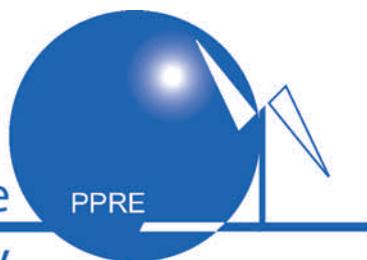


Postgraduate Programme

Renewable Energy



# NEWSLETTER

No. 1/2006 - Vol. 25

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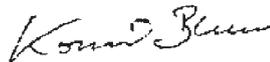
Dear friends,

in a rapidly changing world, when unexpected and even disastrous turns of events happen all too frequently, the Postgraduate Programme Renewable Energy and the associated Alumni Network experience a period of stability and steady development. We are glad to see old friends and new faces in the Seminar room of the Energielabor building, teaching, discussing and last but not least celebrating. Germany has experienced a wonderful summer (maybe even a little bit too warm...) and a quite successful soccer world championship, which allowed the world to see new aspects of the Germans and their country. One of these is a booming Renewable Energy industry, which is creating jobs and income to an unexpected degree. This industry is turning its focus more and more on world-wide business fields and thus is increasingly interested in contacts to institutions and companies in all continents. PPRE students, fresh graduates and alumni might benefit from this kind of 'globalisation' already!

We are looking forward to a special event -- the PV centered DAAD Summer School in late August 2006 (for details see link on [www.ppre.de](http://www.ppre.de)) -- and the next run of PPRE, which will be the 19th and the third with the new, three-term structure.

With the hope that this newsletter reaches you in a state of good health and well-being.

Sunny greetings from Oldenburg

 & 

## NEWS FROM OLDENBURG

### **„Postgraduate Programme Renewable Energy“ received German Solar Award - Oldenburg Master course of studies with world-wide acknowledgment** (press-release)

On 28th October 2005, the Oldenburg Master's programme „Postgraduate Programme Renewable Energy (PPRE) „was awarded the 2005 Solar Prize, Education Category, by the German Society for Solar Power (DGS)

Michael Golba, who is responsible for the course of studies together with Dr. Konrad Blum, received the honour in Munich. The society justified its decision with the fact that the structure of the English-language program has been unique and innovative since it's inception nearly two decades ago. The master's program is recognised world-wide, with many graduates having since attained influential positions in their countries of origin.

The „Postgraduate Programme“ has been offered at the University of Oldenburg since 1987. It is particularly suited to engineers and scientists from developing countries. Through universities and research institutes from around the world, a technical network of about 300 alumni from over 65 countries has developed. Through this network, alumni can exchange ideas and seek support for research and applications in various fields of renewable energy

The founder of the program, Dr. Joachim Luther, is one of the first professors of the University of Oldenburg, which was estab-

lished in 1973. He remained in Oldenburg for twenty years, transferring in 1993 to the Fraunhofer-Institut for solar energy systems in Freiburg (ISE, which has approx. 400 employees). In October, he was honoured with the 2005 German Environmental Prize, the maximum endowed honour of its kind in Europe. Luther also founded, with other University of Oldenburg professors, the “alternative energy research” at the end of the 70's. This, during a period when the Scientific Community still dismissed it as unimportant. Together with other scientists, he further conceived the Energy Laboratory on Wechloy Campus in 1980, which is still today a symbol of the University's environmentally focused research and central location for the PPRE.

Dr. Juergen Parisi, director of the department of energy and semiconductor research at Institute of Physics, to whose portfolio the program belongs, explained that the award was primarily the merit of Michael Golba and Dr. Konrad Blum. They successfully acquired accreditation for the program by restructuring it to meet the new challenges of international and interdisciplinary education.

Alongside the 3 Semester PPRE Master's course, the Institute of Physics hosts the European Renewable Energy Master's program, in conjunction with seven partner universities from five EU countries. In this winter semester, 31 students from 22 countries (7 Asia, 7 Europe, 2 Germany, 7 Latin America, 5 North America, 3 Africa) took up the M.Sc. Renewable Energy at the University of Oldenburg.

### **International PV Summer School 2006 at Oldenburg University**

From August 28th to September 2nd 2006 an International Summer School on Photovoltaics takes place at Carl von Ossietzky University of Oldenburg. This event is prepared and hosted by the Postgraduate Programme Renewable Energy (PPRE) and sponsored by DAAD (German Academic Exchange Service).

This one week of workshops, lectures and excursions covering a wide range of aspects all around Photovoltaics is part of a two week ALUMNI Re-Invitation – Initiative encouraged by DAAD. The two week Programme consists of three PV Summer Schools held simultaneously at the Universities of Oldenburg, Kassel and Freiberg during the first week, a concerted visit of the 21st European Photovoltaic Solar Energy Conference and Exhibition (<http://www.photovoltaic-conference.com/>) in Dresden and finally the attendance of the 3rd "Freiburger Solartage" <http://www.exphys.tu-freiberg.de/photovoltaics/>) at Technische Universität Bergakademie Freiberg.

The first week from August 28th to September 2nd at Oldenburg University is going to tackle issues in different PV-related areas as there are

- **Material science research oriented towards PV (e.g. heterogeneous thin film solar cells, organic solar cells)**
- **Systems research oriented towards PV applications (e.g. Energy meteorology, system optimised operating characteristics, grid connected and stand alone PV systems)**

- **Back-up Systems: Electrolyser, Hydrogen and Fuel Cells**
- **Policy oriented Case Studies and lessons learned from several countries (e.g. rural electrification strategies, barriers of PV market penetration)**

Further parts of the programme are two very interesting excursions. The first one leads us to Institute of Solar Energy Research which is located in Hameln (near Hannover). The second visited venue is a well known Solar Cell Production Company named Q-Cells. It is based in Thalheim (near Leipzig) as part of a fast growing industrial area especially hosting photovoltaic systems component manufacturers.

And last but not least this first week in Oldenburg also is a perfect platform for PPRE ALUMNI, friends of the programme and all people interested in photovoltaics to meet again, to refresh old connections, to share experiences and to update knowledge in photovoltaics and related renewable energy issues. Some social events all around the summer school perfect the whole thing.

PPRE staff is heavily looking forward to welcoming lots of nice people and good friends from all around the world.

All in all we expect some 60 – 70 participants (including about 25 Alumni coming directly on DAAD-ticket). Further info and the detailed programme may be seen at the link on [www.ppre.de](http://www.ppre.de).

## New Hydrogen Research Project at the University of Oldenburg

Torsten Bröer, Germany - PPRE 03/04

Around 15 years after its last Hydrogen engagement the University of Oldenburg starts a new innovative project combining Wind and Hydrogen Technology. The project, known as “HyWindBalance”, addresses the problem of the fluctuating and not fully predictable nature of wind power. It will combine wind with hydrogen, as energy storage, in order to level out electricity supply.

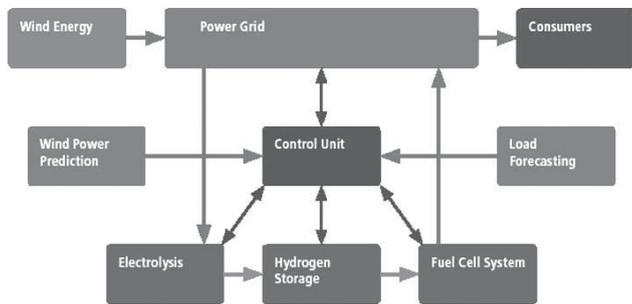
As wind is not a steady force, its (large-scale) integration into the electricity network increases the demand for balancing power (which is usually generated from fossil resources). With the use of hydrogen, there is a potential to adjust the electricity supply from wind power to the current demand at any time: Part of the energy is stored as hydrogen, to be re-converted to electricity as-and-when needed.

The Wind-hydrogen-systems will provide balancing power (CO<sub>2</sub>-free!) and cover peak load demand. They will give a new quality to the product that wind farm operators can offer. In a medium-term perspective, part of the “green hydrogen” may also be sold to markets outside the power sector, such as mobility.

Hydrogen storage holds also the option to integrate energy from other renewable sources in the supply grid where the supply is not constant and not entirely predictable,

as it is typical for wind and sun. The power can be trapped chemically by electrolysis. Reconversion happens by means of fuel cells. So the variations can be smoothed, and even controlled energy from renewable sources can be provided. Today the latter comes mainly from fossil fuels like coal or natural gas.

A key element of HyWindBalance is to develop a system, which involves simulating and testing an optimised wind-hydrogen-system using state of the art technique for wind power prediction, loading forecasting and plant management. The project will also operate a pilot system combining electrolyser, hydrogen storage and fuel cell at the Energy Laboratory of the University of Oldenburg. A schematic of the system is shown below:



The project will be undertaken in cooperation with the companies Overspeed, PLANET, Energy and Meteo Systems, Projekt Ökovekt and ForWind. The former PPRE student **Richard Morris (PPRE 97/98)** with his company Zebotec also contributes to the project by delivering the fuel cell and the electrolyser and doing the corresponding consultancy.

The project HyWindBalance will be run until the end of 2007, with a total budget of 1.5 million euro. It has financial support

of around 620.000 euro from the federal state of Lower Saxony and the European Regional Development Fund. The German energy company EWE also contributes to the project.

Further information you can find under [www.HyWindBalance.com](http://www.HyWindBalance.com) or contact Torsten Bröer at [t.broeer@uni-oldenburg.de](mailto:t.broeer@uni-oldenburg.de).

## Present PPRE / EUREC (Oldenburg-core) – Students

In winter term 2005/06 PPRE welcomed 31 new Master-students in the Renewable Energy Programme at the Institute of Physics, University of Oldenburg.

20 students enrolled in the Postgraduate Programme Renewable Energy (PPRE) and 11 Students in the European Renewable Energy Master Programme, which is organ-

ised and co-ordinated by the EUREC-Agency in Brussels.

The **20 PPRE-Students** come from 16 different countries (6 from L.A., 5 from Europe, 5 from Asia, 3 from Africa and 1 from Canada).

The PPRE-Students-List including placements for the compulsory external practical training are listed below:

Name	First Name	Nation	Subject	Institution	Location
Khan	Ahmed Jahir	Bangladesh	Rural Electr. / Micro Hydro	Bangla Power Dev. Agency	Dhaka, Bangladesh
Boruah	Dwipen	India	Biofuels	Lahmeyer Int.	Bad Vibel, Germany
Maharjan	Bhai Raja	Nepal	Pico Hydro, Indonesia / Energising Development	GTZ <a href="http://www.senternovem.nl/ed">www.senternovem.nl/ed</a>	Eschborn, Germany
Vera Tudela Carreno	Luis Enrique Domingo	Peru	Energy-efficient stoves in Latinamerica	GTZ	Eschborn, Germany
Caag	Donnalyne Atienza	Philippines	Biogas Utilisation	Southern Tagalog Consortium for Industry and Energy R&D	Los Banos, Laguna, The Philippines
Jagwe	Wyclif	Uganda	Rural Electrification Project	NORPLAN Uganda Ltd.	Kampala, Uganda
Mahu	Seth Agbeve	Ghana	Biomass Energy - Charcoal Production and Use with Special Focus on Africa	GTZ	Eschborn, Germany
Wickramarathne	W. G. Hashini K.	Sri Lanka	Modelling of Solar Radiation	Solar Institute Jülich	Jülich, Germany
Paula Chaves	Patricia	Brasil	Energiopolitics / Consulting	GTZ	Eschborn, Germany
Sanchez Herrera	Diego Alejandro	Colombia	Biomass - Gasification	BTG Technology Group	Enschede, Netherlands

Wilches Tamayo	Camilo Andres	Colombia	Rural Electr.	WBREDA	Kalkutta, Indien
Beyn	Mulugeta Weldetnsae	Eritrea	Ethiopian Wind Energy feasibility study	Lahmeyer Int.	Bad Vibel, Germany
Sterner	Michael	Germany	Biomass - Gasification	Center of Appropriate Rural Technology (CART) / Nat. Institute of Engineering	Mysore, India
Hegel	Rodolfo	Guatemala	Rural Electr. Project in China, Solar Test Field	ZSW – Centre for Solar and Hydrogen Research	Stuttgart, Germany
Pechlivnoglou	Georgios (George)	Greece	MHP-Project in Greece	Lahmeyer Int.	Bad Vibel, Germany
Peel	Andrew	Canada	Windenergy	Garrad Hassan & Partner	Oldenburg, Germany
Randig	Sebastian	Germany	PV-Systems	Gehrlicher Umweltschonende Energiesysteme GmbH	Murcia, Spain
Rojas la Rotta	Carlos Mauricio	Colombia	Rural electrification	WBREDA	Kalkutta, India
Herráez Hernández	Iván	Spain	Windenergy	Nordex Energy GmbH	Norderstedt, Germany
Torio Blanco	Herena	Spain	Energetic evaluations of the buildings	Fraunhofer-Institute for Building Physics	Kassel

The **11 EUREC-Students**, who come from 8 different countries (5 \* Europe, 3 \* Canada, and Pakistan, Lebanon, Mexico) only did their core-course for 4 months at Oldenburg

University. Thereafter they did their Specialisation courses at different European Universities:

Name	First name	Origin	Specialisation
ADNAN	Mohammad	Pakistan	BIOMASS, Zaragoza, Spain
McCRACKEN	Philippe	Canadian	HYBRID SYSTEMS, Kassel, Germany
XUEREB	Steven	Maltese	HYBRID SYSTEMS, Kassel, Germany
LOPEZ ALCALA	Leodegario	Mexican	BIOMASS, Zaragoza, Spain
SADER	Hadi	Lebanese	HYBRID SYSTEMS, Kassel, Germany
ROUZE	Jerome	French	HYBRID SYSTEMS, Kassel, Germany
ANTONOPOULOS	Antonios	Canadian	HYBRID SYSTEMS, Kassel, Germany
POLIZOIS	Theodoros-Theodoritis	Greek	Wind Energy, Athens, Greece

GUILLOT	Bertrand	French	HYBRID SYSTEMS, Kassel, Greece
MONTES DE OCA ARJONA	Luis	Spanish	BIOMASS, Zaragossa, Spain
SINGLEHURST	Robert	Canadian	Solar Energy in Built Environment, Athens, Greece

By August 2006 all Students (PPRE & EUREC) started their M.Sc.-thesis work. Details will be given in the next newsletter

### Case Study Tour 2006 An Unforgettable Trip to Austria and South Germany

by PPRE-Students

One of the most important components of summer term in PPRE is the Case Study, where we have to provide a complete energy solution to a customer, of course using renewables. The problem was simple: to provide the energy requirements of a high mountain hut, located in Austrian Alps.

After hard time of calculations, simulations and discussions, we travel to that place to compare the proposed solution to the installed one. But as the travel from Oldenburg to the Alps is a very long one, we extend the travel for two weeks and in this way we could visit many interesting places, to see in practice many of the things we acquired in theory in the several PPRE courses.

We start our journey on 20th July at 4 am from Energy-lab in Oldenburg and our first visit was Hoppecke the leading battery manufacturer in Germany. There we learnt about different types of battery manufacturing process and their electro-chemistry. In the afternoon we attended a BBQ party in RALOS GmbH in Michelstadt who involved turnkey projects including consulting service, design & installation works. One of the owner, **Matthias Belz**, studied **PPRE**



Some of the members of the group in top of the Alpen

**in 1996-97** and started the PV-business thereafter. We also watch football match in big screen arranged by Matthias. After overnight stay at Kloster Höchst, we visited a 5 MW grid connected PV system in Bürstadt installed by RALOS. There Matthias showed us how power is feeding into the grid from PV installed over a warehouse.

We stayed three nights in Freiburg, a very nice city of southern Germany. On 22nd July we visited Intersolar, the biggest Solar Energy Exhibition in Germany. Here we had the opportunity to meet different RE manufactures, their products & services. There we were surprised with the size of the exhibition, and the vast choice of options regarding Solar Energy. It was very nice to be able to know what they were talking about!

