

Kochi Refineries Limited

(i) Unit Profile

The Refinery was commissioned in 1966 with a crude oil processing capacity of 2.5 Million Metric ton per annum (MMTPA). From the date of commissioning to -date, the refinery undertook 3 expansions in refining capacity and installation of matching secondary processing facilities (FCCU). The present crude processing capacity is 7.5 MMTPA and the capacity of secondary processing facilities is 1.75 MMTPA. A fuel gas desulphurisation plant was also commissioned along with capacity expansion project as an environmental protection measure to minimize sulphur dioxide emission.

During the year 1989, the company entered the petrochemical field by commissioning aromatics production facilities with a design capacity of 87,200 tons per annum of Benzene and 12,000 tons per annum of Toluene.

A captive power plant of 26.3 MW ISO rating was commissioned in March 1991. During the year 1998, an additional Captive power plant of 17.8 MW was commissioned.

Light ends feed preparation unit (LEFPU) was put up to supply polybutenes feed stock to Cochin Refineries Balmer Lawrie Ltd. (a joint venture company) in 1993. (This joint venture was subsequently amalgamated with KRL in 2000.)

KRL also commissioned a raffinate purification unit (RPU) for the manufacture of 10,000 tons per annum of Petroleum Hydro carbon solvent in 1994, with the technology developed by the in-house R&D centre.

KRL R&D department developed new product -Natural rubber modified bitumen (NRMB) by blending rubber latex with bitumen. The product was launched in the market in September 1999.

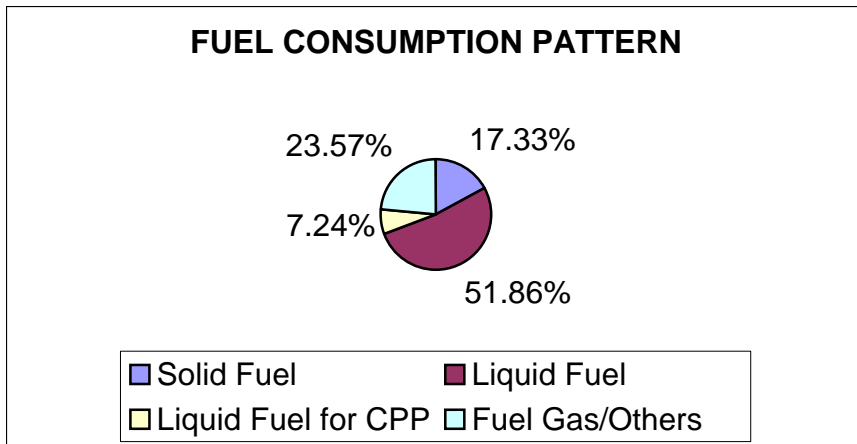
Diesel dehydro desulphurisation unit to reduce sulphur content in diesel to 0.25% along with another sulphur recovery unit to recover sulphur present in the fuel gas was commissioned in 2000. Further an additional reactor to reduce sulphur content in diesel from 0.25% to 0.05wt% was also commissioned. Diesel dehydro desulphurisation unit was revamped in 2004 with additional facilities of removing sulphur from Vacuum gas oil (VGO) to bring down the sulphur content in MS from 0.1 wt% to 0.05wt% so as to meet the BSII specifications.

The major products manufactured from KRL include LPG, Gasolene, Naphtha, Kerosene, High Speed Diesel, Light Diesel Oil, Furnace Oil, Low Sulphur Heavy Stock, Ordinary bitumen, Natural Rubber modified Bitumen (NRMB), Benzene and Toluene.

(ii) Energy Consumption

The fuel consumption pattern of the refinery during 2004-05 was as follows.

Solid fuel	77532	17.33%
Liquid fuel	232017	51.86%
Liquid fuel for Captive Power Plant	32402	7.24%
Fuel gas/others	105465	23.57%



(iii) Energy Conservation Commitment, Policy and set up

KRL has integrated its Energy policy with its environment, health and safety policy, as any energy conservation measure helps in minimizing adverse impact on environment.

KRL’s commitment to energy conservation begins at the design stage itself by incorporating energy efficient techniques. KRL has also implemented several energy conservation schemes based on the experience gathered during the operation. We have fully optimized heat exchanger trains, air preheaters and steam generators in process heaters and a plant lay out fully utilizing the terrain of the area minimizing the pumping requirements. KRL’s policy is to conserve natural resources and to reduce energy consumption. Energy being a natural resource KRL’s commitment to energy conservation goes beyond the premises of the plant.

Through its own R&D effort, KRL has developed natural rubber modified bitumen for road pavement. Field trial reveal that NRMB paved road has longer service life. Longer service life of NRMB roads results in lesser overlays of roads thereby reducing the pollution associated with heating of bitumen prior to laying. Vehicular emission is also reduced as vehicles plying on NRMB roads consume lesser fuel. Moreover, the fuel consumption of vehicles plying on roads paved with NRMB is expected to reduce by about 10%. This also results in substantial national savings.

KRL is also implementing modernization project to meet the future specification of auto fuels.

We have a full-fledged Energy Conservation Cell under the Technical Services Department. A Senior Manager heads this cell and he is supported by the four officers for close monitoring of plant fuel and loss pattern. Regular audits of heater efficiencies, steam, insulation, hydrocarbon loss, overhauling of the energy consumption patterns are reviewed on daily basis.

