

# Final report

## SOLTRAIN Phase IV - Mid-term Review

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# Executive Summary

## 1. Introduction

SOLTRAIN Phase IV with a duration from 1 July 2019 – 31 December 2022 is carried out in Botswana, Lesotho, Mozambique, Namibia, South Africa, and Zimbabwe. It focusses on the following five major areas:

1. Support political stakeholders at the implementation of the Solar Thermal Roadmaps and Implementation Plans
2. 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
3. Raise awareness on the potentials in solar thermal technology
4. Strengthen institutional structures, which can offer expert advice, training and technical support to the local industry and politicians, support the solar thermal technology platforms, which were established in the previous phases
5. Demonstrate that solar thermal technology works

SOLTRAIN Phase IV It aims at achieving the following main objectives:

- 1,200 participants of different training courses
- 100 solar thermal demonstration systems of different sizes and for different applications are planned to be installed
- Implementation of the Solar Thermal Roadmaps as the basis for roll-out

The goals of the mid-term review were:

- To assess the achievement of project phase IV results, which are accomplished up to now. Basis for the review of the project goals is the “Project Document”. Especially the effectiveness, the efficiency, relevance as well as the impact and sustainability of the project should be reviewed based on the “Logframe Matrix” (s. Annex 1 of the project document);
- To assess achievements of the project concerning the awareness and implementation of solar thermal systems in the participating SADC countries;
- To elaborate a proposal, based on the survey and discussion with the project partners on how to ensure that the know-how and network built up in all four phases of SOLTRAIN can continue to be used sustainably after the end of Phase IV.

## 2. Background and Context Analysis

Power outages and targeted power cuts (load shedding) are usual practice in the Southern African region. Currently, electricity is used for domestic hot water preparation in households, boarding schools, social and health care facilities, and for process heat in companies. SOLTRAIN aims to relieve the severely inadequate electricity supply system by replacing electricity use for water heating with solar thermal energy.

## 3. Review Design and Approach

The mid-term review was based on the elements below:

- Desk study to compile and collect information
- Field trips to Zimbabwe and South Africa in November 2021 to collect information on demonstration systems and to interview stakeholders
- Stakeholder survey (questionnaire)

- Collection of feedback from SOLTRAIN project partners via questionnaire, interviews and workshop

The following criteria were applied for selecting the demonstration projects to be visited:

- 1) those that have made some meaningful progress;
- 2) those whose locations make it feasible to visit within the constraints of the project budget;
- 3) those that ensure a good mix of key project characteristics like collector area size, storage capacity, system type, application type, beneficiary type, etc.

The survey followed a qualitative approach as appropriate for the review and the scope according to the Terms of Reference, and was based on questionnaires, interview guidelines, and workshop design. There is no claim to statistical significance. Regarding data analysis, the method of content analysis was used, supplemented by observations. The interpretation was based on the knowledge about the project, the region and the partners, gained by the review-team in the reviews and evaluations of previous SOLTRAIN phases.

#### 4. Findings

Findings are summarised according to the five major areas of SOLTRAIN as shown in the table below.

Table a: Summary of findings

Five major areas of SOLTRAIN – Phase IV (outcomes)	Findings
Support political stakeholders at the implementation of the Solar Thermal Roadmaps and Implementation Plans	5 Solar Thermal Roadmaps under implementation, supported by SACREEE; only South Africa is lagging behind.
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	1801 participants in 83 different types of trainings and workshops; overall satisfaction is high, but there is the request for more practical elements in the trainings and improved time allocation (too much content in too little time).
Raise awareness on the potentials in solar thermal technology	Newsletters were sent according to schedule and the website is available and well maintained. Technical tours, participation at trade fairs, Solar Trailer presentations at general public awareness events, these activities are far behind schedule due to the COVID-19 situation.
Strengthen institutional structures, which can offer expert advice, training and technical support to the local industry and politicians, support the solar thermal technology platforms, which were established in the previous phases	Partners are highly recognized as knowledge centers in their countries and in the region. SOLTRAIN has become a very well-known and highly respected brand.
Demonstrate that solar thermal technology works	55 solar thermal systems installed, in total 238 solar thermal systems approved out of which 67 solar thermal systems benefit women and marginalized groups (status December 2021) Annually saved electricity and annually avoided CO2 emissions from 55 installed systems (status December 2021): 206.2 MWh, 65 t CO2

The achievement of project Phase IV results, which are accomplished up to now were assessed based on the “Logframe Matrix” according to Project Document. Especially the effectiveness, the efficiency, relevance as well as the impact and sustainability of the project are reviewed as follows:

**Relevance:** All SOLTRAIN interventions are relevant because they are suitable to achieve the targeted reduction of CO<sub>2</sub> emissions and the targeted electricity savings. The potential of solar thermal systems in low temperature heat in the residential sector and industry is proven by quality control and data acquisition by means of statistics on all installed solar thermal systems.

