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SOLTRAIN

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Botswana: SOLTRAIN Project Trailer on display at the Gaborone International Consumer Trade Fair

by Dr. E. Matlotse

The Clean Energy Research Centre (CERC), in partnership with the Department of Energy (DoE) under the Ministry of Minerals Resources, Green Technology and Energy Security (MMGE), embarked on a public awareness campaign at the Gaborone International Consumer Trade Fair in late August.

Activities included the setting up of adjacent stalls by both CERC and the DoE, as well as putting the SOLTRAIN project trailer on display. In keeping with the public awareness component of the SOLTRAIN project, it was hoped that the presence of the trailer would promote awareness of different solar thermal technology principles and concepts, and highlight some of the benefits of clean energy to Botswana citizens. Building acceptance is seen as an important step towards the mainstreaming renewable energy technologies.



The department of energy (DoE) stall at the Gaborone International Consumer Trade Fair. The SOLTRAIN project trailer was displayed by CERC in a partnership with DoE. Also shown is CERC's biodiesel powered utility vehicle.

CERC's and the DoE's public awareness efforts seemed to have paid off, with many visitors

expressing interest in the technologies and an appreciation of what it is that the two parties are trying to achieve. Most importantly, they came to appreciate how they can also be a part of the country's journey towards a sustainable energy future.



Botswana: First SOLTRAIN project dissemination training course held at the University of Botswana

by Dr. E. Matlotse

The Clean Energy Research Centre (CERC), ran a successful first dissemination training course in early August. Participants included twenty Ministry of Basic Education technicians resulting in representation from at least two officials for every district in the country.



CERC director, Dr. E. Matlotse, outlining the SOLTRAIN project

The technicians operate regionally in attending to school's solar water heating systems, and lack of skilled capacity had resulted in a high failure rate for these systems. The SOLTRAIN training therefore provided a much-needed shot in the arm in ensuring that the potential of solar thermal technology is realized in providing basic energy services to rural learners.

Proceedings were officially opened by the Faculty

of Engineering and Technology (FET) deputy dean, Dr. O. Kanyeto, followed by CERC director, Dr. E. Matlotse, who delivered an overview of the entire SOLTRAIN project and some specifics of the training course itself.

Thereafter, the roughly two-day training session kicked off in earnest, with the Ministry's Permanent Secretary, Mrs. Grace Muzila, visiting on the second day of proceedings to offer a word of encouragement to the participants. Muzila promised that they will send more technicians to training of this nature.

The training culminated in an official closing and awards ceremony. Dean of Graduate Studies at UB, Prof. G.O. Anderson, welcomed everyone to the ceremony and CERC director, Dr. E. Matlotse, again outlined the SOLTRAIN project to attendees.



Deputy PS Mrs. Oemetse Sally Nkoane giving the keynote address

Guest speaker from the Ministry, Deputy Permanent Secretary Mrs. Oemetse Sally Nkoane, gave a keynote address during which

she thanked both UB and the SOLTRAIN project sponsors for the excellent work that they are doing in the solar thermal sector. After her address, she awarded the certificates to the participants.

One of the participants, Mr. A. Kakungirue, gave a vote of thanks in which he expressed his thanks to UB, SOLTRAIN and his employers in affording him the opportunity to attend and benefit from the training session.



DPS, dean of graduate studies, the trainers (UB SOLTRAIN project team), trainees and other guests conducted a group photo in front of the solar trailer

The closing ceremony was itself concluded with a tour of the SOLTRAIN trailer by the dignitaries and a group photo of dignitaries, trainers and trainees.



Zimbabwe: Solar thermal theoretical and practical workshop for high-school teachers and students at Mahlothova Secondary School, Umguza, Bulawayo
by Blessed Sarema & Samson Mhlanga

The National University of Science and Technology SOLTRAIN team continued with their schools outreach programme aimed at creating

awareness about solar thermal technology and applications. This time the destination was Mahlothova Secondary School, located in Umguza District 45 km from Bulawayo on the Victoria Falls Highway. This was the team's first visit to a school outside Bulawayo thanks to Gawain Badcock who volunteered to tow the Mobile Solar Training Unit, accompanied by Sam Stroupe, a student from Texas Tech University.