In Freiburg, we also visited Volk Wasserkraft AG - a hydropower manufacture in Gutach. The company manufactures different types of hydro turbines. We saw the manufacturing process of producing turbine components.

Then we departed to Ottobeuren, from where we visited STECA, the battery charge controller manufacturer in Memmingen. They gave us a lecture about Battery Charge Controllers, and then we observed the different manufacturing process to produce charge controllers. They even offered us lunch in a nearby Chinese restaurant.

So we prepared ourselves to climb the Alps. The hut is located near to a place called Kals, the furthest point the Bus could reach. From there, we had to climb 2 hours to reach the place where we would stay: Luckner-Hütte (1920 masl). The next day, early in the morning, we climbed another 3 hours and we finally arrived to Stüdl-Hütte at 2800 m altitude! What an emotion! The big effort was then awarded. The place was just BEAUTIFUL!

We stayed one night in Stüdl-Hütte. The hut owner explained us how the hut is powered by different renewable sources, and to our own pride, we found that our assumptions and calculations were even better than those made by the consultants hired to provide the solution!

Coming back to Germany, on the way to München, we visited Walchensee Kraftwerk in Kochel. We observed how electricity is generated by utilizing potential gradient between two lakes. The Walchensee Power station is not only unique in its design but also in the generation of single-

phase electricity for the trains of the German national railways, Deutsche Bahn.

On 29th July we visited TINOX – the selective surface manufacturer for solar absorber in München. They showed us the production process of manufacturing titanium absorber, which was invented by them. They also gave us a lecture about sea water desalination system using solar energy.

Before return to Oldenburg we stayed two nights in the home of our colleague Michael Sterner in Aicha vom Wald in Passau. In the first day we met with city mayor and visited a church. We also watched some renewables (geothermal, solar PV, Biomass) activity in that village. The inhabitants became astonished seeing people from 16 different countries (well, that happened in every place we visited). We could really have a nice insight in the life of the people in this region of Germany.

After one complete day (1st of July) traveling, we finally reached Oldenburg at 9:00 pm!

All in all the group of 24 people (20 PPRE-



PPRE in Aicha, Bavaria

students and staff) spend 12 days together, sharing, learning, and above of all, having fun. An unforgettable experience, for sure!

## Alumni Teaching in PPRE

We are glad to report an increasing numbers of PPRE alumni teaching in the present course.

During the Winter term 2005/06 we had short/compact courses by:

- **Wisdom Ahiataku-Togobo** (Ghana) on Small Wind / decentralised PV / Biodiesel systems. He works still with the Ministry of Energy in his country.
  - Micro-Hydro by **Christoph Schroeder** (Germany), who worked for several years in China as GTZ-officer in rural energy projects
  - and of course **Hans Holtorf**, PPRE alumni, is teaching Solar Energy I and II. He also runs the Case Study show and guides students in the Summer term excursion (see extra report).
- In the Summer term 2006**
- **Dr. Elizabeth von Hauff** (Canada) held a lecture course on Photovoltaics
  - **Jan Lam** (Netherlands) -- together with his SNV-colleague Felix ter Hegde, gave a compact course on rural biogas technology. He is heading the Biogas Promotion Programme in Camodia these days.
  - **Aravind P.V.** (India) held a lecture on gasification. Presently he is doing is PhD at Delft-university in the Netherlands.

Apart from that we had invited lecturers from companies and NGOs - through the PPRE website ([www.ppre.de](http://www.ppre.de)) you can browse the time table of past and future weeks.

## M.Sc.-Thesis – Titles

In the following all thesis titles from our graduates who finished their M.Sc.-Studies in RE by end of last year/early this year are listed:

### PPRE 2004-2006

Name	First Name	Nation	Titel der Master Thesis
Chowdhury	Md. Shahriar Ahmed	Bangladesh	Preparation and Characterization of an Indium Sulphide Buffer Layer for Cu(In,Ga)Se <sub>2</sub> Thin Film Solar Cell by Physical Vapour Deposition
Zobayer	A.N.M.	Bangladesh	Miniaturized Solar Home System for lighting purpose with Light Emitting Diodes

Pena Diaz	Alfredo	Colombia	Offshore wind, turbulence and wind characteristics at high heights. Remote sensing techniques applied to wind energy (Lidar, SODAR, Ceilometer)
Toropov	Maksim	Kyrgyzstan	Efficiency of Solar Aided Heating System
Sapkota	Prakash	Nepal	Performance Analysis of PV Module by Developing a PV Module Tester
Aderinto	Suraju	Nigeria	Planning and Realisation of A Hydrogen Laboratory System
Henriquez Prevoo	Christian Paul	Peru	New Concept of Acquiring Data – Construction and Evaluation of a Mini Meteorological Station
Limsoontorn	Tubtim	Thailand	Jatropha Plantation and Investment Cost for Biodiesel in Thailand
Ochieng	David Otieno	Kenya	Is Solar PV For Rural Electrification an Impossible Dream in Eastern Africa?
Akhtar	Naveed	Pakistan	Dynamic Modeling of Tubular Solid Oxide Fuel Cells
Brudler	Evelyn	Germany	Input/Output-Controlling: Ein in situ Kontrollverfahren für solarthermische Anlagen
Hermann	Sebastian	Germany	Design of a Micro-Hydro Powered Battery Charging System for Rural Village Electrification
Tek	Boon Jin	Malaysia	Investigating the Evaporation Process of a Diffusion-Absorption Cooling Machine
Moreno Munoz	Juan Carlos	Venezuela	Rural Electrification in Venezuela with Renewable Energy. Strategies for Its Implementation

### EUREC 2004-2005 / Oldenburg Core

Name	First Name	Nation	Titel der Master Thesis
AYMARD	Caroline	France	Evaluation of Catalysts for the Hydrothermal Gasification of Wood to Methane through Batch Experiments
THOMAS	Denis	Belgium	Technical Aspects of Bio-Oil Production and Markets for Bio-Oil-Co-Firing in EU-25
LERMITTE	Tristan	UK	An Experimental Study of the Co-Firing of Biomass with Coal to Characterise Depositional Problems during Combustion
CLAUZONNIER	Adrien	France	Set up, operation and monitoring of an isolated hybrid system (wind-photovoltaic-battery) for electricity and freshwater production
ANSELL	Duncan Peter	UK	Tidal Harmonic Analysis with applications to energy prediction of Marine Current Turbines

ADLER GOMES	João Paulo	Portugal	Development of a supervisory control for a middle-sized Hybrid Wind/PV/Diesel System
LECESVE	Laurent	France	Feasibility survey and design of a hybrid system for Mitraniketan, a community in India.
AVRAAMIDES	Stelios	Cyprus	Assessment of the Exploitable Wind Potential of the Republic of Cyprus
CORREIA	Stélio	Portugal	Shunt Resistance of Solar cells
CARRELL	Justin	UK	Feasibility Study on Renovation of Tower Block at Plymouth College of Further Education
MANTAS	Panagiotis	Greece	Air tightness of residential buildings in Greece, The website is: <a href="http://grbes.phys.uoa.gr/">http://grbes.phys.uoa.gr/</a>
DIMOPOULOS	Aris	Greece	Feasibility Wind Farm projects in Cyprus
STROMBONI-P.	Estelle	France	Wind Farm Development from the first site evaluation to the construction of the wind turbines
THIEBAUT	Romarc	France	Reduction of Infusion Resin Cure Time on AL-40 Blade Manufacturing

## EXPERIENCES

### Travel report from INDONESIA

By Sebastian Hermann, PPRE 2004-06

First of all I would like to thank all the “PPRE family” for the last 18 months – the time passed by far too quickly and although it has been extremely stressful at times I enjoyed every bit of this great PPRE course. I made lots of friends and got to know so many interesting people. It really was one of the most interesting times of my life.

For my master thesis I had the chance to go to Indonesia for some months. I worked there together with GTZ and ENTEC AG on the topic Rural Electrification with the help of Pico Hydropower. The aim of my thesis was to design and investigate a small bat-



Pic 1: Outdoor Lab in Indonesia, with a small turbine to test different generators (200 - 300W)

tery charging station for family and village electrification. The whole systems size was limited to 5kW and a simple induction mo-

tor was used as a generator. The idea was to generate high voltage electricity that could be transmitted over several hundred meters to some central “Energy Station” in a village. This “Energy Station” could provide essential services like refrigeration and telecommunication, but it could also serve as a battery charging station for the villagers.

In the end, and after countless little problems the design idea proved to be technically successful and it seems that such a system can really be an economic alternative for small communities with low energy demand. Especially in Indonesia with its remote villages in mountainous areas this system could be a viable solution.



Pic 2 Battery line of a projekt at West Timor (120 batteries - 1000Ah / 2V). Filling the acid is not really done at German Standards !

During my time in Indonesia I also worked closely with another former PPRE student: **Mr. Chayun Budiono (PPRE 1992/93)**. I especially want to thank him for explaining so many of the small mysteries of Indonesian culture to me. Together with Chayun I also took the chance to travel to Western Timor to install a rather big solar system in a village called Nembrala. The solar system has an overall size of 30kW and is connected to a battery backup system (120 batteries, 1000Ah OPzS). Formerly, an old diesel generator that actually



Pic 3 Battery-charging station in rural Indonesia.

consumed about 80l of diesel every single day supplied the village with electricity. Now, the solar system covers most of the energy demand and the diesel system only works as a backup in case of a period of rainy days.

Interestingly and promisingly, even Indonesia, which possesses considerable oil reserves itself, supports more and more Renewable Energy technologies. I also have heard that the first Indonesian wind farm is not far from being implemented.

I really enjoyed my time in Indonesia and surely I will go back there again sometime.

## My Ext. Practical Training in South-India - 1st Steps taken

By Michael Sterner - PPRE 2005-07

I'm now 6 days here and getting settled.

The first days were quite tough, changing from av.-10°C in Germany to av. 30°C Karnataka was not easy. Jetlag and a lot of nice

## Experiences

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traveling + 100% food change (you can't get food without spices - not even breakfast) put me to hospital the 3rd day - food poisoning - it was not that serious, but I went, because of a Typhoid outbreak in our quarter... now everything is stable again. You just have to watch out with the food+drinks.

Otherwise: South India is great! You smile - and they smile back. Indian Society is along with the Brazilian one of the friendliest I ever experienced. People are so helpful, it's really a joy to stay with them.

Also the work is really interesting. They have running gasifier since late 80s, we installed one 2 days ago in a bakery (40kW thermal) and it works. Ok - they don't have this environmental standard as we do in Germany (scrubber water goes to the sewage, a lot of CO is emitted because of little insulation...) but they really keep the tech going and promote it.

Yesterday I was at a Sister's place and I told them about my work - they brought me to their cooking stoves (3 stoves) - loads of biomass in the yard - and I told here - put an improved cooking stove - the tech is there - you'll save a lot - improve the efficiency from 11% to 40%. I tell you - she was flying!

So work is really great - you have the feeling - that you can move and promote things.

One more stove saves a lot of money and CO2 + heals nature. That's what our main goal is, isn't it? And a new stove is just about 500 - 2000 Rupees (10 - 40 EUR).

So - donations are welcomed! Some DAAD fellow did already before here in Mysore.

And if you look for spicy food, good weather, very friendly people, some 'Kannada' language learning and CO2-saving work - welcome to South India - It's great!

## CAREERS

In this chapter we would like to present the different careers taken by our graduates right after their RE-Studies (M.Sc.) with us.

### **Absolvents of European RE Master-programme (Eurec) 2004-05:**

Name	First Name	Nation	Specialization	Job After Studies	Institution
THOMAS	Denis	Belgium	Biomass (Zaragoza)	RE-Cosultant & Engineer	„Energie Facteur 4 asbl“, Belgium, <a href="http://www.ef4.be">www.ef4.be</a>
LERMITTE	Tristan Eugene William	UK	Biomass (Zaragoza)	Temporary job	n.a.
CLAUZONNIER	Adrien	France	Hybrid systems (Kassel)	PV Project Engineer	Suntechnics, Madrid
ANSELL	Duncan Peter	UK	Hybrid systems (Kassel)	Marine Resource Analyst	Marine Current Turbines Ltd. UK.

ADLER GOMES DA COSTA	João Paulo	Portugal	Hybrid systems (Kassel)	Researcher in RE	CIEMAT - Unidad de Energia Eólica, Madrid, Spain
LECESVE	Laurent	France	Hybrid systems (Kassel)	PhD-student	Kassel University
AVRAAMIDES	Stelios	Cyprus	Hybrid systems (Kassel)	Wind Consultant	AEOLIKI, Cyprus (www.aeoliki.com)
CORREIA	Stélio	Portugal	Photovoltaic (Newcastle)	Measurement Engineer	ErSol Solar Energy AG, Erfurt, Germany
CARRELL	Justin	UK	Solar Energy in Buildings (Athens)	RE Project Manager at NGO	Creative Environmental Networks, UK <a href="http://www.cen.org.uk">http://www.cen.org.uk</a>
MANTAS	Panagiotis	Greece	Solar Energy in Buildings (Athens)	RE - Consultant	Lahmeyer Int., Bad Vibel, Germany
DIMOPOULOS	Aris	Greece	Wind (TU Athens)	Windconsultant	Freelancer
STROMBONI-PREVOST	Estelle	France	Wind (TU Athens)	Wind Project Manager	VOLKSWIND, France, <a href="http://www.volkswind.com">www.volkswind.com</a>
THIEBAUT	ROMARIC	France	Wind (TU Athens)	Wind Engineer	Vestas Blades, Isle of Wight, UK

## Absolvents from Postgraduate Programme Renewable Energy (PPRE) 2004-06

Name	First Name	Nation	Job / Position	Institution
Chowdhury	Md. Shahrar Ahmed	Bangladesh	Assistant Engineer	Directorate of Program Bangladesh Power Development Board
Zobayer	A.N.M.	Bangladesh	RET Expert, Sustainable Rural Energy	Local Government Engineering Department, Bangladesh <a href="http://www.lged-rein.org">www.lged-rein.org</a>
Pena Diaz	Alfredo	Colombia	PhD-Student, Uni Copenhagen	Risoe National Laboratory Wind Energy Department, Roskilde, Denmark <a href="http://www.risoe.dk">www.risoe.dk</a>
Toropov	Maksim	Kyrgyzstan	Trainee / RE Engineer	Microsol Solarsysteme GMBH, Hamburg <a href="http://www.SydneySolar.de">www.SydneySolar.de</a>
Sapkota	Prakash	Nepal	RE Engineer	Dhawalagiri Community Resource Development Centre (DCRDC)
Aderinto	Suraju	Nigeria	still pending	n.a.
Henriquez Prevoo	Christian Paul	Peru	Temporary Job	GE, Cologne

Limsoontorn	Tubtim	Thailand	Information Officer	Energy for Environment Foundation, Thailand
Ochieng	David Otieno	Kenya	Regional Manager	GTZ Office Nairobi, Nairobi, Kenya
Akhtar	Naveed	Pakistan	Research Engineer	Chair for Materials Processing University Bayreuth, Bayreuth, Germany
Brudler	Evelyn	Germany	Res. Assistant / Engineer	University of Oldenburg / Planet GbR, Oldenburg
Hermann	Sebastian	Germany	RE Expert – CDM & Joint Implementation	Deutsche Energie Agentur – DENA, Berlin, Germany <a href="http://www.deutsche-energie-agentur.de">http://www.deutsche-energie-agentur.de</a>
Tek	Boon Jin	Malaysia	PV Sales Engineer	Suntechnics Energy Systems Pte. Ltd., Singapore <a href="http://www.suntechnics.com">www.suntechnics.com</a>
Moreno Munoz	Juan Carlos	Venezuela	RE Consultant / Advisor	FUNDELEC - Renewable Energy Team, Venezuela <a href="http://www.fundelec.org.ve">http://www.fundelec.org.ve</a>

Looks like most absolvents got an interesting job in the field of their studies.

