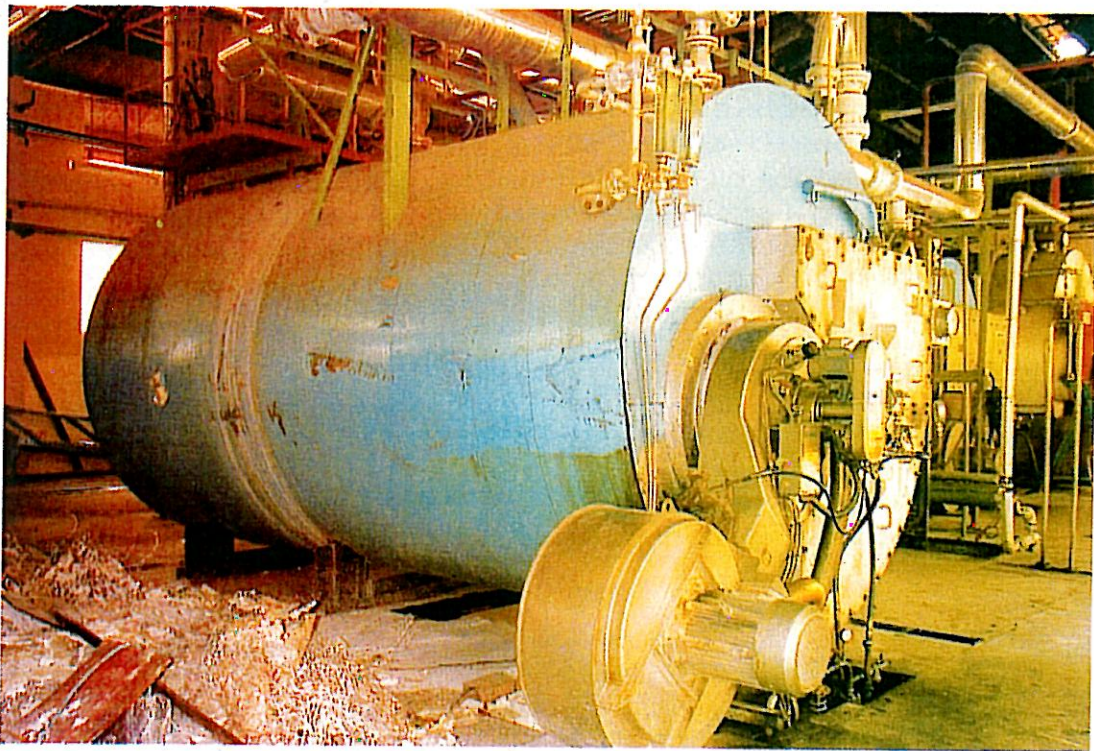


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**SAVING ENERGY IN INDUSTRY:  
INTEGRATED ENERGY MANAGEMENT**

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*Reducing Energy Cost through Integrated Energy Management  
- The Ghana Textile Printing Company Ltd.*



*Boiler at GTP*

**Summary**

Energy waste has been identified as one of the primary causes of the high cost of industrial production in Ghana. It has however been proven that energy efficiency can go a long way to reduce the cost of production which in turn can enhance the competitiveness of Ghanaian industries on both local and international markets.

The Ghana Textile Printing Company, a private textile manufacturing concern in Ghana has taken various measures to reduce the cost of energy and consequently the cost of production. The measures, which were implemented over two years

included:

- a) Improvement in Boiler Efficiency;
- b) Continuous Monitoring of Energy Consumption and comparison with production levels;
- c) Employee education to switch off lights and equipment when they are not in use;
- d) Installation of steam traps and scale prevention devices;

- e) Power Factor Correction; and
- f) Installation of skylights to enable the use of natural light

The implementation of these measures has resulted in a reduction in water consumption by 234,000 cubic metres or 23%, a cost saving of ₵304million in 1999. The company also saved ₵181.6 million in fuel cost and feed water treatment chemicals. Electricity consumption has also dropped from 294.7kWh per 1000 yards of textile produced in 1998 by 6.5% to 275.55kWh per 1000 yards in 1999, saving 207,000kWh at a total cost of ₵35.2million.

### Potential Users

The primary target group for this Case Study is the Textile Industry, though all industries which operate Boilers, Motors, Pumps and Compressors, will benefit from this Case Study.

### Introduction

The Energy Foundation has for the past two years been promoting Energy Management and Conservation measures in the industrial sector. The aim is to create awareness of the benefits derived from good house keeping and energy management practices, monitoring and targeting of energy and the savings achieved for putting these measures in place.

Ghana Textile Printing (GTP) is one of such industries that have taken steps to conserve energy and manage its energy consumption during the last two years. The company has achieved significant energy cost savings as a result.

