ANSOLE News

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## Dear ANSOLERs, friends and network partners,

It is my pleasure to provide you with some reading material for your end of year holidays in the form of *ANSOLE News 3.*

I hope you enjoy reading the various contributions from experienced people as well as from young people, to whom ANSOLE offers this platform to "train" how to write articles, which is in line with its mission of training and education. More importantly, I am sure that young scholars will gain vital information about various funding possibilities that exist through ICTP-ANSOLE and through OPCW.

I want to express my thanks to Ms Lesley Tobin and Dr. Joseph Mutale for accepting the invitation to join the editorial board. My thanks also go to Dr. Bettina Schmidt and Dr. Kate Showers, who did a wonderful job in the first two issues of *ANSOLE News,* but who have withdrawn from editing for now due to health problems and other immediate tasks. In addition, I am grateful to Kate for representing ANSOLE during the Climate Change March in New York in September this year. Kate, thank you for being so creative in improvising an ANSOLE banner for that occasion…

In the coming year *ANSOLE News* will be renamed "*ANSOLE e-Magazine*" and three issues are planned. This will only be possible though your various contributions, to be submitted at editorial@ansole.org.

I want to wish all ANSOLERs and our readers Merry Christmas, Happy Chanukah, Happy Kwanzaa and Happy New Year 2015.

May 2015 be a year full of positive surprises for all of us.

Stay blessed,

Daniel A. M. Egbe

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## In this issue



**The editorial board of the forthcoming ANSOLE e-Magazine invites you to submit your news items, research reports, opinion articles, events, publication announcements and other updates of interest to the ANSOLE community.**

**Email: editorial@ansole.org**

## ANSOLE Activities: August -December 2014

*by Daniel A. M. Egbe*

Since the publication of ANSOLE News 2 in July 2014, apart from its day-to-day tasks, ANSOLE, through its coordination office, has been involved in a series of activities which are in line with its missions of capacity building and promotion of renewable energy in Africa, as presented chronologically below:

### August 2014

On August 1st, I had a Skype™ chat with Dr. Arlen Hastings and Ms Sarah Erich, who are both involved in the RISE (Regional Initiative in Science and Education) program of the Institute of Advanced Studies of the University of Princeton (http://sig.ias.edu/rise/).

RISE prepares PhD- and MSc-level scientists and engineers in sub-Saharan Africa through university-based research and teaching networks in selected disciplines. Its primary purpose is to strengthen science and engineering research and teaching in African universities by training new academic staff and upgrading the qualifications of existing staff. RISE's broader goal is to build capacity in science, technology and innovation as a key to economic development in sub-Saharan Africa, which is a goal shared by ANSOLE. It was decided that ANSOLE will apply to become a RISE network in the next competition-round during 2016-2017. A contribution submitted by RISE fellow Ms Pelly Malebe can be read in this issue.

### Signing of a new MOU

In accordance with the mutual goal to promote cooperation in higher education and after recognizing the mutual interest in the fields of education and training, research and development, transfer of technology and dissemination of knowledge on a long term basis, following exchange visits, discussions and correspondence, a formal broad Memorandum of Understanding (MoU) was signed between the Nelson Mandela African Institution of Science and Technology (NM-AIST) in Arusha Tanzania (www.nm-aist.ac.tz) and ANSOLE on the 25th of August 2015 in Arusha. The agreement was signed by the Vice-Chancellor of NM-AIST on behalf of that institution in the presence of senior administrative members of NM-AIST.

*Signing of MoU between Nelson Mandela African Institution of Science and Technology (NM-AIST) and ANSOLE*

*Participants at the signing of the MoU between NM-AIST and ANSOLE on the 25th of August 2014 at Arusha, Tanzania*

The first action based on this agreement is the co-organisation in 2015 of a Pan-African Scientific Conference with Workshops (ANSOLE DAYS 2015) on Renewable Energies in Africa on the theme "Bridging Academics, Technicians and Entrepreneurs" during the Nelson Mandela week from the 13th to the 18th of July 2015 at NM-AIST.

During my stay at NM-AIST, the issue of the need for renewable energy technologies adaptable to African environment was raised in an exchange with Prof. Eugene Park and Dr Marcel Sitiriche, both lecturers at NM-AIST. Both agreed to contribute an article on this topic, which you can read on page 9.

## September 2014

I was invited by the *Karl Kübel Stiftung (KKS) für Kind und Familie* (www.kkstiftung.de) to present the activities of ANSOLE during a weekend seminar on the theme "*Wer entwickelt Wen und Wohin?"* (Who develops Whom and Where to?). The seminar was held in Francfort (Main) from the 12th to the 14th of September 2014. 22 of the 25 participants were young Germans who had spent approximately one year in India, Malawi and Togo, using the programme called "Weltwärts (world-wards)" financed by the German Ministry of International Development and Cooperation (BMZ) and coordinated by KKS, with the aim of broadening their horizon and assisting in a development project in the host countries. The young people reported on their experience in a foreign country and what they learned for life during their stay. One such report is documented here through the contribution of Johanna Dohl. In addition, the seminar focused on issues pertaining to development aid to countries of the South, and on subtly rooted racism in German/European society. The contribution of Maximiliam Betmann gives a taste of what was debated.

*Participants at the seminar of the Karl-Kübel Stiftung on "Who develops Whom and Where to?"*

*12-14 September Francfort (Main)*

## TriesteNext 2014

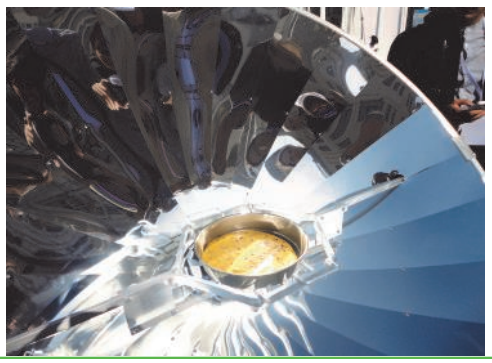
ANSOLE was invited to share a stand with the International Centre for Theoretical Physics (ICTP) during the TriesteNext 2014 event. TriesteNext was an open-air event held in the centre of the city of Trieste from the 26th to the 29th of September. It offered a platform to research institutions in and around Trieste to present their research activities to the general public, and especially to pupils and students from various schools in the area.

The theme this year was "Energy", and many people were attracted to the ANSOLE-ICTP stand by a solar cooker which was placed in front of our stand. We spent hours explaining the importance of solar cookers in alleviating the tasks of women in rural Africa and elsewhere, and their positive impact on the environment and on health (less deforestation, less $CO_2$ emission, disinfection of drinking water, etc), and we also demonstrated how fast this type of cooker can boil water, cook eggs and bake cakes under different solar irradiations. TriesteNext 2014 also organized a round-table discussion on the 27th September, during which the human capacity building activities of ANSOLE were presented.

*Images from TriesteNext 2014:*

*Explaining how a solar cooker functions.*

*Boiling eggs using a solar cooker.*



*Baking a cake using a solar cooker.*

# ANSOLE Report:

## October 2014

The Abdus Salam International Centre for Theoretical Physics 50th Anniversary

I was invited to represent ANSOLE during the 50th Anniversary celebrations of ICTP (www.ictp.it), held from the 6th to the 9th of October 2014. The event witnessed the attendance of a large number of VIPs, among them His Excellency Paul Kagame, the President of Rwanda, who, in his keynote address, emphasized his country´s focus on renewable energies to meet its energy needs. The opportunity was used to distribute ANSOLE flyers and present the network to ministers and heads of the various international institutions that were present.

*Left: His Excellency Paul Kagame, President of Rwanda, addressing the audience at the 50th anniversary celebration of ICTP on the 6th of October 2014.*

*Right: The 50th anniversary cake displayed at the event dinner on the 7th of October 2014.*

I also held a side-meeting with Dr Ralph Gebauer and Dr Joseph Niemela, ANSOLE contact persons within ICTP, during which we discussed the new orientation of the ICTP-sponsored ANSOLE fellowships programmes. It was agreed to extend ICTP support to undergraduate students as from 2015 in addition to the existing INEX (Intra-African Exchange) and ANEX (Africa-North Exchange) programmes. This is line with the future plans of ICTP as presented by its director, Prof. Fernando Quevedo, during the 50th anniversary celebrations.

2nd year students can apply for support if their prospective bachelor thesis is renewable-energy based. Such "on the spot grants" will also be offered to selected Masters and PhD students studying at institutions with a strong focus on renewable energy and having adequate experimental facilities.

The monthly amount for each type of grant is as follows:

- "On the spot" undergraduate: 50-150 €
- "On the spot" Masters student: 100-250 €
- "On the spot" PhD student: 250-300 € (350-500 € for South Africa)
- INEX student: 300-350 € (450-600 € for South Africa) + return-ticket + one time starting support of 250-350 €
- ANEX student: 800-1000 € + return-ticket

The exact amount and the duration of support will be decided from case to case.

From January 2015, prospective applicants are requested to submit the following documents to fellowship@ansole.org:

- Completed and signed application form (to be downloaded from ANSOLE website )
- Detailed CV including colour passport-size photograph
- Letter of motivation in English (or French)
- Two recommendation letters
- Scanned copies of certificates and transcripts
- Acceptance letter of host laboratory (for INEX and ANEX)
- Proof of ANSOLE membership

Applicants' documents will be automatically forwarded to a selection committee consisting of the ANSOLE coordinator and eight experienced ANSOLE members (four males and four females).

At this point, I am calling individuals, institutions, companies, etc., to sponsor our various fellowship programmes, especially the "on the spot" scholarships, so that more young Africans can be adequately trained, in addition to those supported based on the yearly allocation of 18,000 € from ICTP.

The donor decides on the type and duration of the fellowship and the fellowship will bear the name of the donor. In return, donating institutions and companies will be promoted by ANSOLE.

# ANSOLE Report:

## November 2014

On the 10th November, marking UNESCO´s World Science Day for Peace and Development, I participated in an event on nanotechnology to commemorate that day. Organised by the Samuel Lindow Foundation, the event took place at the University of Central Lancashire (UCLan) Westlakes Campus (UK).

Five instructors (Yoel Rothschild from ORT, Israel; Mark Morrison of the former Institute of Nanotechnology; Joe Smerdon of UCLan; Tim Slingsby of the British Council; and Daniel Egbe of ANSOLE) presented various aspects of Nanotechnology to students from local schools during rotating Science Cafés. In addition, PowerPoint lectures were delivered twice to large audiences of students on the topics: "What is nano, what is happening at UCLan" by Joe Smerdon; and on "ANSOLE and the role of nanotechnology in organic solar cells research" by Daniel Egbe.


*UNESCO´s World Science Day for Peace and Development 2014 commemoration at the University of Central Lancashire Westlakes Campus (UK).*

On my way back to Germany, I visited the ANSOLE national representative in Britain, Dr. Joseph Mutale of the University of Manchester, who has joined the editorial team of ANSOLE News and to whom I am very grateful for the hospitality shown to me during my overnight stay in Manchester. He informed me about the creation of the Zambian Renewable Energy Agency (www.zarena.org). We discussed how ZARENA and ANSOLE can work together to promote renewable energy issues in Zambia and in East Africa.

On the 15th of November 2014, ANSOLE was presented in various forms (poster and "question & answer" expert roundtable) during an event on the theme "Think Smart-Go Global: German-African Cooperations in Science and Business", organized by the Stiftung Partnerschaft mit Afrika e.V. in Rheinbach, close to Bonn.

A day later, I flew to Cape Town, South Africa, to attend the All African Nanoscience and Nanotechnology Initiative (AANNI), co-organised by the Organisation for Prohibition of Chemical Weapons (www.opcw.org) and the University of the Western Cape (UWC) from the 19th to the 21st of November 2014. Prof. Emmanuel Iwuoha, South African Research Chair for NanoElectrochemistry & Sensor Technology and Coordinator of AANNI, was the host of the event. Participants were selected delegates of African Member States of OPCW. The detailed information provided during the event by Mr Kumaresh Misra, Head of International Cooperation Branch (ICB) of OPCW, and his colleague Mr Rohan Perera, Senior International Cooperation Officer, on Article XI and the various capacity building programmes of OPCW is of great importance to ANSOLE members using Chemistry as a tool for their research (visit the OPCW website for more details).

The following excerpts from the OPCW website give details on the types of capacity building programmes:

*"In the context of economic and technological development, Article XI of the Convention emphasises the right of Member States to engage in development and application of chemistry for purposes not prohibited under the Convention which include industrial, agricultural, research, medical, pharmaceutical, and other peaceful purposes."*

*"To promote an international cooperation among States Parties, the International Cooperation and Assistance Division implements several programmes for capacity building in the areas of peaceful applications of chemistry."* (see p.6)

**Programmes**

**Associate Programme** - Facilitates capacity building, industry-related national implementation of the CWC (Chemical Weapons Convention) and promotes good practice in chemical manufacturing and safety.

**Analytical Skills Development Course** - Assists qualified analytical chemists to acquire further practical experience in the analysis of chemicals related to the national implementation of the CWC.

**Conference Support Programme** - Facilitates the exchange of scientific and technical information, provides financial support for the organisation of conferences, workshops and seminars on special topics relevant to the CWC and facilitates participation in such events.

**Equipment Exchange Programme** - Facilitates the transfer of used and functional equipment to publicly funded laboratories and other academic institutions in developing countries from institutions in industrialised countries.

**Industry Outreach (Chemical Safety and Security Management)** - Sensitises States Parties to modern approaches in safety and security management, safety culture, and promotes safety in the management and handling of chemicals, in particular in a small and medium-sized enterprises.

**Internship Support Programme** - Scientists and engineers from developing countries conduct advanced research in laboratories in industrialised countries.

