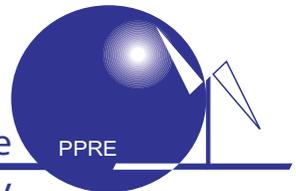




Postgraduate Programme
Renewable Energy



NEWSLETTER



Published by:

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Typesetting & Layout: Tarek Fakih

Printer: Druckzentrum, CvO University Oldenburg - 800 copies

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Dear reader,

PPRE and EUREC/OL are still very alive - even though newsletterwise you have not heard anything from us in 2011. In order to at least partially compensate for this the current 30th issue is larger than ever. As in previous years PPRE application numbers are increasing, on a very high level already: for the second time in a row we received close to 400 applications; and alone the PPRE graduate numbers now surpass 400.

Together with several partner institutions such as Fraunhofer Academy, ForWind and Next Energy, PPRE has already started to develop a *full-fledged blended learning Renewable Energy Master Programme* (mixed face-to-face – online profile), addressing those who have to or prefer to work part-time while studying. The first modules will be presented 2013, the complete programme (120 Credit Points) will not be launched before 2014.

Closely related to this project we are developing preparation / harmonisation modules (both face-to-face and at a distance) for already accepted students to update and upgrade their knowledge and competencies facilitating the inclusion into the PPRE/EUREC batch.

Last year 2 other programmes were launched at Uni Oldenburg, namely the *European Wind Energy Master and the Continuing Studies Programme Offshore Wind Energy*.

Additionally in conjunction with several energy research groups from the physics, chemistry, economy, and computer sciences departments at Oldenburg University we successfully applied with DAAD for a *bi-national PhD programme*. Our partner is the University of Victoria, British Columbia, Canada, in particular its interdisciplinary Institute for Integrated Energy Research. Additional to this project there will be available some scholarships through funding from Oldenburg University and Next Energy. As we know from our recent tracer study more than 30% of PPRE graduates already successfully completed or are still working on their PhD. A Renewable Energy PhD programme integrated into the Graduate School is definitely a well suited complement to education and research at Oldenburg University.

Also in 2011 PPRE lecturers were awarded for the *best professionalisation module* at University of Oldenburg.

Last, but by no means least: We will celebrate *PPRE's 25th anniversary* with a conference on October 1st and 2nd 2012. The conference is titled '*Experts Vision on Renewable Energy 2030*'. In order to discuss energy scenarios from different perspectives we will have experts from various disciplines and working areas.

That means the PPRE-Team is looking forward to see many of you latest beginning of October this year in Oldenburg.

Herzlichen Gruss

E.Knagge / M. Golba & PPRE-team



THE PPRE TEAM

(top fr. left): E. Knagge, H. Holtorf, T. Behrendt, M. Golba, R. Frels
(bottom fr. left): U. Kulschewski, L. Ibing, K. Blum, E. Brudler, A. Günther, J. Rudman

25 Years of PPRE

On the occasion of the 25th anniversary of the Postgraduate Programme Renewable Energy (PPRE) we are pleased to announce the

**International Conference
Renewable Energy 2030 – Experts’ Visions
from 1st to 2nd October 2012
at Carl von Ossietzky University Oldenburg, Germany**

The conference addresses researchers and experts to contribute to the subject of worldwide challenges and perspectives for a sustainable energy supply by 2030.

Main Topics of the conference/alumni seminar will be:

- **Current Developments in Energy Supply Technologies**
- **Capacity Building and Institutional Development**
- **Societal and Economic Aspects of Future Energy Systems**

The conference will be embedded in PPRE 25th birthday celebrations and a PPRE Alumni Seminar, which will be organized with financial support from DAAD.

Info: www.visions2030.uni-oldenburg.de/
E-Mail: visions2030@uni-oldenburg.de

30 YEARS AT THE SERVICE OF RENEWABLE ENERGIES

The photovoltaic array at the University of Oldenburg's "Energielabor" is among the oldest arrays still in operation in Germany. Its 336 modules provide very important measurement data for the current discussion about the lifetime of solar cells. Actual research here is aimed at making photovoltaics a competitive source of energy.

The oldest photovoltaic array still in operation

The "Energielabor" at the University of Oldenburg can be seen as symbolic of Oldenburg's energy research. It was planned back in the 1970s, when the oil crisis triggered a search for new forms of energy. Rather than expanding the use of nuclear power, the Oldenburg scientists set their sights on harnessing the wind and sun as energy sources. The research group "Physics of Renewable Energies" set out to prove that it was possible to run a laboratory powered entirely by renewable energy sources. In 1982, it became the first building to go into operation on the University's Wechloy campus. Until the early 1990s, the "Energielabor" was the subject of almost all research in the field of renewable energies in Oldenburg. Today, the building is used for practical training, lectures and office space. In a few months' time, the "Energielabor" will celebrate its 30th anniversary, but some of its installations have been operating for considerably longer. A number of the photovoltaic panels there have been in use for 36 years – a record time in Germany.

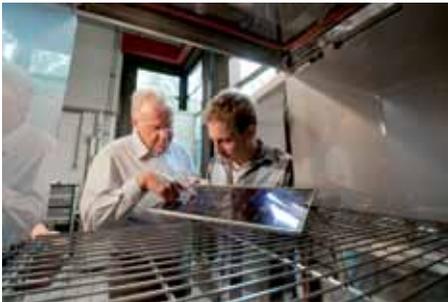
The solar panels were manufactured by the firm AEG-Telefunken under the product name "TSG MQ 36/0". At the time, the electricity company's headquarters were located in Wedel near Hamburg. Over the years, the company changed names several times, passed into the hands of Daimler-Benz and

RWE and now forms part of the technology group Schott AG and is called Schott Solar GmbH. Before the 336 modules with a total rated output of 3.5 kilowatts were installed at the "Energielabor" in 1981, they had already been operating for five years as part of a project funded by the Federal Ministry of Education and Research. Today, the modules at the "Energielabor" constitute the oldest photovoltaic array of such size in Germany..

The "Energielabor" therefore offers ideal conditions for observing the lifetime of solar cells. Because there are hardly any other installations of this size and age in Germany, there is a lack of information about the economic efficiency of photovoltaic arrays. They are generally assumed to have an average lifespan of 25 years. Almost all economic efficiency calculations used for planning the financing of photovoltaic systems are based on this figure. If a photovoltaic array falls short of the operating life guaranteed by the manufacturer, the operator of the system faces considerable financial and economic problems. The solar panels at the Oldenburg "Energielabor" have already exceeded the expected operating life by more than ten years. And they still provide operating data that, on the basis of precise measurements, testify to unaltered quality regarding electricity production.

But what can limit the lifespan of photovoltaic arrays? There are essentially two factors.

On the one hand, the characteristics of the semiconductor materials can alter while the system is in operation. This process is referred to as degradation. The degradation process depends on the materials that are used. For the production of the solar cells at the “Energielabor”, silicon was used: a classic semiconductor metal that is extremely durable and barely changes its characteristics over time. On the other hand – and this is the main factor limiting their lifespan – solar cells need to be protected against environmental influences and connected to the electric system. This entails the use of components such as glass coverings, frames and cable connections which can corrode or crack and therefore constitute the main weak points in a photovoltaic array.



Only careful laboratory measurements can determine the condition of a solar module: scientists examine the solar panel

Photovoltaics: “An energy source with huge potential.”

The quality of a photovoltaic array that has been in operation for some time can be measured in several ways. At first there is the visual inspection, which reveals external signs of aging. Frequent problems are corrosion and bleaching of the cells, the so-called “browning” phenomenon in which the plastic material encapsulating the cells becomes discoloured as a result of UV ra-

diation. Solar panels can also be damaged as a result of bubbles forming in the plastic encasements or degradation of the plastic, as well as cracks in the glass and corroded cables.

But only careful measurements carried out in the laboratory can provide detailed information about the true state of a module. The solar panels are examined under conditions that are precisely defined e.g. as regards amount and spectral distribution of irradiance on the module level, as well as cell temperature. Continuous measurements assessing the total output of the array at the “Energielabor” had indicated that it still had a very good operating performance when compared with the manufacturer’s specifications. In 2010, the researchers of the “Energy and Semiconductor Research Laboratory” decided to investigate further, and in November they detached individual modules and measured their performance in the laboratory.

The results were astounding: providing for the usual deviations from the manufacturer’s specifications, which are aimed at a hardly realistic ideal operating performance, after 35 years in operation the modules still displayed only minimal alterations regarding the key parameters. Both the short-circuit current and the open-circuit voltage were just three percent below the original values, while the fill factor was actually two percent above it. The efficiency, ultimately the decisive factor, was four percent below the values specified by the manufacturer..

Notwithstanding the still high quality of the photovoltaic array in Oldenburg, there have been major advances in the field of photovoltaics since then. The PV modules available on the market today are almost twice

as efficient as the modules at the “EnergieLabor”. And as far as costs are concerned, there has been even greater progress: since the Oldenburg array went into operation, the costs of generating electricity with photovoltaic technology have shrunk to a tenth of what they were initially. And there is still plenty of room for improvement. The intense research and development being carried out at universities, research institutes and in industry will bring further reductions in costs and turn photovoltaics into a competitive energy source with huge potential in ten to twenty years’ time – even under Northern Europe’s limited sunlight conditions.

This is the goal of the research at the University of Oldenburg. It focuses on innovative approaches in photovoltaics that promise to lower costs. One example is thin-film solar cells. The application of thin-film technologies and the sparing use of expensive semiconductor materials are expected to provide a considerable cost advantage compared to crystalline silicon technologies. New approaches to photovoltaic cells based on innovative organic semiconduc-

tors and semiconductor nanocrystals are being combined with established concepts, in particular solar cells made with so-called chalcopyrite compound semiconductors. The activities of the scientists here range from addressing purely fundamental questions regarding materials and components to issues relevant to the practical application of photovoltaics.

In this way the solar cell researchers, together with the other energy researchers in Oldenburg, are forging ahead in the field of renewable energies and helping to design the energy supplies of the future.

The authors:

Prof. Dr. Jürgen Parisi - head of the Energy and Semiconductor Research Laboratory (EHF) at the Institute of Physics.

Dr. Detlev Heinemann is senior scientist at the Institute of Physics and heads the Energy Meteorology group.

Wilhelm Jürgens has worked as an electrical engineer & technician at the University of Oldenburg since 1979. He played an active part in the construction of the „EnergieLabor“ and was in charge of the maintenance ever since.

Robin Knecht studied physics in Umea (Sweden) and Gießen (Germany). Since 2008 he has been a research fellow with the Photovoltaics group. For his PhD Knecht is studying absorber variations in thin film photovoltaics.



The authors of the article in front of the Energy Laboratory (from left): Robin Knecht, Dr. Detlev Heinemann, Wilhelm Jürgens, Prof. Dr. Jürgen Parisi.

THE FUTURE BELONGS TO WIND POWER AT UNIVERSITY OF OLDENBURG

Prof. Martin Kühn is Researching the Relevant Technologies

In 2010 the 'professor of the winds' accepted an appointment at the University of Oldenburg.

Born in 1962, Martin Kühn has made a significant contribution to establishing the wind energy research in Germany.



Prof. Kühn in action

He started studying mechanical engineering at Leibniz Universität Hannover in 1987, at a time when no one was interested in wind power as a source of electricity. There were scientists conducting experiments with gigantic rotors, but they were no use in practice. However, there was still a sense pushing back the frontiers: the first small companies started trying to interest the market in technologies for renewable ener-

gies. Martin Kühn was blown away by wind power: he relocated to TU Berlin to study with one of the pioneers of wind power research in Germany, Robert Gasch.

A fellowship took the scientist to Delft University of Technology in the Netherlands in 1992. There, he discovered the topic which later became his focus: offshore

wind power. In his PhD thesis, he examined how these turbines could be made technically and commercially viable. He took his inspiration from the oil industry which had already demonstrated how stable constructions could be erected at sea. In 2000, Enron Wind GmbH in Salzbergen employed Martin Kühn to help them build a wind farm off the Swedish coast. In 2003, he designed the Arklow Bank Wind Park in Ireland, which at the time was the largest in the world.

After five years in the industry, Martin Kühn returned to academia. In 2004, he accepted the endowed professorship "Wind Energy" at the University of Stuttgart. This was the first chair concerning Wind Energy in Germany. His mission was to turn wind power into an independent subject at German universities.

Since April 2010, he has been the head of the wind energy systems research group. This topic concerns most about understanding wind turbines and wind farms as active, controllable elements in the physical environment including influences like wind, wind farm effects and waves, and as a part of the electrical grid. Work is done on a numerical as well as on an experimental path with strong synergy between both. Numerics can cover the whole range from fast engineering models up to scientific simulations aiming for the full complexity. The experimental validation can be performed on real-size wind turbines and in wind farms "in situ" as well as in a model scale in the laboratory.

One big project is to set up a three-dimensional wind scanner which provides the possibility for accurate measurements of

the wind field in and around large wind farms. The remote sensing technique LIDAR will be used for this.

Together with his colleagues, Martin Kühn wants to enlarge the number of Bachelor and Master courses in the field of Renewable Energies, especially in Wind Energy. Many new projects in education and continuing education are under way. For example the joint Erasmus Mundus Master programme “European Wind Energy Master” or “Continuing Studies Programme Offshore Wind Energy”.

EUROPEAN WIND ENERGY MASTER

The Erasmus Mundus is a programme of excellence of the EU Commission’s Executive Agency for Education Audiovisual and Culture. It supports different courses of study to enhance the quality in higher education through scholarships and academic co-operation between Europe and the rest of the world.

In July 2011, the “European Wind Energy

Master” was approved as Erasmus Mundus programme. The programme is run by the four universities which are world leaders in research and teaching in the field of wind energy: Carl von Ossietzky University of Oldenburg (Germany), Delft University of Technology (Delft, Netherlands), the Technical University of Denmark (Copenhagen, Denmark) and the Norwegian University of Science and Technology (Trondheim, Norway)

The programme will start in the winter semester of 2012/13 and offers the opportunity to study in the quickly growing wind energy sector to 120 people.

The Master course has a duration of four semesters and covers the four specialisations “Wind Physics”, “Rotor Design”, “Electric Power Systems” and “Offshore Engineering”. All students have to attend the first semester at the Technical University of Denmark and then spend the other three semesters at two (or more) partner universities depending on their specialisations.



Prof. Kühn teaching wind energy to his graduate students

The Wind Physics track is taught at the University of Oldenburg and the Technical University of Denmark. "In the wind physics track the students learn how wind power can be used as efficiently and cheaply as possible – depending on the various wind turbine sites and the resulting wind conditions," explains Martin Kühn.

Find more information on:
www.windenergymaster.eu.

CONTINUING STUDIES PROGRAMME OFFSHORE WIND ENERGY

ForWind is developing the first postgraduate study programme for the offshore wind energy sector on an academic level worldwide, presumably: the "Continuing Studies Programme Offshore Wind Energy".

Offshore Wind Energy has become a major driving force for research and is currently developing into a full-size industry sector, bringing together two formerly separate worlds: the maritime and the wind industry. A successful development of the offshore wind sector is closely tied to the availability of qualified personnel. Companies and their staff are facing a lot of new challenges in virtually all aspects of their activities: technically, legally, economically, logistically, and on the management level. The complexity and size of offshore wind farm projects, the speed of innovations, and the dynamic change processes along with the high risks involved are factors that put the jobs of experts and managers on a very high level of responsibility.

Offshore wind has a need for highly skilled specialists with multi-disciplinary know-

how and experience. It offers new job opportunities to personnel from onshore wind and maritime industries, oil & gas and shipping sectors, but also to classically trained engineers, e.g. mechanical, civil or electrical. However, structured and specialized study programme with onshore or offshore wind energy focus are only slowly emerging and will still not be able to meet the market's growing demand.

Therefore, ForWind, the Center for Wind Energy Research of the Universities of Oldenburg, Hanover and Bremen, has teamed up with the Wind Energy Agency WAB, the offshore wind industry association based in Bremerhaven, in a project to develop a new and unique professional part-time course of studies that is adapted to the specific needs of offshore wind energy. The Continuing Studies Programme Offshore Wind Energy will be offering a mix of distance education and classroom teaching. It introduces the students systematically to the technology and the management of offshore wind energy projects. The syllabus will be divided into five modules: Offshore Wind Farm Design, Project Development, Components & Procurement, Logistics & Installation, and Operation & Maintenance..

Short summary of the key facts:

- *Format: the programme is organised on a part-time basis, students stay in their jobs. It is a combination of self-learning periods and classroom instruction.*
- *Degree: Graded university certificate of the Carl von Ossietzky University of Oldenburg.*

- *Duration of programme: scheduled for nine months.*
- *Number of participants: limited to a maximum number of 24 students.*
- *Location: Classroom instructions will be at Bremerhaven and Oldenburg, Germany.*
- *Commencement of studies: The pilot course will start with the first seminar in October 2012.*
- *Course language: English.*
- *Admission requirements: English language proficiency, university degree and/or equivalent professional experience in the wind energy industry, offshore industry or maritime industry.*

Find more information on

www.offshore-wind-studies.com.

PPRE ONLINE - PREMIUM ONLINE QUALIFICATION IN RENEWABLE ENERGY

by Dr. Tanja Behrendt, University of Oldenburg

A new master course is currently being developed in Oldenburg especially for the needs of employed people who would like to study renewable energies in addition to their job. It will be realised within a blended learning concept - a mixture of online and face-to-face learning. It is designed for those who cannot join the face-to-face PPRE and addresses people for whom be-

ing away from their workplace and family for 3 semesters is not possible. The concept allows highly flexible learning, mainly independently of time and space. A few compact face-to-face periods will provide the opportunity for hands-on experience (laboratory courses) and to meet fellow students in person. Overall, the course will take 24 months (incl. master thesis) if studied full-time.

Within a joint project with the universities of Kassel, Hagen and Stuttgart as well as the Fraunhofer-Gesellschaft, Next Energy, ForWind and the Center for Lifelong Learning in Oldenburg, different online courses will be developed and first modules will be tested by 2015. New learning methods with different tools and materials will be researched within this project and used for the successful implementation of the Online Renewable Energy Master. The complete course will be finished by 2017.

TEACHING AWARD FOR PPRE MODULE 'RURAL ENERGY SUPPLY'

In the category "best professionalization module", Hans-Gerhard Holtorf, Michael Golba and Andreas Günther were awarded for their specialization module "Rural Energy Supply" in the Postgraduate Programme Renewable Energy. According to the jury, the practical module boasts an international orientation. The heterogeneity of the student group is seen both as an opportunity and a challenge. In the course, international students with and without previous experience worked on an interdisciplinary task. They were supervised by a faculty team, which included external experts.



PPRE lecturers A. Günther and H. Holtorf (3rd & 2nd fr. right) among winners of teaching awards of University of Oldenburg

The jury particularly looked favorably upon the fact that the work results of the students were presented on a specially designed conference.

The "Preis der Lehre" at the University of Oldenburg has been awarded since 1998 in three categories: specialization module, professionalization module and supervision of scientific research work.

The PPRE students made the award ceremony a very touching event by cheering loudly when Andreas, Hans and Michael were proclaimed winners in their category.

See also <http://www.presse.uni-oldenburg.de/mit/2011/464.html> (German only)

EUREC & PPRE STUDENTS MEET PROF. DAN KAMMEN FROM WORLD BANK

by Craig Wong, USA, EUREC 2007/08

The PPRE and EUREC class of 2010-12 had a fantastic opportunity to meet with Professor Dan Kammen over a light-hearted dinner hosted by the Hanse-Wissenschaftskolleg (HWK) in Delmenhorst. The dinner was held at HWK, during which the students had the opportunity to speak to Mr. Kammen and other distinguished professors: Timothy Shaw from the University of South Carolina, and Reto Weiler and Wolfgang Stenzel from HWK.

Professor Dan Kammen is the World Bank Group's Chief Technical Specialist for Renewable Energy and Energy Efficiency. He

is currently taking a leave of absence from the University of Berkeley California, where he is the Director of Renewable and Appropriate Energy Laboratory (RAEL). Kammen advises the United States and Swedish Agencies for International Development, the World Bank, the American Academy of Arts and Sciences, the African Academy of Sciences and the President's Committee on Science and Technology, and is a member of the Intergovernmental Panel on Climate Change.

Kammen was particularly interested in the PPRE because he noted that there are few programs like this in the world, in which students from a truly diverse background come together like a family and work to solve the world's resource, energy, and social equality issues. One such program is the RAEL, and another is the PPRE program in Oldenburg.

Thanks to Hanse-Wissenschaftskolleg for hosting the meeting and providing great food and drinks, and thanks to Dan Kammen for sharing his experience and knowledge about making positive impact on the world.

BIOGAS COMPACT WORKSHOP 2011 AT THE UNIVERSITY OF OLDENBURG

“Topics covered: Biochemistry, Project Planning and Mass Dissemination for Domestic Biodigesters in Developing Countries.

For the 6th time, the international biogas workshop on domestic biogas technology for developing countries and its mass dissemination took place at the University of Oldenburg. The workshop is an integrated

part of the master course *Postgraduate Programme Renewable Energy* (MSc).

Apart from the 22 students of the current batch, another 35 participants applied from all over the world. Besides 15 international students from the master course SESAM at University of Flensburg, we welcomed experts from NGO's like HIVOS, Norwegian Church Aid, PIN and UNFCCC as well as students from the Universities of Leipzig, Aachen, Hagen, Stockholm and Udine.

The opening address was given by the Dean of the Faculty of Science and Mathematics of the University of Oldenburg, Prof. Dr. Martin Holtaus.

The workshop started with an extended morning and afternoon session on the biochemical processes of anaerobic fermentation presented by the expert on biochemistry Henri Spanjers from Leaf (<http://www.leaf-water.org/UK/>).

The afternoon session offered group work with software analyzing the status of the fermentation process depending on various parameters.

The second day was dedicated to technology of domestic bio-digesters, their construction, quality of bio-slurry, benefits on hygiene and health, soil protection, household labor saving, and other benefits like employment creation presented by Felix ter Heegde from SNV (<http://www.snvworld.org/en/pages/default.aspx>).

With more than 15 years of experience in this sector, dedicated to generate national biogas programs in south-east Asia, he is now working as senior biogas advisor in East Africa.

Widening the perspective for digesting manure from cattle and other livestock to improve living conditions in farmers' households, a presentation on fermenting urban waste was given by Camilo Wilches, PPRE alumnus, working for Biogas-Weser-Ems (<http://www.biogas-weser-ems.de/en/index.php>).

On the third day the long-term experience in biogas programs was presented by means of focusing on success factors for "viable domestic biogas programs". It included aspects on economy and Clean Development Mechanisms on national scale. These topics were highly welcomed by the participants.

Practical units on gas stoves and gas lamps as well as experiments on flow patterns within the digesters completed the overall experience gained in the workshop.

Outlook:

From year to year, the contents of the program are developed further, and the participants' comments are taken into con-

sideration. Consequently, the plans for the workshop in 2012 will probably lead to

- more time discussion
- an external laboratory/practical part
- extended sessions on CDROM
- extended sessions on mass dissemination
- a session on usage of biogas CHP for power production.

To cope with the participants' interest in active participation and group work, we will organize software licenses for the biochemistry sessions in adequate numbers. Moreover, the workshop will be extended to a 4-day event.

Presentations are available at:

<https://sites.google.com/site/biogas4all/documents>

<http://www.ppre.uni-oldenburg.de/51154.html>



Participants of Biogas Workshop 2011 at Uni Oldenburg

EXCURSION TO BIOGAS PLANT

by Juan Luis Ramos Suárez, PPRE 2009/11

In 2010 the PPRE students organized an excursion to visit a biogas plant located near Vechta (Niedersachsen, Germany), constructed by *Weltec BioPower*. *Weltec BioPower* was created in 2001, employs more than 65 people and has worked in more than 30 countries including Asia, North America and Europe. *Weltec BioPower* plans, sells, supplies and erects biogas plants made of a special material – stainless steel – and has erected more than 200 plants. During this visit we were kindly attended by Thomas Wilkens (Marketing department) and Uwe Schröder (Dipl. Biologist).

The visit started with a presentation by the company, including a very interesting session of questions and answers about technical and economical aspects of the financing, planning, construction and maintenance of a biogas plant project.

After this short session, we visited the laboratories of the company, where different experiments are carried out (e.g. fermentation tests), as well as the online control and effluent analysis of some of the biogas plants that the company constructed.

Finally, we left the headquarters of the company to visit the biogas plant. Although this plant was built by *Weltec BioPower*, it is owned by four farmers. In order to feed the digesters, they need to grow 350ha of maize. The initial investment costs were around 2.5 million EUR, but the plant was expanded later

The plant consists of two digesters of 1800 m³ each, which co-digest pig manure and maize silage. One pre-storage tank is need-

ed to store the liquid pig manure and a post-storage tank is needed as well to store the digestate coming out of the digesters. The total power of the plant is around 900kWe and in order to take out the most of the waste heat of the engines (therefore it works as CHP), it has three different engines: two of 190kW and one of 500kW, the formers installed 500m and 1km from the digester.

The waste heat from the engines (they work as CHP units) is used to heat up the digesters that work in the thermophilic range (at 49-50°C), a pig house near the digesters, two houses and a drying system used for cereals and other materials. It is really important to use the waste heat for the economics of the plant, since the price of electricity generated increases when it works as



The two biodigesters, prestorage tank of manure and dry feeding systems. Some of the students and Mr. Thomas Wilkens (right)

CHP, paying one more cent of euro per kWh. The price per generated kWh oscillates between 21-24c€/kWh depending on the size of the engine.

Another important point to make the process environmentally friendly is the use of the digestate for growing the maize that will be introduced later in the digesters. The utilization of the digestate reduces the amount of chemical fertilizer needed substantially, and therefore decreases the global CO2 emissions of the whole process.

Finally, it has to be considered that, although the installed power is low comparing it to PV power plants or wind farms, it has to be taken into account that it is constant all over the year, whereas in PV power plants or wind farms the installed power is normally very high but the mean power during the year is much lower.

PPRE CHALLENGE 2011

by Alvaro Ramirez, Colombia, PPRE 2009/11

Oldenburg, 13 Jul 2011. Sports are back to PPRE. For the fourth time PPRE students face staff members on unrivaled sport battles for victory.



