


Energy Conservation Measure implemented in 2006-2007

ID :	1. Make-up water heater Installation in Heat Recovery Steam Generators (# 3,4 and 7)	Sector : Petrochemicals
Year :		Technology: - NA -
<p>Description of the energy conservation measure:</p> <p>At RIL Hazira, from Gas Turbines exhaust gases, high pressure steam is generated through Heat Recovery Steam Generator (HRSG). In BHEL HRSGs the stack temperature used to remain ~200°C. The dew point temperature of the flue gases was calculated based on the liquid fuel firing and found out to be 130°C. Therefore it was found that the stack temperature can be safely brought down to 145°C safely.</p> <p>Various options for heat recovery were worked out,</p> <ol style="list-style-type: none"> 1) Furnace /boiler air pre-heating 2) Water Preheating 3) Direct LP steam generation for using in <ol style="list-style-type: none"> a. Vapor Absorption Machine b. De-aerator c. Meeting Process Requirement d. Injection in steam turbine for power generation. <p>Option for preheating the feed water to De-aerator was found to be most efficient and economical.</p> <p>Considerations for Make up water heater</p> <ol style="list-style-type: none"> 1) Stainless steel modules to protect from acid corrosion 2) 3-way control valve for bypassing the water, when stack temperature start coming down below 145°C 3) Designing the module for complete dry running 4) PSV at outlet to avoid pressurization due to accidental steaming 5) Within small available space , design optimized to accommodate two rows of module with SS fins 6) Total heating surface 3250 SQM <p>Three nos. make-up water heaters have been installed in HRSGs #3,4 and 7 during the year 2006-07</p>		
Picture/ sketch/ drawing before modification (if available)	Picture/ sketch/ drawing after modification	
-- NA --		
<p>Agency that executed the project (with complete address and email):</p>		

Cethar Vessels (P) Limited No. – 4, Dindigul Road, Tiruchirapalli – 620 001 Tamilnadu, India e-mail : marketing@cethar.com					
Total investment, Rs.: 329 lacs			Year of implementation: 2006-07		
First year energy cost savings, Rs.: 816 Lacs					
First year other savings, Rs.: -					
On annual basis	kWh 000'	Coal (Tons)	Gas sm ³	Oil (kL)	Other
Energy Loss before (Stack loss)			98550104		
Energy Loss after (Stack loss)			88528648		
Energy tariff, Rs/sm ³			8.87*		
Company complete address: Reliance Industries Ltd., Hazira Manufacturing Division Village : Mora, Post : Bhatha Surat - Hazira Road Dist : Surat – 394 510, Gujarat				We authorise Bureau to use this information for dissemination	
Contact person who could be contacted for more information: V. Gopalakrishnan Sr. Vice President, Central Technical Services.				Signature Date	

* cost of gas is based on fuel mix cost for the year 2006-07



Energy Conservation Measure implemented in 2006-2007

ID :	2. Dilution steam Generator blowdown reduction by 17 m³/hr by using an exchanger.	Sector : Petrochemicals
Year :		Technology: Stone & Webster
<p>Description of the energy conservation measure: Earlier superheated 12 kg/cm² g live steam was used as purge steam in Cracking furnaces instruments & valves to prevent choking by coke particles @ 17 T/hr. Also dilution steam is used in furnaces for process reasons, in a closed loop generator system. Both of these steam are jointly condensed in downstream quench section & then taken to steam generator, where dilution steam portion is vaporized & reused in a closed loop manner in furnaces. However the external 12 kg/cm² g steam @ 17 T/hr used as purge steam is extra to the closed loop, hence this 17 T/hr condensate has to be blown down from steam generator as a wastage. Temperature of this blowdown is about 110^o C & hence causes enthalpy loss to cooling water. This scheme was made to replace 12 kg/cm² g superheated steam used as furnace purge steam @ 17 T/hr, with process generated closed loop dilution steam (but superheated to required temperature in a new exchanger for this scheme). The resultant savings is 17 m³/hr of blow-down water to ETP & associated heat loss.</p>		
Picture/ sketch/ drawing before modification (if available)	Picture/ sketch/ drawing after modification	
Agency that executed the project (with complete address and email): The project is executed in-house by Reliance industries Limited - Hazira Mfg. Division.		
Total investment, Rs.: 20 lacs	Year of implementation: 2006-07	
First year energy cost savings, Rs.: 97 Lacs		
First year other savings, Rs.: -		

n annual basis	kWh 000'	Coal (Tons)	Gas sm ³	Oil (kL)	Other
Energy Consumption before			2097939		
Energy Consumption after			909106		
Energy tariff, Rs/sm ³			8.87*		
Company complete address: Reliance Industries Ltd., Hazira Manufacturing Division Village : Mora, Post : Bhatha Surat - Hazira Road Dist : Surat – 394 510, Gujarat				We authorize Bureau to use this information for dissemination	
Contact person who could be contacted for more information: V. Gopalakrishnan Sr. Vice President, Central Technical Services.				Signature Date	

* Cost of gas is based on fuel mix cost for the year 2006-07

Energy Conservation Measure implemented in 2006-2007

ID :	3. Optimization of Effluent pump in PVC	Sector : Petrochemicals		
Year :		Technology: - NA -		
Description of the energy conservation measure:				
<p>Effluent transfer requirement of PVC plant on an average basis is 120 m3/hr. The pumps provided are of 350 m3/hr capacity. Also, due to design for different service, pumps are operating at lower efficiency. In order to improve on the same & reduce energy consumption, the scheme was taken up for replacement of one of the bigger size pump with the smaller capacity & higher efficiency pump. The same has been commissioned in Aug '06. Performance of the new pump vis-à-vis design is as under.</p>				
Pump design Vs. Operating data:				
Parameter	Old Pump		New pump	
	Design	Actual Operation	Design	Actual Operation
Model	CPC150/500		ZE 150-3500	
Capacity	350 m3/hr.	120 m3/hr (160 max)	150	120 (165 max)
Differential head	70 m	75 m	70 m	69.5
N.P.S.H. (R)	2.6 m	-	0.9 m	
Speed:	1480 r.p.m.	1480 r.p.m.	1480 rpm	1480 rpm
Efficiency at rated flow	75%	40%	63.50%	55.00%
Motor capacity installed	110 kW.	110 kW.	55 kw	55 kw
Power Consumption	90 kW	69.5 kw	44.2 kw	47.2 kw
Picture/ sketch/ drawing before modification (if available)		Picture/ sketch/ drawing after modification		
				
Agency that executed the project (with complete address and email):				
The project is executed in-house by Reliance industries Limited - Hazira Mfg. Division.				
Total investment, Rs.: 5.4 lacs			Year of implementation: 2006-07	
First year energy cost savings, Rs.: 3 Lacs				
First year other savings, Rs.: -				

On annual basis	kWh 000'	Coal (Tons)	Gas Nm ³	Oil (kL)	Other
Energy consumption before	608.8				
Energy consumption after	413.5				
Energy tariff, Rs/ kWh	2.33				
Company complete address: Reliance Industries Ltd., Hazira Manufacturing Division Village : Mora, Post : Bhatha Surat - Hazira Road Dist : Surat – 394 510, Gujarat				We authorise Bureau to use this information for dissemination	
Contact person who could be contacted for more information: V. Gopalakrishnan Sr. Vice President, Central Technical Services.				Signature Date	

Energy Conservation Measure implemented in 2006-2007

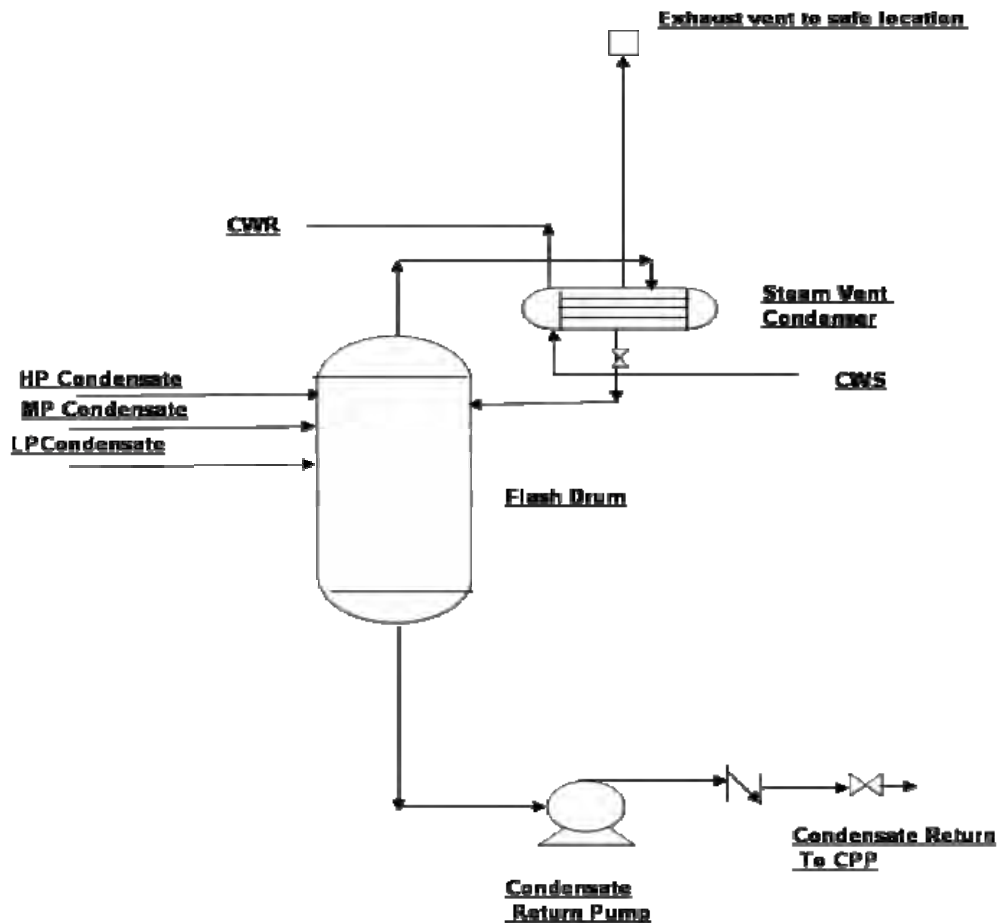
ID :	4. Generation of Low Pressure steam from High Pressure steam condensate.	Sector : Petrochemicals
Year :		Technology : Unipol

Description of the energy conservation measure:

