



## **ASSOCIATED MOTORWAYS LIMITED**

### **Improved Steam System Efficiency through Boiler Maintenance, Leak Repairs and Pipeline Insulation**

#### **SUMMARY OF THE OPTION**

Associated Motorways Limited is one of the leading rubber products factories in Sri Lanka, producing tyres and tubes and retreading tyres. The boiler and steam distribution system were identified as areas for energy efficiency improvement. The energy assessment revealed that in several areas fuel is wasted and heat is lost. The company implemented several options to improve energy efficiency including improved maintenance and operation, management of oxygen in flue gas, increased condensate recovery, insulation of steam pipelines, repair of steam leaks and transformers. These options are part of a continuous steam management program but until the end of 2004 spent US\$ 13,400 for the above improvements and recorded fuel oil saving of 98,400 liters worth US\$ 22,000 per year. The payback period was seven months. The reduction in furnace oil consumption resulted in 303 tons CO<sub>2</sub> per year.

#### **KEY WORDS**

Chemicals, Sri Lanka, Boilers and Thermic Fluid Heaters, Steam Distribution and Utilization, Rubber, Leaks, Insulation, Maintenance

#### **OBSERVATIONS**

The assessment of the boiler and steam distribution system included factory visits, interviews with boiler operators and other relevant staff, and collection and measurement of data. The help of an external expert (UNEP Consultant) was very useful for the assessment. Some important observations are listed below:

- Lack of boiler maintenance and low efficiency
  - The boiler tube cleaning frequency was unsatisfactory reducing boiler efficiency
  - The recorded flue gas temperature was 200 – 230<sup>0</sup> C and there is no recorded condensate recovery resulting in waste heat
  - Boiler firing schedule and tuning is not optimum and therefore fuel consumption is higher than necessary
  - No control of excess air in flue gas hence reducing boiler efficiency
  - Part of the steam transformers were not working or did not function properly
- Most of the distribution lines were un-insulated resulting in heat losses
- Steam leaks were observed in several locations

#### **Fuel Gas Analysis**

<b>Flue Gas Analysis</b>		<b>Average Results for 3 Readings</b>
<b>Parameter</b>	<b>Unit</b>	<b>2004</b>
O <sub>2</sub>	%	5.03

Co	ppm	6.3
Co <sub>2</sub>	%	12.01
No	ppm	341
No <sub>2</sub>	ppm	0
Temperature	°C	264.3
So <sub>2</sub>	ppm	996.3
H <sub>2</sub>	ppm	0.6
Efficiency	%	88.2

## OPTIONS

To improve boiler efficiency, reduce fuel consumption and reduce heat loss, the following options were identified:

- Boiler maintenance / efficiency improvement
  - Improve condensate returns and heat recovery
  - Rearrange boiler firing schedule and tuning
  - Manage excess air in flue gas
  - Investigate and repair steam transformers
  - Increase frequency of boiler tube cleaning
- Insulate steam distribution lines and fittings
- Identify and repair steam leaks in valves and other fittings of the steam distribution lines

The company implemented these options on a continuous basis.



**Figure 1: Insulated steam pipelines at AMW**

## RESULTS

### Financial Benefits

- Investment: US\$ 13,400, consisting of:
  - Boiler maintenance and steam leak repair: US\$ 5,700
  - Steam pipelines and valves insulation: US\$ 7,700
- Annual operating costs: not quantified
- Annual cost savings: US \$ 22,315 (98,400 liters furnace oil X 23 Rs/liter X 0.00986 Rs/US\$)
- Payback period: 7 months

**ASSOCIATED MOTORWAYS LTD: *Improved steam system efficiency through boiler maintenance, leak repairs and pipeline insulation***

---

**Environmental benefits**

- Annual furnace oil savings: 98,400 liters (8,200 liters/month X 12)
- Annual GHG emission reduction: 303 tCO<sub>2</sub>/year (98,400 liters furnace oil X 3.08 tCO<sub>2</sub>/1000 liters)
- Water savings: not quantified
- NO<sub>x</sub> and particulate emission reductions: not quantified

**FOR MORE INFORMATION**

---

***GERIAP National Focal Point (NFP) of Sri Lanka***

Mr. Nihal Cooray, Manager  
Small and Medium Enterprise Developers (SMED)  
Level 4, No. 53, Vauxhall Lane  
Colombo 02, Sri Lanka  
Tel: +94 1 304287, Fax: +94 1 304291  
E-mail: [projsmmed@slt.lk](mailto:projsmmed@slt.lk)



***GERIAP Company Sri Lanka***

Mr. Ananda Caldera  
Director General Manager (Factory)  
Associated Motorways Ltd  
Nagoda, Kalutara, Sri Lanka  
Tel: +94 34 2222386 / 2222437  
Mobile: +94 777 891611

***Disclaimer:***

*This case study was prepared as part of the project “ Greenhouse Gas Emission Reduction from Industry in Asia and the Pacific” (GERIAP). While reasonable efforts have been made to ensure that the contents of this publication are factually correct, UNEP does not accept responsibility for the accuracy or completeness of the contents, and shall not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance on, the contents of this publication. © UNEP, 2006.*