The staff and alumni team



The students' team

The contenders first faced each other on a beach volleyball match in teams of 4. The game was tough, there was sand flying everywhere, balls came and went in a

matter of seconds. At some moments the students felt in trouble when facing such volleyball-star-players in the staff team as Udo Kulschewsky and Edu Knagge which didn't make the game easy for the students. Finally the students' team imposed their strength and will over the staff, which led them to win 2 out of 3 games. Victory for the students!

The volleyball game was followed by a very exciting football match. The weather was gloom, the players hungry of victory, and the stakes high. Both teams lined up in their own side of the pitch, black uniform for the staff and alumni team and white for the students. The first half of the game was characterized by a series of attacks by each team on their opponents' ground. No real dominance of one team against the other could be seen, and the wet grass and ball didn't make it easier for anybody. The second half started pretty much in the same fashion as the first, until a fabulous play started at the middle of the pitch between Orlando Venegas and Miguel Piñera led the student team to the first goal (42') of the game by Orlando. Unfortunately for the students, less than

one minute after goal, Burak Türker, from the staff and alumni team, took advantage of the celebration mood that the students were still under and scored the second goal

(43') of the game. The balance equaled 1 to 1. The game continued with an even fiercer and more determined stance from each team, no one wanted to give even the slightest chance to their rival. The clock kept on running, and at one moment it looked as if the game score wouldn't change, until a nice pass from Edu came in the direction of Dr. Detlev Heinemann, very close to the student's goal, where he made use of his best moves to score a beautiful goal (58') that led the staff and alumni team to victory just two minutes before the final whistle.

In the end, the highest gain was watching both parties enjoy the games and uniting later in a barbecue offered by the staff, letting everyone know that the only winner is PPRE itself.

Word of advice for the 2011-2013 batch, start training soon, otherwise you won't have an easy task against the staff in next year's jousts. But above all, enjoy your stay here!

NEW COORDINATION OF INTERDISCIPLINARY ENERGY EDUCATION AT UNIVERSITY OF OLDENBURG



The University of Oldenburg established a new post for the Coordination of Interdisciplinary Energy Education in February this year. We are happy to announce that Evelyn Brudler (PPRE 04/06), who has worked for PPRE

since 2006, has taken on this position.

With the creation of this position the University of Oldenburg wants to bundle its competences in the sector of education related to energy.

The aim of this post is to consolidate activities at the University of Oldenburg to develop concepts in education which enables students, based on the targets of the Bologna Process (http://ec.europa.eu/education/higher-education/doc1290_en.htm), to tailor their personal educational profile: Elements of this concept will be e.g. varying international joint programs, elective courses, studying single semesters or tak-

ing courses abroad with the guarantee of a formal recognition within the educational program.



The university's activities target is to give open access within the different areas (e.g. economics, sustainability, informatics, and others) to lectures and laboratory facilities in different departments. Such activities are already under development.

Moreover, the university is in the process of developing levelling courses which will be able to be offered as e-learning units in order to meet the demand and challenge of bringing together international students from different professional backgrounds and educational systems.

A newly established homepage will compile the programs on Renewable Energy Education spread over several departments and showing differing aspects on an integrated view of renewables in society (www.energie-studieren.uni-oldenburg.de/).

The activities on education and training are carried through by ENERiO (www.enerio.de). ENERiO represents the University of Oldenburg's en-



ergy research groups, institutes and centres.

BINATIONAL PHD PROGRAM RENEWABLE ENERGY

Within the DAAD program "International Doctorates in Germany", the University of Oldenburg initiated the bi-national PhD program "Renewable Energy" in cooperation with the University of Victoria, British Columbia, Canada. The current program is funded until end of 2013. It does not provide scholarships but students can be funded through projects of the respective

research groups at both universities. Candidates from developing countries are eligible for DAAD scholarships.

The official Kick-Off Meeting took place in Victoria from 16th to 18th November, 2011. Several researchers from both universities presented their research and discussed possible joint research projects. Both partner universities see the PhD Program as a start for a long-term cooperation which should be extended to further partner universities in the future.

Program Aims and Features

Main aims of the program are innovative subject-related research projects, a structured doctoral training program as well as internationalization of the education. An important aspect of the program is research in interdisciplinary and transdisciplinary contexts which will be ensured by way of joint events, such as an annual compact seminar, field trips, colloquia, methodology seminars, etc.

Core features of the program are research stays of students at the partner university as well as an annual summer school which will be organized alternately in Oldenburg and Victoria. Student supervision is ensured by a thesis committee - made up of the main supervisor and two further supervisors, one of which should preferably be from the partner university.

Cooperation Partner

At University of Oldenburg, several research institutions are involved in the cooperation. Beside research groups at the Institute of Physics (TwiSt - Turbulence, Wind Energy and Stochastics, Wind Energy Systems, Photovoltaics, Energy Meteorology), NEXT ENERGY (Energy Research Center), OFFIS (Institute for Information Technology) and

the Department of Ecological Economics are involved in the program.

The cooperation partner in Canada is the Institute for Integrated Energy Systems (IES-Vic, www.iesvic.uvic.ca) at the University of Victoria (British Columbia). IESVic's mission statement is:

"To Chart Feasible Paths to Sustainable Energy Systems". Its big picture approach to sustainable energy research is unique due to collaboration between mechanical engineers, economists and environmental scientists. Students get hands-on experience, examining entire sustainable energy systems – from harnessing, storing and converting energy sources to delivering end-user services. Involved Research Departments are the Department of Mechanical Engineering, the School of Environmental Studies and the Department of Economics.

Research Areas

The research can be divided into three groups:

- *Conversion and storage of renewable energy sources*

Research is based on the scientific methods of physics, chemistry and engineering sciences including the topics Wind Energy Systems, Thin Film Photovoltaics and Energy

Storage Technologies.

- *System integration and management*

System integration and management research is mainly based on modeling and characterization methods, computer science, meteorology and nonlinear dynamics (physics). The research focus is on two areas: Smart Grid and Demand Side Management as well as Resource Assessment and Modeling.

- *Societal acceptance and political-economical framework*

This research area addresses the important and sensitive economical, political and environmental dimensions, when it comes to Renewable Energy. And in particular emphasizes the need for an interdisciplinary approach, including various techniques from economics or qualitative social research.

Further Information and Application

For further information and details on the application procedure please visit our website www.phd-renewable-energy.de or contact the project coordinator Andreas Günther (andreas.guenther@uni-oldenburg.de).

THE DEVELOPING SUSTAINABILITY NETWORK (DEVSUS) AT THE UNIVERSITY OF OLDENBURG

Since 2009, researchers and students from six partner universities collaborate within the network Developing Sustainability, situated at Carl von Ossietzky University Oldenburg, Center for Environment and Sustainability Research COAST. Based on an integrated approach with its core themes "Renewable Energy", "Biodiversity, Land

Use, Marine and Coastal Management", and "Sustainable Enterprise & Environmental Management Information Systems", the network develops the thematic interlinkages between these fields and facilitates the exchange of experiences, knowledge and concepts in research and teaching.

The Network with its partner institutions in

South Africa, Tanzania, Mexico, Indonesia, Cuba and Germany focuses its activities in teaching and research on ensuring environmental sustainability according to MDG 7. The project is funded by the German Academic Exchange Service (DAAD).

The partner institutions of the University of Oldenburg within this Network are:

- Nelson Mandela Metropolitan University, Port Elisabeth, South Africa (NMMU)
- University of Dar es Salaam, Tanzania (UDSM)
- University of Quintana Roo, Mexico (UQR)
- Central University of Las Villas, Cuba (UCLV)
- Institut Teknologi Sepuluh Nopember, Indonesia (ITS)

For more information please visit <http://devsus.uni-oldenburg.de/>

RESEARCH VISIT FROM PARTNER UNIVERSITY IN MANAUS / BRAZIL

Three researchers – **Márcia Drumond**, **Alessandro Bezerra Trindade** and **Fernando Rodrigues Souza** - from the Amazon Region Energy Development Center (CDEAM) from the Federal University of Amazonas (UFAM, Manaus) visited Oldenburg University and the PPRE program from December 3rd to 10th, 2011.

The visitors had the opportunity to get an insight into some Renewable Energy related research activities in Oldenburg. The first station was Next Energy, the joint research

center between Oldenburg University and EWE, the local energy provider. Especially the presentation of the fuel cell activities was appreciated by the visitors as CDEAM/UFAM is going to install a fuel cell in their research laboratory during the next months. At the Energy Meteorology group, Detlev Heinemann presented the research activities, especially the in the area of prediction of solar and wind energy. Finally, the Photovoltaics group was introduced by Maria Hammer who presented the research lab and explained the main research activities in Thin Film Photovoltaics.

Udo Kulschewski, PPRE lab coordinator, gave an overview about the experiments which are conducted by the PPRE / EUREC students during the first semester. This included fundamentals of wind or solar energy, energy storage and fuel cells. In order to get a deeper insight into the student's work, the Brazilian researchers got the opportunity to perform the PV cell experiment.

An excursion to Renewable Energy sites close to Oldenburg completed the program. The first site was the new Solarpark Fliegerhorst in Oldenburg which is a PV power plant placed in a discontinued military base. The plant was scheduled to be finalized before end of 2011 with 14MW installed power from 59.136 solar modules.

The second company visited was Biogas Weser Ems in Friesoythe that projects biogas plants around the world (280 until now). Two former PPRE students who are currently employed by Biogas Weser Ems – **Camilo Wilches from Colombia** and **Juan Pablo Montoya from Venezuela** - introduced the company as well as a 250kW biogas plant on a farm nearby.

During the final day, the future cooperation between PPRE and CDEAM was discussed with Michael Golba (Managing Director

PPRE). It is expected that CDEAM will start a Master Course in Renewable Energy in 2012 which provides a good opportunity to strengthen the cooperation with the PPRE program.

The visit was finalized with a presentation

from CDEAM researchers to the PPRE and EUREC students. The presentation included the infrastructure, the skills, past and actual projects of. The students were invited to Manaus in order to write their Master Thesis.

3RD DAAD NETWORK MEETING OF THE DEVELOPMENT-RELATED POST GRADUATE COURSES

A short & personal résumé given by Isabela Aroeira, Brazil, PPRE 2010/12

As a representative of PPRE/DAAD scholarship holders I was participating in the „3rd Network meeting of the Development-related Post Graduated Courses“ in Bonn on the 14th and 15th of April 2011. We were 28 participants in this meeting, coming from 26 different Post Graduation Courses. The meeting consisted on discussions about the „Millennium Express“, which is a series of events organized by DAAD students.

Besides this experience sharing about organizing events, another activity that took place during the meeting was the discussion about the closing conference of the Millennium express, which is also the 25th anniversary of the overall funding scheme of the development related Post Graduation Courses.

The students were organized in 5 different groups and we were asked to suggest topics to be discussed during this last event. The topics were related to our studies in Germany in general, such as our expectations, challenges and chances, the difficulties of re-integration and going back home and also interculturality and how it affects the learning process.

The whole meeting was about the Millennium express and its closing ceremony, so

you can imagine how tiring it was for everyone, especially for the ones not involved in the organization. I noticed that this feeling was general.

As my feedback to DAAD about the meeting, I suggested to them to take the opportunity of gathering such a multicultural and multitechnical group, that they should give us themes with special relevance to developing countries to look at in groups, like Water, Land use, poverty and of course ENERGY! I believe we would have interesting and different points of view.

The final destination of the Millennium Express will be the Conference **“25 Years of Development Related Postgraduate Courses”**, which will take place from 31.05. – 02.06.2012 in Bonn, Germany.

Further info and registration at:

http://www.daad.de/entwicklung/studierende_und_alumni/veranstaltungen/19064.en.html

ENERGY AND ENVIRONMENTAL MANAGEMENT WORK AT FLENSBURG UNIVERSITY

by Mehari Siltan Beyene, Eritrea, PPRE 2011/13

The Flensburg Motto Workshop was held under the title “Energy and Environmental Management - Science meets Business” from the 24th to 25th of September, 2011 at the University of Flensburg. It was held as part of the 6th Millennium Express Workshop, sponsored by DAAD – the German Academic Exchange Service. It was organized by a team of MSc-students of Energy and Environmental Management (EEM) of the 2011/2012 academic program at the University of Flensburg. During the two-day workshop, different research papers were presented by intellectuals from different areas of expertise. A lot of experiences

Prof. Hohmeyer of the University of Flensburg presented a research paper titled “100% Renewable Electricity: a possibility?” It deals with how it is possible to have almost a 100% renewable energy in Europe using interconnected grid systems to transport energy from one country to another. Other topics included financing of renewable in correlation with increasing energy demand and CDM (Clean Development Mechanisms).

Also Mr. Varun Gaur, India, PPRE 2011/13, presented a report on “Successful Off-Grid Solar Programs in Asian Regions (India, Bangladesh, and Laos)”.



From left to right: Mehari Siltan Beyene, Eritrea; David Thamaini Kigima, Kenya; Varun Gaur, India; Daniela Vega Alzate, Panama; Karakoz Nurmukhanbetova, Kazakhstan.

were gained in areas of technical efficiency in renewable energy, energy sustainability, project management in energy sector, energy oriented researches, and possibilities of 100% renewable energy systems.

A team of the PPRE 2011/13 students from the University of Oldenburg consisting of Mehari Siltan from Eritrea, David Kigima from Kenya, Daniela Vega from Panama, and Karakoz Nurmukhanbetova from Kazakhstan presented a project titled “Opti-

mization of Greenhouse Farming using Photovoltaic Panels". The project indeed got a huge support of the participants, showing that shifting from fossil fuel dependency to renewable energy technologies is the sole option for guaranteeing sustainable and wholesome development of societies in the world. Moreover, the new PPRE 2011/2013 group believes that it has exerted a lot of effort to come up with a tangible project in the area of renewable energy.

The project I am working in is called Solar Energy for Sustainable Agriculture. Objective of the project is to investigate the suitability of applying photovoltaic cells in Greenhouse farming. For this project, a sample of half an acre of farm land, i.e. about 31 meters by 31 meters, is considered (where a case study of Kenya/Eritrea is taken). Estimated initial cost of the project is about 1600 Euros, without including the costs of photovoltaic cells and accessories.

RENEWABLE ENERGY FOR SUSTAINABLE DEVELOPMENT OF INDONESIA AND GERMANY (RESDIG)

by Chayun Budiono, PPRE 1992/93

Introduction

Within the context of the German Week program initiated by the Ministry of Foreign Affairs, the Federal Republic of Germany, German Alumni in Surabaya with supports from DAAD, GIZ and Goethe Institute organized a two-day seminar on renewable energies and a two-day field-trip to some renewable energy projects/installations.

Background

Indonesia is currently facing a very tough economy and the challenge of increasing oil price. The demand for energy, particularly for oil, coal and gas, is ever increasing and will remain essential for the near future.

Furthermore, Indonesia is also actively engaging in environmental conservation to ensure sustainable development of the country. The President of the Republic of Indonesia, Dr. Soesilo Bambang Yudhoyono, in front of G-20 Forum at Pittsburgh – USA in 2009 committed to make a 26% cut in its greenhouse gas (GHG) emissions by 2020

(as against projections of business as usual "BAU" emissions). With the right level of international support, Indonesia can even cut 41% of its emissions, which would in turn deliver nearly 7% of the cuts called for by the Intergovernmental Panel on Climate Change (IPCC). This has forced Indonesia to seek the opportunities of developing a clean and sustainable energy program to respond to Indonesia's energy challenges on the one hand and environmental consideration on the other hand.

Through the cooperation and shared experiences between Indonesia and Germany in renewable and sustainable energy, a common future benefit can be foreseen. The scope of cooperation may include but is not limited to energy conservation, improving energy efficiency and encouraging development of a variety of clean energy sources, be it solar, biomass, and hydro.

This event is also expected to encourage dialogue among stakeholders, nations, government and private sectors to build trust and work together



Participants of RESDIG 2011 in Surabaya, Indonesia.

Program of the Two-Day Seminar

- Understand current policy issues and program for RE and sustainable energy development
- Learn about the technical achievements on various RE energy technologies and needs for improvement
- Uncover various hidden barriers for RE energy project and market development
- Improve future energy project development, market penetration, management approaches, and initiative for cooperation
- Generate private investment, public-private partnership and generate awareness of banking sector on prospect for clean energy project financing
- German-Indonesia Cooperation issues related to RE education, research and development (e.g. Cooperation between University of Oldenburg – UO and Institut Teknologi Sepuluh Nopember – ITS on Post Graduate Program in Renewable Energy,)

Field Trip

A two-day field trip covered the following visits:

- Watoetoelis Sugarcane Factory (WSF) in Mojosari. Participants learned how sugar-

cane is being processed and the old factory is able to run the process independently using the biomass waste generated from the process

- Visit to Seloliman, an agriculture village with green scenery and rice-field terrace. Participants learned about two tiny micro-hydro plants that have been operated and managed by a community of Kalimaron (PKM) since 1994. This project was initially sponsored by the German Embassy of Indonesia.
- Visit to Cocoa and Coffee Research Center (CCRC) in Jember. Participants learned how cocoa and coffee are processed. Similar to KACF, they also saw how the mixed renewable energy sources, i.e. solar-thermal, biomass, biofuel and biogas, are being used for the production process. Currently, CCRC has a cooperation with Hohenheim University on biofuel development.



Visit of Seloliman MHP-Plant

Attendance

The attendance of the event in terms of professional background can be classified as follows:

- Decision makers and administrators responsible for energy program and projects
- Experts related to Renewable Energy Technologies; e.g. biomass, small-hydro, solar PV & solar-thermal
- Energy system technologies Researches, Vendors, and Manufacturers
- Professional Association and related non-government organization (NGO)
- Engineering Procurement Construction (EPC) enterprises and RE System Integrators
- Project Developers and Project Owners

In connection with the German and Indonesian context, the participants can be divided into:

- Daad alumni
- German alumni (Indonesian citizens who graduated from German schools or universities)
- General participants

Total of participants registered during the two-day seminar is about 150 people, in which about 40 participants are German alumni. The majority of the alumni are from Oldenburg University (8 people), Flensburg University (4) and TU Berlin (4). The remaining come from various German universities like TH Aachen, Uni Padeborn, Uni Dortmund and Uni Muenster.



PPRE Alumni at RESDIG 2011 (fr. left): Rosyid, Bachtiar (both Indonesia), Boon Jin (Malaysia), Faraida (Indon.), H. Holtorf & E. Knagge (Oldenburg), Santoso, Budiono (Indon.)

2nd INTERNATIONAL CONFERENCE ON THE DEVELOPMENTS IN RENEWABLE ENERGY TECHNOLOGY (ICDRET)

and German Alumni Energy Expert Seminar for South and South-East Asian Countries, Dhaka, Bangladesh (5th – 11th January, 2012)

Shahriar Ahmed Chowdhury (PPRE 2004-06) has initiated the bi-yearly International Conference on the Developments in Renewable Energy Technology (ICDRET, www.icdret.uiu.ac.bd) in Dhaka, Bangladesh.

The first event was held in December 2009 with technical support from the Institute of Electrical and Electronics Engineers (IEEE), USA, and with co-operation from Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. The second event was held from January 5th to 7th, 2012. The event was organized by United International University, Bangladesh, and Co-organized by PPRE, University of Oldenburg, Germany, Centre for Energy and Global Environment of Virginia Tech State University, USA and

to exchange the ideas on implementation and dissemination of renewable energy technology in different parts of the world, with particular interest in the South Asia region. The scope of the conference is not limited to technology only; it also addresses the economic and sociological aspects of renewable energy. The conference is a forum for sharing experiences, exchanging the views from different tiers of this sector and helping to forge a long lasting bond between academia, industry and the people involved in the dissemination of the technology at the grass roots level. 102 research papers were presented in the second ICDRET and the participants of the conference were from 22 different countries of



Inaugural ceremony of the ICDRET 2012 and the German Alumni Expert Seminar (Shahriar speaking)

Kathmandu University, Nepal.

20 local and international organizations involved in renewable energy has supported the event as sponsors and co-sponsors. The bi-yearly ICDRET is organized with a view

five continents (Asia: Bangladesh, India, Pakistan, Nepal, Sri Lanka, Singapore, China, Malaysia, Indonesia, Vietnam, Thailand, Iran, UAE, Yemen; Europe: Germany, Norway, UK; North America: US, Canada; Australia: Australia; Africa: Sierra Leone, Gambia).

Cooperations

Shahriar has also organized The German Alumni Energy Expert Seminar for South and South-East Asian countries in co-operation with PPRE of University of Oldenburg and Energy and Environmental Management (EEM) of University of Flensburg with the financial support from German Academic Exchange Service (DAAD). The alumni expert seminar was held in United International University in Dhaka, Bangladesh from 5th to 11th January, 2012. The expert seminar consisted of participation in the ICDRET from 5.1.2012 to 7.1.2012 and a DAAD alumni energy expert seminar from 8.1.2012 to 11.1.2012. The ICDRET was open to researchers and professionals in the field while the alumni seminar was exclusively

reserved for alumni who have studied in Germany. 26 scientific participants (alumni of German higher educational institutions) from 10 South and South-East Asian countries and 6 resource persons from Germany contributed to the energy seminar. 10 technical papers and 10 country reports were presented on the first two days of the seminar. The third day included a visit to a PV panel assembling plant and also to a battery manufacturing plant. The final day had a seminar for alumni networking and then the seminar concluded with the certificate giving ceremony. There were also four invited talks on the current technology and local progress in the Renewable Energy sector.



PPRE alumni participants (fr. left): Shahriar Ahmed Chowdhury, Evelyn Brudler, Iresha Somarathna, Yin Zhang, Abdul Mohaimin Mahmud, Hans Gerhard Holtorf, Md. Motaher Hossain, Ibrahim Ahmed Shafi, Sunil Prasad Lohani, Shamsundar Subbarao, Palitha L.G. Kariyawasam & not in picture: Ahmad Jahir Khan, Jorifa Khatun.

EXPERIENCE FROM WAY UP NORTH (NORWAY)

by Michael Norton, EUREC 2010/11

The arctic – not a place which would immediately evoke thoughts of solar power in your mind. More familiar perceptions could be snow-covered mountains, icebergs, reindeers, polar bears and maybe even Santa



Michael enjoying the Fjords view

Claus. Let me introduce to you to the world of photovoltaics in the high north and even above the Arctic Circle. I am currently working on my master thesis project with Norut, northern research institute. The renewable energy offices are located in Narvik, northern Norway. The photovoltaics team here consists of 10 people working on topics varying from anti-reflective coatings to module lamination. Co-operation from the local photovoltaics industry keeps the research here focused on industrial applications. The local PV industry is significant. Innotech solar, also located in Narvik, can boast a motto “greener than green” because they take off-spec cells PV from production lines across the globe, apply their patented repairing techniques and use the cells to make fully functioning PV modules. REC scancell, another local solar cell producer, commenced manufacturing in 2003 and now has a 225 MW capacity. Not far away, across the border in Guillivare, part of the Swedish Lapland, Eco Supplies Solar AB owns a 45 MW capacity facility.

My master thesis project is on the design and planning of a 20 kWp solar tracking and module test plant in Pitea, Sweden which will be owned by Pite Energi. Pitea has a particularly suitable climate for PV with its low temperatures and boasts more sun hours than Freiberg, Germany. The plant will test single and dual axis, optical and astronomical solar tracking systems combined with various PV cell technologies. The facility will demonstrate solar energy is feasible in high northern latitudes and may also give field data on module output and cell technology performance in cold climates. Pite Energi will use this plant as a reference for technology choice for future MW installations in the area.



Michael catching a big fish

It's not all work up North. If you're fond of the outdoors Norway is the place for you. The country is covered in mountains whose valleys resting in fish filled fjords. Summertime in Narvik means you will have to get used to sleeping in daylight. The midnight sun lasts

from late May to mid-July. This is a great opportunity to go out and join the Norwegians for a spot of fishing or maybe even some rock climbing at any time of the day or night. Let's hope the winter is as kind. The northern lights should appear in October and the ski lift will open when the snow comes, so there is something to look forward to before the sun completely disappears!

M.Sc. PROJECTS WITH GIZ IN MOZAMBIQUE

by Sandra Chavez and Juan Pablo Villa, PPRE 2010/12

Mozambique is located in southern east site of the African continent. Statistics define it as a country of 22 million inhabitants where 54% live under the national poverty line, making it one of the poorest countries in the world. Energy-wise, even when the country has plenty of resources, the current production only reaches 11% of the population.

Nevertheless, our impression of Mozambique from the first day was that it is a land full of people with big smiles and even bigger hearts, paradisiacal landscapes complemented by exotic fruits and of course delicious sea food.

Our adventure started when we accepted two projects from GIZ AMES-Mozambique: Juan Pablo, preparing the bases for an Excellence Center on Hydropower and Sandra, designing a battery charging station for rural electrification. When we finally arrived to Maputo, our first surprise was how easily we could communicate since our languages are very close (Spanish and Portuguese).

We were also glad that we got the opportunity to visit the traditional handcraft market and try some excellent “Peixe com coco” at the fish market. Our next stop was our final destination, Chimoio, the capital of the Manica province.

From the first moment life stroke us as much simpler and relaxed than in the big cities. The welcoming at the office was very warm and we found kind and enthusiastic coworkers that have been helping us during this time.

Juan Pablo: My project has taken me to meet people from the universities, governmental agencies, NGO's, private companies and so on with whom I had regular meetings, and, even though they have very different backgrounds and roles, they all showed the same willingness to contribute to the project in any way they could. The experience was amazing and taught me a lot about the group dynamics that need to be considered when planning a multi-stakeholder project.

Sandra: Since the first week I was directly in the field; it was a real adventure to visit rural communities in Mozambique, roads in bad condition and communities completely isolated make every journey a new story. All this is worth it when you see the underprivileged conditions in which the people live and how they are kind and always cooperative with my work. They always have time to answer my questions and share a moment with me.



Sandra giving classes to university students



The smile is contagious

I am very glad to have this opportunity, I am learning a lot from them.

We also found out that our work is not limited to our projects; we have been involved in seminars given to students of the local universities in renewable energies, and also, along with our direct supervisor from GIZ, we have done some community service by helping an orphanage during the weekends. Even though we spend most of our time engaged in tasks related to our projects, we push ourselves to use every bit of spare time to travel and see the country, which has proven to be a great way to enhance our experience as Mozambique has amazing destination for tourism, whether you are looking for a place to rest or an adventure trip to see wildlife.

We know Mozambique is a great place to work, travel and to experience, our few weeks here have shown us that, we really thank PPRE for giving us the opportunity to be here and we are very excited to discover what the remaining time here will show us of this amazing place!



