NTPC LIMITED, KAWAS GAS POWER PROJECT

Surat (Gujarat)

Unit Profile

NTPC, Kawas is one of the prestigious gas based combined cycle power plants developed along the 1800 KM long HBJ Pipeline. The project is located near Kawas village, falling in Choryasi taluka of Surat district Gujarat approximately 18 KM from Surat Station.The project was commissioned in 1993. The combined cycle power plant is capable of running on mixed fuel (Natural gas/Naptha) using the state of art technology. The total generation capacity is 656.2 MW. The beneficiaries of Kawas Power are Maharashtra, Gujarat, Madhya Pradesh, Goa, Dadra Nagar Haveli, Daman & Diu.

Configuration: At NTPC, Kawas there are two blocks each of 328.1 MW capacities. Each block configuration consists two gas turbines of 106 MW, two waste heat recovery boilers and one Steam Turbine of 116.1 MW. All Gas turbine units have dual fuel firing system facility and hence can be operated on both Natural Gas as well as liquid fuel Naptha at any point of time.

Fuel: The gas is received at NTPC Kawas from M/s GAIL terminal at Hazira, and / or GSPL Terminal through dedicated pipelines and is supplied to individual units of gas turbine through its unit skid without any pressure reduction.

The main fuel i.e. Natural Gas can be sourced to NTPC, Kawas Gas Receiving Station either of / both the dedicated pipelines from M/s GAIL terminal at Hazira and/ or GSPL terminal, Mora of Gujarat State Petronet Corporation. The liquid fuel (Naphtha) is received from M/s HPCL Hazira Depot through a dedicated pipeline and stored in four no tanks each having storing capacity of 2000 KL. The change over fuel HSD is received in Road tankers and stored in tank having capacity of 200 KL .

Process: In the gas turbine the air enters the inlet air compartment of the gas turbine unit through a self cleaning filtration system. The inlet air is sucked by the compressor, coupled with shaft of the gas turbine unit through a ducting arrangement. The air enters the combustion chamber wherein it is mixed with fuel for combustion. The mixture of compressed air and fuel gets ignited in the combustion chamber and hot gas enters the gas turbine and expands in the turbine for generation of power.

The exhaust flue from gas Turbine outlet delivered out through an exhaust duct during open cycle operation and exhaust flue gas is let out to atmosphere through an exhaust by pass stack at 55 M height elevation.

In combined cycle operation, the exhaust is diverted through a diverter damper assembly into a waste heat recovery boiler. Each of the gas turbine is provided with a waste heat recovery boiler which discharges flue gas through 55 M high boiler stacks.

Raw water for the project is sourced through Singanpur weir at Variav pump house and water is supplied through a dedicated pipeline 16 Km long to carry water at the rate of 1500 m^3/hr. The water is stored at two large reservoirs with a total storage capacity of 14.4 lac m^3. The pump house is ~16 kms from the plant where an intake well has been constructed by NTPC along with Hazira Area Industries Association and Surat Municipal Corporation.

Energy Consumption

Plant Performance and Energy Consumption		
PARAMETER	**FY 2014-15**	**FY 2013-14**
Generation (MUs)	1741.2	1388.98
Plant Load Factor (%)	30.29	24.16
Declaraed Capability (%)	94.13	91.33
M/c Availability (%) (hrs)	93.57	91.31
Heat Rate (Kcal/ kWh)	2043	2072
Efficiency (%)	42.09	41.51
APC (%)	**2.54**	2.93

Energy Conservation activities

Kawas has taken several initiatives to ensure that cheap and sustained Power is made available to the consumers.

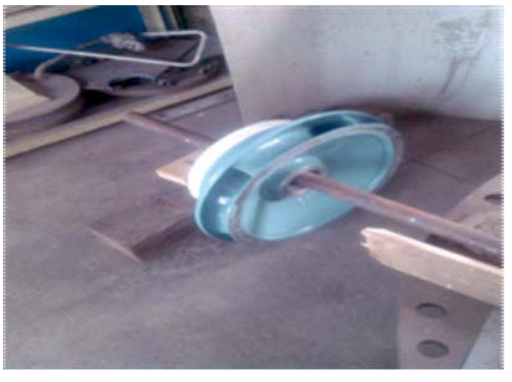
- **ONLINE COMPRESSOR WASHING OF GAS TURBINE**: Fouling of the axial compressors and IGVs take place gradually due to contamination in inlet air. This causes reduction in the efficiency of the Compressors, leading to reduction in power generation and deterioration in Heat Rate of the

Gas Turbines. Online compressor washing has resulted in improved compressor efficiency by 0.5 % average, leading to less power consumption in compressor, leading to higher power delivered at generator terminal. This has resulted in sustained compressor performance by limiting fouling effect.

- **Use of energy efficient motors** :APC Reduction by replacing standard motors with Energy Efficient Motors.

- **Application of energy efficient coating :** Efficiency enhancement of variav makeup water pumpS by coating with energy efficient coating.

Efficiency improved by 9.29% Cost: Rs. 1.54 lacs
Polymer Coated Impellers of Variav pump Metallic Impeller



- **Installation of VFD in raw water pump house Kawas** : Gas Power Project has total 3 nos. Raw Water Pumps of 1500 cum/hr capacity and 75kW drives to cater the need of water requirement of the station.

With the increase of COC from 1.65 to 5 and later due to unavailability of schedule, the water requirement of the station decreased from the originally designed value of 2000 cum/hr to 1000 cum/hr to 700 cum/hr. As a result Kawas was compelled to meet its water requirement by throttling of discharge valves of Raw Water Pumps.

HITACHI make VFDs were installed & commissioned in August 2014 with suitable panels, one for each Raw Water Pump (Total 3 nos.) . It is installed in a separate porta cabin near Raw Water Pump House.

On part loading operation of pump energy saving to the tune of 50 kW is achieved.

- **Foam cleaning of Fin Fan Coolers.**

  GT & generator auxiliary cooling is done by cooling water which in turn cooled by air in fin fan cooling system. Each system having cooler bank (fin tubes) & 15 no of fans. Air flows through finned tubes & cools the water medium in tubes. Air flow between finned tubes depends on cleanliness of tubes. These finned tubes get foul by dirt & dust over period of time .With application of foam cleaning finned tubes are getting cleaned & air flow is increased. This increased air flow resulted in better heat transfer & cooling of water in tubes. Due to this improvement 3 nos of fan in each system have been stopped.

- **Real Time Monitoring of Auxiliary Power Consumption**
  Plant has installed 94 Energy Meters to monitor power consumption of all Major Auxiliaries like CW Pumps, Hp BFPs, and Compressors etc. data of all meters is integrated into single software which generates Tailor made Reports for monitoring.

This has helped us in the following ways:

1. Accumulation of real Time Power data to assess the performance of the Auxiliaries so that efficient equipments can be operated.

2. Assess rate of deterioration of Auxiliaries so that spares and contract can be arranged for timely maintenance.

3. Identify and eliminate idle operation.

4. Compare performance of Aux. of different Units to optimize total power consumption.