



Serial no 20

Chloro-Alkali

**United Phosphorus Ltd
Chemical Division,
Jhagadia**

(i) Unit Profile

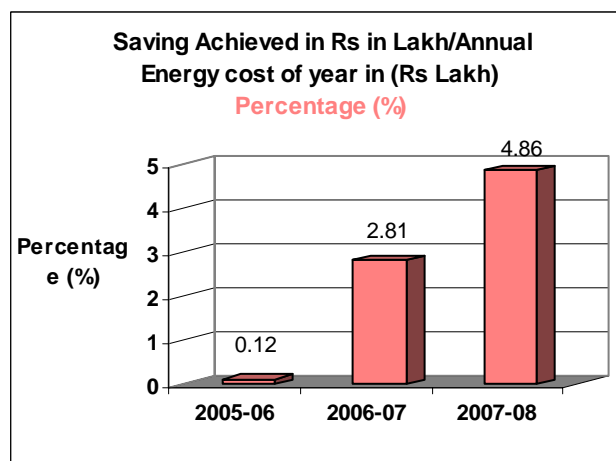
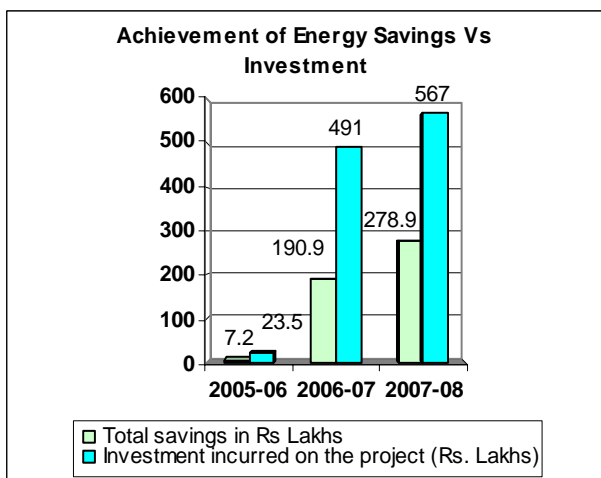
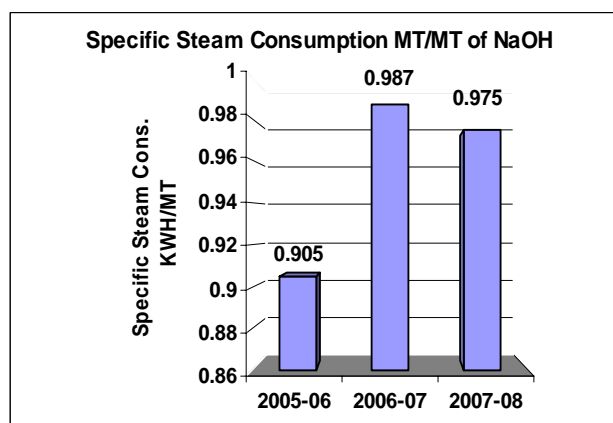
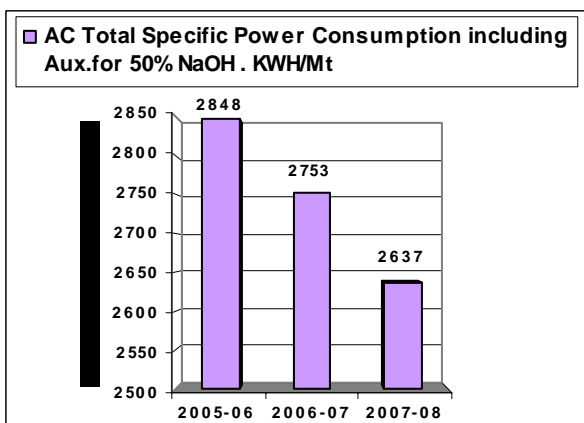
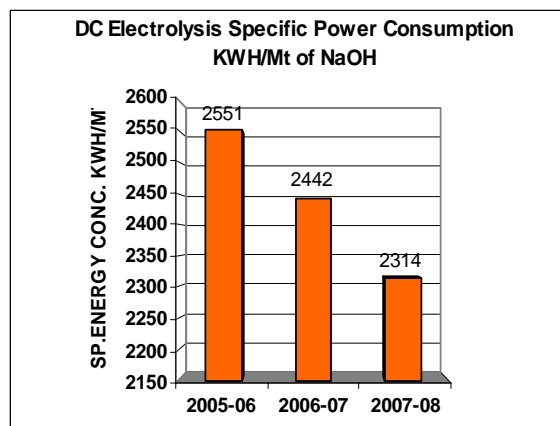
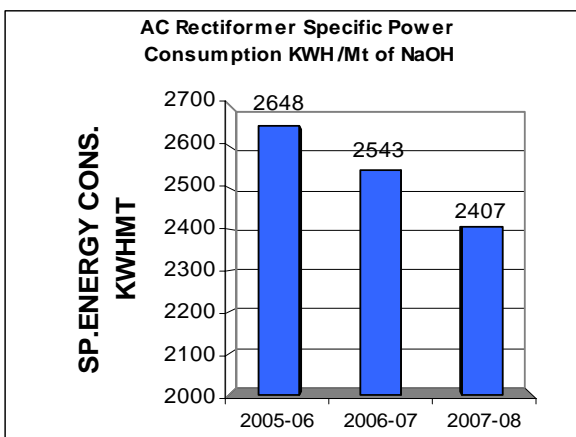
United Phosphorus Limited (UPL) is one of the largest Indian multinational company manufacturing generic agrochemicals, products with global present ranking among top three companies. UPL also manufactures industrial and specialty chemicals and has a chlor-alkali plant integrated with 50 MW Captive Cogeneration Power Plant with green technology of membrane electrolysis cells. It has production capacity of 156 TPD of 50% Caustic Soda Lye and 70 TPD of chlorine used captively by its group companies. Corporate's annual sales turnover for 2007-08 was Rs.3516 crore. The technology adopted by integrated Chloro-alkali unit is energy-efficient and eco-friendly too.

