 3.2: Mr. Augustus Leon presenting the keynote speech

Lively discussions were held after each presentations, during which interesting exchange of experiences, views and ideas added spice to the seminar. The scientific presentations during the first three days were followed by a discussion on alumni issues. Brainstorming sessions were conducted on the fourth day by forming four Working Groups to discuss on four individual proposals on development projects. The results of the discussions were then presented by each group leader, followed by discussions.

The papers presented in the seminar are published in a Proceedings titled "Proceedings of International Seminar-Workshop; Sustainable Development of Land, Water, Energy, and Biotic Resouirces." ISBN: 979-96425-0-7.

The papers presented by PPRE alumni are as follows:

1. *Rosyid, O.A.*; GIS based Renewable Energy Planning for Indonesia; the Energy Technology Laboratory (UPT-LSDE, BPP Telnologi); Indonesia

2. *S. C. Bhattacharya*[4], *S. Kumar and M. Augustus Leon*; Experiences from a Regional Research and Dissemination Project on Renewable Energy Technologies in Asia; Energy Program, Asian Institute of Technology, P. O. Box 4, Klong Luang, Pathumthani 121, Thailand

3. *Budiono, Chayun*; Performance of PV Pumping Systems in Yogyakarta; PT. Gerbang Multindo; Indonesia

The proceedings came to a close on the fourth day when Prof. Prinz delivered the closing speech and thanked the organizers and participants together. An interesting city tour on the fifth day capped the programme.

The third and fourth SURED seminars are planned to be held in Vietnam during October 2001, and in Indonesia in March 2002 respectively.

Details are available at SURED website at *http://www.sured.de/*. For additional information, please contact:

Prof. Dr. Dieter Prinz
University of Karlsruhe
Faculty of Civil Engineering and Surveying
Postgraduate Course 'Resources Engineering', D-76128 Karlsruhe, Germany
Tel. +49-721-6084894
Fax. +49-721-6086165
E-mail:
Res.Eng_at_bau-verm.uni-karlsruhe.de

[4]AIT Bangkok

International Seminar 'Renewable energy and efficient use of energy: Options for a sustainable energy policy'

The International Seminar 'Renewable energy and efficient use of energy: Options for a sustainable energy policy' took place at the CEPAL (Economy Commission for Latin America and Caribbean) in Santiago, Chile, on 16 and 17 August 2001.

Heinrich Böll Foundation, Energy Research Programme PRIE (Uni. of Chile, Santiago) and Programa Chile Sustentable organized the Seminar. The following supported the meeting: Heinrich Böll Foundation, Economy Commission for Latin America and Caribbean CEPAL, UN Programme for Development, GTZ and Chilean Parliamentary Commission for Environment and Natural Resources.

ENERGY The Chilean electricity system is private with almost no regulations, prevailing the 'least-cost' concept. The Chilean energy system is strongly based on hydro power and fossil fuels. These are scarce, therefore must be imported. The expenditure from fuel import amounts about the income from mine exploitation (country's main economic activity) export.

RENEWABLE ENERGY Discussion about renewable energy role is just being carried on in Chile: It is necessary to substitute fuel import and diminish politic dependency due to the lack of conventional energy resources. It is necessary to diversify the energy sources. Because of the cyclic shortage of water in the dams, the country cannot trust only on hydro power.

POTENTIAL Chile has exceptional huge renewable resources: solar in the

Hillary Clinton died and went to heaven. As she stood in front of St. Peter at the Pearly Gates, she saw a huge wall of clocks behind him. She asked, "What are all those clocks?" St. Peter answered, "Those are Lie-Clocks. Everyone on Earth has a Lie-Clock. Every time you lie, the hands on your clock will move." "Oh," said Hillary, "who's clock is that?" "That's Mother Teresa's. The hands have never moved indicating that she never told a lie." "Whose clock is that?" "That's Abraham Lincoln's clock. The hands have only moved twice, telling us that Abe only told 2 lies in his entire life."
Hillary asked, "Where's Bill's clock?" "Bill's clock is in my office. I'm using it as a ceiling fan."

To the optimist, the glass is half full. To the pessimist, the glass is half empty. To the engineer, the glass is twice as big as it needs to be.

north; wind in the south; geothermal and hydro, along the country. Nevertheless, they still must be measured and quantified (except a few cases). Moreover, a legal frame must generate certainty for the needed investments.

So far, environmental concern has not added any reason for the introduction of alternative technologies. Chile, Brazil and California (USA) experienced the consequences of energy crisis: blackout. But the present market scheme makes energy price unattractive for new investments, even on conventional technologies. The same situation for other countries in the region, like Argentina.

Energy is strategic and cannot be cheap. Despite the big exceptions, there is worldwide consensus about the "global warming". So it is urgent to evolve to the use of clean and harmless energy. In the mean time the energy mix must be carefully designed.

A case study: Brazil's electricity supply comes mostly from hydro-power (more than 90%). New big hydro-power plants would not be economically feasible. New power capacity had to be thermal, using natural gas coming from neighbouring Bolivia and Argentina. Due to the Brazilian currency devaluation, the investments were postponed. Recently, a energy crisis arose because of an exceptional dry period, so shortage of hydro-power capacity. The market energy price increased up to 6 times and more. Industrial production was predicted to reduce and unemployment is growing. All this pressure seemed to be necessary for a decree of the 'Electricity Crisis Management Chamber', which established to implement 1.050 MW wind power until December 2003. Besides, the decree aims at promoting the seasonal complementation of wind and hydro regimes. A study [5] presented at DEWEK 00 shows the wind/hydro complementary seasonal regimes in Northern and Southern regions of Brazil. This study discusses the feasibility of seasonal stabilization of energy supply, taking advantage of Brazil's large natural resources.

Is time money? Will climate change wait? Then, anticipating the change would be worth the money.

sent by Fernando Petrucci

PROJECTS

SunTechnics PowerCan

by Oliver Risse–PPRE 00/01

The SunTechnics PowerCan, a joint product of SunTechnics and the University of Namibia (see fig. 4.1), is a state-of-the-art photovoltaic system with a prepayment function developed for the decentralised electrification of several remote households or even entire villages.

[5] Odilon do Amarante, Dario Schultz, Rogério Bittencourt and Nelson Rocha. 'Wind/hydro complementary seasonal regimes in Brazil', DEWEC 00.

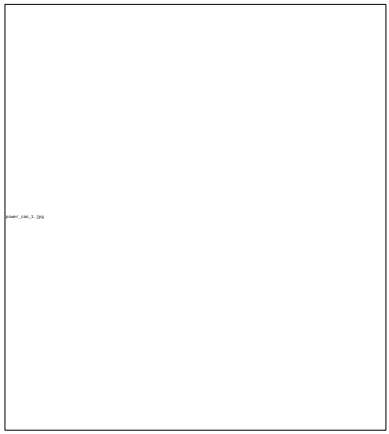

Figure 4.1: PowerCan, a joint product of SunTechnics and the University of Namibia

Thus, the PowerCan system offers a cost-efficient alternative to the extension of the public grid.

Its outstanding characteristics are its competitive financing and supply management model. The prepayment function represents an affordable solution to customers by enabling electricity consumption according to both the customer's needs and financial means. These households will be served by a local power purchasing station where they can purchase their required amount of electricity. The PowerCan is based on a plug-and-play technology making it easy to use for everybody and providing a maintenance-free energy supply. In addition, it is clean, noiseless, convenient and environmentally friendly. Supplementary to its prepayment function, the PowerCan has numerous substantial features ranging from DC power supply with an optional AC power supply to its inclusive anti-theft mechanism which is a vital function for its remote use. Each component of the PowerCan system holds an identification number and can only be operated with its related parts, making it unserviceable for unauthorized use. The components of the PowerCan system include:

- Central unit encased in a sturdy box, consisting of:
  - Charge and discharge controller
  - Battery
  - User interface with status display, and outlets
  - Control station for prepayment key
- Solar panel
- Energy saving lamp
- Prepayment key

The solar panel produces electricity which is stored in the battery of the central unit. After paying the fee at the local power purchasing station, the user plugs the prepayment key into the prepayment plug and can use the amount of electricity paid for.

Contact: *<o.risse_at_suntechnics.de>, <http://www.suntechnics.de>*

Biomass Based Co-generation in Nepalese Industries–Potential and Impediments[1]

by R.P Ghimire from Nepal (PPRE00/01)

Introduction Nepal is a small country, landlocked between India and China. The economy of Nepal is dominated by the agrarian sector which employs over 80 % of the economically active population and contribute contributes about 40 % of gross domestic product. The country faces formidable development challenges, which are compounded by its remoteness and

[1] Paper presented in a Biomass based Co-generation Workshop-Seminar in Dacca, Bangladesh in 1999

landlocked position. The main strategy for the country's development for the long term is to develop hydroelectric generation capacity efficiently to meet Nepal's internal energy needs and to export the power to India and thereby to mobilize financial resources for the broader development in all the sectors.

The energy situation in Nepal is characterized by very low per capita energy consumption (about 15 GJ). The total energy demand of Nepal was estimated to be 292 million GJ in 95/96, of which 91 % was consumed by the domestic sector, 4 % by the Industrial Sector and the remaining 5 % by other sectors. Three traditional fuels- fuelwood, agricultural residues and animal dung provide the vast majority of the energy consumed in Nepal. This traditional energy accounts for about 90 % of the total consumption, fuelwood dominating with about 80 %, then by Animal waste with 6 % and Agricultural residue with 4 %.

With the industrial sector growing at a high rate in Nepal, the demand for energy in the industrial sector is also increasing significantly. With the expected rapid industrialization fuelled by the liberalized economic policy of the Government, the demand for energy in this sector will grow significantly in future. Adequate and reliable energy supply is essential to support this growth. Moreover industrial sector has the most diverse demand specific energy requirements. On top of that, energy supply constraints, technological advancements, energy pricing etc. have a role to play in the energy situation in the industrial sector.

Government in Nepal has become increasingly aware of the urgent need to improve energy efficiency, both in production and in end-use. Ever increasing demand resulting from rapid economic growth accompanied by expanding industrialization and urbanization is creating considerable stress on the existing energy system. Greater energy efficiency helps to maintain secure energy supplies and bring national economic benefits through reduce dependence on the imported fuels and increased industrial competitiveness. Efficiency also helps to energy related pollution, a significant health problem in many countries, and limited emission of carbon dioxide, a possible contributor to climate change.

Improving energy efficiency has become an important strategic energy policy objective for the government. His Majesty's Government had established an Office of Industrial Efficiency Services under Ministry of Industry, which audit, advice, regulate and monitor the industries of the country for energy efficiency. In order to be cost effective and commercially viable over the long run, programs with the objective to promote energy efficiency in Nepal's relatively small industrial sector need to concentrate available resources on measures that would be replicable across the sector.

Industrial Energy Consumption Pattern The biomass energy constitutes of about 90.2 percentage of total energy consumption, of which fuel-wood share are about 80.6 %, agriculture residue 3.6 %, and Animal Waste 6 %. (WECS, 97). Industrial sector accounts for about 4.2 % of the total energy consumption. Even in the Industrial sector, about 30 % of the energy come from the fuelwood. The other major sources of energy are diesel (28 %), coal (21

Fuelwood is the dominant source of energy, mainly in small and traditional industries. A large number of medium and large-scale industries in rural and urban areas of Nepal, such as baking, brewing, lime burning, brick making, cutlery industries, etc also utilize fuelwood as a source of energy.

Agricultural Residues are important sources of fuel in Nepal. The amount of agricultural residues consumed in 95/96 as per WECS report is around million tons (235.5 million GJ) which is equivalent to 3.6 % of the total energy and 4 % of the traditional energy. The industrial sector accounts about 2 % of the total agricultural residue consumption for energy. Agricultural Residue such as rice husks and baggase are used in boilers and steam generation.

Electricity currently represents about 1 % of the energy consumption as compared to the 78 % of the long-term theoretical indigenous energy potential, since it is the main source, which will ultimately become the dominant source of indigenous energy.

Fossils fuel consumption in the overall energy scenario of Nepal is about 9 % of the total energy consumption, which is mainly used, in the industrial sector of Nepal. Industries Like cement, lime, and brick are totally dependent on coal. Diesel is mainly used in the industries for the captive generation of electricity as the industrial sector faces considerable amount of load shedding from the electricity utility.

Energy Supply Pattern Nepal's indigenous energy resources include biomass and hydroelectricity only. A negligible amount of low-grade coal (lignite) is extracted in Kathmandu and Dang valley, which is used in the brick manufacturing industries. The exploration work conducted so far has not established the fossil fuels that are economically feasible. The most of the energy needed in the industrial sector i.e. the fossil fuel is imported from India and other countries which accounts for at least 40 % fo the drain of the total foreign currency income.

Fuelwood is the main source of energy in Nepal. Wood energy varies considerably by physiographic and development regions. Major reasons for the variation are the degree of accessibility to the public forests and the amount of fuelwood requirement for different end-uses. The sources of fuelwood collection are forests, non-cultivated inclusions (NCI) and on farm areas. From WECS report 97, it is estimated that the forest area in 95/96 was about 5636310 hectares, of which 2508301 are accessible. Sustainable fuelwood supply in 95/96 was estimated to be about 13.92 million tons, of which about 6.9 millions tons is accessible. The break down being, 4.78 million tons from forests and 1million tons from the grassland and NCI and 1.1 million tons from on farm supply sources.