Please note that only those graduates are listed, who have been in touch recently. More detailed info from some alumni are listed in chapter 'news from former alumni in brief' !

## NEWS, PPRE ALUMNI

### PPRE 1987-88

#### Mr. Eric Fischer, Brasil

Was working as expert until Mid 2005 at the Centro Federal de Educação Tecnológica do Paraná - CEFET-PR, Tecnologia em Química Ambiental in Curitiba, Brasil, where he was lecturing Environmental Management courses and trying to help implementing a local Renewable Energy Group. Thereafter Eric returned to Brasilia.

### PPRE 1988-89

#### Mr. M.P. Ramesh, India

As Executive Director of the Centre for Wind Energy Technology in Chennai he send us their regular news bulletin called pavan (more info at: [www.cwet.tn.nic.in](http://www.cwet.tn.nic.in)) and the following encouraging words on behalf of the Solar-award for PPRE:

I think that your networking ability was particularly very important for the grand success of the one of its kind course that I had the luck of attending. A great deal of nurturing such an effort has come from the wonderful set of people at PPRE. Congratu-

lations to all those who made this course of ours so good. And recognition always brings on a renewal of interest. The most important thing about this effort is the wonderful networking that you are doing for people who passed through the programme. To think back nostalgically is one thing, which is generally rather private. But to keep the interest going for nearly two decades is no joke! May god give you more strength to do even more. Please include me in the good work you are doing and I will be more than happy to be associated.

**Mr. Cesar Rivasplata, Peru**

Together with his colleagues opened up a new building for the Renewable Energy Centre at the Universidad Nacional Jorge Basadre Grohmann in Tacna, Peru, in 2005.

**PPRE 1989-90**

**Mr. Partha Sarathi Mukherjee, India**

After a long time of silence, Partha informed us, that he changed his job in 2004 already to join a Pune based trust known as Indo Swiss Vocational Training Trust (Initially formed by SDC in association with some prominent persons, Pune) as it's Director. But after joining he realized a lot of management level problems. Immediately, he resigned and joined his former organisation (a local NGO which is working on poverty removal programmes) in his earlier position again.

**Mr. Thomas Schwarz, Germany**

Got a new position at his employer Phönix Solarstrom AG earlier in 2006. He changed from the planning & construction department to the central technology department

of Phönix Sonnenstrom AG ([www.sonnenstromag.de](http://www.sonnenstromag.de)). His tasks include the evaluation of current and new technologies and system components, including maybe standalone and hybrid systems in the future, which might get more in focus when shifting away the German market towards international markets. In line with this Thomas attended the PV-Hybrid/mini grid conference in Aix-en-Provence, 11.-12. May 2006.

**Dr. Eng. Hassan H. Rakha, Egypt**

After long silence Hassan Rakha informed us that he has already got a PhD in the field of Renewable Energy titled: 'Design and Optimal Operation of Photovoltaic / Wind / Diesel Power Generation System by Neural Network'.

Since about 8 years Mr. Rakha is General Manager of the PV Department in the New and Renewable Energy Authority (NREA), Ministry Of Electricity and Energy, Cairo, Egypt.

**Mr. Anil Misra India**

Joined GTZ in New Delhi under its Natural Resource Management Programme in April 2006. Before he was working with UNDP India / Ministry of Environment & Forests (Government of India).

His main areas of work will be Renewables including Biofuels and Climate Change/Adaptation among other things.

**PPRE 1990-91**

**Dr. K. C. Pandey, India**

Successfully completed his Ph.D. from Indian Institute of Technology, Kharagpur,

India on the topic „Investigations on use of soybean oil as a substitute fuel for diesel engines“ in June, 2005. Krishna is working as Senior Scientist in the Agricultural Energy & Power Division of Central Institute of Agricultural Engineering in Bhopal, India.

### **PPRE 1991-92**

**Ms. Anna Naftal Ingwe, Tanzania**  
**Mr. Wycliffe Musungu Nabutola, Kenya**

Informed us in Mid 2005 that they are quite busy these days. Besides running daily business with their company called Renewable Energy Engineering Contractors (Reecon) in Nairobi they are involved with GTZ in promotion of biogas plants as a waste treatment facility for agro based industries. Furthermore they are local counterparts for a German Company called Akut.

**Mr. Patrick Mugisha, Uganda**

Is still lecturing at Makerere University in Kampala Uganda, in both the Renewable Energy courses and Electrical Engineering. He noticed that future programmes in the Faculty of Technology at Makerere University will probably see Renewable Energies becoming more expanded in near future.

In this regard, establishment/strengthening of Laboratory facilities in RE at the Faculty of Technology might be a focal point of his interests.

**Ms. Bettina Abel, Germany**

Visited the Energy laboratory at Oldenburg University again with a small delegation from Tanzania. The 2 visitors are staff at TANESCO, a utility company in Tanzania, who have been on a wind-energy and RE-

study trip in Germany. Their trip was organised by DECON-Consultants, Bad Homburg, Germany - who are doing RE-projects all over the globe and also in Tanzania.

Bettina is working since her graduation in PPRE with Decon-Consultants.

### **PPRE 1992-93**

**Mr. Chayun Budiono, Indonesia**

Attended the UNFCCC-COP11 (United Nation Framework Convention of Climate Change – 11th Conference Of Parties – countries joined the Kyoto Protokol) in Montreal, Canada, which took place from 28 Nov to 9 Dec, 2005. He was actually invited by the Asian Development Bank (ADB) to talk about the potential role of renewable energy as a mean to reduce the greenhouse gas (GHG) emission in an ADB side event.

Earlier in May 2005 Chayun visited some RE-companies in Germany together with a project manager for renewable energy of PLN, which is the Indonesian Utility Enterprise. They also had a short stop over in Oldenburg during the trip.

**Dr. Shrestha Kedar Shanker, India**

With the beginning of 2006 he changed his job again and is now attached to Lubrizol, Japan, where he is working as a technology manager. Lubrizol company is a chemical additive maker for lubricants of vehicles. It is a multinational company and has branches in about 85 countries.

**Mr. James Wafula, Kenya**

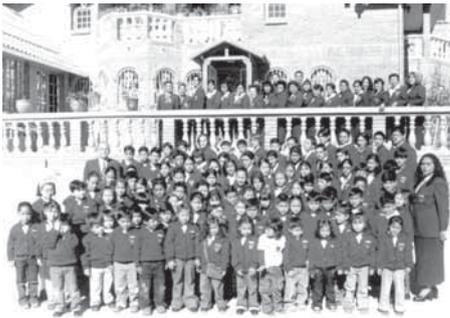
In Mid 2005 James Wafula was one of three people selected to pioneer and teach courses in Renewable Energy at the newly created Department of Renewable Energy at the Institute of Nuclear Sciences in University of Nairobi.

One of his very first duties involved constructing a course syllabus to be used by the students. These courses will generally be divided into three categories, which are Certificate courses, Diploma courses, and Masters courses.

The first M.Sc.-course is ought to start in Mid 2006. Its planned that James will do a PhD-study besides.

**Mr. Rolf Georg, Germany**

Together with his wife opened up a private school called Unidad Educativa Heinrich Zulauf in early 2005 in Sucre, Bolivia. Throughout the first year about 120 pupils (from Kindergarden to High-School) joined the school. Rolf will also include classes of 'Fundamentals of RE-technology' in the curriculum.



Rolf Georg and wife with their pupils of Unidad Educativa Heinrich Zulauf, Sucre, Bolivia

**PPRE 1993-94**

**Dr. Rosana Rodrigues dos Santos, Brasil**

Was employed as General co-ordinator of the National Program „Electricity for All“ of the Brazilian Ministry of Mines and Energy (MME) in Brasilia. Between 2003 and 2004 she has been sometimes assistant to the Minister. Under her responsibility was the execution of the program for the 5 most important states of Brasil (Goiás, Minas Gerais, São Paulo, Espírito Santo and Rio de Janeiro) and also the regulatory issues concerning this program. The contracts she was managing amounted to 1,4 billion of Reais (almost 0,5 Billion US Dollar!) which is supposed to be used to provide 291.000 connections to the Grid (where grid connections were not possible, she advised the utilities to use RE technologies, especially for the decentralized systems.

**Latest news:** Rosana left the Government. At the beginning of 2006 she joined the private sector, as the regulatory person of the distribution utility of the State of Mato Grosso do Sul. Additionally she is part of the regulatory team of the holding group EDP (renamed recently as „Energias do Brasil“). EDP group is the major private investor in the Brazilian energy sector.

**Dr. Henry J.M. Tommy, Sierra Leone**

Is still living in Calgary, where he runs his own mechanical engineering company.

**Dr. Ahmed Mohamed Fathy, Egypt**

Is living since about 4 years in Lybia, where he is Teacher at the Faculty in Physics & Engineering Department at a local University.

### **Mr. Augustus Leon, India**

Resigned from his job at Asian Institute of Technology (AIT) in Thailand after eight long years on 31.8.2005. He became a full-time doctoral student to concentrate on the completion of his PHD-studies, which hopefully will be finished by August-September 2006.

Augustus hopes that he might climb a step up in his career ladder once he gets the PhD-degree.

### **Dr. Johnny Nahui-Ortiz, Peru**

Was organising and co-ordinating the XII Renewable Energy Symposium in Peru, which took place November 21-26, 2005 in Lambayeque, Peru.

### **Mr. Björn Kuntze, Germany**

Is still involved in the research and development of Gasification projects. In 2006 his Mastergas-company is planning to install a pilot plant of a wood-gas producer in combination with a Co-generation unit (100 kWel). Another project planned will have a power output of approx. 460 kWel.

### **Mr. Debesai Ghebrehiwet, Eritrea**

Is heading the Energy Research Training Centre - ERTC - from the Ministry of Energy, which is doing different RE projects at the moment, e.g. implementation of improved stoves nation wide, Installation of 30 sets of solar TV-Systems, and probably purchasing some lab equipment for strengthening the energy centre. He hints the readers of the PPRE Newsletter to the following link: <http://eappc11.lbl.gov/eri-stoves.lbl.gov/>

### **PPRE 1994/95**

#### **Mr. Melis Teka, Ethiopia**

Informed us that he is now working in the Ministry of Mines and Energy, as Head of the Energy Regulatory Department and that **Mr. Mesfin Mergia (PPRE 93/04)** is located in the same department.

#### **Mr. Alexandre Heringer Lisboa, Brasil**

Who did the ELDORADO Wind Energy Summer Course, from July to August 1994 at Oldenburg University informed us last year as follows:

The ELDORADO Summer School at University of Oldenburg was very important to my career and until today I am applying in my Company (Companhia Energética de Minas Gerais - Cemig) the knowledge gained at this course. I am working for the Superintendência de Tecnologia e Alternativas Energéticas.

Cemig is the state owned utility from the Minas Gerais State. Nowadays, I am working in identifying potential wind sites in Minas Gerais State. Also, I am managing a project in solar thermal, that is the project, assembly and operation of the a experimental solar thermoelectric power plant using solar troughs. It is a very small scale - 10 kW, use aluminium as reflector and all material services and engineering is being done in Brasil. The start up should be done in end of this year.

### **PPRE 1995-96**

#### **Ms. Elizabeth Kingu, Tanzania**

Beside being Ass. Director of the O&M Section of Water Supply and Sewage Division

at Ministry of Water Elizabeth finished successfully her MBA-studies at University of Dar Es Salaam in Mid 2005.

**Mr. Bereket Negash, Eritrea**

Since beginning of 2006 Bereket is self employed as RE Consultant to design, install and repair solar and wind energy systems as well as doing electrical installations. He left the Renewable Energy Center for which he was working ever since PPRE.

**PPRE 1996-97**

**Mr. Bernard Osawa, Kenya**

Returned to Germany in April 2005 for about 20 days. He was invited by DAAD to participate in a Summer School at University of Siegen. Afterwards he visited the leading International Trade Fair for Waste Disposal and Environment in Munich – the IFAT 2005.

He was appointed Technical Director at IT Power Eastern Africa in charge of the Sustainable Development Programme end of 2004 already.

**Latest News:** In December 2005 already Bernard joined Lafarge East Africa (Bamburi Cement) as the Alternatives Fuels Manager. He is responsible for spearhead fuel substitution in two plants - Mombasa in Kenya and Hima in Uganda. Currently the plants use coal and Heavy Fuel Oil for the kilns which is the major area of energy consumption in Cement production. The objective is to convert them to at least 50% biomass and other industrial wastes.



Mr. B. Osawa, Kenya (left) meeting **Mr. Awa Celestine Anyam** from Cameroon, Director of Electricity, Ministry of Energy, Kamerun (**PPRE 96/97**) at the FEMA-meeting, Uganda, 2005.

**Mr. Gajanana Hegde, India**

Returned from Curtin University, Perth. Did some work on a leach bed process for anaerobic digestion in a collaborative project between Curtin and Murdoch Universities with funding support from Australian Research Council. Got some interesting results and “have written up most of the thesis and expect to receive the PhD degree within the end of the year 2005” and joined the UN-FCCC Secretariat in Bonn, Germany (United Nations Framework Convention on Climate Change) as Program Officer later in 2005.

**Mr. Sebastian Sancho, Costa Rica**

Did open up a branch-office from the German Company called RALOS GmbH in Madrid, Spain about 1 year ago. He mentioned that their solar adventure faced a smooth first year, which has helped a lot in trading of PV modules, while projects get ready for installation. But bureaucracy is amazing in Spain, which slows down the process of implementing PV-projects very much.

### **PPRE 1997-98**

#### **Ms. Wooslène Vanginé, Haiti**

Is still working for Alstom Power Generation AG in Mannheim, Germany. She is in charge of planning, projecting and installation of Mini-Hydro Power all over Europe and even worldwide.

#### **Mr. Binu Parthan, India**

Was appointed Deputy Director of the rogramme Co-ordination in the REEEP International Secretariat in Vienna, Austria end of 2004. Further info at: [www.reeep.org](http://www.reeep.org)

Binu Parthan visited the Tata Energy Research Institute (Teri) in Dehli, India in November 2005 for launching REEEP South Asian Secretariate.

#### **Dr. Ibrahim Odeh, Jordan**

Has completed his PhD studies from University of Ulster in the UK end of last year 2005. His PhD title is „ Modelling, Field Data Analysis and Economics of PV Water Pumping Systems and the Prospects of Utilizing Desalination Using Reverse Osmosis“. In this regard, Ibrahim thanks very much the Oldenburg University for their help and support during his studies specially their help in supplying data needed for his thesis.

Currently Dr. Odeh is seeking an appropriate job in the field of renewable energy of course, may be in the academic field or with an international agency/body where he can do something for the green sustainable energy.

#### **Mr. Thomas Jackson, US**

Presently living in Portugal, Thomas informed us that he has been out of renewables for some years now, but continues to be very interested, especially in wind energy. At the moment he is giving English lessons at an English Academy in Portugal. He has found it's very difficult to find a job that pays well these days... including in renewables. Unless you own your own company, or are a highly qualified technician or engineer, the pay is very low.

#### **Mr. Wisdom A. Togobo, Ghana**

As Head of Renewable Energy Section in the Ministry of Energy wisdom is willing to make Ghana a centre for PPRE-students and others interested to have a real experience of RE in developing countries.

Presently the following possibilities for practical trainings or Thesis-projects exist: wind water pumping, small wind power, Off-grid solar Electrification, biomass, small hydro power plant. For the later the first small hydro power plant in Ghana was installed in April 2006.

Already last year Wisdom informed us that a MoU for the development of pilot SHPs in Ghana was signed by his Ministry and UNIDO / IN-SHP (International Network of Small Hydro Power), which is based in China. Out of this the first pilot plant was expected to be completed by December 2005.