Goodbye to our supervisor Hans Holtorf

INTERNSHIP EXPERIENCE IN SOUTH AFRICA

by Isabela Aroeira, Brazil, and Alan Kwan, USA, PPRE 2010/12

Isabela: When I first heard about the 2-month internship as part of the PPRE course, I thought it was a really small

amount of time, and I could not get anything done. Only the first part was true. My time as an intern flew.

I had the opportunity to go to South Africa and work for Genergy, a solar collector company in Port Elizabeth. I was looking for professional experience, and of course, a little bit of “solar energy,” as the winter in Germany was not a piece of cake. What I found was much more than that, a beautiful and really diverse country (and I mean it! 11 official languages!) with a rich culture. It was a real life experience, with some great challenges and “hands on.” Thank you PPRE staff and Genergy for the great support.



Isabela and Alan mounting a solar energy system.

Professionally, I think that it is not only an opportunity to make contacts, but also experience different things, particularly both the challenges and the rewards of working in the renewable energy field. I developed a clearer idea of what I desire — and don't desire – in my future career. The internship experience is definitely one of the highlights of the PPRE course, where one should make the most of it.

Alan: In addition to providing an escape from the Oldenburg winter, working at Nelson Mandela Metropolitan University (NMMU) gave me a firsthand perspective

on the challenges South Africa is facing as it strives to incorporate renewable energies into its economy. Notable for me was that the emphasis of the research at NMMU was not on developing ways to extract the most energy possible from renewable resources, but rather on making technologies that were geared towards the needs of small-scale applications, or on making current technologies more economical and user-friendly.

I initially spent most of my time working with an NMMU masters student who was developing a system to use infrared images of PV cells as a rapid test of cell quality. A few weeks into my internship, though, I became active in a collaboration between

NMMU and Isabela's host company, Genergy. The main goals of this work were to develop new tests that could accurately assess solar water heater system (SWHS) effectiveness, and to study how various installation parameters affect SWHS performance. In our short time, we only managed to get the systems set up and run a few initial tests, but I hope we set the stage for future advancements.

Overall, it was a great (or, in South African English, "lekker") experience. Our colleagues and friends were very hospitable, and we had a few opportunities to explore the varied landscapes of the country. Lastly, I got to spend quality time with my Brazilian colleague!

FUEL EFFICIENT ROCKET BARN PROJECT FOR TOBACCO FARMERS IN BANGLADESH

Ms. Daria Mashnik from the US (PPRE 2010/12) went for her internship to Bangladesh, where she was involved in rocket barn tobacco projects. Actually she was involved in modification of the rocket barn for use with agricultural waste (as opposed to trees), which is a very critical project as tobacco production is having huge impact on native forests in Asia and Africa.

A personal note from Daria reads as follows:

"I am not really in a city....a "city" would be an overstatement of a town I am in. I am in a pretty rural part of Bangladesh...surrounded by a lot of poverty and mainly people making their living through agriculture...rice, tobacco leaves, wheat, maize. I am 6 hours away from Dhaka (the capital), about 2 hrs away from Indian border.

I am currently driving from work in the field and I think if I will die in Bangladesh, it's going to be while being driven on Bangladeshi roads. It's incredible. Some cars don't

have lights, bikes and rickshaws (3-wheel bike carriages) don't have lights, people are walking on the sides of the road...there are no street signs anywhere and everyone drives in the middle of the road. Imagine that!

I am working on constructing and designing more fuel efficient barns for tobacco curing. So it's a biomass kind of project, but really more heat transfer, energy efficiency kind of a project. I don't feel thrilled to be working with the second tobacco producing company in the world (British American Tobacco), but we're helping save trees. And this country terribly suffers from deforestation. I have never seen anything like it.

I want to make an impact in this country somehow, but looking around I sometimes find myself feeling hopeless. The future of the planet looks gloomy when I look around here. Most people are lovely though.

More info at www.rocketstove.org or from Peter Scott: apropeter@hotmail.com

A VISIT AT THE OKTOBERFEST, MUNICH

by Nick Brown, PPRE 2009/11

“Ein Prosit, ein Prosit der Gemütlichkeit!!” The song is all too familiar for visitors of Oktoberfest, the “traditional” Bavarian festival which is hardly in October, but is definitely a Fest. For the PPRE alumni living in München, Oktoberfest is the yearly ritual which offers hordes of tourists and outrageous beer prices, but also three weeks of limitless fun. And fun is exactly what our group (Cédric Ullrich, Sebastian Randig, Bhai Raja Maharjan, Cynthia Wu and I) found on a surprisingly sunny Sunday afternoon.



PPRE-Networking at Oktoberfest 2010 in Munich:
fr. lft: Cédric Ullrich, Sebastian Randig, Nick Brown, Bhai Raja
Maharjan, Cynthia Wu.

Our first stop was at the Spaten tent, where we quickly found seats next to a group of giants from the Netherlands. Their insane heights soon seemed unimportant to us however, as the fresh and delicious beer (served of course in one-liter Maßen) instantly helped us to join the loud, friendly atmosphere that makes up an Oktoberfest tent. After our first Maß we were ready to sing along with the band, which played such traditional Bavarian favorites as “La Bamba”, “New York, New York” and “YMCA.” By the time we had started the second Maß we found ourselves standing on our bench-

es and knocking our glasses together with pretty much anyone we could reach.

Next we went on to the historical Wies’n, which offered a look at the Oktoberfest of centuries past. Drinks were served in Steinkrugs, traditionally dressed horses were paraded around a large show ring, and the beer was “only” 4€ for a half liter.

Our last stop was the Schottenhammel tent, known for its raucous and youthful visitors, and that’s exactly what we found there. By that time in the evening, the entire tent was standing on their benches. We quickly made friends with a huge group of Germans from Köln, and two American sisters from California who had just landed in Germany that morning. By the time we decided to call it quits it was past 9pm, meaning we had around 12 hours before we were due into work. Of course for all of the Alumni except for me, their next work day would be spent back at the Wies’n, as their employers had reserved tables for their loyal employees...

HARVESTING THE SUN WITH RELATIO - MY EXTERNAL TRAINING EXPERIENCE IN GERMANY

By Sandra Chavez, Mexico (PPRE 2010/12)

During the company presentations day I heard from relatio for the first time, a group of companies that within 10 years in the PV market had the biggest PV Solar Power plant in Germany with a plan capacity of 70 MWp. This was highly interesting to me. Willing to know more about PV Solar Plants I decided to start my internship with relatio.

The office is located in the middle of the Schwäbische Alb, in a small town called Balingen. Not only has the landscape and nature been fascinating but also the “Schwäbisch” culture and cuisine.

Experience reports

I worked in the International Project development department, dealing with the planning, EPC and O&M of PV Power Plants. The projects I was dealing with are located in the UK, Germany, Austria, Portugal and UAE. The department consisted of 2 people, my boss Alexander Rothauge and me, and we alone were running a complete relation abroad. With the responsibility of selling, developing new projects, keeping track of the old ones, and evaluating new sites by doing a rough planning, the challenge was huge. Relatio works under the motto "learning by doing", therefore a high level of self learning was required of me.

Just when I thought I was getting used to it, the breaking news announced a review in the feed in tariff in UK redefining the whole picture of the PV business, and a couple of weeks later the disaster with the nuclear power plants in Japan triggered more big changes.

I learnt that the Renewable Market is very dynamic, the rules are not written, and it is a young business for young people ready to face any type of challenges. Every week something new popped up making the work very intense and interesting. I would like to highlight the experience of travelling



Tauberlandpark, planned capacity 70 MWp/Actual installed capacity 28 MWp.

to London for a week to attend to the Expo ECOBUILD 2011 and work at relatio's stand.

The external training was a wonderful opportunity to learn and grow as a person. During this time I met very friendly colleagues, always there for me, patient and willing to help especially with the Schwäbisch accent that at the beginning was quite a challenge. I want to thank relatio and PPRE for this life-changing experience.



Berlin, Germany – March 2013: PPRE students (fr. left: R. Faerrón, Costa Rica / K. Küster, Brasil / H. Singh, India / S. Lüers, Germany / C. Lopez, Honduras) demonstrating with a thousand others (mainly from German PV companies) against the planned cuts for the feed-in-tariff of PV power in Germany.

PPRE 2010/12

The students of PPRE 2010/12 completed the following internships in 2011:

Surname	Given Name	Nation	Institution	Website	Location
Alemayehu	Firealem	Ethiopia	Forwind Institute	www.forwind.de	Oldenburg
Aroeira	Isabela	Brazil	Genergy	www.genergy.co.za	Port Elizabeth, South Africa
Braden	Claudia	Germany	SNV Ethiopia	www.snvworld.org	Addis Abeba, Ethiopia
Campero Anchondo	German Fernando	Mexico	Next Energy Institute	www.next-energy.de	Oldenburg
Carvajal Sarzosa	Pablo Esteban	Ecuador	Universidad Federal do Amazonas	www.cdeam.ufam.edu.br	Manaus, Brazil
Chávez Velázquez	Sandra Laura	Mexico	Relatio Group	www.relatio.de	Balingen
Cordes	Johannes	Germany	GIZ office Southeast Asia	www.GIZ.de	Jakarta, Indonesia
De Brito Lima	Danilo	Brazil	Energy & meteo systems	www.energymeteo.de/	Oldenburg
Do Duc	Tuong	Vietnam	Abakus Solar AG	www.abakus-solar.com	Essen
EL-Sayed	Mahmoud Rajeh	Palestine	Phoenix Solar AG	www.phoenixsolar.com	Sulzemoos
Han	Myo Min	Myanmar	Biogas weser ems	www.biogas-weser-ems.de	Frisoythe
Kipruto	Walter	Kenya	UNFCCC	www.unfccc.int	Bonn
Kumaraswamy Sivaprakasam	Rangini	India	aleo solar Deutschland GmbH	www.aleo-solar.de	Oldenburg
Kwan	Alan	USA	Nelson Mandela Metropolitan University	www.nmmu.ac.za	Port Elizabeth, South Africa
Lüer	Stefan	Germany	Energie Umwelt Ressourcen Osnabrück	n/a	Osnabrück
Mashnik	Daria	USA	Rocket stove project, Bangladesh	www.rocketstove.org	Bangladesh
Ramírez Acosta	Rebeca Priscilla	Panama	InnoWind South Africa	www.innovent.fr	Port Elizabeth, South Africa
Ramirez Pineros	Alvaro	Colombia	Vestas Wind Systems A/S	www.vestas.com	Arhus, Denmark

Internships

Surname	Given Name	Nation	Institution	Website	Location
Rodriguez Bonilla	Javier Eduardo	Colombia	OFFIS Institute	www.offis.de/en/start.html	Oldenburg
Sequeda Pineros	Miguelangel	Venezuela	ITS (University of Surabaya)	www.its.ac.id	Surabaya, Indonesia
Venegas	Orlando	Chile	JUWI GmbH	www.juwi.de	Wörrstadt
Villa	Juan Pablo	Argentina	ITS (University of Surabaya)	www.its.ac.id/	Surabaya, Indonesia

PPRE 2011/13

The students of PPRE 2011/13 recently completed the following internships:

Surname	Given Name	Nation	Institution	Website	Location
Arias	Alfonso	Costa Rica	Lahmeyer Int. GmbH	www.lahmeyer.de	Bad Vibel
Beyene	Mehari Siltan	Eritrea	Next Energy	www.next-energy.de	Oldenburg
Candra	Dodieklka	Indonesia	Biogas Weser Ems	www.biogas-weser-ems.de	Frisoythe
Dhir	Harpreet Singh	India	SMA Solar Technology AG	www.SMA.de	Niestetal - Kassel
Faerron Guzman	Ricardo	Canada	Smart Blades	www.smart-blade.com/	Berlin
Gaur	Varun	India	Energy Meteo System GmbH	www.energymeteo.de	Oldenburg
Herrerias Azcue	Martin	Mexico	Solar Alternatives	www.solar-alternatives.com/research.html	Patna, India
Kaminski Küster	Kristie	Brazil	juwi gmbh - Wind	www.juwi.de	Wörrstadt
Kigima	David	Kenya	Overspeed GmbH & Co.KG	www.overspeed.de	Oldenburg
Kühnel	Sven	Germany	DLR	www.dlr.de/tt/	Stuttgart
Landwehr	Greg	South Africa	Energy Meteo System GmbH	www.energymeteo.de	Oldenburg
Lopez	Christian	Honduras	Juwi gmbh - PV	www.juwi.de	Wörrstadt

Internships/ M.Sc. Thesis Projects

Surname	Given Name	Nation	Institution	Website	Location
Mancera Guevara	Diana Rocio	Colombia	DLR	www.dlr.de	Oberpfaffenhofen (Weßling)
Nascimento	Paulo	Brazil	MT Energie - Biogas	www.mt-energie.com	Zeven
Nugusse	Habtom	Eritrea	IWES	www.iwes.fraunhofer.de/en.html	Oldenburg
Nurmukhanbetova	Karakoz	Kazakhstan	Tata BP Solar company	www.tatabpsolar.com/	New Delhi, Indien
Parikh	Dishant	USA	Prajwalbharat - Energy Efficient Street Lighting	www.prajwalbharat.com	Nashik.M.P., India
Pernia	Yutriz	Venezuela	PT Gerbang Multindo Nusantara / Institut Teknologi Sepuluh Nopember (ITS)	www.gerbang-multindo.co.id	Surabaya, Indonesia
Sahin	Nuran Pinar	Turkey	ehp-energy harvesting projects gmbh	www.ehp-bremen.de	Bremen

M.Sc. THESIS PROJECTS

PPRE 2009/11

The following thesis projects were successfully completed in 2011

Name	First Name	Nation	Institution Master Thesis	Title of Thesis
Al-Hammad	Hirak	Bangladesh	EWE Biogas GmbH & Co. KG., Wittmund	Best Practice for Safety Regulations in Anaerobic Digestion Plants
Arroyo Klein	Sebastián Alejandro	Chile	Next Energy, EWE-Forschungszentrum für Energietechnologie e.V., Oldenburg	Application of Vanadium Redox-Flow Batteries for Evening out Wind Power Fluctuations and Inaccuracies in Wind Power Forecast
Brown	Nicholas	USA	GE Global Research, Munich	Modeling of Wind Turbine Wake Meandering for Use in Energy Yield and Loads Calculations
Bussièrès	Frederic	Canada	GE Wind, Salzbergen	Wind Turbine Blade Root Connection Optimization
Chhatbar	Kaushal	India	Suntrace GmbH, Hamburg	The influence of various meteorological parameters on the output of solar thermal power plants
Cuellar Olmos	Alberto	Spain	ARIES INGENIERÍA Y SISTEMAS, Madrid, Spain	Water balance in a parabolic trough plant – New cooling options

M.Sc. Thesis Projects

Name	First Name	Nation	Institution Master Thesis	Title of Thesis
De Vecchi	Rafael	Brazil	G. L. Garrad Hassan, Oldenburg	Blending of Wind Resources from Multiple Masts for Wind Turbine Energy Assessments
Dola	Edwin Ochieng	Kenya	Uni Oldenburg, PPRE	Development of decision making tool for electrification of decentralized/ rural areas in Kenya
Gómez Padrón	María Gabriela	Venezuela	Concentrix Solar GmbH, Freiburg	Assessment of CPV power plants operation and definition of an efficient CPV monitoring system
Hamzeh	Ahmed	Syria	IWES, Kassel	Efficiency Optimization of Multi-functionality Inverter with integrated DC-DC Converter for an e-mobility test infrastructure
Martin Gomez	Juan Pablo	Mexico	Finasol GmbH, Ulm	Barriers and Opportunities for Implementation of Grid Connected PV Projects in Mexico
Mon-tealegre	Federico	Costa Rica	GE Energy GmbH, Salzb- bergen	Analysis of VSC HVDC Transmission Link impact on offshore wind farms
Montoya Rojas	Juan Pablo	Ven- ezuela	Lahmeyer International, Bad Vibel	Incorporation of a module to a calculation worksheet in MS-Excel and VBA to evaluate the heat transfer on the solar receiver component of a solar tower power plant
Moreno Chiunti	Celia	Mexico	Deutsches Zentrum für Luft- und Raumfahrt e.V., Stuttgart	Concentrated Sola Power Financing in Jordan
Ngoma	Daniel H.	Tanzania	Overspeed GmbH & Co. KG, Oldenburg	Accuracy of different wind power prediction approaches and recommendations for particular applications
Noured-dine	Ibrahim	Lebanon	EHF - Semiconductor Research group, Uni Oldenburg	Performance Analysis of Cu(In,Ga)Se ₂ Thin film Solar Cells
Ramos Suárez	Juan Luis	Spain	Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas – CIEMAT, Madrid, Spain	Anaerobic Treatment of agricultural and farming organic waste. Use of the digestate as a soil amendment.
Rodriguez Sanchez	Diana Elisa	Mexico	Fraunhofer ISE, Freiburg	Experimental Determination of Transport Coefficients and Adsorption Equilibrium in Adsorption Composites for Thermally Driven Heat Pumps
Rudenko	Vladislav	Russia	Deutsche Wind Energie Institut, Wilhelmshaven	Influence of the heat flux on wind profile and wind power output
Weldemicael	Yonas Tesfay	Eritrea	Overspeed GmbH & Co. KG, Oldenburg	Investigating the prediction of cut-off events in wind farms at extreme wind conditions
Wen	Chia Chia	Taiwan	SGS Germany GmbH Solar Test House, Dresden	Characterization of solar simulators & Evaluation of spectral and spatial performance

PPRE 2010/12**The following thesis projects were successfully completed in 2012**

Name	Given Name	Nation	Institution	Title of Thesis
Alemayehu	Firealem	Ethiopia	ForWind, Oldenburg	Validation of the farm layout program FLAP for offshore power assessment based on measurement data at the offshore test field alpha ventus
Aroeira de Almeida	Isabela	Brazil	UNFCCC, Bonn	CDM additionality of rural electrification projects
Braden	Claudia	Germany	Solar Energy Foundation, Ethiopia	Indicators of rural development
Campero Anchondo	German Fernando	Mexico	Smart Blade / TU Berlin	Design, Development and Validation of a Digital Load Balance for a Low Reynolds Number Wind Tunnel
Carvajal Sarzosa	Pablo Esteban	Ecuador	GIZ / Eletrobras, Brasil	Standardization of mini-grid photovoltaic systems for isolated communities in Amazons-Brasil
Chavez Velazquez	Sandra Laura	Mexico	GIZ, Mozambique	Design of a battery charging station in Mozambique
Cordes	Johannes	Germany	Deutsche WindGuard, Vareil	Application and Verification of the CFD Toolbox O.F.Wind with special focus on applicability in forested terrain
De Brito Lima	Danilo	Brazil	Ros Roca Envirotec, Stuttgart	Study of the use of the co-products of a sugarcane-based ethanol plant by integrating a biogas plant
Do Duc	Tuong	Vietnam	SNV, Vietnam	Investigation on the potential use of rice husk and rice straw for energy carrier production in rural areas of Vietnam
EL-Sayed	Mahmoud Rajeh	Palestine	Uni Oldenburg	Development and Testing of Photovoltaic Inverters - Inverter Design using matlab simulation
Han	Myo Min	Myanmar	University of Ulm	Small Electricity Generation from Cookstove
Kipruto	Walter	Kenya	Center of Research for Energy and Energy Conservation (CREEC), Uganda	An investigation on potential application of the Stove Use Monitoring System in estimating fuel consumption and monitoring of household energy appliances
Kumar-aswamy Sivaprakasam	Rangini	India	aleo solar Deutschland GMBH, Oldenburg	Mismatch Losses in Photovoltaic Modules
Kwan	Alan	USA	Next Energy, Oldenburg	Corrosion of graphitic bipolar plates in vanadium redox flow batteries
Lüer	Stefan	Germany	Next Energy, Oldenburg	Data analysis of co-generation fuel cells stacks

M.Sc. Thesis Projects

Name	Give Name	Nation	Institution	Title of Thesis
Mashnik	Daria	USA	TU Vienna, Austria	Zero-Carbon Village / Zero-Carbon Resorts
Ramirez Acosta	Rebeca Priscilla	Panama	VDE Prüf- und Zertifizierungsinstitut GmbH, Offenbach	Studies for the interconnection of high amounts of wind energy in Panama. Review of norms, models and considerations for this practice
Ramírez Piñeros	Alvaro	Alvaro	GE Wind Energy GmbH, Salzbergen	Technical-economical evaluation of GE technology in the European market
Rodríguez Bonilla	Javier Eduardo	Javier	University of Oldenburg	Sustainability of Biofuel Production Assessment
Sequeda Piñero	Miguelangel	Venezuela	Planet Gbr, Oldenburg	LCA of batteries in hydrogen vehicles (Tentative title)
Venegas	Orlando	Chile	juwi Wind GmbH, Wörrstadt	Analysis of wind conditions in the Chilean Desert
Villa	Juan Pablo	Argentina	GIZ, Mozambique	Draft plan for Chimoio's Excellence Center Hydropower Division

EUREC 2009/10

Name	Give Name	Nation	Institution	Title of Thesis
Asproulakis	Konstantinos	Greece	Vestas Wind Systems A/S, Athens, Greece	Correlation between predicted behaviors and real time data
Atallah	Adham	Lebanon	Siemens AG, Erlangen	Steady-state modeling of Wind Power Plants for Simulation and Design Optimization
Cadau	Paola	Italy	Scripps Inst. Oceanography UCSD, California, USA	Algae Research Park for UCSD's Camp Elliott
Costache	Andreea	Romania	Fraunhofer-IWES, Bremerhaven	Optimization of offshore wind farm Installation planning based on weather conditions
González Muñoz	Luis Felipe	Mexico	Concentrator Optics GmbH, Cölbe	Development of a Method to Measure and Improve the Adhesion of Silicone Fresnel Lenses to a Solar Glass Substrate
Ibrahimoglu	Can Serkan	Turkey / Cyprus	Ecole des Mines d'Albi, Albi, France	Solar Thermal Concentrator based on Linear Fresnel Reflector and Ericsson Engine
Jalia	Aquil	India	KTH Stockholm, Sweden	Organization and Control of a Local Market Based Concept Towards Onsite Distributed Energy Resource Based Electricity Supply in Urban Swedish Residential Buildings

Name	Give Name	Nation	Institution	Title of Thesis
Kotsonis	Theodoros	Greece	Lahmeyer International GmbH, Bad Vilbel	Offshore Wind Parks Availability and Maintenance Model (OWPAM)
Peña Gama	Pedro	Spain	MECAL B.V., Enschede, Netherlands	Improvements to Offshore Wind Farm Technical Due Diligence Assessments
Petrazzuolo	Giuseppe	Italy	CEDER-CIEMAT, Soria / Spain	Modeling and simulation of small wind turbine blade with finite element method analysis (FEM)
Ramli	Sundus Cordelia	Malaysia / UK	DONG Energy, Fredericia, Denmark	Uncertainty in the application of the Measure-Correlate-Predict Method in Wind Resource Assessment
Thomassin	Etienne	France	Eole Generation GDF Suez, Lorient, France	Wind farm development in Champagne-Ardenne
Zúñiga Galindo	José Fernando	Mexico	Suntrace GmbH, Hamburg	Performance and Optimization Analysis of an Integrated Solar Combined-Cycle Plant

EUREC 2010/11

Name	Give Name	Nation	Institution	Title of Thesis
Angelucci	Massimo	Italy	Lahmeyer International, Bad Vilbel	Investigation and Evaluation of Different Loss Types in Grid-Connected Photovoltaic Systems
Briones Martinez	Maria Gabriela	Germany /Ecuador	Energy Knowledge Center of the Hanze University of Applied Sciences, Groningen, the Netherlands	Decentralized Balancing of Renewable Energy Production
Buyukcoskun	Murat	Turkey	Concentrator Optics GmbH, Cölbe	Thermal Deformation Impacts on SOG Fresnel Lens Performance
Farrés Antúnez	Pau	Spain	Cambridge University, Department of Engineering, Cambridge, UK	Computer modelling of Pumped Thermal Electricity Storage
Gröger	Katharina	Germany	Ingenieurbüro Weber, Gernern	Life Cycle Assessment of the wood chip central heating system of Energiedorf Bergheim
Guevara	Edison	Venezuela	École des Mines d'Albi, France	Performance Assessment of a LFR Collector Prototype
Henningsgaard	Elizabeth	USA	ABB, Zürich, Switzerland	confidential

Name	Give Name	Nation	Institution	Title of Thesis
Merchán Millán	Daniel	Spain	Vestas Wind Systems A/S. Aarhus, Denmark	Noise Assessment on Wind Turbine Generators. Development of a Noise Analysis Tool using Matlab Programming
Mouchtidiotis	Nikolaos	Greece	Technological Educational Institute of Crete, Greece	A Comparative Study of Different PV Modules
Norton	Michael F.	Ireland	Norut Northern Research Institute, Narvik, Norway	Design of a 2-axis Tracking PV Power Plant in Piteå, Sweden
Ramesh	Vinodh	India	Daimler AG, Böblingen	Development of Energy Efficient Charging System for Electric Vehicle
Seethapathy	Poorana K.	India	RWE Innogy GmbH, Essen	Extrapolation of wind turbine design for far offshore environments in the time period 2017-2020
Wasajja	Henry	Uganda	Delft University of Technology, Delft, Netherlands	Backcasting study to evaluate advanced biomass based technologies for rural energy supply

SUCCESS FACTORS OF SHS PROJECTS

Hans Holtorf, Germany, PPRE 1988/89 has started a PhD in distance education mode at Murdoch University in Perth / Western Australia.

“Having seen successful and failing Solar Home System (SHS) projects I want to understand

- what is success of SHS
- which are the key stakeholders of SHS’s implementation
- which are the success factors of SHSs and which factors lead to failure of SHSs.

gies and SHS project descriptions, a desktop study on the point of views of key-stakeholders available from my home office in Oldenburg and two field studies in contrastive areas of SHS’s dissemination. Finally the attempt will be made to measure success, success factors and failure factors for SHS.

I am thankful for any input from readers of this article, my email address is

hans.holtorf@uni-oldenburg.de.”