**Laboratory Assistance Programme** - Aims at improving the technical competence of laboratories engaged in chemical analysis and monitoring.

**Research Projects Support Programme** - Assists small-scale research projects in targeted countries for the development of scientific and technical knowledge in the field of chemistry for industrial, agricultural, research, medical and other peaceful purposes relevant to the CWC.

**Article XI Workshop** - Explores, identifies and develops concrete measures on the full implementation of Article XI of the Convention.

**Programme to Strengthen Cooperation with Africa** - Focuses on activities and interventions to respond to the particular needs of African Member States.

***Obtaining a Programme Document***

*1. How do we know about the issuance of Secretariat notes related to the annual Associate Programme, Analytical Skills Development Course or other one-time projects?*

- *Please check with your National Authority, or*
- *Check the Technical Secretariat's notes in the OPCW website, or request programme information via e-mail icb@opcw.org.*

*2. How do we obtain a guidance document for programme items?*

*The requested document can be received as an e-mail attachment or as a hard copy from the International Cooperation Branch (ICB): icb@opcw.org. One may also print it from the OPCW website under the section on International Cooperation Programmes where these documents are hyperlinked."*

After the presentation of the ANSOLE's activities some of the participants decided to become ANSOLE members. Dr Lydia Rhyman accepted an invitation to represent ANSOLE in Mauritius, making Mauritius the 39th African country with ANSOLE representation.

The participants were lodged at the Hotel Verde http://hotelverde.co.za, Africa´s greenest hotel, which I highly recommend to those travelling to Cape Town. It is located in the vicinity of Cape Town International Airport.


*Above: Participants at the All African Nanoscience & Nanotechnology Initiative (AANNI) event at the University of the Western Cape, South Africa.*

*Left: Hotel Verde -Africa's greenest hotel, where the participants of AANNI lodged.*

## November 2014 *(continued)*

The final ANSOLE activities in November took place from 18th-19th when Dr Marcel J. Castro-Sitiriche of NM-AIST and Mr James Wafula represented ANSOLE at the Africa Mini Grids Summit in Nairobi, Kenya from (see report in this issue).

Following this, the 4th general assembly of ANSOLE e.V. was held on the 22nd of November at the Semmelweisstr. 19 in Jena, Germany (details can be read in the news item: *ANSOLE e.V. intern* [right]).

## December 2014


The first Left-Left-Green State Government of Thuringia, Germany, was sworn in on Friday 5th December, exactly 25 years after the reunification of Germany, marking a turning point in the political landscape, whereby for the first time, Bodo Ramelow, a member of the party *Die Linke* (a transformation of the former Communist Party of former East Germany) became head of a State Government. It is worth mentioning this, because coincidentally ANSOLE e.V. was registered in Jena, Thuringia, and the new Minister of Environment from the Green Party, Ms Anja Siegesmund, is a tenant until the end of July 2015 in the house belonging to us, where ANSOLE will have its offices as from 2015. We congratulate Ms Siegesmund on her new position!

## Other News …

Between August and October 2014, FOM Technologies, Denmark, and NEXT ENERGY in Oldendurg, Germany, joined ANSOLE as constitutional members. We are grateful to have both institutions on board.

## Solar as Industrial Revolution

Li Hejun, Chairman of Hanergy Holding Group, on the Energy Source gave an interview to the New York Times on the subject of "Solar as Industrial Revolution". Follow this link to find out his views on the subject.

## And finally…

As from 2016, ANSOLE will be awarding prizes to outstanding ANSOLE members' achievements.

## ANSOLE e.V. Intern Congratulations

ANSOLE e.V. would like to congratulate Christian Leier, an active ANSOLE e.V. in the early days and medical student in his final year, and his wife Maria Leier, Physics PhD student in her final year, on their wedding on the 2nd of November 2014. We wish them a very successful and "sustainable" marriage!

## Condolences

At the same time we share the sadness of Dr Gabriel Natura, board member of ANSOLE e.V. who suddenly lost his 28-year-old nephew (an adopted son after the death of his sister many years ago) on the 20th of November. This is a very big loss for Dr Natura, because he had pinned a lot of hope on this young man to help him financially support the rest of the family in Mozambique.

## Welcome

We are happy to welcome Prof. Dr. Kerstin Wydra of the University of Applied Sciences in Erfurt and Dr Peter Frey, CEO of SolarValley Mitteldeutschland as new members of ANSOLE e.V. who, through their broad networks and personal dynamism, will have a positive impact on the network.

## WUS Re-elections

During the 64th general assembly of the German chapter of the World University Service, which was held on the 8th of November in Wiesbaden, two board members of ANSOLE e.V., Daniel A. M. Egbe and Bettina Schmidt, were re-elected for the next two years as board members of WUS Germany. WUS, which advocates "human right for education for all", was very instrumental in the process of transforming ANSOLE into ANSOLE e.V. The very first draft of the by-laws of ANSOLE e.V. was written by Helmut Becker, a highly active board member of WUS, who turned 70 this year.

# ANSOLE Report:

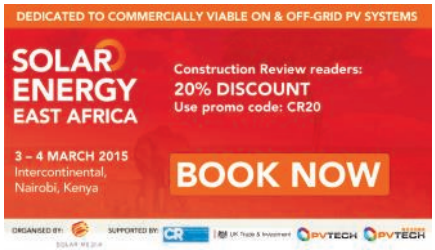
## 4th General Assembly

The 4th general assembly of ANSOLE e.V. was held on the 22nd of November at the Semmelweisstr 19 in Jena. The members present showed satisfaction with the work of the board after obtaining reports on activities and finances of ANSOLE e.V.

Constructive criticism was offered by our member Dr Wichard Beenken of the University of Ilmenau on the written report. He instructed us how to formulate our reports so that they meet the expectations of the German financial authorities. Ms Nassima Bouguerra from the University of Bejaia, the first fellow to receive full funding from ANSOLE e.V. in the frame of the ANEX program for a three-month stay in Austria (October-December), was present at the gathering. She gave a brief progress report of her research activities. The meeting ended with a get-together complemented by Cameroonian food and solar beverages.

## Endorsed Events

- 3-4 March 2015, Intercontinental, Nairobi, Kenya: **Solar Energy East Africa**. ANSOLE members discount - 20% promotional code for bookings. See: http://eastafrica.solarenergyevents.com/




- 18-19 March 2015, Nairobi, Kenya:

  **Africa Future Energy Forum.**

  See: http://africafutureenergyforum.com/

- 13-18 July 2015, at NM-AIST Tanzania

  Due to the Ebola situation in West Africa, **ANSOLE DAYS 2015**, which was originally planned to take place in Ghana, will now be organized in Arusha Tanzania during the Nelson Mandela Week, **13-18 July 2015**, at NM-AIST.

***Check the ANSOLE events calendar***

# About ANSOLE:

## Goals and Objectives of ANSOLE

The Network promotes research, education and training in the field of solar energy among Africans as well as non-Africans with a special focus on - and relationships with - Africa.

As outlined in its by-laws, ANSOLE supports non-profit activities in the field of development aid and cultural exchange with the aim of strengthening the dialogue between the North and African countries (north-south) and among African countries (south-south) on renewable energy.

It endorses the use of solar energy to the benefit of the social and economic development of Africa as well as environmental protection through:

- Education and training of African scientists, experts and students
- Exchange of students and visiting scientists
- Workshops, conferences and meetings in Africa
- Organising and implementing projects and programmes on renewable energy
- Promoting capacity building in the use of renewable energy in Africa for all

*ANSOLE members and those acting in the name of ANSOLE accept and act in accordance with the association's by-laws.*

*Mention of conferences, companies, or products in this document does not automatically constitute an endorsement.*

**Donations to:**
ANSOLE e.V: Bank: Sparkasse Jena,
IBAN: DE52830530300018025668,
BIC: HELADEF1JEN
ANSOLE e.V.: Register of Associations at the Local Court Jena N°: VR 231505

## Publishing information

**ANSOLE:** African Network for Solar Energy
Semmelweisstr. 19, 07743 Jena, Germany (until August 2015)

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**Editorial board of *ANSOLE News 3*:**
Lesley Tobin, Joseph Mutale, Daniel A.M. Egbe

# Native Power and Local Empowerment

*By Marcel J. Castro-Sitiriche, Eugene Park, & Emanuela Colombo*

## Native Power for Local Empowerment

Universal access to electric energy is crucial to improve the quality of life of a large portion of the people on the African continent. Africa has more or less 600 million people without access to electricity. The number is not expected to decrease in the coming decades mainly due to population growth and increase in energy demands. Local empowerment is a key aspect for communities to turn access to electric energy into an improvement of their wellbeing. We introduce the "native" concept to gather a diverse set of ideas that together enable local empowerment. The concept embraces a number of technical and non-technical elements as well as other tangible and intangible dimensions:

1. Native energy of renewable energy sources
2. Native DC electric systems such as solar PV, LED lighting, ICT, and BLDC motors
3. Native materials that can be easily obtained locally
4. Native manufacturing of energy systems that can compete in the global market place
5. Native power that enables local community empowerment
6. Native knowledge and culture analogous to indigenous knowledge

## Appropriate Technology

The appropriate technology movement has been part of the effort to eradicate poverty for the last 40 years. While global efforts to eradicate poverty have failed to provide a clear improvement for the most vulnerable communities, the appropriate technology movement has evolved with multiple experiences from technology transfer to the south, through participatory technology design and capacity building. Perhaps the leading appropriate technology organization, Practical Action, has evolved in this manner and provides ample experience that should shape the way in which this important work is done.

ANSOLE has a focus on capacity building that is aligned with the main course of action taken by Practical Action to "contribute to poor people's wellbeing, using technology to challenge poverty by building the capabilities of poor men and women…". To effectively improve poor people's lives the appropriate technology approach, or similar frameworks such as sustainable livelihoods, need to be adopted and expanded.

Within the concept of appropriateness the long-term sustainability of solutions continually needs to be checked; otherwise, international aid funds will come and go, leaving traces of short-term projects that do not raise the majority of the people from poverty because their capabilities of leading healthy meaningful lives have not been improved to produce the necessary autonomy and self reliance. Universal access to energy is perhaps the central column for building a sustained improvement in quality of life, and renewable energy technologies are a key enabler for the most remote rural communities.

## Virtuous Circle of Native Renewable Energy

African countries are endowed with rich energy resources, both fossils and renewables, but there is an inability to exploit them for the benefit of the vast majority of the people living in rural areas and to enable the appropriate socio-economic growth. Within this scenario, although they do not represent the unique answer, especially when high reliability and high energy density are required, a key role for renewable energies today is well-defined. We state that a virtuous circle exists in the use of renewable energies as an asset to livelihoods within any community.

A number of direct advantages of renewable energies in remote areas are:

- They are decentralized and modular;
- They promote efficiency without decreasing economic output or lowering standards of living;
- They are cost effective due to increased cost for other sources and infrastructure extensions;
- They may increase energy security, while reducing national imports and related costs;
- They may open revenue opportunities by being eligible for carbon crediting on carbon markets;
- They could encourage networking among stake holders to promote sharing of experiences and best practices, thus contributing to improved regional integration.

In addition, renewable-based systems have indirect impact on sustainable development:

They are often promoted within the framework of a green economy but perhaps it is more important that an inclusive participatory approach can in fact accelerate their penetration

Innovative small businesses coupled with the concept of technology justice and innovative democracy could promote stable financial support schemes to enable different players to be engaged in renewable energies business.

Community-based organizations can take the responsibility for managing public goods and services such as electric energy services.

In general, energy access provided mainly by renewable energies may have a relevant impact on human well-being and local empowerment. Finally, we may say that the virtuous circle is closed when capacity building is properly set up within the communities. Then other benefits may follow: employment opportunities may increase, policies and strategies can be better assessed, local acceptance is easier to be established and local technical reliance is more prompt, thus increasing the multiplier effect of renewable energies.

## Native Knowledge and Native Research

Native knowledge, often called indigenous knowledge, needs to be incorporated into the technology innovation process. While it has been recognized and there have been various efforts, concerted and systematic approaches have been limited and we haven't seen enough hard evidence of exploring the native knowledge to serve as the main liaison and advocate embracing new technology.

The collaboration between local higher education institutions and local communities should sow the seeds for many research projects based on native needs by incorporating both native and academic knowledge in the appropriate technology innovation process. If local universities (South) become a bridge connecting the target communities with universities and NGOs in the North, much of the resources could be redirected to other priority areas. While these collaborations do exist in Tanzania and other African countries, they need to be further multiplied and expanded.

## Native Innovation

Technology innovation needs to be tied to business innovations embedded in the local context to enable technology justice and overcome the development divide for the people in resources-rich Africa. While external forces and resources are either inevitable or needed, the driving force of a broad technology justice movement needs to come from within. It needs to be "native." Lessons learned from different contexts are useful but cannot be copied if real empowerment of the people is the ultimate goal. "Imported" innovation may be relevant under specific circumstances or for boosting an initial step-change, but in the long run, native innovation needs to take over and come back to be tailored to the local context and local capacity.

New paths need to be carved for the 600 million people who have no access to electric energy in Africa today. Those new paths, however, need to be rooted in the wisdom that is so often neglected in the current mainstream of any technology innovation process.

## Native Power and Gender-Inclusive Energy Systems

The empowerment of people in Africa depends not only on the technology that enables auto-determination, but also on the wisdom that is so latent in traditional forms of upbringing. The native knowledge has both local reverberation with traditional values and universal significance for other cultures. Native knowledge in many parts of the world provide stories, proverbs and case studies that attest to the importance of traditional values to live a meaningful and productive life.