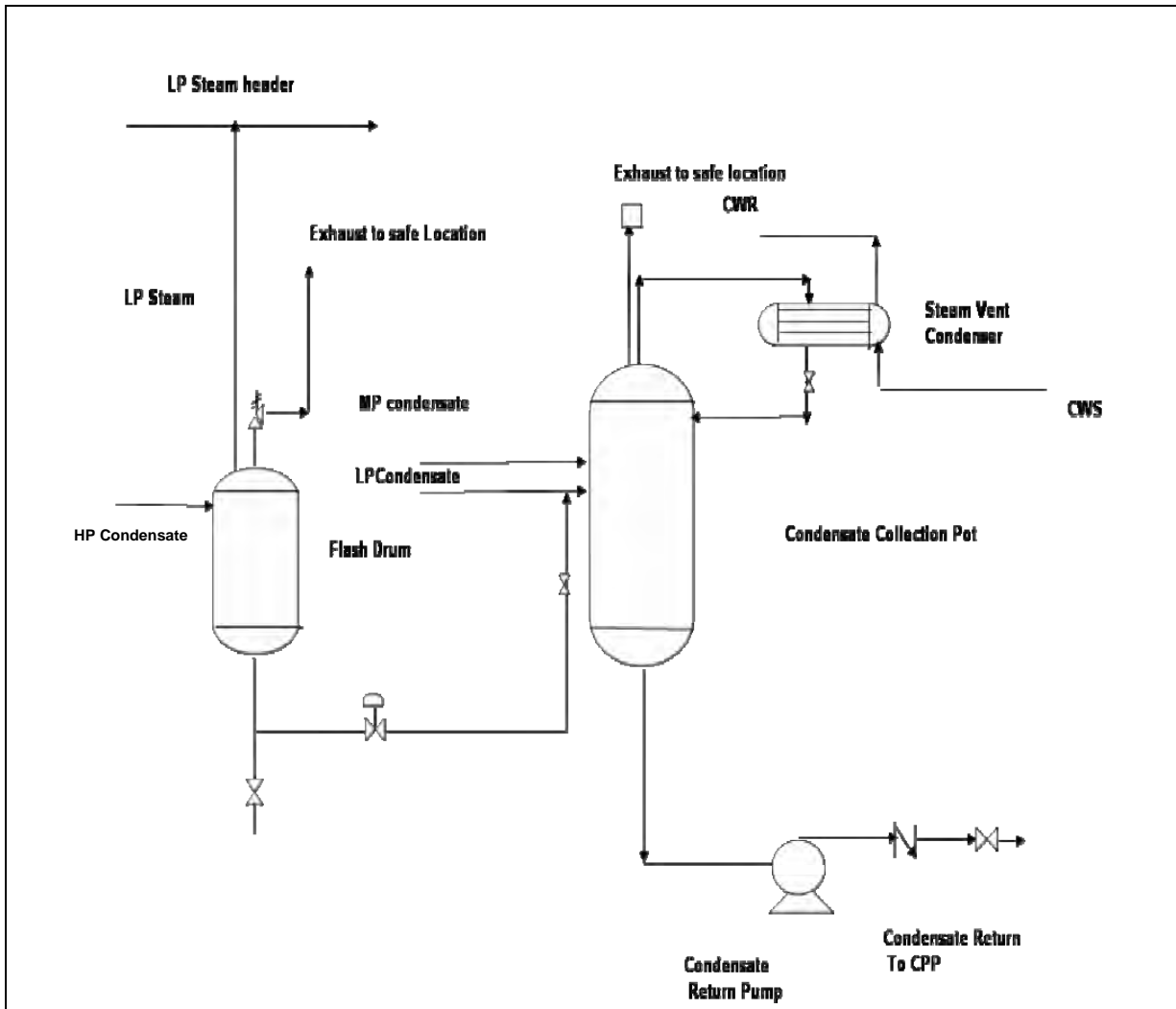
In PP Plant HP steam (40 kg/cm² g) is used for heating barrel of extruder of both lines. The condensate of this HP steam alongwith MP steam condensate and LP steam condensate are collected in a condensate collecting pot. The HP steam condensate having the potential to generate LP steam was initially wasted as the combined condensate stream was sent to CPP after cooling in water cooled exchanger. For Energy conservation a scheme was prepared to generate LP steam from HP steam condensate. HP steam condensate is flashed in flash pot which is floating with LP steam header. The LP steam generated combines with LP steam header and condensate sent to collection pot.

Picture/ sketch/ drawing before modification

(if available)



Picture/ sketch/ drawing after modification



Agency that executed the project (with complete address and email):
 The project is executed in-house by Reliance industries Limited - Hazira Mfg. Division.

Total investment, Rs.: 6 lacs **Year of implementation:** 2006 - 07

First year energy cost savings, Rs.: 62 lacs

First year other savings, Rs.: -

On annual basis	kWh 000'	Coal (Tons)	Gas sm ³	Oil (kL)	Other
Energy Loss before			1391855		
Energy Loss after			0		
Energy tariff, Rs/ sm ³			8.87*		

Company complete address:
 Reliance Industries Ltd.,
 Hazira Manufacturing Division
 Village : Mora, Post : Bhatha
 Surat - Hazira Road
 Dist : Surat – 394 510, Gujarat

Contact person who could be contacted for more information:
 V. Gopalakrishnan
 Sr. Vice President,
 Central Technical Services.

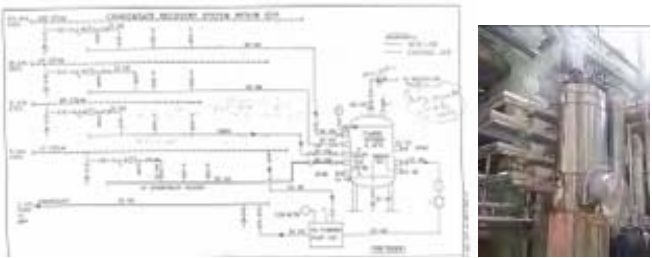
We authorise Bureau to use this information for dissemination

Signature

Date


* cost of gas is based on fuel mix cost for the year 2006-07

Energy Conservation Measure implemented in 2006-2007

ID :	5. Steam trap condensate recovery	Sector : Petrochemicals			
Year :		Technology : - NA -			
Description of the energy conservation measure:					
<p>In RIL – Hz all the steam trap condensate is drained to open storm water channels. In this way total condensate along with its heat energy is lost to atmosphere. A scheme has been devised to collect this condensate through the steam trap drains and divert it to a flash tank. The flash steam generated out of the flash vessel is utilized to replace LP steam going into deaerator and the condensate out of the flash tank is recycle to Return Condensate tank utilizing its heat energy to preheat the boiler feedwater.</p>					
Picture/ sketch/ drawing before modification (if available)		Picture/ sketch/ drawing after modification			
--- NA ---					
Agency that executed the project (with complete address and email):					
The project is executed in-house by Reliance industries Limited - Hazira Mfg. Division.					
Total investment, Rs.: 34 lacs			Year of implementation: 2006 – 07		
First year energy cost savings, Rs.: 16 lacs					
First year other savings, Rs.: -					
On annual basis	kWh 000'	Coal (Tons)	Gas sm ³	Oil (kL)	Other
Energy Loss before			556742		
Energy Loss after			0		
Energy tariff, Rs/ sm ³			8.87		
Company complete address: Reliance Industries Ltd., Hazira Manufacturing Division Village : Mora, Post : Bhatha Surat - Hazira Road Dist : Surat – 394 510, Gujarat				We authorize Bureau to use this information for dissemination Signature Date	
Contact person who could be contacted for more information: V. Gopalakrishnan Sr. Vice President, Central Technical Services.					

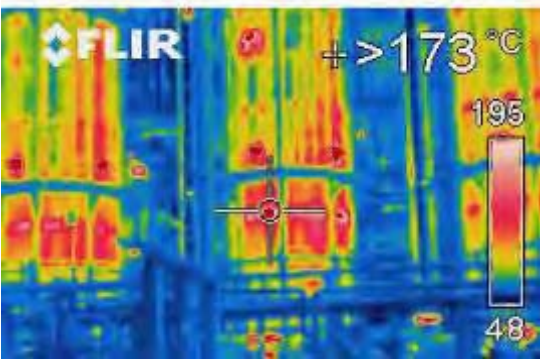
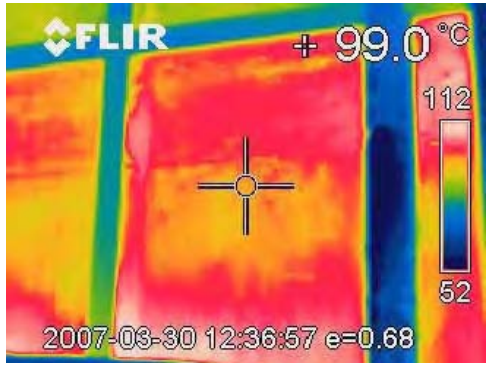
* cost of gas is based on fuel mix cost for the year 2006-07

Energy Conservation Measure implemented in 2006-2007

ID :	6. Cooling water pump coating	Sector : Petrochemicals
Year :		Technology : - NA -
<p>Description of the energy conservation measure:</p> <p>In RIL – Hazira – manufacturing complex, cooling tower pumps are one of the major power consumers. About 10% power consumption out of total 280 MW of an average load is being consumed by cooling water pumps.</p> <p>In order to achieve the power savings in this area, following various options have been considered</p> <ol style="list-style-type: none"> a) Optimisation of pumping requirements based on the seasonal variations b) Installation of VSD in cooling water pumps c) Cooling water pump impeller and casing coating with energy efficient coatings <p>After assessing all the three options and system study it has been concluded that due to increased cooling water circulation requirement in view to increased plant capacity utilizations and debottlenecking, there is very little scope for pumping requirement optimization as well as for VSD installation. Thus cooling water pump impeller and casing coating turned out to be the most feasible option.</p> <p>A systematic approach has been adopted for the coating of the cooling tower pumps – which included selection of vendor based on the energy savings achieved on the trial, reliability of the coating and sustainability of the performance over a sufficient period of time.</p> <p>In the year 2006-07 total 16 nos. pumps have been coated.</p>		
Picture/ sketch/ drawing before modification (if available)	Picture/ sketch/ drawing after modification	
--- NA ---		
<p>Agency that executed the project (with complete address and email): Kirloskar Corrocoat Private Limited "Chintan", 408/15, Mukund Nagar, Pune – 411037 e-mail : kcplinfo@kicopl.com</p>		
Total investment, Rs.: 62 lacs	Year of implementation: 2006 – 07	

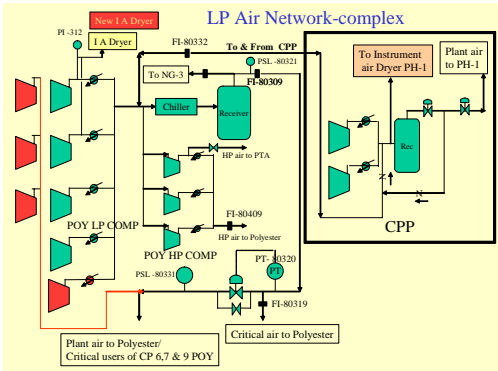
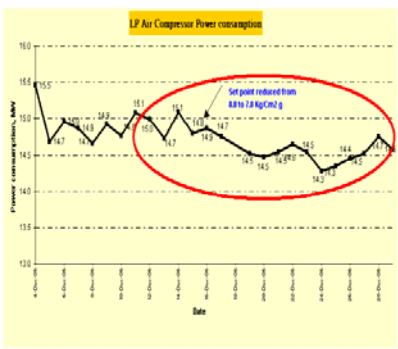
First year energy cost savings, Rs.: 33					
First year other savings, Rs.: -					
On annual basis	kWh 000'	Coal (Tons)	Gas sm ³	Oil (kL)	Other
Energy consumption before	118698				
Energy consumption after	114428				
Energy tariff, Rs/ kWh	2.33				
Company complete address: Reliance Industries Ltd., Hazira Manufacturing Division Village : Mora, Post : Bhatha Surat - Hazira Road Dist : Surat – 394 510, Gujarat				We authorise Bureau to use this information for dissemination	
Contact person who could be contacted for more information: V. Gopalakrishnan Sr. Vice President, Central Technical Services.				Signature	
				Date	

