



3rd Progress Report

SOLTRAIN – Phase IV

Southern African Solar Thermal Training
and Demonstration Initiative

Project: OEZA-Vertrag 2608-00/2019

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SOLTRAIN – Phase IV

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1 Summary

1.1 Aims and goals of the project

The SADC region faces a huge power deficit due to low investment in the power sector. This is illustrated by the long-standing power supply crisis in Southern Africa. In South Africa widespread rolling blackouts began in 2007 and continue to this day as supply falls behind demand. South Africa experienced its worst energy crisis, when Load Shedding Stage 6 activated for the first time ever in December 2019¹. Eskom stated that of its total nominal capacity of around 44,000 MW, it was unable to provide around 13,000 MW of total capacity, resulting in the nationwide blackouts².

In addition, in South Africa for example, 80% of the electricity is generated from coal³. In all countries that are part of the Southern African Power Pool (SAPP), the share of thermal coal-fired power plants is 61%⁴.

The recurring interruptions in the power supply throughout the SADC region are a major threat to the economic growth. Since a considerable share (40-50%) of the electricity generated is converted into heat in the industrial, commercial and residential sectors, the use of solar water heaters could be a major contributor to the reduction of electricity use, with resulting environmental benefits such as reduced CO₂ emissions. SADC member states have excellent solar irradiation with more than 2,000 kWh/m² annual radiation and estimates from the International Energy Agency (IEA) suggest that solar thermal systems could meet about 70 – 80% of the regions low-temperature heating and cooling demand.

For these reasons, SOLTRAIN is designed to support and contribute towards the implementation of energy policies of the target countries that enhance the use of solar thermal systems. Energy poverty negatively affects the circumstances of large numbers of people in general, and particularly in the SADC Member States. There are close links between energy supply and practically all aspects of sustainable development, such as access to water, agricultural and industrial productivity, health care, education, job creation, environmental pollution and climate change.

The focus of SOLTRAIN is to contribute towards reducing energy poverty by improving access to sustainable energy technologies, specifically solar thermal solutions, and thus directly contributing to the realisation of SDG 7 and indirectly to SDG 1, SDG12 and SDG 13⁵.

¹ Nkanjeni, Unathi (10 December 2019). "Stages 6 to 8 load-shedding: What it means and how it affects you". Times Live. Retrieved 2020-04-05.

² Moneyweb. 2019-12-09. Retrieved 2019-12-17.

³ <https://www.usaid.gov/powerafrica/south-africa>

⁴ SAPP Annual Report, 2019

⁵ <https://www.un.org/sustainabledevelopment/sustainable-development-goals/>

SOLTRAIN started in 2009 and is currently in its fourth phase of cooperation with partner institutions in Botswana, Lesotho, Mozambique, Namibia, South Africa, Zimbabwe and SADC Centre for Renewable Energy and Energy Efficiency (SACREEE).

In the first three phases, approximately 3,000 people were trained in 110 training courses and 326 solar thermal systems ranging from 2 to 600 m² collector area, per system, have been installed.

In order to support broad rollout programmes of solar thermal systems in all six participating countries, Solar Thermal Roadmaps and Implementation Plans were developed during SOLTRAIN Phase III in broad stakeholder processes in close cooperation with policy-makers (ministries and governmental bodies).

The logical step in Phase IV is to support the countries in the implementation of these Solar Thermal Roadmaps and Implementation Plans. This is being done in a medium-term process, in close coordination with the renewable and solar energy policy-makers of the partner countries.

SOLTRAIN – Phase IV focusses on five major areas:

Support policy stakeholders with the implementation of the Solar Thermal Roadmaps and Implementation Plans that were published after a broad stakeholder process in all partner countries.

Increase technical skills by carrying out a number of training courses targeted at different levels and stakeholder groups in the value chain of solar thermal technology.

Raise awareness of the potential of solar thermal technologies by using targeted campaigns. In this way the relevant stakeholders and the public are made aware of the wide range of application areas for solar thermal systems. Awareness rising also includes showing the benefits of solar thermal systems with respect to energy supply, poverty alleviation, job creation and the protection of the natural environment.

