

INDIAN OIL CORPORATION LIMITED
Southern Region Pipelines Chittoor (Andhra Pradesh)

Unit Profile

Indian Oil is one of the largest organization in India and only company to be listed in the fortune 500 list. Indian Oil Corporation Ltd. operates a network of about 11,750 km long crude oil, petroleum product and gas pipelines with a throughput capacity of 85.5 million metric tonnes per annum of oil and 9.5 million metric standard cubic meter per day of gas. Cross-country pipelines are globally recognized as the safest, cost-effective, energy-efficient and environment-friendly mode for transportation of crude oil and petroleum products.

Chennai-Bangalore Pipeline

The 290 km long petroleum product pipeline from Chennai to Bangalore was commissioned in March 2010 to position the petroleum products from Chennai Petroleum Corporation’s Manali refinery to Bangalore.

IOCL Chittoor is a Pumping cum Delivery station of Chennai – Bangalore Product Pipeline commissioned strategically to meet the demands of Andhra Pradesh and in and around parts of Tamil Nadu.

The brief features of Chittoor Intermediate pumping station are given hereunder:

- Motor driven Mainline Pumping Units (MLPUs) – 3 Nos.
- Motor: Squirrel cage Induction type, Make- BHEL, Bhopal 6.6 KV, 870 KW, 87 A.
- Pump: Centrifugal, Make BPCL, 4 stages centrifugal, 709 m at a flow rate of 360 KL/hr.
- All MLPU are provided with Variable Frequency Drive (VFD), supplied by M/s YASKAWA for varying the motor speed.



Details of Energy conservation measures implemented:

1. LED HIGH MAST TOWER LIGHTING

Chittoor pump station has total four number of high mast towers which were of Sodium Vapor lamps which was consuming more power and less life. Last year the systems were replaced by energy efficient LED fittings. LED fittings has reduced the energy consumption of lighting loads and increased the ambience of the station.



2. ENERGY SAVER FOR LIGHTING LOAD:

With a view to save the electrical energy by further reducing the LT consumption, a 3 phase 19.5 kVA was procured at a cost of Rs. 85798/- and installed at Chittoor station. The LT load viz. Lights, Fans and electric sockets of PMCC and Control Building was connected to the energy saver. Making use of the energy saver installed, the supply voltage to lighting loads is reduced to 200 from 240V. This is the theory of controlling power consumption by optimizing input voltage. But, this method can apply only in loads in which reduction of voltage will not affect its proper working. Theoretically, it should fetch a reduction of 31% in power consumption. However, analysis of the data validates a reduction of 28% in power consumption of lighting load.

3. TRANSFORMER LOAD OPTIMIZATION

The transformer load study was carried out to find out the most optimized way of operation of the transformer at full load and part load conditions. Various set of configuration were studied and the best energy efficient combination was identified with two transformers with optimum load combination.

4. ENERGY EFFICIENT COMBINATION OF VFD ACS:

To sustain the operations of three VFDs four nos of 16 TR packaged HVAC systems were installed. In due course of the time the compressors and other parts were subjected to wear and tear under various operating conditions. As a part of energy management, special maintenance practices were adopted and efficiency study was taken for the four different HVACs with different combinations to establish the most efficient combination of cooling for reduced specific energy consumption. The total running hours for various HVACs from the current financial year were analyzed with respect to energy consumption. Innovative maintenance practices such as PU canvases for dampers and regular monitoring of refrigerant pressure was undertaken.

1. Combination of VFD HVACs: Based on the energy efficient combination of the AC units (AC1 & AC4), Chittoor pump station was able to save upto 2 KW/hr, than other AC combinations.
2. Single VFD HVAC operation: Based on energy efficient operation of single AC unit, AC-1-3 was found efficient. Based on the data studied On running the best efficient AC, we were able to save around 4 KW/hr than other ACs.
3. The overall specific energy consumption of Chittoor pump station is reduced from 3.34 KW/Kls in 2014-15 to 3.07 KW/Kls in 2015-16 based on this energy efficient combination of MLPU and HVAC units.

Moreover the cooling space were optimized using special partitions without affecting the actual performance of the system which has reduced the running hours of the AC s and the power consumption drastically . A saving of 3000 kWh / month was realized after this modification.

Continuous online monitoring of temperature of VFD rooms through SCADA has fetched an optimized operation of the ACs and reduced power consumption.



5. MAINTAINING OPTIMUM LOADING AND PUMP RPM USING VFD

CBPL operated with two configurations viz pumping to Bangalore and delivery to Chittoor.

During pumping energy study was carried out to know the energy efficient combination of the pumps and various ranges of loads. During the course of study various kinds of combination of pumps at Chennai and Chittoor with varying flow rates were analyzed and the crossed down to single energy efficient operating parameters. For pumping the flow parameter with 230 Kls/hr and for delivery 180 Kls/hr was found to energy efficient and economical.

By maintaining this parameter in the entire course of operations, it was able to realize huge energy savings in the operations and maintenance front. This was achieved mainly using VFD s in optimized way

ENERGY EFFICIENT COMBINATION OF MLPUS



A special Efficiency study was conducted for the three different mainline pumps with different flow rates and combinations to establish the most efficient pump and best efficient combination of pumping for reduced specific energy consumption.

1. Combination of Mainline Pumps: Based on the energy efficient combination of the pumping units (MP2 & MP3), Chittoor pump station was able to save upto 8.5 KW/hr, which is 0.5 percent increased efficiency than other pumping combinations (MP1&MP2 and MP1&MP3).
2. Single Pump operation: Based on energy efficient operation of single pump unit, MP-3 was found efficient, 1.6 percent more than other pumping units. It was based on the data studied in 2013-14, as single pump operation in this financial year was not warranted. On running the best efficient pump, achieved saving of around 11 KW/hr.
3. The overall specific energy consumption of Chittoor pump station is reduced from 3.34 KW/Kls in 2014-15 to 3.07 KW/Kls in 2015-16 based on this energy efficient combination of MLPU units.