Energy Conservation Measure implemented in 2006-2007

ID :	7. Dowtherm vaporizer – B efficiency improvement	Sector : Petrochemicals
Year :		Technology : - NA -
<p>Description of the energy conservation measure:</p> <p>Our old Dow Vaporisers in polyester complex were unable to perform at rated efficiency. Thermography of the various sections of the vaporizer carried out to check the losses through the furnace surfaces. Study revealed high losses through stack due to high stack temperature and losses through furnace surfaces.</p> <p>To bring back the vaporizer to the rated efficiency following actions were carried out based on the audit report.</p> <p>Flue Gas side cleaning</p> <p>Radiation coil cleaning-Physical cleaning Convection coil cleaning- Water wash and chemical cleaning APH water wash</p> <p>Insulation/Refractory repair</p> <p>Radiation section – Cerawool totally changed with new one and provided SS foil as a vapour barrier and wet wrap at top-New Design Convection section side plate refractory changed to new one and end cover new insulation provided Radiation section bottom plate refractory totally changed with new Hysil make refractory</p>		
Picture/ sketch/ drawing before modification (if available)	Picture/ sketch/ drawing after modification	
 <p>Thermograph of vaporizer surface Temperature > 173 deg. C</p>	 <p>Thermograph of vaporizer after revamp Temperature < 100 deg. C</p>	
<p>Agency that executed the project (with complete address and email): The project is executed in-house by Reliance industries Limited - Hazira Mfg. Division.</p>		
Total investment, Rs.: 15 lacs	Year of implementation: 2006 – 07	

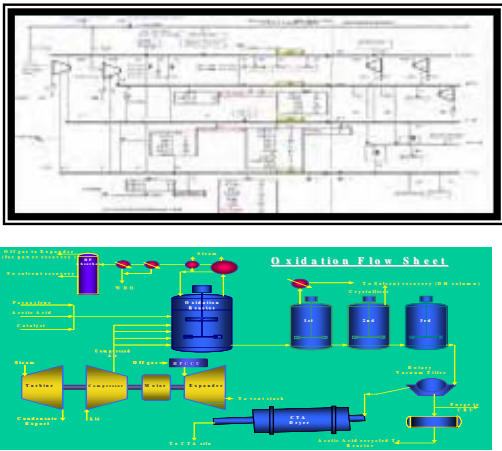
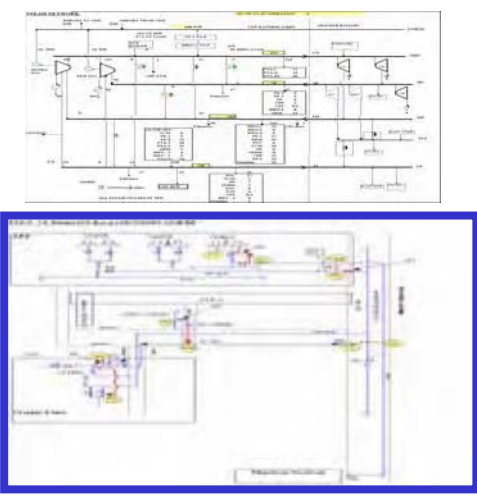
First year energy cost savings, Rs.: 15 lacs					
First year other savings, Rs.: -					
On annual basis	kWh 000'	Coal (Tons)	Gas sm ³	Oil (kL)	Other
Energy consumption before			12201429		
Energy consumption after			11501398		
Energy tariff, Rs/sm ³			8.87		
Company complete address: Reliance Industries Ltd., Hazira Manufacturing Division Village : Mora, Post : Bhatha Surat - Hazira Road Dist : Surat – 394 510, Gujarat				We authorize Bureau to use this information for dissemination	
Contact person who could be contacted for more information: V. Gopalakrishnan Sr. Vice President, Central Technical Services.				Signature Date	

Energy Conservation Measure implemented in 2006-2007

ID :	8. Reduction in plant air and instrument air header pressure	Sector : Petrochemicals			
Year :		Technology : - NA -			
Description of the energy conservation measure:					
<p>There are 9 nos. LP air compressors installed in the complex, of which now 6 nos. are operating on a continuous basis to maintain the header pressure. Identifying the opportunity of header pressure reduction in LP air circuit without affecting the Instrument Air consumers, HP air consumers, which take the air supply from the LP air circuit. Pressure drop in Instrument air circuit was reduced by improving the Prefilter area, regeneration circuit line size change from 4" to 6" and redistribution of load in the instrument air distribution network. It was possible to reduce the LP air Compressor discharge set point from 8 Kg/cm²g to 7.8 Kg/cm²g. As these LP air compressors are centrifugal compressors with IGV control and can be operated on "suction throttle mode" this resulted into direct power savings of 70 KW per LP Air compressor i.e a total of 420 KW of power savings.</p>					
Picture/ sketch/ drawing before modification (if available)			Picture/ sketch/ drawing after modification		
 <p>The diagram illustrates the LP Air Network-complex. It shows a central air supply system with components including a New IA Dryer, L.A. Dryer, Chiller, Receiver, and CPP (Control Panel). Air is distributed to various units: To NG-3, To & From CPP, To Instrument air Dryer PH-1, and Plant air to PH-1. Compressors shown include POY LP COMP, POY HP COMP, and Instrument Air Compressor. Flow indicators like FI-80332, PSL-80321, FI-80309, FI-80409, PSL-80331, PT-1320, and FI-80319 are marked. Critical users of CP 6, 7 & 9 POY and Critical air to Polyester are also noted.</p>			 <p>The graph shows LP Air Compressor Power consumption. The Y-axis is Pressure - Compressor outlet, MPa (120 to 160). The X-axis is Date (from 4 Dec 06 to 28 Dec 06). A red circle highlights a set point reduction from 8.0 Kg/cm²g to 7.8 Kg/cm²g, resulting in a power saving of 70 KW per compressor.</p>		
Agency that executed the project (with complete address and email):					
The project is executed in-house by Reliance industries Limited - Hazira Mfg. Division.					
Total investment, Rs.: NIL			Year of implementation: 2006 – 07		
First year energy cost savings, Rs.: 28 lacs					
First year other savings, Rs.: -					
On annual basis	kWh 000'	Coal (Tons)	Gas sm ³	Oil (kL)	Other
Energy consumption before	132276				
Energy consumption after	128596				
Energy tariff, Rs/ kWh	2.33				
Company complete address: Reliance Industries Ltd., Hazira Manufacturing Division Village : Mora, Post : Bhatha Surat - Hazira Road Dist : Surat – 394 510, Gujarat				We authorize Bureau to use this information for dissemination	
Contact person who could be contacted for more information: V. Gopalakrishnan Sr. Vice President, Central Technical Services.				Signature	
				Date	

* Cost of gas is based on fuel mix cost for the year 2006-07

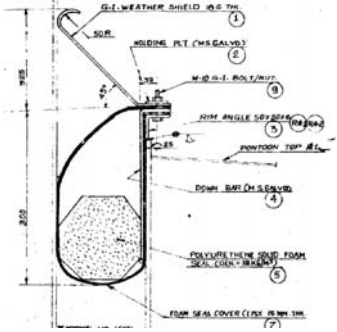
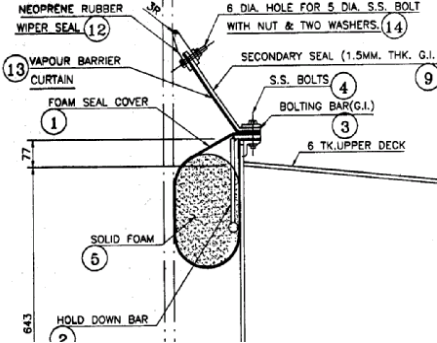
Energy Conservation Measure implemented in 2006-2007

ID :	9. Utilisation of vent steam from PTA – 3 to cracker and CPP	Sector : Petrochemicals
Year :		Technology : - NA -
<p>Description of the energy conservation measure:</p> <ul style="list-style-type: none"> • PTA-3 generates 3.5 kg/cm² g steam in E3-304 (First Reactor Condenser) . The steam, as per design, is expected to be fully utilized in the plant in exchangers and turbine of PAC train. • As per design, the surplus power in PAC train would be exported to RIL grid through motor / generator arrangement in the train. • In actual, the plant was generating excess steam than design in their process and the steam input to the PAC turbine was limited by the total Power generated, necessitating steam venting on header pressure control. • In August'06, at higher plant throughput, it was estimated that ~ 25 TPH of 3.5 kg/cm² g steam was being vented resulting in loss of energy/material (DM Water). <p>Brief Description of Proposed change: Various cost benefit options were evaluated and it was finally recommended to utilize surplus 3.5 kg/cm² g steam based on trials and process calculations:</p> <ol style="list-style-type: none"> 1. Cracker: Cracker has a 3.5 kg/cm² g header, with a consumption of ~ 55 TPH at this level. Then, the requirement was being met by : <ol style="list-style-type: none"> a. Let down from OSBL 4.5 kg/cm² g header (~30TPH) b. Let down from cracker ISBL 12 kg/cm² g header. (~ 25 TPH) <p>The above usage of ~ 15 TPH could be substituted by 3.5 kg/cm² g steam of PTA-3</p> 3. CPP : Deaerators in CPP consume LP steam (0.8 to 1.5 kg/cm² g) which can also be substituted by ~ 10 TPH of 3.5 kg/cm² g source of PTA-3 in Deaeartor # 1&2 or Deaerator # 4 <p>Thus a total of 25 TPH of 3.5 kg/cm² g steam from PTA-3 could be utilized with the available 18" LP steam header in OSBL and at the supply pressure of PTA-3.</p>		
Picture/ sketch/ drawing before modification (if available)	Picture/ sketch/ drawing after modification	
		
<p>Agency that executed the project (with complete address and email): The project is executed in-house by Reliance industries Limited – Hazira Mfg. Division.</p>		
Total investment, Rs.: 40 lacs	Year of implementation: 2006 – 07	

First year energy cost savings, Rs.: 717 lacs					
First year other savings, Rs.: -					
On annual basis	kWh 000'	Coal (Tons)	Gas sm ³	Oil (kL)	Other
Energy Loss before			13918545		
Energy Loss after			0		
Energy tariff, Rs/sm ³			8.87*		
Company complete address: Reliance Industries Ltd., Hazira Manufacturing Division Village : Mora, Post : Bhatha Surat - Hazira Road Dist : Surat – 394 510, Gujarat				We authorize Bureau to use this information for dissemination	
Contact person who could be contacted for more information: V. Gopalakrishnan Sr. Vice President, Central Technical Services.				Signature Date	

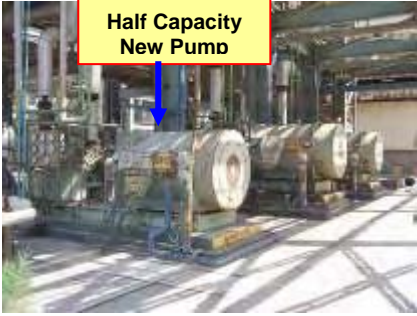
* Cost of gas is based on fuel mix cost for the year 2006-07

Energy Conservation Measure implemented in 2006-2007

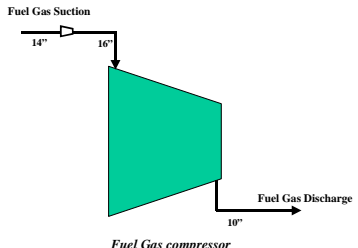
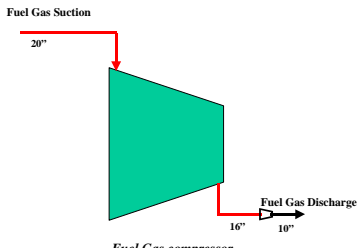
ID :	10. Naphtha loss reduction from storage tanks	Sector : Petrochemicals			
Year :		Technology : - NA -			
Description of the energy conservation measure:					
<p>RIL – Hz handles about 23,72,500 MT per annum naphtha and stored in 6 nos. storage tanks. Each storage tank has an capacity to store about 48,000 m3 of Naphtha. Vapour losses through these tanks results in direct loss of fossil fuel. Efforts have been initiated to account, monitor and improve upon the losses taking place through the storage tanks. A six sigma project has been initiated under DMAIC philosophy to contain the captioned losses. Under this project, secondary seal has been installed to restrict the vapour losses from the storage tanks. The losses have been further reduced with the help of DFSS methodology. Under this project design of the seal has been changed from vapour mounted foam seal to liquid mounted mechanical shoe type seal. These efforts have resulted in the reduction of about 2.5 TPD vapour loss per tank.</p>					
Picture/ sketch/ drawing before modification (if available)			Picture / sketch / drawing after modification		
 <p style="text-align: center;">Seal Before Modification</p>			 <p style="text-align: center;">Seal After Modification</p>		
Agency that executed the project (with complete address and email): The project is executed in-house by Reliance industries Limited - Hazira Mfg. Division.					
Total investment, Rs.: 50 lacs			Year of implementation: 2006 – 07		
First year energy cost savings, Rs.: 199 lacs					
First year other savings, Rs.: -					
On annual basis	kWh 000'	Coal (Tons)	Gas sm ³	Oil (kL)	Other
Energy Loss before			13557142		
Energy Loss after			6778571		
Energy tariff, Rs/sm ³			8.87*		
Company complete address: Reliance Industries Ltd., Hazira Manufacturing Division Village : Mora, Post : Bhatha Surat - Hazira Road Dist : Surat – 394 510, Gujarat				We authorize Bureau to use this information for dissemination Signature Date	
Contact person who could be contacted for more information: V. Gopalakrishnan Sr. Vice President, Central Technical Services.					