Sr. No	Specific Power consumption details	Unit	2005-06	2006-07	2007-08
1)	Annual Production	Mt	58448	60177	56552
2)	Total Energy Consumption per annum	KWH(Lakhs)	1726	1720	1551
3)	Total Thermal Consumption per annum*	Millions kcal*	28567*	32065*	29777*
4)	DC Electrolysis Specific Power Consumption	KWH/Mt	2551	2442	2314
5)	AC Rectifier Specific Power Consumption	KWH/Mt	2648	2543	2407
6)	AC Total Specific Power Consumption including Aux.for 50% NaOH.	KWH/Mt	2848	2753	2637
7)	Sp.Energy Consumption (all inclusive of Cl ₂ & H ₂ bottling)	KWH / Mt	2953	2858	2743
8)	*Steam Consumption	Mt / Mt	0.905	0.987	0.975
9)	Total Hydrogen generation	Lakhs NM3	163.65	168.50	158.35
10)	Hydrogen utilisation for 30% HCl	Lakhs NM3	11.94	11.66	13.33
11)	Hydrogen Sales	Lakhs NM3	101.54	120.14	105.47
12)	Total Hydrogen utilisation	%	69.34	78.22	75.03
13)	Total Liquid Chlorine Production	MT	49287	51321	47591
14)	Captive Chlorine utilisation (Including group companies)	MT	19328	19059	18844
15)	Chlorine Sales	MT	28956	31327	28095
16)	Savings(Savings achieved /Energy cost of year)	%	0.12	2.81	4.93
17)	Total Manufacturing Cost	Rs. Lakhs	8446	8509	8585
18)	Total Energy cost	Rs. Lakhs	4974	5380	5355
19)	Energy cost as % of total manufacturing cost	%	59	63	62

* : Chloro-alkali plant is supplied steam from 50 MW Cogen Combined cycle Captive Power plant with natural gas as fuel.



Graph





Energy Conservation Policy and Set up

The Energy Management Cell has been established headed by Sr. General Manager (Jhagadia unit) assisted by a certified energy auditor as an expert (Energy conservation) to identify the potential EC projects on continual basis. The Energy conservation cells is constituted with people from shop floor level to discuss and execute the accepted EC projects after brain storming sessions. The unit has system to invite new ideas on every Thursday (IDEA DAY) where innovative methods and suggestion are rewarded to encourage active participation for energy conservation also.

Top management is committed for saving energy for better profitably which is evident as professional adviser is in place to boost up energy conservation culture in all units of UPL in general and chloro-alkali unit of UPL at Jhagadia location.



Energy Conservation policy

UPL is committed to measure, monitor and manage energy to use the same in most efficient and eco-friendly manner for manufacturing of its wide range of agrochemicals, industrial chemicals, chemical intermediates.