The project consists of a literature study in success research, social science methodolo-

TECHNO-ECONOMIC PERFORMANCE OF ISOLATED RURAL POWER SYSTEMS: A MONTE CARLO SIMULATION APPROACH

by Al-Mas Sendegeya, PPRE 1999/2000

Prior knowledge about the possible characteristics of demand and supply is vital in the planning and operation of economically sustainable isolated rural power systems. System modeling and simulation is one of the tools that can be used in planning and assessing the performance of these systems. This thesis presents a Monte Carlo simulation methodology for modeling, simulating and analyzing the performance of isolated rural electricity markets applicable in developing countries. The definitions of possible power system operators managing these markets are introduced based on different economic objectives of operating the systems. The two system operators considered in the thesis are: altruistic and profit maximizing operators. The concept used to define types of isolated rural electricity markets combines the definitions of the operators and the possible combinations of power supply options (purely thermal or hybrid system). It is anticipated that the rural electricity markets under consideration comprise uncertainties in demand and supply (both demand and generation are modeled as random variables from assumed or estimated probability distributions).

Demand is price sensitive and modeled as a product of two random variables: relative demand and peak demand. The price sensitivity of demand is shown by representing the peak demand using an economic price-demand function. The parameters (price sensitivity and demand factor) of this function are modeled as random variables reflecting the randomness of consumers' preferences.

The simulation algorithm is based on the theory of correlated sampling in order to compare the performance of systems under different operators. The thesis introduces the concept of nested Monte Carlo simulation to be able to manage the simulation of different operators subjected to the same market conditions. The operators are considered to operate in a monopolistic way in a single market. The impact of provision of subsidies and rate-of-return regulation on the performance of the defined markets is modeled. The performance of electricity markets is assessed by analyzing three parameters (tariffs, profit and reliability) which are random variables presented using probability distributions in form of duration curves.

The methodology is tested on the case study of Kisiizi Hydro Power plant, an isolated electric power scheme located in a rural community in Western Uganda. It has illustrated how to use the model, prepare the input variables and use the output to estimate and assess the possible performance of isolated rural power systems under different power system operators. The proposed methodology can be used by researchers, planners and utilities as a tool for planning, estimating and assessing the performance of rural power systems in isolated areas of developing countries.

Al-Mas Sendegeya handed in his thesis in November 2010 and was awarded a PhD for Rural Electrification.

CHANGING PROPERTIES OF REFERENCE TEST FUELS (GASOLINE) DURING STORAGE AND THE EFFECTS OF AUTOMOTIVE EMISSIONS

by Veronica Fuh, Cameroon, PPRE 2000/01

The research programme was set out with initial activities dealing with identifying and laying down the specifications of relevant fuel parameters of the different types of fuels that have been put into use in the current research. Thereafter was extensive testing and standardizing of the chosen test vehicle, used in carrying out all tests throughout this period. The experimental part of this research was equally approached in two stages: the first stage was devoted to exhaust emissions testing while the second stage was allocated for supporting sub studies including Gas Chromatographic/Mass spectrometric analysis of the different fuel formulations, monthly analysis of the physical properties of the fuels as well as investigating the storage system characteristics with particular interest on temperature changes.

Important parameters were identified including the vapour pressure, density, distillation behaviour, proportion of saturates and the aromatic content of the fuels. Since these parameters are strongly interrelated, vapour pressure has been chosen as the basis for identifying different fuel types. A total of thirteen different fuel formulations have been used in testing. These formulations were achieved by artificially modifying a base fuel composition to the desired specifications.

This research programme established a credible means for reproducibility testing, evaluating the performance of the various fuels in a current gasoline vehicle, equipped with three way catalytic converters, mainly through comparison of exhaust emission levels as well as fuel economy values. The

experimental results offered reliable guides leading to the identification of relevant vapour pressure values, such that flexible tolerance limits of reference fuels could be deduced. These limits do not only bring out beneficial environmental aspects but also point out cost efficient effects for the automobile manufacturer and promotes continuous involvement of oil industries through research, to provide fuels that meet or exceed the requirements of evolving engine and emissions control technology. Research results therefore recommend need for re-consideration of the existing stringent limits of reference test fuel characteristics by the relevant legislative authorities.

FRESNEL CONCENTRATING PROTOTYPE

by Bahy Abd-El Messih, Egypt, PPRE 2001/02

This thesis focuses on the characteristics of the Fresnel concentrating prototype BiFres 22. BiFres 22 is a system that uses mirrors to concentrate the incoming sun rays 22 times on photovoltaic modules. Water runs beneath the cells to cool them down thus producing hot water simultaneously with the electricity. The objective is to study the optical, thermal, and electrical aspects of the prototype. The study includes experimental work, theoretical modeling, and simulations. The long term objective is to show a system capable of producing electricity and heat at a competitive feasible cost for future market dissemination.

Errors in the surface of mirrors of the concentrator affect the quality of the reflected rays and their distribution on the modules, which affect the electrical efficiency of the solar cells. Therefore, a novel experimental method that involves photography and a geometrical algorithm, based on the principles of perspective, is formulated to analyze the produced images, thus assessing the surface slope errors of the mirrors. The experimental work includes measurements of the real prototype concentration ratio, spectrometer tests on the reflectivity of the mirrors, illumination profile on the PV modules, and the thermal and electrical performance of the prototype BiFres 22. The quasi-dynamic test of the European standard EN 12975 is used for the modeling of the thermal output data of the prototype. The TRNSYS simulation environment is used to model the thermal and electrical experimental data. The TRNSYS analytical non-standard model 262 is tested and validated in order to simulate the performance of the BiFres 22 prototype. A parametric study is carried using this model to show the performance of the concentrator under various operating conditions and to compare it to flat plate collectors.

The potential of using the heat generated from concentrated photovoltaic thermal systems, which is a by-product, for solar cooling is an interesting application to extend the functions and usability of the generator. The aim is to assess the effect of the operation of a solar-driven absorption cooling machine on the performance of linear concentrators at medium concentration ratios. The outlet temperature of the photovoltaic thermal concentrator should be kept between 75 °C and 95 °C in order to operate the chiller and this affects the cells performance as their efficiencies degrade with the increase in temperature. Different configuration setups are investigated to connect both the concentrator and the chiller;

also, different cold and hot storage tank sizes are studied for better understanding of the interaction between the various components of the system.

DEVELOPMENT OF PHOTO-VOLTAIC ELECTRICAL DEVICES FOR USE IN AGRICULTURE

by Asliddin Komilov, Usbekistan, PPRE 2001/02

Purpose of work: development of photovoltaic devices with improved efficiency using heat removal - thus, to increase their competitiveness with conventional electricity generators for implementation in agriculture.

The received results: developed a dynamic mathematical module for determining the influence of ambient temperature on electrical and thermal characteristics of a PV panel and PV converter with heat removal. Under natural conditions, a maximum PV panel efficiency decrease to 60% of nominal is calculated, minimum efficiency of PV converter with heat removal constituted 95% of nominal. Calculation solution for determining optimal design considering the influence of hydrostatic pressure on the collector and the PV module is developed. Optimal working regimen was identified using the results of mathematical modeling and experiments. A calculation solution for optimization of physical and thermo-technical parameters of a PV converter with heat removal to identify an optimal construction with maximal electricity production is presented. It is verified that annual electricity production of a PV converter with heat removal is 13.1% higher than of a PV panel.

Practical value: the complex problems of

efficiency improvement in a PV converter with heat removal, including correlation of efficiencies of separate elements of the system with its total efficiency, are studied. Theoretical and experimental results served for the development of a new generation of PV converters with heat removal. Recommendations and suggestions for effective energy supply system on the basis of PV converters with heat removal are developed.

SMART GRID AND WIND POWER: OPPORTUNITIES AND CHALLENGES OF DEMAND RESPONSE

by Torsten Broeer, Germany, PPRE 2003/04

Torsten Broeer is a Ph.D candidate under the supervision of Ned Djilali and Andrew Rowe at the Institute for Integrated Energy Systems (IESVic) at the University of Victoria.

Today's electricity system is not smart. Its design was not made to cope effectively with electricity generation that is increasingly coming from wind power and other variable and distributed energy resources. Expanding the power system and adding conventional generation (reserve capacity) has been the traditional way of dealing with the variability of wind power. However, this may counterbalance the economic and environmental benefits of wind power.

A smarter grid is required and with this as its goal, the U.S. Department of Energy's Pacific Northwest National Laboratory (PNNL) has the mandate to redefine the electrical system of the future. A significant benefit of the prospective smart grid is the flexibility to incorporate distributed energy resources and demand response into the power system.

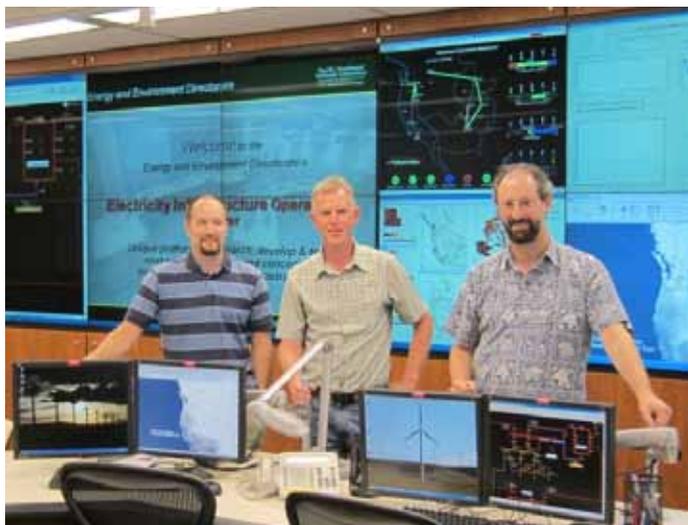
Under the guidance of David Chassin (Staff Scientist at PNNL) the collaborative research between PNNL and the Institute for Integrated Energy Systems at the University of Victoria (IESVic) has been established.

My research at PNNL focuses on the potential and impacts of "responsive loads" in supporting an increased deployment of wind power. The effects and the benefits of smart grid technologies are being modeled and simulated. This detailed power system model incorporates market, end-use and electric load models.

The research simulates and investigates the utilization of end-use appliances as dispatchable grid resources within smart grid architecture. The goal is to allow traditionally passive loads to become a resource which is actively involved in mitigating the consequences of wind's variability on the electrical power system.

Major residential loads, which are the preferred candidates for demand response strategies, are associated with heating and cooling appliances. These end-use appliances are usually thermostatically controlled loads and can maintain their services during power interruptions for a limited time. Examples are electric hot water heaters, space heater and refrigerators. Some of the important questions to answer are: To what extent are these appliances able to mitigate the variability of wind power? Will they be able to reduce reserve requirements associated with wind power? And what impact will responsive loads have on wind power curtailment?

It is expected that the ongoing research with PNNL will provide deep insights into recent developments of smart grid solutions and will enhance the knowledge of new approaches for integrating wind energy into Canada's electrical grid.



From left to right: Jason Fuller, Torsten Broeer, David Chassin (PNNL, Richland, WA)

SYSTEMATIC CHARACTERIZATION OF HT PEMFCS CONTAINING PBI/H₃PO₄ SYSTEMS - THERMODYNAMIC ANALYSIS AND EXPERIMENTAL INVESTIGATIONS

by George Bandlamudi, PPRE 2003/04

High temperature PEMFCs (HT PEMFCs), operating at 120 °C - 200 °C are rather new and offer tremendous advantages. For instance fuel cells operating at > 100 °C reduce issues related to water management substantially. Circulating excess heat energy from such fuel cells into other system processes where heat is needed would be much more practical (due to higher ΔT) compared to the standard LT PEMFCs where the produced heat has less than 90 °C (lower ΔT). Higher tolerance to fuel impurities such as CO, by these HT PEMFCs has made them very practical for many applications.

Although PBI/H₃PO₄ based membranes have been explored for use in PEMFCs from the early 1990s, only recently PEMEAS (cur-

rently BASF) has marketed them as commercially available MEAs. Besides, some companies such as Sartorius (currently Elcomax) and Fuma Tech of Germany, Danish Power Systems of Denmark are offering HT-MEAs on a commercial basis. Although some issues remain, such as development of durable and low cost catalyst and catalyst support materials, acid management, the rapid development of membranes and MEAs has been motivated by a huge demand from many a market. Recently, DLR in Germany has tested its pilot airplane (Antares) fully operated with a HT PEMFC stack (with on-board H₂ bottle).

ClearEdge Power in Portland, USA has been developing systems based on HT PEMFC technology to be deployed in the US as well as in South Korean households. Many

more companies are increasingly interested in this technology due to the manifold advantages it has to offer. This work is aimed at elucidating this HT PEMFC technology, in terms of giving an in-depth view of what it means to operate a HT PEMFC.

George's PhD thesis was published as a book and is available here:

<http://www.logos-verlag.de/cgi-bin/engbuchmid?isbn=2962&lng=deu&id=>

SMART ROTORBLADES FOR THE WIND TURBINES OF THE FUTURE

by George Pechlivanoglou, Greece, PPRE 2005/07

The objective of this work is to increase the efficiency of solar cells through integrated design and thermal solutions making the solar energy cost effective and more affordable.

This document gives a detailed summary of all the research efforts and major results during the course of my PhD dissertation. The purpose of the research project "Smart Rotor Blades for the Wind Turbines of the Future" was to investigate the possibilities of Aerodynamic Flow Control on wind turbine blades. Since this topic is very innovative and relatively new to the wind energy world, the current work functions also as a very detailed overview of the current state of research.

The reader is initially acquainted with the basic theory of airfoil flows and horizontal axis wind turbine aerodynamics. After the basic theory follows the description

of the simulation techniques used during the research project. The simulation codes used for airfoil and wind turbine analysis are explained in further detail and the specific models used within them are briefly discussed. Along with the aforementioned theoretical background information the reader is provided with extensive information on the experimental setups used during the current research project. This section is aimed as a guide for future relevant research projects as well as an educational part.

The basic theory is followed by a very extensive literature research and preliminary investigation section. In this section several flow control solutions are examined and rated in various categories. This section offers a detailed and rational way of categorizing the performance of the flow control solutions. It is aimed as a good starting point for any further research project in the same general field.

The last part of the thesis includes the presentation of the detailed experimental and numerical investigations performed by the author. These investigations involve several flow control solutions and are aimed at the investigation of their effect on wind turbine performance and dynamics. The result of these investigations leads to the definition of a "smart rotor blade" proposal. This rotor blade forms a general proposal regarding the way future rotor blades could be designed and function. It is by no means the only possible solution to the problem rather a feasible approach.

It is the hope of the author that the current thesis will be a useful guide for students, researchers and practicing wind turbine engineers who want to investigate flow control solutions for wind turbines.

The Linear Fresnel Reflector based con-

CONCENTRATING SOLAR-POWER-BASED COGENERATION USING LINEAR FRESNEL COLLECTOR: GLOBAL MODELING OF THE PROCESS

By François Veynandt, EUREC 2007/08

Concentrator is still a young technology. It draws interest for its simplicity and low cost relatively to parabolic through technology. Optimization of the concentrator's geometry and most of the entire receiver is undergoing. The receiver is a key element of the process: it collects the concentrated solar flux with a heat transfer fluid. Different systems exist around the world. On the one hand, there are six main players in the Linear Fresnel Reflector market. Four of them aim mainly at utility scale power production, whereas the two others focus more on small and medium scale industrial processes and cogeneration units. On the other hand, in the last few years, several research teams and companies have started the development of Linear Fresnel Reflector based technologies.

The present work adopts a global approach of the thermal solar process. Modeling the entire process enables a better understanding of the entire system's performances. The system design and sizing can thus be optimized taking into account all the process elements. The proposed model is suitable for steady-state and quasi steady-state simulation. As such, it enables good pre-design studies, not taking into account dynamic effects (strong variations of insolation, start-up and shut-down).

Radiative heat transfer modeling in the optical concentrator is based on a ray tracing method: a statistical Monte Carlo Method. The algorithm developed for Linear Fresnel concentrators takes into account most common geometrical configurations: reflective mirrors of varying shapes, transparent glass cover, absorber tube with respective

optical properties. The algorithm calculates especially maps of flux density received on the absorbing surface. The simulation tool is based on the coding environment EDStar, developed by the research team StarWest, including RAPSODEE laboratory, Ecole des Mines d'Albi, where this study takes place. The statistical Monte Carlo method is used in combination with a rendering tool to deal efficiently with complex geometries.

The incident solar flux distribution is then used in the thermal model. The thermal balance of the receiver is solved analytically. The model estimates thermal energy extracted from the concentrator, temperature profiles of the elements along the receiver (glass cover, fluid, pipe...). All thermal losses are taken into account (convective and radiative). Among possible heat transfer fluids, air is studied in particular. Indeed it can be used directly as a working fluid in an Ericsson engine.

The studied thermodynamic cycle represents the Ericsson engine, which operates on Joule cycle. The partner laboratory LaTEP, University of Pau, develops this type of engine especially for solar applications. This engine is especially suitable for applications ranging from 1 to several tens of kWel. Joule cycle with pressure ratio around 2 to 3 on air and the use of a regenerator gives good performances. Low pressure keeps the piping costs low. Thermodynamic simulations are carried out in the software package Thermoptim developed in Ecole des Mines de Paris.

Chaining the three parts of the model leads to global properties of the solar process. The overall efficiency from solar energy to electricity is especially calculated.

A prototype concentrator based on Linear Fresnel Reflector has been built in Ecole des Mines d'Albi in parallel to this PhD work. It is designed to supply as main application an Ericsson engine. When writing those lines, the first 3 m² module is mounted. First tests are being carried out to characterise thermal and optical performances of the system. To reach the power required two more modules are under construction bringing the total mirror surface to 9 m².

Other potential applications of the studied

technology are related to buildings. Space heating is not the best application because solar resource does not match very well heating needs. But solar systems can be advantageously used to supply cogeneration units for industrial processes at medium temperatures from 100 to 250°C. A thermodynamic cycle then provides electricity and the remaining heat is used in the industrial process. Hybridisation with another energy source (biomass, gas...) and thermal storage are also top priority options for solar thermal processes. Dynamic simulation of the system is then necessary to optimise the process operation strategy. An agent based model would be very relevant to investigate the behaviour of operating solar processes.

NEWS FROM ALUMNI



GIZ group at the efficient stove meeting in Kenya, among others Anna Ingwe, Tanzania (PPRE 91/92) and Andreas Michel, Germany (PPRE 2003/04).

Partha Sarathi Mukherjee, India, PPRE 1989/90

Partha is now working on a development project close to Pune. The public private partnership project is supported by the National Bank for Agriculture and Rural Development (NABARD) and Bajaj Auto Ltd. This is an agri-horti-forestry project to improve livelihood of 1000 tribal families. It has a component on rural energy, i.e. promotion of improved cook stoves, biomass plantation and promotion of pressure cookers etc.

GIZ hosted a regional colloquium on energy efficient stoves in Kenya

sent by Ms. Anna Ingwe, Tanzania (PPRE 1991/92)

On 7th June 2011, stakeholders from East Africa met in Nairobi to discuss burning issues in the stove sector. Topics like stove activities in the region and worldwide, carbon finance, stove commercialization, stove testing and research were discussed.

GIZ stove projects from 6 African countries

(Senegal, Burkina Faso, Ethiopia, Kenya, Uganda and Burundi) extended the meeting for two days. They continued with in-depth discussions about the topics mentioned above and topics which are more project specific. This included urgent issues such as testing protocols and testing centers, sustainability, stove branding and marketing.

Both meetings were used as a platform for exchange and showed the high relevance of the topics in the region. A focus on sustainable commercial structures to achieve successful stove dissemination was a common finding amongst the participants of both meetings.

Debesai Ghebrehwet, Eritrea, PPRE 1994/95

received the '*NATIONAL Energy Globe Award* - country Eritrea' for his project on 'High Efficient Tandur stove design' during the ceremony in on 25th November 2011 in Wels, Austria (www.energyglobe.com).

The Tandur stove is a traditional stove in the lowland of Eritrea and used to cook pancake

and frying fish as well which is the main food in the area. The improved stove has been designed carefully to ensure complete and efficient combustion used in it. The existing stove does not have air flow in the system. But the new improved stove has improved the air flow to the heat to make the burning possible. There is a special gap provided for the heating to circulate between the walls of the stove. This has enabled the stove to solve the existing burning process and enable the family to cook efficiently and safely. Furthermore by making

small modification which suits the cooking style of any one it can be applied everywhere in the globe. Therefore it is hoped to solve the problem of thousands of people who are suffering by using the wasteful, dirty and smoky stove which resulted to cause various smoke born disease and kills thousands mothers and children around the world. The Stove will be one solution to this and the environment as well.

In March 2012 Debesai was also invited to the *1st International Environmental Laureate Convention*, which took place in Freiburg, Germany (www.european-environment-foundation.eu).



Debesai (1st row, 4th fr. left) among Environmental Award Winners in Freiburg

Hiwote Teshome G/Tsadik, Ethiopia, PPRE 1996/97

After quitting with GTZ/GIZ, Hiwote started to work at *Practical Action Consulting (PAC)* to work as Regional Energy Coordinator for East Africa. In August 2011 she went to Kigali, Rwanda, where she managed the implementation of a one year Improved Cook Stove Project by representing PAC for the Ministry of Infrastructure.

Tristan Lermite, UK, EUREC 2004/05

is working since 2007 as Project Engineer for *Econergy Limited, Bristol*, UK's leading biomass heat installer. Among others he is in charge of turnkey management of multiple large-scale biomass boiler installations (from 20-750kW).

A.N.M. Zobayer, Bangladesh, PPRE 2004/06

A.N.M. is still working for the *Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)* in a program to enhance sustainable energies (Sustainable Energy for Development). He was the first in Bangladesh to develop a rooftop biogas plant on the rooftop of his house.

The plant is constructed out of mostly recycled materials like used tire tubes and takes up very little space. It is run from regular kitchen waste, which makes it perfect for placing it in an urban environment (see picture below).



Leodegario Lopez, Mexico, EUREC 2005/06

Through a Bavarian company, Leodegario was working as a project coordinator in Chile for 11 months in 2011. They were preparing a 4-megawatt biogas plant. After the project he was supposed to go back to Germany to acquire new projects.

Juan Esteban Hernandez, Colombia, EUREC 2008/10

Working as a Proposal Manager, Juan is staying in Colombia and works on feasibility studies in the subject of renewables. He was planning a 20-megawatt waste-to-energy plant and, since early 2011, has been doing a study on a small waterpower plant in Surinam.

When Juan wrote his email in early 2011, Colombia was suffering from an eight-month period with only little rain in combination with the upcoming rain season. "The El Niño phenomenon is really destroying the land and there are millions without housing and hundreds of dead. The rain, our big rivers and the high mountains are a deadly mixture for my fellow countrymen."

Juan Pablo Montoya Rojas, Venezuela, PPRE 2009/11

Since October 2011, Juan has been working with **Camilo Wilches from Columbia (PPRE 2005/07)** at *Biogas Weser Ems in Friesoythe*, Germany as project engineer. Since Friesoythe is close by, Juan Pablo is able to stay in Oldenburg.

SOLAR THERMAL/CSP

Julio Sanchez, Columbia, PPRE 2003/04

Julio changed employers from the utility company called 'Vattenfall' (1 of the big 4 players in Germany) to *Fichtner Stuttgart*

in the Dept. of Power Plants, Solar Thermal & Desalination. The reason why he moved to Fichtner was that he hoped Fichtner had the potential to undertake the comprehensive studies which will be required for the next steps of implementation of RE.

Robert Singlehurst, Canada, EUREC 2005/06

Robert left Walter Meier Climate Canada in Ottawa since, due to market forces and to a board of directors' decision, the solar division was shut down after only six months. After doing some consulting work with the Canadian Solar Industries Association in education, training and certification, and with policy, code and standards development, Robert started with *SAIC Canada* in July 2011. He is a Project Engineer in the Renewable Energy and Climate Change division. They design, build and manage many types of projects, including solar PV, solar thermal and ground-source earth energy systems. *SAIC Canada* was Project Manager for the Drake Landing Solar Community in Okotoks, Alberta, North America's largest solar thermal installation with seasonal geothermal storage.

Mauricio Rojas, Columbia, PPRE 2005/07

Since 2008, Mauricio has been working at *Solar Power Group GmbH in Essen*. In September 2011, Mauricio participated in Solarpaces 2011, which took place in Grenada, Spain <<http://www.solarpaces2011.org>>. On the conference Mauricio met other PPRE/EUREC alumni, which were Francois Veynandt, France (EUREC 2007/08), Kaushal Chatbar, India (PPRE 2009/1) and his colleague from Solar Power Group Ms. Rosiel Millan, Mexico (PPRE 2007/09).



Alumni gathering at Solarpaces 2011: Mauricio, Rosiel, Francois and Kaushal

François Veynandt, France, EUREC 2007/2008

In October 2010, when François wrote us, he was working on his PhD about a solar thermal power plant. The trainee at his side was one of our former students from *EUREC 2009/10, Can Serkan Ibrahimoglu from Turkey*, who was working on his master thesis. They were building a prototype of Linear Fresnel concentrator and Can was helping to build and test it.

Meanwhile Francois finished his PhD (see above).

Unchalee Parinyacupt, Thailand, PPRE 2007/09

Unchalee is doing her PhD in Bangkok at the *Asian Institute of Technology (AIT)* at the School of Environment, Resources, and Development. Her thesis consists of GHG emission reduction potentials in buildings in tropical climate areas focusing on hot water heating and space cooling applications using solar energy.

Alberto Cuellar, Spain, PPRE 2009/11

Alberto applied for the first DESERTEC Thesis Award and was shortlisted; he was chosen from more than 50 applicants all over

the world.

The DESERTEC Thesis Award recognizes outstanding academic work in the field of renewable energy in the deserts of the MENA region.

For further information, please see: http://www.dii-eumena.com/fileadmin/Daten/AC_2011/Presentations/Summary_Desertec_Thesis_Award.pdf

José Fernando Zuniga, Mexico, EUREC 2009/10 & Kaushal Chhatbar, India, PPRE 2009/11

Right after their studies with us, José & Kaushal both were employed by the company where they did their internship/MSc-thesis, namely *Suntrace GmbH* in Hamburg. *Suntrace* is a small company established in 2009 to focus on the development, investment, operation and ownership of Solar Thermal Power Plants. The company is run by a group of experienced managers with a long-term track record of 4.000 megawatt capacity in the solar thermal and conventional power industry.

PHOTOVOLTAIC

James Wafula, Kenya, PPRE 1992/93

James is still employed at the *University of Nairobi*. Last year he was trying to promote a project that involves the use of Google Maps for studying the effects of shadows on solar panels mounted on rooftops. He wanted to compare the resolution of images taken over certain sites in Kenya with those taken elsewhere that clearly depict roof mounted panels and any shadows on them.