**Effectiveness:** The SOLTRAIN interventions are very effective because they are well on track to achieve the objectives. The number of demonstration systems will be overachieved by far. The fact that systems are installed by trained staff, quality checked and monitored, ensures that the planned impact and the sustainability in terms of CO<sub>2</sub> emission reduction, electricity saving, better hygienic standards and reliable hot water supply will be achieved.

**Efficiency:** Resources are used very well, especially with regard to demonstration systems where many more systems than planned will be installed. Also, with regard to trainings, the number of participants is more than planned and the overall satisfaction is very high. Nevertheless, there is feedback that there is room for improvement, as some training participants suggest longer duration of trainings and to extend the practical part of the training with more hands-on elements.

**Impact:** SOLTRAIN interventions make a difference in terms of reduction of environmental burden, qualification of installers, education of politicians and other stakeholders, comfort for consumers, and competitiveness of companies.

**Sustainability:** In five countries, the benefits will last due to the successfully managed Solar Thermal Roadmaps that are the instruments for rolling-out trainings and solar thermal system installations, including financing. In South Africa, the Solar Thermal Roadmap has not been endorsed so far. However, the partners SANEDI and CRSES have included SOLTRAIN activities in their portfolio, and therefore, sustainability is ensured here, as well.

## 5. Conclusions

Despite Covid-19 related restrictions, the project is well on track and will most likely overachieve the targets regarding training participants and solar thermal systems installations. Regarding Solar Thermal Roadmap, only South Africa is lagging behind and will probably not fully achieve the objective. Technical tours, participation at trade fairs, and Solar Trailer presentations at general public awareness events, these activities are far behind schedule due to the COVID-19 situation.

Gender mainstreaming is very well implemented in the project team and well implemented in the training component and demonstration component of the project, taking into account the framework conditions which are beyond SOLTRAIN’s sphere of influence.

## 6. Lessons learnt

**Solar Thermal Roadmaps:** The confidence in SOLTRAIN expressed by Zimbabwe policy makers at the SOLTRAIN Conference on 25<sup>th</sup> November 2021 has shown that close collaboration with policy makers, energy regulator, universities, financial institutions, development partners and other key stakeholders can yield a significant impact of SOLTRAIN in policy making and training leading to a potential massive government roll-out.

**Trainings:** Some aspects of the COVID-19 pandemic turned out to be positive, such as the online coordination and also the fact that some part of the training can be delivered online. Video material is very well received and therefore this element should be strengthened in future activities.

**Demonstration systems:** It should be noted that the SOLTRAIN subsidy is not only important to ensure the profitability of the systems but is crucial from another point of view as well: some installations were approved because the donor funding made the switch in the clients mind to proceed with the

installation; mainly because the client is more comfortable knowing that, if the Austrian funding backs the installation, means it must be a good investment and that there would be technical support, as well.

## **6. Recommendations**

Regarding significantly delayed activities of SOLTRAIN Phase IV in a few countries, cost neutral extension could be useful in some cases but might be problematic for other partners. Thus, it is suggested to shift budget from activities that cannot be carried out due to COVID-19 related restrictions, to those activities that can be implemented.

The proposal on how to ensure that the know-how and the network built up in all four phases of SOLTRAIN can continue to be used sustainably after the end of Phase IV is based on the following overall approach:

- The cooperation of the SOLTRAIN partners is excellent and therefore this composition should be maintained.
- SOLTRAIN has become a well-known and highly respected brand and thus the name should be used for the successor programme, for example SOLTRAIN plus, SOLTRAIN SD (sustainable development), SOLTRAIN 2030, or similar.
- The focus should remain on solar thermal water heating, with an extension to cooling and small extensions in other renewable energy areas where appropriate for demonstration projects, depending on the partner countries' priorities.
- It is strongly recommended to maintain the successful combination of trainings and demonstration projects, meaning that only those projects will receive funding that are implemented by somebody who completed the relevant training.

Regarding trainings, the hands-on part of the training needs to be strengthened in all types of trainings, also in the "train the trainer" courses. It could be a voluntary module that can be skipped by the skilled participant, but it should be offered to participants of all types of trainings.

Demonstration systems should be selected in a strategic way, for example, hospitals in order to pilot collaboration with the public sector.

The concept of flagship district should not be applied any longer because sufficient demonstration systems are available in the flagship districts from the previous SOLTRAIN phases and can be used for future on-site visits with politicians and other stakeholders.

Monitoring is essential for the evaluation of the project but also to detect failures that could occur during the operation of the system.

Regarding Solar Thermal Roadmaps, SACREEE already assisted in SOLTRAIN Phase IV, and it is recommended that SACREEE continues to support policy development and the development of implementation plans including financing. It is still a long way until financiers can take them up. They need to be further developed to bankable proposals.

Awareness creation and dissemination should be differentiated between regional (SADC) activities and national activities. National activities should be carried out by partners while regional activities should be taken over by SACREEE.

There are activities such as Solar Roadmap implementation, trainings, demonstration systems and awareness creation and dissemination, that are equally relevant for all partners.

In addition, especially in Botswana, Zimbabwe and Lesotho there is the request for activities in rural communal development that should be addressed in the form of a country specific pilot activity.