Strengthen institutional structures that can offer expert advice, training and technical support to the local industry and politicians.

Support the solar thermal technology platforms that were established in the previous phases: Similar to the European technology platforms, these platforms include all key stakeholders and sectors that influence the general conditions of how to accelerate the dissemination and use of solar thermal systems. These platforms act as an interface between the local companies and the relevant

governmental institutions in order to speed up the broad implementation of solar thermal technologies.

Demonstrate that solar thermal technology works: SOLTRAIN sets up solar thermal demonstration plants in order to apply the knowledge taught in the training programs to installers, students and politicians. Both smaller and larger plants set up at social institutions and at small and medium enterprises contribute to water heating, cooling and the generation of process heat.

Target groups:

The target groups (or direct beneficiaries) consist of about **1,200 participants at different training courses.**

The beneficiaries are staff members, occupants, and patients of social institutions, students, guests of tourism facilities like lodges and hotels, as well as small and medium enterprises. At these institutions about 100 demonstration systems of different sizes and for different applications are planned to be installed. It is estimated that about 7,000 persons will directly benefit from these demonstration systems by reducing their energy bills and by improving the standard of hygiene.

The local partners in the six SADC member states are:

- the Clean Energy Research Centre at the University of Botswana
- the Solar Industries Association of Botswana (SIAB)
- the Bethel Business and Community Development Centre in Lesotho
- the Namibian Energy Institute at the Namibian University of Science and Technology
- the National Company for Science and Technology Parks in Mozambique
- the National University of Science and Technology in Zimbabwe and
- the Centre for Renewable and Sustainable Energy Studies (CRSES) at Stellenbosch University and the South African National Energy Development Institute (SANEDI) in South Africa.
- SADC Centre for Renewable Energy and Energy Efficiency (SACREEE).

The installers of solar thermal systems (small and medium enterprises) will be supported by the optimisation and improvement of solar thermal systems. Furthermore, the major training activities are targeted to this group in order to build or to improve their skills in the design, installation, commissioning and maintenance of solar thermal systems. As for the companies who already participated in previous phases of SOLTRAIN, the cooperation will be intensified, as it can be built on already acquired skills. Based on the experience of the previous phases of SOLTRAIN, about 15 – 20 small and medium enterprises are expected to be active in the installation of the demonstration systems.

Results and expected outputs of Phase IV

- 1,200 persons will be trained in 90 training courses in designing, installation, maintenance and quality assurance of solar thermal systems
- 24 site visits with 250 participants will be carried out to show the potential and results of the operation of solar thermal systems
- 6 national Solar Thermal Roadmaps (one per country) are under implementation
- 6 annual solar thermal statistical data reports (one per country) are available
- 100 solar thermal demonstration systems for various applications installed, in operation and quality checked and
- at least 2,500 MWh of electricity saved and 430 tons of CO₂ emissions avoided annually.

1.2 Interim results and highlights of 2021

This chapter provides a brief summary of the work carried out since the commencement of the project in July 2019 and some highlights of the year 2021. A detailed description of all activities is given in chapter 3.

In general, it can be reported that the project is well on track and the schedule was largely met despite the Corona-related restrictions in 2020 and 2021.

The following table shows the goals achieved by December 2021. In the right column, all the goals that are fully on schedule are shown in **GREEN**. The **ORANGE** marked targets are those where the schedule could not be fully met, but the delay is not critical. The **RED** marked targets are those where the schedule could not be met and the delay is critical. The percentage indicates the share of the respective targets that have been achieved by the end of 2021.

