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POWER WASTAGE IN UGANDA: The benefits of using Power Factor Correction Equipment

Overview

The Ministry of Energy and Mineral Development's priorities include among others; promotion of efficient utilization of energy and increased access to modern energy services through rural electrification and renewable energy development.

Private Sector Foundation Uganda (PSFU), one of the key players under the Energy for Rural Transformation (ERT) project is mandated to support private sector investors in renewable energy related businesses to meet specific market enhancement targets. One of PSFU's objectives is to contribute to improvement of energy efficiency.

This briefing paper focuses on improvement of energy efficiency through the PSFU's support to the installation of power factor improvement equipment and gives policy recommendations.

Key Issues

- Uganda's electricity demand is growing at 10% per annum; the demand is likely to outstrip supply in 2014.
- Energy is wasted through technical losses or inefficient use by large scale commercial users.
- There are some electricity consumers with low Power Factor which result in high energy losses.

Introduction

Energy for Rural Transformation is a 10 year multi-sectoral programme, implemented by the Ministry of Energy and Mineral Development.

The purpose of the program is to develop Uganda's energy and Information/Communication Technology sectors, so that they make a significant contribution towards rural transformation.

Components under Energy for Rural Transformation are:

1: Rural Energy Infrastructure

This includes rural electrification, renewable energy sources, and solar Photo Voltaic systems.

2: Information Communications Technologies

This focuses on extending access to Information Communications Technology (ICT) services.

3: Energy Development, Cross Sector Links, Impact monitoring

The component seeks to harmonize the activities of the different stakeholders and

create the synergies that will facilitate stakeholder commitment and ownership thereby fostering efficient implementation of the project and sustainability of the investments.

PSFU is one of the key sub-component players implementing Cross Sector Links. The agency is mandated to manage the Business Uganda Development Services (BUDS) which links business with professional service providers under cost share grant arrangements.

Private Sector Foundation contributes to two of the four ERT II key performance indicators namely:

1. Megawatts of additional power generation from renewable sources.
2. Tons of carbon dioxide emissions reduced as a result of the project.

Additional megawatts can be generated or saved from existing power losses. The PSFU is using the Power factor correction equipment to reduce on power wastage. A power factor is defined as the ratio of real power flowing to the load, to the apparent power in the circuit. A load with a low power factor draws more current than a load with a high power factor for the same amount of useful power transferred.

Power factor correction equipment is a device designed to improve utility of electricity by reducing the amount of reactive power that the load draws from the utility company- UMEME. PSFU supported the installation of power factor correction equipment with the objective of reducing a given industry's energy demand from the electricity grid and thus contribute to conservation of the electricity.

The support is by way of paying the audit fees for the energy service company, paying an independent consultant's fees for verifying the energy and cost savings and in provision of cost share grants towards the purchase of the power factor improvement equipment.

Some large commercial users have a power factor (PF) as low as 0.5. This represents 51% energy loss. A power factor of 0.5 with a load of 100 kilowatts, 400 volts requires an energy supply of 200 KVA but after installation of power factor correction equipment the same load would require supply of 102KVA. This represents 49% improvement.

The industries that were supported by PSFU include: Uganda Clays – Kamonkoli, Luuka Plastics, Rwenzori Commodities (Hima, Munoba and Kigumba), Lake Bounty, Kasuku Tea Factory, Ugachick Poultry Breeders, Sugar Corporation of Uganda Limited and Tian Tang Group.

The Budget Monitoring and Accountability Unit (BMAU) team visited some beneficiary companies and the findings are shown in the Table below.

Table 1: Improvements in energy utilization after installation of power factor correction equipment

Name of the Site/Organisation	Power Factor before installation of power factor correction equipment	Power Factor after installation of power factor correction equipment	Verified KVA Savings after installation of PF correction equipment
Luuka Plastics- Kawempe	0.7	0.92	93
Lake Bounty- Kampala	0.72	0.96	160
Rwenzori Commodities -Hima Fort Portal	0.65	0.97	134
Uganda Tea Corporation-Kasaku Mukono	0.7	0.97	189
Ugachick Poultry Breeders- Gayaza	0.79	0.93	115
Rwenzori Commodities –Munoba Fort Portal	0.64	0.91	142
SCOUL- Lugazi	0.82	0.92	1,777
Rwenzori Commodities-Kigumba Fort Portal	0.69	0.94	178

Source: *BMAU Qtr FY 2012/13*

Table 1 shows the detailed energy savings that were achieved by each of the companies that were monitored by BMAU. PSFU estimated the entire energy saving from all the ten companies where the power factor correction equipment was installed at 3445.5 KVA which is equivalent to 4.6MVA, convertible to 4.4MW at an average power factor of 0.96.

Several benefits were highlighted as a result of installation of the power factor correction equipment. These included;

- Conservation of scarce resources such as power which is saved using the power factor correction equipment and this electricity is readily available to other users.
- Increased competitiveness. One of the requirements of acquiring an international food certification is to have a Power Factor Correction Equipment. With the installation of the power factor correction equipment, industries in agricultural and food processing can qualify for international food quality certification.

Uganda Tea Corporation is in the process of acquiring one after having the equipment installed. This widens their market base due to the ability to serve regional and international markets.

- Factories are able to increase their profitability as the power correction equipment corrects all power loss so that the power in the metre is without reactive charge. A low power factor attracts a penalty of millions of shillings per month from UMEME. Installation of power factor correction equipment increases the power factor to above 0.9. Factories with a high power factor of above 0.9 receive a financial reward of about the same amount as the penalty incurred prior to the installation of power factor correction equipment.
- Reduced energy bill. Before installation of the power factor correction equipment, Uganda Tea Cooperation used to pay an average of Ugshs.100 million per month to UMEME. This was reduced to Ugshs. 60 million per month after the installation of the equipment.

Conclusions

The Power Factor Correction equipment makes significant savings on power losses. The subsidy of US\$240,000 provided by government through provision of this equipment has saved 4.4 Mega Watts of power. Generation of a 4.4 Mega Watts from a mini hydro scheme would require an investment in the region of US\$ 11 million. Using this equipment has saved the country US\$ 10.76 million.

The power factor correction equipment does not burn any fossil fuel, use any water, and generate any green house gases. This therefore is a sustainable method of increasing power availability.

In addition further cost savings are made since the method does not require any expansion on the grid to deliver.

Policy Recommendations

- a) Government should roll out the implementation of power factor correction equipment and develop relevant policies to ensure that all large scale commercial users have the appropriate power factor to conserve the scarce energy resources.
- b) PSFU should carry out sensitization about the availability of the subsidy for installations of the power correction equipment so that new companies can benefit from the scheme.
- c) Ministry of Energy should assist factories in carrying out energy audits to establish power consumption by factory machinery. This will help factories to appreciate the use of the power factor correction equipment.

References:

- *Ministry of Finance, Planning and Economic Development, BMAU Q2 Monitoring Report for FY 2012/13.*
- *Ministry of Energy and Mineral development; Energy Sector Joint Review Workshop Report 2012.*



Power factor equipment installed at factory.

For More Information Contact:

**Budget Monitoring and
Accountability Unit (BMAU)**
Ministry of Finance, Planning and
Economic Development
P. O. Box 8147 Kampala
Telephone: 0414 707201
www.finance.go.ug