



Energy audit for Cai Lan Oils & Fats Industries Branch at Hiep Phuoc, HCMC

In September 2012, Energy audit Division of RCEE-NIRAS JSC has completed a detailed energy audit for Cai Lan Oils & Fats Industries Branch at Hiep Phuoc, HCMC under the Circular No. 09/2012/TT-BCT.

Earlier from 05 to 08 August 2012, with supports of the plant's technicians, our Audit team conducted surveys and measurement in detail areas, equipment and systems, including: transformer stations, supplying and distributing power, water pumping system, effluent treatment system, coal fired boiler and Gas fired boiler, lighting system of workshop, office, refinery workshop, dry fraction and packing workshop...

Based on measured results, working conditions and operating situation of workshops, our energy audit team has proposed energy saving solutions which can save up to 56,363.50 kWh (equivalent to 1.4 billion VND per year), while reduces greenhouse gas emissions about 927 tons of CO₂ per year. These solutions include energy management system establishment, VSD installation in compressors, heat recovery from compressors system and scale treatment in boiler by ultrasonic method.

For the energy management system, the report points out benefits when establishing an energy management system:

- There is a systematic energy saving management produce.
- Reduce operating and maintenance cost saving and efficiency.
- Staff's awareness of using energy effectively is being raised;
- Improve knowledge of leaders and staffs about energy management;
- Have clear plans and goals on energy use;
- There is a system of procedures for observation and inspection about using energy;
- There are reports on the status of energy uses for the relevant level;
- Support other quality management system such as ISO 9001, ISO 14001...

Cai Lan Oils and Fats Industries Company (CALOFIC) is a joint venture between Vietnam Vegetable Oils Industry Corporation – VOCARIMEX (Ministry of Industry and Trade) and Wilmar Group, Singapore. Founded in 1996 with an initial investment of USD 22 million, now increasing to USD 126.8 million. Currently, CALOFIC has two factories in QuangNinh& Ho Chi Minh City, two branch offices in Hanoi and Ho Chi Minh City with over 1,000 employees nationwide.

During the last energy auditing, CALOFIC gets a lot of positive feedback for air compressed system, lighting system, refinery workshop and boilers.

1. Compressors system

- All compressors in the plant are equipped air flow measurements and power meters. Average power consumption for the compressor is from 1 to 1.15 kWh/m³ which is effective.
- At the time of surveying, the temperature taken in compressor room was 32⁰C, equivalent to the ambient temperature. As observed, the compressor room arranged very open and hot air coming from the compressor was taken outside by the pipe systems in each compressor. So, the temperature of compressor room was reasonable, thus the compressor operated efficiently.

2. Lighting system

- Lighting lamps using in office and factory is fluorescent T8-36W, fluorescent T5-28W, LED and power-saving compact fluorescent light (CFL). T5 lamps are available in stock for replacement of the damaged T8 lamps or decreased performance lamps.
- For the warehouses, pump house, dry fractionation, since 2011 the Plant has arranged translucent panels to take advantage of natural light. With this solution, the plant saves about 150 kWh of electricity for lighting daily.
- In 2012, the Plant has replaced time relays by light sensor (photo-cells), lighting controls is more effective and saving. In addition, the Plant has cut down lighting in some areas which is not necessary. This solution saves about 53 kWh/day.
- Some other solutions which the Plant has implemented and taken effective is fixed lunch time. At lunch time, all lighting and conditioners in office sector are turned off.

3. Refinery Workshop

- From 2009 onward, the plant used measuring equipment to detect and monitor steam leaking areas, which results in energy consumption reduction in refinery workshop.
- In the last three years from 2009, the Plant has conducted the pipe insulation; insulation of the connection points such as flanges, weld, hand valves and control valves, etc.; invest in steam flow measurement devices, a leak detection equipment such as thermal camera (everyday, the workers take this device to check and detect leaks and give remedial measures timely). Especially in the vacuum system (color and odor removal stage of refinery) plant was concentrated under reduced steam consumption in this area by improving the nozzle; regularly cleaning cooling system; at the same time replacement the sealing cushions by high quality sealing cushions has radically reduced the amount of steam leakage through the sealing cushion. With this improvements, the refinery workshop has reduced steam consumption from 130 tons/day in 2009 to (80 ÷ 90) tons /day.
- Reducing significantly steam consumption in the Plant, the boiler using coal with capacity 22 T/h is operating about (5.5 ÷ 6) T/h. The refinery system needs temperature and high pressure about 60 bar, therefore it must to use both the boilers (boiler using coal with capacity 22 T/h and boiler using gas with capacity 3.5 T/h). One thing worth attention is the period of changing water of the boiler with capacity 3.5 T/H is three years, it shows that the Plant is making very good job which are the recovering condensate water and limiting steam leakage.

4. Boiler

- The fluidized bed coal-fired boiler CFB has a capacity of 22 tons / h. This boiler was installed the water heater that utilize the heat from the exhaust gas, raising the water temperature behind the degasser from 98 ° C to 128 ° C. At the same time, two blowers and exhaust fans were also installed inverter to adjust capacity according to the traffic. Boiler was installed the continuous oxygen analyzer to be able to control the level of excess air and establishing the effective operating

mode. As noted by the boiler operating staff, when applying this kind of solution, the plant has saved a huge amount of coal in the furnace.

- Previously, the boiler 22 t / h were used coal totally. But later, the plant was improved to be able to operate by burning both coal and rice husk. At first, the rate of husk fuel/ coal is only about 20/80, but after improving over time, the rate of rice husk fuel / coal is now up to 50/50. As a result, this plant has been achieved the monthly savings of approximately VND 40,000,000.
- Because the plant has made many improvements and energy savings solutions in production area, the demand of using air slightly decreased over the years. Then the capacity of coal-fired boilers is greater than current demand. Besides, the plant has made improvements to minimize the combustion chamber to match actual. With this solution, the coal consumption has been felt by about 3 tons / day and electricity consumption has been reduced from 1670 kWh to 1120 kWh, that saving 550 kWh of electricity daily.
- In addition to using PLC to put the boiler into operation automatically in line, the measurement devices such as flow recorder, thermometer and pressure gage are also installed for monitoring and controlling conveniently, in the assessment process as well as energy efficiency performance evaluation.
- To optimal in terms of energy saving, the boilers are fitted with continuous oxygen analysis and installation of inverters for all systems pump water, condensate, exhaust fans, blower.
- With the condensate system, the plant was installed 2 crystal filters to be able to recover up to 90% of the condensate and reused for other stages. This investment has helped to save about 60 m³ of water/day.
- With the thermal network, all of the steam distribution pipes, condensate tanks, gas remover ... have a good insulation, to reduce heat loss to the environment. All valves and flanges were also wrapped by insulation jacket. The insulation surface temperature is only in the range of (37 ÷ 45) °C.
- The plant is also equipped by a thermal camera to detect the blow holes, leaking steam on pipe, for ensuring fault detection and timely repair.