Sebastian Sancho Dobles, Costa Rica, PPRE 1996/97

Sebastian wrote from Spain, on 1 May 2011 where he was “performing consultancy and commercial things in solar PV, micro wind and energy efficiency.” Before that, in 2010, he “started commercial activities in Costa Rica where net metering has recently been launched. There is great interest for PV although the government’s policy still not so clear for the public.” Besides that he participated as a lecturer in two PV courses together with the School of Applied Earth Sciences and Agriculture. Recently Sebastian joined *Fichtner Consultancy* in Stuttgart as freelancer, specialized in RE in Central America.

Syed Ehteshamul Huq Masum, Bangladesh, PPRE 1998/99

Syed is working at an electricity distribution company in Bangladesh as a technical manager where they have made solar panels mandatory for new customers who will use more than 2 kW in their household. “Customers must have a fraction of their electricity consumption from solar panels. Now we have a lot of companies in our country who are engaged in producing solar panels, batteries, inverters etc. while, when I had my MSc degree in RE, many educated people in our country disregarded sustainable energy. Now, from grassroots level, people are conscious of energy saving devices. Last year we distributed a lot of energy saving CFLs (compact fluorescent lamp) to customers from our company, which was financed by the World Bank.”

Elizabeth von Hauff, Canada, PPRE 2000/01

After doing her PhD at University of Oldenburg and working as Postdoc for some years, Elizabeth received a call for Professorship from *University of Freiburg / Fraunhofer Institute for Solar Energy Systems (ISE)* last

year. Her field of research is organic electronics (solar cells, transistors, OLEDs, sensors, incl. nanotechnology). She works on new devices and on the assessment and characterization of novel organic semiconductors

Ram Dhital, Nepal, PPRE 2001/02

Ram was working on the pacific island of Vanuatu for AusAID for one year. Now he is back in Nepal in his previous office. There he is responsible for solar energy and monitoring and evaluation department in *Alternative Energy Promotion Centre under the Ministry of Environment in Nepal.*

Santiago Sánchez Miño, Ecuador, PPRE 2001/02

Santiago's company 'EnerPro' is very active in solar PV: they installed more than 700 SHS, mostly in the Amazon region. They developed their own technology for the installation based on safety practices and standards. For 2011, the funds for rural electrification got a big cut so they were diverting to solar thermal installations in houses and pools. In 2011 they are also beginning talks to develop a pellet industry to replace the use of LPG and diesel for heating. Energy efficiency is also in their activities and in 2011, they were working on the preparation of the National Energy Efficiency Plan for Ecuador together with a Spanish company.

Jhantu Kumar Saha, Bangladesh, PPRE 2002/03

In late 2010, Jhantu completed his work on the development of high-efficiency silicon PV's. It is a program sponsored by the Ontario Research Foundation-Research Excellence Program in collaboration with Canadian Industry and Universities at the University of Toronto, Canada.

In November 2010, he started to work on

the development of nano-plasmonic solar cells in the Victoria-Suntech Advanced Solar Facility at the Centre for Micro-Photonics, *Swinburne University of Technology, Melbourne, Australia.* The project is funded by the Swinburne University of Technology, Victorian Government and Suntech Power. The aim of the project is to increase the cost competitiveness of photovoltaic solar cells with higher efficiency & lower production cost and next-generation solar cell technology using nano-plasmonic technology in collaboration with the world's largest manufacturer of PV solar panels, Suntech Power Holdings Co. Ltd (Suntech), to research and develop the technology, leading to a prototype for commercialisation and eventual mass production for global distribution.

Richard Lawless, Ireland, PPRE 2003/04

Richard started his new Job at *Geosol* in Berlin. This year he developed his own PV project with 126 kWp and only with components made in Germany. Cells 222Wp modules, Sunways Triphase inverters, and Console (recycled plastic), Substructure, SolarLog monitoring. Before Richard was employed at *Vattenfall* Germany and Lahmeyer Int. for some years.

Boon Jin Tek, Malaysia, PPRE 2004/06

Boon's personal career in recent years in brief:

Boon was in a Hawaiian company, *Sopogy*, which does micro-CSP, from Jan to Aug 2009. They were doing some detailed planning to get a solar powered Air-Conditioning system to run in Singapore, but the economics of it were not very good, so the company abandoned it and him as well (he was retrenched). Luckily, Oliver Risse (PPRE 2000/01) was setting up a company doing Electro-Vehicle charging infrastructure, and his "investee" company, *Annex Power* in Thailand, was preparing to install a 3-MW solar power plant in Thailand. Boon was

asked to join both these companies to help out on the technical side. The EV side of things, he managed to help guide the production of 2 prototypes, and when he left in June 2010, they were continuing with the 3rd design iteration which should be marketed (check www.greenlots.com).

As for the Annex Power project, he was in Thailand more or less during the Red-shirts problem, and had a small experience with them. Otherwise, the project was rather successful so that, during his time there, they finished the construction and wiring of 1 MW of Photovoltaic (thin-film) modules and inverters (string inverters instead of central ones). It was a very interesting and fruitful assignment (see www.annexpower.com).

By the time he was 2/3 of the way from finishing his work in Thailand he got an offer to join *Juwi Solar GmbH* in Germany as a project manager for the off-grid energy solutions department. He just started his work in August last year and is now residing in Mainz. Hopefully, he says, he will stay here for a longer period of time (see www.juwi.de).



Boon (right) exchanging experiences with his country fellow Abdul M. Mahmud, Malaysia, PPRE 2008/10 back home in October 2011

Jorifa Abrar, Bangladesh, PPRE 2006/08

has been working for the *Bangladesh Power Development Board* since 2000 and was recently taking part in a Bangladesh TV show. The claim is to strengthen PV in Bangladesh. Besides that, she was invited to join the World Energy Congress (WEC) in Montreal.

Anatoli Chatzipanagi, Greece, EUREC 2008/2009

joined the *Institute for Applied Sustainability to the Built Environment (ISAAC)* in Ticino Switzerland-(<http://www.isaac.supsi.ch/default.asp>).

Especially Anatoli is involved in Building integrated Photovoltaics (www.bipv.ch)

Sirinya Wannapin, Thailand, PPRE 2008/10

Sirinya is working with a renewable consultancy company called *Annex Power Ltd.* in *Thailand* as a project engineer. Most of projects she has done so far are large-scale PV plants. She is mainly responsible for DC parts of PV, from the mounting up to inverter installation, plant commissioning as well as operation and maintenance of PV power plants.

Ankur Agarwal, India, PPRE 2008/10

After helping out a friend with his PV start-up, Ankur is now working as a Project Engineer for grid-connected photovoltaic plants at *IBC Solar, Bad Staffelstein*. The company is a leading global PV specialist and offering complete solutions for power production for 30 years already. The firm covers the entire spectrum, from planning to the turnkey handover of photovoltaic installations. Globally, IBC SOLAR has already implemented more than 100,000 turnkey PV systems with a total power output of 1 gigawatt.

Cédric Ullrich, France, PPRE 2008/10

Cédric is working for *Renenco* in *Munich*. Due to long-lasting proceedings on the granting of permission in France and new laws concerning FITs for open space plants, Cédric's ambitions to work in France have not been very fruitful. Nevertheless he is working as a project supervisor in PV projects and is in charge of PV installations from scratch to turn-key projects.

Maria Gomez, Venezuela, PPRE 2009/11

Maria is currently living in Munich and working for the *GE Research Center*, dealing with data analysis of solar modules and communications. "It's a permanent position and I'm working specifically with solar energy at the moment." In her team, they work with all kind of renewable energy sources.

Chia Chia Wen, Taiwan, PPRE 2009/11

Sharon is currently working at Photon Laboratory in *Photon International GmbH* in Aachen. She is doing some PV component testing in the lab.

Murat Buyukcoskun, Turkey, EUREC 2010/11

joined *Concentrator Optics GmbH* in Cöbe, Germany as Project Manager responsible for solar lens design, customer relations, project/product management, organization, delivery. Murat also did his internship/thesis-project with at this concentrating photovoltaics engineering firm.

WIND ENERGY

Hadi Sader, Lebanon, EUREC 2005/06

started working from September 2011 onwards in the company called *Fichtner GmbH & Co. KG* in Stuttgart as a wind energy consultant.

Juan Troncoso, Spain, EUREC 2006/07

Juan started to work with *E.ON, Germany* in November 2010 as an electrical engineer in the technical excellence department at E.ON Climate and Renewables in Düsseldorf. He is in charge of standardizing wind farms across the company. E.On is one of the 4 big utility companies in Germany.

He and some of the other alumni from Eurec 2006/07 and PPRE 2006/08 met in Rome in November 2010.



Alumni gathering in Rome fr. l. to r.: Burak, Giota, Paddy, Bodo, Sylvia, Juan and Miguel

Maired Lynch, Ireland, EUREC 2007/08

is working as Project manager for *Wind Prospect France*. *Wind Prospect* has successfully developed wind farm projects around the world. They have approximately 25 offices in 10 different countries, like Australia, Canada, China, England, France, Ireland, Poland, Scotland, Singapore, South Africa.

Giovanni Pabón, Columbia, PPRE 2007/09

Giovanni is working with *Vestas in Denmark*. He is enjoying his job working in blades production at the west coast of Jutland in a

very small town near the Ocean. Vestas is a big supplier of wind power plants and employs a lot of foreigners.

Stanley Nnadozie Achibiri, Nigeria, PPRE 2007/09

left *Cube Engineering in Kassel* to join *GL-Garrad Hassan Germany in Oldenburg* to work on: Wind data analysis, Wind flow modeling, Energy Yield Calculation and Site Condition Assessments.

Bodo Richert, Germany, PPRE 2008/10

In March 2011 Bodo joined *Siemens, Denmark* as patent engineer. After 1 year he still likes his job, where he is involved in very interesting activities like new inventions and developments.

Athanasia Arapogianni , Greece, EUREC 2008/09

Giovanni is working with *Vestas in Denmark*. He is enjoying his job working in blades production at the west coast of Jutland in a very small town near the Ocean. Vestas is a big supplier of wind power plants and employs a lot of foreigners.

Pedro Peña, Spain, EUREC 2009/11

In early February 2011, Pedro moved to Germany to work at *Juwi GmbH* in the very near of Mainz. He is glad to be responsible for the Latin American wind energy section and is planning to stay with Juwi in the next years.

Vladislav Rudenko, Russia, PPRE 2009/11

Vladislav found a job as a Proposal Manager at *Siemens Wind* in Hamburg. He is focused on the implementation of Wind Parks SCA-DA systems for customer projects in eastern markets.

Andreea Costache, Romania, EUREC 2009/10

After an internship at *Hochtief* in Germany, Andreea was offered a job to continue the work she started during the internship. Hochtief is an international construction company which uses its experiences in the construction sector to be really involved in RE. Actually they try to become a big player in Offshore-Wind.

Paola Cadau, Italy, EUREC 2009/10

joined *Acciona Energy North America* in Chicago, USA as project engineer - O&M – in the wind field. She is mainly working on the implementation of software for maintenance of their wind farms and on cost models.

Elizabeth Henningsgaard, USA, EUREC 2010/11

got a job at Renewable Energy group of *ABB Switzerland*, where she already did her thesis project before. On long run (after 6 months) she is supposed to join the ABB group in Sweden for a job with the HVDC Systems - offshore wind energy transmission.

Daniel Merchán Millán, Spain, EUREC 2010/11

Joined *Vestas Technology R&D* in Denmark as Engineer in the field of Noise & Power Performance; where he already did his MSc-project before. Basically his main duties are related to noise measurements and noise analysis, according to IEC specifications. In his department 'Test & Verification' they try to make sure that Vestas Turbines accomplish specifications for commissioning and certificates. Dani seems to really like his job, which is a nice mix between office and on-field work involving quite some traveling , i.e. when doing actual measurements in different wind farms!

ENERGY METEOROLOGY / RESOURCE ASSESSMENT

Ahmed Fathy, Egypt, PPRE 1993/94

Since 2010 Ahmed is working as Associate Professor in the Solar and Space Department at the *National Research Institute of Astronomy and Geophysics in Egypt*. He already published 28 papers in the field of solar radiation and air pollution.

Aside from to his commitment in the Department, he attended several local international conferences throughout the last years and is supervising students in Master and PhD programs.

Alemu Tadesse, Ethiopia, PPRE 1999/00

Alemu changed his job in 2011 and took position at *SunEdison* in the US as a senior Atmospheric Scientist. He is working on solar energy forecasting as a primary task and has other responsibilities related to design, installation and helps sales for PV systems. Within that, he likes to work in a close relationship with Dr. Heinemann and other people at Oldenburg to share knowledge.

Before, he was working on wind energy and wind energy ramp forecasting, particularly conducting research on meteorological case studies for ramp cases. Additionally he was consulting some projects in Ethiopia on wind energy resource assessment and micrositing.

Indradip Mitra, India, PPRE 2004/06

In October 2011 he joined the *Deutsche Gesellschaft fuer Internationale Zusammenarbeit (GIZ) GmbH* in India, where he is involved in the Indo-German Energy Programme (IGEN). Actually he is stationed at the Centre for Wind Energy Technology (CWET) in Chennai heading the SolMap Project, which aims at detailed solar energy resource assessment and creating a solar radi-

ation atlas of India. Also, a part is devoted to PV plant performance and benchmarking. Before Indradip finished his PhD with respect to renewable energy optimization for small island electrification at Fraunhofer IWES, Kassel in 2008 and was working for the Cyprus Institute at Nicosia, Cyprus in the domain of concentrated solar power (CSP) for desalination and electricity generation in cogeneration mode from 2009 until 2011.

Omar Gammoh, Jordan, EUREC 2008/09

After his EUREC master, Omar started working at the consultancy company *3E in Belgium* and is now involved in the MeteorRES project. His work includes a six-month period of work in Oldenburg, where he is presently working as Research assistant in the Energy Meteorology Group of Dr. Heinemann.

RURAL ELECTRIFICATION & DEVELOPMENT

Vanginé Wooslène, Haiti, PPRE 1997/98

Vanginé founded a German-Haitian Society to foster the reforestation in Haiti and to establish PV Plants in the 570 communities in Haiti. In June 2011, she was looking for pre-financers. Within the project, Vanginé was thinking of a study to go along with the project to collect data for her planned PhD.

Sebastian Randig, Germany, PPRE 2005/07

In April 2011, Sebastian started his second job after PPRE. Formerly working for the TUEV SUED, he changed to Uganda to work for the *Uganda Carbon Bureau*. They develop and undertake a big range of climate save projects called Programme Activities (PoA).

Within that, Sebastian is working on a PoA to “Improve Cook Stoves for East Africa” (ICSEA). It aims to create easy access to the CDM carbon market for supplier organisations across East Africa and Sudan. Their products will be more energy efficient and will result in reducing the consumption of non-renewable biomass. The creation of a thriving market for improved cook stoves, where customers have the choice to buy new stoves at affordable prices, will benefit everybody. Improved stove suppliers can be local manufacturers or distributors, as well as importers of stoves.

Edwin Sithole Mwakatage, Tanzania, PPRE 2006/08

In late 2010, Edwin was selected to be in charge of one of *Tanzania’s government technology centres* located at the foot of Mount Kilimanjaro in Moshi. These centres are obliged to disseminate appropriate technologies to small and medium industries and by producing and selling those technologies to SMEs to boost their income generation activities. He likes to use his PPRE knowledge to influence some energy efficiency technologies to Tanzanian community by using this centre. He is interested in improved cook stoves, solar water heaters, cooking by heating, hot air driers for food products, biomass gasifiers, small wind turbines etc.

Dian Galuh Cendrawati, Indonesia, PPRE 2007/09

Dian is now working as researcher candidate at the *Agency for Research and Development for Energy and Mineral Resources in Indonesia*. (www.esdm.go.id). Her division is concerned with new and renewable energies with a strong focus on the electrification of rural areas.

Abdul Muhaimin Mahmud, Malaysia, PPRE 2008/10

Abdul is still working as a Senior Engineer at the *Public Works Department of Malaysia*. He is working on a rural electrification project using a Solar Hybrid System (Solar-Genset) for rural schools in Sabah, Malaysia.

Sebastián A. Arroyo Klein, Chile, PPRE 2009/11

Sebastián is working at the *Energy Department of the Government of Chile*. They mainly develop policies and projects for rural electrification, most of them with renewable energies and also do a lot for introducing the use of solar collectors in the whole country. Currently, he is working on two specific projects. One for implementing a Hybrid PV-Diesel System in Robinson Crusoe Island and another project for a Hybrid Wind-Diesel system for another island (Melinka). As he says, both projects are as interesting as much as they are challenging and complex. They are cooperating with the University of Chile (engineering Faculty) and the private sector, which should assess the risks of the projects.

RE-RELATED SUBJECTS / CAREERS

Godofredo Jr. Magpoc, Philippines, PPRE 1995/96

Working for the *Senior Vice President in the Ministry*, Godofredo let us know that RE in the Philippines is now significantly picking up with the passage of the Renewable Energy Act of 2008.

“There is an on-going debate due to the Feed-In-Tariffs (FIT). If I am not mistaken, this was taken from the German example where the consumers pay higher electricity rates to guarantee a higher price to renewable energy suppliers / producers.” Godof-

redo likes to know more about German experiences in that subject.

Wisdom Ahiataku Togobo, Ghana, PPRE 1997/08

recently wrote: 'It will interest you to know that PPRE is taking a firm root at the *Ministry of Energy in Ghana*. The only three PPRE alumni living in Ghana have taken over the management of the New & Renewable Energy Directorate of the Ministry of Energy. The Directorate is headed by Mr. Wisdom A. Togobo (Director) with two Deputy Directors - **Mr. Seth Mahu, PPRE 2005/07** and **Mr. Isaac Ennison, PPRE 1990/91**. Mr. Mahu is the Deputy Director responsible for Grid Renewables. Mr. Ennison just joined the Ministry of Energy early 2012 as the Deputy Director responsible for New Energies including Nuclear Power. He was seconded from the Ghana Atomic Energy Commission. We are all very grateful for the immense contribution of PPRE in the renewable energy sector in Ghana. You can rest assure that further consideration of prospective applicants from Ghana to PPRE will never be in vain.

Ibrahim Odeh, Jordan, PPRE 1997/98

Besides his private consultancy in the field of renewable Ibrahim is heading the energy research group at the *University of Jordan* and is teaching renewable energy for students at the faculty of engineering at the university.

Cesar Rivasplata, Peru, PPRE 1998/99

Cesar is now coordinator of research of the *Tacna University, Peru* in the field of RE.

Oliver Risse, Germany, PPRE 2000/01

Oliver is currently working as a Chief Operating Officer of *Asia Cleantech Capital*, a Singapore-based cleantech investment firm with core focus on the clean energy and clean transportation sector. Oliver is responsible for the identification, evalu-

ation and execution of new investments and oversees asset management. He also is Managing Director of the portfolio company *Zeco Systems*, better known under the tradename Greenlots, as Asia's leading provider of electric vehicle charging infrastructure.

Al-mas Sendegeya, Uganda (PPRE 99/00)

After finishing his PhD titled "TECHNO-ECONOMIC PERFORMANCE OF ISOLATED RURAL POWER SYSTEMS: A MONTE CARLO SIMULATION APPROACH" at Makerere University in Uganda (see abstract above), Al-mas assumed the position as lecturer in 7/2011 at the *Polytechnic of Namibia* in the Department of Electrical Engineering. He is still teaching Electrical Engineering courses and Renewable Energy. Besides he is involved in Renewable Energy Research and interested in Solar Energy plus rural electrification. In the future (5-6 years) he is planning to concentrate more on rural developmental project and less engagement in academics.

Butchaiah Gadde, India, PPRE 2001/02

The Work for the United Nations Development Programme is still drawing Butchaiah's attention. He completed his PhD in 2009 and, since then, has been working as a consultant in Bangkok.

Ernest Mazimpaka, Rwanda, PPRE 2001/02

Ernest completed his PhD in Energy and Development at the University of Cape Town in South Africa and is now lecturing at the *National University of Rwanda*. He has been requested to develop a MSc in Renewable Energy within the department of Physics.

George Bandlamudi, India, PPRE 2003/04

George was in Korea for a German-Korean project founded by the German Federal Ministry of Education and Science closely related to George's subject of High-Temperature PEM Fuel Cells. George is employed

with the *Centre for PEM Fuel Cells (Zentrum für Brennstoffzellen Technik, ZBT GmbH) in Essen, Germany.*

Palle Badalge Iresha Somarathna, Sri Lanka, PPRE 2003/04

Iresha invented a patent for a withering booster which saves 60% energy in the tea industry. He initiated and formulated Sri Lanka's first renewable energy tariff for consumers and was part of the team to build the first Glyricidia Biomass power plant in Sri Lanka. He was responsible for setting up world's first LEED platinum Green manufacturing building according to the USGBC, along with two other LEED gold certified buildings for Brandix Lanka Limited. Besides that, he was responsible for coming in 2nd place at the Energy Globe Awards 2009 which is one of the most prestigious energy awards in the world, and 1st place at the National Energy Efficiency Awards as the most efficient energy company in Sri Lanka for Brandix Lanka Limited during his term as Senior Energy Manager.

During two years of his time at *Brandix*, they were able to reduce its carbon footprint by 10,000 MT due to energy efficiency and fuel switching projects.

Shahriar Ahmed Chowdhury, Bangladesh, PPRE 2004/06

In September 2010, Shahriar has been appointed as the first director of the newly established "Center for Energy Research" of *United International University in Dhaka, Bangladesh.*

Sebastian Hermann, Germany, PPRE 2004/06

Sebastian was accepted for a PhD Program in the Division of Energy and Climate Studies (ECS), Department of Energy Technology, *School of Industrial Engineering and Management in Stockholm.* Given that he was still living in Vienna, he was offered the pos-

sibility to start his work in home office from Vienna. He planned to move to Stockholm in Mid 2011.

Christian Henriquez, Peru, PPRE 2004/06

informed us that he changed companies in 2010 and is now working for *AGT, Milano, Italy.* But he is still involved in field of gasification.

Andrew Peel, Canada, PPRE 2005/07

In August 2010 Andrew joined *Inbuilt Ltd, UK*, a strategic consultancy offering renewable energy and sustainable buildings advice to corporate organisations.

Andrew leads the company's Passivhaus and thermal modelling services and supports its renewable energy activities. As one of only 4 authorized UK Passivhaus certifiers, Andrew has a deep knowledge of Passivhaus design and construction. He is the lead author of several publications, including a comprehensive guide to renewable energy investment for the higher education sector.

Michael Sterner, Germany, PPRE 2005/07

recently became Professor at the Faculty of Electrical & Information Technology at *University of Applied Sciences in Regensburg, Germany,* where he is involved in teaching and research in the fields of Solar Energy, Energy storage and Energy Economics.

Before Michael finished his PhD at the *'Fraunhofer Institut für Windenergie und Energiesystemtechnik' (IWES) in Kassel.*

Valerie Bennett, UK/Canada, EUREC 2006/07

Valerie wrote in April 2011: "I'm continuing my work at *Marbek in Ottawa, Canada,* and we have recently been acquired by ICF International. I'm excited about the possibilities the acquisition will offer, including the

opportunity to bid on larger, more innovative projects and opportunities to work at ICF offices around the globe."

Besides that, she let us know: "The report for the IEA-RETD that I worked on last year has recently been published by EarthScan: 'Renewable Energy for Residential Heating and Cooling Policy Handbook'. We collaborated with WIP Renewable Energies on the project. I was involved in researching current residential renewable energy heating and cooling technologies in 13 countries; reviewing best practice programs and policies; finding and interviewing key policy and program personnel; and synthesizing the data into a concise report."

Moreover, she has been involved in the design and delivery of a training course on conservation and demand management. She will shortly be working on the design of programs for renewable energy and energy efficiency, which involves understanding the current market trends in renewable energy and energy efficiency in the industrial sector.

Mark Craig, Canada, EUREC 2006/07

In 2010 Mark informed us that he started a job as a sustainability consultant at *Stantec consulting* in Canada. He is completing energy models for buildings and mechanical systems. Besides that, he was doing some research for a paper on California's Low Carbon Fuel Standard. He was happy to let us know that another student of EUREC found a job and tries "to make a difference".

Spyros Skarvelis-Kazakos, Greece, EUREC 2006/07

After successfully finishing his PhD in the UK, Spyros just recently became Lecturer in Sustainable Electrical Power Engineering at University of Greenwich, School of Engineering, London, UK. They are interested in RE and the electricity grid, Smart Grid concepts, Electric Vehicles, etc.

Xavier Gillard, France, EUREC 2007/08

Xavier has been working with a company in Paris for one and a half years; they are into green buildings. He is currently working with architects and other engineers (elec, HVAC, etc) in order to ensure comfort, hygiene and a good management of resources (energy and water mainly). "We are dealing with various kinds of dwellings (residential, offices, hospitals, laboratories). The fields we're tackling are thus quite wide. And the relationships it implies with the other actors of the projects we're working on (clients, architects, engineers, future users), who all have different priorities, is also pretty interesting."

Ibnu Kahfi Bachtiar, Indonesia, PPRE 2007/09

Ibnu is now working as a lecturer in the Department of Electrical Engineering at *Universitas Maritim Raja Ali Haji*, a young university in the province of Kepulauan Riau, Indonesia. The next big city is Batam, 45 minutes from Singapore by boat. Kepulauan Riau is an archipelago province which consists of 96% water. He and his team in the Department of Electrical Engineering are trying to make Renewable Energy the focus of the department and have already introduced some subjects about renewable energy into the curriculum.

Alan Cuddihy, Ireland, EUREC 2007/08

Is still working with *PCH International in Shenzhen, China*, where he sees interesting opportunities in energy efficiency and micro generation in China manufacturing sites. He states: "So much scope for improvement over there and it remains a very hot topic for international brands".

Blake Butler, USA, PPRE 2008/10

After working on a project in South Africa, Blake returned to the United States to take

over responsibilities at the Sacramento Municipal Utility District in *Sacramento, California*. He is a Project Manager in the Energy Research and Development group. There, his task consists of wind energy development and the integration of RE. "It's a great job, and I couldn't be happier about where I've ended up", Blake told us.

Aquil Jalia, India, EUREC 2009/10

Aquil was working at the Industrial Information and Control Systems Department in the School of Electrical Engineering at KTH in Sweden after his EUREC-studies as research assistant. After his stay in Sweden, he returned to Germany, where he is presently looking for a job in an interesting subject like Smart grids.