While native universities embark on the great task to fulfill the notion of "Academia for Society and Industry", specific care is needed to understand the responsibility that entails the dramatic changes in the way of life brought by the technology. At the centre of these tasks are the resources and efforts needed for native universities to link the impoverished local communities and collaborate with external organizations. If the technology innovation process is not strongly linked to core traditional values, more terrain will be lost in the struggle for empowerment and maybe even the most basic objectives of increasing the electrification rate may be more difficult to achieve.

Gender-inclusive energy systems can go beyond gender disparity and bring sustainability to rural communities as women play such an important role in rural communities. They can have a direct and positive impact on the different dimensions of the local livelihood asset for women and the community as a whole. They can contribute to the long-term success of native power systems, which come to be integrated within the livelihood environment of the local community.

Addressing a transition to a different and more inclusive energy system is a generational challenge for African countries. Activities focused on the impact of productive uses of energy via gender-inclusive energy systems in rural communities within Africa will ease the transition.

## About the authors:

Emanuela Colombo, a Nuclear Engineer by training, and achieved a PhD in Energetic at Politecnico di Milano. She is Associate Professor in Energetics, and in Engineering and Cooperation for Development and she was named in 2012 Chair holder of the UNESCO CHAIR in Energy for Sustainable Development. From a scientific perspective, she is working on the interrelations between energy, environment and sustainable development and on access to energy in developing countries.

/cntd..

She is author of more than 115 scientific papers and is currently the scientific coordinator of three European projects on Green Innovation, Water- Energy- Food nexus and Sustainable Energy in Egypt, Kenya, Tanzania and Ethiopia. One of the founders and member of the board of *Engineers Without Borders in Milan,* she was named Rector's delegate to Cooperation and Development in 2005 and more recently to the International Relationship with Africa. She is in charge of coordinating a network of 28 Italian universities and is member of the working group for university cooperation at the Italian Ministry of Foreign Affairs. She has been recently appointed as Adjunct Professor at the Nelson Mandela Institute of Science and Technology in Tanzania.

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Marcel J. Castro-Sitiriche is Associate Professor of Electrical Engineering at the University of Puerto Rico in Mayagüez. He is a 2014-2015 Fulbright Scholar at Nelson Mandela African Institution of Science and Technology. His experience in interdisciplinary teaching and appropriate technology date from 2004 while still a doctorate student at Howard University in Washington DC. He is member of the International Network on Appropriate Technology, the ANSOLE Network, and the Society on Social Implications of Technology of the IEEE Western Puerto Rico chapter among other IEEE associations. His research efforts include the areas of renewable energy systems, remote rural microgrids, appropriate technology, responsible wellbeing. Two signature projects, both funded by the National Science Foundation, are the GREAT-IDEA project (http://greatidea.uprm.edu/), and the CRWS project (Creating Responsible Wellbeing in STEM).

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## NM-AIST BACKGROUND

The Nelson Mandela African Institute of Science and Technology in Arusha (NM AIST-Arusha) is one in a network of Pan-African Institutes of Science and Technology located across the continent. These institutes, which are the proud brainchild of Nelson Mandela, envision the training and development of the next generation of African scientists and engineers with a view to impacting profoundly on the continent's development through the application of science, engineering and technology (SET).

## New high concentration photovoltaic power plant for training, research, innovation and solar electricity production at the University Mohammed V of Rabat, Morocco

*By Abdelfettah Barhdadi*
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Concentrated PhotoVoltaics (CPV) is by far the leading technology and the appropriate solution for high Direct Normal Irradiation (DNI) regions as in the south of Morocco. It delivers outstanding efficiencies at all levels (cell, module, and system) and the highest energy yield compared to other solar technologies. It is also the best technology for solar systems operating at high temperatures with consistent energy production [1]. CPV has also a compelling cost advantage because of its leading LCOE (*levelised cost of energy)* in the target market [2]. It is also environmentally advantaged (no permanent shadowing, minimal impact on land, dual land usage, flexible layout sites, best cradle-to-cradle footprint) and does not need any water consumption for electricity generation. Moreover, CPV is a proven, certified, predictable technology with rapid deployment, scalability, and a strong solar market forecast [1].

Recently, the European Beghelli Group has developed and patented an innovative High Concentration PhotoVoltaic (HCPV) power generation system baptized "Life Tree". A demonstration prototype of this new system has been installed and implemented at the Teachers College (Ecole Normale Supérieure, ENS) of Mohammed V University (UM5), Rabat, Morocco, for training, research and innovation purposes. The installation is well equipped with the necessary meteorological instruments, locally grid-connected, and operating as any small PV power plant. This achievement has been performed in the framework of a scientific and technical cooperation agreement aiming at improving the system performances in terms of energy efficiency, technology, and cost-effectiveness.


(b)


(a)

*Figure 1: Front side (a) and back side (b) of the High Concentration PhotoVoltaic (HCPV) grid connected power plant recently implemented at ENS-UM5, Rabat. Morocco. The installation is well furnished by all necessary meteorological equipment*

The power generation system comprises: (a) a sun tracker (heliostat), which hosts a set of 48 HCPV single modules of 64 cells each, (b) the DC/AC converters (inverters) and (c) the control electronics. The system's nominal peak power is 8160 W at 1 kW/m² DNI and standard cells temperature of 25 °C. The system total weight is 3900 kg and its size is 7.670 x 5.560 m² (figure 1).

The tracker is based on a galvanized steel frame mounted on top of a steel pole which can rotate from east to west (azimuthal rotation) and from bottom to top (zenithal rotation) according to the two angular degrees of freedom. The tracker is specifically designed for the HCPV applications. It is a high accuracy bi-axial solar tracker, with typical tracking error lower than 0.1°. The two tracker movements (azimuthal elevation and zenithal rotation) are driven by two electric brushless motors. Each motor is driven by an electronic PWM circuit embedded in the tracker's control box. The tracking control is based on specifically developed hybrid algorithm. It is an astronomic algorithm which uses the sun ephemeris data, corrected by the sun disc's position identified by the solar camera mounted on the top of the tracker. The tracker is equipped with an anemometer, which is mounted on its top nearby the solar camera. When the wind speed exceed 50 km/h the control box drives the zenithal motor to recover the tracker in 90° home position (fully horizontal) to minimize the surface exposed to the wind force and reach a safe position. The tracker's home position can withstand 190 km/h wind speed.

The high concentration single module is composed of 64 (8 x 8) III-V, triple junction cells, assembled on 8 aluminium fins which are facing the front side of the module to release the excess heat. The 64 triple junction cells are connected in series. Each cell has its own anti-parallel silicon diode to bypass the cell current in case of single cell shadowing. Each cell outputs typically 2.65 V, while the photocurrent at Maximum Power Point (MPP) is about 1 A (figure 2). The sun radiation is concentrated on the cells by parabolic high reflection mirrors. Figure 3 shows the section structure associated to each cell of the optical converter. The optical system is a single reflection type. The sun rays cross the frontal glass and hit the parabolic reflector which concentrates on the secondary optic element (SOE). The SOE homogenizes the light on the cell's surface, thanks to its kaleidoscope behaviour and also enhances the angular performance, allowing a wide angular acceptance of the optical system. The angular acceptance is defined as the maximum angle misalignment which keeps the output power greater than 95% of the maximum. The concentrated sun coming out of the prism lights the solar cell (figure 4). The geometric concentration factor is about 1350 X (the ratio between the paraboloid front area (110 mm²) and the cell area (9 mm²)). Basically, the system is designed to operate at very high efficiency under sunlight intensities more than 1000 times higher than in the case of traditional PV [3].

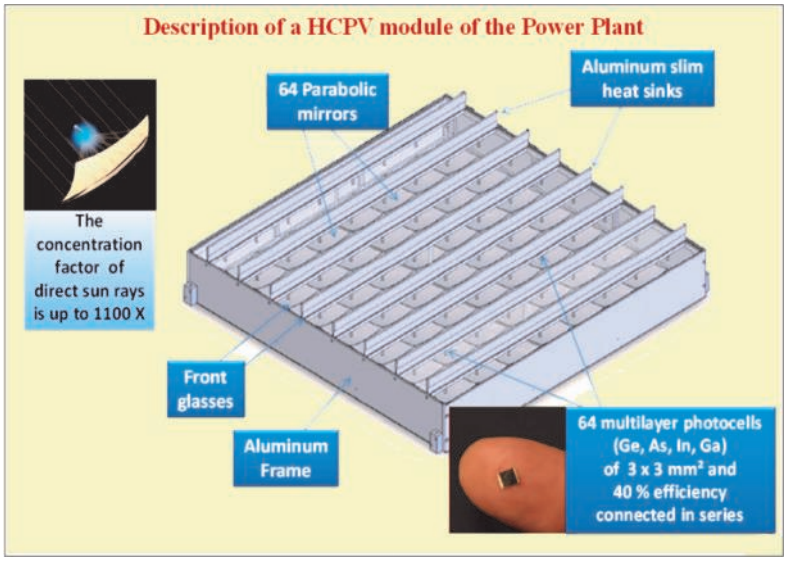


*Figure 2: Details of a single module of the HCPV power plant which hosts a set of 48 HCPV single modules of 64 (8 x 8) III-V, triple junction cells, assembled on 8 aluminium fins which are facing the*

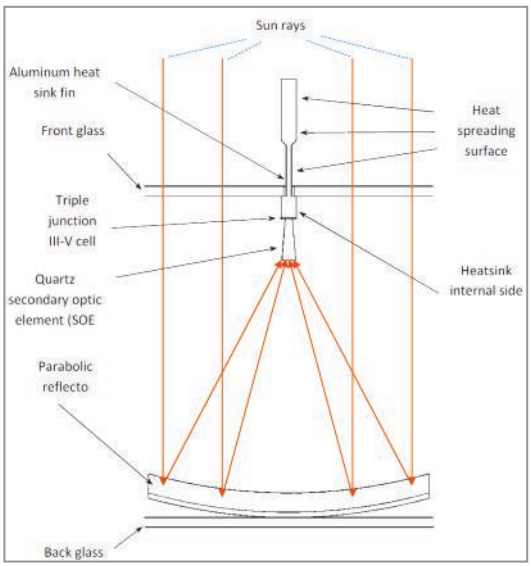


*Figure 3: Diagram of the optical system implemented for concentrating direct solar irradiations in the HCPV power plant*

The technical characteristics of each HCPV single module are the following (Table 1):

Each HCPV single module is connected to its own inverter which converts the 170 V DC generated power into 230 V AC 50 Hz single phase power output. The input is electrically insulated from the output, keeping a high level of electrical safety at system level. In fact the maximum voltage at module level is the module's cell open circuit voltage, lower than 200 V DC. This feature is quite important because it minimizes the problems related to the lack of insulation at module level, a known problem of all PV systems.

The inverter is made of a double high frequency power converting stage: the input inverter operates the MPPT (Maximum Power Point Tracking) algorithm which continuously looks for the maximum power point. The inverter output stage injects the current into the grid synchronously with the sinusoidal grid voltage, at 50 Hz frequency. The grid injected current is proportional at any time to the available input DC maximum power extracted by the MPPT algorithm. The inverter, controlled by a specific microprocessor, keeps synchronized with the grid frequency by means of a digital PLL, and implements all the output protections to immediately interrupt the current injection if the grid parameters are not compliant with safe operating conditions. Each inverter allows the maximum possible energy yield of the HCPV generator, since every single module is independent from the others and there is no problem of module shadowing, mismatching or misalignment. Any aging effect of the system which could eventually lead to mismatching conditions is completely eliminated, since each module will always inject into the grid its maximum available power in any condition. The inverters are connected to the three phase junction box for connection to the HCPV generator to the 400 V grid.

**Characteristics and performances of the HCPV module**

| Item | Value |
|---|---|
| Size | 91.2 cm x 91.2 cm x 17.4 cm |
| Active Area | 0.732 m² |
| Module Weight | 32 Kg |
| Operating Temperature | - 40°C to +85°C |
| Total Number | 48 HCPV modules |
| Maximum Conversion Efficiency | 22 % |
| Maximum Photo-voltage | 176 V -DC- Each |
| Maximum photocurrent ($I_{ph}$) | 1.02 A -DC- Each |
| Nominal Peak Power Capacity $P_{MPP}$ | 170 W -DC- Each |

Each module has its own inverter which converts the 176 V -DC- voltage into 230 V -AC- 50 Hz mono-phase power output

*Table 1: Main characteristics and electric performances of each one of the 48 single modules structuring the HCPV grid connect power plant*

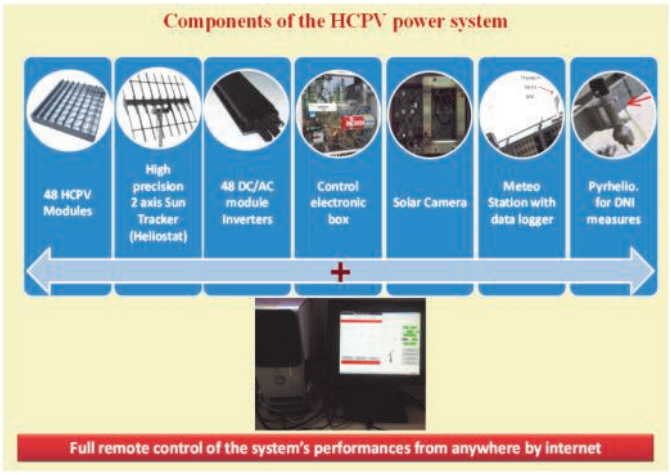


*Figure 4: Components of the HCPV grid connected power plant which is fully remote controlled from anywhere by internet connection*

The control system is based on a specific electronic board (COVECO) included in the metal sealed box fixed to the HCPV generator. The box is visible in figure 4. The COVECO board embeds a LINUX CPU which runs the proprietary Software driving the tracker and monitoring the HCPV generator's operation. The COVECO board is also equipped with a simple 2 rows characters display with 4 keys as a basic man-machine interface for simple installation start up procedures, such as running the motors to move the tracker. The more complete control interface is implemented on a remote computer connected to the COVECO via Ethernet or DSSS radio (figure 4).

