BILAG INDUSTRIES PRIVATE LIMITED
(A unit of Bayer and Bilakhias)
Vapi Gujarat

Unit Profile:

It all started as Mitsu in **1992**… and later by creating global size capacities, using high level R & D leading to regular introduction of new products, adapting strict international quality control norms, employing highly sophisticated manufacturing processes and with continuous backward integration to curtail manufacturing costs, Mitsu catapulted to a position of strength in the global agrochemicals market.

Believing in the philosophy of "collaborate rather than compete", AgrEvo, an agrochemical company of the German chemical giant Hoechst Ag and Schering, and Bilakhias decided to form a joint venture.

In 1999, the joint venture was incorporated in India with AgrEvo investing in a 51% stake in the Synthetic Pyrethroids manufacturing business of Mitsu. The new entity was christened BILAG representing Bilakhias and AgrEvo.

In the later years AgrEvo merged globally with Rhone Poulenc of France to form Aventis Crop Science. In 2002, the German chemical conglomerate Bayer AG to create Bayer CropScience acquired Aventis Crop Science.

Milestones (Growth profile)

1992:	Started as Mitsu with manufacture of Chloral
1993:	Trichloroacetyl Chloride production commenced
1994:	Forward Integration to manufacture Chlorpyriphos Tech
1995:	Cypermethrin Tech & its intermediates Cypermethric Acid Chloride and Metaphenoxybenzaldehyde production
1996:	Alpha Cypermethrin and Permethrin production launched
1997:	Metaphenoxy Benzyl Alcohol and launch of Deltamethrin
1998:	Allethrins Range launched
1999:	Creation of BILAG
2001:	Aventis CropScience in place of AgrEvo in JV
2002:	Bayer CropScience replaces Aventis CropScience. Shareholding of Bayer increased to 74%
2003:	Launch of Acrinathrin
2004:	Launch of Imidacloprid & Bayothrin
2005:	Launch of Cyfluthrin & Beta Cyfluthrin

Bilag Industries Private Limited is a highly successful joint venture company of Bayer CropScience AG, a chemical conglomerate from Germany and Bilakhia Group a first generation Indian entrepreneur.

The shareholding of Bilag is **91% Bayer and 9% Bilakhia Group**. Bilag is an agrochemical manufacturing company engaged in the production of Synthetic Pyrethroids active ingredients and their intermediates for use in a wide array of agriculture and environmental science products.

BILAG is the single largest manufacturing unit in the world with fully backward integrated facilities for manufacturing all the products of its range. With mastery over difficult chemistry, global size manufacturing capacities, adoption of international quality control standards, low production costs and highly successful R & D, Bilag's business focus is on world markets. BILAG is one of India's largest exporters of agrochemicals. Bilag's turnover (Year 2006) is Rs.500 Cores of which 75% is generated from exports to over 60 countries.

High powered R & D, ability to manufacture custom made grades of various products, large logistics capabilities, state-of-the-art SAP software implementation and convenient transportation links to any part of the world make Bilag a logical choice for procurement of their requirements for many multinational agrochemicals corporate in India and abroad. Bayer Crop-Science today considers Bilag as an exclusive Pyrethroids manufacturing site.

Bilag's production site is located at Vapi, in the State of Gujarat in Western India. Conveniently located at (Location Map) a distance of 180 kms from Mumbai, the commercial capital of India, it is very well linked by road to locations for international transportation by rail, sea and air.

The production plants are situated on a 230000 Meter sq. Industrial plot of land with custom-built constructions, housing sophisticated manufacturing machinery for each product.

The production site is served via an excellent infrastructure of utilities and energies. Bilag has its own two power generation plants, each of 6.4 MW capacities for captive consumption. It also has its own R & D Center equipped with highly sophisticated equipments and apparatus.

An effluent treatment plant, two solid and liquid waste incinerators and safety arrangements such as medical aid center, fire tenders etc. are well provided for.