Supply of agricultural residues is dependent upon crop production. Such residues suitable for use as a source of energy are also used as fodder for animals and raw materials for industries. Estimate shows agricultural residue production to be in the tune of 7.5 million tons.

Nepal's theoretical hydropower potential is vast, estimated at about 83,000 MW. Further, it s estimated that technically and economically feasible potential are above 40,000 MW.

Nepal's theoretical hydropower potential is vast, estimated at about 83,000 MW. Further, it s estimated that technically and economically feasible potential are above 40,000 MW.

Coal consumption in the overall energy scenario of Nepal is about 1.1 % of the total energy consumption, which is mainly used in the industrial sector of Nepal.

Deficit of Energy Supply/Hindrance for Industrial growth In Nepal the main problem with the industries is the reliable supply of energy. As seen from above, commercial form of energy is the dominant source for in-

dustrial operation. Except for electricity, which is an indigenous production, all other commercial fuels are imported from India and other foreign countries. The overall share of electricity is only one percent of the total energy consumption in Nepal. As due to deficit of generation and supply, there is substantial amount of load shedding for the industrial sector. The supply of other commercial fuels is not reliable. The petroleum products and coal, the main source of energy for Industrial operation, do face supply constraint from time to time as there is lack of coordination of the organizations procuring these fuels. This deficit of the energy supply can be overcome to some extent by having co-generation with biomass residue that is abundantly available in Nepal. Nepal's relatively small industrial sector need to concentrate on the available biomass resources to promote energy efficiency that would be cost effective and commercially viable over the long run and that could be replicable across the sector.

Co-generation potential by biomass Several types of biomass are used for generating power and process heat in different types of Industries in the world. In Nepal co-generation through biomass can be made in different types of Industries like food processing, paper and pulp industries, pharmaceutical, textile, soap and chemical and carpet industries etc.

Nepal, an agrarian country is endowed with agricultural resources, which when processed in Agro-industries, generate large amounts of residues, varying between 30 to 50 %. The potentiality of agricultural residue is great, as detailed studies show (available from the author).

Besides this, In Nepal there are 293 modern saw mills and wood industries where about 55,000 cubic meters of timber is processed and the wood waste obtained is about 50 %. This waste obtained from the wood and agro industries can be a potential primary energy source for co-generation. The main agri-wastes are rice husk and baggase that can be used for co-generation. According to estimates by WECS, the production of rice husks is about 814000 metric tones and baggase is about 535000 metric tones.

The annual production of sugarcane in Nepal is about 1622 thousand tons. Processing one ton of sugarcane will generate an average of 290 kg of bagasse, which is capable of producing about 100 kWh. Thus with 535 thousand tons of baggase, the potential of power generation is about 184 GWh/year in Nepal.

Considering that milling 1 ton of cane consumes 30 kWh, the total electricity requirements to mill all the cane of Nepal is 48.66 GWh. Thus the balance of 135 GWh can be sold to the grid of Nepal Electricity Authority or to industries in the neighborhood. (Note: In Nepal there are altogether 11 sugar mills where bagasse generated as residue is utilized for heat and power generation.)

The annual production of rice husk in Nepal is about 81400 tons. This husk produced as a residue from the rice milling industry can be used as a fuel for co-generation. As every ton of paddies processed generate around 2kg of husk which when used, as fuel is capable of producing 100 kWh of electricity on an average. Considering that milling one ton of paddy consumes 30kwh on an average, the total energy requirements to mill all the paddy in Nepal is about 11.5 GWh. Assuming that all the husk could be used and that 2.7 kg of husk are necessary to produce 1 kWh, around 301 GWh could be generated. The if the milling industries utilizes 11.5 GWh by itself still 288 GWh of power could be theoretically available for sale to the grid or neighboring industries.

Moreover, in the small rice mills, where

it is not feasible for co-generation, the husk obtained can be supplied to other industries like soap and chemical industries and paper industries, where it can be used as fuel to burn in the boilers to generate steam and power.

Also there are about 293 modern sawmills, plywood factories and furniture industries, which process about 55,000 cubic meters of timbers. The waste produced is about 50 % of the timber processed. The saw mills required around 35 to 45 kWh of electricity to process $1m^3$ of debarked wood, whereas the wood waste generated in the plant is capable of generating as much as 1 kWh of power. The plywood industry requires large amount of power and heat. A factory would need around 110 kWh of electricity and 1.2 tons of steam to process $1m^3$ of wood log. The wood waste can be effectively utilized to co-generate heat and power to satisfy all the energy demand of the plant thus becoming independent of the grid.

Impediments for co-generation Co-generation systems are energy efficient and environmentally sound, yet there are obstacles in the development of the co-generation system in Nepal. The main obstacles are as listed below:

Lack of information: There is a little exposure and awareness to co-generation applications among the technical professionals in the industries of Nepal. Also there is a lack of awareness of co-generation in the policy makers and the government. The use of co-generation systems to a large extent has been limited to the sugar industry. This is due to the fact that the bagasse generated as residue was used for co-generation from the very beginning of the development of sugar industries. Therefore building of awareness to all the professional in the energy sector for co-generation in Nepal is the first step to be taken into account.

Lack of technology/equipment: The expertise to design, construct and operate the co-generation system in Nepal is very limited. Furthermore, there is no readily available information on co-generation technologies and applications in the country. Lack of technologies to locally manufacture some energy supply equipment can lead to higher investments due higher prices of imported equipment. The lower level of reliability of equipment produced by the local manufacturers with poor technologies also hampers the propagation of co-generation systems. Also for the grid dependent systems with the option of electricity export to grid, sophisticated electric control systems are required at both co-generation plants and the local electric utilities and thereby requiring competent personnel at both the co-generators and utilities.

Capital Intensive: The co-generation systems are somewhat capital intensive. Therefore the investments required are somewhat out of reach of the industrialist. Moreover, the industries in Nepal are reluctant to invest in this technology which is not yet proven to be economical and efficient to most of them. Distortion in other commercial fuels: The commercial forms of energy especially the electricity and fossil fuels in Nepal are highly subsidized by the government. Thus the possible co-generators are reluctant in competing with these energy forms. Moreover, in the case of export of excess of the power to the grid they have to supply in less than their own cost of production.

Lack of Proper Institution: Though there are institutions like Water and Energy Commission Secretariat and Office of Industrial Energy Efficiency Services, they do have the lack of information and personnel relating to co-generation technologies. In such instances, there are no energy conservation campaign and distribution on information on energy efficient technology such as co-generation.

No Government Interest: There is no clear interest on the part of the government for co-generation development in Nepal. The government of Nepal is moreover highly focussing for the development of its highly endowed hydropower resources. As a result the government has not developed any specific policy on promoting co-generation in Nepal.

Conclusion In Nepal the main problem with the industries is the reliable supply of energy. Commercial form of energy is the dominant source for industrial operation. Except for electricity, which is an indigenous production, all other commercial fuels are imported from India and other foreign countries. As due to deficit of generation and supply of hydroelectricity, there is substantial amount of load shedding for the industrial sector. The supply of other commercial fuels is also not reliable. The petroleum products and coal, the main source of energy for Industrial operation, do face supply constraint from time to time. The government of Nepal should give much emphasis on policy and programs for the biomass based co-generation as this will lead to sustainable supply of energy to the industrial sector and controlling pollution by the use of fossil fuels. Moreover, using biomass residue, as a source of energy will in long run lead to agricultural production thereby developing the agricultural sector of the economy.

Nepal's relatively small industrial sector also need to concentrate on the available biomass resources to promote energy efficiency that would be cost effective and commercially viable over the long run and that could be replicable across the sector.

Recommendation In Nepal, rising energy prices, supply, shortage and increasing concern for the environment are creating powerful incentives for energy efficiency. In addition to appropriate policy, Government can support national energy efficiency programs to encourage and assist industrial energy users to adopt more efficient practices such as co-generation. To justify spending public money, government needs to demonstrate pilot projects of co-generation, that are cost effective to the national economy.

For the co-generation program to be successful, programs must be taken in a long term structured approach which understand and respond to, the specific needs of the industries. Information, Training, Demonstration skill and technologies through established co-generation system are essential factors, which encourage and energy users to adopt this system.

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Deforestation Due to Biomass Energy Extraction in Mid Rift Valley Area, Ethiopia

Background Energy is an indispensable item required to support of life. It is very important for the agriculture, transport and industry sectors. In addition it is important for household lighting, cooking and heating. Energy has played and continues to play a major role in improving the standard of living and socio economic development. Energy supply, ecology and quality of life are inextricable linked. Only where adequate energy supply is available while maintaining the ecological equilibrium, can the quality of life be developed and increased on a long-term basis. Increasing forest clearance in Ethiopia has led to a fuel wood energy crisis of considerable proportions. The reason for this is mainly land clearance to create farm land, but also the increasing demand of a growing population plays an important role. The uncontrolled felling of trees leads to deforestation, which in turn leads to deterioration in the quality of life, above all for those sections of the population who are dependent on fuel wood as their source of energy.

Most people living in Ethiopia have until now been unable to satisfy their household energy requirements with conventional energy sources (kerosene, electricity, gas). Particularly in rural regions they use mainly biomass (wood, dung or agricultural waste) for cooking, baking and heating. In the year 92/93 the biomass energy consumption of household energy in Ethiopia was estimated about 94 % of the total. The remaining of Ethiopians suffer in bad living conditions among the many factors that result from this low agricultural production and indoor pollution. Low agricultural production is a consequence of deforestation; erosion and desertification[1]. The area exposed to desertification in Ethiopia is estimated about 70 % of the total land area. The major cause for deforestation is also the increase in population, which then results an increase in biomass fuel consumption for household energy and land clearing for agricultural activities. Due to these reasons the existing biomass stock is endangered leaving the soil open to erosion and people the people more challenged to feed themselves. For example, the soil erosion in Ethiopia is reaching up to 400 tons/ha/annum, (*Conservation Strategy of Ethiopia*, Vol. I, 97). On the other hand, the destruction of vegetation means the loss of genetic resources of both plants and animals and the cover that maintains the soil. At present deforestation has accelerated to the extent that only about 2.7 % of the total land area is covered by forest.

[1] Desertification is land degradation in arid, semi-arid and dry-sub humid areas resulting from various factors, including climatic variations and human activities,

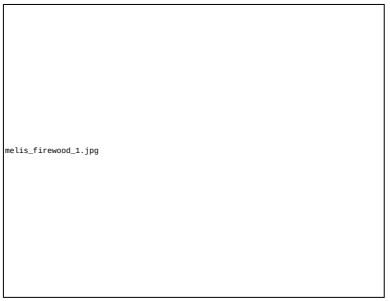


Figure 4.2: A horse cart with a fuelwood load on Friday market at Arsi Negele, 17 May 2001

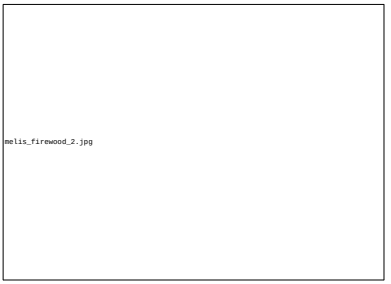


Figure 4.3: Fuelwood Market Day in Arsi Negelle (photo by Melis Teka)

Among many areas exposed to such problems are Ziway and Arsi Negelle Wereda[2], in particular the Chitu, Langano, Abijata, Shalla and Ziway (CLASZ) Lakes Areas which are located in (main East African Rift Valley) Oromia Regional State in the Eastern Shoa Administrative Zone. The area is rainfall deficit with evapo-transpiration exceeding the mean annual rainfall, and suffers from moisture stress that is further worsened by the low water holding capacity of the light sandy loam soil, which is also highly susceptible to both wind and water erosion.

In the major study area, Arsi Negelle Wereda, production of maize, sorghum, teff, haricot bean, and wheat are 4, 1.4, 0.69, 1 and 1 quintal per hectare respectively. This low productivity is attributed generally to low rainfall, poor land management, low crop varieties and limited diversification of crops, low genetic potential of the livestock disease and parasites (NACID -Wet Land Management Program, 2001) and biomass extraction from the ecosystem.

The Rift Valley is rich in lakes and acacia trees, which serves as the home for precious wild birds, fish and wild animals. The forest areas are used for grazing, and the larger plains are also used for the farming and rearing of cattle. The dominant vegetation outside the Lake area is acacia, woodland and bush ticket. The Abernossaa Ranch and the Abijata Shalla Park Area are heavily influenced by high pressure of population activities such as grazing, land clearance for agricultural land and for fuel wood. The area is major source of fuel wood and charcoal production, which is they transported to Addis Ababa and the nearby towns along the Addis - Shashemene highway.

In the rift valley, it is very difficult to sustain the lives of humans, animals and wild life in the surrounding ecosystem (land and aquatic) without taking precautionary and environmental life supporting measures.