In order to propagate the essence of energy conservation beyond the premises of the refinery, KRL has formed an ENCON CLUB comprising 25 schools and colleges in Kerala. The main objective of this club is to drive home the elements of energy conservation and environmental protection in the minds of the public. KRL organizes various activities like seminars/workshops/quiz competitions etc on energy conservation at different locations within the state for the Encon Club members as well as the general public. Regular visits to the refinery are arranged for the Encon club members. Encon club also conducts awareness programmes for housewives, drivers etc.

KRL conducts regular training programmes on energy conservation for our employees. In order to motivate our employees on energy conservation, we have a practice of distributing Encon mementos as part of Oil Conservation Fortnight Celebrations.

Year	MBTU/BBL/NRGF
2002 - 03	92.73
2003-04	90.14
2004-05	94.37 *

Reduction in specific energy consumption for the year 2004-05 could not be achieved due to shut down of DHDS and auxiliary units for revamp activities during December-04- Jan-05, to meet BS-2 norms for MS & HSD.

(iv) Energy Conservation Achievements:

Details of major Encon projects implemented during 2004-05.

1) Replacement of metallic blades of air fin fans with FRP blades in crude distillation unit overhead system.

The metallic blades of two-air fin fans of crude distillation overhead column were replaced with aerodynamically balanced FRP blades. There was reduction in the total power consumption of the two fans, from 40.6 KW to 30.6 KW after changing the blades. Annual savings expected Rs.2.6 lakhs.

2) Replacing Naphtha Splitter 1 heater with a steam reboiler thereby stopping bottom pump and saving in fuel.

The existing heater reboiler (NH1) of Naphtha splitter is replaced with steam heated shell and tube type heat exchanger (thermosyphon reboiler) as a part of energy optimization scheme. By implementing this scheme the bottom circulation pump was stopped and there by saving power. Also there is a net saving of fuel of 0.233 t/hr. Annual savings expected is Rs.208 lakhs.

(v) Energy conservation plans and targets.

Our policy is to conserve natural resources and reduce energy consumption. In order to reduce energy consumption the following energy conservation activities are planned to be carried out in future.

- 1) Insulation of Plant fuel tank 190
- 2) Condensate Recovery from VR/PF tank farm
- 3) Internal coating of cooling water pumps in ARU in order to improve pump efficiency.
- 4) Replacement of Naphtha stabilizer reboiler by optimizing of crude preheat exchanger train in Crude distillation unit-1.
- 5) Removal of overhead column compressor in Crude distillation unit-1 by routing overhead gas directly to heaters after amine wash.

(vi) Environment and safety

KRL continues to strive hard for the improvement of environment performance and prevention of pollution. Commitment for environmental protection starts at the design stage itself by selecting environmental friendly technology. Regular audits are carried out by various internal and external agencies and the recommendations are promptly implemented.

We are the first industry in the state of Kerala to get consent from the Pollution control board for discharge of treated effluents into the inland waters.

We are also the first industry in Kerala to get the ISO 14001 certification. KRL joined hands with Cochin port trust for the set up of Tier-1 facilities for combating oil spills. KRL was the major contributor in this venture. KRL contributed 57 lakhs for this venture, which is 80% of the total cost. Regular mock drills are conducted as a part of the oil combating exercise.

KRL also launched a new product Natural rubber modified bitumen (NRMB). Field trial reveal that NRMB paved road has longer service life. Longer service life of NRMB roads results in lesser overlays of roads thereby reducing the pollution associated with heating of bitumen prior to laying. Vehicular emission is also reduced as vehicles plying on NRMB roads consume lesser fuel. Moreover, the fuel consumption of vehicles plying on roads paved with NRMB is expected to reduce by about 10%. This also results in substantial national savings.

We have received several awards in recognition of our efforts on the environmental front. We have received a special award from Kerala state pollution control Board for the year 2004, for making substantial and sustained efforts in pollution control.

Details regarding energy schemes implemented during the year 2004-05 are given below:

(1) Replacing Naphtha Splitter 1 heater with a steam reboiler thereby stopping bottom pump and saving in fuel.

The existing heater reboiler (NH1) of Naphtha splitter is replaced with steam heated shell and tube type heat exchanger (thermosyphon reboiler) as a part of energy optimization scheme. By implementing this scheme the bottom circulation pump was stopped and there by saving power. Also there is a net saving of fuel of 0.233 t/hr. Annual savings expected is Rs.208 lakhs.

Fuel saved per annum by replacing heater of fired duty (8.71 MMKcal/hr) with steam reboiler of 6.5 MMKcal/hr	1899	KL
Equivalent money saved per annum	188	Rs.in lakhs
Power saved per annum by stopping the splitter bottom pump of 60 KW	4.8	KW hr
Equivalent money saved per annum (Rs.in Lakhs)	20	Rs.in lakhs
Total amount saved	208	Rs.in lakhs

(2) Replacement of metallic blades of air fin fans with FRP blades in crude distillation unit overhead system.

The metallic blades of two-air fin fans of crude distillation overhead column were replaced with aero dynamically balanced FRP blades. There was reduction in the total power consumption of the two fans, from 40.6 KW to 30.6 KW after changing the blades. Annual savings expected is Rs.2.6 lakhs.

	CF7A (KW)	CF7B (KW)	Total power (KW)
Power consumption With existing metallic blades	19.6	21	40.6
Power consumption with FRP blades	14.9	15.5	30.4
Power savings per hour - 10.2 KW hr			
Run hours considered per annum = 8000			
Units in KW hr saved per annum = 81,600			
Equivalent money saved per annum -Rs. 2.6 Lakhs			
Cost of 2 FRP fans = Rs. 1.12 lakhs			



CRUDE COLUMN O/H AIRFIN FAN WITH FRP BLADES



SPLITTER 1 STEAM REBOILER