

Industrial Energy Efficiency Improvement: Steam Project - Malaysia

A Success Story of Steam System Optimization April 2014

Background

Pan Century Oleo Chemicals (PCOC) located at Pasir Gudang Industrial Estate near Johar Bahru, produces several chemicals and soap noodles from Palm Oil. It is a steam intensive plant as all its processes need steam at various pressure levels. The plant's Energy Engineer learned about the UNIDO's IEE improvement programme and invited UNIDO coordinators to his management. The plant's Head of Operations, Mr. Gurdev Singh Bhatti, who was very supportive to the UNIDO programme, immediately offered his plant as a *host plant* to UNIDO's Steam System Optimization efforts. He also instructed his management team to provide all the support to the UNIDO's assessment team. From a list of 7 plants, PCOC was selected as the Host plant, mainly due its Management's positive & enthusiastic support to the UNIDO's effort and its reasonable size Steam System. 16 candidates, including 2 PCOC engineers were selected by UNIDO from the participants of the several 2-days Steam System User Training sessions to participate in the Experts Training programme. The 16 selected candidates started their Experts Training at the on-site Host plant assessment at PCOC during June 19 – 21, 2013.

Steam System Optimization assessment at Host plant-PCOC

The plant's General Manager welcomed all the UNIDO team members and the plant's Safety, Health & Environmental Manager provided the safety briefing to all participants.

UNIDO team brought the Energy Audit Instruments, Portable Combustion Analyzers, Contact & Non-contact Thermometers, Infrared Camera & clamp-on portable flow meter. In addition to plant's own portable instruments were also utilized. The on-site assessment activities included, necessary site data collection, field measurements, Thermographic measurements using the Infrared Camera, Steam

System Assessment Tool (SSAT) model building, Brainstorming on the potential savings opportunities in the steam system, and Impact Evaluation of the improvement opportunities using the SSAT model. At the end of on-site assessment, the following list of energy savings opportunities were recommended to the Host plant:

Site Assessment Findings at PCOC

Brief Title of the Energy Savings Opportunity		Energy Savings RM/yr
1.	Fix the LPS Generators to improve the Process & Better utilization of the WH Steam	1,088,000
2.	Improve the Boiler Efficiency by maximizing heat recovery	127,000
3.	Optimize the steam utilization at the Soap Noodle Dryer	
4.	Recover Condensate from Tank Farm & other feasible area	511,000
5.	Install Blowdown heat recovery system	57,000
6.	Initiate Steam Trap Management program	46,000
7.	Identify hot spots & improve the Thermal Insulation	58,000

Total preliminary estimated energy cost savings 1,887,000

Implemented Efficiency Measures & Savings Results

The Plant Management motivated with UNIDO's on-site assessment, went ahead and already implemented 3 of the 7 recommendations.

1. Project for better utilization of WH Steam: The Low Pressure (LP) Steam generated at 1.5barg pressure from the process waste heat boilers is presently boosted to about >2 barg with the installation of a Thermo compressor and supplied to the Tank Farm. Installation of Thermo compressor has reduced the 16.5barg steam use at Tank Farm saved over 1250 MTons of 16.5barg steam in 3 months and the cost of investment was already paid back.

2. Project to recover waste heat from Boiler & TOH stacks:

Based on stack gas analysis conducted during the Assessment heat recovery potentials identified at Boiler #2 and also at Thermal Oil Heater (TOH) s #1 & #2. Now the plant management has installed an Economizer at TOH #1, and the second one at TOH #2 is being installed. One more new Economizer for Boiler #2 is also arrived at site, and will be installed soon. The Economizer installed at TOH #1 is already recovering heat. In all the 3 Economizers, make-up Boiler feed water would recover the wasted heat, and estimated to save fuel firing worth of over RM 127,000 annually at the Boilers.

3. Heat loss Reduction Project: The assessment recommended improving the outdoor steam pipe insulation, by conducting an Insulation survey. However the plant engineers found one immediate opportunity in the 150mm steam supply line to Tank Farm. Instead of insulating the 150mm steam line, they replaced it with an existing 50mm line, since the steam flow to the Tank Farm was not very much and insulated the 50mm line. After completing these 3 projects, the utility engineers noticed a significant reduction in the Boiler steam generation & steam flow out of the boiler house. The Utility Manager conservatively estimated an average 1.5 ton/hr. steam savings, which is expected to reduce natural gas use by about 10% from the present levels at the Pan Century Oleo Chemicals, Pasir Gudang.

Summary of Steam System Optimization Efforts after the host plant assessment:

The Steam System Optimization Efforts was successful at PCOC site, because:

- Top management & employees were already aware of the high costs of steam & Natural gas.
- The UNIDO's efforts motivated them to focus on steam system optimization.
- Motivated employees identified idle equipment & piping for re-. conservation, saving time & money towards implementing the steam system optimization projects.
- The committed Top Management supported their employee's steam system optimization efforts and provided the priority funding to implement the projects.

Now with the positive results of 10% lower natural gas bill each month, the plant management is seriously considering installing a Cogeneration plant (Gas Turbine & Heat Recovery Steam Generator) at their site.

Total Natural Gas Savings Total Project Cost ROI

= RM900,000/year

- = RM1,350,000
- = 1.5 years

This success belongs to the PCOC's top-management and its Engineering team, which recognized and well-utilized the UNIDO's catalytic role and achieved results in a quick phase.







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