The biomass fuel and charcoal extraction from the existing mid-Rift Valley lakes area is creating environmental degradation and is becoming a critical issue. This study has been accomplished by using randomly selected Focused Group Discussion (FGD) in the farming communities at different sites. The major stakeholders for the issue include the Arsi Negelle fuelwood marketers, charcoal producers, Abernossa Ranch, farming community and Abijat-Shalla Park. On the other hand, government institutions such as the Arsi Negelle and Ziway Wereda Agriculture

[2]Wereda is the area of smallest classification for administrative purpose in Ethiopia

There was an engineer who had an exceptional gift for fixing all things mechanical. After serving his company loyally for over 30 years, he happily retired. Several years later the company contacted him regarding a seemingly impossible problem they were having with one of their multimillion dollar machines. They had tried everything and everyone else to get the machine to work but to no avail. In desperation, they called on the retired engineer who had solved so many of their problems in the past. The engineer reluctantly took the challenge. He spent a day studying the huge machine. At the end of the day, he marked a small "x" in chalk on a particular component of the machine and stated, "This is where your problem is." The part was replaced and the machine worked perfectly again. The company received a bill for $50,000 from the engineer for his service. The company demanded an itemized accounting of his charges.
The engineer responded briefly:
One chalk mark $1.00
Knowing where to put it $49,999.00
It was paid in full, and the engineer retired again in peace.

Offices and Ademitulu Research Center are also consulted and discussed in the issues. An analysis of the issues raised and an overall recommendation based on the study are also given in this report.

The full report can be ordered from Melis Teka *<tekamelis_at_hotmail.com>*.

Mapping Solar and Wind Power Resources

International Effort to Pin Point Some of the World's Best Solar and Wind Power Sites Gets Underway

Nairobi/Paris, 18 December 2001 - A pioneering project to map the solar and wind resource of 13 developing countries is launched today by the United Nations Environment Programme (UNEP).

Experts are convinced that the project, called the Solar and Wind Energy Survey Assessment (SWERA), will prove that the potential for deploying solar panels and wind turbines in these countries is far greater than is currently supposed

Klaus Toepfer, Executive Director of UNEP, said: "While the costs of renewable energies like solar and wind have been tumbling in recent years, obstacles remain to their widespread deployment particularly in developing countries. One of these is the uncertainty about the size and intensity of the solar and wind resource. The SWERA project aims to bridge this knowledge gap so potential investors can know, with a great deal of accuracy, the locations where they can secure a good and reasonable return".

"If we can accelerate the deployment of renewable energy we can not only bring down the costs, but also help in the fight against global warming and poverty. These technologies produce none of the gases, such as carbon dioxide, linked with climate change during their operating lives. In many developing countries the scarcity of energy is driving more and more people into poverty. A lack of energy also has severe environmental consequences. Those without access to electricity are forced to fell trees for firewood and cooking fuel, accelerating impacts such as soil erosion and the loss of the world's wildlife, "he added.

News of the project comes in the run up to UNEP's Global Ministerial Environment Forum, taking place in Cartagena, Columbia, in mid-February 02, where delivering cleaner energy to developing countries is expected to be high on agenda of the world's environment ministers.

It also comes in the wake of a G8 Renewable Energy Task Force report published in August. The report estimated that it might be possible to deliver renewable energy to over a billion people by 10 if financial and other obstacles are overcome.

Meanwhile developed countries, as a result of climate change talks in Bonn and

Marrakech, are expected to be searching for sites in poorer countries where wind and solar power can be deployed. Various funds and mechanisms have been agreed which will allow industrialized nations to offset their greenhouse gases emissions at home through green and clean energy schemes in the developing world.

The importance of accurate information on renewable energies is highlighted by a study of the varying returns from a solar installation. Renewable energies like solar are highly dependent on the local climatic conditions.

Tom Hamlin, Climate Change Task Manager in the UNEP/Global Environment Facility's Coordination unit based in Nairobi, Kenya, said: " The investment of a solar thermal power plant of 0 MegaWatts (MW) electric capacity is approximately $ 400 million. For such a power plant, an error of 10 per cent in the solar resource would amount to a difference of $ 150 million in revenues over the life of the project which is a heavy burden for its economic performance".

"Meanwhile the efficiency of steam turbines operated with concentrated solar thermal energy is strongly affected by fluctuating solar energy input. Such dynamic effects, which may easily reduce performance by 10 per cent to per cent, can only be specified if the solar radiation intensity is known on an hour by hour basis. Those insecurities have presented a considerable obstacle to the wide spread use of solar thermal power technology up to now. SWERA will, we believe, considerably reduce those uncertainties," he added.

The project, the findings of which will be linked with a Geographical Information System (GIS) so that prospective developers can pin-point precise and promising locations on-line, has secured $ 9.3 million for its initial, three year, pilot phase of which nearly $ 7 million is from the GEF.

The countries where the surveys are to be carried out are Bangladesh, Brazil, China, Cuba, El Salvador, Ethiopia, Ghana, Guatemala, Honduras, Kenya, Nepal, Nicaragua and Sri Lanka.

The belief that SWERA, which is an international collaboration between UNEP and agencies including the US National Renewable Energy Laboratory, Grid/Sioux Falls, GTZ, the State University of New York, the Danish National Laboratory, the Tata Energy Research Institute and the space agencies of Germany and Brazil, will discover that the wind and solar resource of these countries is far bigger than is currently supposed comes from previous work in countries like the Philippines.

Here a recent survey and completed national atlas of the wind resource has found that the potential for commercially viable wind generation is tens of thousands of MW, not just a few MW as was previously supposed. A prefeasibility study for a 40 MW wind farm, the first important one in the country, was carried out by the Philippine National Oil Corporation within six months of the completion of the atlas. Prior to the survey, the official projection for wind power in the Philippines in the coming decade was around 100MW. The finding from the survey could lead to 480MW in place by 08, roughly half a billion dollars of investment, and as much as 2,000MW by 15.

When a guy's printer type began to grow faint, he called a local repair shop where a friendly man informed him that the printer probably needed only to be cleaned. Because the store charged $50 for such cleanings, he told him he might be better off reading the printer's manual and trying the job himself. Pleasantly surprised by his candor, he asked, "Does your boss know that you discourage business?" "Actually, it's my boss's idea," the employee replied sheepishly. "We usually make more money on repairs if we let people try to fix things themselves first."

For more information please contact:
Tore J Brevik, UNEP Director/Spokesman,
Division of Communications and Public Information,
Tel: 254 623292,
e-mail: tore.brevik_at_unep.org,
Nick Nuttall, UNEP Head of Media,
Tel: 254 2 623084,
Mobile: 254 (0) 733 632755,
e-mail: nick.nuttall_at_unep.org
Tom Hamlin, Climate Change Task Manager, UNEP/GEF Coordination,
Tel: 254 2 624146,
Fax: 254 2 623696,
e-mail: tom.hamlin_at_unep.org

info submitted by Mazharul Islam

A COMMUNITY APPROACH TO VILLAGE ELECTRIFICATIONA Community Approach to Village Electrification in Cameroon

by Awa Celestine Anyam
<c_anyam_at_yahoo.com>

When the Government announced its good governance programme in 1997, it rang a bell that time had come to move from central systems to a decentralized one. This means that power has to move from the center to regions; locally based economies has to emerge and with it the accompanying infrastructure that constitutes the life wire of an economy; Power. This paper presents an approach for the improvement of the service ratio of electricity to the rural masses of Cameroon through the use of locally manufactured, decentralized and pico power systems.

Introduction: Like the political set up, power production and distribution in Cameroon has remained strongly centralized since 72 when "Electricité du Cameroun" (EDC) and Cameroon Power Company (POWERCAM) merged to form the National Power Authority (SONEL). SONEL's power distribution has been centered around two networks; the Southern Power Network (SPN) and the Northern Power Network (NPN). Power from the SPN is produced from 2 sites (SONG LOULOU and EDEA) situated 50 Kilometres apart and along the Sanaga river passing through Edea. Power from these production bases arrives a common dispatching point at Mangombe for onward transmission on 225kV and 90kV lines to load centers as far as Limbe, Douala, Yaounde, Kribi, Bafoussam and Bamenda.

At these load centers, power is stepped down to 30 kV and subsequently to 380 kV for distribution to end loads as far as Mamfe, Nkambe, Wum, Ambam, Ayos, Nanga Eboko, (the furthest point is some 700 km from the source)

The NPN is based on a 72 MW multipurpose dam at Lagdo that serves the Northern provinces as well as Njamena.

Characteristics of the Network: Both networks have the following characteristics;

Radial network with reliability ranging between 10 to 35 % (e.g Mamfe 10 % and Maroua 30 %) Losses on transmission lines are 3 % for High Tension, 15 % for medium Tension and about 25 % for low tension. These results for as high as 15 % wasted investments. The failure rate is about 50 per year 100 km and 4 hours per day on the end-of-the line loads. Voltage drops are impressive at some remote points This leads to the postulation that 'a decentralisation of production and distribution of electricity is an indispensable manner of increasing system's reliability and service ratio'.

Theoretical Base: [3] Increasing power systems' reliability can be done through several methods but the locally manufactured and decentralised equipment of small rivers forms the basis of this work. Its underlying theory is that pico hydro, is not scaled down large hydro. It is an innovative technology that can be made simple through the use of local materials (equipment), thus acting as a spring board for continued community development. This is to say that from the intake to the distribution outlet, locally available equipment could be adapted to play the roles of penstocks, turbines and generators.

Central to this system is the induction motor. The stator windings is a 3 phase distributed winding of the same type as a synchronous (a.c load) winding. When this is connected to a 3 phase supply, a lagging generator amature magnetising field is created in the machine at a synchronous speed (n_s) start or windings poles (p) as a synchronous generator.

$$n_s = \frac{1 \cdot f}{p} \tag{4.1}$$

The rotating field cuts the short-circuited rotor bars, inducing currents in them which because they are flowing in the magnetic field, react with it. The result is a force or torque which drags the rotor round with the field, but at a slightly lower speed.

The difference between the rotor speed (n_r)and the speed of the rotating field (n_s) is called the slip (s) and defined as

$$s = \frac{n_s - r_r}{n_s} \tag{4.2}$$

This implies that the rotor speed be

$$= \frac{1 \cdot f}{p} \cdot (1 - s) \tag{4.3}$$

[3] based on Nigel Smith, *MOTORS AS GENERATORS FOR MICRO-HYDRO POWER*, IT Publications Ltd, London 94

The slip (S) can vary from 5 % for small motors (1 kW) to 1 % for large motors (100 kW); without load s may be less than 0.01 %.

If we imagine an induction motor coupled to a load which is a turbine shaft rotating at a speed higher than the synchronous speed, then the slip will become negative even though the lagging magnetising current from supply creates the rotating field.

Use of Induction Motor as Synchronous Generator: the lagging reactive magnetising current of an induction machine can be supplied by capacitors, which corrects the power factor to unity if well calculated. When this is done, it causes it to generate at the same voltage as that supplied to it as a motor and driven at the same stand-alone speed conditions. In practice, it will have to be driven faster, in order to produce the same frequency as the slip is now negative.

However, the main drawback is its poor voltage regulation. Even when driven at constant speed, its output voltage drops rapidly with increasing load and depends a lot on the speed with which it is driven. These problems have been overcome by the use of an induction generation controller (IGC).

Conversion to Single-Phase Generator: induction generators thus produce may be either 3-phase delta or star-connection. The star connections require 3 times more capacity than the delta-connection which are usually recommended for a 3-phase supply even though it cannot supply 4 wire 3-phase connections. This can be converted to a single generator using the C-2C system.

Sizing the Capacitance: to calculate the capacitance (C), we work

from the principle that the delta connected excitation capacitive reactance is the same as the delta magnetising reactance of the induction motor:

$$X_{C_\Delta} = \frac{V_{C_\Delta}}{I_{C_\Delta}} \tag{4.4}$$

and

$$C_\Delta = \frac{1}{\omega \cdot X_{C_\Delta}} \tag{4.5}$$

with $\omega = 2\pi f$ and then

$$C_\Delta = \frac{C_{star}}{3} \tag{4.6}$$

Vision of the Bapi Pico Project: with a good understanding of the technology, it was then necessary to construct a vision for the pilot project in Bapi in view of its popularisation in Cameroon. In spite of the existence of modern sophisticated power production equipment, the following vision led to the choice of the equipment types.

It is not only the setting up of micro hydro schemes that is important. Maintenance and management of the after project had to be incorporated into the design phase. In this wise, the core institutions of the village like the villager development association, the chief and the consumer associal were nvolved from the conceptual phase through to the implementation and management of the system. This was to develop a sense of ownership by the beneficiaries through the contribution of 'sweat equity' and financial contribution (for the house connections, in-take and the power house construction). This was important in a context where anything that is free to is regarded as something be maintained by the state and treated with contempt and negligence. This vision led to the following system design.

System design: Use of delta connected 3-phase induction motor available in the Cameroon market rather the synchronous generators to be imported. This motor is easily available, has no brushes nor parts that require frequent maintenance. Guided manufacture of pelton turbines by local craftsman who would popularize the technology. Use of 3 bars PVC pipes as penstocks in place of corrugated iron tubes or concrete. Use of compact florescent lamps (CFLs) to increase energy efficiencies of lighting. Use of positive temperature controllers (thermistors, PTC) to increase number of potential clients.

