

Energy Efficiency Improvements in Small, Medium-Sized and Informal Enterprises, Zimbabwe

Themes

- ★ Energy efficiency
- ❖ Financial mechanisms and private sector involvement
- ❖ Technical capacity development
- * Poverty alleviation (MDG 1)
- * Health (MDGs 4-6)

PROJECT DATA

Name: Implementing Energy Efficiency Measures in 12 Small, Medium and Informal Enterprises

Implementing organization: Heritage Energy and Environment (NGO)

Location: Zimbabwe

SGP contribution: \$47,483

Start Date: April 2001

ENERGY OVERVIEW

Energy resource: grid electricity (fossil fuels)

Technology: various (ovens, light fixtures, grinders, welding machines, etc)

Application: various industrial production processes

Sector: commercial

Efficiency improvement: various, depending upon the business and technology

Number of businesses served: 12 small, medium-sized or informal enterprises

BACKGROUND

According to the Ministry of Industry and Trade, in Zimbabwe in 1997 approximately 1.6 million people in the country worked for small and medium-sized enterprises or for informal enterprises. The informal sector alone accounted for about 1.1 million jobs. In the mid-1990s the government established a ministry responsible for policies related to small and informal enterprises, and other entities are also engaged in supporting them, including several micro-finance institutions such as the Zambuko Trust, and the Small Enterprises Development Corporation (SEDCO), which operates in many countries across Africa. However, these entities have not focused much, if at all, on how energy efficiency improvements can help these small businesses, as well as the environment. Yet, these enterprises have little access to information about energy auditing and efficiency improvements, and are often too focused on day-to-day survival to think about environmental impacts or how efficiency improvements can help them.

PROJECT DESCRIPTION

Overview

This project examined the possibilities and benefits of improving energy efficiency in small and medium sized or informal

enterprises. To do this, 12 such enterprises were selected and undertook specific energy efficiency improvements, and at the same time built their capacity to understand energy use issues and to manage their own energy use.

Implementation

Two micro-finance institutions that work with small or informal enterprises, EMPRETEC Zimbabwe and Zambuko Trust, were involved in identifying potential enterprises to participate in the project. Selection criteria were developed, and included a gender balance in enterprise leadership and willingness on the part of the enterprise to attend training sessions and make investments in appropriate energy efficiency improvements. The 12 enterprises selected cover a range of commercial activities, including baking, pottery-making, metal-working, food service, soap-manufacturing, and fabric-making. Representatives of each enterprise attended an in-class training workshop about energy efficiency, and then further training was provided onsite. Through energy audits and feasibility analysis, specific efficiency improvements were identified in each enterprise, and 7 out of the 12 enterprises have so far undertaken the improvements. These improvements required some financial contribution from each enterprise.

Technology

This project led to a variety of technical changes to improve energy efficiency, depending upon the needs of the enterprise. Of the 12 enterprises involved in the effort, four have not undertaken the identified efficiency improvements and one has been delayed for financial reasons, mostly due to large currency devaluations in Zimbabwe during the project period. The other seven enterprises have taken a variety of steps to improve energy efficiency. Four have achieved significant improvements, while the other three have not.

Purdueast Investments (a workshop): compressor valves were re-conditioned, and filter elements were replaced. Two Hitachi grinders were repaired, along with other equipment. These interventions have been completed, but energy savings have not proved significant.

- **African Trends (pottery factory):** new heating elements were installed, and an oven was insulated. Upon completion, the energy intensity of pottery production reduced from an average of 70 kWh/kg to an average of 25.7 kWh/kg.
- **Longway Engineering (metal fabrication):** old welding machines were replaced with a new one. Upon completion, this intervention has achieved only minor energy savings.
- **Beverly Cakes (confectionery):** three domestic stoves were replaced with a new, more efficient industrial-sized oven. Upon completion, energy consumption was reduced from an average of 1,300 kWh/month to approximately 400 kWh/month.
- **Trivial Engineering (metal fabrication):** as with Longway Engineering, the replacement of old welding machines with a new one did not significantly reduce energy use.
- **Brumford Bakery:** a new dryer envelope and temperature

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control instruments were installed. The final energy analysis is not yet complete, but preliminary results are positive; the enterprise's energy bill has been cut in half.

- **MoCliff Engineering (foundry, workshop):** a new castings machine was installed. Although the evaluation is not yet complete, this is expected to reduce molten metal loss by up to 30%.
- **Maggie's Kitchen (take-out food):** a wood-fired open-grate cooking system is to be replaced with an improved stove. Implementation of this intervention has been delayed due to financial difficulties.
- **Glen Lorne (soap manufacturing):** a modified improved stove is to be installed, as well as a wire mesh for cutting pieces of soap. Implementation has been suspended due to funding problems.
- **JEY-EM (take-out food):** a refurbishment of fryers and cookers was planned, but suspended due to funding problems.
- **Batik (fabric production):** currently, this enterprise is using a domestic stove for commercial cloth drying. A new, more appropriate system was to be installed, but implementation was suspended.
- **Taste of Africa (take-out food):** domestic cookers were to be replaced with industrial-sized, energy efficient cookers. However, implementation was suspended.