Federico Montealegre, Costa Rica, PPRE 2009/11

Instead of working for the Edison Engineering Development Program (EEDP) by General Electric, Federico decided to work as a Junior Consultant with *Ecofys in the Netherlands* in 2011. "It was a really hard decision, because **Frederick Bussiers, Canada and Rafael De Vecchi, Brazil** (both from **PPRE 2009/11** as well) were also chosen (for EEDP), and well, it would have been great working with friends. But the plan with Ecofys seems to have more interesting things for me, achievable in the midterm. Going back to reboost operations in Costa Rica is a very good projection for me! They also have launched the biggest test site in Europe and are going to transfer me a lot of knowledge, smaller company, more personal basis and more growth possibilities. So I am going all in with this one, hope it's the right choice."

Diana Elisa Rodriguez Sanchez, Mexico, PPRE 2009/11

returned to Mexico after PPRE, where in September 2011 she started working in the *Secretariat of Energy in Mexico City*. She is

an adviser in the undersecretary of electricity, but not so much active in the RE field, which is not so popular in Mexico yet.

Besides her duties at the Ministry Elisa is working with a professor at my old University (Universidad de Sonora), where she is involved in analyzing experimental data of a existing solar thermal power plant project.

Hirak Al-Hammad, Bangladesh, PPRE 2009/11

started to work as Energy Engineer/Consultant at International Advisory Services in *Frankfurt School of Finance & Management GmbH* right after his PPRE-studies.

Yonas Tesfay Weldemicael, Eritrea, PPRE 2009/11

After his studies at Oldenburg University, Yonas joined *Airwerk GmbH*, Essen to work on the implementation of a data acquisition system for 'acousticsonar transponder measurement' from an offshore measurement mast, to be integrated with wind power SCADA system

Vinodh Ramesh, India, EUREC 2010/11

Got a job in the Smart Charging Group of *Daimler AG, Germany*, where he also did his thesis-project. Actually he got an offer to work as development engineer for Battery Management Systems in Nabern, Germany.

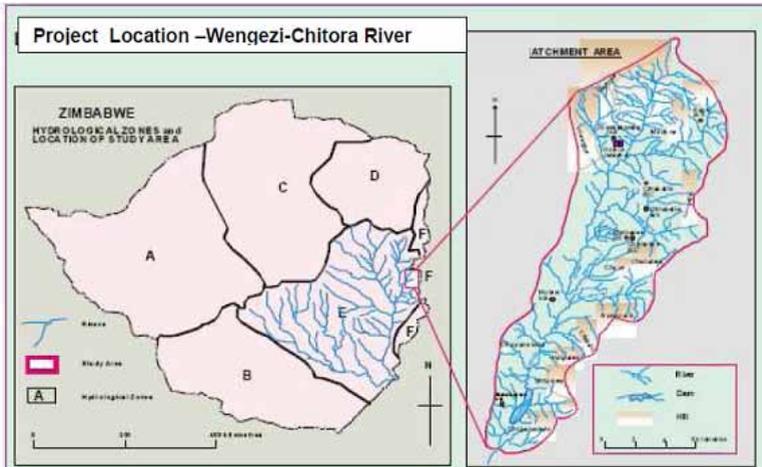
CHIPENDEKE - A ZIMBABWEAN EXPERIENCE OF A MINI HYDRO PROJECT

by Godfrey Sibanda, University of Zimbabwe (Alumni of Partner Master Programme REP in Harare, Zimbabwe)

Godfrey Sibanda was one of the students from the University of Zimbabwe (MSc Renewable Energy) who in 1999 got the opportunity to do industrial attached with Biomass Technology Group in the Netherlands under the Oldenburg University and the University of Zimbabwe partnership. He is a leading consultant in the evaluation of renewable energy projects though employed by University of Zimbabwe as lecturer in Environmental Science. He was part of the team (Dr L Zanamwe and Mrs I Mbengo both Environmental Scientist from the University of Zimbabwe) which evaluated the renewable energy project 'The Regional Mini Hydro Project in Zimbabwe at three

technologies in the energy mix in the poor rural areas.

A visit to Chipendeke community in Zimbabwe's isolated rural areas in the Eastern Highlands before 2008 would reveal continued lack to access modern energy. This had a tremendous burden on women and children who head-load heavy sacks of maize and other grains for long distances in order to process their grain. The marginalized rural poor, particularly women, had little time to pursue alternative economic activities. Lighting was provided by wood or paraffin lamps and the quality of light was poor and not sufficient for detailed work or sustained



sites' sponsored by European Union on behalf of Practical Action Southern Africa in February 2011. The Regional Mini Hydro Project in Zimbabwe which was part of the broader project in Southern Africa aimed to improve access to modern energy services and increase up-take of renewable energy

periods of study by school children. Health matters such as maternal delivery at night were difficult to perform without proper lighting and vaccines were difficult to provide without refrigeration. Practical Action Southern Africa implemented a mini hydropower project in the Chipendeke com-

Reports sent by Guests

munity in order to alleviate the mentioned problems.

Our evaluation team had this to report on the impacts of the renewable energy project on the local economy and environment at Chipendeke.

Improved income on local businesses

- Extension of business hours because of lighting
- More commodities especially those which need refrigeration
- Entertainment: radios, TVs attracting customers
- Increased communication

Improved health delivery system on local clinic

- Refrigeration of medicines
- Attraction and retention of qualified staff
- Low mortality rate among newly born infants

Improved quality of education at local school

- Attraction and retention of qualified staff
- More reading time by students
- More preparation time by teachers
- Better quality of education

Impact on community economy

- More income generating activities
- More entertainment from radios, TVs, videos
- Improved lighting
- Cleaner energy for cooking

- Proximity of services e.g. grinding mills
- Savings on expensive fossil fuel

Impact on environment

- Pollution reduction from use of fossil fuel
- Reduction in cutting down of trees hence conserving the environment

Impact on business

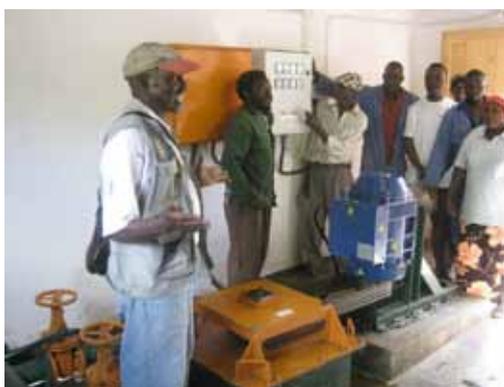
- Increase in number of business which use of electricity

Increase in finance and financing mechanisms

- Financing modalities developed to sponsor emerging entrepreneurs
- Financing modalities developed to sponsor other MHS projects in the area
- Amount of financing disbursed

Job creation

- Number of people employed on business enterprises increased



Visitors admiring the Chipendeke mini hydro plant

Lessons learnt from the Mini hydro project:

- » Stakeholder involvement is an important key to renewable energy project success
- » Community involvement enhances renewable energy project ownership by the communities
- » In remote areas, there are renewable resources which, if exploited properly, can improve lives of poor communities
- » Renewable energy projects can improve economic activities of a community
- » Training and capacity building in renewable energy is a tool for sustainability

Albeit the successes of the project there were constraints facing the wider uptake and delivery of renewable energy services for the rural poor in Zimbabwe mainly:

- **Human capacity** – the energy sector lacked sufficient numbers of experienced and capable cadres of professionals who design and implement renewable energy projects. This was lacking from the decision making level down to the end-user.
- **Best cases of MHS and resource assessment tools** - the absence of a good number of demonstration units, lack of design and implementation capacity increases investment risk and hindered development of such.
- **Financial support** - the finance sector in the targeted countries had not recognized renewable energy projects in particular de-

centralized power as an industry worth supporting with loan finance. The absence of such realization and support from financial institutions was a barrier to potential investors when they needed capital for energy projects development.

- **Community and institutional awareness** – renewable energy use and potential existed in the country. To many communities and institutions, the concept of renewable energy was alien and would not be considered an option even where feasible.

Nonetheless Chipendeke is now a transformed community!!!

REPORT OF MY INTERNSHIP IN ECUADOR

My name is Nils Giese and I'm a student of the Master program Sustainability Economics and Management at the University of Oldenburg.

On the first of September 2010 I landed in Quito (Ecuador) to begin my internship for the next 6.5 weeks at the company ENERPRO, which is headed by **Santiago Sanchez, Ecuador (PPRE 2001/02)**. The first two and a half weeks, I only had desk at the company ENYAtec (a friendly engineering office a few blocks away), because ENERPRO during this time still employed another trainee, who occupied the only remaining free desk. So I also had the opportunity to work for both companies, which are leaders in the development of renewable energies in Ecuador. This was one of my goals during this internship.

First, I will describe my main task during the entire time because I have researched prices and demand for solar collectors and tanks in both companies. Then, I will give a

brief report about ENYAtec and ENERPRO. Finally, I will summarize the results in a brief conclusion.

10800 Solar thermal collectors

The Ecuadorian Ministry of Construction and Housing has imposed a welfare program for the poorest population of the country and has built simple houses across the country. The Ecuadorian government and the Ministry of Electricity and Renewable Energy Development (MEER) wanted to equip 10800 of these houses with a solar thermal system, consisting 2sqm collector and 150L water storage. The advantage of these installations is that the conditions with constant annual high radiation (sunlight) are very good and the country has very high costs of subsidizing gas issues. By installing and dissemination of solar thermal the subsidies for gas could be reduced in the long run.

In Ecuador are, so far, no production facilities to build these 10800 systems. This is why they had to import them after a public invitation at the end of October. For this purpose I have asked producers worldwide, mainly in Germany and China, to make an offer to create a list of all prices.

The second step was planning the construction of a manufacturing facility in Ecuador to produce for their own market. ENERPRO and ENYAtec are planning this project. It should be a private company so, at first, a market analysis of demand is required. In addition, Ms. Veronika Yopez of ENYAtec

and I created a survey with questions of user behavior and willingness to pay. Potential consumers and contractors answered these in order to subsequently analyze the market.

Another important aspect was the calculation of construction costs for the planned manufacturing facility, as well as the calculation of the cost of ultimately manufactured collectors, operating costs and the resulting cash flow. Therefore, I have researched information on the material costs of the collectors.



ENYAtec - Energy and Environment Co. Ltd. is a technology company specializing in the design and implementation of technical projects related to renewable energies - solar, wind and hydro, and biomass

and energy efficiency. Furthermore, ENYAtec created environmental and sustainability reports for industrial and agricultural wastewater use.

Biogas plant - ENYAtec installed a small biogas plant (6 kWh / day of electricity and 30 kWh / day thermal energy) in the Botanical Garden of Quito to demonstrate the technology to interested parties and school classes. This was in cooperation with the Ministry of Electricity and Renewable Energies. Together with two colleagues, I have done maintenance work there for two days.



Nils visiting the Biogas Plant at Botanical Garden in Quito



ENERPRO - The Company ENERPRO is specialized in renewable energies, energy efficiency and engineering electronics. The company is specialized on technical know-how. ENERPRO has already implemented a lot of interesting projects with the use of natural resources. Projects, both public and private, are identified, planned, supported, advised in feasibility studies, constructed, operated and implemented in all phases as well as maintenance afterwards.



Nils (left) with his Supervisor Santiago Sanchez

During my time in the office I have dealt with the above-described main task of the project of 10 800 solar thermal collectors. I have gained much experience in terms of solar energy and procedure. Besides working in the office I had the opportunity to get to know the project EURO-SOLAR.

EURO-SOLAR is a program of the initiative Europe Aid, a Unit of the European Commission. ENERPRO has implemented this initiative in Ecuador. The main objective of this program is to promote renewable energy "as the engine of human development" in the eight poorest countries in Latin America, including Ecuador. The program includes the installation of 600 systems in all countries and 91 in Ecuador, which provide 100% renewable energy sources such as photovoltaic and in some cases with the assistance of wind turbines. A system consists of a 1.1kW PV system (7 panels), 2 inverters (800W; 160W) and a battery storage (1100Ah) to serve the load for 5 laptops, 1 multi-function printer, 1 projector, 1 antenna for satellite reception with a modem for phone and internet access, a water purifier, exterior and interior lighting. This program eventually gives 300,000 people in 600 rural communities without connection to the power grid the ability to get these services and to use the communication media.

On Tuesday afternoon on 21.09.2010, I was asked if I would like to see one of these projects in the east, on the edge of the Amazon basin, and support the local people. The next day I took the bus to Lago Agrio. The bus ride took about 7 hours, but it was unbelievable, the nature which we experienced. The next morning at 5:30 I went with Fausto Gancino, the supervisor on site, and David, a technical employee, to the Anangu



Nils visiting the rural electrification project in Anangu Quicha

Quichua Community, which is located in the northeast of Ecuador. The way to the port was wide and with new roads, which were built by the oil company Petro Amazonas. The road was accompanied by more or less reliable pipelines, which is very sad and scary at this hotspot of biodiversity.

On the Rio Napo we took a speedboat to reach the community. There, we configured the five PCs and installed new programs while Fausto held a seminar on the application of this system for the responsible people of the village. It was a pity that there was not much time to explore the place more because we had to return quickly. Unfortunately, the following day, a visit to another village was cancelled. On Saturday morning, David and I flew back to Quito. ENERPRO took the entire cost of this excursion, which is a very positive aspect of this project.

Conclusion

With my choice of internship, I've really been lucky. The colleagues were very nice and helpful and there very many different and interesting aspects to my work. Especially the research activities of the prices for solar thermal collectors, storage and absorber materials have provided me much knowledge about the technology and the market.

The field trip to the Orient has given me a special impression, especially of auxiliary projects. Throughout the internship I spoke Spanish with my colleagues and I was surprised how well communication worked.

At this point I would also like to thank my lecturers, Hans-Gerhard Holtorf and Edu Knagge through which I got in touch with Santiago Sanchez from EnerPro. I would also like to thank the Hans-Böckler-Stiftung, which has promoted this internship.

Nils Giese

Quito, Ecuador, October 15th 2010

SMALL ALUMNI GATHERING AT (DIREC) 2010

...during official German side event, 28 October 2010 on South-South Cooperation for Renewable Energy Capacity Development and Technology Exchange

by Chayun Budiono, Indonesia, PPRE 1992/93

Side Event

As the third follow-up conference of the renewables2004 Conference in Bonn, DIREC 2010 is expected to send another strong signal for the expansion of renewable energy around the world. One of the key issues is the role of renewable energy in achieving the MDGs. In a global economy where the shift of power towards emerging markets continues at an ever-growing pace, the role attributed to south-south cooperation increases. Today, developing countries offer innovative approaches in cooperation with other developing countries – both in the area of basic capacity development and in the area of technology and industrial innovation. It is crucial for development success that such cooperation is to the benefit of all involved – and sometimes very different – partners.

Development partnerships can systematically support south-south cooperation. Civil society actors and the private sector are of highest importance in such cooperation and present innovative approaches (e.g. Indonesian Gerbang Multindo Nusantara PT for technology cooperation and Barefoot College for capacity development). In the very area of renewable energy, the German development cooperation has worked successfully for many years and can share valuable insights.

Discussion

The discussion was moderated by Stefan Helming, Head of GTZ India, who has thor-

ough understanding of all stakeholder groups. During this event, Chayun Budiono (PPRE 92/93) – Director of Gerbang Multindo Nusantara PT, presented his experiences in a south-south cooperation in RE Technology for rural development.

Alumni Gathering

During DIREC 2010 event, at least 5 PPRE Alumni were present including:

- Anil Misra, 89/90
- Chayun Budiono, 92/93
- Udayan Pandya 92/93
- Binu Parthan, 97/98
- Anand Shukla, 01/02

Unfortunately, there were only four alumni that could meet each other and had small dinner gathering. These include Anil, Chayun, Udayan and Anand. Binu was not able to make it as he had important business meetings.

FROM KAVALA TO OLDENBURG: THE FOUNDING OF KAOL ENERGY

by Ioannis Gkinis, Greece (EUREC 2008/2010) and Dionysios Temponeras, Greece (PPRE 2008/2010)

After finishing our master thesis projects, Dionysios in ETA-Florence Renewable Energies in Italy and Ioannis in Center of Renewable Energy Sources and Saving in Greece, we both tried to find a job in Greece! The financial crisis in our country did not allow us to find a good opportunity to work.

So during the summer of 2010, while we were lying down on a beach under the sun and drinking some cold beers, we decided

to found a small company (August 2010). The name of our company is KAOL Energy (www.kaol-energy.com). This name derives from the two cities in which we both studied, KA from Kavala in Greece and OL from Oldenburg! Of course, the purpose of creating this company was not only that we couldn't find a job, but also our will to do something renewable and for the environment. Our company deals with projects of Biomass, Wind and Solar in small scale from the planning/sizing until the realization/installation.

Our first job was a Biomass project for ETA-Florence Renewable Energies and dealt with the current situation of Biomass in Greece and local future plans (new laws, feed-in tariffs, scenarios etc.).

After the 10th of November 2010, the Ministry of Environment Energy & Climate Change introduced the new feed-in tariff law on accelerating the development of Renewable Energy in Greece. So now, everyone who owns a roof can install a small PV system (1-10kW grid connected) on it with a feed-in tariff of 0.55 Euro/kWh. This fact gave us the opportunity to enter the PV market and make some installations.

Our first installation was in Zakynthos Island, a 3.3 kW roof-installed PV grid connected system. For us it was an unprecedented experience to make a project like that because we were not experts and we had to deal with everything from the first step down to the last detail. Until now we have installed about 20 kW on roofs and we hope that we will continue.

Our future plans have to do with bigger projects in the PV market and some projects in Wind Energy and especially in medium and small-scale wind turbines. Moreover, we are planning to start dealing with biomass projects both large and small-scale.

KAOL Energy will be one year old in the summer of 2011. Our effort all these months gave us a really good experience in the management of the company, on planning/sizing projects and the hands-on work for the realization of them. Moreover we are improving the ability to communicate with our customers and the most important thing is that we are learning how to fight under difficult situations because the competition is huge.

PARTICIPATION IN 21ST WORLD ENERGY CONGRESS IN MONTREAL

by Jorifa Khatun, Bangladesh (PPRE 2006/08)

The U.S. Energy Association invited four females from South Asia including me to participate in the XXIst World Energy Congress, which was held September 12-16, 2010, Palais des Congrès de Montréal, Canada, as part of a U.S. Agency for International Development (USAID) SARI/Energy South Asia Women in Energy Partnership Program.

We were the SARI/Energy delegation of six women from Afghanistan, Bangladesh, India, Nepal, and Pakistan, who have been identified as leaders in the future role of women in the fields of energy efficiency and conservation. This exchange will further the executives' knowledge of modern technologies, financing strategies, policies and successful project development methodologies, to foster renewable energy production and energy conservation in South Asia, as well as to help develop a network of peers within the region.

The World Energy Council organizes a world Energy congress every three years. This congress, the premier international multi-energy forum with exhibitors from the

field, is an opportunity for participants to better understand energy issues and solutions from a global perspective. It brings together more than 3,500 top world leaders in the field of energy, coming from industry, governments, and international organizations, as well as the media, universities and energy industry associations. The World Energy Council is more than ever committed to working toward responsible growth that reconciles economic development, environmental protection, and the reduction of global inequalities.

This congress is very helpful to all those who are actually working in the Energy Sector. The theme of this year's congress are: Responsibility, Now to Global Challenges, Energy is Transition for a Living Planet, Presents to examine the current state of our energy resource and to discuss strategies for their future use in a way that balances economic growth with environmental sustainability.



Jorifa at WEC 2010 in Montreal, Canada

In this congress, there were a lot of sessions such as exhibition, presentation, discussion, meeting and so on. I personally am interested in power generation from renewable & non renewable sources, energy efficiency measures and global solutions for this. Lots

of speakers presented their energy scenarios, barriers & how these barriers can be omitted as well as meet up energy demand. The inter-ministerial meeting was nice, they pointed out their country energy scenario and how to solve it through regional cooperation.

Discussion topics concerning Clean Energy Technology: Clean Technology development is advancing rapidly and there is a major potential for their deployment in particular in the quickly growing developing countries. Clean Technologies are:

1. Coal gasification technology (supercritical)
2. Gas-based combined cycle power plant
3. Nuclear power
4. Wind power

5. Solar power (PV & Thermal)
6. Biofuel

As of now, Bangladesh is still not a member of WEC. I personally talked to a concern person about how Bangladesh can become a member of WEC. I hope my experience and knowledge gained from this World Energy Congress will be shared with my colleagues as well as practical utilization for my organization (Bangladesh Power Development Board). The 22nd World Energy Congress will be held in Korea of Asian countries in October 2013; I am sure that a lot of Asian people including Bangladeshi will join that congress. I also hope that my other colleagues will join the 22nd World Energy Congress in Korea.

LARGE OFF-GRID PV SYSTEM IN OPERATION AT SCHOOL IN KENYA

by Thomas Schwarz, Germany, PPRE 1989/90

On Feb. 25, 2011, one of the largest PV systems (19kWp) in Kenya started its operation at the Likunda Primary School in Ukunda, Kenya.



Ground preparation for foundations of the PV system

Reports sent by Alumni

This project was initiated by a Phoenix Solar employee's contact to the association "Watototo e.V.", which founded and finances that school and 3 others nearby. Phoenix Solar wanted to support a project, preferably solar, in a developing country in line with their



Transport of batteries

CSR (corporate social responsibility). The school on the other hand had electricity from the Kenyan grid, but wanted to substantially reduce their electricity cost (electricity prices in Kenya are very high!). For that reason, the school wanted to become as independent from the grid as possible, so it was decided that the system would not be a standard grid coupled system, but a stand-alone system with batteries.

Grid-connected PV systems are virtually unknown in Kenya so far despite the recently installed large 515 kWp PV system on the roof of UNEP headquarters in Nairobi, so we could see no chance that any excess power fed into the grid would have been paid for by Kenya Power Company. So instead of being fed into the grid, now the excess PV energy generated during the day (>40% of the loads are lights and other nighttime loads, so that there is considerable excess power during most of the daytime) is stored in the batteries, and the nighttime load is supplied by those batteries.

The grid connection at the school is still there, but will only become effective when the batteries are discharged below 40% SOC and there is not enough solar energy for charging available (so the grid replaces the backup Diesel generator that you usually have in such systems). With this configuration, the PV system will supply about 24000 kWh annually to the school grid, covering about 60% of the schools electricity consumption, and thus save considerable expenses for the school (how much exactly, however, will only be clear after the next invoices from Kenya Power). A brief technical summary of the system can be found below.

All planning was done by myself, for which gathering the necessary input data about the load demand was the most difficult and time consuming. But eventually, by mid November, all components in the right quality and quantity were determined and procured from the manufacturer. At some point I was hoping we could get the system running before Christmas, so the school would have a big Christmas present, and I was booking my stay in Kenya accordingly, connecting it with some holidays.

Unfortunately, I had to learn that logistics and forwarding companies do not always work so fast, and that freight ships from Europe to East Africa have to go all the way around Africa, because the Suez canal is (or was at that time) reserved for ships going the other way from Africa to Europe. Finally, the containers arrived in Mombasa in mid January, a time when I was already back in Germany.

So during that first stay I could only supervise the construction of the support structure for the PV modules, which was done according to plans from Phoenix Solar, but made entirely from materials locally available in Mombasa. And that availability of materials and components proved to be the next high hurdle! Our Phoenix support

structure which served as a model was designed with components that are standard or at least easily available in Germany in (Western) Europe. But in Mombasa...? I had expected that in a city of that size you could get suitable materials for constructing a fairly simple steel structure. But for most things we asked for in Mombasa we heard: you have to go to Nairobi for that (resp. order it and wait until it has been delivered from Nairobi). How on earth do they complete any building in this city without being dependent on what comes from Nairobi?

Well, fortunately, we could adapt our structure so far that the materials available in Mombasa were sufficient, plus a lot of manual cutting and drilling and also painting (with rust-proofing paint; in all of Mombasa it was not possible to get galvanized steel, or have something galvanized; *how long that painted steel will withstand the rust under such rust-favoring conditions, therefore, remains my biggest concern for this system!*). So the substructure was ready just when my first stay ended in mid January.

The containers with all other materials arrived only at the end of January or in early February, respectively. And if that hadn't taken long enough already, the Kenyan customs knew how to delay things further. Even though Solar materials could suppos-

edly be imported free of custom charges, they saw that as restricted to the Solar modules only. For everything else they wanted 30% customs charge. The school had to send a delegation to the minister in Nairobi to get an explicit exemption from the minister himself. But finally, by mid February, all materials were available on site, so I went there again for the installation. This was done entirely by local workers, among them a skilled electrician and a skilled mechanic, led and instructed by myself and my technical counterpart from the school, an architect that was in charge of all technical matters at the school.

The timeframe was set quite tight, as I had to return to Germany only two weeks later exactly. Considering how long the installation of the substructure had taken, I was a bit concerned if we would finish everything in time. But the seven guys surprised me. After 3 days only we had all 252 PV modules installed, after 5 days the system was feeding into the school grid without batteries, and after 7 days the batteries were set up also.

But as if to remind me that things do not go so smoothly in Kenya, the last 3 days brought the biggest challenges:

First of all, we still needed the right cables for connecting the batteries, as they had



Grid connection & power house before and after

been missing in the shipment of the batteries. They had been sent from Germany by express mail, but as expected, they were stuck again in Kenyan customs. Fortunately, we had some suitable cable left over from the connection of the inverters, but we needed the proper terminals for those 70mm² thick cables, and somebody who had the tool to crimp them to the cables. So we had to find out again what was available in Mombasa. And as expected, this again proved to be like the search for a needle in a haystack. But at the end of a long day we fi-

“backup generator”. Only then, we examined this grid connection closer, and found that out of the 3 phases only two were present – two of the three cables were connected to the same phase. That was because one of the grid cables had been damaged during the excavation of a trench for the cables of our system. Like that, the battery inverters could not synchronize their self-generated grid voltage to the voltage from the external grid. So we connected only one phase of the external grid so we could put the whole system in operation.



Completed 19 kW PV system with local construction team

nally had some terminals on our cables with which we could connect the batteries. So on day 9, the batteries went into operation.

But as soon as the battery inverters went into operation, they already disconnected again. There was obviously something wrong with the connection, and it soon was clear that it must have been the connection of the external grid which served as

However, in that night already, the system switched off again, and during the next morning the master battery inverter every now and then stopped working completely. It seemed that it had suffered some internal damage by that faulty grid connection. Time was running out, and in that situation even my internet connection (by modem) and cell phone connection suddenly didn't work anymore, making the consultation of

the manufacturer's hotline temporary impossible.