#### **Dr. Yin Zhang, China**

Is currently acting Dean of Dept. of Physics at Shandong Institute of Education in China, where he graduated in the State Key Lab. of Crystal Material in June 2004 with PhD in

Materials Science and Engineering. During his study, although he specialised in studying the micro-structure, surface morphology and physical properties of Nano-oxide powder and thin films, he was always participating in lectures, seminars and other programmes in solar cell. His research group is applying at national nature science foundation for a project related with organic solar cell.

### **PPRE 1998-99**

#### **Mr. Hans Jaoko, Kenya**

Was supposed to finish his PhD on Modelling 'UVB radiation in mid latitude of Africa' in India by Mid May 2006. Besides he started a company called Regenerative Energy Systems and Technology Services (RESTS) last year in Kenya, where he has done a couple of projects in Kenya, Tanzania and Somalia in Renewable Energy.

#### **Dr. Dana Chirvase, Romania**

Returned to Romania right after finishing her PhD-Studies about organic Solar Cells at our Energy-and Semiconductor Physics Group, University of Oldenburg.

Presently she is studying International Economic Relations in Bucharest. Her long term plans are to work within an international organisation for energy (renewable) and sustainable development. She thinks that she needs to know about economics as well besides the technics to reach her goal.

**Latest news:** Dana started to work within the Ministry for Economy and Commerce, Department for Energy Policies, end of April 2006.

#### **Ms. Lui Hui, China**

Successfully finished her MBA-study at Hult Int. Business School in the US last year December. She wrote "The MBA study has been an interesting, and busy year, very intensive, just like our PPRE. My eyes became bigger again"

In near future Lui Hui is determined to work in the International business development field, especially when it is related with China. She is planning to return to China in August 2006.

#### **Mr. Jan Lam, The Netherlands**

Earlier in 2005 Jan Lam, who re-joined the SNV - Biogas Team in the Netherlands in 2004, wrote to us from Rwanda where he was involved in the feasibility study for a national biogas programme aiming at the mass dissemination of household biogas plants. The idea is that they extend the Asia Biogas Programme also in to some Latin-American and African countries. Rwanda is the first on the list. From there Jan Lam went to Cambodia to start the preparations for implementing a biogas dissemination programme. Starting Mid June 2005 he will be stationed for his new assignment in Phnom Penh, Cambodia for 3 years. SNV signed a MoU with the local Ministry of Agriculture on the set-up of a national biogas programme, for which Jan Lam will be acting as an advisor.

#### **Mr. Bidzina Kekelia, Georgia**

Currently works for a small consulting company named CORE International in an USAID funded project. They provide Advisory Assistance to the Ministry of Energy of Georgia.

### **PPRE 1999-00**

#### **Dr. Ali Salim Al-Alawi, Sultanate of Oman**

Returned as Associate Researcher to the Department of Mechanical and Industrial Engineering, College of Engineering, Sultan Qaboos University after completing his PhD on 'PV-diesel hybrid water and power system', Curtin University of Technology in Perth, Australia.

His present interests are in the field of fuel cell, energy storage, energy system optimisation, solar thermal and PV.

#### **Mr. Al-Mas Sendegeya, Uganda**

Informed us in 2005 that he changed the supervisor and the title of his PhD studies. Now his research topic is about planning rural power systems. The title is: „Monte Carlo Methods for Planning Rural Power Systems“. He is supervised by Prof. Söder of KTH-University in Stockholm, Sweden. As a first step, Al-mas was looking at the initial stages of the first proposed paper on investigating price sensitive loads and their impacts on long-term load forecasting.

Al-mas is still staff-member of Makerere University, Kampala, Uganda and is doing a Sandwich-PhD with both institutions in Uganda and Sweden.

Additionally Al-mas was in charge of organising a summer course together with Norwegian University of Science and Technology (NTNU) in Mid 2005. The course has been organised as a joint venture between the two universities (NTNU and Makerere University). Al-mas was the coordinator from the Uganda side and at the same time among

the lecturers. He delivered modules on Solar Energy (both PV and Thermal) and Energy Economics. Also **Mr. W. Jagwe, Uganda (present PPRE-student)** delivered lectures about the energy situation in Uganda and planning rural power systems.

The title of the Summer School was „Energy Systems for Developing Countries“ with a focus on Uganda as the case study. The course was attended by 32 participants (12 from Norway and 20 from Uganda). All participants were undergraduate students from the two universities. The course was funded by NTNU and hosted by the Faculty of Technology. The course has also helped Al-mas to enhance his PhD research. They are likely to organise a similar course next summer. If the funding University accepts to continue with the course they want to involve students and modulators from other universities in the region (Kenya and Tanzania) as well.

#### **Mr. Bernhard Gläser, Germany**

Moved to Ethiopia in May 2006 to joined the GTZ (German association for technical cooperation), who is assisting the Ethiopian Government with their University Capacity Building Program (see also small article).

#### **Mr. Sham Subbarao, India**

As Senior Lecturer and co-ordinator of the Biomass Power Project in the Dept. of Mech. Engg. at National Institute of Engineering in Mysore, India, Sham is regularly taking up projects on renewable Energy systems design. His main focus is on Biomass Energy Technologies, where he is currently involved in building fuel efficient wood stoves (known as ASTRA VOLE) for a tribal school near a local National park. In 2005



Sham (4 fr. left) next to his wife Suma at lunch on Eco-Farm Project.

Sham was also conducting a one day workshop for local Masons to build fuel efficient biomass stoves.

Another project from him on sustainable Farm has taken shape in 2005 as well: Six (environmental conscious) families have joined together and they have started developing a sustainable and organic farm by name „KANANA“ in a village near by. The farm is totally of 3 acres and they have started growing vegetables for their home requirements organically (No chemicals !). They have also built a small house using eco friendly technology (Mud blocks). Their vision is to meet the food and energy needs of all 6 families from this farm. They were planting some 1000 trees in the rainy season (May/June 2005) and they have started a plant nursery. Other plans: building of a Biogas plant, solar water pumping, drip irrigation systems.

## PPRE 2000-01

### Mr. Francis X. Ochieng, Kenya

Finished a 1 year Wind Training Course, IN-WENT in Germany last year October ([www.inwent.de](http://www.inwent.de)). Recently he joined University of Nairobi to built up an RE Training programme and to prepare for his PhD-studies.

### Mr. Alger Gil Guerrero, Mexico

Quit his job at GPCc Inc., Quebec, Canada to return to Germany in Mid 2005 for his PhD-studies. His studies will focus on Wind potential for Mexico and he will conduct his research at Technical University of Freiberg supported by DAAD.

More details about his PhD: The objective of this study will be to apply the large scale wind resource assessment methodology developed by CBEE, and currently being used within the UNDP SWERA program, to preliminarily assess the wind potential in Mexico and from this it is hoped that they could be in a position to draw some conclusions about the overall wind potential of the country.

How I got there ? - Here a brief chronology about the PhD studies:

2002: While doing an internship at Lahmeyer International with Dipl.-Phys. Roland Riess, I got interested in Mesoscale Modelling to assess wind potential for large areas.

2003: (1) While working for GAMESA Energia's partner in Mexico, I got involved in site prospection activities and realized about the lack of reliable meteorological information in countries like Mexico, which represents one of the several and evident obsta-

cles to the implementation of large scale wind energy projects.

(2) First approach with Oldenburg University to propose a research project related to this field. This effort unfortunately failed due to administrative requirements.

(3) Deeper research about mesoscale modelling activities in different countries. I was particularly interested in the work being done at Brazilian Wind Energy Center by Dr. Everaldo Feitosa and Dr. Robert Benoit from Environment Canada.

(4) First personal contact with Dr. Robert Benoit in Montreal.

(5) Interest from GTZ-Mexico and Institute for Electrical Research (Mexican government agency) to provide support to this project as part of the UNDP project for Mexico called „Plan of Action for Removing Barriers for the Full Scale Commercial Implementation of Wind Power“ (UNDP)

(6) After many efforts and with strong support from Dr. Spitta from DAAD-Mexico, I was finally accepted as PhD student by TU Freiberg.

2004: The project is finally and kindly supported by EAB-Technology Group, company based in Freiberg, with about 400 MW in projects in Brazil and interest to eventually develop wind energy projects in Mexico.

2005: Award of a DAAD Scholarship to pursue PhD Studies.

### **Dr. Elizabeth von Hauff, Canada**

Successfully finished her PhD titled „Field effect investigations of charge carrier trans-

port in organic semiconductors“at the Energy- and Semiconductor Research Group at University of Oldenburg end of 2005. She is currently holding a 2 years Post-doc position within the Institute of Physics at University of Oldenburg. In the Summer term 2006 she gave a lecture course “photovoltaics” for the present PPRE students

### **PPRE 2001-02**

#### **Mr. Santiago Sánchez, Ecuador**

Wrote in 12/2005:

My company ENERPRO is going well. I am participating in some tenders for the supply and installation of RE systems in the continent (Amazon) and in the Galapagos. Looking for some distribution of RE equipment. I will start a consultancy for the Galapagos Electric Utility on capacity building to handle the large RE projects planned there with UN funds. Also, we are entering the area of energy efficiency. There is a lot of work; hopefully this will translate into earnings next year.

I am also teaching RE at the Universidad San Francisco de Quito. It is a private university of prestige <[www.usfq.edu.ec](http://www.usfq.edu.ec)>. They also run an Energy and Environment Post Graduate Course together with the University of Calgary (CANADA) for American students.

Btw: I had the opportunity to attend the Solar World Congress 2005 in Orlando, Florida, this past August and in one of the conferences the speaker said “Renewables is not a job, IT IS A CAUSE” and I am glad (and probably you too) we are involved in this endeavour for a better world. It will take time, but we will leave a track.

**Mr. Oliver Risse, Germany**

As Regional Manager for Southeast Asia from SunTechnics GmbH, Hamburg, Germany (which is a subsidiary company of Conergy AG) Mr. Risse is currently in charge for the establishment of another subsidiary office for Southeast Asia, which will be located in Singapore. Actually they are recruiting new staff for their Singapore office at the moment and still looking for experienced manpower.

In April 2006 Mr. Risse moved with his family to Singapore for 3 years.

**Mr. Alejandro Umana, Columbia**

Quit working with Garrad Hassan and Partners in Bristol, UK, by end of March 2006. He joined UPC Europe Wind Management in London. Their main aim for development is east European countries but they are also active in countries like India and the Philippines.

**Dr. Quoc Khanh Nguyen, Vietnam**

Did finish his PhD in 2005 titled „Long term optimization of energy demand and supply in Vietnam with special reference to the potential of renewable energies“. Khanh was working at the Bremen Energy Institute ([www.bei.uni-bremen.de](http://www.bei.uni-bremen.de)) and his supervisors were Prof. Pfaffenberger (most of you know) from International University of Bremen and Prof. Welsch from University of Oldenburg.

Presently Khanh is working at the Hanoi Institute of Energy, but his work there has not much to do with renewable energy.

**Mr. Anand Shukla, India**

Is presently doing his PhD-research titled ‘Study of technological, economical and social aspects to energize off-grid region through distributed generation in developing countries’ at Wuppertal Institute for Climate, Environment and Energy, Germany. Within the scope of his PhD Anand is supposed to carry out several case-studies in different countries. Therefore he spent the first half of 2005 in Vietnam and thereafter he joined the Energy Research Center (ERC), University of Cape Town, South Africa for a Case-study on “Understanding of Rural Electrification in South Africa”(please see details in other article).

**Mr. Aravind PV, India**

Who is still doing his PhD-studies at Section of thermal power engineering, Faculty of Design, Engineering and Production, Delft University of Technology, The Netherlands, was invited to PPRE, University of Oldenburg in early June 2005 for providing a Gasification-Seminar to PPRE-students.

**Mr. Jordi Avellaneda de la Calle, Spain**

Is about to finish his MBA-studies at IESTE, Barcelona, Spain. Jordi went in September 2005 to Tuck Business School, Boston, US, to take his second year of his MBA-studies overthere.

**Mr. Butchaiah Gadde, India**

After some years with IT Power India in Pondicherry Butchaiah has been accepted for PhD studies at the Joint Graduate School of Energy and Environment (JGSEE), which is an autonomous graduate school instituted

under the jurisdiction of the Council of the King Mongkut's University of Technology Thonburi in Thailand.

### **PPRE 2002-03**

#### **Mr. Jhantu Kumar Saha, Bangladesh**

Is doing his PhD in the field of Thin Film Solar Cell Materials in Saitama University, Japan since last year April 2005 after passing the Doctors entrance examination. End of 2005 Jhantu was focusing his research on the micro-wave plasma enhanced chemical vapor deposition (MWPE-CVD) of amorphous and polycrystalline silicon films for thin film solar cells.

#### **Ms. Jie Shao, China**

Is working in a Chinese governmental program called "RE in Rural Areas" in Gansu province. They focus on the operators training, the rural fuels and rural energy consumption – please see also her small article. Once she was working together with Mr. **Christoph Schröder** from Germany (**PPRE 97/98**) who is working for GTZ in China since about 4 years in the Pico Hydro Power field.

Btw: Jie Shao gave birth to a lovely daughter called Maomao in 2005.

**Latest news:** In May 2006 Jie Shao moved to Beijing to work for a wind program called 'China Wind Power Center'. Beside she will also continue working for her recent program, 'RE in rural areas', as a technical consultant.

#### **Mr. Gianpiero Nacci, Italy**

Informed us, that his team at the European

Bank of Construction Management (EBRD) is looking for an engineer, who will be in charge of Energy Efficiency and Climate Change matters.

A respective job-advertisement was spread via the PPRE-alumni list.

Alumni interested, please contact either Gianpiero directly or the PPRE-staff.

#### **Mr. Alejandro Bango, Spain**

Went to Brasil early 2004 to work on local RE-projects. Presently he is working with Ecologica Assessoria in Sao Paulo.

About his first 1,5 years in Brazil Alejandro wrote the following:

Since my arrival in Brazil I'm working on the promotion of renewable energy projects, focused on the CDM issues as a market incentive to improve financial flows into renewable energy projects. Within this scope, we try to promote mainly micro-hydro, solar PV and biofuels as part of the fuel switching programs to decrease pollution from energy facilities.

Also the rural electrification is within this scope, bearing in mind geographical particularities. I'm trying to study the feasibility of PV grid connected and on isolated grids (North Brazil) and the use of Biomass gasification as energy source for local communities.

The technologies are well known in Brazil, moreover the country is shattered by thousand of projects lacking a deep study on customer-provider management schemes, in the mean time the governmental program to bring light to the rural areas is still seen as philanthropic and not as a potential business.

On the CDM issues, I'm involved on the design and feasibility studies on potential CDM projects, covering energy efficiency, renewable energies, landfill to gas projects, transport sector and reforestation projects – in one of them I was directly involved..... to be continued !

**Mr. Fernando Vega, Honduras**

In Mid 2005 went with his family to the US, more precisely Siloam Springs, Arkansas, where he joined a private university ([www.jbu.edu](http://www.jbu.edu)), to teach in the engineering division and to do some research as well. In the medium term his job will involve a lot of renewable energies in the form of teaching and project implementation in 3rd world countries. The long term project goal is to create a renewable energy program for which they actually hired Fernando.

**Mr. Ihtsham Farooq Choudhry, Pakistan**

Was employed by AREVA Energietechnik GmbH, Division of decentralized energy systems, in Bremen, Germany in Mid 2005 ([www.areva-td.com](http://www.areva-td.com)). They are working in the field of Biomass Power plants. Last year the company had three contracts of construction and erection of 13 MW power plants run by biomass (CHP) in Brazil. Sham is working on project management (operation and functioning of the whole plant and also different components of the plant, like boiler, turbine etc).