At the workshop the team managed to train 9 teachers and 239 students in three sessions. The first session focused on the theory behind solar thermal heating, covering various applications for solar thermal systems, preconditions for solar energy, utilization and solar resource, flat plate versus tubular collectors, materials and other components.

In the second session, participants were taken through the Mobile Solar Training Unit. Practical demonstrations on how the thermosiphon systems and active pump systems work were conducted. Space heating applications of solar thermal energy was also demonstrated through the radiator circuit of the trailer. The team also took the opportunity to explain functionality of the photovoltaic system on board.

The final session of the training sought to impart some practical skills to the participants in terms of making solar collectors using locally available resources. The team demonstrated the basics of soldering that is required during assembly and installation of solar water heating systems.

Fittingly, the training was concluded with a visit to a local vocational training centre as the team sought opportunities for broader collaboration within the field of solar thermal energy.



Zimbabwe: Second training course on installation of thermosyphon solar water heating systems

by Blessed Sarema & Samson Mhlanga

The National University of Science and Technology (NUST) and SOLTRAIN hosted another round of solar water heating system installer training in Bulawayo in early July. Aimed at improving the quality of installations in Zimbabwe, this was the second round of training, with the first having been conducted in Harare at roughly the same time the previous year. The training was conducted by Rudi Moschik from AEE INTEC alongside Eng. Samson Mhlanga from NUST.



A total of 15 installers drawn from various fields including technicians and engineers were included in this round. The training included important theoretical concepts such as collector type, collector efficiency, orientation, inclination and some of the fundamental installation errors that one needs to look out for.

Once again the Solar Mobile Training Unit proved to be an important training resource, and some

of the lessons were delivered on the trailer itself, with the participants being able to appreciate the best practices evident from the system that is installed on the trailer.



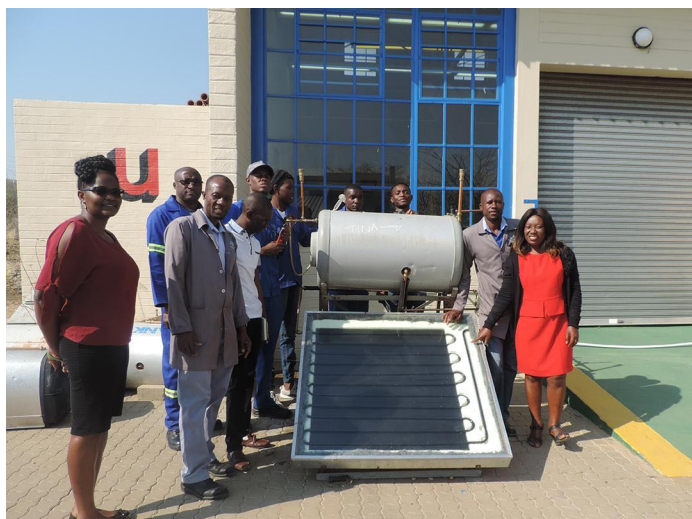
A demonstration of the installation of a vacuum system was also completed, and all the participants participated in the practical step-by-step installation procedure leading up to the commissioning stage. Key maintenance checkpoints were also discussed. To conclude the training, participants were assessed by means of a test, with certificates being awarded to successful participants.



Namibia: First Collector manufactured in Namibia by the participants of Train the Trainer Courses carried out under SOLTRAIN II

by Fenni Shidhika, Helvi Ileka and Virginia Roman

Colleagues from the Windhoek Vocational Training Centre attended the Final Stakeholder Workshop on the Implementation Plan of the Namibian Solar Thermal Technology Roadmap to present the first locally manufactured solar collector. Many of these individuals attended the Train the Trainer courses for professionals carried out previously under SOLTRAIN II. The aim of these courses was to increase the knowledge of professionals on solar thermal systems and to be able to design, build and install such systems.



Immanuel Iiyagaya and Mr Shilongo, in grey overall, participants of the SOLTRAIN training of trainers from Windhoek Vocational Training Centre, with the first solar collector

The collector was manufactured by the Vocational Educational Trainers, Kayec Training Trust, National Youth Service, NamWater Human Resource Development Centre and National

Training Authority, with the assistance from Gesellschaft Für Internationale Zusammenarbeit's (GIZ) ProVet programme.