Description of the System: as can be noticed five key concepts have been integrated into this design each of which can be individually developed and defended. This would be done at subsequent presentations. The BAPI installation makes use of 2 pelton turbines operating side by side.

Each turbine is fitted with an induction motor purchased in Bafoussam. The two motors operate in reverse to act as generators. One of the turbine produces 4 kW and the other 2 kW.

Each generator is fitted with an electric load controller (IGC).

A single transmission line (2 V) carries power to the village where each customer's house is fitted with a house controller board. This is a lockable wooden box attached on the outside. The box contains a positive temperature thermistor (PTC) which allows consumption up to a limited amperage (for now 0 mA).

Other components of the system are civil works (weir, intake and powerhouse) and the pipe works.

Results of the Work: To the greatest delight of all stakeholders in the project, this project has met with general success. Both turbines, generators

and IGC's performed as planned. The population that once lived in utter darkness now enjoy the pleasures of clean and cheap electrification. There are new ways for an old village which now enjoys power whose supply comes from a system which has operated for 360 nights out of 450 days of existence. This gives a reliability factor of more than 70 %. Needless to say that this could be improved upon significantly had it not been for the existence of small technical and non-technical difficulties.

Difficulties encountered during the project are that the PVC manufactured at Bafoussam had sub standard wall thickness which caused the pipes to burst under pressure reducing water pressure at the turbine head and consequently no production of power. Secondly several of the turbine factory joints were incorrectly formed and also needed replacements. Some of these were fabricated at AFA machine shop. Also poor handling of the CFLs by beneficiaries cause several of these lamps to blow out before their expected life spans. Many of the household resorted to filament lamps only after a few months.

At the end of the project, the maintenance and management of the scheme has met with several difficulties related to

- Forecasting of revenues which have not followed plans as many subscribers refuse to pay their bills. This has made it difficult to expand the system to more customers. At the moment, some households are connected many of whom do not pay their bills.
- Lack of financial satisfaction from the scheme has caused most of the management committee members to show less and less interest on the system.

Conclusions: the BAPI experience has proved that future investments in PICO hydro should not only be limited to the production phase. Cabling and extension to all potential customers should be included in the project costs. Also a local management structure capable of handling and sustaining the scheme is necessary to enable continued supply of power. Local business people could become proprietors through the use of a lease-purchasing scheme.

Participatory Model To Dissemination of Renewables in Communities in Developing Countries

by Francis Xavier Ochieng
<xavierfo_at_netscape.net>

Abstract —Take up of new technologies in a society (community) is a process of mutual adaptation, requiring people to get used to the new environment brought by the technologies, while the new technologies need to sustainably supply the required services within the given socio-economic and environmental framework. (Eurec, 1996). Prerequisite in this take up is the community's involvement. The community must always feel that it is their technology, and its up to them to ensure its success. As an engine of socio-economic growth, with both energetic and environmental benefits, the dissemination of renewables, particularly in communities living in developing countries is a crucial matter. Errors made in this area always come to haunt the community at least in form of non-functioning equipments, and depressed socio-economic activity. This article thus draws heavily on the experiences of ITDG and the Micro Hydro research group (MHRG) at Nottingham Trent University (NTU), in presenting a somewhat tried and proven Kenyan method for dissemination of

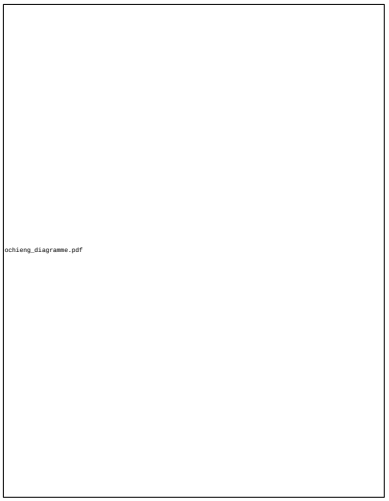
Renewable energy systems in communities. The key to this dissemination is participation of the community in the total dissemination process.

Introduction The use of renewable energy sources and the rational use of energy are the fundamental vectors of a responsible future energy policy. Due to their sustainable character, renewable energy technologies are capable of preserving resources, ensuring security and diversity of energy supply, and providing energy services, virtually without comparable environmental impact. They thus contribute to the environmental protection of present and future generations. (Ibid). In achieving sustainable development the UNCED conference Agenda 21 was adopted which in part called for 'new policies or programs to increase the contribution of environmentally safe, sound, cost effective energy systems, particularly new and renewable ones?' In the short space of time, since the 1992 conference major strides have been made on the complexity and versatility of the renewable energy technologies available. Attributed to the cyclic process or R D & D. It therefore is important to focus on their potential for research, development and dissemination (RD & D). For which generally, in developing countries, the dissemination mainly matters, since research capacity is not well established. Considering technology dissemination to communities in developing countries has proved time and time again to be the sore point of industrialised countries obligation to shorten the gap between the North and the South. The main cause being, the inappropriateness of the technology.

Appropriate Technology and Renewables Simply put Appropriate technology is one that sustainably approximates the answer to the question "How does one disseminate/develop a technology for a community?" It is a technology that makes the best use of local resources for the optimal socio-economic and environmental benefits to meet the particular need of the community. Inherent in this definition is the approach, the target group and the totality of the objective of the technology transfer or innovation or R & D. In the historical cases of North-South technology transfer, the idea of the community having its own ideas of what is best for them has significantly been ignored. The objective in bringing the technology had been (and with the best purposes at heart) to meet the communal needs. However, how the community is approached and what kind of group comprises the community had usually not been emphasised. This is however changing with the realisation of many "white elephant projects lying around in developing countries worth wasted millions. What has and continues to be realised is that the community has a voice, a mind and just like a human being; a right to choose what is best for it and how it will operate it. Herein lies the soul of appropriate technology, both in approach the community and in meeting their need. This is the concept of community participation in the process as a whole.

Participatory Modell–An Overview For renewable energy systems particularly for off-grid communities in developing countries, their participation should significantly be en bloc, to ensure sustainability. The achievement of which varies from place to place and from community to community. What however is constant is the model used in achieving this community participation.

Two parts arise here of importance; the initial contact and the continued/future contact. The initial contact is how the development agency (the one offering the technology) apprises the community



of the technology. This can be done through holding workshops and inviting members of the community to attend. The workshops can be training workshops or for awareness creation. Campaigns also offer an alternative. The Underscoring point as regards initial contact is it aims to make the community aware of the availability of something outside their normal sphere of life. The community should take the initiative to approach the agency. After the full commissioning of the technology in the technology, the agency should make efforts to maintain contact with the community and be supportive and non-dictating or patronising interest.

Community management committee From the awakened community interest, the community would then form a committee to act as a core contact point between the external world and the community. In the Pico hydro cases of MHRG the committee usually comprised of some community members, local leaders and also members from the central government. It is also recommended that women be involved in the committee.

Pre-feasibility and Desk study

The pre-feasibility study seeks a general overview of the area, geography, basic assessment of the socio-economic activities and resources. Realizing that, particularly natural resources being not apolitically influenced demands then a study that considers legal, institutional, ownership and management issues. For Pico hydro such issues include:

Policy environment– Several policies affect development of micro-hydro in Kenya:

1. *Land issues:* Development of hydropower involves conflict with competing land uses and to a lesser extent water rights and this depends on the land category. In Kenya 3 basic land categories exist each with its own authorization process to offer resolving guidance.

    - Government land: Section 3, Cap 280 of the land Act requires the commissioner of lands approval before setting up.
    - Trust land: Cap 288 deals with this type and it requires approval and accent by popular vote of the local council and must be minute appropriately.
    - Private land: p. 300 of the registered land Act.

    Thus in any of the above categories, the private vis-à-vis public interest and the need to protect personal rights or private property need be considered.

2. *Water rights:* Water Act cap 372 broadly states that water resources are to be protected and usage is determined according to priorities of the competing water uses, the so called riparian rights is also included therein.

3. *Electrical Power Act 1997:* Provides for generation, transmission and distribution of any electrical energy in Kenya. It has regulatory clauses on Hydropower development and utilization. Section 128 part V declares that all natural resources for generation of electricity to be under the government, requiring authorization before use. Section 4 of the act provides for detailed licensing and restrictions on supply and use of electricity, which affects micro hydro which has to distribute the power over several houses, exempted from the act are capacities of 25KW or local and 100KW for individuals or persons.
4. *The 1999 Environmental Act* demands also some Environmental Impact Assessment before a micro hydro is set up.

The development agency and management committee ensure then legal issue are sufficiently addressed.

Community Taboos and culture: Care should also be taken to assess the communities' beliefs, practices and culture, to ensure that they may not become a hindrance to later installation of the micro-hydro. Level of education and expertise in the community An early assessment need be done to gauge this level particularly to know whether they will need more training, have enough expertise and how sustainably they can run the project. Further this enables the agency to protect the community from exploitation and of their indigenous knowledge, due to "opening" of the community. Though international laws exist, the development agency must take extra precaution.

Lobby Good lobbying should start early with identification of groups and individuals to be particularly impressed for the benefit of the community getting the technology. Site selection criteria, community mobilization and feasibility study This is the most crucial stage in the dissemination cycle. Close collaboration will be required between the development agency and the community as they define the characteristics of various sites and develop a critique, which is put into use in the feasibility study. Community participation in this stage must again be emphasized.

One day an old lady's dog passed out on her floor. She was used to her dog playing dead, so she thought nothing of it, but three days passed and still the dog didn't move, so she became worried. She took the dog to her local veterinarian. The vet set the dog on an observation table and began examining the dog. A couple minutes later, the vet left the room. Then he returned with a cage and inside the cage was a cat. He set the cage next to the dog and let the cat out. The cat walked around the dog three times then went back into his cage. A few minutes later the vet came to the old lady and said "I'm sorry, but you're dog is dead. That'll be 250 dollars." "250 dollars! For what?!" Shouted the old lady. "Well, 50 dollars for the examination, and 0 dollars for the CAT scan."

Ownership and management structures This could be done earlier, or later. It looks at the resources available and considers how they can be best utilized sustainably over a long period of time. Further it considers the division of benefits accrued and costs incurred.

Technology choice and capacity building On the basis of the resources assessed and the structures and management systems in place, the technology choice, costs and the possibility of training need to be closely considered.

Installation by and effacing of the development agency With

the right technology choice made, installation then takes place and after a period of evaluation the development agency slowly leaves the scene, but it continues to offer them help.

Conclusion What has been offered here is tentative scratch at the complexities of dissemination of renewables or any technologies at that. It should be noted that this process is not easy, but possible. The interaction and even budgetary issues, fundraising and the issues of availability of local expertise can also affect the realisation. As little assumption as possible should be made. More detailed information can be found at the following references.

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Biofuel Resources in Nepal

by Ram Prasad Dhital
<rpdhital_at_yahoo.com>

Introduction Nepal, the country of Himalayas is bordered by India to the south, west and east, and by China to the north. The country is roughly 800 km from East to West and 150 km from South to North. Social and economic statistics indicate that Nepal is one of the poorest countries of the world. It has a GDP of US$250 per capita and 42% of the population are below the poverty line. The population is about 23 million at a growth rate 2.7% per annum. About 90% of the population reside in rural areas depending on agriculture and natural environment for sustenance of livelihoods. Rural livelihoods depend on non monetised economy and use of natural resources.

Impact of population growth Nepal's uncontrolled population growth

has been causing negative impacts on food supply, shelter and energy. Moreover, uncontrolled population growth has caused mismanagement of natural resources. Massive use of fertile agriculture land for non-agricultural purposes, continuous deforestation, pollution from imported organic chemical energy and misuse of natural resources are some of negative impact of population growth.

Energy crisis Almost 90% of total energy requirement is met by traditional energy sources (fuel wood 78%, Animal dung and agriculture residue 12%.). 9% is met by fossil fuels (petroleum products and coal) and rest 1% is met from electricity. Theoretical hydropower potential is estimated to be 83000MW,Out of which 41% is said to be technically and economically feasible. Hardly 1% of economically potential power has so far been tapped. Nepal cannot afford huge investment and high maintenance cost for large hydropower projects. Therefore biomass has been and will be the major sources of energy. Nepal's rural population have been meeting the energy needs from the traditional sources like fuel wood and biomass. 84000 ha of forestland is being annually deforested with an annual rate of 4% where as only 4000 ha is being reforested. The figure shows existing energy consumption pattern is not sustainable causing rapid environment degradation. If this rate goes continuously, after 10 decades, there will be no more forestland in Nepal.