* cost of gas is based on fuel mix cost for the year 2006-07

Energy Conservation Measure implemented in 2006-2007


ID :	11. Installation of half capacity Boiler Feed Water (BFW) pump	Sector : Petrochemicals			
Year :		Technology : - NA -			
<p>Description of the energy conservation measure: CPP is meeting complex steam requirements to the tune of 500 – 550 TPH. Also process plant like PTA take about 40 TPH high pressure BFW for (150 bar g) from CPP for attemperation. Thus in total about 630 m³/hr of BFW is require to be pumped from deaerators. RIL – Hz has 9 nos. 150 m³/hr capacity pumps each needing about 1.0 MW power. Theoretically, it requires 4.2 BFW pumps to be operated for 630 m³/hr. Given the configuration, it was imperative to operate 5 BFW pumps at lower than best efficiency point.</p> <p>In order to avoid this power loss, a scheme to install half capacity pump of 80 m³/hr was proposed. The pump is designed to operate in parallel with the existing battery of BFW pumps. Thus, the operation has shifted from 5 nos. of high capacity BFW pumps to 4 high capacity BFW pumps & a half capacity pump, saving 346 KW of power.</p>					
Picture/ sketch/ drawing before modification (if available)		Picture/ sketch/ drawing after modification			
-- NA --					
Agency that executed the project (with complete address and email): The project is executed in-house by Reliance industries Limited - Hazira Mfg. Division.					
Total investment, Rs.: 7 lacs			Year of implementation: 2006 – 07		
First year energy cost savings, Rs.: 65 lacs					
First year other savings, Rs.: -					
On annual basis	kWh 000'	Coal (Tons)	Gas sm ³	Oil (kL)	Other
Energy consumption before	8760				
Energy consumption after	5729				
Energy tariff, Rs/ kWh	2.33				
<p>Company complete address: Reliance Industries Ltd., Hazira Manufacturing Division Village : Mora, Post : Bhatha Surat - Hazira Road Dist : Surat – 394 510, Gujarat</p> <p>Contact person who could be contacted for more information: V. Gopalakrishnan Sr. Vice President, Central Technical Services.</p>				We authorize Bureau to use this information for dissemination Signature Date	

Energy Conservation Measure implemented in 2006-2007

ID :	12. Cracker fuel gas compressor suction pressure drop reduction	Sector : Petrochemicals			
Year :		Technology : Stone & Webster			
Description of the energy conservation measure:					
Cracker plant operates a fuel gas compressor for captive consumption. The energy conservation opportunity has been identified by increasing suction line size from 14"/16" to 20" and discharge spool from 10" to 16". This has resulting in up-rating of MP steam (17 bar g) to HP steam (40 bar g).					
Picture/ sketch/ drawing before modification (if available)			Picture/ sketch/ drawing after modification		
 <p style="text-align: center;">Fuel Gas Suction 14" 16" Fuel Gas Discharge 10" Fuel Gas compressor</p>			 <p style="text-align: center;">Fuel Gas Suction 20" Fuel Gas Discharge 16" 10" Fuel Gas compressor</p>		
Agency that executed the project (with complete address and email): The project is executed in-house by Reliance industries Limited - Hazira Mfg. Division.					
Total investment, Rs.: 13 lacs			Year of implementation: 2006 – 07		
First year energy cost savings, Rs.: 13 lacs					
First year other savings, Rs.: -					
On annual basis	kWh 000'	Coal (Tons)	Gas sm ³	Oil (kL)	Other
Energy consumption before			2539524		
Energy consumption after			2377664		
Energy tariff, Rs/sm ³			8.87*		
Company complete address: Reliance Industries Ltd., Hazira Manufacturing Division Village : Mora, Post : Bhatha Surat - Hazira Road Dist : Surat – 394 510, Gujarat				We authorize Bureau to use this information for dissemination	
Contact person who could be contacted for more information: V. Gopalakrishnan Sr. Vice President, Central Technical Services.				Signature	
				Date	


* cost of gas is based on fuel mix cost for the year 2006-07

Energy Conservation Measure implemented in 2006-2007

ID :	13. Using MP steam (17 kg/cm² g) instead of HP steam (40 kg/cm² g) in steam purge heater	Sector : Petrochemicals			
Year :		Technology : Nova			
Description of the energy conservation measure:					
<p>In PE plant, cyclohexane is being used for flushing of Polymer from adsorber. The cyclohexane needs to be heated before being used for flushing .High temperature helps as a better solvent media for polymer. The solvent heating was done with HP steam . After the detail study / trial it was observed that MP steam can be used in place of HP steam, hence the provision has been made to provide MP steam in steam purge heater. By this modification ,we have substituted HP steam with MP steam without compromising on the process requirements.</p>					
Picture/ sketch/ drawing before modification (if available)			Picture/ sketch/ drawing after modification		
-- NA --					
Agency that executed the project (with complete address and email):					
The project is executed in-house by Reliance industries Limited - Hazira Mfg. Division.					
Total investment, Rs.: 0.25 lacs			Year of implementation: 2006 – 07		
First year energy cost savings, Rs.: 7 lacs					
First year other savings, Rs.: -					
On annual basis	kWh 000'	Coal (Tons)	Gas sm ³	Oil (kL)	Other
Energy consumption before			1269762		
Energy consumption after			1188832		
Energy tariff, Rs/sm ³			8.87*		
Company complete address: Reliance Industries Ltd., Hazira Manufacturing Division Village : Mora, Post : Bhatha Surat - Hazira Road Dist : Surat – 394 510, Gujarat				We authorise Bureau to use this information for dissemination	
Contact person who could be contacted for more information: V. Gopalakrishnan Sr. Vice President, Central Technical Services.				Signature	
				Date	

* cost of gas is based on fuel mix cost for the year 2006-07

Energy Conservation Measure implemented in 2006-2007

ID :	14. Using MP steam (17 kg/cm² g) instead of HP steam (40 kg/cm² g) in coils of cyclohexane make-up dryer and LP diluent dryer	Sector : Petrochemicals			
Year :		Technology : Nova			
Description of the energy conservation measure:					
<p>SH make up drier is used for solvent purification .The purified solvent is used for catalyst batch preparation . Presently HP steam is used in cyclohexane makeup drier coils for heat tracing. As the temperature of MP steam is sufficient to meet the requirement in the cyclohexane makeup drier, HP steam used is converted to MP steam for energy conservation.</p>					
Picture/ sketch/ drawing before modification (if available)			Picture/ sketch/ drawing after modification		
-- NA --					
Agency that executed the project (with complete address and email):					
The project is executed in-house by Reliance industries Limited - Hazira Mfg. Division.					
Total investment, Rs.: 0.20 lacs			Year of implementation: 2006 – 07		
First year energy cost savings, Rs.: 1 lacs					
First year other savings, Rs.: -					
On annual basis	kWh 000'	Coal (Tons)	Gas sm ³	Oil (kL)	Other
Energy consumption before			190464		
Energy consumption after			178325		
Energy tariff, Rs/sm ³			8.87*		
Company complete address:				We authorise Bureau to use this information for dissemination Signature Date	
Reliance Industries Ltd., Hazira Manufacturing Division Village : Mora, Post : Bhatha Surat - Hazira Road Dist : Surat – 394 510, Gujarat					
Contact person who could be contacted for more information:					
V. Gopalakrishnan Sr. Vice President, Central Technical Services.					


* cost of gas is based on fuel mix cost for the year 2006-07

Energy Conservation Measure implemented in 2006-2007

ID :	15. Improvement in Superheated High Pressure header pressure steam	Sector : Petrochemicals			
Year :		Technology : - NA -			
<p>Description of the energy conservation measure: CPP supplies SHP steam (110 kg/cm² g; 500 deg. C) through 3 nos. headers to all the consumers like Cracker turbines, PTA plants and CPP steam turbines and PRDS. These headers have been built in a phased manner over a period of time. Phase – 1 SSHP header pressure was operated on higher side to supply SSHP steam from HRSG – 1 and 2. In order to mitigate the higher pressure drop and thus to save HRSG supplementary fuel, a modification has been carried out to interconnect phase – 1 with phase – 2 and phase – 3 SSHP headers. This has reduced the pressure drop in the over all system leading to fuel savings.</p>					
Picture/ sketch/ drawing before modification (if available)	Picture/ sketch/ drawing after modification				
<p>Agency that executed the project (with complete address and email): The project is executed in-house by Reliance industries Limited - Hazira Mfg. Division.</p>					
Total investment, Rs.: 25 lacs		Year of implementation: 2006 – 07			
First year energy cost savings, Rs.: 17 lacs					
First year other savings, Rs.: -					
On annual basis	kWh 000'	Coal (Tons)	Gas sm ³	Oil (kL)	Other
Energy Loss before			209301		
Energy Loss after			0		
Energy tariff, Rs/sm ³			8.87*		
<p>Company complete address: Reliance Industries Ltd., Hazira Manufacturing Division Village : Mora, Post : Bhatha Surat - Hazira Road Dist : Surat – 394 510, Gujarat</p>				We authorize Bureau to use this information for dissemination Signature Date	
<p>Contact person who could be contacted for more information: V. Gopalakrishnan Sr. Vice President, Central Technical Services.</p>					

* cost of gas is based on fuel mix cost for the year 2006-07

Energy Conservation Measure implemented in 2006-2007

ID :	16. Using MP steam (17 kg/cm² g) instead of HP steam (40 kg/cm² g) in coils of polymer knock out drum	Sector : Petrochemicals			
Year :		Technology : Nova			
Description of the energy conservation measure:					
<p>HP steam in PE plant is at 40 kg/cm² g while MP steam is at 17 kg/cm² g .The HP steam is de-super heated to 240 deg. C at the battery limit. The MP steam is received at 254 Deg. C.</p> <p>HP steam was used in polymer KO pot steam tracer coils for heat tracing of the equipments. As the temperature of MP steam is sufficient to meet the requirement in the polymer KO pot steam tracer coils, HP steam used is converted to MP steam for energy conservation.</p>					
Picture/ sketch/ drawing before modification (if available)			Picture/ sketch/ drawing after modification		
-- NA --					
Agency that executed the project (with complete address and email):					
The project is executed in-house by Reliance industries Limited - Hazira Mfg. Division.					
Total investment, Rs.: 0.05 lacs			Year of implementation: 2006 – 07		
First year energy cost savings, Rs.: 0.6 lacs					
First year other savings, Rs.: -					
On annual basis	kWh 000'	Coal (Tons)	Gas sm ³	Oil (kL)	Other
Energy consumption before			126976		
Energy consumption after			118883		
Energy tariff, Rs/sm ³			8.87*		
Company complete address: Reliance Industries Ltd., Hazira Manufacturing Division Village : Mora, Post : Bhatha Surat - Hazira Road Dist : Surat – 394 510, Gujarat				We authorise Bureau to use this information for dissemination	
Contact person who could be contacted for more information: V. Gopalakrishnan Sr. Vice President, Central Technical Services.				Signature	
				Date	