A key objective of the manufacturing initiative was to start the manufacture of a collector with locally available materials. The size of the collector produced is 1.2 m by 1.2 m (1.4 m² in total), with components consisting of copper pipes, black-painted flat sheets, insulation foam and the wood, which was used as a frame, could all be bought locally.

Participants tested the functionality of the collector in terms of temperature changes of the fluid in the collector. However, it is noted that this is an ongoing activity and more tests need to be performed on the collector to determine metrics such as the flow rate and efficiency of the collector. The Vocational Training Centres confirmed that they have the workforce available and are now in search of potential investors who can assist them with commercialisation efforts.

It is encouraging to see that the Windhoek Vocational Training Centre is using the training materials provided by the SOLTRAIN project for practical training purposes. For example, the tank from the trailer will be used at the World Skills Competition in Abu Dhabi later this month by the Windhoek Vocational Training Centre.



Windhoek Vocational Training Centre preparing for the World Skills Competition

Namibia: Key Stakeholders commit to implement the Solar Thermal Technology Roadmap (Nam-STTR) Implementation Plan at the Final Stakeholder Workshop

by Fenni Shidhika and Helvi Ileka

The Namibia University of Science and Technology (NUST), through the Namibia Energy Institute (NEI), organised the Final Stakeholder Workshop on the Implementation Plan of the Namibia Solar Thermal Technology Roadmap (Nam-STTR) under the Southern African Solar Thermal Training and Demonstration Initiative (SOLTRAIN Project) in collaboration with the Ministry of Mines and Energy (MME). The workshop took place in late June at the NUST hotel school.

The main objectives of the workshop were to present the final draft of the Namibia Solar Thermal Roadmap Implementation Plan and get input from stakeholders. In addition the workshop sought to obtain full commitment and pledges in the implementation of the Roadmap from Key Stakeholders and participating institutions such as Electricity Control Board (ECB), NamPower, Environmental Investment Fund (EIF), Namibia Standards Institute (NSI), National Training Authority (NTA), Ministry of Works and Transport (MoWT), Ministry of Mines and Energy (MME), Renewable Energy Industry Association of Namibia, (REIAoN), National Housing Enterprise (NHE) and the National Commission on Research, Science and Technology (NCRST).

The implementation plan will guide the key stakeholders on various activities, milestones,

strategies and timelines in order for Namibia to reach the mission of achieving an installation of 1.5 million m² of solar thermal collectors installed capacity in Namibia by 2030, which translates to about 0.5 m² per inhabitant with a thermal output equivalence of approximately 1.05 GWth (based on the international conversion factor of 1 m² = 0.7 kW).



Participants from various institutions that attended the Final Stakeholder Workshop on the Implementation Plan of the Nam-STTR

Dr Tjama Tjivikua, the NUST Vice Chancellor in an address delivered on his behalf by Mr Lameck Mwewa, elaborated on the achievements of the SOLTRAIN Project to date. John Titus, the Director of Energy from MME who delivered the speech of the Permanent Secretary of Ministry of Mines and Energy spoke highly of the SOLTRAIN initiative. The impacts of activities and contributions from SOLTRAIN are already evident in Namibia, especially in the work towards the development of Renewable Energy Policy, Demand Side Management Study, Update of the National Energy Policy, the development of the curricula in Universities and in Vocational Training Centres.

Tonateni Amakutuwa from ECB said that ECB commits to offer regulatory support, while Arno Pfohl from NamPower pledged that NamPower will offer technical support. MET underscored Namibia's commitment to reduce its carbon footprint and gave assurance of its support towards the goal of having 70 % of electricity

generated from renewable energy by 2030.

Petrus Muteyauli from MET head of Environmental Economics Unit stated that they are willing to work with the energy industry to submit bankable renewable energy projects to access funds from the Green Climate Fund. Aina-Maria Iteta from the EIF said the stakeholders should strive to own the Nam-STTR. She emphasised that the EIF will continue to make a loan facility for renewable energy available through local banks. Nico Snyders from MME stated that the Renewable Energy Policy and the National Energy Policy spearheaded by the Ministry, which has been recently approved by Cabinet, will enhance the uptake of solar thermal technologies.