Energy Consumption:

The International Standard of Comparison (Benchmark) e.g is suitable for **HOMOGENEOUS plants** and the benchmarks for major industry sectors viz. Iron & Steel, Cement, Fertilizer, Paper and pulp etc are evolved and are readily available for comparison.

For the **Pesticides industry** sector, being **Heterogeneous** in nature ie. wide range of products comprising of various grades manufactured within the same production equipment facilities, however, evolution of industry standards or benchmarks is a difficult proposition.

Though, understanding the very importance of “Benchmarking” for Intra-plant comparison, the Bilag has already initiated such an exercise to benchmark all of their individual manufacturing facilities. **The exercise takes into the critical examination of product mix, process routes, standard cycle times etc.**

ESCO Services

Bilag has always accorded top-most priority for energy conservation and a dedicated energy conservation and technical audit cell has been set-up.

Routine in-house savings are carried out with regard to air/steam leakages, insulation effectiveness, motor load surveys etc to identify potential areas of improvement.

Specialized studies are carried out through reputed energy consultants to compare the energy performance with the best practices adopted worldwide and new opportunities for energy conservation are explored / identified. The out come of these studies are reviewed and analyzed in details at various levels and energy conservation measures that are practicable / feasible are implemented at the earliest opportunity.

Presently**, DSCL Energy Services Company Limited** – one of the largest ESCO's of the country has been retained by the company for its Vapi facility. Brief objectives of this exercise is narrated as under.

Introduce a system that would allow management to measure the energy performance of each site.

· By taking into account the physical differences, a meaningful performance indicator be evolved to enable individual product plants to compare their performance and efficiency.

To standardize the specific energy consumption for each product/key process, so as to enable the management to set up an accurate and controlled targeting system.

To enable the management to determine accurately the savings and payback periods and ensure confident project sanctions.

To stimulate site managers and create staff awareness.

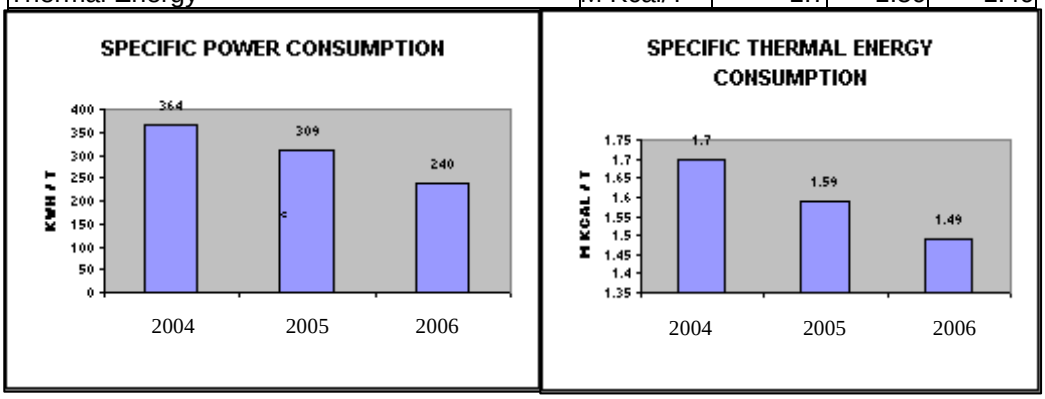
Needless to say that with the ability to compare one process to another, realistic consumption targets can be set.

The result of the Phase-I study (Energy Efficiency Improvement) has been successful in pinpointing energy conservation opportunity of around Rs. 70/- (L) per annum, which is **6.5%** of total electrical energy consumption at Bilag. During the Phase II study that is under progress, we are targeting for almost equivalent savings. The Phase-I study report is under review and it is intended to have the implementation of the major energy conservation projects under the innovative ESCO route being offered by DSCL Energy Services Company Limited.

The overall SEC comparison is not possible because of various types of products having different SEC. We have shown a graphical presentation of SEC for our one or two products as listed below for consequent three years, which depicts continual reduction in energy consumption over last two years due to our sustained efforts of energy conservation with the implementation of various energy conservation measures & ideas to improve the performance of the equipments/machinery exist in the unit.