* cost of gas is based on fuel mix cost for the year 2006-07

Energy Conservation Measure implemented in 2006-2007

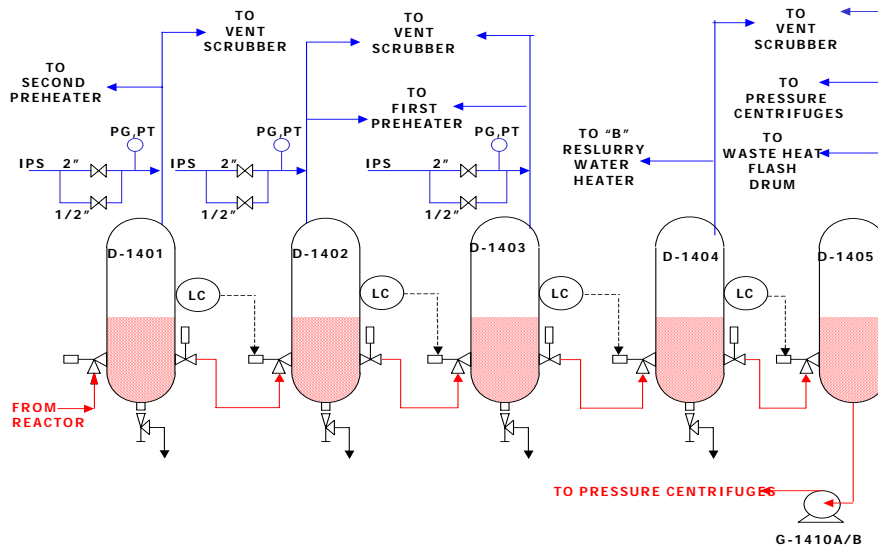
ID :	17. Full utilization of waste heat	Sector : Petrochemicals
Year :		Technology : Invista

Description of the energy conservation measure:

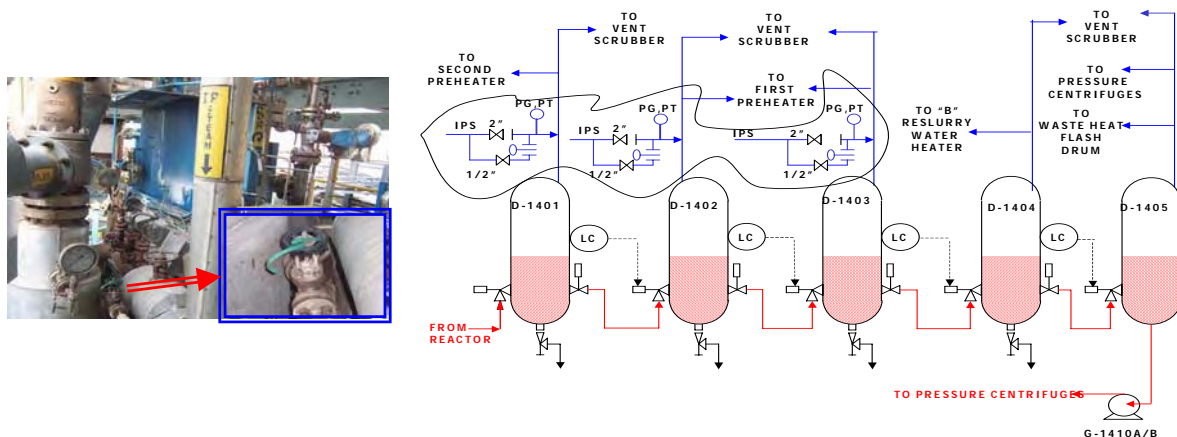
Purification Section of PTA plant involves preheating the feed from 95°C to 283°C in a series of exchangers. As a part of heat integration, waste heat from process is used in first three exchangers and then final heating is carried out using High Pressure (90 kg/cm² g) steam in last two exchangers. This steam is derived from SHP steam at 110 kg/cm² g steam through pressure reducing desuperheating station (PRDS) at PTA plant

Use of intermediate pressure (IP) steam for flushing instrument tapings in crystallizers vapor line had restricted free recovery of waste heat which was then being vented to atmosphere. Requirement of fresh steam for flushing was assessed and accordingly Restriction Orifice plate (ROP) provided. After this modification, it was possible to fully recover the waste heat in crystallizer vapors resulting in fresh SHP steam (110 kg/cm² g) usage by 1.2 TPH.

Picture/ sketch/ drawing before modification (if available)



Picture/ sketch/ drawing after modification



Agency that executed the project (with complete address and email):

The project is executed in-house by Reliance industries Limited - Hazira Mfg. Division.

Total investment, Rs.: Minor		Year of implementation: 2006 – 07			
First year energy cost savings, Rs.: 12 lacs					
First year other savings, Rs.: -					
On annual basis	kWh 000'	Coal (Tons)	Gas sm ³	Oil (kL)	Other
Energy consumption before			1395343		
Energy consumption after			558137		
Energy tariff, Rs/sm ³			8.87*		
Company complete address: Reliance Industries Ltd., Hazira Manufacturing Division Village : Mora, Post : Bhatha Surat - Hazira Road Dist : Surat – 394 510, Gujarat				We authorise Bureau to use this information for dissemination	
Contact person who could be contacted for more information: V. Gopalakrishnan Sr. Vice President, Central Technical Services.				Signature Date	

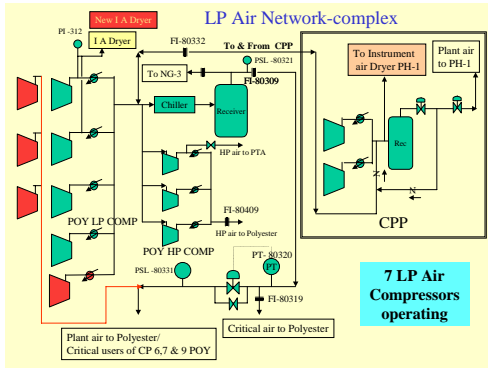
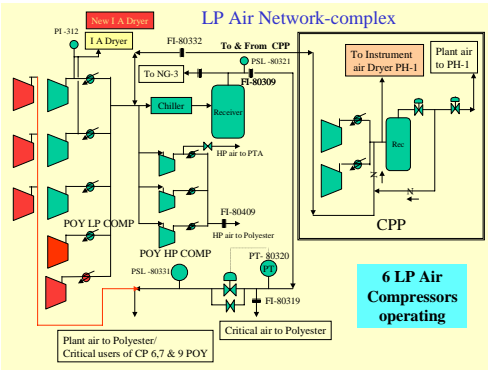
* cost of gas is based on fuel mix cost for the year 2006-07

Energy Conservation Measure implemented in 2006-2007



ID :	18. Stoppage of Spent Caustic Oxidation unit air compressor	Sector : Petrochemicals
Year :		Technology : - NA -
<p>Description of the energy conservation measure:</p> <p>Spent Caustic Oxidation unit (SCO) compressors in Cracker were being operated (2 out of 3) to feed SCO Reactor units for process requirement and their header pressure requirement was matched with OSBL LP air circuit. During the energy audit, it was identified that under normal operation SCO Reactor Units in Cracker could directly import Plant Air from OSBL header, which was maintained at 7.8 –8kg/cm² g pressure. The Plant air network Analysis of OSBL suggested having a dedicated header for supplying air directly to SCO Reactor unit to minimize the pressure drop.</p> <p>Modification: A new 8" Plant air line (sized for 4500 Nm³/hr) tapped form 14" OSBL header (interconnection header of CPP & Polyester) to Cracker SCO units with revised instrumentation logic and control was done.</p> <p>Result:</p> <ul style="list-style-type: none"> Both SCO compressors of Cracker was stopped As per actual trial taken in SCO Compressor C, the unloaded power consumption was 375 kW Vs Normal of 410 KW each i.e. savings of ~ 700 KW During low Plant Air pressure in OSBL header, Cracker SCO unit is independently operated through SCO Air Compressors in isolation from the Plant air network. <p>HAZOP modification:</p> <ul style="list-style-type: none"> ➤ Auto start of SCO air compressors during OSBL pressure collapse to avoid effect on Cracker plant operation. ➤ Due to the above integration, no Nitrogen or Caustic back up into the Plant Air header is allowed so Nitrogen back up control had to be discontinued and in an event of total Power failure proper isolation and modified SOP is developed to keep the spargers clean ➤ Interconnecting valves are provided with solenoid-operated block and bleed arrangement to prevent the back flow of Spent caustic into the Plant Air Header along with NRVs. 		
Picture/ sketch/ drawing before modification (if available)	Picture/ sketch/ drawing after modification	
<p style="text-align: center;">Cracker SCO circuit Before modification</p>	<p style="text-align: center;">Cracker SCO circuit After modification</p>	
Agency that executed the project (with complete address and email): The project is executed in-house by Reliance industries Limited - Hazira Mfg. Division.		
Total investment, Rs.: 20 lacs	Year of implementation: 2006 – 07	

First year energy cost savings, Rs.: 12 lacs					
First year other savings, Rs.: -					
On annual basis	kWh 000'	Coal (Tons)	Gas sm ³	Oil (kL)	Other
Energy consumption before	6132				
Energy consumption after	0 (Stopped)				
Energy tariff, Rs/sm ³	2.33				
Company complete address: Reliance Industries Ltd., Hazira Manufacturing Division Village : Mora, Post : Bhatha Surat - Hazira Road Dist : Surat – 394 510, Gujarat				We authorise Bureau to use this information for dissemination	
Contact person who could be contacted for more information: V. Gopalakrishnan Sr. Vice President, Central Technical Services.				Signature Date	