The solar camera device is mounted on the top of the tracker and embeds the CCD camera, the wide angle irradiation sensor, and the narrow angle irradiation sensor. The irradiation sensors are monitored by the control box. The sensors are calibrated at the moment of installation and are used as reference sensors to measure the irradiation levels and estimate the generator efficiency.

A very important system function is the "tracker scan". This function allows automatic analysis of the angular performance of the whole tracker (and obviously of every single module). Starting the scan procedure, the tracker automatically, while it continues to track the sun position, adds a variable angular offset which is changed in small steps, one at a time; each offset step is kept for the time needed to complete an I-V acquisition (embedded in each inverter) from all the modules; at each step the I-V data is stored and a new step is defined; a complete matrix is scanned of all the angles around the sun pointing position. For each offset angle the maximum power output of each module is calculated and the maximum power output of the whole generator is then calculated.

Researchers and PhD/Master's students from Semiconductors Physics and Solar Energy Research Team (PSES) are now developing training sessions and performing proper research activities on the HCPV system to reach the scientific and technical cooperation agreement objectives. They are studying system performance monitoring after periods of effective and continuous operating. They are also focusing on designing and developing innovative integrated and reliable components that should improve the system and boost its competitiveness in the PV market. The work performed on the HCPV system as well as the first results obtained have been presented in several international scientific meetings [4 - 9] and are now available in 3 published papers [10 – 12] and detailed in a research report [13].

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## About the author:

**Professor Abdelfattah BARHDADI** is a physicist actively working on semiconductors and their applications in photovoltaic technologies. He has more than 30 years' experience in this applied physics field in which he has developed a very high capacity and skills.

Since 1995, he is full Professor at the physics department of Ecole Normale Supérieure, Mohammed V Agdal University, Rabat. He is also Director of a research structure on semiconductor physics and solar energy (PSES Research Team) and holds several academic responsibilities in national and international scientific institutions, prestigious scientific organizations and distinguished research structures. He is also an international expert in photovoltaic, author/co-author of 50 scientific publications, 18 Scientific books, chapters and research reports, and 68 scientific communications including 26 invited plenary/thematic conferences at international scientific events. He has directed more than 20 theses, dissertations and essays. He has provided his expertise as a scientific evaluator or referee in more than 100 research works, scientific reports and conference proceedings. He is also co-editor of specialized scientific journals, manager of several funded research projects, co-organizer of numerous scientific events, and initiator/ co-founder of 7 national and international scientific skills networks and clusters.

Professor BARHDADI is a co-founder of the African Network for Solar Energy (ANSOLE). He is also the Moroccan Coordinator and the Vice-Regional Representative in North Africa of this network. He is also the coordinator of the scientific and technological cooperation agreement co-signed by ENS-UM5A and ANSOLE.

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## Dimensioning and realisation of a booster and emergency photovoltaic system for LMSE laboratory of the University of Bordj Bou Arreridj University in Algeria

*by C. Mihoub, K. Rouabah, B. Benhamada, Z. Rouabah*

Researchers in our materials and electronic systems laboratory, *Laboratoire des Matériaux et Systèmes Electroniques* (LMSE) at the University of Bordj Bou Arreridj, had a glaring problem of power outage. This greatly influenced the research activities as well as the functioning of the monitoring system of the laboratory. Indeed, the electric current cut off that happened while doing some experiments such as agitator and VoltaLab solution that take more than eight hours led to restart experiences. This problem also occurs during the execution of simulation programs that sometimes require more than 30 hours. In addition, it is necessary to ensure continuity of the power supply monitoring system.

Due to this fact, and in order to solve this problem, we suggested a booster and emergency photovoltaic system sized and made for our laboratory (LMSE), ensuring the power supply continuity for some experiments devices, work station, and a monitoring system. Furthermore, this system can be used for different educational experiments and scientific research. This installation, funded entirely by Condor Electronics Bordj Bou Arreridj includes: 8 Condor 240W solar panels, solar inverter *XTM 24V 2400W,* regulator *AM80 FLEX MAX* 440 -12/24V 80Ah *and 6* batteries RITAR 180 Ah , 12V.


Left: *Photovoltaic panels.*

*Middle: connection between solar inverter, regulator and batteries.*

*Right: scientific experiment on the shadow effect*

### A short description of LMSE laboratory

The materials and Electronic Systems laboratory (LMSE) affiliated to the University Mohamed El Bachir El Ibrahimi Bordj Bou Arreridj, is structured in four multi-disciplinary teams: the materials and processes team, the characterization team, the information processing team and the microelectronics team. The research staff includes 16 researchers, 24 PhD students and 4 engineers for the maintenance technical support.

LSME focusses on the following research topics:

- New materials for microelectronics and photovoltaic cells.
- New structures for solar cells.
- Development and characterization of solar cells.
- Formulation of new functional materials and new environmental concrete.
- Identification, characterization and removal of micro-pollutants in wastewater.
- Study of the behavior of electrons and positrons at both, low and medium energy in metals and semiconductors.
- Signal and image architectures for processing in real time.
- Classification and pattern recognition.

### About the author:

Dr Zahir Rouabah obtained his (BSc.eng) degree, from the University of Setif, Algeria, in 1994. He obtained his Masters in Physics in 1999 and his PhD in 2009 at the same institution. His PhD thesis focused on Optics and Precision Mechanics. In 2011, he was appointed accredited research supervisor in Physics at the University of Biskra, Algeria. He is currently an associate Professor at the Electromechanical Department, Faculty of Sciences and Technology, University of Bordj Bou Arreridj, Algeria. Dr. Rouabah is author and co-author of 7 publications in reputed international journals and has presented more than 25 papers at international conferences. He is leading the doctoral committee on "Materials Science and Engineering" since 2012. His research interests focuses on electron and positron transport, computational material science, photovoltaic systems and materials, renewable energy and energy efficiency.

# First DIY Mount Solar Panel for Off-Grid People

*By Johannes Stöllinger, John Wambua*

Solar energy is often the most convenient way to provide power to off-grid communities in developing countries. The conventional solar module tends to be rigid, if not heavy, and is not fully suited for mounting on the fragile corrugated iron roofs found in these countries.

Team SOLAMANDER has set out to remedy this problem by combining its local market knowledge of the developing world with European technology. They have developed a specially adapted solar module that requires no underneath support structure specifically for these countries. A Building Integrated Photovoltaic (BIPV) solution for the developing countries, it is the first Do It Yourself (DIY) photovoltaic solar module in the market. Just a hammer or stone is needed to nail it onto the roof using already existing roofing nails. The solar module is glass-free hence unbreakable, easy to transport as can be rolled up and theft-proof as it is integrated in the roofing material. The transparency of the solar module serves for natural interior illumination during the day.

This photovoltaic module is perfectly suited as an energy source for solar home systems (SHS) which comprise a battery that is charged during the day and used at night for lighting, charging of mobile phones and or to operate television sets. There are currently 1.2 billion people worldwide living "off-grid" with the majority of them geographically located along the Equator and using corrugated iron sheets for roofing purposes.

SOLAMANDER plans to produce solar roofing sheets in Europe for retail and special projects but on a larger scale they plan to work in cooperation with local companies who will produce and distribute these sheets locally in target markets operating on a franchise system.

The patent pending Solar Roofing Sheets are already on sale in Kenya with advanced plans in place for commercial production to commence officially next year in Europe.

The Solar Roofing Sheet is available singularly or as part of a Solar Home System (SHS) set which includes all the necessary system components excluding batteries and light bulbs.

*Picture: Solamander 36 Watt Photovoltaic panel mounted on a corrugated roof and held in place with nails*

*Picture: Solamander 135 Watt Photovoltaic Panel mounted on a corrugated roof*

*Picture: Easy transportation of a rolled up 135 Watt panel on a motorbike*


**About the authors:**

*Johannes Stöllinger an Austrian is a graduate of the Paris Lodron University, Salzburg specializing in thin film Photovoltaics with 14 years of professional experience in special machine construction and process technology.*

*John Wambua a Kenyan national holds an MSc in Geoinformatics from Stuttgart University of Applied Sciences, Germany with professional qualifications in Sales and Marketing Management.*

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*Cntd/...*

## First DIY Mount Solar Panel for Off-Grid People


## FOM-Technologies joins ANSOLE

*By Torben Damgaard*

FOM Technologies is very happy to become a new company member of the ANSOLE network and engage with a wide range of researchers within the field of renewable energy in Africa.

As a Danish company, our interest in ANSOLE stems from a solid belief in the value of building internationally competitive research in the field of organic polymer-based solar cells in Africa as a means of achieving national ownership of the renewable energy sector on the African continent in the imminent future.

This engagement falls in line with the overall objective of FOM Technologies:
*To support local commercial development of organic photovoltaic solar cells (OPV), by providing research equipment for process development scalable for industrial processing, and thereby provide clean, cheap and renewable energy at micro scale - accessible everywhere, by anyone.*

### What we do

In short, FOM Technologies has established cutting edge OPV production equipment, ranging from small scale printing equipment for testing purposes to large scale production facilities. More specifically, we specialize in R&D equipment for coating and testing of functional organic materials - with emphasis on the OPV field. In the words of one of our clients at the University of Addis Ababa, "*FOM Technologies is the most committed developer of research equipment for the development of low-cost, flexible polymer-based photovoltaic devices using roll-to-roll printing technologies, and produces robust and reliable machines*".

Example of one of our key products:

### Mini Roll Coater.

Scaling up can be done quite easily with the Mini Roll Coater. The Mini Roll Coater allows for slot-die coating and flexographic printing with roll-to-roll compatibility without having to invest in a roll-to-roll system or expensive installation. Early implementation of roll coating allows for investigation of material properties in terms of processing, film forming and build-up of material layers towards technology maturation and industrial application. An on-line demonstration video can be viewed here – www.youtube.com/user/FOMTechnologies

# FOM-Technologies joins ANSOLE

## International client base

Our current primary customer base comprises research institutes and large companies in the energy sector with internal R&D. We cover six continents with our largest customers being USA, Colombia, Ethiopia, Australia, Japan, China, South Korea, Germany, Italy, Cyprus and Sweden.

On the African continent, FOM is supplying OPV production equipment to the Addis Ababa Technical University in partnership with Uppsala University, Sweden.

## How can ANSOLE and FOM mutually benefit from each other?

By joining the ANSOLE network, we particularly seek to network with researchers within the field of OPV with the objective to formulate joint funding proposals that will enable your researchers to acquire our equipment.

We believe that collaboration between ANSOLE researchers and FOM Technologies will hold great potential for cutting into to fabric of conventional solar panel industry by means of strengthening internationally compatible research in - and eventually also local production of - OPV solar cells on the African continent.

## About our equipment

Our equipment meets the highest quality standards, as since its recent establishment FOM Technologies is already involved in international research and development partnerships in Japan, United Kingdom and Australia with OPV focused university groups.

This allows us continuous access to the latest know-how, materials and equipment. Furthermore our company history provides a solid reference for our scientific standards.

FOM Technologies was formed in 2012 as a spin-out from DTU (The Technical University of Denmark), with equipment and knowledge from Risoe, the former Danish National Center for Sustainable Energy (now merged with DTU).

This allows us to transfer knowledge to our customers, reducing the potential for error in the process of upscaling from handmade devices to automated processing of OPV or other functional material technologies.

## Let's get in touch!

We hope you feel inspired to make use of our equipment in your research. If you want further information on possible ways to cooperate, please contact Dr. Daniel Egbe or browse through our website www.fomtechnologies.com to learn more about our products.

Given the positive attention to renewable energy research, as seen in the speedy accumulation of researchers in the network of ANSOLE, we strongly believe that together we can take great steps towards expanding OPV research on the African continent.

We congratulate ANSOLE on your immediate success and look forward to becoming part of your ever growing network.

## About the author:

*Torben Damgaard, Co-founder and Partner*

Before founding FOM Technologies, Torben Damgaard Nielsen served as Special Advisor working as innovation and business developer at Risoe National Laboratory for Sustainable Energy, now DTU Energy Conversion (DTU - Technical University of Denmark).

Mr. Damgaard has 10 years' experience with technology transfer, technology management from prototype to production in research and university environments.

He has managed the product development of the product technology licensed from DTU and engages with a large international network in the OPV research community and internally at DTU.

Besides in-depth-knowledge of the technology of the FOM products, Mr. Damgaard's expertise covers a wide range of fields, including R&D environments, business development, innovation management, marketing, sales, product development, fundraising, project management, business management and market analysis.

FOM TECHNOLOGIES

# Interview with ANSOLE exchange student: Duvalier PENE

Q: *Please make a brief presentation of yourself*

I am Armel Duvalier PÉNÉ, born on 15 January 1980 in Bafoussam, West region of Cameroon. I am the 2nd born of a family of 2 children. My father is a retired worker and I lost my mother. I carried out my secondary education in Baham and Bafoussam. I obtained my Baccalaureat in Electrical Engineering at the Martin Luther´s Polyvalent Bilingual College of Bafoussam in June 2002. I enrolled that same year at the Unversity of Ngaoundere where I obtained my BSc in Electronics, Electrical Engineering and Automation in September 2007. I started my Masters thesis in the same field on January 2008 and obtained it in September 2009. In August 2011, I started my PhD study under the supervision of Professors Laurent BITJOKA and César KAPSEU of University of Ngaoundere, and George ELAMBO NKENG of the "Ecole Naionale des Travaux Publics" of Yaounde.

Q: *How did you come to know about ANSOLE and its scholarship programs*.

