

ADVANCING SWH IN SOUTHERN AFRICA: TRACK RECORD OF SOLTRAIN

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ABSTRACT

The Southern African Solar Thermal Training and Demonstration Initiative (SOLTRAIN) is financed by the Austrian Development Agency (ADA) for three years, and implemented by AEE-Institute for Sustainable Technologies in cooperation with SESSA & the University Stellenbosch in South Africa, Polytechnic in Namibia, Eduardo Modlane & NM Logotech in Mozambique and Domestic Solar Heating in Zimbabwe. The goal is to expedite the transition from fossils to the RE economy by building capacities in solar thermal (ST) applications, thereby improving the quality, performance and lifetime of such systems in the region. Furthermore it creates new, sustainable jobs with SMMEs, while it initiates/strengthens policies and measures in support of the ST stakeholders. 50 improved demonstration systems for social institutions (hospitals, orphanages, homes for the elderly, HIV/AIDS institutions etc) will be installed to improve the hygiene while reducing running costs. The focus is on training institutions and other training centres, which will then disseminate the acquired capacities of design, manufacturing, installation, maintaining and monitoring small and large-scale systems. A ST test rig at the University Stellenbosch is included in the financing. Nine initial Workshops are being conducted in the region. University and SMME attendees are installing the improved ST systems at the selected institutions and these are being monitored. The initiative includes special workshops on global best practice for policy decision makers at all levels. Given the current energy and job situation in Southern Africa, this initiative could not come at a better time. SOLTRAIN endorses and supports the Million SWH initiative and the Eskom SWH Programme. The presentation includes the measured results of existing small and large scale, industrial installations in the participating countries as well as technical improvements and their quantification, as well as other lessons learned.

KEYWORDS: Solar thermal, solar water heating, training, dissemination, improvement, manufacturing, testing, results

1. INTRODUCTION

Most of Southern Africa is blessed with exceptionally good sunshine, especially in winter, the critical energy demand period. No less than 59% of the entire world's best sunshine area occurs in southern Africa. Logically

one would expect Southern Africa to be the world leader in solar thermal applications. Likewise, one would expect Southern Africa as a region to have major joint R&D programmes, test facilities, standardisation, training and manufacturing in solar thermal energy. Given the current energy crisis in Southern Africa, and as well as the renewable energy targets set by governments, one would think that governments at all levels would lead by example in using solar water heating and other solar thermal applications in all public buildings.

By contrast, Austria is a world leader in solar water heating. It is a small country with 1/7 of South Africa's population and 1/15 of its land area, half the sunshine and no mineral riches. Yet, the Austrian Development Agency sponsors the SOLTRAIN initiative not only in South Africa, but also in Mozambique, Namibia and Zimbabwe. From the recipients' side it has the great advantage that we can learn from other people's experience, while being aware that 'he who follows is always behind'.

2. METHODOLOGY

2.1 ORGANISATIONAL STRUCTURE

To handle the complex SOLTRAIN organisation over five countries, it was necessary to devise an organisational structure as shown in Figure 1.

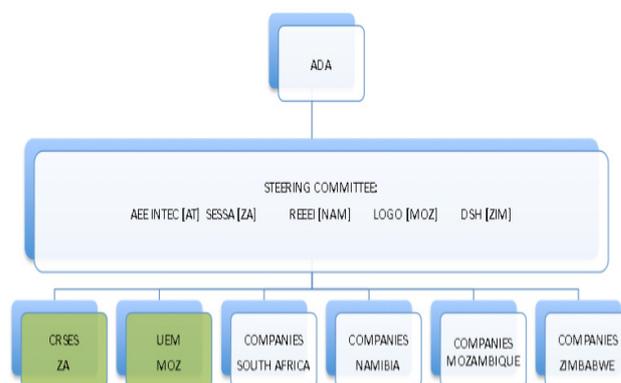


Figure 1: Organisational structure of SOLTRAIN

2.2 WORK PACKAGES

The programme extends over a period of three years, and therefore had to be subdivided into work packages (WPs), which were again subdivided into sub-units. Each work

package is defined in terms of participants, time assigned, objectives, description of work, and deliverables. An overview is presented below:

WP1-Project Management

- 1.1 Coordination
- 1.2 Steering Committee Meetings
- 1.3 Biennial reports

WP2-kick-off workshop

WP3-Markets and monitoring

- 3.1 Country market reports
- 3.2 Monitoring of existing solar thermal systems
- 3.3 Analysis and dissemination of results

WP4-Training

- 4.1 Train the Trainers
- 4.2 Dissemination
- 4.3 Policy support to decision makers

WP5-Assistance to producers

- 5.1 Individual advice to manufacturers
- 5.2 Collector testing and improvement

WP6-Installation and monitoring of improved systems at social institutions

- 6.1 Selection of social institutions
- 6.2 Design of solar thermal systems based on improved technology
- 6.2 Installation of improved demonstration systems at selected sites
- 6.3 Commissioning and quality check

WP7-Awareness and public relations campaign

- 7.1 Leaflets, is trade fairs, presentations, articles, radio, TV and the website

WP8-External evaluation

3. PROGRESS

The SOLTRAIN programme was started in May 2009 and is on schedule. The only delay is that no guidance has been received in connection with SAQA approval. The request was submitted on 2010-01-14.

4. RECEPTION

The programme is being supported enthusiastically by stakeholders from industry, research institutions and political decision-makers.

The participation of members of the Sustainable Energy Society's Solar Water Heating Division is exceptional. Leading members participate actively, and the workshops are oversubscribed.

The interest taken by the architectural profession is noteworthy. This bodes well for the future of South African buildings and the solar thermal industry.

Understandably, some of the solar water heating manufacturers in Southern Africa who in the past have received neither recognition nor any form of support, initially had a more reserved view. On receiving feedback from the monitoring and evaluation programme, the initial reservation gradually disappeared.

Political decision-makers participated by presenting Powerpoints and responding in the discussions. It is trusted that the lessons learnt locally and internationally will bear fruit in the near future. There is no need to reinvent the wheel or to repeat known mistakes.

5. MAJOR RESULTS

5.1 COUNTRY REPORTS

Updated market surveys of the four participating countries have been produced and are available. These provide rational information for interventions by policymakers, industry and academia. The reports have been prepared to a standardised format, and were integrated into the international surveys prepared by the International Energy Agency, a body that is increasingly realising the value and the global impact of renewable energies. The standardised format of the country reports enables the production of timelines, which will provide a very useful metric of progress as well as the positive or negative effects of interventions. (Figure 2)

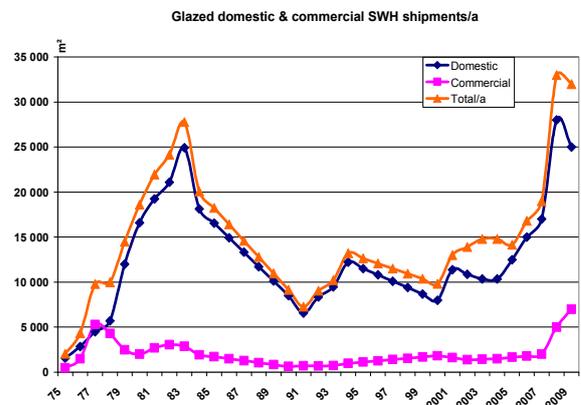


Figure 2: Glazed domestic and commercial solar water heater shipments in South Africa

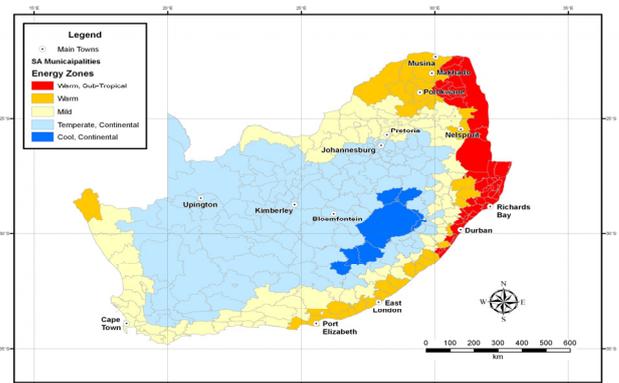


Figure 3: Climatic regions of South Africa according to municipality boundaries (Holm, Engelbrecht & Meiklejohn)

5.2 TRAIN THE TRAINER WORKSHOPS

To date, a series of two consecutive workshops have been held in various centres, enabling specialists to come abreast with the latest developments in the field.