Energy Conservation Measure implemented in 2006-2007

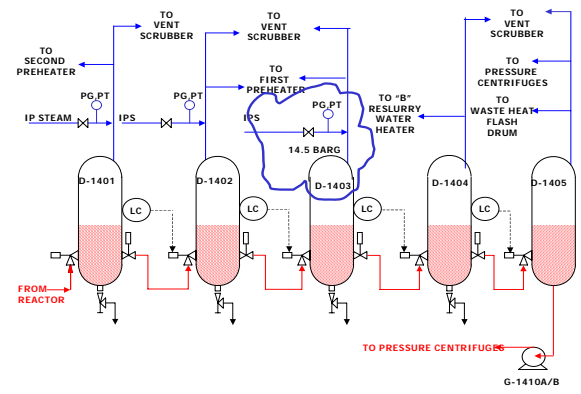
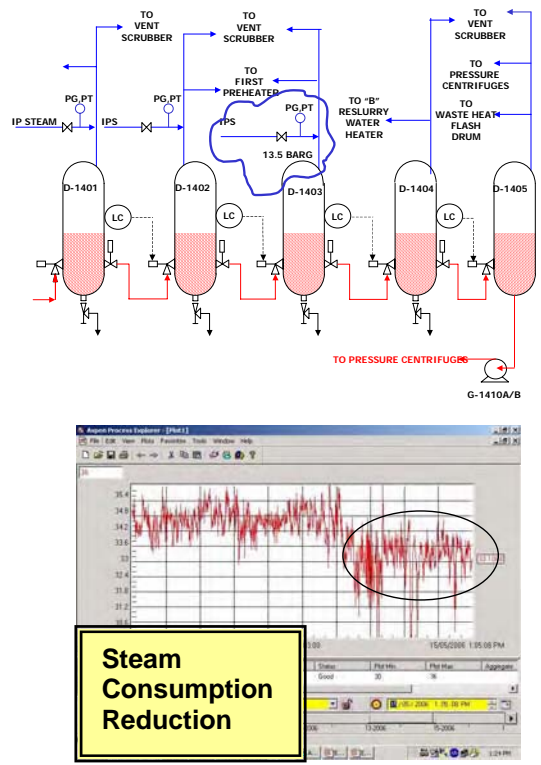
ID :	19. Optimisation of plant air compressor operations	Sector : Petrochemicals			
Year :		Technology : - NA -			
Description of the energy conservation measure:					
<p>There are 9 nos. LP air compressors installed in the complex, of which now 7 nos. were operating on a continuous basis to maintain the header pressure after the expansion projects CP-10 & CP-11. A study was initiated to optimize number of LP air compressors operating at CPP, POY & CP-10/11: Based on the margins in new and old compressors in POY, following was done.</p> <ul style="list-style-type: none"> ➤ Set points were matched to minimize Unloading valve openings in POY LP air Compressors. ➤ Minimum amperage settings revised from 212 to 196 amps in CPP compressors and ➤ Discharge set point revised to unload 2 POY compressors based on their actual performance <p>Result: As a result, the margins in the system were created and with the normal demand, One LP air Compressor was stopped after the above changes saving 1.3 MW. Today, the complex demand is being met with 6 no. of LP air compressors.</p>					
Picture/ sketch/ drawing before modification (if available)	Picture/ sketch/ drawing after modification				
 <p style="text-align: center; color: blue; font-weight: bold;">7 LP Air Compressors operating</p>	 <p style="text-align: center; color: blue; font-weight: bold;">6 LP Air Compressors operating</p>				
Agency that executed the project (with complete address and email):					
The project is executed in-house by Reliance industries Limited - Hazira Mfg. Division.					
Total investment, Rs.: NIL	Year of implementation: 2006 – 07				
First year energy cost savings, Rs.: 221 lacs					
First year other savings, Rs.: -					
On annual basis	kWh 000'	Coal (Tons)	Gas sm ³	Oil (kL)	Other
Energy Loss before	143664				
Energy Loss after	132276				
Energy tariff, Rs/ kWh	2.33				
Company complete address: Reliance Industries Ltd., Hazira Manufacturing Division Village : Mora, Post : Bhatha Surat - Hazira Road Dist : Surat – 394 510, Gujarat				We authorise Bureau to use this information for dissemination	
Contact person who could be contacted for more information: V. Gopalakrishnan Sr. Vice President, Central Technical Services.				Signature	
				Date	

Energy Conservation Measure implemented in 2006-2007

ID :	20. Steam trap maintenance	Sector : Petrochemicals			
Year :		Technology : - NA -			
Description of the energy conservation measure:					
<p>RIL – Hz has 2 nos. Polyethylene plant (PE – 1 and PE – 2). During the beginning of the year 2006 07 – It has under gone a major turnaround. Before the turnaround a systematic audit of steam traps and steam leak has been carried out. The same has been attended during the shutdown. It resulted in the reduction in MP steam consumption by 0.9 TPH and LP steam consumption by 1.5 TPH.</p>					
Picture/ sketch/ drawing before modification (if available)			Picture/ sketch/ drawing after modification		
					
Agency that executed the project (with complete address and email):					
The project is executed in-house by Reliance industries Limited - Hazira Mfg. Division.					
Total investment, Rs.: Minor			Year of implementation: 2006 – 07		
First year energy cost savings, Rs.: 112 lacs					
First year other savings, Rs.: -					
On annual basis	kWh 000'	Coal (Tons)	Gas sm ³	Oil (kL)	Other
Energy Loss before			1370087		
Energy Loss after			0		
Energy tariff, Rs/ sm ³			8.87*		
Company complete address: Reliance Industries Ltd., Hazira Manufacturing Division Village : Mora, Post : Bhatha Surat - Hazira Road Dist : Surat – 394 510, Gujarat				We authorise Bureau to use this information for dissemination Signature Date	
Contact person who could be contacted for more information: V. Gopalakrishnan Sr. Vice President, Central Technical Services.					

* cost of gas is based on fuel mix cost of the year 2006-07

Energy Conservation Measure implemented in 2006-2007

ID :	21. Reduction in 3rd stage crystalliser operating pressure	Sector : Petrochemicals
Year :		Technology : Invista
Description of the energy conservation measure:		
<p>Reduction in 3rd Crystallizer operating pressure for improved waste heat recovery: Purification Section of PTA plant involves preheating the feed from 95°C to 283°C in a series of exchangers. As a part of heat integration, waste heat from process is used in first three exchangers and then final heating is carried out using High Pressure (90 barg) steam in last two exchangers. Reduction in 3rd crystallizer operating pressure from 14.5 to 13.5 barg has increased the flash steam generation thereby improving waste heat then resulted in reduction in high-pressure steam (90 barg) consumption from 34 TPH to 33 TPH.</p>		
Picture/ sketch/ drawing before modification (if available)	Picture/ sketch/ drawing after modification	
		
Agency that executed the project (with complete address and email): The project is executed in-house by Reliance industries Limited - Hazira Mfg. Division.		
Total investment, Rs.: NIL	Year of implementation: 2006 – 07	

First year energy cost savings, Rs.: 41 lacs					
First year other savings, Rs.: -					
On annual basis	kWh 000'	Coal (Tons)	Gas sm ³	Oil (kL)	Other
Energy consumption before			23720829		
Energy consumption after			23023157		
Energy tariff, Rs/ sm ³			8.87*		
Company complete address: Reliance Industries Ltd., Hazira Manufacturing Division Village : Mora, Post : Bhatha Surat - Hazira Road Dist : Surat – 394 510, Gujarat				We authorize Bureau to use this information for dissemination	
Contact person who could be contacted for more information: V. Gopalakrishnan Sr. Vice President, Central Technical Services.				Signature	
				Date	

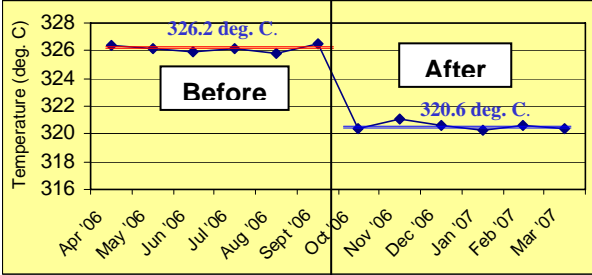
* cost of gas is based on fuel mix cost of the year 2006-07

Energy Conservation Measure implemented in 2006-2007

ID :	22. Optimisation of LB column feed location	Sector : Petrochemicals			
Year :		Technology : Nova			
Description of the energy conservation measure:					
<p>LB column in PE plant is used for separation of cyclohexane ,ethylene and butene .The top product is ethylene and butene while the bottom is cyclohexane .The column is having thermosiphon reboiler which uses DTA as the heating media. The column is taking vapor and liquid feed . With the change in vapor and liquid tray location ,there is 0.5 Mmkcal / hr saving in DTA .</p>					
Picture/ sketch/ drawing before modification (if available)			Picture/ sketch/ drawing after modification		
Agency that executed the project (with complete address and email):					
The project is executed in-house by Reliance industries Limited - Hazira Mfg. Division.					
Total investment, Rs.: NIL			Year of implementation: 2006 – 07		
First year energy cost savings, Rs.: 22 lacs					
First year other savings, Rs.: -					
On annual basis	kWh 000'	Coal (Tons)	Gas sm ³	Oil (kL)	Other
Energy consumption before			6048571		
Energy consumption after			5527142		
Energy tariff, Rs/sm ³			8.87*		
Company complete address: Reliance Industries Ltd., Hazira Manufacturing Division Village : Mora, Post : Bhatha Surat - Hazira Road Dist : Surat – 394 510, Gujarat				We authorize Bureau to use this information for dissemination Signature Date	
Contact person who could be contacted for more information: V. Gopalakrishnan Sr. Vice President, Central Technical Services.					

* cost of gas is based on fuel mix cost of the year 2006-07

Energy Conservation Measure implemented in 2006-2007

ID :	23. Santotherm header supply temperature optimisation	Sector : Petrochemicals																													
Year :		Technology : - NA -																													
Description of the energy conservation measure:																															
<p>RIL – Hz commissioned its 11th continuous polymerization plant (CP-11) in the year 2006-07. As per the design this plant is to supply hot Santotherm at about 325 deg. C. The system has been studied to find out the opportunity for the energy conservation. The study brought out the opportunity for the optimization of hot santotherm supply temperature by about 5 deg. C. Thus, by reduction in santotherm supply temperature, fuel firing has been reduced resulting in a savings of about 8 lac sm³ per annum of fuel gas.</p>																															
Picture/ sketch/ drawing before modification (if available)			Picture/ sketch/ drawing after modification																												
 <table border="1" style="margin: 10px auto; border-collapse: collapse;"> <caption>Santotherm Supply Temperature Data</caption> <thead> <tr> <th>Month</th> <th>Temperature (deg. C)</th> </tr> </thead> <tbody> <tr><td>Apr '06</td><td>326.2</td></tr> <tr><td>May '06</td><td>326.2</td></tr> <tr><td>Jun '06</td><td>326.2</td></tr> <tr><td>Jul '06</td><td>326.2</td></tr> <tr><td>Aug '06</td><td>326.2</td></tr> <tr><td>Sept '06</td><td>326.2</td></tr> <tr><td>Oct '06</td><td>326.2</td></tr> <tr><td>Nov '06</td><td>320.6</td></tr> <tr><td>Dec '06</td><td>320.6</td></tr> <tr><td>Jan '07</td><td>320.6</td></tr> <tr><td>Feb '07</td><td>320.6</td></tr> <tr><td>Mar '07</td><td>320.6</td></tr> </tbody> </table>			Month	Temperature (deg. C)	Apr '06	326.2	May '06	326.2	Jun '06	326.2	Jul '06	326.2	Aug '06	326.2	Sept '06	326.2	Oct '06	326.2	Nov '06	320.6	Dec '06	320.6	Jan '07	320.6	Feb '07	320.6	Mar '07	320.6			
Month	Temperature (deg. C)																														
Apr '06	326.2																														
May '06	326.2																														
Jun '06	326.2																														
Jul '06	326.2																														
Aug '06	326.2																														
Sept '06	326.2																														
Oct '06	326.2																														
Nov '06	320.6																														
Dec '06	320.6																														
Jan '07	320.6																														
Feb '07	320.6																														
Mar '07	320.6																														
Agency that executed the project (with complete address and email):																															
The project is executed in-house by Reliance industries Limited - Hazira Mfg. Division.																															
Total investment, Rs.: NIL			Year of implementation: 2006 – 07																												
First year energy cost savings, Rs.: 34 lacs																															
First year other savings, Rs.: -																															
On annual basis	kWh 000'	Coal (Tons)	Gas sm ³	Oil (kL)	Other																										
Energy consumption before			16346736																												
Energy consumption after			15580107																												
Energy tariff, Rs/ sm ³			8.87*																												
Company complete address: Reliance Industries Ltd., Hazira Manufacturing Division Village : Mora, Post : Bhatha Surat - Hazira Road Dist : Surat – 394 510, Gujarat				We authorise Bureau to use this information for dissemination Signature Date																											
Contact person who could be contacted for more information: V. Gopalakrishnan Sr. Vice President, Central Technical Services.																															