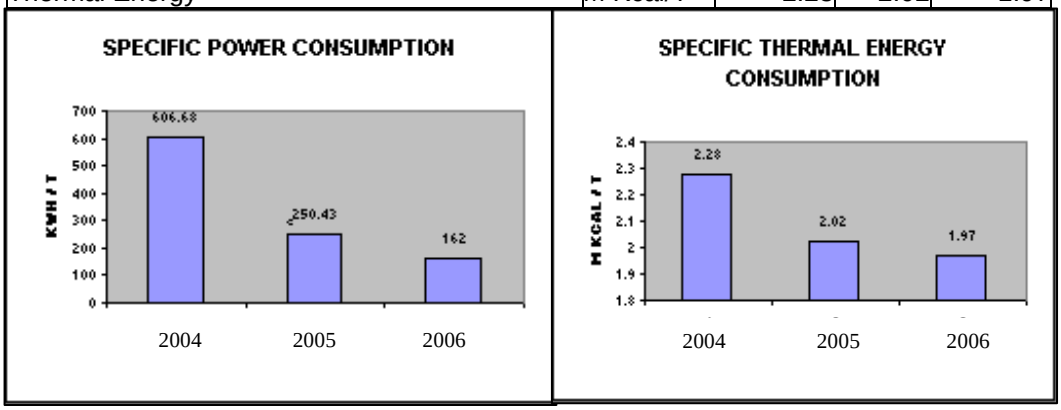
MPB I

Description	Unit	2004	2005	2006
Electrical Energy	Kwh/T	364	309	240
Thermal Energy	M Kcal/T	1.7	1.59	1.49



MICO

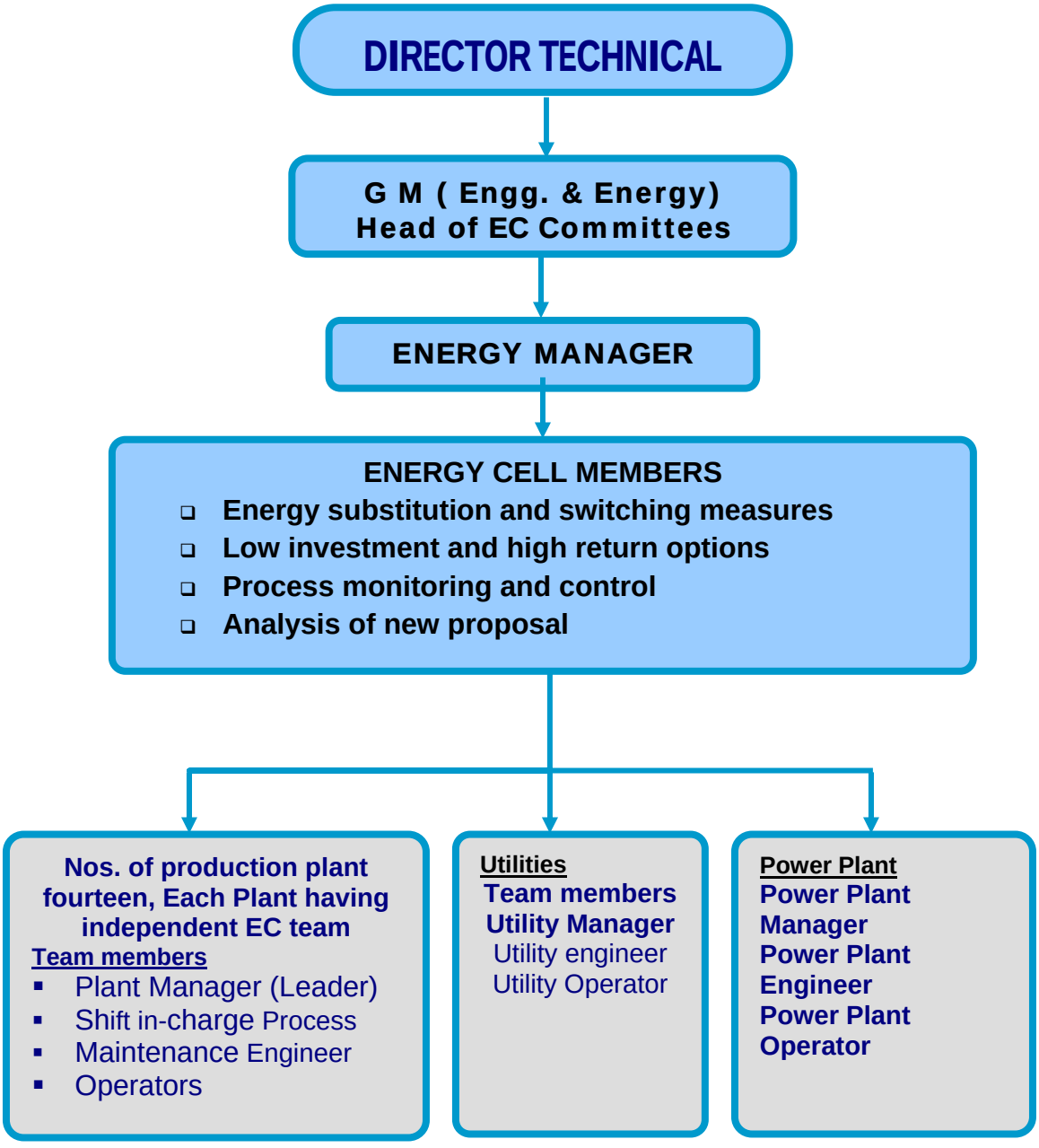
Description	Unit	2004	2005	2006
Electrical Energy	Kwh/T	606.68	250.43	162
Thermal Energy	M Kcal/T	2.28	2.02	1.97



