



Case Studies



International
Labour
Organization

Factory Improvement Programme

Saving Energy and Boosting the Bottom Line Resource Efficiency at Tien Bo Printing Company

Tien Bo, employing around 400 people, was established in 1946. It is a printing company and is therefore still a State Owned Enterprise (SOE). However, at the end of 2003, the company was one of the pilot enterprises to be converted into a 1 member limited liability company (with the State holding the 1 share).

Tien Bo was interested in joining the Factory Improvement Programme (FIP) to address some of the inefficiencies inherent in SOEs. In light of Vietnam's entry into WTO, and an increasing competitive marketplace, there is a clear need to increase profitability.

In the past the company had used external management consultants to address specific issues but the Director felt that FIP, with its integrated approach to overall improvement of systems and management, driven by the factory and its

employees rather than through external specialists, would be better suited to the factory.

The worker/manager Factory Improvement Team established by Tien Bo as part of FIP meets once per week. There has been a great deal of enthusiasm in the FIT and in the factory in general with regard to FIP and its objectives. The actions that have been taken so far have generated interest among the entire workforce.

INITIAL SITUATION

The company continues to operate from a central Hanoi facility where it has been since its establishment in 1946. While there has been some additional property development, it consists of large buildings with high ceilings, buildings which may have been appropriate for the large / tall machinery available 60 years ago but does not compare well with modern, purpose-built printing factories of today. In Tien Bo's older buildings it is difficult – but very important, from a cost perspective – to effectively manage the temperature, lighting and power usage.

During the factory visit for the cleaner production module, the FIP coordinator and the cleaner production expert toured the premises of Tien Bo and identified a number of practical changes that the company could make to become more energy efficient.

A significant expense for the factory is the electricity that it uses. There were three aspects of the factory and its usage of electricity that stood out as requiring immediate attention.

Firstly, in the administrative areas, the expert highlighted that the air conditioning units were not appropriate for the volume of air that required cooling. In the printing workshops the rooms were not properly insulated and the doors were often left open or ajar, causing the air temperature to fluctuate significantly.



Secondly, in Vietnam, the electricity company charges a premium rate to any company whose cos phi (cos ϕ) is lower than 0.85, as is the case at Tien Bo. Cos phi is a measurement of voltage and current that indicates efficiency in electrical power consumption. The lower the numerical value of cos phi, the lower the efficiency (the greater wastage) of electricity. A capacitor can help to improve the efficiency and reduce wastage. The management had mistakenly assumed that the premium rate that they paid was less expensive than purchasing and installing a capacitor.

Lastly, the factory uses approximately 400 light bulbs. The majority of these bulbs are 40 watt capacity. However, using a slightly lower capacity bulb would not have a detrimental effect on the overall quality of lighting in the factory.

RECOMMENDATIONS BY THE FIP TEAM

The FIP's cleaner production expert spent time with the Tien Bo's Factory Improvement Team (FIT) discussing how the company could improve its efficiency in terms of energy usage and make financial savings from reducing overall consumption of electricity. The expert also provided a rough calculation of the potential savings to the FIT to demonstrate that some up-front investments in energy saving equipment and improvements would bring longer term benefits

The expert's recommendations covering these topics were:

- Managing the air temperature in the administrative area and the printing workshops;
- Reducing the consumption of electricity, increasing the efficiency of the power supply and reducing the cost to the company by investing in a capacitor;
- Changing the light bulbs to a lower capacity bulb.

The expert worked with the Factory Improvement Team to demonstrate what actions required to be taken for both recommendations.

ACTIONS TAKEN BY FACTORY

Implementation of change in Tien Bo is achieved through the Factory Improvement Team, which considers the information learned in each FIP training and the recommendations from the expert and FIP coordinator. The team then discusses the

issues and develops recommendations. These are then presented to the Board of Management which typically supports the recommendations. The Factory Improvement Team then has responsibility for implementation.

As a result of the recommendations of the expert, the Factory Improvement Team developed a technical specification for the air conditioning required to maintain an appropriate temperature throughout the year. The conclusion was that all indoor air-conditioners with a 2.4kw / 9000BTU specification should be replaced with 2 air-conditioning units each with a specification of 0.8kw / 9000BTU. This would reduce the energy consumption and cost but would not have an adverse impact on the optimal desired temperature.

With specific regard to the printing workshops the team took action to thermally insulate the doors in the workshops where air-conditioning is used. This also means ensuring that there is a form of automatic closure on all doors in those rooms. They also prepared a costing for insulating the windows in the print workshops. The most effective solution would be ensuring the windows were double glazed (ie. have 2 layers of glass with a gap between them), however, it is also possible to achieve a similar effect by install insulating curtains, which is less expensive.

The team also:

- Created regulations limiting the temperature of the air conditioners in the administrative area and printing workshop;
- Developed and commenced a programme of planned maintenance of air conditioners to ensure they were running at optimal efficiency;
- Commenced a planned replacement programme for all light bulbs. Whenever a light bulb fails it will be replaced with a 36 watt bulb.

The Factory Improvement Team used the FIP expert's guidance to prepare a cost benefit analysis for purchasing and installing a capacitor. Capacitors are used in power factor correction. In this case the capacitors come as three capacitors connected as a three phase load. The purpose is to counteract inductive loading from electric motors and fluorescent lighting in order to make the load appear to be mostly resistive and therefore more efficient and less wasteful.

The cost benefit analysis illustrated to the company how the installation of a new capacitor could result

in savings to the business, despite an initial investment that originally seemed quite large. The savings not only result from eliminating the premium that the company has to pay to the electricity company, but also by using the capacitor to manage the energy consumption more efficiently and reducing wastage.

IMPACT OF CHANGES

It is anticipated that the improvements to the air-conditioning system and insulation will reduce energy consumption by approximately 10% per year.

By investing in a new capacitor, the company should reduce its electricity bills by about 10% per year. This will result in a saving of around VND120 million (US\$7,500) per year.

The table below highlights the energy efficiencies achieved to the end of July. This represents a **20.29% increase** in energy / production output **efficiency**.

	2006	2007 (to July)
Average monthly Consumption of Electricity	102,012 kwh	107,032 kwh
Average monthly production	211,806 kg	265,945 kg
Average output per kwh	2.07 kg	2.49 kg