### Background

GTP is a textile factory located in Tema, about 30km east of Accra. The company employs about 650 people and produces various types of textiles from yarns supplied by a sister company, Juapong Textile Limited. The company's products are sold on both local and export markets. There are other textile industries in the country producing wax prints similar to what is produced at GTP. Therefore in order to maintain a competitive edge over the other local textile manufacturers and imports from neighbouring countries and Europe, and in order to be able to increase the export drive for their products, GTP initiated steps to reduce the cost of production.

For GTP, reducing the cost of energy was one of the cost effective options that was available. The company realised that the best option for energy cost reduction was through good house keeping practices

and Energy Management and has invested substantially in these over the past two years.

### Energy Supply

Electricity to the factory is supplied by the Electricity Company of Ghana (ECG) through 2 transformers, each with a capacity of 750 kVA. Three steam boilers with a combined capacity of 30 tons per hour supply steam for industrial processes. All three boilers use Residual Fuel Oil (RFO) and operate at the same time. Apart from electricity the company is a major consumer of water, which is supplied by the Ghana Water Company.

### Energy Management

GTP implemented a combination of "no costs", "low cost" and "high cost" measures to improve boiler efficiency, water and electricity utilisation during 1999. These measures included:

#### Improvement in Boiler Efficiency

##### Low cost measures

These measures included regular control of boiler air/fuel ratio, adoption of a boiler maintenance schedule, repair of faulty insulation on steam and condensate lines and elimination of leaks on steam lines, valves and process equipment.

##### High cost measures

Steam traps were installed to remove condensate from steam. An electronic device "Scale Blaster" that continuously "de-scales" the boiler and at the same time prevents scale formation in the boiler tubes was also installed. This electronic device sends electromagnetic waves at a frequency of 24,000 times per second through the feed water pipe, instead of the scale forming ions attracting each other to form scales, they are repelled by the electromagnetic waves. This action prevents



scale formation and also removes scales, which have been formed already in the tubes of the boiler.

### Implementation Cost

GTP spent €70million during 1999 to purchase and install the "Scale Blaster" and to undertake all the other fuel saving measures mentioned.

### Savings achieved

Before the measures were implemented in 1998, GTP consumed on the average 429.54kg of fuel per 1,000 yards of textile produced. With the implementation of the above measures, fuel consumption reduced to 407.5 kg in 1999. This is equal to 5.13% or 310,000kg (279,000litres) saving in fuel consumption. At an average cost of €522.00 per litre of RFO, the savings amounted to €145.6million. In addition to this, GTP saved €3million a month in terms of scale prevention chemicals, which it would have used to treat the feed water. This brought the total savings in 1999 to €181.6million. The payback period for this investment is about 4 months.

### Water Saving Measures

#### Low Cost Measures

Leaks in water lines, valves, storage tanks and process equipment were eliminated, while wastewater was recycled for use.

#### High Cost Measures

A new 1,200m<sup>3</sup> concrete reservoir and interconnecting pipelines to enable the recycling of water was built. GTP spent €100million to implement these water efficiency projects.

### Savings achieved

Before the implementation of these measures in 1998, the average water consumption rate was 74.4m<sup>3</sup> per 1,000 yards of textile produced. With these measures in place, the rate reduced to 57.21m<sup>3</sup> in 1999. This is equivalent to 23.12% or 234,50002m<sup>3</sup> savings in water consumption. Cost savings of €304million was realized in 1999, giving a payback period of 4 months.

### Electricity Saving Measures

#### No Cost Measures

Workers were educated to switch off equipment when they are not in use and reduce artificial lighting where natural light could be used to supplement indoor lighting.

### Low Cost Measures

Skylights were installed to increase the use of natural light while some rewiring was done to permit turning off of lights in little used areas.

### High Cost Measures

The company installed Capacitor Banks to improve plant power factor. Subsequently the Power factor at the factory improved to 0.92 after the installation in 1998. The company currently has a maximum demand of 1,160 kVA.

Variable speed drives were also installed on some on some motors, pumps and compressors whilst burnt out motors were replaced with high efficiency ones.

### Savings achieved

Before these measures were implemented in 1998, the average electricity consumption was 294.71kWh per 1,000 yards of textile produced, but this reduced to 275.55 kWh when the energy efficiency measures were implemented. The reduction represents a saving of 6.5% equivalent to 207,000 kWh or €35.19million in 1999<sup>1</sup>.

### Summary of Energy Efficiency Measures

Measure	Energy savings	Cost Savings, € million
Electrical Energy Saving Measures	207,000kWh	35.19
Water Saving Measures	234,500m <sup>3</sup>	304
Fuel & Chemical Saving Measures	310,000kg	181.6
<b>TOTAL</b>		<b>520.79</b>

### Conclusion

The integrated energy management approach with the active support of management has helped GTP to achieve tremendous improvement in energy utilisation with a corresponding reduction in production cost. This has resulted in a total cost saving of €520.79million in 1999.

The experience of GTP has confirmed that energy can be managed in the same way other production inputs such as raw materials are managed. Energy Management should be treated as a continuous process. With the creation of awareness and acceptance of the concept, it is expected that GTP will continue to record cost savings in subsequent years.



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