My supervisor Pr. César Kapseu, who is the cofounder of ANSOLE informed me about the network, which I immediately joined. The scholarship programs were presented by Prof. Egbe during ANSOLE DAYS 2012 in Yaounde, an event that I attended.

Q: *Which scholarship program did you apply for? How long was the application procedure? Did you encounter difficulties during this phase?*

I applied for Intra African Exchange Program (INEX). The main thing to do was to find a host laboratory; Prof. Egbe had sent to Pr. César Kapseu and to me the list of renewable energy laboratories. I wrote to the "Laboratoire des semi-conducteurs et d'énergie solaire" in Senegal and they answered me positively. After that, things progressed very fast.

Q: *Which laboratory, department, university and country were the hosting side? How long did it take you to obtain an entry visa into the host country. How did you get to your host country?*

I was hosted by two laboratories. I began in the "Laboratoire des semi-conducteurs et d'énergie solaire", Faculté des Sciences et Technologies, Cheikh Anta Diop University where I stayed one year (2012-2013) under the supervision of Pr Grégoire Sissoko.

Then, I continued to the Laboratoire de Physique des Matériaux et Applications des Energies Renouvelables, Faculté des Sciences et Techniques, Université Hassan II Mohammedia, in Morocco. It was very easy for me to obtain the entry visa in Senegal and in Morocco. I got to Senegal by Air Senegal and to Morocco by Royal air Maroc. The air ticket to reach Senegal cost 380000 FCFA equivalent to 585 Euros and to reach Morocco was 278000 FCFA equivalent to 428 Euro. So the two trips cost 1013 Euros that was paid back to me by ANSOLE.

Q: *How did you experience the start in the host country? What are the requirements should a foreign student fulfil in your host country? How long did it take you to fulfil these requirements? Was it easy to get an accommodation? How expensive are students accomodations? Was it easy to get a carte de sejour d´etudiants? How long did it take?*

My start in Senegal and in Morocco was very good. The warm welcome of my external supervisors and my colleagues made me feel as at home. The first thing to do for a foreign student is to register in his embassy in order to get a certificate of coverage, one of the main documents to apply for the *carte de séjour*. It was not a problem for me to get this paper from the Cameroonian embassy. The common thing is to share a flat with friends in a building. I thank God for both my sister Youdom Tatiana who was already in Senegal and for my friend Hervé Joel Tchognia, who als was already in Morocco, before my arrival. Both assisted me in getting a room in their flat. There are no students' accommodations in Dakar nor in Mohammedia, that is the reason why flats are very expensive.

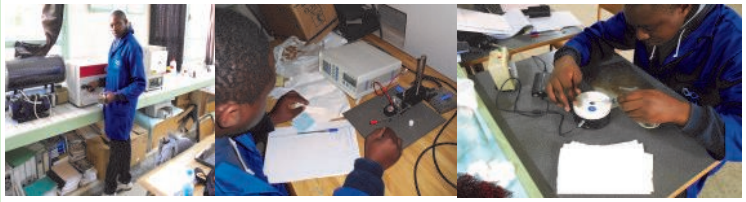
*Q: Can you describe your scientific start in your host laboratory. How is the working atmosphere in your host laboratory and department?*

As I said before, the warm welcome of my colleagues created a suitable environment for work. They showed me how things operate in the laboratory and they were always ready to help if I had difficulties. They were open-minded.

*Q: What is the title of your phd-thesis, research or project?*

I worked on a modeling study of a bifacial solar cell in steady state and under multispectral illumination in Senegal, whereas in Morocco, I worked on the development and the characterization of solid sources of diffusion on massive silicon for their application into photovoltaics.

# Interview with ANSOLE exchange student: Duvalier PENE



*Q: What are key issues you cover in your work? What activities and research is involved?*

The realization of a silicon solar cell emitter is a critical and very important step in photovoltaic technology. Indeed, the surface concentration of boron (B) or phosphorus (P) and junction depth determines the photovoltaic conversion efficiency of silicon solar cells. In our study, we formulate doping solutions for the realization of the emitter through the sol-gel method. This method allows the elaboration and the realization of thin films by using the low costs materials. This study aims to reduce the cost of the fabrication of solar cells. This is what I covered in my work.

Q: *Briefly describe what results you have achieved and published so far. Could you present your results during scientific events (conferences, workshops, etc)? What has been the feedback so far?*

I made in the Semiconductors and Solar Energy laboratory (LASES) in Dakar (Senegal) a modeling study of a bifacial solar cell in steady state and under multispectral illumination. An external magnetic field was applied to the cell and the light incidence angle was also varied. For this kind of solar cell, the three illumination modes were used: front side illumination, back side illumination and simultaneous front and back sides illumination. We considered in this work these three illumination modes of the bifacial solar cell and we established the expressions of the excess minority carrier's density in the base of the cell, the photocurrent, the photovoltage, the diffusion capacity according to the incidence angle and the intensity of the magnetic field. At the end of this work, we submitted an article which was accepted and published in the International Journal of Emerging Technology and Advanced Engineering, Volume 3, Issue 9, September 2013. We also presented two oral communications at the multidisciplinary international symposium, St. Jerome Catholic University Institute of Douala, on the 08$^{th}$ to 10$^{th}$ January 2014 and the 1$^{st}$ ANSOLE-ICTP fellows' workshop "AIFW 2013", Mohammedia, Morocco on 5$^{th}$ January 2013.

I continued at the Laboratoire de Physique des Matériaux et Applications des Energies Renouvelables, in Morocco. I worked on the realization of emitters made by diffusion of phosphorus or boron from solid doping sources developed by the sol-gel method that is associated with spin-coating and dip-coating on monocrystalline and polycrystalline silicon wafers.

At the end, two articles were published in Afrique Science, Vol.10, N°3 (2014), 1st Septebmer and Phys. Status Solidi C. doi**:** 10.1002/pssc.201400060, 13th August . We also presented three communications: (oral and posters): the "1$^{er}$ Colloque franco-marocain sur les énergies nouvelles et renouvelables (COFMER'01)" 28$^{th}$—30$^{th}$ 0ctober 2014, "Ecole Mohammadia d'Ingénieurs", Rabat, Morocco (Oral presentation), the International Conference on Functional Materials and their technological Applications(CIMFAT 2014), which took place on October 24$^{th}$ -25$^{th}$ at the "Ecole Normale Supérieure" Hassan II University Casablanca, Morocco and the E-MRS Spring Meeting 2014, May 26$^{th}$-30$^{th}$ at Lille Congress Center, France (both Poster presentations).

*Q: What is left to be done for your PhD?*

The experimental part of my thesis is finished and i hope to write it and submit it before March 2015.

*Q: What are key challenges you face in your work at present and the coming months?*

My main challenge now is limited financial resources since the support from ICTP-ANSOLE has come to an end after 2 years 7 months.

*Q: How do you view recent developments and achievements in the field of renewable energy in Morocco, your last host country?*

The government of Morocco is strongly engaged in the promotion of renewable energy and there is strong awareness raising. There are many conferences, workshops, schools, events in the field organized by universities and industries of the Kingdom to share recent developments and achievements . I think things are advancing very fast and Morocco could be a leading African nation in the field in the coming years.

Q: *Would recommend your host laboratory, or university, or country as a study environment to other foreign students*?

Morocco is already a host country for many foreign students particularly sub-Saharan African students. I found the educative system very well organized My host laboratory is open to everyone who shares its philosophy of collaborative research. Of course, I would recommend my laboratory and Morocco as a study country to other foreign students.

Q: *Do you have issues or last remarks you would want to share with readers?*

Just to say that ANSOLE has opened my way and allowed me to build my scientific career by offering me this scholarship. I am very grateful to ICTP (The Abdus Salam International Centre for Theoretical Physics) and ANSOLE and also to his international coordinator Prof. Daniel Egbe for his advice and encouragement which help me to always keep the cape.

## Report on the ENERstore Summer School "Energy Storages for Sustainable Energy Supply" Dresden Germany, September 22nd -27th, 2014

By *Claude Vidal Aloyem Kaze*

From 22nd to 27th September, 2014 I attended at the *Technische Universität Dresden* the Summer School of Excellence, ENERstore summer school, on the theme "Energy Storage for Sustainable Energy Supply". My motivation and expectations for attending this summer school were:

- By attending the ENERstore event, I will gain knowledge and skills in the field of energy storage, which I can use to train other members of my research group in Cameroon.
- Taking part in ENERstore is a perfect chance to develop both my personal and professional experience by interacting with top researchers of other nationalities, discovering new cultures and traditions.

Before giving a small report of this important event, I wish to express my grateful thanks to ANSOLE for the information provided prior to the summer school. I am especially indebted to Daniel Egbe, the coordinator of ANSOLE, for his encouragement and advice.

### Overview

The 2014 Summer of Excellence was attended by 30 participants, comprising PhD students, post-docs, and other excellent students from all over the World and from TU Dresden. Through the mediation of ANSOLE, the African continent was well represented by the coordinator of ANSOLE, Dr. Daniel Egbe and four other participants from Nigeria, Ethiopia, Cameroon and Kenya. The gender balance between male and female participants was just right. All participants in the Summer School were provided with hotel rooms near the University and were taken care of.

### Format of the school

The format of the school was 4 (four) lectures per day, each lecture lasting 1 hour with 30 minutes devoted to discussions and questions at the end of the lecture. After every two lectures, there was a 30 min coffee break with lunch taken at 12:30. On Monday afternoon, we had poster presentations to which almost all participants contributed for the exchange of ideas. The posters were kept up throughout the week to continue discussions. The school provided lectures and activities that covered the entire field of energy storage systems. In this spirit, on Wednesday, there were field trips to Helmholtz-Zentrum Dresden-Rossendorf, Drewag and Sunfire.

### Summary of the content of ENERstore

On Monday, after the welcome address by Prof. Peter Schegner, TU Dresden Chairman of ENERstore 2014, the participants listened to the first lecture on "Energy storages-Key components for the reliability and security of renewable Energy systems", which was also presented by Prof. Peter Schegner. The highlights of this lecture were the classification and specially the comparison of energy storage technologies. The second lecture of the day was on "Fundamentals and basic process for energy storage" and was given by Prof. Michael Beckmann of TU Dresden. In this lecture Prof. Beckmann talked about the necessity to have a storage system which can supply electricity for lengthy periods in a system based on wind and solar energy in situations where both wind and solar resources are unavailable for a long period.

The last lecture of the day by Prof. Petr Stehlik, Brno University of Technology on "Waste-to-Energy systems Vs potential Energy storage" was also very instructive as were the lectures by Prof. Peter Schegner and Prof. Michael Beckmann. The day closed with the poster presentations and an exchange of ideas between participants and mainly the Chairman of ENERstore 2014 and other lecturers. On Tuesday 23th September 2014, four lectures were presented. The first lecture by Dr. Ramteen Sioshansi, Ohio state University entitled "The economics of Energy Storage" taught us that end-users can store energy when the energy retail price is low and discharge it when the price is higher.

This strategy can be deployed in the management of energy costs by end-users. The second lecture, by Dr. Holger Althues, Frauhenhofer IWs, was titled "Overview and comparison of secondary batteries for electrochemical energy storage". In this presentation, challenges of Li-Ion-Batteries, Li-S-Batteries, Na-S-Batteries, Li-Air- Batteries and super capacitors were presented. After lunch, Prof. Edeltraud Guenther gave an exciting presentation on "Economic-ecological optimization; how can we optimize storage systems and why should we?", which was based on recent results of her research.

The final lecture of the day, Dr. L. Röntzsch and B. Kieback was titled "Hydrogen Solid-State Storage".

The third day was reserved for the field trip to Helmholtz-Zentrum Dresden-Rossendorf, to Drewag, and Sunfire. At the Helmholtz-Zentrum Dresden-Rossendorf, Prof. T. Weier gave another interesting and exciting lecture on "Liquid metal batteries". After the tour to the spectacular laboratory centre, the participants took the road to Drewag (www.drewag.de). Drewag is a company that supplies all of Dresden with energy and water. This was also one of the great moments of the Dresden tour. These tours ended with the visit to Sunfire (www.sunfire.de).

Sunfire's mission is to develop and market efficient energy conversion technology. All activities here promote the use of regenerative energies. The final presentations on the 25th September 2014 were given by various lecturers. These presentations included: lectures given by Prof. Wilfried Hofmann, Chair of Electrical Machines and Drives, TU, on "Electrical components of Flywheel Energy Storages for Stationary applications"; Prof. Uwe Gampe, Chair of Thermal Power Machinery and Plants, TU Dresden, on "Hybrid Power Generation Units with integrated Energy Storage; Concepts, modeling, dynamic simulation, case study"; Prof. Wolfgang Lehner, Chair of Database Technology, TU Dresden on "Large-scale Energy Forecasting" and finally by Ass. Prof. Marc Petit, Supelec on "Application of storage systems in Electric Power Systems."

These lectures were really valuable for me in particular and I hope for all participants in general. I was personally satisfied with this Summer School, since my motivation and expectations to take part in this event were fulfilled. Furthermore, meeting our peers and establishing contacts (and collaborations) in an informal atmosphere was very interesting and exciting.

## Social event

We really appreciated the social events that were lined up for us by the event organization committee. These included:

- The Dresden city tour
- The Summer of Excellence
- The Saxony power evening.

This gave us the opportunity to appreciate German culture. Friday and Saturday, the last two days, were devoted to the workshop and workshop presentations.