Kudakwashe Ndhlukula, the Executive Director for SADC Centre for Renewable Energy and Energy Efficiency (SACREEE) who wants SOLTRAIN to be replicated in all SADC member states, also committed support for the roadmap implementation plan in industrial applications of solar thermal technologies. Paulus Mungeyi from NCRST said that they will support the roadmap implementation plan on research activities in the energy sector, prioritising renewable energy. Nandaemua Maharero from NSI said that NSI together with the industry will be engaged to review, develop and adopt relevant standards for proper implementation of various technologies.

Harald Schutt from REALoN stated that they will support the implementation plan of the roadmap in various solar thermal technologies. Christoph Heil from NTA and Gesellschaft Fur Internationale Zusammenarbeit (GIZ) presented the initiatives and activities undertaken by NTA and GIZ on the promotion of Vocational Education & Training in Namibia (ProVET) in the implementation of Unit Standards on Solar Technologies at all Vocational Training Centres.

The Implementation plan of the Namibia Solar Thermal Roadmap is divided into two phases and has identified activities and key stakeholders to

fast track the implementation of the Roadmap. The first phase, which is the short-term strategy (2017 – 2021), will focus more on awareness, policy support, and training, and pave way for the full scale implementation. This will be done while physically implementing a number of installations.

The planned activities in this phase include carrying out a review of any existing policies and, if necessary, developing relevant policies that may support the smooth implementation the Roadmap, carrying out outreach and public awareness to showcase the benefits of increased solar thermal technology deployment and usage, and encouraging academic institutions to develop training programmes, and implement research programmes to support the sector. The development of possible financing and subsidy mechanisms for the various technologies will be encouraged in this short-term strategy phase.

The second phase which is the long-term strategy (2022 – 2030) will consolidate the activities initiated in the first phase, and some of the tasks in phase 1 will continue into this phase. The full scale deployment of the installations will be emphasized in phase 2, with objective of meeting the set targets. The activities will be monitored by the steering committee, which will receive regular updates from the secretariat (NEI), and systems assessment will be through direct interaction with the key stakeholders. The Roadmap will be continuously updated during actual implementation phase and monitoring and evaluation will form part of the process during the implementation. The entire activities will be overlooked and supervised the Roadmap Steering Committee.



Lesotho: A tribute to Dr. Anton Schwarzmüller in Zimbabwe

by Ivan Yaholnitsky

This month's submission to the Soltrain Newsletter from BBCDC, pays tribute to the work of Dr. Anton Schwarzmüller in Zimbabwe. One of the great achievements of the SOLTRAIN program is the sharing of ideas and cross fertilization of experience. At one of the first presentations of SOLTRAIN II in Lesotho, Werner Weiss introduced some of the low cost institutional systems that were built by Tony and his team in Zimbabwe.

When I saw Tony's systems, they immediately drew my interest, because of the low cost, bulk supply models they developed for schools and institutions. In Lesotho, we are in the same position of needing low-cost solutions, that include some local manufacturing and doing what you can with local materials and components. It took us some years, but I wanted to demonstrate for myself and at BBCDC, that system's like Tony's can work and are appropriate for the African context.



Assembling evacuated glass tube, heat pipe and manifold assembly

In 2017 we finally installed a system inspired directly by the work of Dr. Schwarzmüller. BBCDC operates a lodge on its campus and in response to increased demand for bookings and accommodation, we renovated a house

previously damaged by fire. A new roof was installed to provide extra sleeping space and two new guest flats were constructed and fitted with new bathrooms and plumbing. We needed hot water and this provided an opportunity to design and build a system like Tony's in Zimbabwe.

We purchased two commercial evacuated glass tube collectors with heat pipes and then constructed a low pressure solar water heating system with a 500 litre plastic tank. A simple float valve is used to fill the tank and maintain low pressure in the water volume. The elevation of the tank and a good volume ensures adequate pressure at the shower heads.



Making final connections between tank and collectors

A young German engineering intern by the name of Malte Schien came to BBCDC in June 2017 for a 6 month academic attachment for his degree, and assisting with this task was one of his first assignments. The system came together well and is working properly. We were stumped for a few days by reverse thermo-syphoning across the horizontal manifold which we could not explain at first. It seemed that nocturnal cooling of the un-insulated storage tank created an unexpected stratification of cold and hot water in the tank, which would reverse the thermo syphon from the previous day.

