1.	ID: 85	Title of measure	Sector: Refinery Industry
2	Survey Year: 2007	Improvement in condensate recovery	Technology: Condensate Recovery
3	Name of the Company	:	Hindustan Petroleum Limited, Refinery Division, Chembur, Mumbai, INDIA
4	Agency that executed the project	:	In-house
5	Year of Implementation	:	2006-07

6 **Unit Profile:**

Hindustan Petroleum Corporation Limited (HPCL) is a Global Fortune 500 company in the Energy business. HPCL has two refineries located in Mumbai (West Coast) with a capacity 5.5 MMTPA and Visakh (East Coast) with a capacity 7.5 MMTPA, producing wide range of petroleum products, viz. LPG, MS, SKO, ATF, HSD, Bitumen etc. and over 300 grades of lubricants, specialties and greases as per BIS standard. HPCL has been sustaining almost 20% of India's refining requirements.

Mumbai Refinery is a Lube based refinery with the largest lube production capacity in India. The refinery produces superior quality lube base oils.

7 **Description of Energy Conservation Measure:-**

In the light end unit of FR Block, high pressure steam (14.0kg/cm^2) is used in the reboilers. The normal consumption in this block when all the units are in service is varying from 50-55 T/h. In order to maintain the reboiler outlet temperature of the FRE-Naphtha stabilizer, the condensate was drained partially to sewer. In view to recover the condensate to the tune of 4T/h, earlier 4.5 kg/cm^2 differential pressure Ball and Float steam trap were replaced with the higher differential pressure of 21 kg/cm^2 and condensate loop was also modified. This has helped to recover the condensate fully.

8 **Hindustan Petroleum Refinery, Mumbai**

Picture After Modification

9	Total investment :	1,875 US$
10	First year energy cost savings :	97,000 US$
11	First year additional savings beyond energy (i.e. water, raw materials etc.):	Nil
12	Annual oil consumption before, kl	580
13	Annual oil consumption after, kl	290
14	First year oil savings, kl	290
15	First year tons of Co_2 mitigated	875
16	Assumed sustainability, years	10
17	**Expected tons of Co_2 mitigated throughout life cycle**	**8,750**

1.	ID: 86	Title of measure	Sector: Refinery Industry
2	Survey Year: 2007	Optimization of Refinery Sour Water Stripper Operation	Technology: Refinery Sour Water Stripper
3	Name of the Company	: Mangalore Refinery & Petrochemicals Limited, Kuthethoor post, Mangalore, INDIA	
4	Agency that executed the project	: In-house	
5	Year of Implementation	: 2006-07	

6 **Unit Profile:**

Mangalore Refinery and Petrochemicals Limited (MRPL), a subsidiary of Oil and Natural Gas Corporation Limited, is a grass root Crude Oil Refinery located at Mangalore, a coastal city of Karnataka. MRPL contributes approximately 8% of India's total Refining capacity. MRPL's refinery complex consists of state-of-the-art facilities for crude distillation and secondary processing units. The refinery, with its predominant middle-distillates product focus, is a trendsetter among Indian Refineries with two Hydro crackers, two Catalytic Reforming & Light Naphtha Isomerization units. The Refinery has achieved the highest ever crude throughput of 12.53 MMTPA which is ~129% of the installed capacity during the year 2006-07.

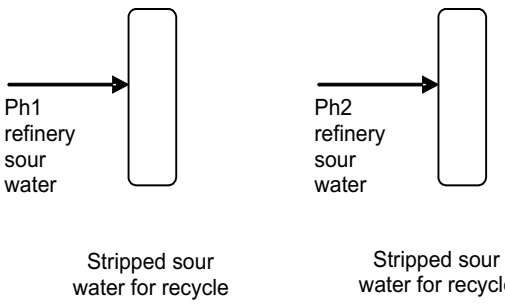
7 **Description of Energy Conservation Measure:-**

A study was carried out to check the feasibility of optimizing Refinery Sour Water Stripper (SWS) operation. Earlier both Refinery SWS1 & Refinery SWS2 units were in operation catering to phase 1 & 2 units respectively. An in-house study revealed that phase 2 SWS unit alone could take the entire refinery sour water.

