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SOLTRAIN Newsletter #07

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South Africa: Specialised Training Course on Solar Heat for Industrial Applications

Monika Spörk-Dür

A specialised course for a restricted number of experts was held in Stellenbosch at the end of November, giving insight into state-of-the-art design, simulation, planning and installation of advanced high quality solar thermal systems for industrial applications in Southern Africa. The training course was carried out in co-operation with SOLTRAIN and the Solar Academy of the IEA Solar Heating and Cooling Programme, and was hosted and organized by the SOLTRAIN project partner, CRSES, from Stellenbosch University.

The course accepted 50 participants, of which about 12 were planners from the solar thermal industry. The remaining participants comprised SOLTRAIN partners, researchers and members of public institutions. The course was lectured by SOLTRAIN coordinator, Werner Weiss, from AEE –Institute for Sustainable Technologies (AEE INTEC) in Austria, and by Christoph Brunner, head of the Department of Industrial Processes and Energy Systems at AEE INTEC, Austria.

The feedback of participants was unanimous in that they derived great benefit from attending the course, and expressed great interest in any future SOLTRAIN courses. ☼

Zimbabwe: Hospital Solar Water Heating Systems Technical Tour

Samson Mhlanga

The National University of Science and Technology, Zimbabwe's SOLTRAIN partner, and the Zimbabwe Institute of Engineers – Matebeleland Chapter, co-hosted a solar water heating systems technical tour to United Bulawayo public Hospital (UBH) and Mater Dei private Hospital in Bulawayo in mid November.

The delegation of over 30 participants included engineers, school and orphanage representatives and students from the university's Engineering Faculty. The highlights of the tour included a demonstration of the benefits of solar water heating systems at the institutions, the design of industrial solar water heating systems and solar water heating systems potential in Zimbabwe. Eng. S Mhlanga also highlighted the role of SOLTRAIN in supporting solar thermal technology uptake and the demonstration systems co-funding.

The UBH system has 98 flat plate collectors with a surface area of 215m^2, and 20 000 l of storage capacity. The SOLTRAIN funded system at Mater

Dei Hospital has 12 flat plate collectors with a surface area of 24m^2 and 1000 l of storage capacity, supplying the laundry, and a 6 flat plate collector system with a surface area of 12m^2 and 500 l of storage capacity for a pre-heat water system for the boiler. ☼

Zimbabwe: SOLTRAIN Supports Schools Climate Change Education and Awareness Campaign Fair

Givemore Kanyemba and Samson Mhlanga

The National University of Science and Technology, Zimbabwe's SOLTRAIN partner, exhibited at the Schools Climate Change Education and Awareness Campaign Fair under the theme Change the Mind, Not the Climate at Hillside Junior Primary School, Bulawayo in the latter part of November. Other organisations present were the Zimbabwe Climate Change Coalition, Edgars, and various primary and secondary schools.

The objectives of the exhibition included making children aware of climate change, its causes and effects, and to make children aware of the various means of mitigating global warming by using less electricity and promoting the use alternative, renewable sources of energy at their homes. It also sought to expose children to alternative, more sustainable technologies and to influence future policy and decisions by the children when they take positions of influence later on in life.

The event included presentations from Mr Zvaita (Programme Director of Zimbabwe Climate Change Coalition), Mr Sibanda (Deputy Provincial Education Director), Mr G Chirinda, (SOLTRAIN-NUST Representatives) and an Edgars Representative. Mr G Kanyemba and Mr A Mnkandla manned the SOLTRAIN stand for practical demonstrations. ☼

Mozambique: Representatives of ADA visit Maputo

Geraldo Nhumaio

The new Counsellor and Head of Cooperation of the Austrian Embassy in Mozambique, Mr Hubert Neuwirth, visited the Faculty of Engineering of the Eduardo Mondlane University (FEUEM) in late November in order to get acquainted with the SOLTRAIN activities in Mozambique. After the briefing at FEUEM and after being shown the SOLTRAIN demonstration trailer, Mr. Neuwirth was pleased to visit one of the SOLTRAIN I demonstration systems installed at Ndlavela, a health centre within 7 km of Maputo's peri-urban area.

Briefing about the SOLTRAIN activities in Mozambique. From left to right: Hubert Neuwirth (ADA), Madeleine Salinger (ADA), Muarapaz (EDM), Deputy-Dean for Research and Extension, Faculty Administrator, SOLTRAIN Coordinator.

