

The Status of Large-Scale Solar Thermal Systems for Industrial Applications in South Africa and the Promotion of Solar Thermal Research at CRSES, Stellenbosch University

Buckley A.I.¹, Mamphweli S.², Kritzinger K.³

¹ Corresponding author: Mr. Angelo Ian Buckley, Stellenbosch University, Centre for Renewable and Sustainable Energy Studies, Private Bag X1, Matieland, 7602, South Africa, Phone: +27 21 808 3605, Fax: +27 21 883 8513, email: buckley@sun.ac.za

² Co-author: Prof. Sampson Mamphweli, Stellenbosch University, Centre for Renewable and Sustainable Energy Studies, Private Bag X1, Matieland, 7602, South Africa. Phone: +27 21 808 4251, Fax: +27 21 883 8513, email: mamphweli@sun.ac.za

³ Co-author: Karin Kritzinger, Stellenbosch University, Centre for Renewable and Sustainable Energy Studies, Private Bag X1, Matieland, 7602, South Africa. Phone: +27 21 808 3605, Fax: +27 21 883 8513, email: karink@sun.ac.za

Abstract

The Centre for Renewable and Sustainable Energy Studies (CRSES) at Stellenbosch University has been involved with large number of solar thermal (ST) projects within the country, including its role as one of the South African partners for the Soltrain initiative. The study aims at presenting recent key findings and field experiences in the field while promoting the ST research and projects done by the CRSES. The study builds on the work done by Joubert et al. (2016), entitled “*Large-scale solar water heating in South Africa: Status, barriers and recommendations*” by discussing the updated large-scale ST database of CRSES. This is aimed at providing an overview of the current status of large-scale ST installations in South Africa. This database includes information such as the year of installation, provincial location, type of application, beneficiary industry and specific ST technology used. During 2016, CRSES was contracted to conduct a feasibility study, draft the technical specifications and provide technical advisory services for the tender evaluation process of a leather tannery located in the Western Cape, South Africa. This feasibility study identified that a 500 m² collector area would be able to supply a total of 531 MWh/year of thermal energy, covering 61% of the company’s annual heat demand and saving the company a total of 68 m³ of HFO annually. The total system cost is estimated at R 2 350 000 and

presents a payback period of 7 years with a project IRR of 31%. The project was released on tender and a total of 9 proposal were received. This study presents the key findings related to technical aspects and financial outcomes of this feasibility study and provides a detailed system and component costing comparison, based on tender proposals, with the costs based on those shown by Joubert et al. (2016) for the Cape Brewing Company (CBC) Solar Thermal project, done under CRSES.

The study also presents the data and key findings of the monitoring systems installed at two of the Soltrain solar water heating (SWH) demonstration systems in the Western Cape over the past year. Furthermore, it presents means in which this monitoring data, as well as data from SWH systems planned to be equipped with monitoring devices, can be used for the validation of decentralised ST system modelling and simulations, allowing more accurate research outputs and feasibility studies from within CRSES, related to the field.

Keywords: Solar thermal, Database, Soltrain monitoring data, CRSES, Tannery ST project

Corresponding author: Angelo Ian Buckley

Email address: buckley@sun.ac.za

Telephone and Fax: +27 21 808 4251 (Tel) +27 21 883 8513 (Fax)