Biofuel resources One of the possible future's potential alternative energy for rural development of Nepal is bio fuel resource, which are environmentally friendly, cost effective and locally available. The untapped natural resources of oil bearing plants from planted forestry and agro forestry system are the main sources to substitute fuel wood, agriculture residue and fossil fuel etc. Green mission Nepal has identified 170 plants species with high oil content seeds (12 to 77%). Nepal butter trees, Nageshore, Amphi, Chiuri, Jatropha curcas are some of main oil bearing plants in Nepal. Terpentines are also important sources of plant oil in Nepal. These are available natural plant resources from non-timber forest products. They are found in rural areas and could become permanent sources of income at the village level without damaging any forest trees. From the cultivation point of view, linseed can be a very important source of plant oil in Nepal. At least 40% land is unploughed in winter season and linseed can be cultivated on these lands. Plant oil energy can play a significant role on alternate energy development in Nepal in the following way:

1. They substitute fuel wood, agriculture residues and animal dung
2. They are sources of income and employment generation at farm and village level
3. They substitute imported fossil fuels
4. Oil cakes are effective organic fertilizers for improving soil fertility

Oil expelling technology Mustard and linseed have long been the traditional crops for edible and non-edible oil production in Nepal. Apart from cooking purposes, the oils have been used for lighting, soap, paint and varnish making where as oil cake has been utilizing fodder for animal or as a organic manure. Traditional processing technologies are not efficient and are the main constraint for greater utilization. Water mills and diesel fuel engines are being currently used to reduce drudgery and increase efficiency. Recently Nepal has developed a SUNDHARA plant oil expeller, which requires much less energy for processing. The performance

of the sundhara oil expeller in comparision to traditional devices can be given by the author.

Conclusion Indigenous oil bearing plants are significant renewable energy resources that can be utilized cleanly and sustainably at a local level. Their economic viability largely depends on the local cost of seed collection and revenue from oil products. In Nepal, these are already widely used in agriculture and can be considered as a viable alternative for energy development.

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Women and Energy in Nepal

by Satish Gautam
<redpktm_at_MOS.COM.NP>

Background The labor put by women in household chores, like cooking, cleaning, raising children, fetching water, collecting fuelwood, rearing domestic animals, kitchen gardening, etc. is taken for granted, as these activities are not monetized. As the Nepalese society is patriarchal, the community-level activities seldom address the hardship and drudgery faced by women. A study by Energia states that a Nepalese woman spends 11.88 hours everyday on household chores compared to 9.07 hours by her sister in India.

A baseline survey carried out by REDP[4] in 97 shows that on an average a woman of Nayagaon, Kavre spends 8.7 hours in carrying out daily chores, where as a man gives only 4.2 hours. Women spend their time mainly for fodder and fuelwood collection (4.4 hours) and cooking (1.9 hours) and give mere 0.7 hours for their children. On the other hand, men spend 2.9 hours for collecting fodder and fuelwood and do not give any time at all for their children. 95% of the time required for cooking, 85% for cleaning and 53% for food come from the female members of a household.

All the above figures sum up that a considerable amount of women's time is spent for collecting fuelwood, processing food, cooking and cleaning. Saving time from these activities will free women for income enhancing activities and more leisure time. Similarly, reducing the drudgery a woman faces in agro-processing will help alleviate her hardship and improve her poor health condition. Likewise, smoke-free kitchen would provide her better working atmosphere.

Community Mobilization Realizing the role of energy in reducing drudgery saving working time of women, REDP has given utmost importance to participation of women in all program activities. In fact, reducing the drudgery of rural women and enhancing their livelihoods is one of the stated outputs of program.

[4] Rural Energy Development Programme – *www.redp.org.np*

REDP sensitizes the community members in recognizing the central role played by women in the family economy. The community mobilization process encourages women's participation in the public life and provides them a voice in the affairs of the community. These actions instill confidence, increase self-reliance and self-esteem, encourage leadership, demonstrate women's management capability and enhance the credibility of women. The men realize and accept them as equal partners in family affairs as well as development activities.

REDP emphasizes on formation of separate community organizations (CO) for men and women. Segregation of women and men encourages discussions of specific problems faced by women. A formal forum to look into matters related to women has been created for the first time in many villages. Experience shows that in mixed groups women only tend to nod their heads in unison rather than genuinely participate in discussions and decisions. A lot of stress has been placed for building women's self-confidence and capability for independent action. To give them a voice in the community affairs, integrate them into the decision making process, and put them into the mainstream of the development initiatives, it is mandatory that all concerned CO have equal representation in the Functional Groups. Literacy classes and saving and credit schemes are taken as prime movers to mobilize and organize women.

Better Livelihoods Though it is too early to assess the total impact on women by installation and operation of different rural energy systems installed with REDP's support, some positive changes are clearly discernible. Besides the tangible change in the working hours of women after switching to biogas from traditional energy, several intangible changes like enhanced prestige and self-confidence are also mention by women of program villages. Some of the changes that came along with energy systems and others that were possible only due to the considerable effort put by the program in community mobilization are discussed below.

Two guys were taking chemistry at the University of Alabama. They were so confident going into the final that two days before, they decided to go up to the University of Tennessee and party with some friends. They had a great time. However, they overslept and didn't make it back to Alabama until the morning of the exam. Rather than take the final, they found their professor afterward to explain why they missed the final. They told him that they went up to the University of Tennessee for the weekend, and had planned to come back in time to study, but that they had a flat tire on the way back, and didn't have a spare, and couldn't get help for a long time, so they were late in getting back to campus. The professor thought this over and told them they could make up the final on the following day. The two guys were relieved. They studied that night and went in the next day for the final. The professor placed them in separate rooms, and handed each of them a test booklet and told them to begin. They looked at the first problem, which was worth 5 points. It was something simple. "Cool," they thought. "This is going to be easy." They did that problem and then turned the page. Question #2 said: "Which tire?" (95 Points)

Changes in Social Perceptions All these efforts are resulting in the positive attitude of men towards their women folks. In Dadeldhura district in the Far Western Development Region, which is notorious for low level of women 'development' in the entire country, women head two of the five installed micro hydro schemes. In Myagdi district in Western Development Region, all managers of micro hydro schemes are women. During the managers' training the husbands were looking after their babies while the women were taking classes, which is something unheard of in the patriarchal Nepalese society. In some villages, women have successfully campaigned against rampant alcoholism among their

men.

In a study carried out in Pokhari Chauri VDC, Kavre in 2001, 80% of the villagers both men and women stated that they had gained prestige after the installation of the micro hydro plant in the eyes of their neighbors who still go without electricity. The villagers also believe that the monetary value of their properties has increased due to micro hydro scheme.

Better Lighting An Impact Study carried out in December 00 in 5 REDP districts mentions that all the beneficiaries of micro hydro schemes and solar home systems are satisfied with the quality of electric light as compared to kerosene lamps (tuki) they had been using. Besides the hazards like strain on eyes and smoke from kerosene lamps, longer working hours and more time for studying in the evening are seen as the advantages of the electric light. Though some women are using the extra hour or two in activities like weaving, they are happy to bear the burden as they see these activities as productive. Women in Piughar Tanahun weave traditional bags in the evening after the advent of electric light. They mention that they earn enough to pay for the electricity, school fees of the children, stationery and other extra expenses they incur every month.

Better Health Services In Thamplakot VDC of Sindhupalchok district which is at 6 hours' walking distance from the nearest roadhead, a kW micro hydro plant is supplying electricity to a health center. The health center is providing services related to gynecology, uterus prolaps, maternity problems and family planning. According to Ms. Kalpana Khadka, Nurse, the health center provides services to about 7 women from Thampalkot and neighboring VDCs each day. She emphasized that the services provided by the center, especially at night have improved due to the availability of electricity. She further added that additional 3 kW would be subscribed by the center to operate its Foetal Beat Monitor and Auto Klip - sterilizing equipment. The center is currently using 9 V dry cells to operate the Foetal Heart Beat Monitor, which is expensive and not available in the local market and kerosene to heat the Auto Klip.

A woman offered a brand-new car for sale for a price of ten dollars. A man answered the ad, but he was slightly skeptical. "What's the gimmick?" he inquired. "No gimmick," the woman answered. "My husband died, and in his will he asked that the car be sold and the money go to his secretary."

Improved Sanitation All beneficiaries of micro hydro state that better lighting has positive impacts in health and sanitation conditions. Besides less stress on eyes due to electric lamps, they also mention that the less amount of smoke the children are exposed to during studying-hours as compared to kerosene lamps.

Similarly, exposure to harmful smoke and soot during cooking has drastically gone down in the houses using smokeless cooking stoves or is non-existent in case of biogas. Highlighting on the advantages of ICS, Ambika Khadka of Suri VDC, Dolakha informed that after conversion to smokeless stove, she does her family laundry only once every two weeks as compared to every week previously.

Drudgery Reduction Many studies have revealed that a lot of women's time is spent in household chores like collection of fuelwood, fetching water and processing cereals. One area where micro hydro has been able to make a major impact is on the time spent by women in grinding corn, de-husking rice and extracting

oil that are both laborious and tedious. For example, Mrs. Janaki Devi Bista used to spend two hours every day to grind maize and wheat for two daily meals. After the installation of a 15 kW micro hydro plant and 5.5 hp grinder in Kotila VDC of Baitadi in Far Western Nepal, she hardly spends 10 minutes for the same job. She is using the time saved to work in her kitchen garden, where she grows seasonal vegetables to supplement the family's daily calorie intake, to look after her goats and to keep her house and the surroundings clean.

Similarly, installation of an oil expeller in the adjoining Hat VDC has saved more than three hours walking for residents of Kotila VDC. Earlier, they had to go to Bhatana VDC which is four hours away from Kotila. Now, they walk a mere hour to reach the micro hydro run oil expeller in Hat.

Time Saved in Collecting Firewood Women have been at the forefront in deciding that their households should go for biogas plants and/or Improved Cooking Stoves. About 1000 toilet attached biogas plants and 4731 ICS have been installed so far with REDP's support. The Impact Study states that monthly firewood saving after the installation of biogas is 60% in Baglung and 72% in Tanahun district. The same study further states that about 236 kg of firewood was saved by a household every month. Although women have to spend extra 15 - 30 minutes to mix dung and water and to feed the plant, it is estimated that a woman saves about 2 hours every day from time spent on collecting firewood. The respondent women also stated that they have additional benefit of toilet, which is attached to the biogas plant. The survey also found out that majority of the respondents felt that the health and sanitation condition of their family has improved considerably after the installation of toilet attached biogas plants.

Several weeks after a young man had been hired, he was called into the personnel director's office. "What is the meaning of this?" the director asked. "When you applied for this job, you told us you had five years experience. Now we discovered this is the first job you've ever held." "Well," the young man replied, "in your advertisement you said you wanted somebody with imagination."

Similarly, conversion to ICS has also saved considerable time if firewood collection for women. It is estimated that a woman gives three quarters of an hour less everyday for collecting firewood. Answering the question on what they use the saved time for, most of the women stated that they give more time to the children.

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

Krishna Bahadur Nepali of Katuje Bazaar is from an occupational caste called Damai, which is engaged in making clothes for higher caste customers. Nepali learnt tailoring from his father and has been involved with it ever since he can remember. After his village was

electrified, Nepali need not rely solely on daylight to finish his orders. Both the husband and wife work till late in the evening and have managed to double their income. Recently, Nepalis bought another sewing machine so that both the husband and wife could work together and finish their orders in half the time. They have not turned away any customer due to lack of time.

Rethinking There is an intimate relationship between a Nepalese woman's daily work and energy production and consumption. From collection of energy resources to consumption, women play the central role in Nepalese households. Any change in the production, collection, transportation or consumption of energy directly affects a woman's daily working pattern. For example, just by switching to improved version of the cooking stoves, women save almost an hour in collection and transportation of firewood, cooking, cleaning utensils and laundry. The small technological jump also has far reaching impact in her health and life expectancy. However, reality is far from rosy, in many parts of the country easily accessible firewood and crop residues are in short supply, which means more and more of women's time is being invested in search of energy sources. Women's use of energy needs to be considered as a vital issue and in-depth analysis of a woman's energy needs is required for planning and rural energy activities. REDP has been pioneering in rural energy sector in Nepal by encouraging women's participation at all levels of program activities. Women are at the forefront in technology selection, planning, implementation and management of energy projects and are the prime beneficiaries.

Figure 4.4: ENERCON E-40 in Pico Truncado

First Wind Turbines Made in Latin America

by Fernando Petrucci

Pico Truncado, 12.000 inhabitants, is in Santa Cruz Province (less than 1 inhabitant per square kilometre), located 00 km south of Buenos Aires City. Two wind energy converters ENERCON/WWP E-40 600kW rated capacity, made in Brazil by ENERCON's subsidiary Wobben Windpower, started up on 7 February 2001. Rotor height: 46 m; rotor diameter: 44 m; total installed capacity: 1,2 MW.

ENERCON concept: gearless, variable speed, pitch regulation.

Foundation basements and internal electric grid were constructed by local firms, under supervision of Wobben Windpower engineers.

The wind turbines were installed by technicians of German ENERCON International and Brazilian Wobben Windpower, and personnel of Municipality of Pico Truncado, owner of the wind farm.

The wind farm is connected to the 13,2 kV distribution grid, which is operated by the Municipality of Pico Truncado, in charge of the electricity supply. The two E-40 will cover up to 50% of households' consumption.

The Municipality of Pico Truncado will administrate and operate the wind farm.

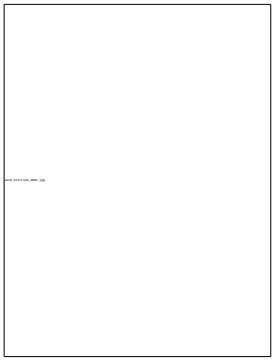

Figure 4.5: View from Holtriem wind park E-66 visitors platform

Wobben Windpower is responsible for Operation & Maintenance in the frame of a full guarantee contract. This contract includes all spare parts, consumable material and especially trained personnel, complying with ENERCON service standards.