Future Plan - Furnace oil fired Power plant conversion into Natural gas fired Power plant has already been approved & implementation work is in progress. The Natural gas is a green fuel & also more cost effective with respect to furnace oil. The copy of approved project is attached. The main advantages are

1. Fuel cost saving to the tune of Rs.3.6 Crore/Annum
2. Sox reduced by 500 MT/year
3. Carbon monoxide & Nox emissions will also be reduced.

Energy Conservation Commitment Policy and Set up BIPL :



bilag

A Company of Bayer & Bilakhia

Bilag Industries Pvt. Ltd.

Plot No.: 306/3, G.I.D.C., Phase II, Vapi - 396 195 (Guj.)

ENERGY POLICY

We at Bilag are committed to achieve reduction of specific Energy consumption.

We are determined to achieve the goal by following levels.

- By carrying out regular energy audit and management review meeting.
- By conducting regular training and awareness program for all concerned.
- By adopting new energy efficient technologies.
- By managing efficiently the utilization of energy resources.

K. K. Unni
Chairman & Managing Director

1st January 2006

Energy Conservation Achievements :

During the period 2004-2007, we implemented more than 75 energy saving proposals generated through regular interaction between plant, Utilities & Energy Department. We invested Rs.350 Lakhs and achieved saving of Rs.672.3 Lakhs with pay back period of 6.2 months only. It has resulted in percentage reduction of 11.17% energy in last 3 years shown below.

Year	Investment made (Rs. Lakhs)	Savings achieved (Rs. Lakhs/ year)	Energy Cost (Rs.lakhs/year)	% Savings (savings achieved/ Energy Cost of previous year)
2004 - 2005	74.30	128.83	2110	--
2005 - 2006	62.05	79.59	2435	3.27
2006 - 2007	77.32	255.49	2288	11.17

1. Condensate Recovery by installing Pressured Power Pump

- Installation of Pressured Power Pump.
  - Recovery of condensate at 85 °c.
  - DM water recovery

Investment : Rs 5.25 Lacs

Saving : Rs 6.20 Lacs

2. Installation of Zero air loss automatic moisture drain valve and reduced air loss

- Installation of Zero air loss automatic moisture drain valve.
  - Reduction of air loss.
  - Reduction of power consumption due to air loss.