And specialty chemicals by:

- Promoting and procuring energy efficient & upgraded technologies and equipments.
- Setting stretched goals and achieving the same to reduce specific energy consumption for products & utilities.
- Training, motivating people for creative thinking to reduce energy consumption minimum by 1% per annum on average.
- Preserving environment by conserving energy and exploring use of renewable energy resource in this industrial sector.

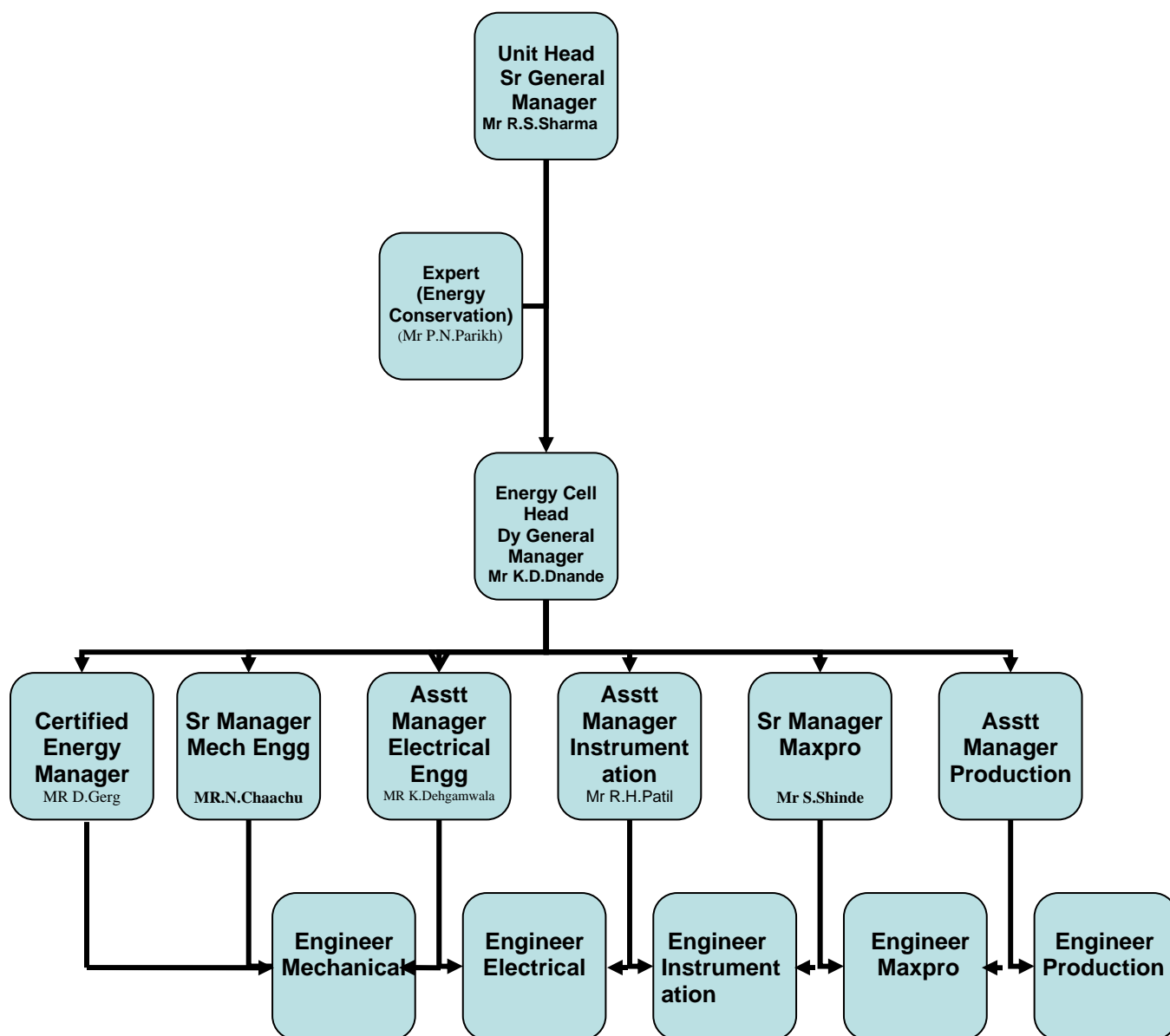
Mumbai

C.O.O/Executive Director

UNITED PHOSPHORUS LIMITED UNIT-05 JHAGADIA



Energy Management Cell



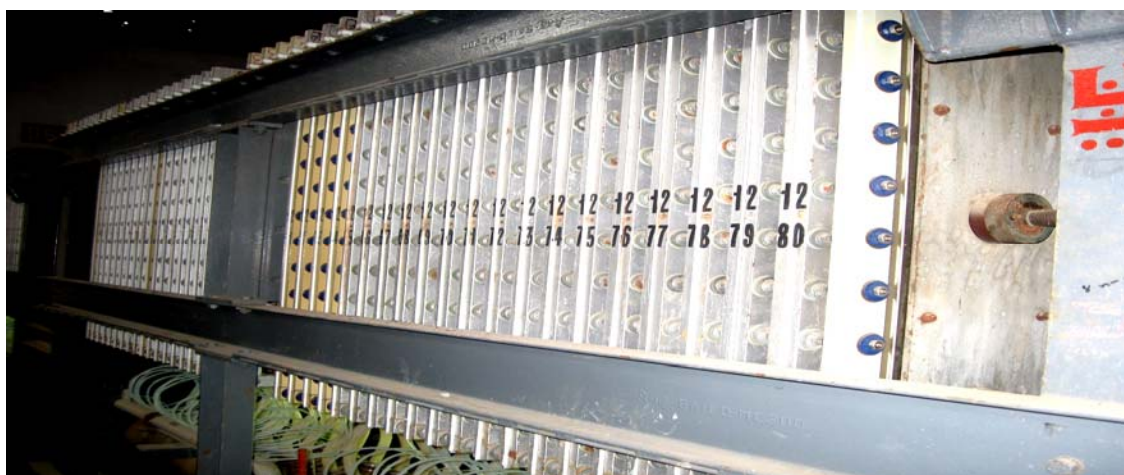
**Energy conservation Achievements during the year 2007-08**

- The unit has saved Total Rs 278.9 Lakhs with Total investment of Rs 567 lakhs
- Specific Electrical Energy Consumption came down from previous year by 116 KWh /MT (2753 KWh/MT to 2637 KWh/MT) ~ 18050 KWH / Day saving
- Specific Thermal Energy Consumption as came down from previous year by 6300 Kcal/MT (0.5328 Mkal /MT to 0.5265 Mkal /MT) ~ 1 Mkal / Day saving.

Year	Product	KWH/MT	% Reduction over 2005-06
2005-06	Caustic soda lye (50%)	2848	-
2006-07	---Do---	2753	3.36 %
2007-08	---Do---	2637	7.41 %

Major Projects implemented during 2007-08

1. Replacement of old membranes by energy efficient membrane and improved in the brine quality.