**Mr. Juan Jose Trujillo, Colombia**

Joined the Endowed Chair of Wind Energy at the Institute of Aircraft Design, University of Stuttgart as research assistant. Juan is supposed to do his PhD-studies there.

**Mr. Manoj Khadka, Nepal**

Since May 2005 he is director of the Institute of Local Governance Studies (Inlogos), an NGO working for empowering local governance system and support for different development works at the central level as well as local level.

Major Works Performed:

- Involved in team of preparing guidelines for „Internalization of MEDEP into DDC and other central level agencies“ for MEDEP/UNDP.
- Involved in technical support team of „Preparation of Urban Poverty Reduction Strategy“ organized by Municipal Association of Nepal and Ministry of Local Development with support from GTZ and DED.
- Coordination of other activities associated with the institute as Comparative Study of CIAA, Study of Personnel Management of Kathmandu Metropolitan City, Review of District Periodic Plan of Bhaktapur DDC, Study of PPP arrangement of Electricity and Water Supply in Municipalities etc. done by the Institute.
- Looking after the overall financial and administrative management of the institute.
- Coordinating with the Board of directors and working as secretary of the board.

Btw: Manoj got married in Summer 2005.

**PPRE 2003-04**

**Mr. Ferdinand Ajamah, Cameroon**

Wrote earlier last year:

We are presently experiencing a very sympathetic situation in Cameroon with respect to the continuous rise of fuel prices. The

government has just announced another increase in fuel prices, two months after the last one. The question is when shall this rise stop?

To bring renewable energy to the people of Cameroon, we, SAF - Solair Afric - (Solar Energy company) are presently carrying out capacity building in photovoltaic technology. Additionally, we are opening a renewable energy research department in our company. Target groups amongst others include engineers, technicians and researchers, personnel of the various ministries including the ministry of energy in Cameroon.

In brief, our perspectives include

- To promote a strong scientific exchange with other countries in the world by offering laboratory and field training to scientists, engineers, technicians and specialised courses in PV conversion;
- Serving as a regional resource of technical expertise in PV demonstration projects and implementation problems ;
- Serving as a regional centre for renewable energy policy research, studying the social and cultural factors relating to the use of solar energy.

To go through this task we need any collaboration and guidance especially with respect to getting some funding, otherwise we might fall short of our target. I shall be grateful if you will kindly give me links (contacts) of any Alumni who has undertaken a similar project so that we can exchange experiences.

Of course Ferdinand is still working with the ministry of Energy and is doing also energy projects with NGO's like Humanities & Social Sciences Research Centre

### **Mr. George C. Bandlamudi, India**

Started his PhD at Centre for Fuel Cell Technology (ZBT)" at Duisburg, Germany ([www.zbt-duisburg.de](http://www.zbt-duisburg.de)) in April 2005 – please see article.

### **Mr. Everson Possamai, Brasil**

Was looking for a job for 5 months upon his return to Brasil after PPRE. Actually there have been some opportunities with respect to Renewable Energy offered to him, but obviously the salary was not good enough.

Finally Everson got a job as engineer with John Deere (an internationally known farm tractors manufacturer). For 1,5 year his job will be in a new plant project execution. Later on he is supposed to work inside the plant in maintenance or process engineering. Everson thinks that John Deere offered him a job because of his RE background, which might be also interesting for John Deere in the long run ?

Latest news: in March 2006 Everson wrote that he is working as Environmental Technical Advisor in a big steel producer multinational (and that he is proud to be in a Brazilian multinational!). He is responsible for solid waste management of the plant located close where he is living with his family.

### **Mr. Andreas Michel, Germany**

Did join the GTZ after graduation, where he is working in ProBEC - Programme for Biomass Energy Conservation in Southern Africa. The Head office is located in Mulanje, MALAWI. End of 2005 Andreas informed us that the dissemination of the Rocket stoves

in the region is increasing steadily. So far more than 600 Rocket stoves have been distributed (see also respective article).

After doing a training for several months at GTZ in South-Africa, Andreas was offered a proper job at GTZ in October 2005. He will be involved in the project named above.

Earlier in 2006 he participated in a GTZ-Stove-conference in Johannesburg, South-Africa, where Andreas met other PPRE-alumni, like **Ms. Anna Ingwe, Tanzania (PPRE 1991-92)** and **Samson Tolessa, Ethiopia (PPRE 1994-95)**.



PPRE-Alumni-Meeting at GTZ-Stove-conference in Johannesburg

Besides improved cookstoves the local GTZ-team is also working on new projects related to Improved Tobacco curing barns.

### **Mr. Richard Lawless, Ireland**

Started working as RE-Engineer with Lahmeyer International GmbH in Bad Vibel, near Frankfurt in Mid 2005.

### **Mr. Matthieu Sarran, France**

Quit his job with Sun Master Energiesysteme in Austria late 2005 to also join Lahmeyer Int. in Bad Vibel, near Frankfurt.

### **Mr. Prashun Ratna Bajracharya, Nepal**

Re-joined the Biogas Programme Nepal after PPRE. The biogas programme in Nepal is running smoothly. They are implementing Fourth Phase of the biogas programme and with a target to construct additional 200.000 biogas plants all over the country up to 2009. Last year, Biogas Programme -Nepal received Ashden Award - 2005 from Ashden Award for Sustainable Energy-Great Britain. 'Biogas Programme Nepal' has already been registered with the executive board of the CDM and 180.000 biogas plants have been registered with the CDM in its preliminary phase. World Bank is all set to make an agreement with Nepal to buy one million tons of carbon dioxide for about 4.5 million dollar.

### **Mr. Indradip Mitra, India**

Returned to his duties at the Tata Energy Research Institute (TERI) in Dehli, India after PPRE.

In 2005 he was engaged in a project where they are trying to develop a master plan for electrification of over 16000 households (over 100000 people) in Sundarbans with grid quality power through renewable energy technologies.

Mr. Mitra also went for a 128.8 MW wind farm vetting for Enercon company (India) to a site near Jaisalmer, close to the desert 'Thar', where there is already 450 MW installed. The picture below shows a sandstorm during a his site-visit, which is common in this region.

In early 2006 Mr. Mitra started his PhD-studies under the guidance of Prof. Schmid at University of Kassel. His PhD-Studies are sponsored



Typical sand storm at WEC-farm in Desert-region in India

by CONERGY company located in Hamburg, Germany. He will be located at Institute of Solar Energy Research (ISET), Kassel.

### **Mr. Erkata Yandri, Indonesia**

As Energy Analyst and Project Development Controller at PT. SMART Tbk ([www.smart-tbk.com](http://www.smart-tbk.com)) Erkata informed us that in Mid 2005 his company was dealing with a Japanese investor to start a CDM Biogas Project. If accepted Erkata will be involved in this big Biogas construction project. Further news to come !

### **Ms. Farida Joppich, Kyrgyzstan**

Formerly known as Farida Husainova started her PhD-studies with respect to Hydrogen Storage at the Technical Thermodynamic Institute in DLR, Stuttgart in Mid 2005.

The correct title of her PhD is „Entwicklung und Verifizierung eines Auslegungskonzepts für neu entwickelte Metallhydridsysteme zur Wasserstoffspeicherung“.

### **Mr. Iresha Somarathne, Sri Lanka**

In Mid 2005 Iresha was trying to couple one small Stirling engine with a Gasifier and he

promised to send an experience paper. Furthermore he mentioned that in Sri Lanka there are no much research facilities available and basically no money to do experiment – so he is trying with his own money.

### **Mr. Nicolas Veneranda, Argentina**

wrote about his work for Lahmeyer International in Italy:

“Here in Italy apart from being cold, the government doesn’t decide to promote wind energy as it should be, so all projects in Sardegna are stopped, the bureaucracy is strong but any way, this is Italy”.

### **Mr. Torsten Bröer, Germany**

As Ph.D. Candidate of the recently implemented HyWindBalance-Project (see also article under news from Oldenburg) at EHF in the Institute of Physics at University of Oldenburg, Torsten visited for 4 months as guest researcher the Institute for Integrated Energy Systems (IESVic), University of Victoria, Canada ([www.iesvic.uvic.ca](http://www.iesvic.uvic.ca)).

From there he wrote:

Today a colleague of mine came into my office and introduced me to a guy from Germany. We had the usual conversation like „were do you come from“, „what are you doing there“ etc. etc..... and after a while it turned out that we both were studying in Oldenburg and even more surprising we both did PPRE.

So thanks to my colleague over here - who just thought „Germans should meet Germans“ - ... I met **Milorad Nikolic (PPRE 95/96)**, who is in the Dept. of Greek and Roman Studies over here and does research on „Fluid dynamics in aquaducts“ - the peo-



PPRE-alumni met by chance in Vancouver Island: M. Nikolic (left) & T. Bröer

ple in the department where I work in (at the moment) are also doing lots of „Fluid dynamics research“ - but on fuel cells. Milo is using the same simulation software and that's why archaeology and fuel cells „have lots in common“.

### **PPRE 2004-06**

#### **Mr. A.N.M. Zobayer, Bangladesh**

Returned to his former position in the Sustainable Rural Energy Project at the local Government Engineering Department, Bangladesh. Zobayer already managed to raise funds for 10 Solar Home System using LED for demonstration. They are going to install these systems on large scale. Actually he is seeking LED lamp manufacturer companies at the moment.

In August 2006 Zobayer is going to Asian Institute of Technology (AIT) in Thailand for Biomass Gasifier Specialisation. This stay is funded by UNDP.

#### **Mr. David Otieno, Kenya**

Did his practical training and project work at gtz-office in Eschborn, Germany. In Novem-

ber 2005 he was invited to give a presentation to gtz-staff about 'Rural Electrification in Eastern Africa: is Solar PV an impossible dream?'- Contents: Eastern Africa Overview, Solar PV for Rural Micro-entrepreneurship: possible?, Social Capital / Social Interactions: the Missing Link in PV, PV in Eastern Africa: „Success“ or „Failure“?, Some Highlights from the East African Renewable Energy Common Market Study, Conclusion.

After his studies with us he returned to Kenya earlier this year, where he joined the gtz-office for East-Africa, which is located in Nairobi. Initially he will be in charge of pooling the (gtz) energy projects into one basket. He is Regional Officer at GTZ Regional Energy Advisory Platform Eastern Africa (GTZ REAP-EA).

#### **Mr. Boon Jin Tek, Malaysia**

Started 1st of May as training engineer with CONERGY AG in Hamburg. After the training of several months Boon Jin was shifted to the newly installed branch office for the East-Asian market in Singapore. The company there is called: Suntechnics Energy Systems Pte. Ltd. ([www.suntechnics.com](http://www.suntechnics.com)). Hence Boon Jin is almost at home.

#### **Mr. Alfredo Pena Diaz, Columbia**

Started his PhD-studies at the Wind Energy Department in Risoe National Laboratory, Roskilde, Denmark, in April 2006. He is working in the meteorology division. The project in which he is involved, at the first beginning, is the evaluation and analysis of measurements taken offshore with LIDAR and SODAR in a platform in the north sea. Aim of the project is to see the characteristics of the boundary layer at different heights and turbulence properties.

### **Mr. Naveed Akhtkar, Pakistan**

After PPRE he got a job as Research Engineer at the Chair for Materials Processing in University of Bayreuth, Germany, where he is involved in fuel cell activities and in charge of building up a test station for SOFC.

### **Mr. Maksim Toropov, Kyrgyzstan**

Is working as trainee since May 2006 in a small firm in Hamburg, called Microsol Solarsysteme GMBH ([www.SydneySolar.de](http://www.SydneySolar.de)). The company has around 15-years experience in installation and service of solar thermal and PV systems in Hamburg and outskirts. In August he'll start to work for them within a pilot-project. Their task will be to assemble and test so called Maximum Reflector Collectors. It has a small elongated absorber and big parabolic reflector. That design pretend to be a low-cost alternative to the flat plate collector.

### **Mr. Juan Carlos Moreno, Venezuela**

Joined FUNDELEC's Renewable Energy team on May 15th 2006. Fundelec <<http://www.fundelec.org.ve>> is a government foundation whose main responsibility is to lead special projects and studies for the electrical sector in Venezuela.

Juan Carlos has been hired until December as an Advisor for the National Coordination of the Program "Sembrando Luz", which is addressed to provide electricity to schools, health and community centers located in isolated and boundary areas of Venezuela with RE options. The Program has started using only PV systems but it is planned to evolve soon to hybrid systems (PV-Wind-Diesel).

His responsibilities are: advising the National Coordination in the planning of the program, giving some lectures about Stand Alone PV Systems to distribution utilities' technicians, and giving support to PV installations all over the country when it is needed.

### **Mr. Sebastian Herrmann, Germany**

Will start working for „Deutschen Energie Agentur“ – DENA – in Berlin (<http://www.deutsche-energie-agentur.de>) from 1st of August 2006.

He will join the International Cooperation team working in the field of CDM and Joint Implementation.

## NEWS, EUREC ALUMNI

### **Mr. Adrien Clauzonier, France**

Who started to work for Suntechnics Company in Madrid after EUREC-programme informed us that he is working at the moment on off-grid systems; and that he is seeking some data of off-grid systems in order to compare off grid simulation tool to reality life operation system.

### **Mr. Denis Thomas, Belgium**

After his fruitful MSc-studies Denis returned from Zaragoza to Belgium, where he got married and became father in April. Only after settling these rather personal matters, Denis started working for a non-profit organization named „Energie Facteur 4 asbl“ ([www.ef4.be](http://www.ef4.be)) from the beginning of May. He is project responsible for the implementation of PV projects on public buildings in municipalities in Wallonia. Besides this, Denis takes part in a large study (FIERWall) which tries to identify the industrial RE channels in Wallonia through R&D, production, distribution and exportation

### **Mr. Panagiotis Mantas, Greece**

Started working on Wind-projects for LAHMEYER INTERNATIONAL GmbH, Bad Vilbel, Germany. At the moment he has a 6-months contract. At Lahmeyer he meets quite a few PPRE-absolvents.

### **Mr. Avraamides Stelios, Cypres**

Is working at AEOLIKI company ([www.aeoliki.con](http://www.aeoliki.con)) in Cyprus. The company's main objectives are Environment projects and En-

ergy. Some of the areas which he is involved in are:

- Wind potential measurements
- Techno-economic studies for wind parks developments
- Energy Management and Planning

### **Mr. Justin Carrell, UK**

After months of looking he has found a job with Creative Environmental Networks ([www.cen.org.uk](http://www.cen.org.uk)), a not for profit organisation in London working in partnership with local authorities and the European Union to design and implement environmental projects. Justin is working as a project manager in the renewables team. At the moment he is assessing CHP projects (up to about 100kWe), which includes feasibility studies, promotional and marketing work, and project management. He also works on sustainable energy in housing, looking at all small scale renewable and low carbon micro generation.

However, CEN does also work on solar thermal, PV, small wind and biomass, so that he might hopefully get some exposure to these topics as well.

### **Mr. Duncan Ansell, UK**

Is working as Marine Resource Analyst in the field of tidal energy Marine Current Turbines Ltd., UK. They developed the SeaGen machine which is going to be installed in Northern Ireland, later this year. Duncan promised to send some pictures of the installation when ready.

## REPORTS FROM ALUMNI

### Largest PV system of Central & Latin America installed

By Thomas Schwarz, Germany (PPRE 89/90)

On March 10th 2006 the largest PV system (20kWp) of Central & Latin America started its operation at the German school in San Salvador, as the first grid-coupled PV system in El Salvador. The system will generate about 27000 kWh annually and cover about 25% of the schools electricity consumption and thus save considerable expenses. In addition, the generated surplus energy during weekends and vacation time will be fed into the public grid and the local utility company will pay a certain compensation to the school for each kWh fed into the grid. This, in addition to the electricity cost savings, should recover the investment costs within 20 years (this may be different for other conditions with different energy prices!). As this grid coupled system does not include batteries (the grid serves as energy „buffer“), it is expected however to work with minimal maintenance for many more years.