Due to Mr Neuwirth's time availability, a visit will be re-scheduled so that he can also tour the Psico-Social Rehabilitation Center where a 1 000 l

solar thermal system was installed as part of SOLTRAIN I, as well as the 2nd trailer in the possession of a vocational school. Both locations are within 7 km radius of downtown Maputo. ☼

South Africa: SWH and PV system installed at Mariendahl

Angelo Buckley

The Centre for Renewable and Sustainable Energy Studies (CRSES) at Stellenbosch University undertook a project to install two solar-powered, water-heating systems at the Mariendahl farm. Mariendahl serves as Stellenbosch University's experimental farm and is located approximately 14 km north of Stellenbosch.

Although both systems are solar powered, they are powered using two different technologies. The one system is powered by solar thermal energy and is referred to as a solar water heating (SWH) system. The other system is powered using photovoltaics (PV). The project was funded by Stellenbosch University through the SOLTRAIN initiative. The SOLTRAIN initiative is managed by AEE-Intec in Austria and funded by the Austrian Development Agency (ADA) and the OPEC Fund for Industrial Development (OFID).

The solar photovoltaic water heating system

The initial stage of the project included the modelling and simulation of each of the systems to identify suitable sizing. This simulation modelling was followed by a detailed financial analysis to investigate the feasibility of each system and the detailed designs with the assistance of AEE-Intec. The systems should substantially reduce the electricity consumption of the residents as less grid electricity will be required for water heating. The aim of this project is to compare the systems, their performance and cost effectiveness.

A 2.4 m^2 flat-plate collector with a 200 l hot water storage was designed and installed on one of the houses and the other with a 1.5 kWp PV system. The PV system powers a DC/AC element for heating the water in a 200 l hot water storage tank identical to the tank used in the SWH system. The DC/AC resistive element, a relatively new technology on the market, allows DC electricity from the PV system to directly power the resistive element without the needed of an inverter. The element is also able to operate with AC electricity from the grid which serves as a back-up for when solar energy is insufficient. The SWH system is also equipped with a back-up AC resistive element.

The PV and SWH systems are expected to provide 60% of each residence's hot water needs. Both systems are equipped with monitoring equipment that allows CRSES and AEE-Intec to monitor and evaluate the performance of the systems. This will allow for a detailed technical and financial comparison of the types of technologies based on system operation, project costs and the cost of energy. ☼

Botswana: Upcoming SOLTRAIN Conference

Dr. Edwin Matlotse

The yearly SOLTRAIN Conference will be taking place at the Botswana Conference Center in Gaborone from 1st to 2nd February 2018 and will be hosted by the University of Botswana. One of

the topics that will be discussed is “How to Secure Sustainability - SOLTRAIN in the network of co-operation”. The relevance of the SOLTRAIN project for Southern African participant´s national renewable energy policy and national solar programmes will be illustrated using Botswana and Namibia as examples.

In addition, the conference will provide an outlook as to how how to ensure that the SOLTRAIN network is sustainable after 2019, and how to extend SOLTRAIN activities to other SADC countries. A panel discussion will address the Solar Thermal Roadmaps and Implementation Plans of SOLTRAIN in participating countries and will deal with the questions on what impact that the Roadmap and Implementation Plans have on the national renewable energy policies, what the needs for the implementation of the roadmaps are, and how to monitor the progress of implementation.

Focus will also be given to solar thermal demonstration systems, the monitoring of results from SOLTRAIN demonstration systems, operational experiences of large scale demonstration systems installed in South Africa, demonstration systems in Zimbabwe and Lesotho, as well as challenges and opportunities for solar thermal systems for the tourism sector in Botswana.

On the second day, a technical tour will be organized showing the solar thermal trailer in use for educational purposes at University of Botswana, as well as solar thermal systems at Moruapula Secondary School and at the Conference Hall of University of Botswana.

For more information and registration for the conference please contact Dr. Edwin Matlotse, University of Botswana, at the following address: winnenotshi@gmail.com.

Click here to download the Programme.

