1	**ID: 27**	**Title of measure**	**Sector: Chlor-Alkali Industry**
2	**Survey Year: 2007**	**Reduction in Impeller Diameter of Cooling Tower Pump in HCL area**	**Technology: Pump Impeller**
3	Name of the Company :	**Shriram Vinyl & Chemical Industries, Shriram Nagar, Kota, Rajasthan, INDIA**	
4	Agency that executed the project :	In-house	
5	Year of Implementation :	2006-07	

6 **Unit Profile:**

Shriram Vinyl & Chemical Industries (SVCI) established in the year 1963 is situated at Kota in state of Rajasthan, in the North - western part of India. SVCI is a part of DSCL, a US$ 0.39 billion plus, diversified business group based in North India. DSCL business interests comprises of(1) Agri-Business (Urea fertilizer, Sugar, Farm inputs marketing such as DAP, Pesticides, Seeds, Agri retailing - Haryali Kisan Bazaar). (2)Plastics (PVC and PVC compounds). (3)Chemicals (Chlor-Alkali).(4) DSCL Building Products (Fenesta door and window profiles). Caustic Soda plant is the first plant of SVCI, Kota and was commissioned in 1963 in technical collaboration with the Shin-Etsu, Japan and has a turnover US$ 55 million in the year 2006-07.

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

Cooling tower Pump performance of HCL plant area was reviewed during internal energy audit. The in-house team found that there is a possibility of reduction in impeller diameter to conserve energy. Pump characteristics with flow requirements were studied and power savings have been achieved after reduction in impeller diameter.

8 **A View of Electrolysers at SVCL Kota Plant**

Picture After Modification

9	Total investment :	250 US$
10	First year energy cost savings :	11,450 US$
11	First year additional savings beyond energy (i.e. water, raw materials etc.):	Nil
12	Annual electricity consumption before, MWh	735
13	Annual electricity consumption after, MWh	563
14	First year electricity savings, MWh	172
15	First year tons of CO_2 mitigated	172
16	Assumed sustainability, years	10
17	**Expected tons of CO_2 mitigated throughout life cycle**	**1,720**

1	**ID: 28**	**Title of measure**	**Sector: Chlor-Alkali Industry**
2	**Survey Year: 2007**	**Utilization of by-product hydrogen gas as a fuel instead of natural gas by modification of burner**	**Technology: Mixed gas (hydrogen/natural gas) fired burner**
3	Name of the Company	: **Gujarat Alkalies and Chemicals Limited, Dahej, Gujarat, INDIA**	
4	Agency that executed the project	: In-house	
5	Year of Implementation	: 2006-07	

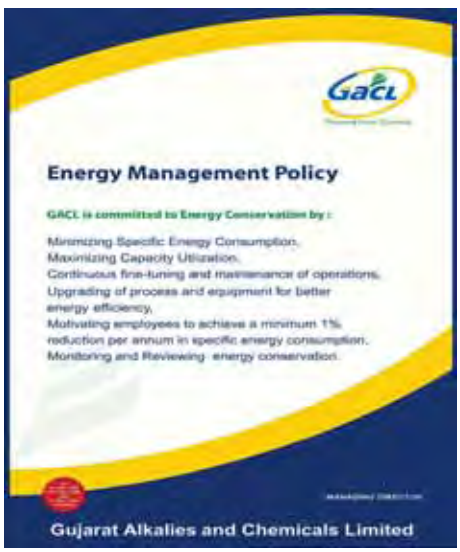
6 **Unit Profile:**

GACL (DAHEJ) is an integrated complex of Caustic Soda – 600 TPD, Captive Power Plant (Combined Cycle Co-generation Power Plant) having an installed capacity of 90MW and Phosphoric Acid Plant (Technical Grade) with installed capacity of 80 TPD. GACL markets its products all over Gujarat and exports many products. GACL commenced operations in 1976. GACL opened its main door at Dahej in 1993. At present GACL - Dahej Unit is a multidimensional complex, producing many products.

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

The CCU-1 (old) furnace was run with natural gas. By modifying the burner system to suit for hydrogen and natural gas dual firing system, with more or less the by-product hydrogen gas only utilized instead of natural gas. Hydrogen gas is produced as a by-product during the electrolytic process of brine solution. After this modifications, the natural gas to the tune of 11963 Mkcal/annum (1.755 million Nm^3/Annum of Natural Gas) was saved.

8



Picture After Modification

9	Total investment :		50,000 US$
10	First year energy cost savings :		4,240,500 US$
11	First year additional savings beyond energy (i.e. water, raw materials etc.):		Nil
12	Annual gas consumption before,	thousands of m^3	--
13	Annual gas consumption after,	thousands of m^3	--
14	First year gas savings,	thousands of m^3	1,755
15	First year tons of CO_2 mitigated		4,899
16	Assumed sustainability, years		10
17	**Expected tons of CO_2 mitigated throughout life cycle**		**48,990**

1	**ID: 29**	**Title of measure**	**Sector: Chlor-Alkali Industry**
2	**Survey Year: 2007**	**Reduction in Furnace Oil Consumption**	**Technology: Pot Based Heating System**
3	Name of the Company	:	**Shriram Vinyl & Chemical Industries, Shriram Nagar, Kota, Rajasthan, INDIA**
4	Agency that executed the project	:	In-house
5	Year of Implementation	:	2006-07

6 **Unit Profile:**

Shriram Vinyl & Chemical Industries (SVCI) established in the year 1963 is situated at Kota in state of Rajasthan, in the North - western part of India.SVCI is a part of DSCL, a US$ 0.39 billion plus, diversified business group based in North India. DSCL business interests comprises of(1) Agri-Business (Urea fertilizer, Sugar, Farm inputs marketing such as DAP, Pesticides, Seeds, Agri retailing - Haryali Kisan Bazaar). (2)Plastics (PVC and PVC compounds). (3)Chemicals (Chlor-Alkali).(4) DSCL Building Products (Fenesta door and window profiles). Caustic Soda (mercury based) plant is the first plant of SVCI, Kota and was commissioned in 1963 in technical collaboration with the Shin-Etsu, Japan and has a turnover US$ 55 million in the year 2006-07.