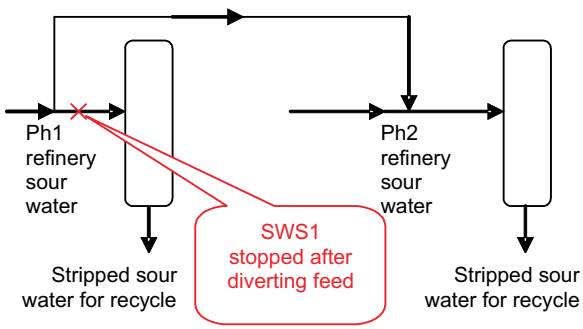
m^3/h	Phase 1		Phase 1	
	Design	Actual	Design	Actual
Earlier, Average	51	27	103	55
Max		33		68
Present		0		~90
Present		0		~90

Accordingly SWS1 load was shifted to SWS2 & SWS1 unit was stopped. This measure mainly resulted in saving of reboiler steam (33,595 MT per year) & power savings.

8 **Picture Before Modification**



Picture After Modification



9	Total investment :	Nil
10	First year energy cost savings :	7,65,750 US$
11	First year additional savings beyond energy (i.e. water, raw materials etc.):	Nil
12	Annual electricity consumption before, MWh	7,647
13	Annual electricity consumption after, MWh	7,178
14	First year electricity savings, MWh	469
15	First year tons of CO_2 mitigated	469
16	Assumed sustainability, years	10
17	**Expected tons of CO_2 mitigated throughout life cycle**	**4,690**

1.	ID: 87	Title of measure	Sector: Refinery Industry
2	Survey Year: 2007	On line chemical cleaning of 3 heaters	Technology: On Line Chemical Cleaning
3	Name of the Company	:	Hindustan Petroleum Limited, Refinery Division, Chembur, Mumbai, INDIA
4	Agency that executed the project	:	GTC Technology, Housten,USA
5	Year of Implementation	:	2007

6 **Unit Profile:**

Hindustan Petroleum Corporation Limited (HPCL) is a Global Fortune 500 company in the Energy business. HPCL has two refineries located in Mumbai (West Coast) with a capacity 5.5 MMTPA and Visakh (East Coast) with a capacity 7.5 MMTPA, producing wide range of petroleum products, viz. LPG, MS, SKO, ATF, HSD, Bitumen etc. and over 300 grades of lubricants, specialties and greases as per BIS standard. HPCL has been sustaining almost 20% of India's refining requirements.

Mumbai Refinery is a Lube based refinery with the largest lube production capacity in India. The refinery produces superior quality lube base oils.

7 **Description of Energy Conservation Measure:-**

Crude heater of FRE is a balanced draft furnace with rotary type of air preheater. Feed in the furnace was restricted to the 440 m^3/h due to fouling in the convection and the radiant zone and the fired duty of the furnace was crossing the design duty of 42.8 MkCal/hr. Similarly in FRE-VDU and LR-VDU, limitations were observed in the feed rate above 145m^3/hr and 125m^3/hr respectively as it resulted in higher Tube skin temperatures and lower efficiencies. To overcome the above limitations, online chemical cleaning of three furnaces was done by M/s GTC, USA during Feb 17 to March 02,2007.This resulted in increase of overall feed rate by 15 -20 m^3/h with furnace efficiency improvement of 1.5 to 2.8%.

8

Picture Before Modification

Radiant Tubes Before

Convection Tubes Before

Picture After Modification

Radiant Tubes After

Convection Tubes After

9	Total investment :	93,750 US$
10	First year energy cost savings :	116,500 US$
11	First year additional savings beyond energy (i.e. water, raw materials etc.):	Nil
12	Annual oil consumption before, kl	5,760
13	Annual oil consumption after, kl	5,460
14	First year oil savings, kl	300
15	First year tons of CO_2 mitigated	905
16	Assumed sustainability, years	10
17	**Expected tons of CO_2 mitigated throughout life cycle**	**9,050**