Environmental Benefits

Global: Improvements in energy efficiency reduce greenhouse gas emissions, since approximately 60% of power generation in Zimbabwe is from coal-fired power plants.

Local: Local environmental improvements, such as in local air quality, may very well result from these interventions in some cases, since efficient stoves create less smoke. In addition, one improvement is expected to result in 30% less molten metal wasted in the production process. This may reduce waste disposal problems and reduce pressure on the local environment.

Livelihood Benefits

Health: Efficiency improvements, especially those related to stoves, may result in improved health conditions for workers in these enterprises.

Income generation: Since these are small enterprises, savings in energy costs can sometimes translate rather directly into increased income for owners and employees.

Beneficiaries

Beneficiaries of this project include the participants in the training sessions on energy management, the workers who may now have improved working conditions, and enterprise owners who now have greater awareness of their energy costs and ability to control them.

Capacity Development

A major activity of this project was holding training sessions on energy management with at least one representative of each of

the enterprises. All 12 enterprises received in-class training, and the 7 enterprises that undertook energy efficiency improvements also received on-site training, which led to energy audits and the identification of possible changes to result in improved efficiency.

Partners

The major partners in this project are:

Small scale enterprises: The participating enterprises received training and assistance, but they also were required to contribute financially to the improvements made in their own plants. For example, African Trends paid all the labor costs for insulating furnaces and changing heating elements and the thermocouple. Beverly Cakes upgraded from a single-phase to a 3-phase electricity supply at its own cost. Brumford Foods met 15% of the material costs, and MoCliff met all labor costs. Thus, their partnership in this effort has been essential to the project and the achievement of results.

Micro-finance organizations: Two micro-finance organizations, EMPRETEC Zimbabwe and Zambuko Trust, helped identify enterprises to participate in the project. These organizations are also an audience for the project; one goal is to demonstrate to micro-finance institutions the importance of energy efficiency and possible ways to achieve it. Efforts are underway to scale this project up to a medium-sized GEF grant, and these institutions will have an important role in the medium-sized project.

LESSONS LEARNED

Environmental Management

The project demonstrates the potential for introducing energy saving techniques into the informal economy, which in most developing countries is a major part of the economy. The scope for improvements can be great; one enterprise achieved 50% reductions in energy use through this project. However, one lesson from this project is that not all enterprises will have scope for implementing energy-saving techniques, and certain changes may not make economic sense for the enterprise. In this project, 4 out of the 7 enterprises that actually undertook changes appear to have reduced their energy use as a result of those changes. A certain amount of time must be spent with each enterprise assessing their energy use to find out whether or not energy efficiency improvements are possible. This suggests that in designing a larger scale project like this, time be spent developing good criteria for selecting participants, and that initial assessments be carefully designed so as to minimize time spent on enterprises that do not really have much scope for improving their efficiency.

Another lesson the managers of this project learned was that when an enterprise replaces equipment, it does not simply throw out the old one but resells it on the market. From the perspective of the energy efficiency project managers, this does not help because the old equipment is now in use somewhere else.

Finally, access to the appropriate equipment is only part of the

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challenge for improving energy efficiency. The other factor is how the equipment is used; improper use could also lead to continued inefficiencies. This requires good training programs for participating enterprises.

Barrier Removal

Technical: This project reduces technical barriers first by educating enterprises about how to monitor their energy use and read their electricity meters, and second by assisting them in replacing equipment and/or implementing new procedures to save energy. In addition, the project suggests that not only should enterprises be more technically skilled in this area, but also energy suppliers should be aware and able to implement energy saving techniques. One technical barrier that was identified but not addressed through this project is the fact that energy efficient equipment is not being manufactured on a large scale in Zimbabwe.

Financial: 4 of the scheduled participants in this project had to drop out due to the poor economic conditions in Zimbabwe. Part of the problem was that due to currency fluctuations in Zimbabwe, it became impossible to purchase the necessary

equipment to implement improvements. This could be addressed by purchasing equipment from outside of Zimbabwe. Another necessary step to reducing financial barriers is to involve micro-finance institutions in energy efficiency improvements. These institutions could offer loans for the purchase of equipment, which could be repaid over time through savings in energy costs. This project laid the groundwork for a larger collaboration with micro-finance institutions.

Scaling Up

This project is being considered for a medium-sized GEF grant. The potential for impacting the informal sector in Zimbabwe is great, provided that ways are found to cope with currency fluctuations and other economic problems.

SOURCES CONSULTED

Project Record ZIM/98/G52/038, SGP Project Database,
<http://www.undp.org/sgp>
SGP Zimbabwe. "Implementing Energy Efficiency Measures in 12 Selected Small, Medium and Informal Sector Enterprises in Zimbabwe," Project summary, 2002.