- Replacement of old membranes with high performance membranes in four electrolyzers out of six electrolyzers.
- Improvement in brine quality by replacing the hardness from 30 ppb to below 20 ppb.
- Power saving 22308 KWH / Day.

Total investment of the project
Saving

Rs 500 Lakhs
Rs 236 Lakhs



2. Installation of 6 Nos of Variable Frequency Drives for power saving in compressors and pumps.



Chlorine compressor VFD



Chlorine compressor VFD



H2 Blower VFD



Air Compressor VFD

- 6 Nos Variable frequency drives installed for variable load applications of chlorine compressors, air compressors, hydrogen blower, and brine pump.
- Power saving 1729 KWH/Day.

**Total investment of the project
Saving**

**Rs 13.1 Lakhs
Rs 18.6 Lakhs**



3. Stoppage of Filtered Brine Pump of 56 TPD plant by combining it with 100 TPD Brine



- Optimized the filter brine circulation system and stopped 56 TPD plant filter brine pump.
- Power saving 324 KWH/Day.

Total investment of the project
Saving

Rs 0 Lakhs
Rs 3.5 Lakhs

4. Reduction in Chlorine Compressor Discharge Pressure from 3.5 Kg/Cm2g to 2.8 Kg/Cm2g by Installation of Additional Chlorine Liquefier.



- Reduced discharge pressure by providing the additional heat transfer area by adding one more chlorine liquefier, Freon condenser and receiver,
- Power saving 503 KWH/Day.