Investment : Rs 1.80 Lacs

Saving : Rs 2.60 Lacs

3. Reduction of Generation Frequency at CPP

- Reduction of generation frequency at CPP.
  - Reduction of power consumptions by 2%.
  - No process delayed due to frequency reduction.

Electricity saved : 589000 Kwh per annum

Investment : Nil

Saving : Rs 25.60 Lacs per annum

4. **NDCT Replace by IDCT**

▪ Replacements of Natural draft cooling tower to Induced draft cooling tower. - Reduction of water consumption by avoiding drift losses. - Reductions of pump operating pressure. - Installation of energy efficient motor. - Installation of CT EN saver **Investment : Rs 6.00 Lacs** **Saving : Rs 4.50 Lacs**	

5. Installed Energy Efficient Motor

▪ Installation of energy efficient motor and reduced power consumption **Investment : Rs 3.25 Lacs** **Saving : Rs 3.40 Lacs**	

6. Stopped Cooling tower pumps 160 HP as per process requirement

▪ **Stopped Cooling tower pumps 160 HP as per process requirement** - Stopped 4 nos of pumps - Reduction of power consumption **Electricity saved : 687000 Kwh per annum** **Investment : Nil** **Saving : Rs 29.9 Lacs per annum**	

7. Waste heat recovery from lube oil in CPP.

▪ Waste heat recovery from lube oil in CPP - Recovery heats of hot water to heat lube oil. - Reduction of oil consumption. **Investment : Rs 1.72 Lacs** **Saving : Rs 2.90 Lacs**	

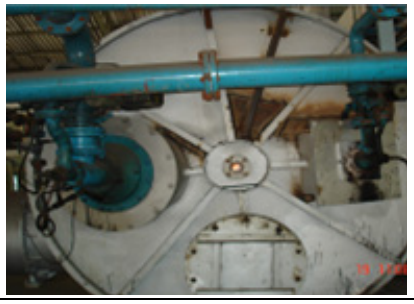
8. Installed un-cooled nozzle instead of cooled nozzle

▪ Installed un-cooled nozzle instead of cooled nozzle. - Stopped nozzle temperature cooler unit. - Reduced electrical consumption by stopping electrical heater. **Investment : Rs 1.85 Lacs** **Saving : Rs 2.30 Lacs**	

9. Installation of energy efficient Defuse aeration system in ETP

▪ Installation of energy efficient Defuse aeration system in ETP. It generates 0.5 mm dia bubbles which gives excellent mass transfer of oxygen bio logical activity - Stopped 75 HP pump - Reduction of power consumption. **Investment : Rs 20.25 Lacs** **Saving : Rs 18.96 Lacs**	

10. Installed liquid burner & pump for continuous burning of waste

▪ **Installed liquid burner & pump for continuous burning of waste**. - Increased waste burning from 400 kg to 1600 kg at same fuel. - Reduction of fuel consumption. **Investment : Rs 29.0 Lacs** **Saving : Rs 36.0 Lacs**	

11. Reduction of HSD consumption by process optimization

▪ **Reduction of HSD consumption by process optimization.** - Stopped all LTDG sets. **HSD saved : 268.4 Kl per annum** **Investment : Nil** **Saving : Rs 93.00 Lacs per annum**	