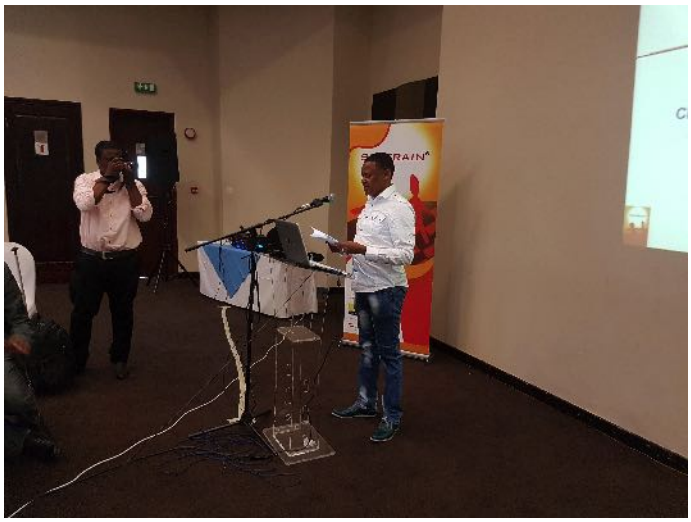
Click here to download the Registration Form.

Botswana: Solar Thermal Technology Roadmap (BSTTR) and Implementation Plan Launch

Dr. Edwin Matlotse

The Clean Energy Research Centre (CERC) of the University of Botswana (UB) recently launched the Botswana Solar Thermal Technology Roadmap (BSTTR) along with its implementation plan, a key output of the Solar Thermal Training and Demonstration Initiative (SOLTRAIN) programme.

The proceedings started with a welcome address by the CERC director, Edwin Matlotse, during which the value of BSTTR the importance was emphasized, considering the policy vacuum with regards to solar thermal specifically in Botswana currently.



Dr. Edwin Matlotse gives the welcoming address

AEE-INTEC’s Werner Weiss gave a regional overview of SOLTRAIN achievements to date in Botswana, Lesotho, South Africa, Namibia, Zimbabwe and Mozambique, congratulating Botswana for being the last participant to join the project but yet being on par with the rest of the SOLTRAIN partners who have benefited from their participation during the first and second phases.

The roadmap is a rigorous six-phase process sanctioned by the Botswana Solar Thermal Technology Platform. According to Prof. Andrew Obok Opok, the roadmap will run from 2018 until 2030. Opok also presented financial data regarding different solar thermal systems in various sectors, both public and private, during the period under consideration.

Proceedings were concluded with stakeholders commending the UB project team for compiling the BSTTR document and expressing thanks to the programme sponsors. ☼

Lesotho: BBCDC Awarded Emirates Energy Award

Ivan Yaholnitsky

On Oct. 24, Stephen Lelimo and Ivan Yaholnitsky accepted an Emirates Energy Award in Dubai, United Arab Emirates, on behalf of Bethel Business and Community Development Centre (BBCDC). BBCDC was recognized in the category of Education and Capacity Building and received a cash prize of 21,780 USD and Certificate.

Stephen Lelimo and Ivan Yaholnitsky with the award

The Emirates Energy Award was part of a Green Economy Summit which ran in late October, and and which received broad exposure on social and global media. The sponsors of the award covered BBCDC's travel and accommodation, and the program included a world class expert's panel on RE transition and clean energy.

The UAE is setting impressive and urgent targets for decarbonisation of its energy supplies. BBCDC is greatly honoured to receive this award and grateful to the organizers and people of the United Arab Emirates. BBCDC will use the cash prize to purchase an electric utility vehicle and bolster the solar energy program with a working model of a clean transportation system.

The vehicle will facilitate inexpensive driving lessons and reduce energy costs for local transportation. The prize will also enable additional investment in education and programs at BBCDC.

BBCDC's submission for the EEA included the contribution from OFID, AEE-Intec and the Austrian Development Agency, and summarized BBCDC's work on solar energy for the last two decades. ☼

Lesotho: Solar Innovation at BBCDC

Puleng Mosothoane

New 20 heat-pipe collector manifold

An average solar radiation of 6kWh per square meter per year provides enough solar thermal energy for Leotho's BBCDC to rely on solar water heating for its hostel's hot water requirements. Having been early adopters, some of the installed infrastructure is already 15 years old and recently needed some maintenance. At the same time, Lesotho's very cold winters present challenges due to freezing, resulting in the rupturing of pipes within the aging infrastructure.One of the girl's hostels had a 200 litre galvanized tank and 4 square meter flat plate collector made out of galvanized pipes installed.

This year, the BBCDC decided to replace the galvanized pipe collector with a 20 heat-pipe collector manifold. Since the new heat pipes are freeze resistant up to -32°C, freezing should no longer be an issue. The heat pipes also have a higher efficiency than the galvanized pipe collector, meaning that more hot water will be produced.

