

# Energy Conservation at HPCL

## Introduction

HPCL accords highest priority to energy conservation. Both the Refineries have a dedicated Energy Conservation (ENCON) cell, consisting of Managers & Engineers to monitor ENCON measures on a day-to-day basis. It has been a constant endeavor to make optimal use of energy and this philosophy has been zealously pursued over the years. Since the last decade, HPCL Refineries have invested more than Rs.257 Crores in various ENCON projects, and a further Rs.73 Crores worth of ENCON projects are currently under implementation. These projects coupled with increased awareness levels amongst the employees, have resulted in continuous lowering of fuel & loss consumption over the years.

### Various ENCON measures at HPC Refineries

- Energy Conservation Measures implemented in the past include:
  - Adoption of CO generation principle for generation of steam / power, etc. including installation of FCCU CO Boiler at Mumbai Refinery
  - Modernization of Fired Heaters
  - Maximization of crude preheat by optimization of Heat Exchanger Train using Pinch Technology
  - Effective use of Waste Heat
  - Modernization of Instrumentation and Advanced Control Strategies
- HPCL was one of the first oil companies in the country to initiate and implement full-fledged automation of its off-site facilities at both its Refineries. The facilities comprise of the following:
  - Automation of tank gauging & inventory management system
  - Advanced on-line blend control
  - Continuous on-line monitoring of quality of critical products / streams
  - Accurate measurement and monitoring of custody transfer operations
  - Continuous monitoring of critical off-site transfer pumps

The Off-site Automation facilities were designed to reduce loss and quality giveaway to optimize allocation of various Refinery streams to give final blended product as well as to improve overall distillate yield and product accounting.

As a part of this project a customized software package has been implemented which models the Refinery operation. The model will help decide optimal crude mix based on prevailing prices & demand of various products and optimize plant throughputs and product slate to get maximum netbacks.

- A detailed Hydrocarbon loss study has been carried out thru M/s British Petroleum for Mumbai Refinery and the various recommendations are in the process of being implemented
- A brief description on some of the recently completed on-going energy conservation related activities at both Refineries are as follows:
  - **Following equipment related measures are being implemented:**
    - Installation of improved steam traps
    - Replacement of Glass Reinforced Plastic (GRP) blades in cooling tower fans with energy efficient hollow Fiber Reinforced Plastic (FRP) blades. Each FRP blade fan reduces electricity consumption by approx. 30%
    - Sonic Soot Blowers installed at boiler house. This uses kinetic energy of sound waves to avoid soot deposition. This results in direct steam savings as compared to conventional steam soot blower.
    - Replacement of Rotary Air Pre Heaters (APH) with stationary APH

- Fuel Efficiency Monitors (FEMs) are being used to reduce excess air and improve efficiency levels of furnace & boilers. The oxygen content measurement at various locations (ex convection section, APH inlet, APH outlet etc.) in furnace helps in taking necessary corrective actions for optimizing furnace operation
- Non-contact type thermometers (Pyrometers) are being used for radiation loss estimation from furnaces and boiler
- Hydrocarbon loss monitoring instruments are being used to estimate gas losses through safety / relief valves. The timely action for maintaining the valves reduces the hydrocarbon loss
- Gas Surveyors are being used to identify fugitive emission sources and take corrective actions accordingly
- On-line oxygen analyzers on furnaces / boilers have been provided to control excess air these measure the oxygen content of flue gas on continuous basis. Control of oxygen content in flue gas helps in improving the furnace efficiencies
- Ultrasonic Flare meters have been provided to measure the flow rates as well as molecular weights of different hydrocarbons going to the flare. This helps to identify the source, type and quantity of hydrocarbon going to flare. Timely action is then initiated at the respective unit to control hydrocarbon loss
- Mass flow meters have been installed in various furnaces / heaters for monitoring individual furnace fuel consumption
- CC1V for round-the clock viewing j controlling of flare stack has been installed
- Electronic thermo probes have been installed for taking accurate measurement of tank temperatures. The measurement of accurate temperature reduce the inaccuracy in accounting due to inaccurate temperature readings, which were earlier reflected in hydrocarbon loss
- A CO Boiler is being installed as part of FCCU-I revamp under the Visakh Refinery Expansion Project-II. CO Boiler will result in recovery of heat from FCCU flue gas and generation of steam
- Special Traps for Copper tubes used for instrument tracer lines j steam tracing application to control steam losses through these Copper tubes
- **Following operational measures have been undertaken:**
  - Monitoring of steam balance, flaring losses, APH and soot blower service factors, fuel consumption for power generation, etc. is done regularly
  - Regular decoking of charge heaters using Decoking facilities to improve heater performance
  - Periodic survey of performance of steam traps using sophisticated Trapman for taking immediate corrective action to reduce steam loss
  - Automatic blow down control system to optimize the blow down of boilers
- **Following studies have been initiated:**
  - Steam Network
  - Efficiency Improvement
  - Furnace Efficiency Improvement
  - Feasibility study for providing secondary seals in floating roof tanks to control the evaporation loss of hydrocarbon

As a result of the various aforementioned ENCON projects j measures, Fuel & Loss for Visakh Refinery has reduced from 7.46% wt. in 1985-86 to 5.4% wt. in 1999-00. Likewise, specific energy consumption for the same period reduced from 242.4 MBTU/BBL/NRGF to 121.5 MBTU/BBL/NRGF. Similarly, there has been significant improvement in performance of Mumbai Refinery. Currently the Fuel & Loss of Mumbai Refinery is 6.3% wt. (average for last few years) and specific energy consumption is 125.5 MBTU/BBL/NRGF. These figures compare favorably with national / international Fuel & Loss and Specific Energy Consumption levels.

**Reference:**

<http://www.centreforhightechnology.com/>