## Workshop

The workshop was divided into five groups. Workshop 1 was supervised by Prof. Peter Schegner. The title of this workshop was "Integration of storages into the Electrical Supply System. Challenges and opportunities". Workshop 2, supervised by Prof. Dr. Dominik Möst, was about "Economics of Energy Storage". Workshop 3, supervised by Prof. Cornelia Breitkopf, was titled "Microkinetic modeling in heterogeneous catalysis—Introduction to transient methods". Workshop 4, titled "Systems Analysis of Storage Technologies with respect to the Security of Energy Supplies", was supervised by Prof. Michael Beckmann. The last one, workshop 5, was supervised by Prof. Uwe Gampe and was titled "Energy-Neutral Software".

Personally, I participated in workshop 5. The task for our group work in Workshop 5 was to investigate the contribution of software to Energy Efficiency in the optimization of consumption of energy.

## Working method

First of all, the participants in this workshop followed the presentation given by Prof. Uwe Gampe on "How to develop Energy-Efficient Software". In this task, he was accompanied by his collaborator Dr. Sebastian Götz. Prof. Uwe began by presenting some applications they envisage for the future and the need to optimize energy utilization. For instance, this is the situation in Internet of Things (IOT) or the Smartphone since they have to work out power supply. The problem in the programming is the context and energy-ignorance. For example, if the robot is used for certain tasks, when it moves from room A to room B, the context changes and at the same time, we have to react to the context changing. When you programme, you cannot really know how much the energy will cost. These are some of the problems of mobile phone batteries. This was one of the goals of the exercise namely to develop a programme that will consume less energy. After this talk, we visited the laboratories where these programmes are developed and implemented. At the end of these exercises, we prepared a presentation summarizing the results of our workshop.




*Prof. Peter Schegner, Chairperson of the Summer School and African participants*

## Results

The title of our workshop presentation was "Software for Energy Efficiency from the viewpoint of Optimization." Our analysis was focused on Internet of Things (IOT). In fact, the IOT is considered as a small developed piece of equipment that needs a lot of energy; so there is a need here to have a huge storage system to manage the energy. Therefore, we need software in order to optimize the use of energy in the system. This is an example of the optimization of the consumption of the energy.

Let us talk about the model of software implemented at TU Dresden to optimize the utilization of the solar energy generated by solar panels. According to this programme, depending on the input, one can change the type of the source utilized by the consumers. For example, if solar energy is not available, the regulator will automatically switch to battery. If there is the possibility of obtaining energy from a solar system, the regulator will also switch to the solar panel.

Talking about flexibility in time, if we take for example the case of the washing machine, this means: If you put your dress in the washing machine in the evening, there should be the possibility for the machine to be flexible in the allocated time. It means that washing the clothes will start when energy cost will be the lowest. Furthermore, it will start working at the moment that the power consumption is also the lowest, which is the most efficient for energy storage. Flexibility in the cost means the software will choose the time where the energy cost is the lowest to start working.

## About the author:

Dr. Aloyem Kaze Claude Vidal completed his Ph.D in Mechanics-Energetics at the University of Dschang, Cameroon in April 2012. He is currently associate permanent lecturer at the Higher Technical Teacher Training College Bambili, Department of Electrical and Power Engineering, at the University of Bamenda.

His research interests include the mathematical modeling, numerical simulation and experimental investigation of solar air collectors. He uses the Second Law of Thermodynamics based on exergy to study and optimize their functioning. Indeed, from the thermodynamic point of view, exergy is defined as the maximum amount of work which can be produced by a system or a flow of matter of energy as it comes to equilibrium with a reference environment. The concept of exergy can be applied to various industrial sectors and thermal processes. Since exergy is a measure of the quality of usefulness of energy, exergy efficiency measurement is more significant than energy efficiency measurement. Exergy analysis should therefore, be considered in the evaluation of the energetic systems.

Thus, through this powerful analysis tool of thermodynamics systems, he places a strong emphasis on the societal impact of the research and the environment. His current research is focused on the energy storages for renewable energy sources.

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## Africa Mini-Grids Summit Report

*by Marcel Castro-Sitiriche*

Marcel J. Castro-Sitiriche from the University of Puerto Rico in Mayaguez and the Nelson Mandela African Institution of Science and Technology, and James Wafula from University of Nairobi attended the Africa Mini Grids Summit on 18-19 of November at Nairobi, Kenya.

A site visit to the solar PV based Mini Grid at Strathmore University (weblink) provided a good opportunity to see a successful economic model of establishing solar PV systems that also serves research (see picture).

The conference covered different topics including: affordability, mini grids potential and the planning for main grid arrival, feed-in-tariffs and government subsidies, regulations and policy, data availability, investment risk. All these issues are very much linked to ANSOLE Network efforts.

Recent relevant publications that are freely available are:

- Alliance for Rural Electrification: Mini-grid Policy Toolkit weblink
- International Energy Agency: Africa Energy Outlook weblink
- Poor People's Energy Outlook 2014 weblink


## Commercial solar training in Kenya

*by Paula Perez Rodriguez*

Several companies offer solar training in Kenya regarding solar energy. One of these companies is Solar for Sub-Saharan Schools and Communities (S3C). It is a newly established international social venture, aiming to implement solar solutions for electrification of rural schools and communities in Sub-Saharan Africa.

The chosen approach differs from other ventures in its structure. It consists of a registered company (LTD) and a foundation. In this scheme, the LTD is mainly owned by the foundation. Therefore, the benefits from the LTD go into the foundation to be able to develop projects for the electrification of schools, health clinics and other public buildings, as well as developing local capacity by training local entrepreneurs.

There were two kinds of training: a solar sales agents and a solar technicians one. In the first one, to equip rural youth with the knowledge to become local sales managers of small solar lamps and systems, they went through a training program focused on sales approaches, but also providing product knowledge. Therefore, both marketing techniques and the product's technical background are discussed.

The training was organized in conjunction with local NGOs, which were in contact with the local youths and were able to select a group of approximately 20 people for it. They were also in charge of finding a venue for the training to take place, usually in one of the facilities belonging to these NGOs.

The workshops consisted of 3 separate days, in which the main concepts of solar PV were explained, as well as marketing strategies and the basics of entrepreneurship and book-keeping.

A total of four trainers were involved: two covering the marketing part and two for the technical training. The participation was free of charge, as long as the trainees engaged with S3C in the future by helping to promote their products. After the training, a certificate was provided to them as proof that they followed the course. About 70% of the people finished the training and was able to get the certificate. Such a program has already been implemented in the Kajiado town area in June 2013 by the subcontractor ASD and in Namanga by S3C in July 2013. The salesmen and women trained there have grown in the area as sales people, achieving a good sales volume that allows them to afford the basics.

# Commercial solar training in Kenya

*Figure 1. Technical explanation of the products during sales training*

*Figure 2. Sales team for S3C after the training in Namanga*

In addition to the sales training, a more technically focused training was offered. This one was designed for electricians all over Kenya who wanted to upgrade their profile to be able to install solar systems. The training was organized in Nairobi for a full week. The local entrepreneurs associated with S3C chose 7 technicians from Namanga or Homa Bay to Mandera, who were based in a hotel in Nairobi for the training. The training team consisted of two technical staff from S3C.

The topics covered during the training are summarized here. It started by clarifying the basics of DC and AC electricity, the use of millimetres and the concepts of solar resources. Then, a general introduction for the solar cells and solar modules, battery technology, charge regulation theory and inverters was given. Also, types of loads, fuses, PV circuits and cables, as well as mounting and maintenance of the systems were discussed. Finally, different PV system configurations were explained and the basic rules of design were given. In addition to the theoretical part, some practical training with a real system were organized. In these practicals, the participants learned how to connect all the components of the system, and measure its behaviour. Finally, a visit to the PV module manufacturer Ubbink, located in Naivasha, Kenya, was organized.

The participation in this workshop was also free as long as the technicians were associated with the distributed business centres of S3C. On completion, certificates were given to all participants as proof that they had followed this course. It must be noted that this training was offered as an introduction to the topic, since some of the concepts were too complicated to grasp in a 5-day training course.

*Figure 3. Demonstration of a PV system connection during technical training.*

*Figure 4. Electricians undergoing the technical training.*

*Figure 5. Clarifying concepts during the visit to Ubbinlk factory.*

## About the author:

My name is Paula Perez. I studied Chemical Engineering in Spain, after which I moved to Delft, in the Netherlands, for my masters in Sustainable Energy Technology. There, I learnt a lot about renewable energies, with special interest in solar energy and smart grid integration. I also learnt about the energy market, and the inequalities between so-called developed and developing countries, which led me to work a total of 8 months in Kenya for the company Solar for Sub-Saharan Schools and Communities (S3C). As part of my job, I designed and installed solar systems, and I trained local youths in the rural areas in the basic principles of PV and solar thermal, and also discussed the main products in the market. Now I am pursuing my PhD in solar energy in the Netherlands. Nevertheless, my interest in Africa and its association with solar energy is still growing. In order to develop it, I decided to collaborate with ANSOLE, for which my training experience can become useful for future workshops.

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# First Solar Power Designer Workshop in Dar es Salaam, Tanzania

*by Nico Ulmer*

The German-South African *maxx-solar academy* offered the first workshop on solar power in Dar es Salaam from 20th to 24th October this year. The goal of the workshop was to impart knowledge to the participants regarding the planning, calculating and sizing of different components of a photovoltaic system. A site visit at the premises of the *German Agency for International Cooperation* (GIZ) in Dar es Salaam was among the examples that were being used as a hands-on demonstration by the lecturers Dr. Matthias Klauss and Kinesh Chetty.

The workshop started with the theoretical basics of solar electricity such as serial and parallel connected Photovoltaic (PV) Modules as well as the possibilities when it comes to on- or off-grid systems. After addressing different components of solar back-up systems, the planning and designing of those systems from beginning to end was the content of the course. On the last day the participants got the chance to learn about the show case of a 2 $MW_p$ PV power plant in Tanzania: The system is legally approved and ready to be built but will probably not be realized due to changing considerations by the customer.

The potential for PV of all dimensions in Tanzania is huge (see Figure 1). Being just slightly below the equator, the yearly sum of solar irradiation in Tanzania is around 2100 kWh per $m^2$, which means the yield of a 1 $kW_p$ grid-tied PV-system can range from 1500 to 1700 kWh per year. With initial values like these, a PV-system produces electricity for around 200 TSh/kWh considering a lifetime of 10 years and 100 TSh/kWh considering a lifetime of 20 years. Despite these figures the Tanzanian Government is yet to fully acknowledge this potential of solar electricity in a legal framework. As of yet there are plans for 100 MW of installed Photovoltaic Power according to the *Power System Master Plan 2012* of the Tanzanian Government. In the light of this it even seems more important to disseminate knowledge about the PV potential as well as the economical and technical implications of solar technique. Since the workshop was rich in variety and the participants are now able to design a system according to the needs of a customer on their own, *maxx-solar academy* is planning to expand solar training in order to enhance the knowledge and dissemination of solar energy/ photovoltaic in Tanzania.

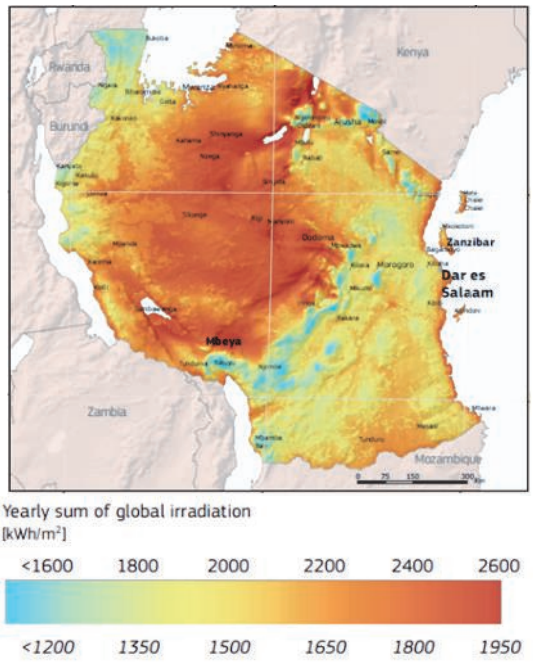


*Figure 1: "Global irradiation and solar electricity potential in Tanzania", Source: IET (2014)*

The 18 workshop-participants (Figure 2) were from different international backgrounds, including China, Germany, Tanzania, Zimbabwe and (when it comes to lecturer Kinesh Chetty) South Africa. So apart from getting knowledge about the planning and sizing of PV systems, there was also the chance of networking and creating possibilities for future business cooperation with fellow students.

*Source of Figure 1: Joint Research Centre – Institute for Energy and Transport (IET) (2014): Solar radiation and photovoltaic electricity potential country and regional maps for Africa, the figure was cut for this article, http://re.jrc.ec.europa.eu/pvgis/cmaps/afr_new.htm#TZA (retrieved 2.11.2014)*

*Figure 2: Participants with lecturers Dr. Matthias Klauss and Kinesh Chetty (picture by Francis Fo-*

## About the author:

**Nico Ulmer** finished his Master Studies (M.Sc.) in *Renewable Energy Management* at the University of Applied Sciences Erfurt in Germany. He is currently working in Morogoro, Tanzania, for the non-governmental organization Mazingira Network (MANET). MANET is addressing environmental issues such as Forestry and Extractives and is putting effort into improving legal framework as to ensure the sustainable management of natural resources in Tanzania. Furthermore MANET is planning to expand its work to the field of Renewable Energies.

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# Solar Cooking in Namibia

*By Samantha Nhi Huynh*

Most of the population in rural parts of Africa use wood and dung as cooking fuel, which causes not only eye irritation but also lung diseases such as pneumonia and lung cancer. Poor families can either spend almost half of their income on cooking fuels or a great amount of time collecting wood. The distances to be walked for this chore become longer each day as trees become scarcer in these areas. The risk of being harmed by either animals or criminals also increases with these extended walks.