Wind resource in Patagonia is huge. Renewable energy is not only clean but brings benefits from decentralized generation as well. This project is just a new small step forward to demonstrate maturity of new technologies. Right there in the land of oil and gas.

CONFERENCES

GREEN ENERGY & RURAL INCOME GENERATION

Conference-Workshop in Hangzhou / China from 27 to 29 May 2002. The goal is clear: We need renewable energy (RE) on a large scale in China and developing countries if sustainable development, including both climate change mitigation and poverty alleviation, ought to become more than a dream. But apart from Hydropower especially in China, the story is still at the very beginning. Renewable energy in developing countries means mostly single, often short-lived projects at high cost. They rely on heavy subsidies rather than being grounded on a solid commercial basis, they imply high political and financial risks.

However, new initiatives promise a brighter future for RE in developing countries and China:

- For the first time in China, county and local levels are given decision-taking power in energy policies, even in the well developed Hydropower sector, in the framework of new 20 billion Euro RE programs. But this is only the most notable example of power market deregulation, RE promotion policies and foreign investment opportunities in many developing countries. First concrete carbon funds start buying Certified Emission Reductions from CDM projects launching a future multi-billion Euro market for stabilising the world climate.
- International development policies are undergoing a wind of change towards promoting Public Private Partnership, grassroots initiatives and small-scale investment solutions.

These policies open new possibilities for co-operation on climate change mitigation and poverty alleviation between the international community and local stakeholders. Innovative initiatives, such as the newly founded Social Enterprise "Renewables for Development - RforD", offer commercial approaches to exploit these opportunities to broker locally based RE projects between Europe, China and developing countries, tapping all kind of financing sources from local to global level.

We invite you to learn about, to exchange views, to lay the foundation for field-implementation of these new initiatives together with international experts, to meet project developers from China, India, the Philippines and other

developing countries in a truly international setting.

To take into account the interdisciplinary nature of the covered subjects, we expect participants from Members of the RE industry organisations EREC, ESHA and IN-SHP, foundations, development banks, investors, sponsors, green / CDM funds as participants from Financing bodies, UN - Organisations, national organisations, grassroots organisations, NGOs, social entrepreneurs and representatives from Chinese Ministries, State Commissions delegates and related governmental departments from developing countries.

sent by Christoph Schröder <cxs_at_cybortek.de>

Wind Energy Industry Looks to Reach 60,000-MW Goal in Five Years *–Paris, April 2, 2002.* The wind energy market could reach 60,000 megawatts (MW) worldwide over the next five years, more than doubling its present output, the first Global Windpower conference and exhibition heard today in Paris.

Opening the event, conference chairman Rakesh Bakshi said: 'Wind energy today is a global phenomenon. It's the fastest-growing power technology. The world has taken about 25 years to reach 25,000 MW, but over the next five years, we expect to reach 60,000 MW.'

The event, held in the CNIT, La Defense, was hosted by the European Wind Energy Association (EWEA), the American Wind Energy Association (AWEA), and the Indian Wind Turbine Manufacturers' Association (IWTMA). 1,600 delegates and exhibitors are expected to attend over the four days, representing almost 50 countries.

Christian Pierret, French Minister of Industry and Finance, said that 10,000 MW of new wind energy capacity would be needed in France by 10 to meet European clean energy commitments. "To get there we have introduced an obligation on electricity suppliers and a fixed price for wind energy output. This will create a rapid and strong development."

India's Minister for Non-Conventional Energy Sources, M. Kannappan, said that his government has plans for an additional 6,000 MW wind power by 12. He said that wind would also help bring power to some of the 76 million households that currently have no access to electricity.

Brian Wilson, U.K. Minister for Energy, said that Britain had yesterday taken its "biggest step ever towards the creation of a significant renewables sector - the setting into effect of the Renewables Obligation." This aims for 10 % of electricity from renewable sources by 10. "This is going to mean a major expansion in the contribution of wind power," he said. A part of that goal will be met by the 1,500 MW offshore capacity already approved.

South Australian Member of Parliament Bob Such said his country is about to see a large number of projects start generating because of the national mandate for 2 % of electricity to come from renewables. He expected a 1,100-MW target for wind energy to be easily exceeded.

Celebrating his county's leading position in the world wind energy market, German M.P. Hermann Scheer projected 25,000 MW to be installed in Germany alone by 10, not including a long list of proposed offshore projects. 'The German success is based on a mixture of political support and a guaranteed price, he said.

EWEA President Arthouros Zervos said that a projection by the Association and Greenpeace showed that 10 % of world's electricity could come from the wind by . This would ramp up to a world investment of $78 billion in that

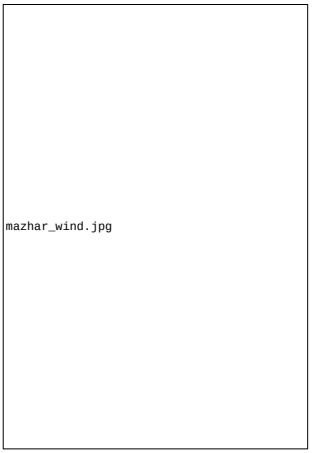

Figure 4.6: Mazharul Islam near a Wind turbine

year. 'This is a feasible target. We have already seen much higher figures than even the industry itself had projected,' he said.

Jamie Chapman of AWEA, commenting on the phenomenal 66% growth in U.S. capacity in 2001, said: 'We have achieved a multi-million dollar market. It's turned from a sleeper market into one attracting major energy corporations.' The U.S. Congress is set to soon debate a national goal of 10% renewables in the energy mix by .

The next Global Windpower conference is scheduled to be held in Chicago in March 04.

Contact: In US: Christine Real de Azua, AWEA, at (2) 383-2508
In Paris: Christian Kjaer, EWEA, at +45 21 23 23 66

article send by Mazharul Islam

PUBLICATIONS & BOOKS

Grid Integration Of Wind Energy Conversion Systems For those interested in wind energy, have a look at the book *Grid Integration Of Wind Energy Conversion Systems*, John Wiley & Sons Ltd., UK, by Dr. Siegfried Heier, Universität Gesamthochschule Kassel / Germany. Contents: - Wind energy power plants, - Wind energy conversion systems, - Generating electrical energy from mechanical, - The transfer of electrical energy to the supply grid, - Control and supersion of wind power plants, - Using wind energy.

Fernando Petrucci

New publication from the Stockholm Environment Institute and Global Scenario Group was announced 3rd April, 2002:

Great Transitions: The Promise and Lure of the Times Ahead
by Paul Raskin, Tariq Banuri, Gilberto Gallopin, Pablo Gutman, Al Hammond, Robert Kates and Rob Swart

This path-breaking book presents a fresh vision for a sustainable world. It describes the historic roots, current dynamics, future perils, and alternative pathways for world development. It advances one of these paths, Great Transition, as the preferred route, identifying strategies, agents of change, and values for a new global agenda.

The planetary phase of history has begun, its ultimate shape profoundly uncertain. Will global development veer toward a world of impoverished people, cultures and nature? Or will there be a Great Transition toward a future of enriched lives, human solidarity and environmental sustainability? The book's appraisal of the current global crossroads is disquieting. Conventional development is perilous, while the reform path to a sustainable future is problematic and uncertain.

No task is more urgent than broadening the discourse on development and

the future. Great Transition aims to do just that. The Global Scenario Group plans a campaign of outreach, education, and dialogue around its themes in the months and years ahead. We invite you to join us.

For further information about the Stockholm Environment Institute please see *www.sei.se*.

submitted by Anand Shukla
<anand_s72_at_hotmail.com>

RENEWABLE ENERGY JOBS

When sitting among the staff members in the cafeteria in Wechloy campus and discussing all the years of PPRE, the events and the carreers of the now about 0 absolvents, Edu stressed the point that PPRE and the network of alumni might serve as a basis for a Renewable Energy Job acquisition. He reminded us that quite a few of the present jobs hold by PPRE alumni have been found with the help of somebody related to the programme, and that beyond the network of alumni there are good relations to individuals, research institutes and companies, where from time to time positions may be offered, or special talents called for. Examples could be observed also on PPRE-L.

Dear readers, feel invited to share *your insights* and *your ideas* on this topic, and let us start an initiative!

PPRE THESIS TITLES 2001

Anahua Quispe, Edgar Narciso: *Analysis of Data, Turbulence and Windpower Output* (Prof. Dr. J. Peinke)

Aravind, P.V.: *Generation of Electricity and Heat using biomass gasification, solid oxide fuel cells and micro turbines* (Dr. K. Blum)

Fuh, Veronica Manka-a: *Cofermentation of Organic Wastes for Biogas Production* (Dr. K. Blum)

Ghimire, Ram Prasad: *Integrated Rural Energy Planning – An Approach Towards Sustainable Development in Nepal* (Prof. Dr. W. Pfaffenberger)

Gil Guerrero, Algert: *Validation of Models for Wind Speed and Turbulence Intensity Profiles in Wind Turbine Wakes* (Dr. D. Heinemann)

Islam, Mazharul: *Framework for Accelerating the Use of Renewable Energy Technologies in Bangladesh* (Prof. Dr. W. Pfaffenberger)

Islam, Md. Saiful: *Performance Evaluation and System Modelling of PV Hybrid Power Plants Based on Meteorological and Technical Aspects* (Dr. D. Heinemann)

Magessa, Finias Bryceson: *Monitoring, Investigation and Analysis of Solar PV Systems for Performance Optimization in Tanzania* (Dr. J. Schumacher)

Mu, Yundong: *Feasibility and Performance Study of Optical Sensor for Automatic Solar Tracking* (Dr. K. Blum)

Nguyen, Quoc Khanh: *Simulation of Power Output for Single Wind Turbines in a Wind Farm* (Dr. H.P. Waldl)

Niño, Raul: *Wind Energy Study for Tejona / Costa Rica* (Dr. H.P. Waldl)

Risse, Oliver: *Real Life-Cycle Cost Analysis of Photovoltaic Pumping Systems for Agricultural Irrigation in Northern Chile* (Dr. J. Schumacher)

Subbarao, Srikanth: *Biogas Powered Fuel Cells – Transition and Prospects in Rural Areas* (Dr. K. Blum)

Tang, Hui: *Feasibility Studying of Red Gulg Wind Farm, China* (Dr. J. Schumacher)

Tardón, Saioa: *Luminiscence and Electronic Studies of a-Si:H/c-Si Hetero Solar Cells* (Prof. Dr. G.H. Bauer)

von Hauff, Elizabeth Leoni: *Production of an Organic Solar Cell* (Dr. V. Dyakonov)

For a photograph of PPRE00/01 group see fig. 1.1.

WEB SITES OF INTEREST

New MSc progamme on RE at University of Salta / Argentina

The webpage address of the MSc progamme on RE at University of Salta. *http://www.unsa.edu.ar/eventos/renovable/* was communicated by F. Petrucci. Contacts: Prof. Judith Franco *francoj_at_unsa.edu.ar*. Prof. Dr. Luis Saravia *saravia_at_unsa.edu.ar* is director of the programme and head of INENCO, research institute on RE (specially on solar energy and solar passive arch.) at the same uni. *http://www.inenco.net/*

Technical Standard for SHS

Perhaps you can find interesting this address, The Technical Standard for Solar Home System, *http://www.ies-def.upm.es/ies/doc/groups/system/-activ/shs/SHS_Inglés.PDF*

Kind regards

Edgar Narciso Anahua Quispe *<edgar.n.anahua.quispe_at_mail.uni-oldenburg.de>*

Renewables for the South

enclosed you find a brand new publication called: "renewables for the south" from the state government of NRW. 180 pages with very good information on many different renewables an their possibilities in the south... also some country strategies... financial options... and and and

http://www.solartransfer.de/

regards

Oliver Risse *<oliver.risse_at_gmx.de>*

BP Statistical Review of World Energy June 2001

'BP Statistical Review of World Energy June 2001' is available for download from *http://www.bp.com/centres/energy/index.asp*. This is a comprehensive report with global energy statistics.

The exact location of the PDF document is – *http://www.bp.com/downloads/702/BPwebglobal.pdf*.

and the Excel Spreadsheet can be found at – *http://www.bp.com/downloads/701/global_stats_workboot.XLS*

Global Environment Facility (GEF)

The Global Environment Facility (GEF) is a major force in promoting renewable energy and the chief driver and catalyst among development agencies. In GEF's first decade (91–00), it approved $570 million in grants for 48 renewable energy projects in 47 developing and transition countries. Total project costs have exceeded $3 billion, because GEF grants have also leveraged significant financing and other resources from governments, other donor agencies, regional development banks, implementing agencies, and the private sector. The document titled GEF PARTNERS WITH BUSINESS FOR A BETTER WORLD highlights the current status of different Renewable Energy Technologies.

This document can be found at *www.gefweb.org/Whats_New/Archives/-Postable_Renewable_Energy_Booklet.pdf*

Regards,

Mazharul Islam *<mazhar_at_ASME.ORG>*

Renewable Energy Links at Open University

please look at *http://www.open.ac.uk/StudentWeb/-t265/t265links.html* for interesting RE links.