This PV system is part of the „Leuchtturm“ project of the German Energy Agency (DENA), through which grid coupled PV systems will be set up in several German schools around the world. The first one had been installed in Athens during last years Olympics, and at least two more will be installed in Portugal and South Africa. The financing of these systems is shared between DENA, the schools as the beneficiaries, and various sponsors, among them the companies involved. For the San Salvador project this was our company, Phönix SonnenStrom AG, in charge of planning, delivery and installation, the module manufacturers RWE



Schott Solar and Photowatt, and the inverter manufacturer SMA.

The PV system is outstanding not only for it's size but also by its architecture, which makes it a widely seen attraction (see pictures on internet page below). And it will serve not only as a regional role model, but also as a teaching and training object for students of the German school and the neighbouring university. Such follow-up activities are part of the second phase of the project, for which Phönix SonnenStrom AG is cooperating with the „Universidad CentroAmericana José Simeón Cañas“ of San Salvador. And last but not least, part of the PV system serves as sun-roof for the playground of the „Kindergarten“ of the German school. This way, the kids grow up with a solar system as a natural part of their daily life.

Meanwhile, on April 7, it has been already officially inaugurated by the President of El Salvador himself, who is very supportive for the widespread application of solar energy in his country. So, supported by excellent news coverage in leading newspapers and TV channels, this project has already drawn the attention of many more interested companies and organisations in El Salvador, who want to set up and operate similar systems.

For additional information about the whole project You can contact me, who was in charge of the planning and installation, or my colleague Gerson Castillo (Castillo@SonnenStromAG.de), who initiated the project and will be in charge for the follow-up activities. And check out the following internet pages for a description, technical summary and several pictures of the system:

<http://www.SonnenStromAG.de/index.php?entryid=233>

### **Case-study on “Understanding of Rural Electrification in South Africa”**

Proposal within PhD on ‘Study of technological, economical and social aspects to energize off-grid region through distributed generation in developing countries’

submitted by Mr. Anand Shukla, India (PPRE 2001-02) Submitted at: Energy Research Center (ERC), University of Cape Town, South Africa

#### **Concept**

Provision of electricity is necessary for the overall development of any region. The sad fact is, there are more than 2 billion population living in rural areas without access to electricity. And, the equal number of people are having access to electricity but to a limited and unreliable extent. International projections reveal that there will be equal number of people without access to electricity in the year 2030 if we follow the business-as-usual scenario. Situation is more critical to the areas (off-grid), where electricity is not possible to supply through conventional grid due to technical and eco-

nomical reasons.

Electricity supply in rural areas is often done with an stand-alone approach without considering its social, economical and environmental dimensions. The present concept of sustainable development envisages to include all three dimensions in order to achieve overall development. It is from this perspective, the present PhD research has been undertaken to study all three dimensions of electrification in off-grid rural areas. Proposed research envisages to assess various technological options and experiences gained so far with the help of successful case examples in various countries. Off-grid electrification is the prime focus in the present research, therefore, potential and scope of renewable energy technologies in the country is considered.

To understand the subject more deeper, it is important to have first hand experience, study country's government policies on rural electrification and gain the grassroot realities through visiting few sites in rural areas. Selection of South Africa for the case study is an outcome of small survey conducted among key International Energy professionals. The main view point was that South Africa is quite advanced in the context of rural electrification and also country has shown number of successful examples which could serve as a good learnings for other countries.

#### **Objectives of case study**

The main objective of the case study is to understand the rural electrification situation keeping in mind the following questions:

- Is rural electrification taken as integrated

approach?

- Is distributed generation an option for rural electrification?
- How sustainable is rural electrification in the present approach?
- Potential and scope of renewable energy technology in off-grid electrification?
- Target to achieve universal electrification in the country
- What should be the strategies for rural electrification?
- Interlinkages of rural electrification with rural development, MDGs, etc,
- Success factors and technologies for rural electrification?
- Relevant investment projects

### Methodology

The proposed case study is planned to be carried out with the help of different approaches through desk study as well as the field research. The desk study would include develop an understanding over government policies on rural electrification in the country. Literature survey will be done and a search will be made on various studies carried out in the country in the recent past.

Visit to the rural areas will help deepening the understanding into the sector. Various key stakeholders is planned to interview for assessing their insights and understanding in this sector (also through structured questionnaire). This will help analysing the future of rural electrification in the country.

### Duration

15th July 2005 to 31st October 2005.

Address for correspondence: Wuppertal Institute for Climate, Environment and

Energy, Döppersberg 19, 42103 Wuppertal, Germany. Tel: +49 202 2492 309

## Energy efficient household stoves for Malawi – Smokeless fire in the ROCKET STOVE



By Andreas Michel (PPRE 03/04), ProBEC/GTZ, andreas.michel@gtz.de

In 2004 the Rocket Stove technology was brought to Malawi within ProBEC (Programme for Biomass Energy Conservation in Southern Africa / GTZ). So far the wood burning stoves are used for institutional cooking in Malawi. Due to complete combustion inside the insulated combustion chamber the stove reaches very high efficiencies. The wood savings of some customers are up to 90% by using this new technology. Besides the high efficiency the health impact of this stove needs to be mentioned. Due to the high combustion temperatures even the smoke is burnt, so in these stoves there is a smokeless fire.

The task for 2005 is to scale the Rocket Stove principle down to household size. We are developing a wood burning household stove that will compete with the charcoal and paraffin stoves. The challenge is to find local materials from which the stove can be made. This will reduce the costs and it will allow that the stoves can be built by local producers.

The Household Rocket Stove was presented at the Malawi International Trade Fair 2005 in Blantyre/Malawi end of May 2005.

By end of 2005 about 600 Rocket stoves have been distributed in the region.

### **GTZ support for Ethiopia's University Capacity Building Program**

By Bernhard Gläser, Germany (PPRE 1999/2000)

The GTZ (German association for technical co-operation) is assisting the Ethiopian Government with their University Capacity Building Program.

The programme's scope is to build 13 universities (!) at various locations across the country. The Ethiopian government is fully funding this very ambitious project, and they have allocated a considerable amount of money in order to meet this challenge.

The GTZ is acting as a consultant within the construction/engineering sector for this project. In order to enhance skills and generate lasting expertise the GTZ should further organize vocational training advice for the Ethiopians. I am one out of 25 German skill-upgrading experts who have the hon-

our and duty to deliver German expertise.

This is historically one of the biggest ever projects in East Africa (for GTZ), and the excitement coming along with it is of course huge.

I will keep interested parties updated – but please be patient until Mid 2006 before expecting any further announcements. For further information please visit: [www.gtz.de/international-services](http://www.gtz.de/international-services)

### **My present activities in Georgia**

By Bidzina Kekelia, Georgia (PPRE 98/9)

Currently I work for a small consulting company CORE International in a USAID funded project Advisory Assistance to the Ministry of Energy of Georgia. Our project provides advisory services to the Ministry in a host of energy sector issues including national energy policy reform, energy sector reform and governance improvement, medium and long term sector strategy development, public awareness and public participation methodologies to engage the public in an informed dialog on reforms, development of a Ministry-wide energy management information system, as well as assisting the Ministry in the day to day sector policy issues. CORE's advisory support to the Ministry includes assistance in the development of new legislation to aid in implementing reforms, development of amendments to existing energy laws, policy papers on energy regulatory approaches and market structure, issues surrounding energy security of the country.

My position with this project is called Senior Energy Expert and I'm mostly involved with

technical issues. I also manage several sub-projects like:

- \* Development of a website for the Ministry of Energy ([www.minenergy.gov.ge](http://www.minenergy.gov.ge));
- \* Preparation of Pre-Feasibility studies for potential large scale projects like: 700 MW Khudoni HPP; 500 KV High Voltage Transmission Line „South Georgia“; 450 MW Namakhvani HPP Cascade;
- \* Development of a Simulation Model of Georgian Power Sector (hourly dispatch of power plants and financial revenue modeling);
- \* Development of Ministry MIS system (including internal Document Forwarding System and Database - both linked to the Ministry website);

And any other technical issue that comes up or requested by the Ministry, like the one on classification of Hydro Power Plants in other countries...

Our project runs till the end of this year... Then, I will see...

By the way, I have applied to PhD programs in Mechanical Engineering at several Universities and waiting for their decisions. One of them is Colorado State University with a strong Solar Energy program and Solar Lab. It could happen that I may end up on a study bench again... :o)

Best regards to Oldenburg and PPRE staff!  
Bidzina

### **My Research at Centre for Fuel Cell Technology, Duisburg**

By George Bandlamudi, India (PPRE 2003-04)

I had an invitation to do my PhD in the „Cen-

tre for Fuel Cell Technology (ZBT)“ at Duisburg, Germany, just when I was concluding my short stay at the GATE division of GTZ, Eschborn in Feb. 2005. The invitation was quite a surprise as I was on the verge of leaving for India, after working for GTZ.

Well, ZBT is a young research Institute, funded by the state of NRW (Nord-Rhein-Westfalia) and the EU. It was quite interesting for me to join ZBT straight away without having to go to India and come back to Germany. Hence, I had joined ZBT in April 2005 and am still with ZBT since then. The research work is quite interesting, challenging and rewarding. The work environment is quite pleasant. ZBT's thrust areas are gas processing, auxiliary power units and fuel cell stack designs. I am especially working to understand the fuel cell system behavioural patterns over time. My focus areas are micro and mini fuel cells. I am also interested in high temperature PEMs coupled to biogas processors. The high temp. PEMs (HT PEMFCs) are an emerging technology where high CO tolerance is possible, and the water management is not an issue. HT PEMFCs would make sense for systems coupled to biogas processors. Well, its a long way to go, but one step at a time with steady progress is what I aim at. I do believe that my work at ZBT would enable me to build systems that would contribute to sustainable development.

If any of you should be interested in project proposals such as biodiesel, biogas coupled systems using HT PEM stacks, feel free to get in touch with me and we might try to work together.

My e-mail: [g.bandlamudi@zbt-duisburg.de](mailto:g.bandlamudi@zbt-duisburg.de)

CNESOLER, MALI (PPRE 1988-89)  
E-mail: maiga\_alhousseini@yahoo.com

## **The activity of the 'RE in Rural Areas'- program in China**

By Ms. Shao Jie, China (PPRE 2002/03)

The program of 'Renewable Energy in Rural Areas' is a technical cooperation program with Chinese NDRC and MOFCOM in line with Chinese government program, called Township electrification program (song dian dao xiang). Its concentrating in four provinces of Western China, which are Qinghai, Yunnan, Gansu and Tibet. The program started in the year 2002 in Qinghai and Yunnan provinces and was extended in 2005 to Gansu and Tibet provinces. End of Program is scheduled for September 2007.

The aim of this program is to improve the living and working conditions of the rural population in remote areas far from the grid by providing access to energy services based on renewable sources of energy. The main activities are concerning the fields of consulting to the program of 'Township electrification program' and a KfW (German Government Bank) PV program by system design and monitoring as well as operators training, socio-economic impact monitoring, international quality standards of RE components, dissemination of rural fuels and rural energy consumption technologies, capacity building and publicity campaigns.

## **PEPLS Project: Public lighting with solar lamp-stand**

By Alhousseini Issa Maiga, Research Engineer in

### **Objective of the Project:**

This project has contributed to the poverty reduction by energy access and the providing to the Malian population from remote areas of 960 solar PV systems for an installed power of 56 678 Wp with 1383 modules in 250 villages.

These systems permit to improve the quality and the rate of health, alphabetisation, education and training.

In its implementation, the project answered to the preoccupation and politics of the government, mainly those written in the referential program of the fight against poverty (CSLP), the energetic policy, the strategy for promotion and vulgarisation of Renewable Energies.

### **Specific objectives:**

- Provide to the rural areas 960 solar PV systems for lighting within 570 lamp-stand;
- Provide to the rural areas 15 systems for solar PV water pumping of 1680 Wp each to supply the common water;

### **Project Impacts:**

- To give lighting to 275 schools, health centres, alphabetisation centres and public lighting in rural areas;
- To give 670 lamp-stands for public lighting within 100 portable lamps;
- To give 750 m<sup>3</sup> of drinkable water per day in remote areas (15 solar pumping systems, which provide each around 50 m<sup>3</sup> of water per day). This quantity of water may satisfy the water needs of 27.500 per-

sons per day.

- To produce 226,71 Kwh per day (82,75 Mwh annually). By considering the hypothesis that a Malian use nowadays 300 Kwh/year, this production may satisfy the annual needs of 275.833 persons.
- To avoid the production of 3641 tons of CO<sub>2</sub> per year if one watt-hour produced is considered to permit an emission reduction of 44g of CO<sub>2</sub>;

According to the expectation that the PV module has a lifetime of 20 years, we obtain:

- Production of 1655 Mwh;
- Emission reduction of 72820 tons of CO<sub>2</sub>.

### **CONCLUSION:**

The PV solar energy could be an extremely important input in order to:

1. Satisfy the energetic needs of the population in rural areas;
2. Reduce the greenhouse gas emission;
3. Reduce the gap between town/country side related to energy;
4. Fight against poverty;



Maiga on site - visit

Supporting and promoting the PV solar energy projects are recommended

## **Transformation of Rural PV market In Tanzania**

By Musa Mzumbe, Tanzania (PPRE 1999/2000),

who is reporting about his ongoing UNDP/GEF – Project in the following:

Our project is going on well and the following are achievements we have recorded since we started:

- The level of Awareness of PV in our project area has increased and sales of PV systems has doubled. Awareness campaigns are still going on as presented the newsletter. We have installed 18 demonstration PV systems at health centres and secondary schools in the region. We expect to install more next year.
- Since July 2005, Duties and Taxes have been waved on solar and wind energy equipment and accessories. Previously they added PV component prices by about 30%. The act of Establishment of Rural Energy Agency (REA) and Rural Energy Fund (REF) was passed by the parliament in April 2004. The agency is likely to start its operation early next year. We have finalised review of PV standards and Codes of practice with Tanzania Bureau of Standards. We are still waiting for approval by East Africa technical committee towards the end of this year. The standards will be for East African countries.
- We are continuing building capacity of private sector in the area of our project. We have conducted a number of business planning sessions to the local PV dealers and

trained more than 64 local technicians in the project region. Vocational Educational Authority (VETA) approved incorporation PV curriculum in their electrical installation courses for technicians. The course has started at one centre where it will be monitored and evaluated before it is adopted for the rest of the centres in the country. The project has provided all necessary equipment for practical sessions. VETA instructors have already attended training of trainers course.



Installation of a PV demonstration system at a local school in Tanzania

- Our effort now is directed to PV financing (both consumer and supplier financing). We have identified PV applications for productive uses and we will start demonstration this month. We are in the process of making agreement by commercial bank to start

consumer financing. This is the area where we still have a lot to do and more challenging.

This is what we have done since last year. I

Five Germans in an Audi Quattro arrive at the Italian border. The Italian Immigration agent stops them and tells them: „It’sa illegala to putta 5 people in a Quattro.“ „Vot do you mean it’z illegal?“ asks the German driver. „Quattro meansa four“ replies the Italian official.



„Qvattro is just ze name of ze automobile“, the Germans retort unbelievably. „Look at ze papers: zis car is designt to kerry 5 persons.“

„You can’ta pulla thata one on me!“, replies the Italian customs agent. „Quattro meansa four. You hava fiveva people ina your car and you are thereforea breaking the law.“

The German driver replies angrily, „You idiot! Call your zupervisor over, schnell! I vant to speak to someone viz more intelligence!“

„Sorry“, responds the Italian official, „ He can’ta come. He’sa busy with a 2 guys in a Fiat Uno.