The new collector was installed by second year Solar Technology students at BBCDC.

Heat exchanger

The BBCDC is also experimenting with its own heat exchanger to deal with sub-zero temperatures and the damage caused by freezing. It is made out of copper pipes and copper sheeting which is soldered together. The collector is filled with freeze-resistant heat exchange fluid which in turn heats water in the storage tank. The heat exchanger is highly insulated so that all the heat in it is transferred to the water to be heated. The dimensions of the heat exchanger are 50cm x 7cm.

On the day it was tested, the loop from the collector with the heat exchange fluid reached 65°C, while the loop going to the tank reached 56°C. On the test day, the solar radiation averaged at 800 watts/m^2, and in 4 hours the heat exchanger managed to heat 20 l of water from 20 to 50°C.

A 2m^2 copper pipe flat-plate semi-closed collector was used in the testing. More tests on the heat exchanger will be conducted. ☼

Namibia and Lesotho: Solar Bakery Information Exchange

Fenni Shidhika, Helvi Ileka, Virginia Roman, Matthias Kinateder and Puleng Mosothoane

Under the Southern African Solar Thermal Training and Demonstration Initiative (SOLTRAIN), partners are expected to transfer technology and exchange information. Namibia Energy Institute (NEI) in collaboration Lesotho's Bethel Business and Community Development Center (BBCDC) demonstrated a solar bakery at the Windhoek Industrial and Agricultural Show (WIAS) at the beginning of October. The parabolic oven was transported from Lesotho and was on display for the whole week, with the main

objective being to raise awareness from bakery entrepreneurs in the country in order for those who are interested in the solar baking to submit proposals for co-financing under the SOLTRAIN project as demonstration systems.

The parabola, loaded up and ready for it's long trek to Namibia

Another objective of the collaboration was for Namibia to learn from Lesotho on how to construct the solar bakery, so that Namibia can start designing and manufacturing their own solar bakery. Participants from Lesotho shared their knowledge by demonstrating how the solar bakery works by baking a variety of bread and muffins. Normal standard bread pans as well as traditional pans from Namibia were also tested in the solar oven and were found to fit properly. Malte Schien, an Intern student from Germany who assisted BBCDC in the construction of the solar bakery, shared this knowledge of constructing and operating the solar bakery with staff and interns of NEI, members of the public and members from the Renewable Energy Industry Association of Namibia.

Members of the public who attended the WIAS were amazed at how the solar bakery worked and how well it baked bread and muffins. The demonstration of the solar bakery was done in conjunction with a cook-off competition organized by NEI under the Namibia University of Science and Technology (NUST). The competition was focusing on using different sustainable cooking methods including cookers using energy from the sun and wood efficient stoves. Various institutions participated in the competition and companies from industry such as Amusha Consulting and RDJ Consulting showed interest in knowing more about the design and manufacturing of the solar bakery. NUST and the University of Namibia students and lecturers also indicated that they would like to introduce the solar bakery at their institutions for research projects.

Freshly baked by the sun

According to Namibian census data from 2011, the main domestic energy source for cooking was wood and charcoal. The census indicated that 86 % of all rural households and about 20 % of all households in urban area were still using wood for cooking. Women and children do heavy work in gathering wood all the time, resulting in health problems and absence from school. In addition, traditional cooking methods cause health problems through smoke inhalation, especially in women and children. The introduction of clean cooking technologies to the communities will reduce some of these health risks and will improve the livelihood of people in both urban and rural areas.

In sunny weather conditions, the parabolic oven reached an ideal baking temperature of 180ºC and took approximately 35 minutes to bake a batch. ☼

Interview with Helvi Ileka from the Namibia Energy Institute

Namibia is southern Africa´s front runner in terms of solar energy. Solar could provide energy security for the country which currently depends heavily on fuel imports. This includes power and water heating for homes, but also heat for the food and mining industry and desalination of water.

Helvi Ileka was recently interviewed at the Solar World Congress in Abu Dhabi on how the roadmap of the Namibian government marks the shift towards solar.

Click **here** to view the interview on Youtube.

SOLTRAIN

The Southern African Solar Thermal Training & Demonstration Initiative is a regional initiative on capacity building & demonstration of solar thermal systems in the SADC region. It is funded by the Austrian Development Agency & co-funded by the Opec Fund for International Development.

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