In the end, on the 10th and my last day in Kenya, we still changed that faulty inverter against a spare one (which, fortunately, I had included in the shipment), and finally the system was working as planned, and made the school independent from the grid. The only thing missing at the time of writing this was a working internet connection, so that I could monitor the system over the internet (this should be working by now). But according to feedback from the school, the system itself is running without major problems, and has already drawn the attention of many more interested companies and individuals in Kenya, who want to set up and operate similar systems. Besides, this system serves as an illustrative sample for kids and teachers alike for how the abundant sun in Kenya can be converted to useful energy, and the kids grow up with a solar system as a natural part of their daily life. That's why I'm always happy when I can install a PV system at a school, and after the German

schools in San Salvador and in Mountain View, USA, this was already my third school PV system in a "developing country".

I hope these systems and the schools where they stand will be part of the transition into a society where the use of Renewable Energy is a natural part of everyday life, not just in industrialized countries, but even more in developing countries, who soon enough won't be able to afford the rising oil prices.

For additional information about the whole project you can contact me, or the responsible people from Mekeala Academies: Stefan Wentzel (stefan@mekaela.com) or Jackim Ochieng (jack@mekaela.com)

Also check out the article about the system from the view of the school at www.mekaela.com/solar_en.htm And finally, contact me if you would like to realize a similar project somewhere in your country. I'll be glad to give advice, supply components, or even give a hand for making it reality.

RECENT PROJECTS/ACTIVITIES FROM SHAMSUNDAR, NIE-CREST, MYSORE, INDIA

by Shamsundar Subbarao, India, PPRE 1999/2000

Shamsundar is currently working as director of NIE-CREST, NIE, Mysore, India.

Shamsundar Subbarao was invited as a Speaker to the **DAAD-sponsored conference "Higher Education Co-operation – a key factor for development"**. The DAAD invited a few alumni of German universities working in the Higher Education sectors as speakers from all parts of the world, Shamsundar was invited from India. The conference took place in Berlin, Germany on 11th and 12th May 2011.



Shamsundar at DAAD Conference

DAAD sponsored Summer School and Inter-solar Europe-2011: Shamsundar Subbarao participated in the Summer School on **“Applied Solar Technology in Developing Countries” organized by the University of Kassel, Germany.** The summer school was held from 30th May to 8th June 2011 at Witzenhausen campus, University of Kassel. It was followed by a visit to the Intersolar Europe 2011, an international solar exhibition held from 8th June to 10th June 2011 at Munich, Germany.

Fuel-efficient Biomass stove at Manthralayam: A fuel-efficient Biomass stove has been constructed at Raghavenra swamy temple, Manthralayam, Kurnool, Andhra Pradesh, India, with design, supervision and technical assistance from NIE-CREST during January 2011. The stove has been well-accepted by the users at Manthralayam for preparing prasadam



Inauguration of the Summer School

conducting the Programme for one week from Sep 12 to Sep 17, 2011. Nine participants from different research backgrounds selected under the “Energy Efficiency group” arrived Mysore on Sep 10, 2011. The Summer School began with a heritage walk on Sep 11, 2011. The programme was flagged off with an official inauguration on Sep 13 at Sir M V Auditorium, NIE-Golden Jubilee Block, Mysore. Block, Mysore.

The participants were given an opportunity to meet and interact with officials of Mysore City Corporation, Members of NGO and many other officials. The participants visited Kanana-An Organic Farm at Bardanapura, Mysore. The concept of sustainability in food was illustrated by Organic food Prepared/arranged by Ahara Butti.

After a fruitful week, many questions arose on different policies and governance structure, which were taken for discussion in third week at Pune. The programme at



Meeting at Kanana, on Sustainability with Organic Farming

The **GIZ-DAAD Summer School-2011 on Sustainable Habitats in India-III** was an International Summer school sponsored by GIZ and DAAD, Germany. The Summer School was of three weeks duration. It was conducted in three places in India, i.e. Mysore, Kochi and Pune. At Mysore, we (NIE-CREST) were the partner organisation for

Mysore was concluded with a farewell on the evening of Sep 16.

Biofuel Project – Mysore District Biofuel Information and Demonstration Centre:

The stability of Indian economy is solely dependent on crude oil. About 85% of the crude oil is imported. Petroleum sources are

diminishing with time. There is no energy security to replace crude oil. Also, fossil fuel is responsible for major carbon emissions.

The alternative to diesel fuel in transportation can be any non-edible bio oil after transesterification. The oil extracted from NON EDIBLE oil seeds like pongamia (Honge), Simaruba, Neem, Surahonne, Naga sampige, Caster, Jatropha etc. can be used as biodiesel after transesterification. These oils can be used in blend with diesel up to 40% by volume.

The bio-fuel information and demonstration centre NIE-CREST is set up in the premises of The National Institute of Engineering, Mysore. The centre is funded by Karnataka State Bio-fuel Development Board [KSBDB], Government of Karnataka. Objective: To provide information for all the public, farmers, bio-fuel cultivators, researchers and entrepreneurs in the field of bio-fuels.

Activities:

» Production of Bio-diesel from non-edible seeds like Honge, Mahua, neem etc.

» Conducting awareness programmes and training programmes on bio-fuels

» Carrying out research work through projects in the field of bio-fuels/engines



Inauguration of Biofuel Information and Demonstration Centre, NIE-CREST, NIE, Mysore



Demonstration of Bio diesel by S Shamsundar to J Shettar (Minister for rural Development)

The District Biofuel Information and Demonstration Centre [DBIDC-M] at “The National Institute of Engineering”, Mysore was inaugurated on 19th September 2011. Since its inception, the centre has been visited by 300 people (students, farmers and media); the emphasis is laid on providing information to each and every visitor so as to appreciate the concept of biofuels and sustainability associated with these green and clean fuels.

Rain Water Harvesting at Antipoaching Camp

Hunsur Division, Mysore: Rain Water Harvesting has been implemented at 3 Antipoaching camps viz. Sulogodu, Gadipalya, Sannagadde with design, consultancy and supervision from NIE-CREST. The filters for the system were also fabricated by NIE-CREST.



Rain Water Harvesting at an Antipoaching Camp

Students Project: Shamsundar Subbarao guided two student projects which were carried out with financial assistance from the Department of Science and Technology (DST), Government of India under IEDC scheme for the year 2010-11, "Solar Hybrid Photovoltaic and Water Heating System" and "Stirling Engine".

Biogas Plant at Mysore Zoo: Sri Chamara-jendra Zoological Gardens, Mysore, the largest in Asia is getting a Organic Waste (Animal dung+ Kitchen Waste) based biogas plant of capacity 1.5 tonnes (1500Kg) per day implemented by NIE-CREST. The scheme has been designed by NIE-CREST to generate biogas and use slurry for vermi-composting. The biogas plant is under construction, the main digester has been constructed till date and the project will be completed soon.



Biogas Plant Under construction at Mysore Zoo

YES COURSE ON SUSTAINABILITY IN COLOMBIA

by Craig Wong, USA, EUREC 2007/08

I had the amazing opportunity to participate in a course called Sustainability through Social Entrepreneurship, which is the perfect complement to the PPRE experience. The course was conducted for three weeks on a coffee farm in Colombia by ACTIS Education, and headed by Dr. Roger Baud and Fabio Seguro (see Footnote). Dr. Baud, through his organization ACTIS, has been conducting YES Workshops (Youth Encounter on Sustainability) throughout the world for the past ten years introducing today's youth to sustainability issues facing the world.

Roger and Fabio put together this most recent YES course to address how one can practically implement change via Social Entrepreneurship. The course was a mix of lectures and group work during which the multi-disciplinary participants came together like a family to work together and learn from each other.

During the group work, the principles learned in the lectures were applied to solving real social problems. After working to a solution, we were given the opportunity to interview the social entrepreneur who had really started an organization to address this problem, and discuss the difficulties faced. One of the best things about the workshop was the motivation that one gets from connecting with so many people who had implemented their ideas, as well as your peers who were working to implement their own ideas.

Throughout the workshop, we focused on:

- Building effective business models
- Organizing thoughts

- Organizational Leadership
 - Finances
 - Case Studies
 - Mnemonics (the way the mind understands information)
 - Various consulting tools
 - Properly identifying a problem
 - Evaluating performance
- Of course we had time to enjoy the Colombian culture, coffee, national parks, food, and people, all of which made a priceless experience, which I strongly recommend to anyone really interested in making a change in the world.



Participants of the YES workshop Dec. 2010 in Columbia

Dr. Roger Baud is the manager and owner of ACTIS-Activating Talent in Sustainability. He retired from ETH Zürich, where he acted for 10 years as lecturer, Director of the Institute for Sustainability, and 4 years as Director of the AGS (Alliance for Global Sustainability).

Fabio is the Investment Manager for Latin America at LGT Venture Philanthropy, the impact investment fund of the Princely Family of Liechtenstein. LGT VP is an impact first investor supporting organizations that increase quality of life of less advantaged people, by providing them with financial, intellectual, and social capital. They provide debt and equity capital as well as grants in the range of USD 200'000 to USD 1.5M, and are active in Latin America, Africa, Southeast Asia, India, and China.

More details can be found at:

http://www.lgt.com/en/private_kunden/philanthropie/index.html

GIZ ACTIVITIES ON RENEWABLE ENERGY IN BANGLADESH

by A.N.M. Zobayer, Bangladesh, PPRE 2004/06

Context

Reliable and efficient modern energy services are a key to reducing poverty. Bangladesh, however, is an energy starved country. Only 40% of its 160 million people are connected to the electricity grid and, in the rural areas, where over 70% of the population live, only 20% have electricity. Just 6% of the entire population have access to natural gas, and they are primarily in urban areas. Most people in the rural areas depend on kerosene lamps for light. 80% of all Bangladeshis cook on stoves burning biomass, such as rice husks, jute sticks, cow dung or wood. In fact, half of Bangladesh's total energy consumption is derived from biomass.

Those who do have an electricity connection experience daily blackouts, because the demand for power is so much greater than can be reliably supplied. Almost all medium-sized and large factories in the country are forced to install captive or standby generation facilities (gas or diesel engines) to avoid interruptions that would leave workers idle for hours on end, or cause entire production runs to be discarded. Small enterprises and micro-businesses simply close at dusk. Children cannot study in the evenings, and medical facilities cannot refrigerate their medicines or vaccines. At the same time, the smoke and soot created by kerosene lamps and conventional stoves cause eye problems and respiratory diseases.

Objective

Decentralised renewable energy supplies to households and businesses have increased, and the energy available is used

more efficiently. Poorer families now have a better chance of replacing their obsolete and unhealthy appliances, such as traditional stoves and kerosene lamps.

Approach

The Sustainable Energy for Development (SED) programme uses a multi-level approach, cooperating with a variety of partners. At the policy level, the Ministry of Power, Energy, and Mineral Resources (MoPEMR) is its most important partner. GIZ is advising the Ministry on ways to improve the legal and institutional framework for the energy sector. This includes the development of energy policies, as well as rules and regulations for energy conservation. The programme is also supporting the establishment of the Sustainable Energy Development Authority (SEDA).

For the development and adaptation of technologies, the programme cooperates with research and educational institutions, such as the Bangladesh University of Engineering and Technology, and the Bangladesh Rice Research Institution. To disseminate these technologies, it works with many local partners, most of which are consulting firms and NGOs. The most important of these NGOs are Grameen Shakti and BRAC. Recently the programme has also started working with the World Bank.

Results achieved so far

The solar home systems (SHS) programme, initiated by the state-owned financing company Infrastructure Development Company Ltd., is now one of the world's most successful solar energy programmes. With the

support of GIZ, it has installed over 190,000 solar home systems (SHS) of 30 – 85 Wp, in the country's villages, benefiting over 1.5 million Bangladeshis. SED has promoted dissemination of small solar home systems (SSHS) with less than 30W capacity and helped finance about 53,000 SSHS. Total capacity of SED support S/SHS is about 7.5 MW. As a result, more Bangladeshis now have access to electric power, which enables them to earn more from producing handicrafts, and through the extended opening hours for market stalls, cafés, rice mills, saw mills, tailoring shops and grocery shops. The light helps the children to study in the evenings. Community health centres can run a refrigerator for storing vaccines and other medicines. The villagers can charge and use mobile phones, which help them keep in touch with market prices for their produce, and with their relatives working in the cities or overseas.



Engr. Zobayer (left) visiting Biogas plant with Journalists

Over 1,500 large-sized biogas plants have been installed in slaughterhouses, dairy farms and egg-layer poultry farms which saves traditional cooking fuels, as well as preventing diseases and producing of pathogen-free fertilizer. 4 biogas plants have

been installed in Dhaka Zoo, and more than 50 biogas plants using human sewage have been installed in public institutions, such



Engr. Zobayer Testing ICS efficiency

as hostels, madrassas, schools and police dormitories. More than 20 biogas plants are installed in boarding schools. About 50 poultry and dairy farms generate electricity from biogas with a capacity of about 1 MW. 12 solar PV pumping systems for supplying of drinking water have been installed in the cyclone- prone south-west on the country.

Under the Bondhu Chula (improved cook stoves) programme, about 11,000 technicians and 500 supervisors have been trained, who have so far produced over 275,000 domestic stoves and over 4,000 commercial stoves. These stoves are also used for yarn-dyeing cottage industries, saving at least 150,000 tones of firewood a year. Over 2,000 people are earning their livelihoods by installing and maintaining improved stoves. The stoves are designed to draw smoke cleanly out of buildings, so they have reduced health risks for the users, who are mostly women accompanied by their children.

Cooperating with the Bangladesh Rice Re-

search Institute, the Energy Auditor of the Energy Audit Cell, MoPEMR, and Modern Erection Ltd, the programme has successfully piloted an improved system in several rice mills for parboiling rice. By optimising the old system, the consumption of rice husks has been reduced by over 50%. Two

demonstration boilers for rice parboiling have been installed, and 20 more are operational or under construction.

The advisory services to MoPEMR have helped to improve the legal and institutional framework of the energy sector.

RENEWABLE ENERGY & ENERGY EFFICIENCY INSTITUTE (REEEI) POLYTECHNIC OF NAMIBIA, WINDHOEK

by Kambulakwao Chakanga (PPRE 2008/2010)

I am currently doing my PhD in Physics at the University of Oldenburg. My research is on amorphous thin film solar cells. Though I am conducting the PhD at the EWE Research Centre for Energy Technology NEXT ENERGY, it is funded by the Deutsche Bundesstiftung Umwelt (DBU) in the form of a scholarship. For future perspectives in photovoltaic research in Namibia and Zambia respectively potential project partners after I finish my PhD I am interested in contacts from these regions. On this note I would like

to thank Edu Knagge and Michael Golba for introducing me to Kudakwashe Ndhlukula from Zimbabwe Harare a former PPRE.

While I was in Namibia in August 2011, I managed to meet Kudakwashe Ndhlukula, who is the coordinator of the academic project REEEI (Renewable Energy & Energy Efficiency Institute project) and Al-Mas Sendengeya PPRE 1999 – 2000 from Uganda who is also currently a lecturer at School of Engineering at the Polytechnic of Namibia. They



from left to right: Al-Mas Sendengeya, Kambulakwao Chakanga and Kudakwashe Ndhlukula in front of the Energy Trailer, one of the demonstration projects of REEEI.

are actively involved in promoting Renewable Energies in Namibia by implementing respective topics in the curriculum and conducting research at the Polytechnic of Namibia. Their achievements are really impressive and I would like to share with the Alumni the overview I obtained during my visit.

REEEI is a joint venture initiative between the Polytechnic of Namibia and the Ministry of Mines and Energy and is fully integrated within the structures of the Polytechnic of Namibia. One of REEEI's aims is to collect and disseminate information on renewable energy and energy efficiency technologies and practices. For instance, one project was conducted on Renewable Energy and Energy Efficiency Capacity Building Programme (REEECAP). It had the objective to increase the use of renewable energy and energy efficiency by taking measures to promote environmentally sustainable socio-economic development of Namibia.

One important aspect taken into consideration was the social-cultural barriers to using traditional fuels and stoves. Since Namibia is generally a desert country, the conventional traditional fuels are always a challenge to access. Alternative technologies that save on these fuels are demonstrated by REEEI. The target population of the awareness campaigns are urban and in informal settlements of rural areas in Namibia. In rural and informal settlements the focus is on promotion of improved Vesto (tsotso) and solar stoves, biogas as well as solar home systems. In the urban environment, the focus is on promotion of energy efficient practices like lighting, water heating and cooking on solar stoves. To bring the technologies closer to the target group, the "Energy Trailer" and the wood gasifier are used for demonstration.

The wood gasifier (figure below) is a System Johansson type capable of producing 6kWe. It is used to demonstrate to various stakeholders, such as farmers' organisations, how solid biomass can be used to generate energy. Furthermore, the gasifier is used for research purposes at the Polytechnic.



The system Johansson type gasifier used for research and demonstration by REEEI

The 'Energy Trailer' (Figure 1 and Figure 3) is a working, mobile model which demonstrates the use of renewable and energy efficient technologies. It is equipped with solar home system, a small wind turbine, Vesto (Tsoso) stoves, solar box cooker and parabolic cooker. In one demonstration of the energy storage capability with batteries and energy consumption, energy saving bulbs can be connected and directly compared to convention light bulbs.

In the same spirit REEEI works closely with manufacturers of efficient (tsotso) stoves, solar cookers, and wood gasifiers to promote these and other technologies. They see a great room for improvement in terms of marketing of solar stoves. REEEI is hence exploring ways of assisting the manufactur-



Energy Trailer during a demonstration. Source: <http://www.drfn.org.na>

ers of the stoves on how they can expand their market and support the technology standardization for cooking, heating and ventilation. .

One of the current bath EUREC students 2011, Dimitri Ottaviano, from Italy, has managed to obtain a practical training at the Polytechnic of Namibia, where he is working on one of REEEI's projects. He shall be working closely with Kuda and Al-Mas. For further reading on REEEI's achievements, here are a few follow-up links:

Polytechnic and REEEI:

<http://www.polytechnic.edu.na/>

<http://www.reeei.org.na/>

Energy-Trailer and wood gasifier:

<http://www.news-namibia.org/Roan/sep2008/REEEI09-2008.pdf>

http://unic.un.org/aroundworld/unics/common/documents/newsletters/en/Windhoek_UN_in_Namibia_Newsletter%28April-June%202008%29.pdf

http://www.wpi.edu/Pubs/E-project/Available/E-project-051005-001230/unrestricted/HRDC_Energy_Trailer.pdf

PPRE Students

Course	Family Name	1st Name	Tit.	Origin
1987-88	Bekdach	Hussein	Dr.	Lebanon
1987-88	Demel	Lothar	Mr.	Germany
1987-88	Dibor	Alfred	Mr.	Nigeria
1987-88	Fischer	Eric	Mr.	Brasil
1987-88	Heilscher	Gerd	Mr.	Germany
1987-88	Zarate	Carlos	Mr.	Peru
1988-89	Hamad	Bakri	Dr.	Sudan
1988-89	Kimaro	Ainea	Mr.	Tanzania
1988-89	Holtorf	Hans G.	Mr.	Germany
1988-89	Morares-Duzat	Rejane	Dr.	Brasil
1988-89	Nontaso	Ngarmnit	Ms.	Thailand
1988-89	Lu	Bai	Ms.	China
1988-89	Jia	Xi-Nan	Dr.	China
1988-89	Maiga	Alhousseini Issa	Mr.	Mali
1988-89	Oludhe	Christopher	Dr.	Kenya
1988-89	Pietscher	Jochen	Mr.	Germany
1988-89	Rakha	Hassan	Dr.	Egypt
1988-89	Camillo	Roger R.	Mr.	Nicaragua
1988-89	Ramesh	Muthya Praneshrao	Mr.	India
1988-89	Toro Cortes	Francisco	Mr.	Chile
1988-89	Rivasplata	Cesar	Mr.	Peru
1989-90	Gao	Ying	Dr.	China
1989-90	Jahn	Ulrike	Ms.	Germany
1989-90	Kimani	John Muiruri	Mr.	Kenya
1989-90	Han	Wei	Dr. .	China
1989-90	Miranda Murillo	Alexis	Mr.	Honduras
1989-90	Misra	Anil K.	Mr.	India
1989-90	Mukherjee	Partha Sarathi	Mr.	India
1989-90	Reynaldo	Reynaldo	Mr.	Philippines
1989-90	Schwarz	Thomas	Mr.	Germany
1989-90	Tarh	Zaccheus T.	Mr.	Cameroon
1989-90	Thi Hong Hai	Nguyen	Ms.	Vietnam
1989-90	Park	Myong-Sik	Mr.	Korea
1990-91	Barroga	Maria L.	Ms.	Philippines
1990-91	Hassan	Gimba	Mr.	Nigeria
1990-91	Usbeck	Stefanie	Ms.	Germany
1990-91	Ennison	Isaac	Mr.	Ghana
1990-91	Pandey	Krishna C.	Dr.	India
1990-91	Adam	El Fadil	Dr.	Sudan
1990-91	Kioko	Joel M.	Mr.	Kenya
1990-91	Knagge	Edu	Mr.	Germany
1990-91	Mishra	Christanand	Dr.	India
1990-91	Okae	Charles	Mr.	Ghana
1990-91	Osman	Abdalla	Mr.	Sudan
1990-91	Peiris	Wettasingha	Mr.	Sri Lanka
1990-91	Lemus	T. Hernando	Mr.	Bolivia
1990-91	Xie	Enhai	Mr.	China
1991-92	Abel	Bettina	Ms.	Germany
1991-92	Ally	Noel	Mr.	Guyana
1991-92	Gyi	Aung	Mr.	Myanmar
1991-92	Hakim	Mahmoud El	Mr.	Sudan

List of Alumni / Students

1991-92	Ingwe	Anna Naftal	Ms.	Tanzania
1991-92	Kaur	Jagjit	Ms.	India
1991-92	Mansaray	Kelleh G.	Dr.	Sierra Leone
1991-92	Xiang-jun	Ming	Mr.	China
1991-92	Mugisha	Patrick	Mr.	Uganda
1991-92	Santoso	Murtiyanto	Mr.	Indonesia
1991-92	Tegeler	Ludger	Mr.	Germany
1991-92	Nabutola	W. Musungu	Mr.	Kenya
1992-93	Al Kailani	Fayez Jamil	Mr.	Jordan
1992-93	Budiono	Chayun	Mr.	Indonesia
1992-93	Hamid	Mohamed Ali	Mr.	Sudan
1992-93	Kariyawasam	Palitha L.G.	Mr.	Sri Lanka
1992-93	Kassenga	Gabriel	Dr.	Tanzania
1992-93	Lonis Abdu	Bertha	Ms.	Nigeria
1992-93	Magno Desendario	Evelyn	Ms.	Philippines
1992-93	Shresta	Kedar Shanker	Dr.	Nepal
1992-93	Pandya	Udayan	Mr.	India
1992-93	El Asaad	Kawther A.. Mohamed	Ms.	Sudan
1992-93	Mutwaly	Safaâ	Ms.	Sudan
1992-93	Wang	Jing Jing	Ms.	China
1992-93	Wafula	James C.	Mr.	Kenya
1992-93	Blaas	Markus	Mr.	Germany
1992-93	Georg	Rolf	Dr.	Germany
1993-94	El-Ghany	Ahmed Fathy	Dr.	Egypt
1993-94	Tubail	As'ad	Dr.	Palestine
1993-94	Tommy	Henry J.M	Dr.	Sierra Leone
1993-94	Nahui-Ortiz	Johnny	Dr.	Peru
1993-94	Leon	Mathias Augustus	Dr.	India
1993-94	Rommel	Mathias	Mr.	Germany
1993-94	Mergia	Mesfin	Mr.	Ethiopia
1993-94	Gadah Eldam	Nagwa	Ms.	Sudan
1993-94	Siefert	Oliver	Mr.	Germany
1993-94	Andriamahefaparany	Olivier Donat	Mr.	Madagascar
1993-94	Rodrigues dos Santos	Rosana	Dr.	Brasil
1993-94	Hurmuzan Kanam	Senda	Mr.	Indonesia
1994-95	Lingbo	Cui	Mr.	China
1994-95	Yanzhao	Dong	Mr.	China
1994-95	Teka	Melis	Mr.	Ethiopia
1994-95	Tolessa	Samson	Mr.	Ethiopia
1994-95	Primo	Gayle	Ms.	Guyana
1994-95	Myint	Mu Yar	Ms.	Myanmar
1994-95	Gautam	Satish	Mr.	Nepal
1994-95	Sellahewa	Raveendra A.	Mr.	Sri Lanka
1994-95	Ntoga	Julius	Mr.	Tanzania
1994-95	Gassir Farouk	M'med Ibrahim	Mr.	Sudan
1994-95	Ghebrehiwot	Debesai	Mr.	Eritrea
1994-95	Mesfin	Yohannes	Mr.	Eritrea
1994-95	Ksoll	Michael	Dr.	Germany
1994-95	Kuntze	Björn	Mr.	Germany
1995-96	Negash	Bereket	Mr.	Eritrea
1995-96	Fraser	Orville	Mr.	Guyana
1995-96	Rosyid	Oo Abdul	Dr.-Ing.	Indonesia
1995-96	Basnet	Diwaker	Mr.	Nepal
1995-96	Ahmed	Maqbool	Mr.	Pakistan
1995-96	Magpoc	Godofredo Jr.	Mr.	Philippines