A solar cooker is a device used for cooking food and boiling water. It is fully powered by solar thermal energy, where light energy is converted directly into heat energy. Therefore, solar cooking provides an emission free and enormously low cost solution to families like those in rural Africa. Using a solar cooker to pasteurize water can also prevent deadly diseases caused by unsafe drinking water.

Cooking and wood collecting are activities mostly carried out by women and girls and therefore, by implementing this technology, this group won't have to be exposed to dangers such as unsafe smoke and physically exacting chores. In its place, they can spend time on more enriching activities such as attending school or learning a new skill that could contribute to an income for the household. This means that solar cooking can act as aid in the work of empowering women.

My personal interest for renewable energy and a sustainable lifestyle led to my enrolment in the course *Solar heating technology* at Lund University. It was not a standard course for my Bachelor programme and therefore it was very refreshing to study something different; something that my classmates weren't studying. After completing the course, I was extremely motivated to carry out a Bachelor's thesis within this area.

The next step involved an in-depth web search to find an interesting and suitable topic; and as I have a great passion for cooking – as has my dear mother – when I stumbled upon the science of solar cooking, it caught my complete attention at once. Additionally, when I realized the connection that this technology had with development issues and the change that this technology could achieve, it was a simple choice for my dissertation. I then sent out at least a hundred emails, if not more, to people within the solar thermal energy sector and related fields, whom I considered might be interested in me carrying out a field study on their behalf.

Unfortunately, less than half of them wrote back, and those who were kind enough to reply didn't have any open projects for me. However, a few of them did refer me to someone they believed could help me out. One of these people was Dr. Daniel Mbi Egbe of ANSOLE.

Dr. Egbe referred me to a professor in Germany who had just purchased a solar cooker and was looking for a student to carry out tests with it. "Bingo!" was my first thought. "Could this be it?" I contacted this professor but unfortunately, the spot had been filled and I had to keep looking. I kept on writing emails, answering emails and contacting people that I had been referred to and who in turn referred me on, and so on. At one point I was starting to lose hope. Maybe I was being too specific? Solar cooking was after all not very widespread. I was considering broadening my search and not to be so set on working with solar cookers. In this moment, Dr. Egbe contacted me. He had sent an email to ANSOLE members regarding my quest to find a solar cooking project for my Bachelor's thesis and multiple professors and people in the field had replied and a few even proposed actual projects. I couldn't have been happier.

To cut a long story short, Dr. Egbe was genuinely engaged in the whole process and gave me meaningful advice. I ended up proceeding with Dr. Al-mas Sendegeya at The Polytechnic of Namibia in Windhoek, where I was to assess the performance of a locally manufactured parabolic solar cooker. The aim of my project was to lay the foundation for a Masters student at the Polytechnic of Namibia, Owen Olivier, and his future Masters thesis on improving the performance of this solar cooker.

*Figure 1: Parabolic solar cooker from Döbra*

# Solar Cooking in Namibia

From here there weren't many obstacles. The paperwork was simple; a few papers were emailed, signed, scanned, and emailed back. I received help from the international coordinator at the Polytechnic of Namibia to apply for a student VISA – no hassle at all. I applied for funding from SIDA (Swedish International Development Cooperation Agency) through their Minor Field Study programme, which is aimed at Swedish students who are going to a developing country for at least 8 weeks and need funding for personal expenses related to their projects. The application required a lot of work but it was rewarding as I ended up receiving funding.

This was great news as I could use my savings for other things. I decided to fly in to Johannesburg, South Africa, as this was a much cheaper route from where I was coming. I also purchased a 12-day overland camping trip from Cape Town to Windhoek. This was a great way to travel from South Africa to Namibia and at the same time see the country of Namibia. By the time I arrived in Windhoek I had already seen an extensive part of Namibia. Spitzkoppe was my absolute favorite spot.

*Figure 2: Spitzkoppe (Copyright Inga Wonneman)*

Prior to my fieldwork at the Polytechnic of Namibia, I also carried out a study visit to NaDEET centre at NamibRand private reserve. It is a non-profit organization that provides local communities with education within nature conservation and sustainable living, including solar cooking. Here I had my first experience of cooking with the sun. I also acquired valuable information about the solar cooker I was to work with.

When I came back to Windhoek it was time to start my 9 weeks of work at the Polytechnic of Namibia.

Unfortunately, I was informed that the funding for the project had been delayed and therefore the purchase of solar cookers and measuring equipment had been delayed too. From here, I handled the contact with suppliers of the necessary equipment and the manufacturer of solar cookers in Döbra. Finally, after 4 weeks or so, it was possible to place orders; and after another 4 weeks we had everything we needed at the Polytechnic of Namibia.

Ultimately, I didn't have a lot of time to carry out my performance tests but I managed to fulfill my purpose of acquiring data that can be used as a benchmark for further work with the particular solar cooker. All in all, it has been an exciting journey going to Namibia and learning about solar cooking. I am grateful that Dr. Sendegeya offered me this opportunity, though we didn't have a lot of contact during this time.

I would not only recommend European students but any student to come to Africa and work on a project that matters to you. You will learn a lot, you will meet new friends and you will have a unique experience. Just remember, it is imperative to keep a positive spirit, an open mind and heart, and get ready to be flexible – at all times. Things will not go as planned but don't worry, because it will all work out. And in the end, when you look back, you wouldn't want it any other way.

**About the author:**

My name is Samantha Nhi Huynh and I am a Swedish Mechanical Engineering student at Lund University in Sweden. In the late 80s my parents decided to leave their home in Vietnam, with aspirations for a new and better life elsewhere. They fled, on a fishing boat, to Hong Kong and there I was born, at a refugee camp, where our family resided for over a year. We were later sent to a second refugee camp in the Philippines and shortly after; my sister came to this world. I was only 2 years old when the four of us moved to Sweden – a beautiful country that is my home and where I will attain my university degree. This is my story on how I came to be in touch with the fascinating and feasible technology of solar cooking, mainly directed at European students like myself.

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# The RISE of SABINA

*By Pelly Malebe*

The Regional Initiative in Science and Education (RISE) is a project that prepares MSc and PhD level scientists and engineers in sub-Saharan Africa through university -based research and teaching networks. RISE is a project of the Science Initiative Group (SIG). This group is based at the Institute for Advanced Study in Princeton, NJ, USA. SIG is dedicated to promoting science in developing countries. RISE is supported by grants from the Carnegie Corporation of New York. Over the years, the individual RISE networks have also attracted supplementary program funding as well as individual research grants from various sources.

The Southern African Biochemistry and Informatics for Natural Products (SABINA) network was selected to be one of the five RISE networks in mid-2008. I came to be part of the SABINA network in 2009 as a first year MSc student by applying for the SABINA MSc studentship. I have been privileged to be part of this network as SABINA has played a vital role in my studies. SABINA has lessened the financial burden (that comes with pursuing ones postgraduate studies) by providing financial assistance that went towards covering tuition fees, a student bursary/stipend and research costs.

What sets SABINA apart from other studentships is that the network remains actively involved in the students' studies. This is achieved by hosting annual meetings where we gather and present our progress. This has been beneficial to me as it has been a platform to carry out scientific communication and to broaden my scope by learning from others. The opportunity to network with fellow students from different countries has shed light on the application of this field in different regions. The most recent annual meeting, which was held in October 2014 in Tanzania, was an opportunity for me to engage with members of the Tea Research Foundation of Central Africa (TRFCA).

SABINA has forged a partnership with the TRFCA and this has had direct benefits to my research. The network has also provided training on a range of topics including project and business management as well as thesis and article write-up. The extra training was provided to us through a complementary action termed Policy and Support Actions for Southern African Natural Product Partnership (POL-SABINA). The action was funded by the African, Caribbean and Pacific group of states of the EU (ACP-EU), which also afforded students and staff exchange visits to other network nodes

The five networks that comprise RISE also gather during annual meetings and there is time allocated for student presentations. This is another opportunity for the students to share their research and gain insight into what other researchers are doing. SIG has played a crucial role in creating exposure for our scientific research and work. SIG is also in constant contact with the students, notifying us of various funding opportunities as well as conferences.

My experience with SIG, RISE and SABINA has been a positive one. SABINA has been like a mother to my scientific career in that it has nurtured the birth of my career and continues to encourage development. I am currently doing my PhD in Biotechnology at the University of Pretoria and I am still a member of the SABINA network. The same guidance and monetary support has been provided towards my PhD.

*Figure 1: With a few of the SABINA members during an annual meeting.*

*Figure 2: SABINA students and staff*

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*Figure 3: Some of the RISE members at a 2013 annual meeting*

*Figure 4: Pelly Malebe at a tea research foundation collecting tea leaves*

**About the author:**

Pelly Malebe is currently enrolled at the University of Pretoria, South Africa as a PhD candidate, in biotechnology at the Department of Biochemistry. She graduated with a BSc (Human Genetics) and MSc (Biotechnology) both from the University of Pretoria. Her current research focuses on identifying and developing molecular markers for drought tolerance, yield and quality in the tea plant. The potential outputs of this research are robust molecular markers that can be used in a selection process to improve yield of tea produced by the global tea industry. Her focus is on increasing the understanding of the genetic basis of drought tolerance in plants as this may impact on food and job security through breeding of drought tolerant crop varieties. A patent was filed on the results of the research she conducted during her MSc study. Final filing of this patent in African Regional Intellectual Property Organization, India, Sri Lanka, and China is underway. Miss Malebe was selected to be part of the Southern African Biochemistry and Informatics for Natural Products (SABINA) network in 2009. She completed her MSc in 2011 and was subsequently awarded the SABINA Network doctoral fellowship. This research is partly funded by the University of Pretoria Institutional Research Theme (Genomics). She has received several awards, including the National Research Foundation Doctoral Innovation Award as well as the Department of Science and Technology 2013 Women in Science Award doctoral fellowship., and is also a member of the Member of the Golden Key International Honours Society.

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# Renewable Energy Agency in Zambia

*by Joseph Mutale*

The Zambia Renewable Energy Agency (ZARENA) was established in May this year, 2014. It is the latest renewable energy association to be established in Africa. ZARENA, like many other renewable energy associations around the world and in Africa, is an interest group for renewable energy stakeholders in Zambia.


Its main objective is to foster and promote the large-scale adoption of renewable energy in Zambia by working collaboratively with all stakeholders to achieve the following specific objectives:

- Improved regulatory frameworks for renewable energy through enhanced policy advice
- Improvements in the transfer of renewable energy technology
- Progress on skills and know-how for renewable energy
- A scientifically sound information basis through applied research
- Financing of renewable energy

For further information on ZARENA visit:
http://zarena.org/index.html

**About the author:**

Dr Mutale holds a Doctor degree in Power System Economics from the University of Manchester with 20 years of experience in renewable energy. His focus areas are solar energy, & hydropower with vast experience in Europe and Africa from a business perspective and academic view.

## The Aid Debate—Jeffrey Sachs, William Easterly and the effectiveness of foreign aid

*By Maximilian Betmann*

It is almost ten years ago that Jeffrey Sachs and William Easterly started a debate about whether aid is a useful tool to spur development or not. On the outside, the two of them are not too different. Both are economists, both teach at prestigious universities in New York City and both have tremendous experience working in developing countries. They both are sincere about wanting to relieve the world's poorest of their suffering. But they have very different ideas on how to arrive there.

Jeffrey Sachs is professor of economics and the director of the Earth Institute at Columbia University. He has been an economic advisor to many governments, including Russia, China and India, and a personal advisor to the UN Secretary-General Ban Ki-Moon, as well as his predecessor Kofi Annan. From 2002-2005, he led an expert commission, the UN Millennium Project, that was ordered to find practical ways to achieve the UN Millennium Development Goals (MDGs). The policy recommendations expressed by the Millennium Project were then explained by Sachs in his 2005 book *The End of Poverty – Economic Possibilities for our Time*.

William Easterly is professor of economics and the co-director of the Development Research Institute at New York University. He worked at the research department of the World Bank for 16 years, focusing on macroeconomics and growth. A strong critic of foreign aid, he responded to Sachs' publication with his own book, called *The White Man's Burden – Why the West's Efforts to Aid the Rest Have Done So Much Ill and So Little Good.*

Jeffrey Sachs believes that poor countries are stuck in a poverty trap from which they cannot escape on their own. Geographical isolation, plagues and diseases as well as a lack of capital all make it impossible for these countries to spur economic growth and development on their own. In order to climb the "ladder of development", they need a push from outside to make it to the first rung. This is where foreign aid can help. Poor countries barely get any tax revenues, leaving their budgets short of being able to finance the necessary investments in education, health and infrastructure. This is called the "financing gap". It can be filled through development assistance from foreign governments, making these countries able to invest into their public services. Poor households can also be supported by aid, through humanitarian assistance, microcredits, and the likes, increasing their incomes and allowing them to save. These savings can then be used to invest into their farms (by buying improved seeds, constructing irrigation systems, etc.) or into their families (by buying more food, medication, school materials, etc.), slowly overcoming the vicious cycle of extreme poverty.

But of course Sachs is not as naïve as to believe that aid works everywhere. Corrupt public systems are just one of the many potential threats to successful development. For a government to determine which country should be given aid, he recommends a practice from medicine, called "differential diagnosis". When a patient visits a doctor, the doctor usually looks at the symptoms and goes through a checklist, figuring out the best treatment for the patient. This is how aid should work as well. By closely analyzing a country and crafting an individual assistance plan, one can make foreign aid work in the most efficient way. This is what Sachs calls "clinical economics".

But Easterly disagrees. To him, Sachs is a pure technocrat, one that offers simple solutions to complex problems which will never work in practice. If 2.3 trillion dollars spent in development assistance over more than 60 years have not made things better for the poor, then increasing the amount of money will not suddenly cause anything to change. Poverty is a complicated issue with political, economic, social, historical, institutional and geographical dimensions. For one to say that they know the answer is simply a lie.