A total of 170 trainees attended the first Train the Trainers workshops in Southern Africa, of which 120 in South Africa. The first policy decision makers' workshop drew 50 participants in Southern Africa, of which 28 were in South Africa. The second more advanced Train the Trainer workshop held at the University of Pretoria was attended by 29 trainees.

Bearing in mind that this training, whose long-term value can only grow, comes as a donation to South Africa, one gets an idea of the great benefit to the country. Attendees at the workshops in northern South Africa are committed to train at least 10 people each in their dissemination workshops.

5.3 DISSEMINATION WORKSHOPS

The knowledge gained in the Train the Trainers workshops is being disseminated throughout the country. This has already occasioned a remarkable growth of solar thermal expertise in South Africa, as it has in the neighbouring countries. A total of 250 attendees have been trained to the first dissemination stage in South Africa.

5.4 MONITORING OF EXISTING SYSTEMS

A selection of systems offered by the designers, were monitored with sophisticated instruments imported from abroad. The data were transmitted to Austria and analysed there. Lessons learned were shared with original local designers. These results were also fed back in the Train the Trainer sessions.

Significant findings were that elementary thermal insulation is often insufficient and inconsistent, major defects being uninsulated ports and hot water supply pipes being connected to thermal storage tanks without thermal traps. Pump systems tended to be oversized, leading to lowered efficiencies as well as higher capital and running costs. Electric backup heating often concealed malfunctions in the solar system. Set-points of back-up systems were far too high. The indiscriminate mixing of galvanised and copper piping in hot water runs with the consequent bimetallic actions was also noted. Not infrequently, the system operation was debilitated by either a lack of maintenance or less informed and unrecorded interventions. All these lessons learnt would probably never have been discovered and are of great value. It is expected that future monitoring will add similar value.

5.5 IMPROVED INSTALLATIONS AT SOCIAL INSTITUTIONS

The greatest hurdle experienced by local initiators was securing the required minimum of 50% local co-funding for social institutions like orphanages, old age homes and other similar social institutions.

5.6 AWARENESS

The website (www.soltrain.co.za) is linked to the major partners both nationally and internationally, and contains the most recent information.

6. CONCLUSIONS

The SOLTRAIN programme is achieving its target, enjoys the full support of the solar thermal industry, the leading research institutions, and policy decision-makers. It is designed to make a sustainable impact on the regional level. The benefits in ameliorating the regional energy crisis, creating local jobs and protecting the environment while growing the economy are obvious and evident.

The growth of a new generation of solar thermal experts at some of the leading universities in South Africa it is very encouraging. Some of the universities that participated in the Train the Trainer workshops actually integrated the information and knowledge into their regular courses current research programmes.

It is to be hoped that governments at all levels will avail themselves of this unique opportunity by creating a long-term (20 years) supportive legislative environment, and by leadership through example. Subsidies of unknown duration have been shown to distort the market, introducing uncertainty and causing havoc in local job creation.

A crucial step is the establishment of 5 to 7 university linked and research-orientated solar thermal test facilities whose major benefit would be to train the urgently required person power, while developing the local industry through independent and informed R&D feedback.

7. ACKNOWLEDGEMENTS

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9. AUTHOR

Principal author: Dieter Holm is a consultant in Sustainable Development in the Built Environment. He lives in the first modern autonomous house in Africa, built before 1974 according to passive solar design principles, and featuring rainwater harvesting, solar water



heating, recycling, as well as solar thermal applications. Photovoltaic panels power the household in addition to his office. Dieter is an enthusiastic teacher and researcher, He serves on the SANS 204 Steering Committee producing the South African Standard for energy efficiency in buildings. He has received many awards for his work, including the International Solar Energy Society (ISES) special award for special services and the ISES White Paper (Renewable Energy Future for the Developing World) that has been translated into 4 other languages. He is currently the Vice-President for Conference of ISES, and is the Southern African Development Community co-ordinator for the SOLTRAIN project. Prof. Dieter Holm is a regular speaker at international and local conferences, and for radio interviews and TV specialist features on energy efficiency and renewable energy. He obtained his BArch in 1960 and his DArch in 1985 from the University of Pretoria.

Presenter: The paper is presented by Dieter Holm.