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1995-96	Maltsev	Alexandre	Mr.	Russia
1995-96	Lin	Yeong-Chuan	Mr.	Taiwan
1995-96	Kingu	Elizabeth A.	Ms.	Tanzania
1995-96	Endale Geda	Genene	Mr.	Ethiopia
1995-96	Baba	Abdallah	Mr.	Tunesia
1995-96	Fuentes	Enrique	Mr.	Chile
1995-96	Steinmeier	Ernstjoachim	Mr.	Mexico
1995-96	Nikolic	Milorad	Mr.	Germany
1995-96	Woelk	Karsten	Mr.	Germany
1996-97	Kamberi	Mirela	Ms.	Albania
1996-97	Orlando	Perez	Mr.	Bolivia
1996-97	Celestine Anyam	Awa	Mr.	Cameroon
1996-97	Ye	Zhao Hui	Ms.	China
1996-97	Teshome G/Tsadik	Hiwote	Ms.	Ethiopia
1996-97	Yimer Woldetekele	Nebiyu	Mr.	Ethiopia
1996-97	Gbagbo	Joseph Kofi Nani	Mr.	Ghana
1996-97	Hegde	Gajanana Krishna	Dr.	India
1996-97	Osawa	Bernard	Mr.	Kenya
1996-97	Ballesteros Perez	Miguel Angel	Mr.	Nicaragua
1996-97	Projestus M.	Rwiza /	Mr.	Tanzania
1996-97	Morris	Richard	Mr.	Australia
1996-97	Sancho	Sebastian	Mr.	Costa Rica
1996-97	Dalexis	Walmé	Mr.	Haiti
1996-97	Belz	Matthias	Mr.	Germany
1996-97	Schröter	Wolfram	Mr.	Germany
1997-98	Vásquez Cavieres	Ruben Eduardo	Mr.	Chile
1997-98	Chen	Rong	Mr.	China
1997-98	Zhang	Yin	Dr.	China
1997-98	Castillo Arguello	Guillermo Eduardo	Mr.	El Salvador
1997-98	Abdulkadir Ibrahim	Bekala	Ms.	Ethiopia
1997-98	Ahiataku Togobo	Wisdom	Mr.	Ghana
1997-98	Parthan	Binu	Mr.	India
1997-98	Odeh	Ibrahim	Dr.	Jordan
1997-98	Sichali	Francis	Mr.	Malawi
1997-98	Petrucci	Fernando	Mr.	Argentinien
1997-98	Schröder	Christoph	Mr.	Germany
1997-98	Jackson	Thomas	Mr.	USA
1997-98	Delamo Duch	Alex	Mr.	Spain
1997-98	Endres	Manuela	Ms.	Germany
1997-98	Vanginé	Wooslène	Ms.	Haiti
1997-98	Lustig	Konrad	Mr.	Germany
1997-98	Gomez Vilar	Ramon	Mr.	Spain
1998-99	Masum	Syed Ehteshamul Huq	Mr.	Bangladesch
1998-99	Liu	Hui	Ms.	China, VR
1998-99	Yang	Na	Ms.	China, VR
1998-99	Urena Vargas	Wesly	Mr.	Costa Rica
1998-99	Kekelia	Bidzina	Mr.	Georgien
1998-99	Patil	Samudragupta Ashok	Mr.	India
1998-99	Tiako Ngalani	Christophe	Mr.	Cameroon
1998-99	Jaoko	Hancox Wilson	Dr.	Kenya
1998-99	Chima	Timothy Freeman	Mr.	Malawi
1998-99	Al--Alawi	Ali Salim	Dr.	Sultanate of Oman
1998-99	Chirvase	Dana	Dr.	Rumänien
1998-99	Dlamini	Sibusiso Ndumiso	Mr.	Swaziland
1998-99	Jamiyansharav	Khishigbayar	Ms.	Mongolia

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1998-99	Lam	Johannes (Jan)	Mr.	Netherlands
1998-99	Straub	Christoph	Mr.	Germany
1998-99	Oehrens	Juan Sebastian	Mr.	Chile
1999-00	Tadesse	Alemu	Mr.	Ethiopia
1999-00	Khan	Md Mesbah	Mr.	Bangladesch
1999-00	Hoque	Mozammel	Mr.	Bangladesch
1999-00	Ambe	Roseline	Ms.	Cameroon
1999-00	Wang	Di	Mr.	China, VR
1999-00	Paredes	Rodriguez	Mr.	Colombia
1999-00	Subbarao	Sham	Mr.	India
1999-00	Al-Nawaiseh	Bassil	Mr.	Jordan
1999-00	Gamula	Gregory	Mr.	Malawi
1999-00	Dahal	Yubaraj	Mr.	Nepal
1999-00	Musa	Mzumbe	Mr.	Tanzania
1999-00	Sendegeya	Al-Mas	Mr.	Uganda
1999-00	Ziesmer	Andrea	Ms.	Germany
1999-00	Ulziisuren	Enhbold	Mr.	Mongolia
1999-00	Gläser	Bernhard	Mr.	Germany
1999-00	Kuyvenhoven	Simon	Mr.	Holland
2000-01	Islam	Mazharul	Mr.	Bangladesh
2000-01	Fuh	Veronica Manka	Ms.	Cameroon
2000-01	Mu	Yundong	Mr.	China
2000-01	P.V.	Aravind	Mr.	India
2000-01	Srikanth	Subbarao	Mr.	India
2000-01	Gil Guerrero	Algert	Mr.	Mexico
2000-01	Ghimire	Ram Prasad	Mr.	Nepal
2000-01	Anahua Quispe	Edgar Narciso	Dr.	Peru
2000-01	Magessa	Finias Bryceson	Mr.	Tanzania
2000-01	Nguyen	Quoc Khanh	Dr.	Vietnam
2000-01	Islam	MD. Saiful	Mr.	Bangladesh
2000-01	Tang	Hui	Mr.	China
2000-01	Risse	Oliver	Mr.	Germany
2000-01	Abbas	Mushahid	Mr.	Pakistan
2000-01	Tardón Ruiz de Gauna	Saioa	Dr.	Spain
2000-01	Nino	Raul	Mr.	Venezuela
2000-01	von Hauff	Elizabeth Leoni	Ms.	Canada
2001-02	Mohtad	Ibrahim (Shafi)	Mr.	Bangladesh
2001-02	Belle	Vivian	Mr.s.	Cameroon
2001-02	Nanji	Henry Nota	Mr.	Cameroon
2001-02	Sanchez Mino	Santiago Jorge	Mr.	Ecuador
2001-02	Shukla	Anand	Dr.	India
2001-02	Gadde	Butchaiah	Mr.	India
2001-02	Heang	Bora	Mr.	Cambodia
2001-02	Ochieng	Xavier	Mr.	Kenya
2001-02	Dhital	Ram Prasad	Mr.	Nepal
2001-02	Poudel	Om Prasad	Mr.	Nepal
2001-02	Mazimpaka	Ernest	Mr.	Rwanda
2001-02	Abd El Messih	Bahy Saad Abdalla	Mr.	Egypt
2001-02	Umana	Alejandro	Mr.	Colombia
2001-02	Pilalas	Loukas	Mr.	Greece
2001-02	Triantafyllos	Panagiotis	Mr.	Greece
2001-02	Manssen	Thomas	Mr.	Germany
2001-02	Winterfeldt	Jörg	Mr.	Germany
2001-02	Avellaneda de la Calle	Jordi	Mr.	Spain
2001-02	Shah	Sayed Faruque	Mr.	Bangladesh

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2001-02	Komilov	Asliddin	Mr.	Usbekistan
2002-03	Asaah	Alice Ghopai	Ms.	Camerroom
2002-03	Saha	Jhantu Kumar	Mr.	Bangladesh
2002-03	Tafesse	Anteneh Gulilat	Mr.	Ethiopia
2002-03	Vega	Fernando Alberto	Mr.	Honduras
2002-03	Irasari	Pudji	Ms.	Indonesia
2002-03	Lee	Joo Yeol	Mr.	Korea
2002-03	Kumar Khadka	Manoj	Mr.	Nepal
2002-03	Mishra	Subhash Kumar	Mr.	Nepal
2002-03	Shao	Jie	Ms.	China
2002-03	Trujillo Quintero	Juan José	Mr.	Colombia
2002-03	Peter	Marco	Mr.	Germany
2002-03	Nacci	Gianpiero	Mr.	Italy
2002-03	Choudhry	Ihtsham Farooq	Mr.	Pakistan
2002-03	Bango Cascon	Alejandro	Mr.	Spain
2002-03	Galsan	Sevjdsuren	Ms.	Mongolia
2003-04	Veneranda Mola	Nicolás Enrique	Mr.	Argentina
2003-04	Ahmed	Firoz Uddin	Mr.	Bangladesh
2003-04	Aman	Julia	Ms.	Bangladesh
2003-04	Ferdinand	Ajamah	Mr.	Cameroon
2003-04	Sanchez Conteras	Julio Rene	Mr.	Colombia
2003-04	Mitra	Indradip	Mr.	India
2003-04	Lawless	Richard	Mr.	Ireland
2003-04	Han	Seong-sook	Ms.	Korea
2003-04	Trinh Viet	Hieu	Ms.	Vietnam
2003-04	Sarran	Mathieu	Mr.	France
2003-04	Bröer	Torsten	Mr.	Germany
2003-04	Michel	Andreas	Mr.	Germany
2003-04	Bandlamudi	George-Chakravarthy	Mr.	India
2003-04	Joppich	Farida Damirovna	Ms.	Kyrgyzstan
2003-04	Dosmailov	Meirzhan A.	Mr.	Kazakhstan
2003-04	Possamai	Everson	Mr.	Brazil
2003-04	Palle Badalge	Iresha Somarathna	Mr.	Sri Lanka
2003-04	Bajracharya	Prashun Ratna	Mr.	Nepal
2003-04	Yandri	Erkata	Mr.	Indonesia
2004-06	Chowdhury	Mohammad Shahriar Ahmed	Mr.	Bangladesh
2004-06	Zobayer	A.N.M.	Mr.	Bangladesh
2004-06	Pena Diaz	Alfredo	Mr.	Colombia
2004-06	Toropov	Maksim	Mr.	Kyrgyzstan
2004-06	Sapkota	Prakash	Mr.	Nepal
2004-06	Aderinto	Suraju	Mr.	Nigeria
2004-06	Henriquez Prevoo	Christian	Mr.	Peru
2004-06	Limsoontorn	Tubtim	Ms.	Thailand
2004-06	Ochieng	David Otieno	Mr.	Kenya
2004-06	Akhtar	Naveed	Mr.	Pakistan
2004-06	Brudler	Evelyn	Ms.	Germany
2004-06	Hermann	Sebastian	Mr.	Germany
2004-06	Tek	Boon Jin	Mr.	Malaysia
2004-06	Moreno M.	Juan Carlos	Mr.	Venezuela
2005-07	Khan	Ahmed Jahir	Mr.	Bangladesh
2005-07	Boruah	Dwipen	Mr.	Indien
2005-07	Maharjan	Bhai Raja	Mr.	Nepal
2005-07	Vera Tudela Carreno	Luis Enrique Domingo	Mr.	Peru
2005-07	Caag Cabaces	Donnalyn Atienza	Ms.	Philippines
2005-07	Jagwe	Wyclif	Mr.	Uganda

List of Alumni / Students

2005-07	Mahu	Seth Agbeve	Mr.	Ghana
2005-07	Wickramarathne	Widana G. Hashini K.	Ms.	Sri Lanka
2005-07	Paula Chaves	Patricia Castello Branco	Ms.	Brasil
2005-07	Sanchez Herrera	Diego Alejandro	Mr.	Columbia
2005-07	Wilches Tamayo	Camilo Andres	Mr.	Colombia
2005-07	Beyn	Mulugeta Weldetnsae	Mr.	Eritrea
2005-07	Sterner	Michael	Mr.	Germany
2005-07	Hegel Pellecer	Rodolfo	Mr.	Guatemala
2005-07	Pechlivanoglou	Georgios	Mr.	Greece
2005-07	Peel	Andrew	Mr.	Canada
2005-07	Randig	Sebastian	Mr.	Germany
2005-07	Rojas	Carlos Mauricio	Mr.	Colombian
2005-07	Herráez Hernández	Iván	Mr.	Spain
2005-07	Torio Blanco	Herena	Mr.	Spain
2006-08	Khatun	Jorifa	Ms.	Bangladesh
2006-08	Khatiwora	Nar Bahadur	Mr.	Bhutan
2006-08	Vasconcellos	Marcelo de Lima	Mr.	Brazil
2006-08	Nafiri	Faraida	Ms.	Indonesia
2006-08	Lohani	Sunil Prasad	Mr.	Nepal
2006-08	Singh	Nanik	Mr.	Panama
2006-08	Mekki	Nada Mohamed	Ms.	Sudan
2006-08	Mwakatage	Edwin Sithole	Mr.	Tanzania
2006-08	Patschke	Erik	Mr.	Germany
2006-08	Türker	Burak	Mr.	Turkey
2006-08	McGraw	Sabin	Mr.	USA
2006-08	Wu	Caiyang	Ms.	China
2006-08	Zhang	Wendi	Ms.	China
2006-08	Kaklamanakis	Emmanouel	Mr.	Greek
2006-08	Surkute	Dnyanoba M.	Mr.	India
2006-08	Richert	Bodo	Mr.	Germany
2006-08	Karampela	Panagiota	Ms.	Greece
2007-09	Anwar Hossain	Mohammad	Mr.	Bangladesh
2007-09	Prakash K.C.	Chandra	Mr.	Nepal
2007-09	Nwaogaidu	Simeon Obinna	Mr.	Nigeria
2007-09	Elhadi Adam	Rania Mohammad	Ms.	Sudan
2007-09	Parinyacupt	Unchalee	Ms.	Thailand
2007-09	Mubbala	Ritah M.	Ms.	Uganda
2007-09	Cendrawati	Dian Galuh	Ms.	Indonesia
2007-09	Garcia da Fonseca	Leila	Ms.	Brazil
2007-09	Pabon Restrepo	Giovanni Andres	Mr.	Colombia
2007-09	Achibiri	Nnadozie Stanley	Mr.	Nigeria
2007-09	Potzmann	Silvia	Ms.	Austria
2007-09	Günther	Andreas	Mr.	Germany
2007-09	Bachtiar	Ibnu Kahfi	Mr.	Indonesia
2007-09	Millan	Rosiel	Ms.	Mexico
2007-09	Güner	Bedrettin	Mr.	Turkey
2007-09	Sandris	Georgios	Mr.	Greece
2008-10	Alcazar	Freddy	Mr.	Venezuela
2008-10	Binda Pereira	Mariana	Ms.	Brazil
2008-10	Butler	Blake Allan	Mr.	USA
2008-10	Chakanga	Kambulakwao	Ms.	Zambia
2008-10	Farmani Marzankalateh	Issa	Mr.	Iran
2008-10	Goepfert	Tyler	Mr.	USA
2008-10	Hossain	Md. Motaheer	Mr.	Bangladesh
2008-10	Javed	Ahsan	Mr.	Pakistan

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2008-10	Mahmud	Abdul Muhaimin	Mr.	Malaysia
2008-10	Njoka	Francis Namu	Mr.	Kenya
2008-10	Paradine	Martin D.	Mr.	Canada
2008-10	Pereira Santos	Rafael	Mr.	Brazil
2008-10	Semere Tesfaselasia	Russom	Mr.	Eritrea
2008-10	Shah	Adnan	Mr.	Bangladesh
2008-10	Tchiemogo	Hamadou	Mr.	Niger
2008-10	Temponeras	Dionysios	Mr.	Greece
2008-10	Thakuri	Sujit	Mr.	Nepal
2008-10	Ullrich	Cédric	Mr.	France
2008-10	Wannapin	Sirinya	Ms.	Thailand
2008-10	Agarwal	Ankur	Mr.	India
2009-11	Cuellar	Alberto	Mr.	Spain
2009-11	Al-Hammad	Hirak	Mr.	Bangladesh
2009-11	Arroyo Klein	Sebastián Allejandro	Mr.	Chile
2009-11	Brown	Nicholas	Mr.	USA
2009-11	Bussièeres	Frederic	Mr.	Canada
2009-11	Chhatbar	Kaushal	Mr.	India
2009-11	De Vecchi	Rafael	Mr.	Brasil
2009-11	Dola	Edwin Ochieng	Mr.	Kenya
2009-11	Gómez Padrón	María Gabriela	Ms.	Venezuela
2009-11	Hamzeh	Ahmad	Mr.	Palästina
2009-11	Ramon Suarez	Juan Luis	Mr.	Spain
2009-11	Martin Gomez	Juan Pablo	Mr.	Mexico
2009-11	Montealegre	Federico	Mr.	Costa Rica
2009-11	Montoya Rojas	Juan Pablo	Mr.	Venezuela
2009-11	Moreno Chiunti	Celia	Ms.	Mexico
2009-11	Ngoma	Daniel H.	Mr.	Tanzania
2009-11	Noureddine	Ibrahim	Mr.	Lebanon
2009-11	Rodriguez Sanchez	Diana Elisa	Ms.	Mexico
2009-11	Rudenko	Vladislav	Mr.	Russia
2009-11	Weldemicael	Yonas Tesfay	Mr.	Eritrea
2009-11	Wen	Chia Chia	Ms.	Taiwan
2010-12	Alemayehu	Firealem Wosene	Mr.	Ethiopia
2010-12	Aroeira de Almeida	Isabela	Ms.	Brazil
2010-12	Braden	Claudia	Ms.	Germany
2010-12	Campero Anchondo	German Fernando	Mr.	Mexico
2010-12	Carvajal Sarzosa	Pablo Esteban	Mr.	Ecuador
2010-12	Chávez Velázquez	Sandra Laura	Ms.	Mexico
2010-12	Cordes	Johannes	Mr.	Germany
2010-12	De Brito Lima	Danilo	Mr.	Brazil
2010-12	Do Duc	Tuong	Mr.	Vietnam
2010-12	EL-Sayed	Mahmoud Rajeh	Mr.	Palestine
2010-12	Han	Myo Min	Mr.	Myanmar
2010-12	Kipruto	Walter	Mr.	Kenya
2010-12	Kumaraswamy Sivaprakasam	Rangini	Ms.	India
2010-12	Kwan	Alan	Mr.	USA
2010-12	Lüer	Stefan Michael	Mr.	Germany
2010-12	Mashnik	Daria	Ms.	USA
2010-12	Ramírez Acosta	Rebeca Priscilla	Ms.	Panama
2010-12	Ramírez Pineros	Alvaro Andres	Mr.	Colombia
2010-12	Rodríguez Bonilla	Javier Eduardo	Mr.	Colombia
2010-12	Sequeda Pinero	Miguelángel	Mr.	Venezuela
2010-12	Venegas	Orlando	Mr.	Chile
2010-12	Villa	Juan Pablo	Mr.	Argentina

List of Alumni / Students

2011-13	Arias Pérez	Alfonso	Mr.	Costa Rica
2011-13	Beyene	Mehari Siltan	Mr.	Eritrea
2011-13	Candra	Dodiek Ika	Mr.	Indonesia
2011-13	de Oliveira Nascimento	Paulo Eduardo	Mr.	Brazil
2011-13	Dhir	Harpeet Singh	Mr.	India
2011-13	Faerron	Ricardo	Mr.	Costa Rica
2011-13	Gaur	Varun	Mr.	India
2011-13	Herrerías Azcué	Martin	Mr.	Mexico
2011-13	Kaminski Küster	Kristie	Ms.	Kenya
2011-13	Kigima	David Thamaini	Mr.	Kenya
2011-13	Kühnel	Sven	Mr.	Germany
2011-13	Landwehr	Gregory Brent	Mr.	South Africa
2011-13	Lopez Escoto	Christian David	Mr.	Honduras
2011-13	Mancera Guevara	Diana Rocio	Ms.	Colombia
2011-13	Nugusse	Habtom	Mr.	Eritrea
2011-13	Nurmukhanbetova	Karakoz	Ms.	Kazakhstan
2011-13	Parikh	Dishant	Mr.	India
2011-13	Pernía Rodríguez	Yutriz Yusely	Ms.	Venezuela
2011-13	Sahin	Nuran Pinar	Ms.	Turkey
2011-13	Vega Alzate	Daniela	Ms.	Panama

EUREC/REMA-students

Course	Family Name	1st Name	Tit.	Origin
2004/05	Aymard	Caroline	Ms.	France
2004/05	Thomas	Denis	Mr.	Belgium
2004/05	Lermitte	Tristan Eugene William	Mr.	UK
2004/05	Clauzonnier	Adrien	Mr.	France
2004/05	Ansell	Duncan Peter	Mr.	UK
2004/05	Adler Gomes Dacosta	João Paulo	Mr.	Portugual
2004/05	Leceve	Laurent	Mr.	France
2004/05	Avraamides	Stelios	Mr.	Cypruss
2004/05	Correia	Stélio	Mr.	Portugual
2004/05	Carrell	Justin	Mr.	UK
2004/05	Mantas	Panagiotis	Mr.	Greece
2004/05	Dimopoulos	Aris	Mr.	Greece
2004/05	Stromboni-Prevost	Estelle	Ms.	France
2004/05	Thiebaut	Romarc	Mr.	France
2005/06	Adnan	Mohammad	Ms.	Pakistan
2005/06	McCracken	Philippe	Ms.	Canada
2005/06	Xuereb	Steven	Ms.	Malta / Canada
2005/06	Lopez Alcalá	Leodegario	Ms.	Mexico
2005/06	Sader	Hadi	Ms.	Lebanon
2005/06	Rouze	Jerome	Ms.	France
2005/06	Antonopoulos	Antonios	Ms.	Canada
2005/06	Polizois	Theodoros-Theodoritos	Ms.	Greece
2005/06	Gulliot	Bertrand	Ms.	France
2005/06	Montes De Oca Arjon	Luis	Ms.	Spain
2005/06	Singlehurst	Robert	Ms.	Canada
2006/07	Skarvelis-Kazakos	Spyros	Ms.	Greece
2006/07	Roycroft	Patrick (Paddy)	Ms.	Germany /Ireland
2006/07	Craig	Mark Kenton	Ms.	Canada
2006/07	Bennett	Valerie	Ms.	UK / Canada

List of Alumni / Students

2006/07	Perini	Leonardo	Ms.	Italy
2006/07	Di Lorenzo	Lisa	Ms.	Canada/Italy
2006/07	Martinez-Streignard Viana	Vanesa	Ms.	Venezuela
2006/07	Gil Zapata	Miguel	Ms.	Spain
2006/07	Edge	Tad Michael	Ms.	USA
2006/07	Troncoso Lago	Juan Antonio	Ms.	Spain
2006/07	Marques Malcato	Silvia	Ms.	Portugal
2006/07	Teksan	Yunus	Ms.	Turkey
2007/08	Tanguy	Yann	Mr.	France
2007/08	Chacon Calderon	Nancy	Ms.	Guatemala
2007/08	Del Cid Lemus	César Roberto	Mr.	Guatemala
2007/08	Townsend	Michael	Mr.	US
2007/08	Phillips	Ian	Mr.	US
2007/08	Veynandt	François Charles A.	Mr.	France
2007/08	Goy	Solène	Ms.	France
2007/08	Wong	Craig John	Mr.	US
2007/08	Baldus-Jeursen	Christopher	Mr.	Canada
2007/08	Cuddihy	Alan	Mr.	Ireland
2007/08	Paterakis	Petros	Mr.	Greece
2007/08	Qwen	Emma Louise	Ms.	UK
2007/08	Lynch	Mairead	Ms.	Ireland
2007/08	Gillard	Xavier	Ms.	France
2007/08	Manginas	Georgios	Ms.	Greece
2008/09	Adams	Brian	Ms.	USA
2008/09	Arapogianni	Athanasia	Ms.	Greece
2008/09	Chatzipanagi	Anatoli	Ms.	Greece
2008/09	Emmerich	Roy	Ms.	South Africa
2008/09	Gammoh	Omar	Ms.	Jordan
2008/09	Gkinis	Ioannis	Ms.	Greece
2008/09	Hernandez Rodriguez	Juan Esteban	Ms.	Columbia
2008/09	Kwapis	Elke	Ms.	Germany
2008/09	Loosen	Alex	Ms.	USA
2008/09	Perez	Miguel	Ms.	Venezuela
2008/09	Rojas	Sergio	Ms.	Costa Rica
2008/09	Teixeirinha	Patricia Alexandra	Ms.	Portugal
2008/09	Thomas	Jaimie	Ms.	Costa Rica
2009/10	Jalia	Aquil A	Mr.	India
2009/10	Konstantinos	Asproulakis	Mr.	Greece
2009/10	Adham	Atallah	Mr.	Lebanon
2009/10	Paola	Cadau	Ms.	Italy
2009/10	Andreea	Costache	Ms.	Romania
2009/10	Luis Felipe	Gonzalez Munoz	Mr.	Mexico
2009/10	Can	Ibrahimoglu	Mr.	Turkey
2009/10	Theodoros	Kotsonis	Mr.	Greece
2009/10	Pedro	Peno Gama	Mr.	Spain
2009/10	Giuseppe	Petrazzuolo	Mr.	Italy
2009/10	Sundus	Ramli C.	Ms.	Malaysia
2009/10	Etienne	Thomassin	Mr.	France
2009/10	Jose F.	Zuniga	Mr.	Mexico
2010/11	Angelucci	Massimo	Mr.	Italy
2010/11	Briones Martinez	Maria Gabriela	Ms.	Germany / Ecuador
2010/11	Buyukcoskun	Murat	Mr.	Turkey/Canada
2010/11	Farrés Antúnez	Pau	Mr.	Spain
2010/11	Gröger	Katharina	Ms.	Germany

List of Alumni / Students

2010/11	Guevara	Edison	Mr.	Venezuela
2010/11	Henningsgaard	Elizabeth	Ms.	US
2010/11	McKinley	Alex R.	Mr.	US
2010/11	Merchán Millán	Daniel	Mr.	Spain
2010/11	Mouchtidiotis	Nikolaos	Mr.	Greece
2010/11	Norton	Michael F.	Mr.	Ireland
2010/11	Ramesh	Vinodh	Mr.	India
2010/11	Seethapathy	Poorana K.	Ms.	India
2010/11	Wasajja	Henry	Mr.	Uganda
2011/12	Ayoubi	Amjad	Mr.	Syria
2011/12	Benberrah	Abdelhalim	Mr.	Algeria
2011/12	Gonzalez	Ricardo Sebastian	Mr.	Colombia
2011/12	Gonzalez	Antonio	Mr.	Mexico
2011/12	KR	Bhargav	Mr.	India
2011/12	Liu	Ke-hsuan	Ms.	Taiwan
2011/12	Mittal	Ankit	Ms.	India
2011/12	Nikolis	Charalampos	Mr.	Greece
2011/12	Ottaviano	Dimitri	Mr.	Italy
2011/12	Pablo	Berges del Arco	Mr.	Spain
2011/12	Parekh	Varun	Mr.	India
2011/12	Perez Rodarte	Aldo	Mr.	Mexico
2011/12	Saenz	Cesar	Mr.	Chile
2011/12	Staffolani	Nicola	Mr.	Italy

STUDENTS PPRE 2010-12 AND EUREC 2010-11





STUDENTS PPRE 2011-13 AND EUREC 2011-12