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

In the flaking plant of the unit, hydrogen or furnace oil is used for conversion of caustic soda lye to Caustic soda flakes. This conversion is essentially an evaporation process. The in-house team took measures for better utilization of hydrogen and was able to reduce the consumption to 3 liters per ton (from target consumption of 15 liters/ton).

8 **SVCL Plant, Kota**

Picture After Modification

9	Total investment :	Nil
10	First year energy cost savings :	61,475 US$
11	First year additional savings beyond energy (i.e. water, raw materials etc.):	Nil
12	Annual oil consumption before, kl	158
13	Annual oil consumption after, kl	32
14	First year oil savings, kl	128
15	First year tons of CO_2 mitigated	380
16	Assumed sustainability, years	10
17	**Expected tons of CO_2 mitigated throughout life cycle**	**3,800**

1	ID: 30	Title of measure	Sector: Chlor-Alkali Industry
2	Survey Year: 2007	Proactive Approach for Optimization of Cooling Water Flow as per Operating Load	Technology: Control Systems
3	Name of the Company :	Shriram Vinyl & Chemical Industries, Shriram Nagar, Kota, Rajasthan, INDIA	
4	Agency that executed the project :	In-house	
5	Year of Implementation :	2006-07	

6 **Unit Profile:**

Shriram Vinyl & Chemical Industries (SVCI) established in the year 1963 is situated at Kota in state of Rajasthan, in the North - western part of India.SVCI is a part of DSCL, a US$ 0.39 billion plus, diversified business group based in North India. DSCL business interests comprises of(1) Agri-Business (Urea fertilizer, Sugar, Farm inputs marketing such as DAP, Pesticides, Seeds, Agri retailing - Haryali Kisan Bazaar). (2)Plastics (PVC and PVC compounds). (3)Chemicals (Chlor-Alkali).(4) DSCL Building Products (Fenesta door and window profiles). Caustic Soda (mercury based) plant is the first plant of SVCI, Kota and was commissioned in 1963 in technical collaboration with the Shin-Etsu, Japan and has a turnover US$ 55 million in the year 2006-07.

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

In the process plants, it was a normal practice to circulate same quantity of cooling water irrespective of plant operating load and weather conditions i.e. no flow reduction of cooling water was done as per weather conditions or in the conditions of lower operating load of the plant. The in-house team, as an energy conservation measure, started proactive control of cooling water flow as per the plant operating load & weather conditions by throttling of cooling tower pumps, discharge valves, even stoppage of one of the pump.

8 **SVCL Plant, Kota**

Picture After Modification

9	Total investment :	Nil
10	First year energy cost savings :	14,175 US$
11	First year additional savings beyond energy (i.e. water, raw materials etc.):	Nil
12	Annual oil consumption before, kl	--
13	Annual oil consumption after, kl	--
14	First year oil savings, kl	212
15	First year tons of CO_2 mitigated	639
16	Assumed sustainability, years	10
17	**Expected tons of CO_2 mitigated throughout life cycle**	**6,390**

1	**ID: 31**	**Title of measure**	**Sector: Chlor-Alkali Industry**
2	**Survey Year: 2007**	**Identification of cell units operating at higher voltage**	**Technology: Cell Membrane**
3	Name of the Company :	**Shriram Vinyl & Chemical Industries, Shriram Nagar, Kota, Rajasthan, INDIA**	
4	Agency that executed the project :	In-house	
5	Year of Implementation :	2006-07	

6 **Unit Profile:**

Shriram Vinyl & Chemical Industries (SVCI) established in the year 1963 is situated at Kota in state of Rajasthan, in the North - western part of India.SVCI is a part of DSCL, a US$ 0.39 billion plus, diversified business group based in North India. Caustic Soda plant is the first plant of SVCI, Kota and was commissioned in 1963 in technical collaboration with the Shin-Etsu, Japan and has a turnover US$ 55 million in the year 2006-07.

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

Increase in cell voltage and hence power consumption occurs due to:

- ageing of membrane
- with deposition of calcium and magnesium on membrane. This enters the membrane cell with feed brine, the resistance of membrane increases, resulting in increase in cell voltage
- reduction in active area due to patch welding on membranes for stopping the pin hole leakage, increases the voltage drop and the power consumption.
- Over potential (voltage drop) of anode and cathode also increases due to gradual de-activation of anodic and cathodic coating with ageing of cell units.

Cell units (total – 27nos), which were running at higher voltage were identified & replaced with latest design natural circulation type of cell units. Natural circulation has superiority in terms of power consumption, simplicity over the conventional forced circulation electrolysers.

8

SVCL Kota Plant

Picture After Modification

9	Total investment :	80,000 US$
10	First year energy cost savings :	26,875 US$
11	First year additional savings beyond energy (i.e. water, raw materials etc.):	Nil
12	Annual electricity consumption before, MWh	9,662
13	Annual electricity consumption after, MWh	9,259
14	First year electricity savings, MWh	403
15	First year tons of CO_2 mitigated	403
16	Assumed sustainability, years	10
17	**Expected tons of CO_2 mitigated throughout life cycle**	**4,030**