* cost of gas is based on fuel mix cost of the year 2006-07

Energy Conservation Measure implemented in 2006-2007

ID :	24. Superheated High Pressure (SHP) steam temperature optimization by header segregation** [** Trend setter project]	Sector : Petrochemicals			
Year :		Technology : - NA -			
Description of the energy conservation measure:					
<p>At RIL – Hz, SSHP steam is generated through 9 nos. HRSGs. The steam is supplied to various consumers like CPP – Steam turbines, Cracker – steam turbines and PTA plants. The entire header was maintained at 510 deg. C temperature at 110 kg/cm² g pressure leading to excess steam generation which had to be condensed in steam turbine for power generation leading over all sub optimal operation of CPP. In order to improve upon the efficiency of CPP operations the idea of SSHP header segregation has been conceived. The final temperature requirements at all the consumers have been studied. It was brought out by the study that STGs in CPP require only 485 deg. C temperature. The re-wheeled turbines at the cracker end requires only 494 deg. C temperature. PTA plant can tolerate 480 deg. C temperatures. Thus the temperature of 510 deg. C has been optimized to 500 deg. C at CPP end. The SSHP header segregated by closing selected isolation valves for supplying steams from HRSG # 1,2 to STG – 1 and steam from HRSG -# 8,9 to STG #2. This measure led to minimum supplementary firing in HRSG # 1,2,7 and 8. Cracker and PTA has been supplied through HRSG #3,4,5,6 and 7. Using turndown capacity of HRSG # 3,4,5,6 and 7 – supplementary firing in 2 nos. HRSGs have been stopped. Thus the total SSHP steam generation was reduced to the tune of 31 TPH.</p>					
Picture/ sketch/ drawing before modification (if available)			Picture/ sketch/ drawing after modification		
Agency that executed the project (with complete address and email):					
The project is executed in-house by Reliance industries Limited - Hazira Mfg. Division.					
Total investment, Rs.: NIL			Year of implementation: 2006 – 07		
rst year energy cost savings, Rs.: 799 lacs					
First year other savings, Rs.: -					
On annual basis	kWh 000'	Coal (Tons)	Gas sm ³	Oil (kL)	Other
Energy consumption before			386509971		
Energy consumption after			364728686		
Energy tariff, Rs/sm ³			8.87*		
Company complete address: Reliance Industries Ltd., Hazira Manufacturing Division Village : Mora, Post : Bhatha Surat - Hazira Road Dist : Surat – 394 510, Gujarat				We authorise Bureau to use this information for dissemination	
Contact person who could be contacted for more information: V. Gopalakrishnan Sr. Vice President, Central Technical Services.					
				Signature	
				Date	

* Cost of gas is based on fuel mix cost of the year 2006-07

Energy Conservation Measure implemented in 2006-2007

ID :	25. Improvement in boiler Cycle of Concentration by blowdown reduction using High Efficiency Reverse Osmosis ** [** Trend setter project]	Sector : Petrochemicals
Year :		Technology : Aquatech
Description of the energy conservation measure:		
<p>Surface water reservoir created by check dam at Singanpur weir on River Tapti is the source of water for RIL Hazira, through a surface well in the basin and 17 km long pipeline. In 2001, it was estimated by Surat Municipal corporation (SMC) and Hazira Industries 12 % of domestic effluent is getting mixed. Due to ingress of domestic effluents in the fresh water reservoir, nutrients like -NO₃ and -PO₄ are detected to the tune of 5-6 ppm and coliform is as high as 900-1100 MPN. It has also given rise to huge vegetation and algae in the basin, which also led to rise in TOC content (Total Organic Carbon) in Raw water from < 1 ppm in the year 2001 to about 6 ppm in the year 2004. High TOC in raw water caused following operational and quality issues in our Petrochemical complex especially in the high-pressure boilers operating at 110 Kg/cm²g.</p> <ol style="list-style-type: none"> 1. High Pressure Steam generators in CPP and Cracker Plants were forced to operate with increased Na: PO₄ molar ratio of up to 3.55. These Boilers were operated with very low COC ~ 25 leading to blow down up to 4% against standard of < 2% to control pH in the pH-Phosphate coordinated treatment control and Drum silica of only 0.1- 0.2 ppm against the spec of max permissible of 2 ppm. 2. During high TOC in Raw water (6ppm), TOC of DM water is reduced up to 1.2 to 1.5 ppm. DM water conductivity and chloride are observed as high as 0.55 mS/cm and 45-50 ppb respectively. Alkaline brine treatment of the anion resin drain sample shows COD up to 5000 ppm. 3. TOC was found as high as up to 3 to 4.5 ppm in Boiler drum samples of all HP boilers and average boiler drum water pH is lower by 0.5 units than expected. 4. Study by M/s BHEL showed that Boiler Feed Water silica of < 10 ppb is found almost doubled at Economizer outlet which confirms the presence of colloidal silica in DM water. <p>To achieve said objectives it was proposed to enhance DM water quality to 50 ppb TOC and 10 ppb total silica. (Reference: American Power Conf. 1986- case study -Millstone Nuclear power generating station)</p> <p>Raw water Reverse Osmosis (RO) of 250m³/hr capacity had no Indian reference so it was new proposition. The high efficiency RO process is a US patented process. It involves operating the RO system at the highest pH level acceptable to RO element manufacturer. DOW offers specially developed membranes to operate the system at pH level of 11. This operation significantly increases rejection of weakly ionized anions, such as organics, silica and derivatives (TOC) silicic acid, and all other weak acids. The conventional RO system operates at 6-8 pH and that could not reject the above stated parameters.</p> <p>Further strongly ionized salts are also better rejected at such typical pH levels, residing in a lower ionic level to the ion exchange equipment downstream.</p> <p>Recovery of more than 90-94% and passage of TOC & silica to permeate in the range of 0.003-0.005% are the major advantages of the process</p> <p>DMRO plant went on stream by end of March 2006 and has achieved targeted quality and COC was of boiler increased in July 2006 from 25 to 30 thus ensuring the high-energy water conservation to the expected values.</p>		
Picture/ sketch/ drawing before modification (if available)	Picture/ sketch/ drawing after modification	
		

Agency that executed the project (with complete address and email): The project is executed in-house by Reliance industries Limited - Hazira Mfg. Division. The technology is licensed by :					
Aquatech Systems Asia Plot No. 3 Survey No. 250/5 Baner Park , Near DP Road Aundh Pune 411 007 e-mail:					
Total investment, Rs.: NIL			Year of implementation: 2006 – 07		
First year energy cost savings, Rs.: 39 lacs					
First year other savings, Rs.: -					
On annual basis	kWh 000'	Coal (Tons)	Gas sm ³	Oil (kL)	Other
Energy consumption before			4171429		
Energy consumption after			3585183		
Energy tariff, Rs/sm ³			8.87*		
Company complete address: Reliance Industries Ltd., Hazira Manufacturing Division Village : Mora, Post : Bhatha Surat - Hazira Road Dist : Surat – 394 510, Gujarat				We authorize Bureau to use this information for dissemination	
Contact person who could be contacted for more information: V. Gopalakrishnan Sr. Vice President, Central Technical Services.				Signature	
				Date	

* Cost of gas is based on fuel mix cost of the year 2006-07

Energy Conservation Measure implemented in 2006-2007

ID :	26. Service water pump optimisation	Sector : Petrochemicals			
Year :		Technology : - NA -			
Description of the energy conservation measure:					
<p>At RIL – Hz, CPP&U plant cater service water through operating service water pumps GA – 2156 A, GA – 2156 S and GA – 2154A from its filter water pump bay. Among these GA – 2156 pumps (A and S) were designed for 280 m³/hr. These pumps' impellers have been modified from 255 mm diameter to 265 mm diameter which increased the capacity to 290 m³/hr. The motor changed from 72 KW to 90 KW in order to cater to the increased power requirements. The change has led to stoppage of one pump, thus for the same service water requirement CPP&U is operating 2 nos. pumps instead of earlier 3 nos. pumps.</p>					
Picture/ sketch/ drawing before modification (if available)			Picture/ sketch/ drawing after modification		
-- NA --			<p>Service Water Network</p>		
Agency that executed the project (with complete address and email):					
The project is executed in-house by Reliance industries Limited - Hazira Mfg. Division.					
Total investment, Rs.: 4.7 lacs			Year of implementation: 2006 – 07		
First year energy cost savings, Rs.: 4 lacs					
First year other savings, Rs.: -					
On annual basis	kWh 000'	Coal (Tons)	Gas sm ³	Oil (kL)	Other
Energy Loss before	438				
Energy Loss after	0				
Energy tariff, Rs/kWh	2.33				
Company complete address: Reliance Industries Ltd., Hazira Manufacturing Division Village : Mora, Post : Bhatha Surat - Hazira Road Dist : Surat – 394 510, Gujarat				We authorise Bureau to use this information for dissemination Signature Date	
Contact person who could be contacted for more information: V. Gopalakrishnan Sr. Vice President, Central Technical Services.					



* Cost of gas is based on fuel mix cost of the year 2006-07

Energy Conservation Measure implemented in 2006-2007

ID :	27. LP steam injection temperature improvement	Sector : Petrochemicals			
Year :		Technology : - NA -			
Description of the energy conservation measure:					
<p>Steam Turbine Generator -2 was commissioned in Feb '04 with provision of LP steam injection to utilize the surplus LP steam in the complex. Attemperator-A was in use through which LP steam extracted from STG-1 was sent for distribution in complex and balance surplus LP steam was being injected in STG-2 (Ref: sketch before modification). Attemperator A was stopped and Attemperator B was re-commissioned in order to increase the LP steam injection temperature at STG-2 on 2nd Dec '06.</p> <p>As the LP steam injection average temperature increased from 155 Deg C to ~180 Deg C, the inlet steam enthalpy increased by 13 Kcal/kg resulting into saving of SSHP steam of 0.5 TPH</p>					
Picture/ sketch/ drawing before modification (if available)			Picture/ sketch/ drawing after modification		
Agency that executed the project (with complete address and email): The project is executed in-house by Reliance industries Limited - Hazira Mfg. Division.					
Total investment, Rs.: Nil			Year of implementation: 2006 – 07		
First year energy cost savings, Rs.: 10 lacs					
First year other savings, Rs.: -					
On annual basis	kWh 000'	Coal (Tons)	Gas sm ³	Oil (kL)	Other
Energy Loss before			348836		
Energy Loss after			0		
Energy tariff, Rs/ sm ³			8.87*		
Company complete address: Reliance Industries Ltd., Hazira Manufacturing Division Village : Mora, Post : Bhatha Surat - Hazira Road Dist : Surat – 394 510, Gujarat				We authorise Bureau to use this information for dissemination Signature Date	
Contact person who could be contacted for more information: V. Gopalakrishnan Sr. Vice President, Central Technical Services.					