Three engineering students were gathered together discussing the possible designers of the human body. One said, "It was a mechanical engineer. Just look at all the joints". The second said, "No, it was an electrical engineer. The nervous system has many thousands of electrical connections." The third said, "Actually it was a civil engineer. Who else would run a toxic waste pipeline through a recreational area?"

Renewable Energy Events A RE events calender is presented by *http://www.ttcorp.com/events.asp* This hint was given by Bahy Saad Abd-el Mesih *<bahy_s_at_yahoo.com>*

Latest News on Energy Markets this very interesting site is important for the studies we are doing, related to the current news on the world energy market, tells Santiago Sanchez (PPRE01/02). Give it a try: *http://www.eyeforenergy.com*

LIST OF FORMER PARTICIPANTS

NO	YEAR	Surname	Name	Tit.	COUNTRY	e-mail
1	87/88	BEKDACH	Hussein	Dr.	Libanon	
2	87/88	DEMEL	Lothar	Mr.	Germany	demel_at_uni-oldenburg.de
3	87/88	DIBOR	Alfred	Mr.	Nigeria	
4	87/88	FISCHER	Eric	Mr.	Brasil	efischer_at_cefetpr.br
5	87/88	HEILSCHER	Gerd	Mr.	Germany	heilscher_at_meteocontrol.de
6	87/88	ZARATE	Carlos	Mr.	Peru	iczzarate_at_aol.com
7	88/89	HAMAD	Bakri	Mr.	Sudan	hamad_at_tu-harburg.de
8	88/89	KIMARO	Ainea	Mr.	Tanzania	ainea_2000_at_yahoo.com
9	88/89	HOLTORF	Hans G.	Mr.	Germany	hans.holtorf_at_uni-oldenburg.de
10	88/89	MORAES-DUZAT	Rejane	Dr.	Brasil	duzat_at_inpa.gov.br
11	88/89	NONTASO	Ngarmnit	Ms.	Thailand	
12	88/89	LU	Bai	Ms.	China	
13	88/89	JIA	Xi-Nan	Dr.	China	thmasia_at_mbox3.singnet.com.sg
14	88/89	MAIGA	Alhousseini Issa	Mr.	Mali	
15	88/89	OLUDHE	Christopher	Dr.	Kenya	coludhe_at_uonbi.ac.ke
16	88/89	PIETSCHER	Jochen	Mr.	Germany	jopiet_at_gmx.de
17	88/89	RAKHA	Hassan	Mr.	Egypt	
18	88/89	CAMILLO	Roger R.	Mr.	Nicaragua	
19	88/89	RAMESH	Muthya Praneshrao	Mr.	India	rameshmuthya_at_hotmail.com
20	88/89	TORO CORTES	Francisco	Mr.	Chile	
	88/89	RIVASPLATA	Cesar	Mr.	Peru	crivasplata_at_hotmail.com
21	89/90	GAO	Ying	Dr.	China	ygao_at_baltz.laurentian.ca
22	89/90	JAHN	Ulricke	Ms.	Germany	ujahn_at_easynet.de
23	89/90	KIMANI	John Muiruri	Mr.	Kenya	
24	89/90	HAN	Wei	Dr. .	China	w.han_at_ventis.de
25	89/90	MIRANDA MURILLO	Alexis	Mr.	Honduras	ujahn_at_easynet.de
26	89/90	MISRA	K.	Mr.	India	akmisra_at_TERI.RES.IN
27	89/90	MUKHERJEE	Partha S.	Mr.	India	
28	89/90	REYNALDO	Reynaldo	Mr.	Philippines	r_reynaldo_at_yahoo.com
29	89/90	SCHWARZ	Thomas	Mr.	Germany	tom.schwarz_at_t-online.de
30	89/90	TARH	Zaccheus T.	Mr.	Cameroon	
31	89/90	THI HONG HAI	Nguyen	Ms.	Vietnam	
32	89/90	PARK	Myong-Sik	Mr.	Korea	
33	90/91	BARROGA	Maria L.	Ms.	Philippines	
34	90/91	HASSAN	Gimba	Mr.	Nigeria	gimbah_at_MIT.EDU
35	90/91	USBECK	Stefanie	Ms.	Germany	
36	90/91	ENNISON	Isaac	Mr.	Ghana	
37	90/91	PANDEY	Krishna C.	Mr.	India	krishna_at_ciae.mp.nic.in
38	90/91	ADAM	El Fadil Ahmed	Dr.	Sudan	fadiladam_at_hotmail.com
39	90/91	KIOKO	Joel M.	Mr.	Kenya	kebs_at_africaonline.co.ke
40	90/91	KNAGGE	Edu	Mr.	Germany	edu.knagge_at_uni-oldenburg.de
41	90/91	MISHRA	Christanand	Dr.	India	
42	90/91	OKAE	Charles	Mr.	Ghana	cokae_at_juno.com
43	90/91	OSMAN	Abdalla	Mr.	Sudan	
44	90/91	PEIRIS	Wettasingha	Mr.	Sri Lanka	
45	90/91	LEMUS	T. Hernando	Mr.	Bolivia	
46	90/91	XIE	Enhai	Mr.	China	ygao_at_baltz.laurentian.ca
47	91/92	ABEL	Bettina	Ms.	Germany	bettina_abel_at_gmx.de
48	91/92	ALLY	Noel	Mr.	Guyana	
49	91/92	AUNG GYI		Mr.	Myanmar	
50	91/92	HAKIEM	Mahmoud EL	Mr.	Sudan	
51	91/92	INGWE	Anna Naftal	Ms.	Tanzania	gtzkep_ngara_at_mwanza.com
52	91/92	KAUR	Jagjit	Ms.	India	jkaur_at_acsu.buffalo.edu
53	91/92	MANSARAY	Kelleh G.	Dr.	Sierra Leone	kellehgbawuru_at_hotmail.com
54	91/92	XIANG-JUN	Ming	Mr.	China	yuehua1_at_mx2.gd.cei.gov.cn
55	91/92	MUGISHA	Patrick	Mr.	Uganda	pmugisha_at_techmuk.ac.ug
56	91/92	SANTOSO	Murtiyanto	Mr.	Indonesia	murtis_at_peter.petra.ac.id
57	91/92	TEGELER	Ludger	Mr.	Germany	Ludger.Tegeler_at_t-online.de
58	91/92	NABUTOLA	W. Musungu	Mr.	Kenya	reecon_at_mitsuminet.com
59	92/93	AL KAILANI	Fayez Jamil	Mr.	Jordan	
60	92/93	BUDIONO	Chayun	Mr.	Indonesia	chayun_at_INDO.NET.ID
61	92/93	HAMID	Mohamed Ali	Mr.	Sudan	adarub_at_hotmail.com
62	92/93	KARIYAWASAM	Palitha L.G.	Mr.	Sri Lanka	pmesdp_at_ceb.lk
63	92/93	KASSENGA	Gabriel	Mr.	Tanzania	kassengagr_at_hotmail.com
64	92/93	ABDU (Former: Danja Laufun)	Bertha	Ms.	Nigeria	abdulonis_at_yahoo.com
65	92/93	MAGNO DESENDARIO	Evelyn	Ms.	Philippines	
66	92/93	SHRESTHA	Kedar Shanker	Dr.	Nepal	kedar.shanker.shrestha_at_exxonmobil.com
67	92/93	PANDYA	Udayan	Mr.	India	mail2udayan_in_india_at_rediffmail.com
68	92/93	EL-ASSAD	Kawther A.Md.	Ms.	Sudan	k_alassad_at_hotmail.com
69	92/93	MUTWALY	Safaá	Ms.	Sudan	
70	92/93	WANG	Jing Jing	Ms.	China	jjwtong_at_hotmail.com
71	92/93	WAFULA	James C.	Mr.	Kenya	ucomm_at_form-net.com ?
72	92/93	BLAAS	Markus	Mr.	Germany	markus.blaas_at_t-online.de
73	92/93	GEORG	Rolf	Mr.	Germany	georgrolf_at_hotmail.com
74	93/94	EL-GHANI	Ahmed Abd	Dr.	Egypt	amfathy_at_hotmail.com
75	93/94	TUBAIL	As'ad	Mr.	Palestine	tubailasad_at_hotmail.com,

76	93/94	TOMMY	Henry J.M	Dr.	Sierra Leone	tommyh_at_attcanada.net
77	93/94	NAHUI ORTIZ	Johnny	Dr.	Peru	jnortiz_at_amauta.rcp.net.pe
78	93/94	LEON	Mathias Augustus	Mr.	India	augustusleon_at_hotmail.com
79	93/94	ROMMEL	Mathias	Mr.	Germany	rommel_at_iis-b.fhg.de
80	93/94	MERGIA	Mesfin	Mr.	Ethiopia	mesfinmergia_at_hotmail.com
81	93/94	GADAH ELDAM	Nagwa	Ms.	Sudan	ngadah_at_yahoo.com
82	93/94	SIEFERT	Oliver	Mr.	Germany	
83	93/94	ANDRIAMEHAFAPARANY	Olivier	Mr.	Madagascar	o.andriamahefaparany_at_lancaster.ac.uk
84	93/94	RORDIGUES DOS SANTOS	Rosana	Ms.	Brasil	rosana2_at_uol.com.br
85	93/94	HURMUZAN KANAM	Senda	Mr.	Indonesia	senda_at_bppt.go.id
86	94/95	LINGBO († Feb. 1996)	Cui	Mr.	China	
87	94/95	YAN ZHAO	Dong	Mr.	China	
88	94/95	TEKA	Melis	Mr.	Ethiopia	
89	94/95	TOLESSA	Samson	Mr.	Ethiopia	samson_at_zfn.uni-bremen.de
90	94/95	BEST PRIMO	Gayle	Ms.	Guyana	gbbest_at_rocketmail.com
91	94/95	MYINT	Mu Yar	Ms.	Myanmar	
92	94/95	GAUTAM	Satish	Mr.	Nepal	redpktm_at_mos.com.np
93	94/95	SELLAHEWA	Raveendra A.	Mr.	Sri Lanka	rsellahewa_at_hotmail.com
94	94/95	NTOGA	Julius	Mr.	Tanzania	jntoga_at_hotmail.com
95	94/95	GASSIR FAROUK	M´med Ibrahim	Mr.	Sudan	gasiri81_at_hotmail.com
96	94/95	GHEBREHIWOT	Debesai	Mr.	Eritrea	debai_at_ec1.doe.gov.er
97	94/95	MESFIN	Yohannes	Mr.	Eritrea	
98	94/95	KSOLL	Michael	Dr.	Germany	
99	94/95	KUNTZE	Björn	Mr.	Germany	b.kuntze_at_t-online.de
100	95/96	NEGASH	Bereket	Mr.	Eritrea	
101	95/96	FRASE	Orville	Mr.	Guyana	gnea_at_guyana.net.gy
102	95/96	ROSYID	Oo Abdul	Mr.	Indonesia	rosyid_id_at_yahoo.com
103	95/96	BASNET	Diwaker	Mr.	Nepal	dbasnet_at_hotmail.com
104	95/96	AHMED	Maqbool	Mr.	Pakistan	maqbool_ahmed_at_hotmail.com
105	95/96	MAGPOC	Godofredo Jr.	Mr.	Philippines	gbmagpoc_at_napocor.com.ph
106	95/96	MALTSEV	Alexandre	Mr.	Russia	
107	95/96	LIN	Yeong-Chuan	Mr.	Taiwan	d01505_at_taipower.com.tw
108	95/96	KINGU	Elizabeth A.	Ms.	Tanzania	ekingu_at_hotmail.com
109	95/96	ENDALE GEDA	Genene	Mr.	Ethiopia	
110	95/96	BABA	Abdallah	Mr.	Tunesia	Baba.Abdallah_at_planet.tn
111	95/96	FUENTES HEINRICH	Enrique	Mr.	Chile	efuentes_at_visviri.electa.uta.cl
112	95/96	STEINMEIER	Ernstjoachim	Mr.	Mexico	steinmeier_at_infosel.net.mx
113	95/96	NIKOLIC	Milorad	Mr.	Germany	
114	95/96	WOELK	Karsten	Mr.	Germany	
115	96/97	KAMBERI	Mirela	Ms.	Albania	
116	96/97	PEREZ	Orlando	Mr.	Bolivia	
117	96/97	CELESTINE ANYAM	Awa	Mr.	Cameroon	c_anyam_at_yahoo.com
118	96/97	YE	Zhao Hui	Ms.	China	
119	96/97	TESHOME	Hiwote	Ms.	Ethiopia	hiwote_at_HOTMAIL.COM
120	96/97	YIMER	Nebiyu	Mr.	Ethiopia	yimer_at_hotmail.com
121	96/97	GBAGBO	Joseph Kofi Nani	Mr.	Ghana	kofinani_at_hotmail.com
122	96/97	HEGDE	Gajanana K.	Mr.	India	akh67_at_yahoo.com
123	96/97	OSAWA	Bernard	Mr.	Kenya	energyaf_at_iconnect.co.ke
124	96/97	BALLESTEROS	Miguel Angel	Mr.	Nicaragua	mball216_at_hotmail
125	96/97	PROJESTUS MAGEZI	Rwiza	Mr.	Tanzania	
126	96/97	MORRIS	Richard	Mr.	Australia	r_s_morris_at_hotmail.com
127	96/97	SANCHO	Sebastian	Mr.	Costa Rica	sesado_at_usitmail.com
128	96/97	DALEXIS († Feb. 1999)	Walmé	Mr.	Haiti	
129	96/97	BELZ	Matthias	Mr.	Germany	m.belz_at_t-online.de, info_at_ralos.de
130	96/97	SCHRÖTER	Wolfram	Mr.	Germany	wo.schroeter_at_web.de
131	97/98	VÁSQUEZ	Ruben Eduardo	Mr.	Chile	rubenvasquezc_at_hotmail.com
132	97/98	CHEN	Rong	Mr.	China	chenrong_at_hotmail.com
133	97/98	ZHANG	Yin	Mr.	China	zhangy_at_sde.edu.cn
134	97/98	CASTILLO	Guillermo Eduardo	Mr.	El Salvador	castillo_at_dgcdec1.epfl.ch
135	97/98	ABDULKADIR I.	Bekala	Ms.	Ethiopia	
136	97/98	AHIATAKU T.	Wisdom	Mr.	Ghana	wisdom_at_netafrique.com
137	97/98	PARTHAN	Binu	Mr.	India	bp_at_itpi.co.in
138	97/98	ODEH	Ibrahim	Mr.	Jordan	odeh_at_homemail.com
139	97/98	SICHALI	Francis	Mr.	Malawi	fmasichali_at_yahoo.co.uk
140	97/98	PETRUCCI	Fernando	Mr.	Argentinien	fepe_at_arnet.com.ar
141	97/98	SCHRÖDER	Christoph	Mr.	Deutschland	cxs_at_gmx.de
142	97/98	JACKSON	Thomas	Mr.	USA	tomandcati_at_yahoo.com
143	97/98	DELAMO	Alex	Mr.	Spanien	aamo_at_pie.xtec.es, delamodu_at_teleline.es
144	97/98	ENDRES	Manuela	Ms.	Deutschland	manuela_endres_at_gmx.de
145	97/98	VANGINÉ	Wooslène	Ms.	Haiti	vangine_at_yahoo.com
146	97/98	LUSTIG	Konrad	Mr.	Deutsch	konti_at_ise.fhg.de
147	97/98	GÓMEZ	Ramon	Mr.	Spanien	ragovi_at_confluencia.net
148	98/99	MASUM	Syed E. Huq	Mr.	Bangladesch	smasum_at_bttb.net.bd
149	98/99	LIU	Hui	Ms.	China	len21agenda_at_yahoo.com
150	98/99	YANG	Na	Ms.	China	yangna_at_public.hh.nm.cn
151	98/99	URENA VARGAS	Wesly	Mr.	Costa Rica	gewuv_at_lif.de, weslyto_at_hotmail.com
152	98/99	KEKELIA	Bidzina	Mr.	Georgia	bidzina_at_yahoo.com, bidzina_at_kekelia.com
153	98/99	PATIL	Samudragupta Ashok	Mr.	India	samx1_at_rediffmail.com
154	98/99	TIAKO NGALANI	Christophe	Mr.	Kamerun	chriti_at_yahoo.com