Total investment of the project
Saving

Rs 18 Lakhs
Rs 5.41 Lakhs



5. Replacement of HPSV Lamps in place of HPMV Lamps



- Nos: 34 nos lamps replaced
- Power saving : 42 KWH Per day:

Total investment of the project
Saving

Rs 1.12 Lakhs
Rs 0.46 Lakhs

6. Replacement of Low Efficient Auxilliary Transformer with Energy Efficient Transformer.



- Two transformers of 2.2 + 1.6 MVA replaced by 3.0 MVA energy efficient transformer.
- Efficiency of old transformers :
- Efficiency of new transformers:
- Power saving 23 KWH / Day.

Total investment of the project
Saving

Rs 18 Lakhs
Rs 0.26 Lakhs



7. Replacement of 0.75MVA Lighting Transformer with 0.5MVA Transformer



Lighting transformer of 0.75 KVA was replaced by 0.5 KVA transformer at reduced voltage for energy saving.
Power saving 57 KWH/Day.

Total investment of the project
Saving

Rs 0 Lakhs
Rs 0.62 Lakhs

8. Insulation replacement of Cl2 storage tank-5No.



Total investment of the project
Saving

Rs 3.5 Lakhs
Rs 3.5 Lakhs



9. Reduction in Effluent Generation by Recycling Mech Seal Cooling Water of Hypo System, Vacuum Pump Cooling Water of CEU, Hydrogen Gas Holder Seal Water, RVDF Vacuum Pump, Cooling Water, Chlorine Evaporator Steam Condensate, Vapour Condensate of CEU (Partly)



➤ 120 KL/Day Reduction in water consumption achieved.

**Total investment of the project
Saving**

**Rs 4.0 Lakhs
Rs 1.26 Lakh**



10. Reduction in steam consumption in Caustic evaporators by replace of vapor evaporator.



- By replacing damage vapor condenser by new one we are saved 660.107 MT /annum steam.

Total investment of the project
Saving

Rs 9.0 Lakhs
Rs 9.3 Lakhs



Energy Conservation plans and targets

Energy Conservation Measures (Planned)	Anticipated Savings		Approx investment (Rs Lakhs)	Project commencement and completion year
	Energy value Specify Units	Rs Lakhs		
Replacement of Old Membranes with New Membranes in 02 Nos. Electrolysers in 100 TPD Plant	18.67 Lakhs KWH	65.3	325	2008-09
Replacement of Reciprocating Air Compressor with Screw Air Compressor(with VFD)	0.504 Lakhs KWH	1.764	20	2009-10
Use of Voltage Reduction Solution in Catholyte in Membrane Cells	2.8 Lakhs KWH	9.8	18	2008-09
Replacement of Reciprocating Freon Compressors with Screw Compressors in Chlorine Liquefaction Section	0.18 Lakhs KWH	0.64	100	2009-10
To increase the Utilization of Hydrogen Gas from 75% to 85% of the total generation	4266 Millions Kcal	126	60	2008-09
Steam saving in Chlorine Evaporator by Using Steam Condensate from CEU	5.56 Gas (Lakhs SM3)	55.6	30	2008-09
Steam saving in Pure Brine Heat Exchanger by Installing Chlorine and Brine Recuperator in 56tpd Plant	11.12 Gas (Lakhs SM3)	111.2	45	2008-09
Replacement of Steam Fired VAM with NG Fired VAM (02 Nos.)	5.741 Gas (Lakhs SM3)	57.41	65	2008-09
Replacement of FO Fired Burner with NG Fired Burner in 10 TPH Steam Boiler	27.42 Gas (Lakhs SM3)	274.2	60	2008-09
Installation of Economizer in 10 TPH Steam Boiler	1.68 Gas (Lakhs SM3)	16.8	36	2008-09
Thermo compressor-power plant	33.35 Gas (Lakhs SM3)	333.5	150	2008-09



Environmental and Safety

UPL Jhagadia unit has been recognized by following awards for its initiatives taken for improvements in environmental and safety aspects at the work place and surrounding community during the year 2007-08 and earlier.

- **3 Star rating from British Safety Council in 1999**
- **Safety Shield from Rotary International in 1997**
- **Gujarat Safety Council -1st prize in Best safety Performance in 1997**
- **3 Leaves from Central for Science and Environment and got 5th rank among all Chlor-Alkali Industries.**
- **Best Responsible Care Committed Company Award from ICMA in 2004.**
- **Certificate of Appreciation from Gujarat Safety Council for the year 2004**
- **Best Improved Unit among all UPL group for year 2005-06**
- **Best Performance award among all UPL group for year 2006-07**