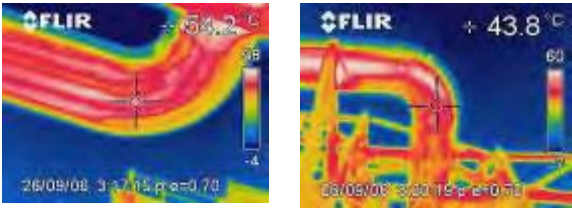
* Cost of gas is based on fuel mix cost of the year 2006-07

Energy Conservation Measure implemented in 2006-2007

ID :	28. STG – 1 condenser efficiency improvement	Sector : Petrochemicals			
Year :		Technology : - NA -			
Description of the energy conservation measure:					
<p>RIL – Hz has two nos. STG. STG – 1 is Skoda make which was commissioned in 1997. It was designed for the vacuum of 0.05 bar abs. at condenser end using one steam jet ejector. Due to air ingress in the vacuum condenser, two nos. steam ejectors were under operation resulting in high steam consumption and lower overall efficiency. On-line Helium leak detection technique was employed to locate and subsequently arrest the leakages. There were 2 major and 5 minor leakages were identified and arrested through welding and flange tightening. It resulted in MP steam savings of 0.8 TPH and SHP steam savings of 0.5 TPH.</p>					
Picture/ sketch/ drawing before modification (if available)			Picture/ sketch/ drawing after modification		
					
Identification of Leakages			Leakages are being attended		
Agency that executed the project (with complete address and email):					
Arudra Engineers Private Ltd. #79(Old 29/9), Valmiki Street, Thiruvanmiyur, Chennai 600041, India. igp@md3.vsnl.net.in; igp@vsnl.com					
Total investment, Rs.: 1.25 lacs			Year of implementation: 2006 – 07		
First year energy cost savings, Rs.: 42 lacs					
First year other savings, Rs.: -					
On annual basis	kWh 000'	Coal (Tons)	Gas sm ³	Oil (kL)	Other
Energy Loss before			824369		
Energy Loss after			0		
Energy tariff, Rs/ sm ³			8.87*		
Company complete address:				We authorise Bureau to use this information for dissemination Signature Date	
Reliance Industries Ltd., Hazira Manufacturing Division Village : Mora, Post : Bhatha Surat - Hazira Road Dist : Surat – 394 510, Gujarat					
Contact person who could be contacted for more information:					
V. Gopalakrishnan Sr. Vice President, Central Technical Services.					

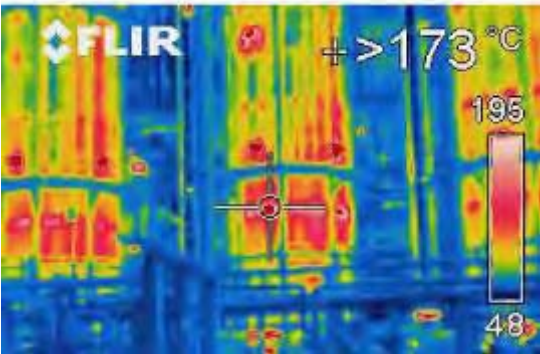

* Cost of gas is based on fuel mix cost of the year 2006-07

Energy Conservation Measure implemented in 2006-2007

ID :	29. Reduction in insulation loss in superheated high pressure steam header	Sector : Petrochemicals			
Year :		Technology : - NA -			
Description of the energy conservation measure:					
<p>CPP supplies SHP steam (110 kg/cm² g; 500 deg. C) through 3 nos. headers to all the consumers like Cracker turbines, PTA plants and CPP steam turbines and PRDS. A study has been taken –up to improve the temperature and cracker turbines. The study resulted in a finding that the temperature drop across the cracker ISBL header is to the tune of about 16 deg. C which is very high compared to the design value of 4 deg. C. An insulation survey was carried out within cracker SHP header through thermography. The heat loss spot has been identified and repaired. This has resulted in a savings of about 0.15 TPH of SHP steam saving.</p>					
Picture/ sketch/ drawing before modification (if available)			Picture/ sketch/ drawing after modification		
					
<p>Faulty Insulation</p>			<p>Thermograph indicating high surface temperature (> 110 deg. C)</p>		
			<p>Thermograph indicating low surface temperature (< 55 deg. C)</p>		
Agency that executed the project (with complete address and email):					
The project is executed in-house by Reliance industries Limited - Hazira Mfg. Division.					
Total investment, Rs.: 2 lacs			Year of implementation: 2006 – 07		
First year energy cost savings, Rs.: 5 lacs					
First year other savings, Rs.: -					
On annual basis	kWh 000'	Coal (Tons)	Gas sm ³	Oil (kL)	Other
Energy Loss before			104651		
Energy Loss after			0		
Energy tariff, Rs/ sm ³			8.87*		
Company complete address: Reliance Industries Ltd., Hazira Manufacturing Division Village : Mora, Post : Bhatha Surat - Hazira Road Dist : Surat – 394 510, Gujarat				We authorise Bureau to use this information for dissemination Signature Date	
Contact person who could be contacted for more information: V. Gopalakrishnan Sr. Vice President, Central Technical Services.					

* Cost of gas is based on fuel mix cost of the year 2006-07



Energy Conservation Measure implemented in 2006-2007

ID :	30. Dowtherm vaporizer – A efficiency improvement	Sector : Petrochemicals
Year :		Technology : - NA -
<p>Description of the energy conservation measure:</p> <p>Description of the energy conservation measure:</p> <p>Our old Dow Vaporisers in polyester complex were unable to perform at rated efficiency. Thermography of the various sections of the vaporizer carried out to check the losses through the furnace surfaces. Study revealed high losses through stack due to high stack temperature and losses through furnace surfaces.</p> <p>To bring back the vaporizer to the rated efficiency following actions were carried out based on the audit report.</p> <p>Flue Gas side cleaning</p> <p>Radiation coil cleaning-Physical cleaning Convection coil cleaning- Water wash and chemical cleaning APH water wash</p> <p>Insulation/Refractory repair</p> <p>Radiation section – Cerawool totally changed with new one and provided SS foil as a vapour barrier and wet wrap at top-New Design Convection section side plate refractory changed to new one and end cover new insulation provided Radiation section bottom plate refractory totally changed with new Hysil make refractory</p>		
Picture/ sketch/ drawing before modification (if available)		Picture/ sketch/ drawing after modification
 <p style="text-align: center;">Thermograph of vaporizer surface Temperature > 173 deg. C</p>		 <p style="text-align: center;">Thermograph of vaporizer after revamp Temperature < 100 deg. C</p>
<p>Agency that executed the project (with complete address and email): The project is executed in-house by Reliance industries Limited - Hazira Mfg. Division.</p>		
Total investment, Rs.: 15 lacs		Year of implementation: 2006 – 07

First year energy cost savings, Rs.: 8 lacs					
First year other savings, Rs.: -					
On annual basis	kWh 000'	Coal (Tons)	Gas sm ³	Oil (kL)	Other
Energy consumption before			11379240		
Energy consumption after			10375858		
Energy tariff, Rs/ sm ³			8.87*		
Company complete address: Reliance Industries Ltd., Hazira Manufacturing Division Village : Mora, Post : Bhatha Surat - Hazira Road Dist : Surat – 394 510, Gujarat				We authorize Bureau to use this information for dissemination	
Contact person who could be contacted for more information: V. Gopalakrishnan Sr. Vice President, Central Technical Services.				Signature Date	

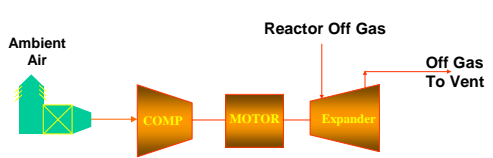
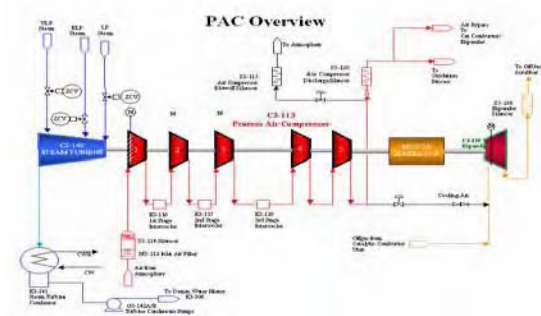
*Cost of fuel gas is based on fuel mix cost for the year 2006-07

Energy Conservation Measure implemented in 2006-2007

ID :	31. Counter current cooling tower installation in PTA – 3**	Sector : Petrochemicals
Year :	[** Trend setter project]	Technology : - NA -
Description of the energy conservation measure:		
<p>While deciding the type of PTA-3 Cooling Tower, merits and demerits for Counter flow and Cross flow Cooling tower was discussed considering the potential to save Power. As per the design, potential of a total of ~ 900 KW savings for 30000 m3/hr circulation in a counter flow tower operation vs. Cross flow tower operation exists due to</p> <ul style="list-style-type: none"> ○ Pumping head in Counterflow is lower than Cross flow CT due to reduction in the height of the return header in CT by 4 to 6m depending on the fill and Tower design Lower pump head of 0.55 m which translates to Pump power savings of ~600 KW. The benefit of which can be realized if the user plant is suitably designed for lower head pump operation ○ L/G in Counter flow is higher than Cross flow due to improved film fill efficiency, hence lower air requirement, which brings down the fan power requirement Additional Fan Power saving of ~300 KW due to lower static, velocity head and less air requirement. ○ Fan Static head requirement is influenced by CT geometry –Length, width, height, Fan stack height and it can be optimized for a Cross flow Tower also by increasing the length of each cell or modifying the configuration. ○ No regular special maintenance requirements in Counterflow CT except during commissioning. ○ Make up water quality and circulating cooling water quality was found suitable to handle Countercurrent flow Tower Design <p>Counter current Cooling tower was selected for PTA-3 Cooling tower which is giving a better thermal performance at reduced power load.</p>		
Picture/ sketch/ drawing before modification (if available)	Picture/ sketch/ drawing after modification	
 <p>In other Plants</p>	 <p>Cooling tower in PTA - 3</p>	
Agency that executed the project (with complete address and email): The project is executed in-house by Reliance industries Limited - Hazira Mfg. Division.		
Total investment, Rs.: 1897 lacs	Year of implementation: 2006 – 07	

First year energy cost savings, Rs.: 139 lacs					
First year other savings, Rs.: -					
On annual basis	kWh 000'	Coal (Tons)	Gas sm ³	Oil (kL)	Other
Energy consumption before	54890				
Energy consumption after	46927				
Energy tariff, Rs/ kWh	2.33				
Company complete address: Reliance Industries Ltd., Hazira Manufacturing Division Village : Mora, Post : Bhatha Surat - Hazira Road Dist : Surat – 394 510, Gujarat				We authorize Bureau to use this information for dissemination	
Contact person who could be contacted for more information: V. Gopalakrishnan Sr. Vice President, Central Technical Services.				Signature Date	

Energy Conservation Measure implemented in 2006-2007

ID :	32. Power recovery train at PTA - 3	Sector : Petrochemicals
Year :	[** Trend setter project]	Technology : Invista
Description of the energy conservation measure:		
<p>Installation and commissioning of power recovery train as part of new PTA plant commissioning resulting in power generation by waste steam. The conventional PTA technologies consume about 12 MW of power in its Process Air Compressor while the new technology employed by RIL – Hz exports power to the tune of 6 MW, reducing the power demand from Captive power plant.</p> <p><u>Salient Features:</u></p> <ul style="list-style-type: none"> → New technology – Process integrated power train → Steam Turbine – Motor cum Generator – Expander Train → Surplus low Pressure steam from process heaters used in steam turbine (LP, VLP, ELP) → Static Frequency Controller (SFC) used for export of power available from steam turbine → SFC ensures Machine operation at steady speed in spite of Grid frequency variations → SFC determines the speed of the whole train → SFC reduces the installed Motor power requirement since it comes in line after reaching 30% speed 		
Picture/ sketch/ drawing before modification (if available)	Picture/ sketch/ drawing after modification	
		
		
Agency that executed the project (with complete address and email):		
The project is executed in-house by Reliance industries Limited - Hazira Mfg. Division.		
Total investment, Rs.: 5500 lacs	Year of implementation: 2006 – 07	

First year energy cost savings, Rs.: 2758 lacs					
First year other savings, Rs.: -					
On annual basis	kWh 000'	Coal (Tons)	Gas sm ³	Oil (kL)	Other
Energy consumption before	105120				
Energy consumption after	- 52560 (Export)				
Energy tariff, Rs/sm ³	2.33				
Company complete address: Reliance Industries Ltd., Hazira Manufacturing Division Village : Mora, Post : Bhatha Surat - Hazira Road Dist : Surat – 394 510, Gujarat				We authorize Bureau to use this information for dissemination	
Contact person who could be contacted for more information: V. Gopalakrishnan Sr. Vice President, Central Technical Services.				Signature Date	