*Sent by Bahy Saad, Egypt*

# Managing Demand and Supply through Decentralized Electrification: The Case of Kenya - April 2005

By Bernard Osawa, Kenya (PPRE 96/97) - osawabernard@yahoo.co.uk

## 1. Background

### 1.1. Decentralised Electrification and MDGs

In the quest to achieve the Millennium Development Goals (MDGs), access to quality and improved energy services to all sectors of the economy need not be overemphasised. Access to energy supplies for business, water, health, education and households sectors in most developing countries (e.g. Kenya) has been limited by approaches and resources available to electrification and in particular rural electrification.

Decentralised Electrification (DE) offers attractive options that support national development and economic recovery through the provision of electricity to distributed sites without the limitations of grid electrification. Decentralised systems are modular, often well matched to the energy demand and can be easily expanded to meet growing energy demand. They can be used on stand-alone basis and tailored to meet local needs leading to better control and utilisation of local resources by local communities, and generally to more transparent resource use. Such systems are therefore better suited to facilitate the achievement of MDG objectives.

### 1.2. Electricity Sector in Kenya

Like most sub-saharan countries, per capita energy and electricity consumption and

electrification levels are extremely low and unfortunately declining in Kenya. Current overall level of access to electricity stands at a low 15.3% of all households predominantly located in urban centers. Of these only an estimated 2% are situated in rural areas<sup>1</sup>. Electrical energy consumption is relatively low at about 121kWh per capita.

At the current rate of electrification it is unlikely that a significant proportion of population will access, and take up supply of electricity in the near future. This situation is crucial considering the electrification levels have a direct correlation to the poverty levels.

In terms of power sector institutional organization, there are four key players namely Kenya Electricity Generating Company (KenGen), Kenya Power and Lighting Company (KPLC), Independent power producers, and Electricity regulatory Board (ERB). The broad functional mandates of these institutions include, inter alia, electricity generation, power transmission and distribution and retail and power industry regulation.

## 2. Electricity Demand

While the demand for electricity in Kenya is varied and widely distributed the total national demand for electricity is currently un-quantified. Demand centres fall into

<sup>1</sup>Kenya is a rurally oriented society, with over 75% of the population living in rural areas, and approximately a third of the GNP being produced in the agricultural sector.

two main categories; on grid and off-grid demand. The latter refers to institutions and households not connected to the grid using, but currently using Kerosene, dry cells and lead acid batteries.

## 2.1. On-grid demand

Consumption of electrical energy is dominated by the industrial sector at 63%, followed by domestic and small-scale industrial at 33%, while Consumption by rural electrification customers comprises only 4% of the total demand. Currently there are an estimated 68,000 customers connected through the REP consuming an average 140 GWh annually. Peak demand for grid electricity is in the order of 786MW, but is believed to be suppressed by the prevailing poor supply networks and economic conditions. Historical average demand growth rate over the past 5 years in has been 1.4%.

## 2.2. Off-grid demand

Demand outside the national grid and in some cases for locations proximate to the grid (<1km) is currently supplied by various technologies including large decentralised generators, small thermal generator sets, small hydro, photovoltaic, wind etc. Some of the demand is however not supplied at all. It is believed that demand outside the national grid is actually larger than on-grid, but cannot be economically supplied through grid extension.

## 3. Electricity Supply

On-grid demand is currently well serviced with an estimated overcapacity of 200MW, which is expected to be absorbed by grow-

ing demand in the short term. A total installed generation capacity of 1,225.4 MW dominated by hydropower at 55.6%, thermal at 32% and geothermal at 10% supplies electricity to the national grid. Because of affordability to technical issues, off-grid demand remains largely unmet. The government has for a long time focused on grid electrification, leaving off-grid electrification to individuals and the private sector. Private sector entrepreneurs have embraced this and have been servicing the electricity demand of off-grid clients via distributed services which include small hydro, PV, wind and small thermal generator sets.

Regarding grid electrification the government uses the Least Cost Power Development Plan (LCPDP) to prioritize the development of identified power resources based on appraisal of their viability, before power projects are commissioned. Each development is evaluated on the basis of financial, technical, environmental and social merits. A major shortcoming of the LCPDP is its inability to take into consideration the development of isolated sites or load centres that are best electrified using distributed generation and that would utilise renewable energy resources especially wind and small hydro.

Investments in the power sector have lagged behind growth in demand and leading to stagnation in both economic and social sectors. To effectively supply the current and growing demand for electricity, key areas that need to be addressed to increase access include:

- Supply of reliable, efficient, clean and cost-effective power
- Efficient distribution through decentralised grids where possible and reductions

in technical and non-technical losses in the wider national grid

- Increased access to electricity as a means for stimulating income and employment growth;

These demands call for innovative distributed electrification approaches as well as the strengthening of supportive regulatory frameworks.

## 4. Supplying Distributed Demand

Interestingly the Kenyan government identified the need to electrify urban centres in rural areas as means to curtailing the rural to urban migration. For this reason the Rural Electrification Programme (REP) was initiated in 1973 to expand access to electricity as a means to promote sustainable socio-economic development of rural communities. Recommended approaches were and still remain to accelerate the pace of rural electrification through grid extension, isolated grids and off-grid projects, taking into account economic cost effectiveness criteria, and emphasizing productive use of power for growth and employment creation.

Unfortunately this noble idea was eventually skewed towards grid electrification, with very little support going to distributed generators and grids. This supply gap has over time fuelled the proliferation of public and private DE initiatives. To date DE is still predominantly associated with off-grid installations.

### 4.1. Distributed Thermal Generators

In line with its development agenda, GoK set up seven (7) decentralised generator grids in remote towns (also district headquarters) across Kenya through the REP in the 1970s. These isolated grids are operated by KPLC and KenGen on behalf of the Ministry of Energy. Customers of these isolated grids pay a uniform tariff of €0.08 per kWh which is similar to that paid by other customers on the national grid. These consumers are therefore subsidised by rate payers on the national grid from a “fuel levy”. Table 1 provided data on the decentralised stations.

These DE schemes have been faced with serious financial resource constraints, which have greatly limited generation, capacity

Station	Installed Capacity (kW)	Effective Capacity (kW)	Connected Consumers	Generation efficiency (kWh/litre)	Cost Per kWh (€)
Marsabit <sup>1</sup>	1,346	1,000	820	3.45	0.28
Moyale	651	350	1,094	2.69	0.16
Mandera	884	480	1,081	3.07	0.20
Wajir	1,506	1,466	1,084	3.21	0.17
Lodwar	811	640	677	2.36	0.26
Lamu	1,400	1,100	2,434	-	0.20
Garissa	2,393	1,980	3,226	-	-

Table 1: Stations, installed capacity, number of connected consumers and production costs

and network expansion at a pace consistent with growth in demand. To redress this situation, Government is seeking to privatise or concession the isolated systems on the basis of tariff price cap and a committed programme for network expansion. As part of the power sector undergoing liberalisation this is expected to improve the efficiency and quality of service.

With the exception of the government initiated decentralised projects, there are scores of informal DE schemes in operation across Kenya with varied problems and successes. A case study of one such project is presented below.

### **Case study 1: Mpeketoni Community Decentralised Grid**

Mpeketoni Electricity Project (MEP) is a decentralized community electricity generation and distribution company founded in 1994 with support from GTZ. The scheme is privately owned by local households through a share purchase scheme and supplies power to households and businesses within Mpeketoni town.

MEP which began its operations in 1994 with a client base of 60 connections and a heavy subsidy from GTZ currently services some 250 connections. It is operated on a commercial basis by a management board using finances generated by sale of electricity. The rapid change in diesel prices over time has led to the price of electricity escalating from €0.06 per kWh in 1994 to the current €0.23 per kWh. These prices while reflecting the full cost of generation and distribution contrast dramatically with other decentralized schemes operated by the government through the local utility KPLC which have tariffs fixed at the national rate of €0.08 per kWh.

In spite of a very high demand for electricity, scaling up of the generation capacity and extension of the distribution cannot be carried out effectively due to operational and financial constraints. Operations of the scheme are currently not sustainable despite the high tariffs charged. Given the favorable wind regime of its location, the scheme is currently being assessed by a private investor with a view to converting it to a wind-diesel hybrid. This is expected to reduce the cost of electricity production. Critical issues that will need to be addressed include ownership structure, technical design and operational plans.

While this case study highlights the pertinent issues faced by distributed grids outside the governments electrification 'projects', the costs of operating such schemes can be substantially reduced

through better systems management and use of renewable based hybrids.

### 4.2. Renewable Energy Generation

Use of small hydro, solar photovoltaic and wind in DE has for a long time been limited to off-grid applications. Cogeneration from bagasse has however been used on-grid, but only to a small extent. Reducing and substituting the contribution of thermal generator into the national grid is currently a priority which expected result in better and more stable tariffs to the consumers.

The following technologies are in various stages of utilisation in decentralised power supply;

- a. Geothermal: With an estimated potential of 2,000MW, only 150MW has so far been developed providing 10% of the total installed grid capacity. A further 420MW is planned by 2019. Following power shortages experienced in year 2000 as a result of severe drought, emphasis has been put on the development of geothermal as a prime source for grid connected generation. Isolated grids are possible with smaller units but this is currently not being pursued.
- b. Small Hydro: In addition to off-grid decentralised small hydro units put up by private individuals and institutions, installed grid connected small-scale hydro-electric projects contribute some 6.3 MW. Mini and micro hydropower in Kenya were recognised as sources of localised energy systems in the early 1900s. Potential for Small hydro systems (<10MW) is estimated at 1,500 MW countrywide. Their exploitability for grid power supply is restricted by the high projected inter-connection. However they remain attractive for off-grid or decentralised rural electrification.
- c. Cogeneration: Potential for cogeneration exists in sugar, sawmill and paper industries where steam is generated for process requirements, and excess steam or feedstock is available that can be used to generate electricity cost effectively. Currently, a total capacity of 36.5MW is installed in the sugar industry all grid connected. Unexploited potential estimated at 200 MW exist which could be used to electrify those areas/markets proximate to the factories or fed back into the grid. During the power crisis of 1999/2000 some 2MW of surplus bagasse power was injected into the grid.
- d. Photovoltaic: Solar electric systems currently provide the most accessible, cost effective and largely affordable avenue for off-grid DE especially for households and small businesses. Driven by the private sector with limited government support, more than 200,000 households and institutions have installed an estimated combined total of 3.8MW of PV for lighting and amenity power.
- e. Wind: Kenya has good wind regimes in specific locations. Wind is already being used at two decentralised generation sites in grid-connect and isolated hybrid mode. Several feasibility studies are underway with at least two wind farms (grid connect and isolated hybrid grid) of 7-15 MW planned for development within the next 3 years.
- f. Waste-to-energy: Although still virgin, this provides an excellent decentralised electricity generation opportunity especially for cities where peaking power is critical. Potential targets are sewerage treatment plants and urban solid waste. Potential capacities are un-quantified.

While efforts promote and entrench the utilisation of DE technologies outlined above are not currently well coordinated, they are nonetheless beginning to make an impact and are defining approaches for the implementation of decentralised electricity. An integrated strategy for the development of DE need to be developed for it to succeed and make an impact in increasing access to electricity and energy services to a wider section of the populace.

## 5. Discussion

### 5.1. Drivers and Barriers

Until recently, DE was predominantly associated with isolated sites and off-grid installations. However, the market is evolving and DE is starting to make an impact in on-grid applications. Key drivers include;

- Liberalization of the electricity sector allowing more players and different approaches to electrification
- Demand for reduce reliance on imported fuels. This coincides with current worldwide shift to address climate change through cleaner electricity and large potential for CDM projects. As outlined in section 4.2, renewable energy in the form of cogeneration, wind, small hydro and PV is beginning to cut out a niche in the future energy matrix.
- The transmission and distribution system requires significant investment especially for remote sites. DE offers an attractive alternative.
- With increased oil prices, the price of electricity is expected to rise, use of renewables are therefore expected to bring down or moderate electricity price increases in the long term making decentralised schemes more sustainable.

- Short timescale for DE project development when compared to grid extension.

Key barriers to the development of DE include;

- Lack of awareness of the multiple benefits of DE.
- Policy and Regulations for the electricity sector are oriented around centralised grid connected generation.
- Relatively low price of electricity at the current time driven by old large hydro plants. These prices are lower than those being proposed by RE generator (wind, cogen, PV, small hydro etc) and are therefore a disincentive to DE project developers

Long-term prospects for cogeneration and renewable DE in Kenya are good. However, limitations to potential growth will remain due to the relatively low marginal cost of currently installed power generation and the built-in barriers in existing policy and legislation. Power market ownership is highly concentrated representing additional entry barriers for new technologies.

## 6. Recommendations

The following key interventions to promote DE for increased access to electricity and widespread electrification are recommended;

- a. Streamline current institutional arrangements for implementation of the Rural Electrification Programme (REP) through the creation of a special purpose agency to manage the REP, including formulation of a Master Plan which will explore the development of decentralised renewable energy and limited thermal generation

presenting the least-cost electrification options for target areas.

- b. Provide concessions and incentives to private sector investors for decentralised generation while encouraging partnerships with local communities where possible. Under this policy intervention, such communities and the private sector will be allowed to charge a tariff reflecting the operating costs and a return on investments.
- c. Establish conducive regulatory framework including cost reflective tariff structures and ring-fencing funds for financing distributed electrification of the poor through small power utilities targeting areas remote from the national grid.
- d. All generators of electricity should have fair and non-discriminatory access to the grid. Use of transmission and distribution networks should be priced according to the services they provide and not in such a way as to incentivise distribution companies to avoid decentralised electricity interconnection;
- e. Exploit market based instruments, for

example emissions trading, energy taxation and output-based standards, which fully reflect energy conversion efficiencies and internalise environmental costs of energy conversion DE resources which experience high entry barriers.

With concerted efforts, increased access to electricity and modern energy services all sectors should energise income generation, employment growth and facilitate the achievement of MDG objectives.

### References

1. Kenya Energy Sector Development Strategy, Draft Report Ministry of Energy, 2003
2. World Survey of Decentralized Energy 2004, WADE
3. KPLC Annual Report 2004
4. Mbuti P, Geothermal Energy in Kenya, Ministry of Energy, Nairobi, 2004

### Re-invention of solar PV physics:

#### The Solar panels

This is the part that catches the sunshine and converts it to electricity. This is a simple process. DC Electricity, is only a stream of electrons, moving along a wire or conductor. To make electrons move in one direction, the Solar panel is coated with silicon. Silicon allows electrons to travel through it, in only one direction and will not allow electrons to go back

the other way. When electrons are under the sun they absorb energy, becoming excited, and begin to move in all directions. Because they are in the silicon, they get stopped in one direction, but manage to move freely in the other direction. Once they are moving, all in the same direction, we have electricity.

*Send by Boon Jin Tek from Malaysia, who found this description at a solar energy company in Malaysia which is promoting the use of small solar PV applications for street lights and the likes.*

# THE MARSABIT WIND-DIESEL ELECTRICITY GENERATION SYSTEM

By JAMES C. WAFULA Kenya (PRE 92/93)

## ABSTRACT

*The extraction of energy from the wind for conversion into electrical energy is a relatively new technology in Kenya. The Wind-Diesel electricity generation system in Marsabit town is the first of its kind in Kenya. Installed in 1988, this 200 kW Wind Turbine generator has been supplying electricity to the residents of Marsabit town in combination with a 200 kW Caterpillar diesel generator and three 110 kW Cummins generators. The success of this project is such that an average of 60% of the daily electrical energy demand is supplied by the wind.*

## 1. Introduction.

In September 1988 an Autonomous Wind Diesel System, AWDS, was installed in the town of Marsabit. The objective of this Belgian project was to save fuel and to expand the electricity supply of the town. This was to be done by the additional installation of a 200 kW Wind Turbine in combination with a 200 kW diesel generator.