Total energy conservation during the year 2006-07

Project description	Achievement of energy savings per year basis						Investment incurred on the project (Rs. Lakhs)
	Electricity	Fuels*				Total savings in (Rs. Lakhs)	
	(Lakhs (kWh)	Coal (tonnes)	F.Oil (KL)	HSD (KL)	Total (fuel) in Mkcal)		
1. Condensate recovery by installing pressured power pump	-	-	36.72	-	354.07	6.20	5.25
2. Installation of Zero air loss automatic moisture drain valve and reduced air loss.	0.59	-	-	-	-	2.60	1.80
3. Reduction of Generation Frequency at CPP	5.87	-	-	-	-	25.60	-
4. NDCT Replaced by IDCT	1.03	-	-	-	-	4.50	6.00
5. Installed energy efficient motor	0.78	-	-	-	-	3.40	3.25
6. Stopped Cooling tower pumps 160 HP as per process requirement	6.86	-	-	-	-	29.90	-
7. Identified radiation loss and insulated the same.	-	-	65.76	-	634.07	11.10	-
8. Reduced auxiliary consumption of CPP	1.90	-	-	-	-	8.30	-
9. Waste heat recovery from lub oil in CPP	-	-	17.18	-	165.66	2.90	1.72
10. Installed un-cooled nozzle instead of cooled nozzle	0.53	-	-	-	-	2.30	1.85
11. Electrical power distribution	1.12	-	-	-	-	4.90	4.20
12. Several small identification	1.34	-	-	-	-	5.83	4.00
13. Reduction of HSD consumption by process optimization	-	-	-	268.40	2463.91	93.00	-
14. Energy Efficient diffuse aeration system installed in our ETP.	4.35	-	-	-	-	18.96	20.25
15. Installed liquid pump for continuous burning of waste.	-	-	213.27	-	2056.46	36.00	29.00
Sub Total	**24.37**	**0.00**	**332.93**	**268.40**	**5674.18**	**255.49**	**77.32**

Energy Conservation Plan Targets:

Energy Conservation Measures (Planned)	Anticipated savings in			Approx. investment (Rs.lakhs)	Project Commencement & Completion year
	Energy Value		Rs. Lakhs		
	Mkcal/Yr	LKwh/yr			
Condensate Recovery from HP Steam line of Gr-II	206	-	2.6	2.5	2007
Condensate Rwcovery from Plant	792	-	10	9	2007
Effective Compressed Air Leak Control Program	-	0.7	3	3	2007
Installation of Energy Efficient Motors	-	1.4	6	6	2007
Replacement of conventional chilled water pumps with Energy Efficient Pumps	-	2.1	9	10	2008
Fuel Substitution in Boilers (F.O to Natural Gas)	-	-	145	168	2007
Fuel Substitution in Power Plant (F.O to Natural Gas)	-	-	362	800	2007
Performance improvement in VAHP	2139	-	27	28	2008
Performance improvement in Brine Compressor	-	6.9	30	35	2008
Replacement of conventional cooling water pumps with Energy Efficient Pumps	-	9.6	42	29	2008
Energy Efficiency improvement - Installation of auto voltage stabilizer, installation of CFL/T5, Cable loss reduction etc.	-	5.0	22	23	2008

Environment and Safety:

The unit is committed to preserve its environment and safety. We have well-established safety and environment policy. Details of it are as follows

a) Water effluent:

Effluent from various section / plant are led to effluent treatment plant. Effluent treatment plant consists of primary, secondary and tertiary treatment. Floating matter from effluent is separated in oil and grease tray and taken to equalization tanks. Equalized effluent is neutralized to pH 6.5 to 8.5,and taken to primary clarifier, where suspended solids are separated. Neutralized effluent is biologically treated in two stage bioreactors. Sludge generated always biological treatment is separated and dried clear liquid meets CETP norms specified by GPCB.

Our treated effluent is further treated in common effluent treatment plant of vapi industrial estate.

b) Air:

For controlling pollution following facility are provided

- For gaseous pollutant from process suitable scrubbing system are provided.
- Chimney of adequate height as per norms are provided for all utility like boilers, Power plants and thermic fluid.
- Process stacks and utility stocks are monitored by our environmental cell third party environment auditors and GPCB officials
- Ambient air is monitored at different location within the factory.

c) Solid waste:

All hazardous waste are identified and treated as follows

- Process waste, used filter cloth and cotton waste, oil and grease from ETP are incinerated.
- ETP waste and incinerated ash will be disposed off to TSDF site managed by M/S Vapi waste & effluent management Co. Ltd., Vapi.
- Used oil incinerated and sold as per GPCB guidelines.
- Barrels/Bag/containers/liners of hazardous material will decontaminated and disposed off/incinerated as per GPCB guidelines.
- Spent catalyst is returned back to supplier for regeneration