In his book, Easterly divides people into two categories: Planners and Searchers. A Planner is someone who claims to know what people in poor countries need to escape poverty. He then drafts a plan, like the MDGs, and promises that with enough money, the problems can be solved. On the other hand, a Searcher does not make these bold and unrealistic promises. A Searcher knows about the complexity of development and therefore knows that there is no simple solution to it. Instead, he will look for individual solutions to individual problems on the ground, on a small scale. He will use the *trial-and-error*-method to find out which ideas work and which do not.

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What is dazzling to Easterly is that current trends in development, such as the MDGs, completely ignore lessons learned from the past. The MDGs are nothing but a new version of the "Big Push"-strategies that were tried in the 50s and 60s. The underlying idea is that through a massive investment from outside into all sectors of an economy, it can "take-off" into self-sustained growth and development. Once economists realized that their ideas failed, they switched to the neoliberal economic models of the Washington Consensus, named after the financial institutions that advertised it (i.e. the World Bank and the International Monetary Fund, IMF, whose headquarters are located in Washington D.C.). They issued "structural adjustment loans" to developing countries, which were tied to conditions that forced these countries to privatize their companies, de-regulate their economies and reduce government spending. But imposing a free market economy from above does not work either, so now the whole development industry returns to the idea of the Big Push.

But why do plans not work? To Easterly, there are two core aspects that they lack: Feedback and accountability. If the UN drafts a plan in their offices in New York, how are they supposed to know what a farmer in Southern India really needs? What if he wants something else than a farmer in Ethiopia? And how are they supposed to communicate these needs? For ambitious planners, there is no way to find out what each individual person in every developing country considers important. And if a plan fails, who is responsible for it? The UN? The international financial institutions? The countries themselves? Are they going to fire people if the MDGs are not going to be achieved? The answer is probably no, and this the fundamental flaw of plans – there is simply no way the poor can hold anyone accountable for their failures.

But Easterly does not pretend to know the answers himself. But he knows that our current system of development cooperation does not work and has to be reformed. He calls on the UN and other important players to give up the unrealistic hope that there is one big plan to end all problems. Instead, solutions can only be found by Searchers, those who look for them on the ground. Individual NGOs should focus on one problem at a time and test their actions through rigorous scientific evaluations. If a method works, it should receive more funding. If a method does not work, funding should be cut. That way, development agencies will be judged by their results, not by their public relations work.

So where does this leave us? Who should we believe? In my opinion, both Sachs and Easterly offer intriguing arguments to make their points. Let us simply look at their favorite topic of debate, the MDGs. The MDGs, agreed on by most countries at the 2000 Millennium Summit in New York, aimed to halve, by 2015, the amount of people living in extreme poverty (defined by the World Bank as earning less than 1.25$ a day), achieve universal primary education, promote gender equality (and empower women), reduce child and maternal mortality, combat HIV/AIDS, malaria and other diseases, ensure environmental sustainability and to set up a global partnership for development. With less than 500 days left before their expiration date, the last status report shows mixed results.

But even the successes seem less impressive if you take a closer look: Achieving universal primary education seems nice and good, but simply getting kids into school does not say anything about the actual education they get there. While primary school enrollment in India rose from 84.6% (1992-3) to 95.4% (2002-3), one third of the students leave school before finishing the primary level. And even if some of the goals were reached, can the UN really claim that is was because they formulated the MDGs? What if countries came up with the idea that reducing poverty or fighting diseases is a good thing to do, without the UN telling them?

In the end, I do not think that you can look at development from a purely economic perspective. The Washington Consensus showed that there is an asymmetry of political power between rich and poor countries. The IMF and the World Bank, those very institutions that drove the Consensus, both have their headquarters in walking distance to the White House and the U.S. Congress instead of being in the countries they are supposed to help (Yes, they have regional offices, but that is not the point). Furthermore, the U.S. is the only country that can veto decisions in the IMF, having a voting share of 16.75%, while more populous countries like China and India stand at a mere 3.81% and 2.34% respectively.

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## The Aid Debate—Jeffrey Sachs, William Easterly and the effectiveness of foreign aid

So while Sachs and Easterly talk about how to improve development from a technical point of view, they hardly mention the fact that political decisions often work in the opposite direction of aid, showing that policymakers in the developed countries lack the will and the commitment to change current power structures. US and EU subsidies for their agricultural sector, which makes it impossible for farmers in developing countries (who often make up ~70-80% of their entire workforce) to compete, are just one of the many examples. And this is, in my opinion, the fundamental obstacle preventing development from being successful today.

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**About the author:**

Maximilian Betmann, 23, is student of political science and economics at the Julius-Maximilians-University in Würzburg, Germany. During his studies abroad at the State University of New York at Albany, USA, he discovered his interest in international development. He gained more experience in this field during an internship with the German NGO Karl-Kübel-Stiftung, which carries out projects in rural India and the Philippines.

## What India taught me about the real meaning of wealth

*By Johanna Dohl*

In autumn 2010 I thought about my future. What will I do after school? Will I go to university? Will I travel all around the world? Will I stay at home in order to do an internship? There are so many possibilities to start living and being independent, but what shall I do? At least, I asked myself: What am I able and willing to do?

I think that many young people do not know what they will do after their A-levels in Germany. Most of them are talented, curious and interesting young people who have so many possibilities that they cannot decide on a direction. In my opinion, the best thing you can do: Go abroad, get to know a new culture, learn more about yourself, see a different part of the world and come back with a rich treasury of experience.

In my case, I decided to apply for the German programme "Weltwärts". A long time ago I had heard about the programem which is supported by the Federal Ministry for Economic Cooperation and Development (BMZ) and various German NGOs and foundations. The aim of the programme is to support young German people between 18-28 years who want to serve as volunteers, mainly in the so-called developing countries in Asia, Africa and Latin America, but also in Eastern Europe.

It is a precondition that the applicant is interested in development work and open-minded about other people, cultures and surroundings. The partners, NGOs in the various countries, appreciate the effort of the volunteers who can enrich the work of the project.

However, the "Weltwärts" programme should be seen as a learning experience for young people and not as a social service in developmental aid. As most of the participants are young people who do not have a degree, they can contribute to the success of the project, but they do not have any subject-specific knowledge. Nevertheless, it is important that the volunteers have adequate language skills (like English, French or Spanish) and that they are creative and motivated to support the NGO. Moreover, it is very important to prepare young people for their time in a so-called developing country: Most of them have rarely experienced power cuts, extreme climate situations, oppression of political or social groups, corruption and other situations which are not common in Germany.

In order to be part of the programme, it is necessary to search for a project in a specific country and a specific context. I decided to apply for the "Weltwärts" programme of the Karl Kübel Stiftung für Kind und Familie in Bensheim (which is close to Frankfurt).

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# What India taught me about the real meaning of wealth

This foundation cooperates with several partners in India, and the volunteers work together in a team with the Indian NGOs. To be more specific, the aim of the Karl Kübel Stiftung is "to build a bridge" and that is the reason why the project is called the "bridge builder programme". As the period of exchange (8 months in total) is relatively short in comparison to other organizations, the foundation recommends that the volunteers contribute to an exchange between Germany and India after their return: to write articles for newspapers, to give speeches in the school or in the parish, and to spread knowledge about India.

After a motivation letter and an application form in English, an orientation workshop and two preparatory seminars with information about the Indian population, the religions, the costumes, the food and many other things, we were "prepared" to start our voluntary service in September 2011. I have to admit that I think that the Karl Kübel Stiftung is one of the best organizations because the preparation is very detailed and should encourage the volunteers to be critical and reflective about their time abroad. But to be honest, even the best preparation is not good enough because especially in India everything can be different from your expectations. But if we talk about bridges, exchange programmes and equality, we need to involve young people in the partner countries in order to give them the opportunity to experience our life in Germany.

September 2011: Incredible India. My first impression of this country: How can everything in India be that extreme? The traffic is extremely chaotic, the food extremely spicy and the climate extremely hot! There were so many new impressions, experiences and adventures. I needed to adapt to my new surroundings…

Fortunately, I was a volunteer for the organization REAL (Rural Education and Action for Liberation) in Pondicherry, Tamil Nadu, South India. Together with my team partner, I was involved in the development projects of REAL: protection of child rights, empowerment of women, agricultural projects, support of self-help groups, exposure visits and many more.

As volunteers, we got the task of teaching spoken English in a government school and in a tuition class. In order to motivate and encourage the children to speak English, we learned new songs, games and tried to show them the advantages of speaking English. When I remember the time with the children, it was one of the greatest times in my life: full of laughter, joy, happiness, jokes, colours, smiles and the feeling of being their bridge to Western countries.

To support the idea of building a bridge, we often organized special events for the children of the tuition class. Instead of doing grammar exercises, learning vocabulary or new songs, we organized special days which connected the German habits with the Indian traditions.

In February 2012, when our time in India had nearly come to an end, we decided to celebrate the German carnival in India. For children in Germany, the carnival festival is great fun because it involves dressing up as animals or celebrities, music and dancing. Of course we could not buy any fancy dress material in India, where the festival is not celebrated. Therefore my mother sent balloons, soap bubbles and make-up for face-painting from Germany and fortunately we did not have any problems with the Indian postal service. After several hours of face-painting, blowing up balloons and hundreds of soap bubbles, we were surrounded by numerous tigers, lions, butterflies, dogs and cats. The children were playing games like "Stop-Tanz" (when the music stops you are not allowed to move any more), we sang German songs, and all of them seemed to be happy. In retrospective I would say that it was one of the most fun days in my life and I hope I will always remember it.

I think it is nearly impossible to not feel welcomed in India. No matter where you are, no matter what you do, there are always nice Indian people who ask: "Where are you from? What are you doing in India? What is your father's profession? Are you married? Do you like Indian food and Indian culture? Do you like India?" It is difficult to summarize eight months' experience in a country of extreme differences, but one thing is always for sure: Indian hospitality is one of the most incredible I have ever experienced and I think that anyone who has been to India can confirm this claim.

However, I think what most people associate with India is the extreme diversity. In this country you can find very rich and very poor people; the climate can be extremely hot or extremely cold; the landscape can either be as green as in a jungle or orange like the desert; some men are remarkably respectful and others are violent; some woman are too shy to stand up for their rights, whereas others are the incarnation of emancipation. Even if India seems to be far away from Africa and Europe, and even if the Indian people might be different to others in the world, they have the same problems as some of their African brothers and sisters— the power supply. I have to admit that I am not used to a situation where there are deliberate power cuts because I have rarely experienced it in Germany.

# What India taught me about the real meaning of wealth

In contrast, these power cuts are the order of the day in India because there is not enough power for more than one billion people. Most people are used to the fact that the government of the different states cut the power supply several times a day and they structure their days depending on the power supply. But the problem of power cuts becomes more serious if there are violent storms like cyclones or tsunamis because the electric cables are not laid underground. Following a heavy cyclone which hit the costal area of Tamil Nadu in December 2011, the power supply was cut for four days in the cities and for more than one month in the rural areas. That means that the people were not able to see after the dusk at 6.00 in the evening; they could not cook, there were no free time activities in the evening.

This is an important area where ANSOLE can improve the lives of rural people all over the world. On the one hand, solar energy is better for our environment than coal production or nuclear power, while on the other hand the supply of solar energy can fulfill the daily needs of the people who are neglected by corrupt politicians or rich citizens in the cities.

After returning home from India after such a long time, it felt like a burden to relive my old German way of life. I felt privileged because I was born in Germany. In contrast to the generation of my grandparents and to most of the people in the world, I never had to experience war, the feeling of hunger when you do not have any food, extreme poverty or any other extreme situations. I was born in a country where woman have the same rights as men, where girls are as valued as boys, where school education and health care are basic rights for every citizen, and where unemployed people are supported by the government. And I was born in a country where I have been given the opportunity to live eight months in India, where I have learned very important things about myself, my personality and values that are important to me.

I came to the conclusion, that I should question the idea of "development" and "under-development". It is true that India faces many problems such as malnutrition, poverty, water shortage, child abuse or the oppression of women. In contrast, Germany seems to be one of the richest countries in the world, where we only face luxury problems. But does rich mean that we all wish to be as individual as possible? Does rich mean that we prefer to get a divorce instead of staying together? Does rich mean, that we break the family circle because we want to fulfill our own dreams and therefore forget to consider each other?

In India I got to know that being rich is about sharing, being rich means that you show affection and hospitality towards strangers and that you are rich if you can be together with people you love. Hence I asked myself: "What will be different from before?"

Nowadays, I am more critical about many issues: I am aware about the working conditions of people all over the world who work in the textile industry, who grow and pick tea, who produce chocolate or coffee. I

know that I can spread my knowledge, my enthusiasm and my thoughts about India and that the influence on other people might change the quality of life of the producers. It takes time, but it is possible to change the consumer behaviour.

Furthermore I am participating on the reverse programme of "Weltwärts" in the city where I am studying. This year, four young Indians will have the opportunity to work as volunteers in Germany. They will get to know the German language and culture, they will learn more about Europe, and they can expand their horizon as I did. I think this programme is the best way to gain inter-cultural experience, to discover globalization, to take on challenges and, most importantly, to experience personal growth.

**About the author:**

Johanna Dohl is 23 years old and she has been one of twelve volunteers who were participating at the "weltwärts" program of the Karl Kübel Stiftung in 2011/2012.

After her voluntary service in India she started to study "Intercultural European-and American studies" in Halle/Saale (Germany) and Paris (France). In her free time, she likes reading, traveling, sports and photography.

She got to know about ANSOLE during a workshop about German development work which was organized by the Karl Kübel Stiftung and where she met Dr. Daniel Egbe.

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