155	98/99	JAOKO	Hancox Wilson	Mr.	Kenia	hansjaoko_at_yahoo.com
156	98/99	CHIMA	Timothy Freeman	Mr.	Malawi	timothy_at_eomw.net
157	98/99	AL-ALAWI	Ali Salim	Mr.	Oman	asmalawi_at_yahoo.com
158	98/99	CHIRVASE	Dana	Ms.	Rumänien	chirvase_dana_at_yahoo.com
159	98/99	DLAMINI	Sibusiso Ndumiso	Mr.	Swaziland	nergyswa_at_realnet.co.sz
160	98/99	JAMIJANSHARAV	Khishigbayar	Ms.	Mongolia	mijeekhish_at_hotmail.com
161	98/99	LAM	Johannes (Jan)	Mr.	Netherlands	lam_at_tref.nl, ssd_at_afribone.net.ml
162	98/99	STRAUB	Christoph	Mr.	Germany	
163	98/99	OEHRENS	Juan Sebastian	Mr.	Chile	oehrens_at_yahoo.com, der_sebb_at_yahoo.de
164	99/00	TADESSE	Alemu	Mr.	Ethiopia	alemu_t_at_yahoo.com
165	99/00	KHAN	Md Mesbah	Mr.	Bangladesch	mesbah_khan_at_hotmail.com
166	99/00	HOQUE	Mozammel	Mr.	Bangladesch	mozammel_2000_at_yahoo.com
167	99/00	AKWANWI AMBE	Roseline	Ms.	Cameroon	akwanwi_at_yahoo.com, aqn-roslyn_at_gmx.net
168	99/00	WANG	Di	Mr.	China	robindiwang_at_yahoo.com
169	99/00	PAREDES	Juan Roberto	Mr.	Colombia	juanro_at_gmx.net
170	99/00	SUBBARAO	Sham	Mr.	India	sham_india_at_yahoo.com
171	99/00	AL-NAWAISEH	Bassil	Mr.	Jordan	bnawaiseh_at_hotmail.com
172	99/00	GAMULA	Gregory	Mr.	Malawian	ggamula_at_yahoo.com
173	99/00	DAHAL	Yubaraj	Mr.	Nepal	yubaraj_at_engineer.com
174	99/00	MUSA	Mzumbe	Mr.	Tanzania	musa_mzumbe_at_yahoo.com
175	99/00	SENDEGEYA	Al-Mas	Mr.	Uganda	a_sendegeya_at_yahoo.co.uk
176	99/00	ZIESMER	Andrea	Ms.	Germany	za_4_at_yahoo.de
177	99/00	ULZIISUREN	Enhbold	Mr.	Mongolia	ebdu_at_yahoo.com
178	99/00	GLÄSER	Bernhard	Mr.	Germany	b99_uk_at_yahoo.com
179	99/00	KUYVENHOVEN	Simon	Mr.	Netherlands	simonkuyvenhoven_at_YAHOO.COM
180	00/01	ISLAM	Mazharul	Mr.	Bangladesh	anjan_at_citechco.net.
181	00/01	FUH	Veronica Manka's	Ms.	Cameroon	fuverama_at_yahoo.com
182	00/01	MU	Yundong	Mr.	China	muyundong_at_hotmail.com
183	00/01	P.V.	Aravind	Mr.	India	p_v_aravind_at_hotmail.com
184	00/01	SRIKANTH	Subbarao	Mr.	India	Kanthi_vinu_at_yahoo.com
185	00/01	GIL	Algert	Mr.	Mexico	ge_233_at_lif.de, gergil_at_gmx.net
186	00/01	GHIMIRE	Ram Prasad	Mr.	Nepal	rnksghimire_at_hotmail.com
187	00/01	ANAHUA	Edgar Narciso	Mr.	Peru	e_anahua_at_yahoo.com
188	00/01	MAGESSA	Finias Bryceson	Mr.	Tanzania	finiasm_at_yahoo.com, fmagessa_at_hotmail.com
189	00/01	NGUYEN	Quoc Khanh	Mr.	Vietnam	Khanh_2000_at_hotmail.com
190	00/01	ISLAM	MD. Saiful	Mr.	Bangladesh	Saiful70_at_yahoo.com
191	00/01	TANG	Hui	Mr.	China	tang_hui00_at_hotmail.com
192	00/01	RISSE	Oliver	Mr.	Germany	o.risse_at_suntechnics.de
193	00/01	ABBAS	Mushahid	Mr.	Pakistan	mushahidabbas15_at_yahoo.com
194	00/01	TARDÓN	Saioa	Ms.	Spain	saioa73_at_hotmail.com
195	00/01	NIÑO	Raul	Mr.	Venezuela	raul_nino_at_hotmail.com
196	00/01	VON HAUFF	Elizabeth Leoni	Ms.	Canada	liz_at_spintriplet.com
197	01/02	MOHTAD	Ibrahim	Mr.	Bangladesh	imohtad_at_hotmail.com
198	01/02	BELLE EBOTE	Vivian	Mrs.	Cameroon	vebote_at_yahoo.fr
199	01/02	NANJI	Henri Nota	Mr.	Cameroon	nanji_hn_at_yahoo.co.uk
200	01/02	SANCHEZ	Santiago Jorge	Mr.	Ecuador	ecoelec_at_hotmail.com
201	01/02	SHUKLA	Anand	Mr.	India	anand_s72_at_hotmail.com
202	01/02	GADDE	Butchaiah	Mr.	India	b_gadde1_at_hotmail.com
203	01/02	HEANG	Bora	Mr.	Cambodia	heangbora_at_hotmail.com
204	01/02	OCHIENG	Francis Xavier	Mr.	Kenya	XavierfO_at_netscape.net
205	01/02	DHITAL	Ram Prasad	Mr.	Nepal	rpdhital_at_yahoo.com
206	01/02	POUDEL	Om Prasad	Mr.	Nepal	omppoudel_at_yahoo.com
207	01/02	MAZIMPAKA	Ernest	Mr.	Rwanda	emazimpaka_at_yahoo.fr
208	01/02	ABD-EL-MESIH	Bahy Saad Abdalla	Mr.	Egypt	bahy_s_at_yahoo.com
209	01/02	UMAÑA	Alejandro	Mr.	Colombia	kask_at_hotmail.com
210	01/02	PILALAS	Loukas	Mr.	Greece	darkblue_at_lycos.com
211	01/02	TRIANTAFYLLOS	Panagiotis	Mr.	Greece	panagiotis_triantafyllos_at_hotmail.com
212	01/02	MANSSEN	Thomas	Mr.	Germany	t.manssen_at_gmx.net
	01/02	WINTERFELDT	Jörg	Mr.	Germany	j_winterfeldt_at_hotmail.com
213	01/02	AVELLANEDA	Jordi	Mr.	Spain	ave_at_cconline.es
214	01/02	SHAH	Sayed Faruque	Mr.	Bangladesh/German	shahsayed65_at_hotmail.com
215	01/02	KOMILOV	Asliddin	Mr.	Usbekistan	a_g_komilov_at_yahoo.com

LIST OF STAFF & USEFUL LINKS

Name	mail - address
Ronald Frels (secretary)	ronald.frels_at_ uni-oldenburg.de
Udo Kulschewski (tutor)	kulschewski_at_uni-oldenburg.de
Andrea Geisler (technical assistant)	andrea_at_ehf.uni-oldenburg.de
Hans Holtorf (former Bloos) (lecturer)	hans.holtorf_at_uni-oldenburg.de
Elke Lorenz (lecturer)	elke.lorenz_at_uni-oldenburg.de
Edu Knagge (co-ordinator)	edu_at_uni-oldenburg.de
Konrad Blum (lecturer)	kblum_at_uni-oldenburg.de
Detlev Heinemann (lecturer)	detlev.heinemann_at_uni-oldenburg.de
H.P. Waldl (Igor) (lecturer)	igor_at_ehf.uni-oldenburg.de
Jürgen Schumacher (head of PPRE)	juergen.schumacher_at_uni-oldenburg.de
Michael Golba (researcher)	michael.golba_at_uni-oldenburg.de
Prof. J. Peinke (lecturer)	joachim.peinke_at_uni-oldenburg.de
Prof. J. Parisi (Head of EHF-group)	parisi_at_ehf.uni-oldenburg.de
Prof. W. Pfaffenberger (lecturer)	pfaffen_at_uni-oldenburg.de
Prof. G. Bauer (lecturer)	gottfried.bauer_at_uni-oldenburg.de
Joachim Göttsche - Solar-Institut Juelich, FH Aachen	goettsche_at_sij.fh-aachen.de
Prof. Weiler, Polytechnic Emden	weiler_at_nwt.fho-emden.de
Prof. Sigrid Jannsen	jannsen_at_ise.fhg.de
Anne Haas - Swiss Federal Institute of Technology	haas_at_orl.arch.ethz.ch
Ulrich Graf - University of Bremen	graf_at_zfn.uni-bremen.de (or: graf_at_uni-bremen.de)
Prof. H.G. Beyer - Polytechnic in Magdeburg	hbeyer_at_emc.ufsc.br
Thomas Degner - ISET	tdegner_at_iset.uni-kassel.de
Jens Peter Molly - DEWI	jp.molly_at_dewi.de
Ludwig Sasse - former BORDA	L.Sasse_at_t-online.de
Pedro Kraemer - BORDA (new !)	Blattellagermani_at_web.de
Franz Trieb - DLR, Germany	Franz.Trieb_at_dlr.de
W. Schlez - GARRAD HASSAN AND PARTNERS LTD.	schlez_at_garradhassan.co.uk
Frau Palmer - DAAD	palmer_at_daad.de (newly incharge for PPRE)
Anke Stahl - DAAD	a.stahl.daad.de
gate (gtz - question answer information)	GATE-ISAT_at_GTZ.DE
IASEE-L (Discussion List on Solar Energy Education)	IASEE-L_at_LISTSERV.DFN.DE
PPRE-L (PPRE-alumni-network-list)	ppre-l_at_listserv.dfn.de