

A Value Chain Analysis of the Solar Water Heater Industry to identify opportunities for poverty alleviation, local economic development and energy conservation in the Stellenbosch municipal area

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The Stellenbosch municipal area is confronted with a massive demand for low and middle-income housing. In 2005 the Sustainability Institute (2006) estimated that area would require at least 25 000 additional formal houses by 2017, nearly double the 34 000 then existing homes. This shortfall is particularly problematic in a country that currently faces a large electricity capacity shortfall (Republic of South Africa, 2008b) and ESKOM is unable to provide additional electrical capacity for town expansions. Concurrently, the poorer sectors of Stellenbosch such as Kayamandi and Cloetesville are fraught with high levels of unemployment and a lack of basic services including hot water. Though hot water is often seen as a luxury commodity, it is in fact also a prerequisite for improved levels of health and increased quality of life. At present, low-income households spend a significant portion of their income on electricity or paraffin to heat hot water for cooking, cleaning and bathing purposes. Beside straining already limited incomes this resource use pattern also contributes to unsustainable energy usage in South Africa.

Solar water heaters (SWHs) provide a possible sustainable solution to the dual challenges of energy shortage and the lack of hot water availability. By installing solar water heaters on new, low-income houses, the electricity capacity requirement for new developments would be significantly reduced while poor households would gain access to hot water. The solar water heating industry could also contribute considerably to job creation amongst currently unemployed persons in the Stellenbosch area. By identifying these opportunities, the SWH industry can become a strategic leverage point for local economic development (LED).

Unfortunately the South African Solar Water Heater industry is still in its infancy and largely unable to meet even the existing demand from middle-income households with the total national manufacturing capacity estimated at only 10 000 units per annum (Republic of South Africa, 2008b). The high capital costs of installing SWHs (between R7 000 and R20 000 per unit (Republic of South Africa, 2008b)) means that the technology remains totally beyond the reach of low-income consumers.

The primary objective of the thesis will be to conduct a value-chain analysis of the solar water heater chain to identify;

- *blockages in the value-chain that lead to supply shortfalls,*
- *opportunities for cost savings that could make SWHs financially accessible for poor households and*
- *opportunities for local economic development through the founding of parts of the value-chain in the Stellenbosch area.*

Subthemes to be addressed will include analyses of:

- how solar water heaters can be manufactured and installed more cost effectively without compromising significantly on quality;
- where in the value-chain workers from the local area can be employed;
- how poor households can gain access to a technology with such high initial capital costs;
- how much energy can be conserved by installing SWH's instead of electric geysers;
- (very briefly) an overview of possible sources of funding that could make solar water heaters more accessible for low-income households.

The project is to be carried out in the wider context of the energy shortage in South Africa and the low levels of economic development in large segments of the country's population. The particular focus area will be

Stellenbosch Municipality where a multi stakeholder process comprised of Sustainability Institute, the local municipality, the CSIR and the University of Stellenbosch is ongoing to formulate a roadmap for the sustainable development of the town and its surrounds.

Research Progress:

By June 2009, the research process has been slow but fruitful. Ongoing research includes:

- The installation of three different types of solar water heaters to determine their effectivity in real contexts.
- A comprehensive literature review to contextualise Solar Water Heaters in South Africa in the sustainable development and renewable energy literature as well as in terms of the poverty and energy crisis challenges confronting South Africa.
- Interviews with Western Cape based businesses involved in the supply side value chain of Solar Water Heaters. To date interviews have focused on manufacturing but businesses focussing on installation, assembly and maintenance will be contacted soon.

Preliminary findings

- Material costs are the largest contribution to the costs of Solar Water Heater Manufacturing accounting for up to 60% of Manufacturing costs.
- Installing 30 000 solar water heaters over three years in a town such as Stellenbosch can create roughly 60 direct employment opportunities for the three years.
- Flat-plate collector systems can be manufactured 100% locally whereas evacuated tube collectors are largely imported from China, which leads to concerns about the life-cycle costs of evacuated tube collectors.
- Mandatory South African Bureau of Standards testing is disproportionately expensive for low-cost applications.

Value for Stellenbosch Municipality

- The value chain analysis will present the Municipality with an overview of the solar water heating industry that will allow it to effectively target policies aimed at the fostering of local value-chain activities for job creation.
- The in-context testing of Solar Water Heaters will provide an idea of which systems can be successfully installed locally.
- The research will include a modelled estimate of the electricity savings that can be expected through the installation of solar water heaters on low-income houses in Stellenbosch that will present a model of the contribution that solar water heaters can make towards alleviating the electricity capacity shortfall that the municipality faces.