All of us learned something, and finally, modification of the flow lines from the tank to the manifold eliminated the problem, along with insulation and covering of the storage tank. In the end the system is producing plenty of hot

water, and we were able to build a 500 litre solar water heating system for a relatively low cost. Many of our students were up on the roof with us, and as an educator, I am happiest not to give them answers, but to allow them the opportunity of figuring it out for themselves. This is the best development outcome. After seeing presentations about Tony's work in Zimbabwe, I scratched my head and found our own solution. The premise of the SDGs is local agency and self-sufficiency; so be it for our students.



Solar water heating system is fully operational; other design synergies include day lighting, good ceiling insulation and winter sun facing windows

There are numerous boarding schools in Lesotho because of the dispersed nature of the population, especially at secondary level. A pressing technical and health imperative is installation of low cost bulk solar water heating solutions for large populations of boarding students. What is needed for showering is a large volume of warm but not necessarily hot water. Developers, technicians, plumbing firms and administrators can get with it as we did. Thanks *haholo* Tony.



South Africa: Stellenbosch University presents benefits of solar thermal projects to metal finishing industry

by Karin Kritzinger

The Centre for Renewable and Sustainable Energy Studies at Stellenbosch University (CRSES) attended the South African Metal Finishing Association (SAMFA) annual general meetings in June. CRSES was represented by Angelo Buckley and the opportunity was used to present and discuss the potential for large-scale applications of solar thermal technologies in the metal finishing industry and to introduce the SOLTRAIN initiative, aimed at driving and funding large-scale solar thermal demonstration systems in South Africa. One of the meetings was also attended by Peter Klein from the CSIR, who presented on the Solar Payback Project and provided insight into the benefits it offers.



Angelo Buckley presenting at the SAMFA AGM in Edenvale, Gauteng

SAMFA was established with Danish funding in 2000 to execute cleaner production programmes in the Metal Finishing industry. SAMFA supports and represents companies, including suppliers to the trade, in the electroplating, e-coating,

anodising and powder coating sectors in South Africa.

CRSES recognises the potential benefit of solar thermal technologies to supply process heat for low temperature processes of the industry such as metal cleaning, finishing and surface treatment. Most of these processes require hot water at temperatures ranging from 40 °C to 100 °C, making solar thermal heating systems ideal for providing a large percentage of a company's process heat demand, and offsetting the usage of more costly, conventional fuel sources such as electricity, diesel and liquid petroleum gas (LPG), which is most commonly used for process heat by the industry.

There was a large interest from SAMFA members in solar thermal technology and the financial benefits it could provide to their respective companies. Many companies have looked into renewable energy technologies such as solar thermal and solar photovoltaics (PV) as well as energy efficiency technologies such as heat pumps. However, to date no significant investments have been made in such projects. CRSES hopes that the presentations grow the industry's understanding of solar thermal technology, the financial benefits it has to offer and the different funding initiatives available (such as the SOLTRAIN and Solar Payback) and that this sparks the onset of the first of many large solar thermal projects within the industry in South Africa.

CRSES would also like to give a special thanks to Tony van der Spuy, Chairman of SAMFA, for providing the opportunity to attend and present at these meetings.



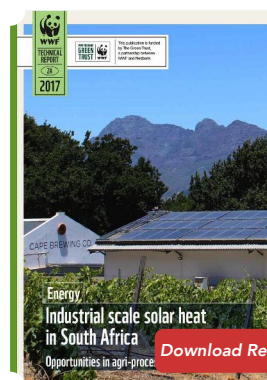
New Report from WWF-SA: Industrial scale solar heat in SA

by Angelo Buckley

WWF-SA recently published a technical report exploring the barriers and potential for the uptake of solar thermal energy in South Africa in the agri-processing and textile industries.

Staff at the Centre for Renewable And Sustainable Energy Studies at Stellenbosch University, one of the South African SOLTRAIN partners, co-authored the report.

Although the use of solar thermal technology in industry is highly applicable to low temperature requirements, the key reason why it has not received the level of attention of PV is due to the high cost of both the installation of the plant and the storage of heated water.



South Africa has some of the highest levels of solar irradiation in the world, and while both domestic and industrial use of PV to generate electricity has gained traction, the use of solar thermal for industrial process heat has not attracted much

attention. The agri-processing and textile industries offer key market opportunities due to their need for low temperature heat (below 160 °C).

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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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