Picture1: Typical scene in the dusty streets of Marsabit town, Pic by James W.

The town of Marsabit is remotely located making it much cheaper to generate electricity locally rather than connecting it to the national grid. Prior to the installation of the AWDS in Marsabit, the town's electricity was supplied by three 110 KW Cummins diesel generators. These three engines could not meet the increasing demand of the town. Because Marsabit town is located in the middle of the desert, fuel expenses are relatively high due to transportation costs

combined with the unavailability of the fuel during rainy seasons when the roads are made impassable.

In September 1987 HMZ Belgium n.v. (now known as TURBOWINDS<sup>1</sup>) started the design of the AWDS. From January 1988 up to August 1988 the complete system was tested at the wind farm in Zeebrugge, Belgium. During the tests all kinds of extreme situations had to be simulated.

<sup>1</sup> In 1995, Turbowinds bought WindMaster Belgium's know-how in wind energy and took on all the engineers and technicians involved in the design, project management, manufacturing, operations and maintenance of Wind Turbines and central supervisory control systems around the globe (REF 5).

The construction of the AWDS started in September 1988. This construction included the installation of overhead lines, the erection of the Wind Turbine, the installation of the diesel generator and the interconnection of the three components.

In October 1988 the complete system was started and officially inaugurated by the Belgian government and local officials.

## 2. System design.

The following criteria had to be met.

- rated voltage 420/240 V  $\pm$  5%
- rated frequency 50 Hz  $\pm$  4%
- able to handle sudden load changes.
- type of loads include: lighting (tubes and bulbs), radio and TV sets, electrical tools, refrigerators, air conditioners, welding apparatus.

The AWDS has to service the necessary power demand even when there is no wind. Therefore the size of its sister diesel engine had to be the same as that of Wind Turbine. The system therefore consists of a 200 kW Wind Turbine and a 200 kW diesel engine.

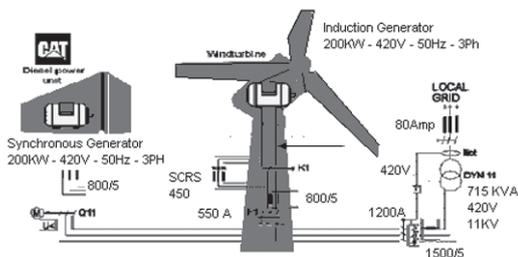


Diagram reproduced from REF 5

The Wind Turbine always runs when there is enough wind. Additionally, when the electric power demand is high and the wind is low, 1 or more diesel engines can be brought on line.

To start, the Wind Turbine will automatically start its own diesel engine to ensure enough current is available to magnetise the Wind Turbine generator (field current). Immediately thereafter, the diesel engine is put off. During periods of low loads, the Wind Turbine works in parallel with one of the 110 kW Cummins engines. Hence the Wind Turbine only uses its sister diesel engine as a standby start-up engine. In this manner, loads of up to 300 kW can be serviced. As soon as the load goes over this figure, more engines are brought on line. As a consequence, the diesel engines wear and tear is reduced to a minimum. This start and stop procedure happens only a few times a week.

As the wind power may exceed the load power, the Wind Turbine can pitch its blades until the output meets the demand. This is done by means of a software algorithm in conjunction with the blade mechanism of the Wind Turbine. The software algorithm controls the frequency, rpm's and power output at the same time makes sure that the power output is such that the frequency stays within the 4 % limit. This applies also in very high winds and low load situations. Such a system therefore eliminates the use of a dump load which may be very expensive and fragile.

## 3. Testing.

The tests performed on this system included all kinds of different situa-

tions. These tests also included situations which could ordinarily never happen in reality. Most of these tests were performed in extremely high winds with no loads. Even in these tests, the frequency could always be kept between 51.5 Hz and 49.5 Hz. Following is a summary of the tests performed.

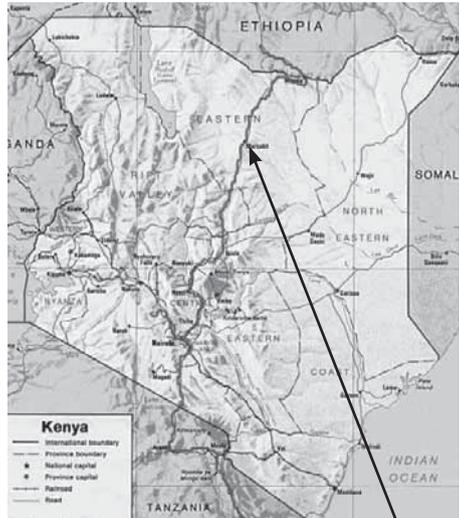
- Starting Wind Turbine when diesel engine is fully loaded. This means that the diesel engine must supply enough energy to the Wind Turbine for starting up even when it already is fully loaded.
- Starting Wind Turbine when diesel engine has no load. This means that the diesel engine must suddenly supply enough energy to the Wind Turbine for starting up.
- Running Wind Turbine together with the diesel engine with no load.
- Running Wind Turbine together with diesel engine on maximum load.
- Running Wind Turbine together with diesel engine and stepping up/down the load in steps of 100 kW.
- Running Wind Turbine together with diesel engine and stepping up/down the load in steps of 10 kW.

All of the above tests were performed in 3 different combinations.

1. A 200 kW Wind Turbine together with a 200 kW diesel engine.
2. A 200 kW Wind Turbine with a 100 kW diesel engine.
3. A 200 kW Wind Turbine with a 300 kW diesel engine.
4. Winds in Marsabit.

Marsabit is located at latitude 2.4° N and longitude 38° E. It is situated on a hilly region of 20-40 km diameter at an altitude of 1000-1500m. This region is surrounded by a plain of 500-1000m. The north and eastern

parts of Kenya receive the harshest of the weather. Sparse rains and hot sun makes this a semi-arid area.



**Marsabit**

The highlands of Marsabit however stand out as an unusually green island in a sea of desert vegetation. The wind regimes experienced here are markedly different to those in the plains. The average annual wind speeds near the town of Marsabit measured by an anemometer beside the Wind Turbine at a height of 10m are as given in the Table 1.

Minimum	3 m/s
Mean	11 m/s
Maximum	23 m/s

Average annual wind speeds.[source REF 1 ]

The diurnal wind variations are also very impressive, providing a high potential for extraction of wind energy. These are shown in Table 2.

Time (Hrs)	Wind Conditions
0000 - 0600	Very High
0600 - 1200	Moderate but Gusty
1200 - 1800	Low and Calm
1800 - 2400	Normal (about 11 m/s)

Table 2: Summary of typical diurnal wind variation.[source REF 1]

This wind regime can probably be explained by the fact that during the daytime (from about nine or ten in the morning to sunset), a wind blows up the valleys as the ground gets heated by the sun, the strength of the wind decreasing through the day as the high ground reaches similar temperatures to those of the low ground. During the night, an air current moves downwards out of the valleys, lasting until morning. The night breeze is more marked than the day breeze.

### 5. Power demand in Marsabit.

The town of Marsabit has recorded a maximum daily power demand of 494 kW achieved during the year 1993. In 1994, a maximum daily power demand of 450 kW was recorded [REF 4]. Power consumption is mostly due to domestic and public lighting and some light industry.

### 6. System description.

As stated earlier, the system consisted of a 200 kW asynchronous Wind Turbine generator, coupled to a 200 kW Caterpillar diesel generator. Three Cummins diesel generators are brought on line as required should the Wind Turbine and the Caterpillar fail to meet the demand.

The diesel generators used, the Caterpillar and the three Cummins, are standard 'off the shelf' generators with the following characteristics.



Picture 2: The Marsabit Wind Turbine with KPLC van in the foreground.

**Caterpillar.**

Rating 320 kVA  
256 kW  
50 Hz.

Generator data 3 phase ac  
10 wire  
WYE - series connection  
400 V ; 462 Amps  
Excitation, 35 Volts, 7.1 Amps  
1500 rpm  
max. temp. rise 105° C.

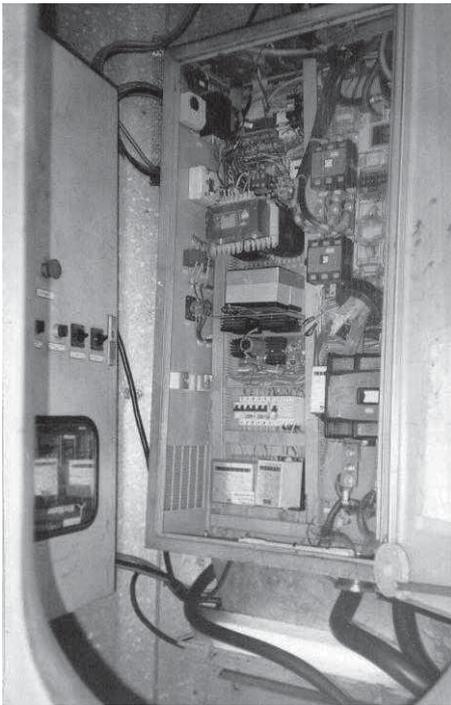
**Cummins.**

Rating 150 kVA  
50 Hz

Generator data 3 phase ac  
415 / 240 V ; 208.5 Amps  
1500 rpm  
p.f. 0.8

## 7. Installation performance.

Wind energy is unpredictable in nature and has subsequently variable power output. To overcome this problem, the WindMaster (Turbowinds) has a hydraulic pitch and yaw control system that allows the Wind Turbine speed to be varied thus allowing for optimum (or sufficient) energy capture. This is achieved using a fast processing P-PID software algorithm that controls frequency (approx. 50 Hz), generator rotations (rpm) and power. The control system tightly couples the blade pitch of the turbine to the anticipated load on the local grid, ensuring that most of the demand is met by wind power.



Picture 3: The electronic control circuitry located in the base of the tower. (Pic. by James W)

## 7.1 The Pitch Blade Control System.

The operation logic of the pitch blade mechanism is as follows [REF 3];

1. High power demand situations - The Wind Turbine electric generator optimises its output and the diesel generators provide the additional power demanded by the grid.
2. Low power demand, high wind situations - The Wind Turbine generator in this case can produce more power than is demanded by the grid. In this situation, the Wind Turbine will pitch its blades until its output matches the demand on the grid. The wind electric generator (via the installed software) observes the frequency on the grid and accordingly adjusts its power output.
3. Low power demand, increasing wind situations - The Caterpillar engine provides sufficient current to meet the magnetisation current of the Wind Turbine generator. Once the wind electric generator is connected to the grid, the diesel engine is stopped allowing the wind turbine to operate in parallel with the smallest appropriate diesel generator on the grid. The frequency regulation will automatically adjust the power output of the connected wind electric generator and diesel engines each time the wind electric generator connects to or disconnects from the grid.

Using this control system, the Marsabit system has been able to achieve high wind penetrations and as low as 3% frequency fluctuations. There have been reports of up to 80% wind penetrations on particularly windy days. [REF 1]

## 8. Economic aspects.

Reports indicate that fuel savings in Marsabit town are to the tune of 18,000 litres per month [REF 2].

Even more could be saved when more demand would be needed during the day. The demand met by the Wind Turbine at the time of writing this demand was 100 kW with the Wind Turbine able to produce 150 kW due to the good winds. This means that even more fuel would be saved in the future because of the growing demand.



Picture 4: Fuel storage tanks for the diesel engines.(Picture by James. W)

The production of the Wind Turbine is 460,000 kwh/year [REF. 2] Assuming the cost of producing 1 kwh of electricity with a diesel engine to be a modest figure of 10 kSh, the fuel savings amount to:

$$\begin{aligned} &460,000 \text{ kWh} \times 10 \text{ kSh/kWh} \\ &\approx 4,600,000 \text{ kSh} \end{aligned}$$

The investment costs involved in installing the AWDS were of the order of

$$470,000 \text{ US\$},$$

## REFERENCES

1. Personal communication with Mr. Swaleh S. Imu, Generation Manager, Kenya Power and Lighting Company.
2. WindMaster (Turbowinds) paper Paper availed after personal communication with Mr. Mohammed, Manager Marsabit KPLC depot.
3. WindMaster (Turbowinds) brochures.
4. Personal communication with Mr. Mohammed, Manager Marsabit KPLC depot.
5. <http://www.turbowinds.com>

## Websites of interest

<b>Link</b>	<b>comment</b>	<b>Who sent</b>
<a href="http://www.green-x.at/">http://www.green-x.at/</a>	...a very interesting programme	G. Nacci
<a href="http://gec.jp/gec/gec.nsf/en/Publications-Reports_and_Related_Books-CDM_Meth_Guidebook">http://gec.jp/gec/gec.nsf/en/Publications-Reports_and_Related_Books-CDM_Meth_Guidebook</a>	CDM Methodologies Guidebook	E. Yandri
<a href="http://gec.jp/gec/gec.nsf/en/Publications-Reports_and_Related_Books-CDM-Manual-2004">http://gec.jp/gec/gec.nsf/en/Publications-Reports_and_Related_Books-CDM-Manual-2004</a>	CDM Manual for project developers and policy makers	E. Yandri
<a href="http://www.solarbuzz.com">www.solarbuzz.com</a>	Also, for those really interested in solar energy, you can subscribe to a newsletter at	A. Peel
<a href="http://www.solarbuzz.com/solarindex/expo.htm">http://www.solarbuzz.com/solarindex/expo.htm</a>	Here, you can look up a listing of companies based on country and type.	A. Peel
<a href="http://www.windpower.org/en/tour/wres/index.htm">http://www.windpower.org/en/tour/wres/index.htm</a>	Here is a very good website about wind energy	B. Guillot
<a href="http://www.greenjobs.com/Public/job_detail.aspx?jobid=167">http://www.greenjobs.com/Public/job_detail.aspx?jobid=167</a>	... they have a mailing list with job postings	A. Antonopoulos
<a href="http://www.erneuerbare-energien.de/inhalt/6465/5982/">http://www.erneuerbare-energien.de/inhalt/6465/5982/</a>	the last (English!) version of the German „act on granting priority on renewable energies“	S. Randig
<a href="http://www.ren21.net/globalstatusreport/RE2005_Global_Status_Report.pdf">www.ren21.net/globalstatusreport/RE2005_Global_Status_Report.pdf</a>	overview of the status of Renewable Energy worldwide in 2005	Edu
<a href="http://www.hydrogencommerce.com/FCHandbook/TechOver1-1FC-Desc.htm">http://www.hydrogencommerce.com/FCHandbook/TechOver1-1FC-Desc.htm</a>	simplified but comprehensive description of Fuel Cells. There are other useful links on the same page about the different types of fuel cells-pros and cons	W. Jagwe
<a href="http://members.tripod.com/~cturare/bio.htm">http://members.tripod.com/~cturare/bio.htm</a> <a href="http://www.btgworld.com/technologies/gasification.html">http://www.btgworld.com/technologies/gasification.html</a>	very useful websites on biogasification	W. Jagwe
<a href="http://www.reeep.org/">http://www.reeep.org/</a>	...there are lists of projects and 3000 members from all over the world doing RE stuff, funding opportunities, etc. The amount of info is pretty staggering.	A. Antonopoulos
<a href="http://www.reegle.info/">http://www.reegle.info/</a>	this is like a google for renewable Energy	P. Chaves
<a href="http://www.pvresources.com/en/software.php">http://www.pvresources.com/en/software.php</a>	PV Sizing / simulation software - Overview	K. Blum
<a href="http://www.resource-solutions.org/policy/TariffHandbook/">http://www.resource-solutions.org/policy/TariffHandbook/</a>	The Regulator’s Handbook on Renewable Energy Programs & Tariffs is a reference guide for regulators involved in the design of renewable energy programs	A. Antonopoulos
<a href="http://www.sefi.unep.org/">http://www.sefi.unep.org/</a>	.. the „sustainable energy finance initiative“, with their directory of financiers for projects:	A. Antonopoulos

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