Table 1: Results achieved by December 2021, based on the indicators defined in the project document

Indicators of expected outputs <u>by the end</u> of the project	Achieved by Dec. 2021	
Work Package 1 - Solar Thermal Roadmap Implementation		
24 Policy Workshops carried out	20	83%
Participation at 24 trade fairs (4 by each partner)	7	29%
42 information workshops for private and public sector (6 by each partner)	23	55%
Work Package 2 - Training		
13 Train the Trainer courses carried out	13	100%
15 persons trained in the dual training program	12	80%
10 training courses for VTCs organized	9	90%
7 training courses for artisans from the private and public sector organized	3	43%
Three specialized courses for professionals carried out	2	67%
38 dissemination courses carried out	19	50%
Set of 4 short training videos on solar thermal	4	100%
Solar Trailer for the National University of Lesotho	delivered in March 2021	100%

Work Package 3 - Demonstration Projects		
100 Solar thermal demonstration systems approved	238	238%
100 Solar thermal systems installed, in operation and quality checked	55	55%
2,500 MWh of electricity saved	206	8%
430 tons of CO ₂ emissions avoided annually	65	15%
32 technical tours carried out	6	19%
Installed demonstration systems documented on the SOLTRAIN Web-site	55	55%
Work Package 4 - Quality Control, Maintenance, and Monitoring		
Quality checks carried out for all installed systems	55	55%
Monitoring reports for all monitored systems	6	100%
Work Package 5 - Awareness Raising and Dissemination of Results		
14 SOLTRAIN Newsletters published	12	86%
Redesign of the SOLTRAIN website	completed	100%
10 articles in newspapers and journals	24	240%
3 SOLTRAIN conferences organized	1	33%
20 student projects funded	14	70%
20 papers or posters for national and international conferences	10	50%
Work Package 6 - Management		
Kick-off meeting organized and carried out	completed	100%
3 Annual progress and financial reports	3	100%
6 Steering committee meetings	19 ⁶	320%
Mid-term review	11/2021	100%
Final project evaluation	07/2022	
Final project report and final financial report	03/2023	

1.2.1 Highlights 2021

A total of **2070 people took part in the 90 trainings and workshops** carried out until the end of 2021.

If this is compared with the goals set, which was to carry out 90 training courses with 1,200 participants, then the goal has already been achieved in terms of the trainings carried out and the number of participants has already been significantly exceeded.

By end of December 2021, applications for a total of **390 solar thermal demonstration systems** were submitted. 238 of these systems were approved for funding by the steering committee by end of December 2021. 55 of the approved solar thermal demonstration systems have been constructed and are in operation. Thus, it can also be assumed that the goal to save at least 2,500 MWh of electricity and to avoid 430 tons of CO₂ annually will be achieved.

67 or 29% of the approved solar demonstration systems will be used in institutions that **support women and marginalized groups**. Applications range from dormitories for female students to a training centre for the San community in Namibia and a maternity clinic in Zimbabwe.

Another 16 systems will be installed at hospitals.

⁶ Since physical meetings of all project partners were not possible due to the corona pandemic in 2020, it was decided to hold monthly steering committee meetings to maintain momentum in the project. This means that the frequency of Steering Committee meetings has been significantly increased compared to planning.

The largest project that SOLTRAIN-Phase IV supported so far with the installation of solar systems is the e-Junction Residential Development, which is being built for low-income families in Cape Town. The total collector area is 249 m².



Figure 1: E-Junction Residential Development during the construction phase. Three solar storage tanks in the foreground before installation.

Other highlights include the two Namibian **mass-housing projects** OSONA Village with 10,000 houses and the Aussenkehr low-cost housing project including 58 houses. All of them are going to be equipped with solar water heating systems. The OSONA Village project is supported by SOLTRAIN with training of installers, monitoring and quality control.

Hospitals formed another highlight in 2021. These are the Katutura hospital with 120 m² collector area, the Lady Pahamba Private Hospital with a total of 360 m² collector area (both in Namibia) and the Maternity Centre in Marondera, Zimbabwe.

Electricity (Solar Water Heating) Regulation in Zimbabwe

An initial outgrowth of the Solar Thermal Roadmap and Implementation Plan was the Electricity (Solar Water Heating) Regulation, which took effect in Zimbabwe in November 2019. This regulation was developed with the significant participation of the SOLTRAIN partners from Zimbabwe and is mainly based on the recommendations of the Solar Thermal Roadmap and the Implementation Plan.

Gleisdorf, Gaborone, Harare, Johannesburg, Stellenbosch, Maputo, Windhoek,
Mt. Moorosi

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