INDUSTRIAL ORGANICS LIMITED

Industrial Organics Limited (IOL), is a chemical manufacturing industry located in Barnala in Punjab. IOL began with a small project of Rs. 650 lacs to manufacture 4500 TPA of Acetic Acid and has now diversified into a multi product company having the facility to manufacture 33000 TPA of Acetic Acid, 23100 TPA of Ethyl Acetate, 8250 TPA of Acetic Anhydride and 600 MTPA of Ibuprofen.

Industrial Organics Ltd. Has reached the dizzying heights of success through sheer determination, dedication and hard work leading a team of able Institutional Builders, development Coaches, frontline Entrepreneurs and Associates.

Having worked single mindedly, since inception in 1986 for developing and manufacturing effective products, the company has attained an undisputed market leadership in its product range. The Company has a strong and growing presence in the alcohol based industry in India and facilitates the growth of Indian Industry and has made reputed place in the manufacturing of bulk drugs.

Quality is not just what one puts in the products, but what one gets out of the products. IOL adopts the most up to date technology for manufacturing, processing and quality control.

For a company like IOL, the search for innovative products is an ongoing one, driven by intensive R&D.

ENERGY MANAGEMENT POLICY

To procure and manage energy supplies and their use in the most cost effective manner consistent with the industry's wider objectives and the resources available.

The industry will increase energy efficiency by:

- Adopting best energy management practices,
- Regularly monitoring energy use
- Reporting quarterly on energy use to staff and at Management Board meetings
- Establishing an Energy Management organization structure
- Encouraging Energy Managers of significant facilities to initiate Energy Management Committees and/or Energy Champions for their facilities
- Ensuring that new appliances, equipment, and building projects are energy efficient
- Identifying all areas of opportunity for improved energy performance via detailed consultation with staff
- Facilitate developing and implementing an action plan
- Checking the effectiveness of the energy saving measures, periodically document any changes in procedures resulting from process improvement, and make comparisons with objectives and targets.

OBJECTIVES

The Energy Management Policy seeks to:

• Avoid unnecessary expenditure;

• Improve cost effectiveness in producing a comfortable working environment;

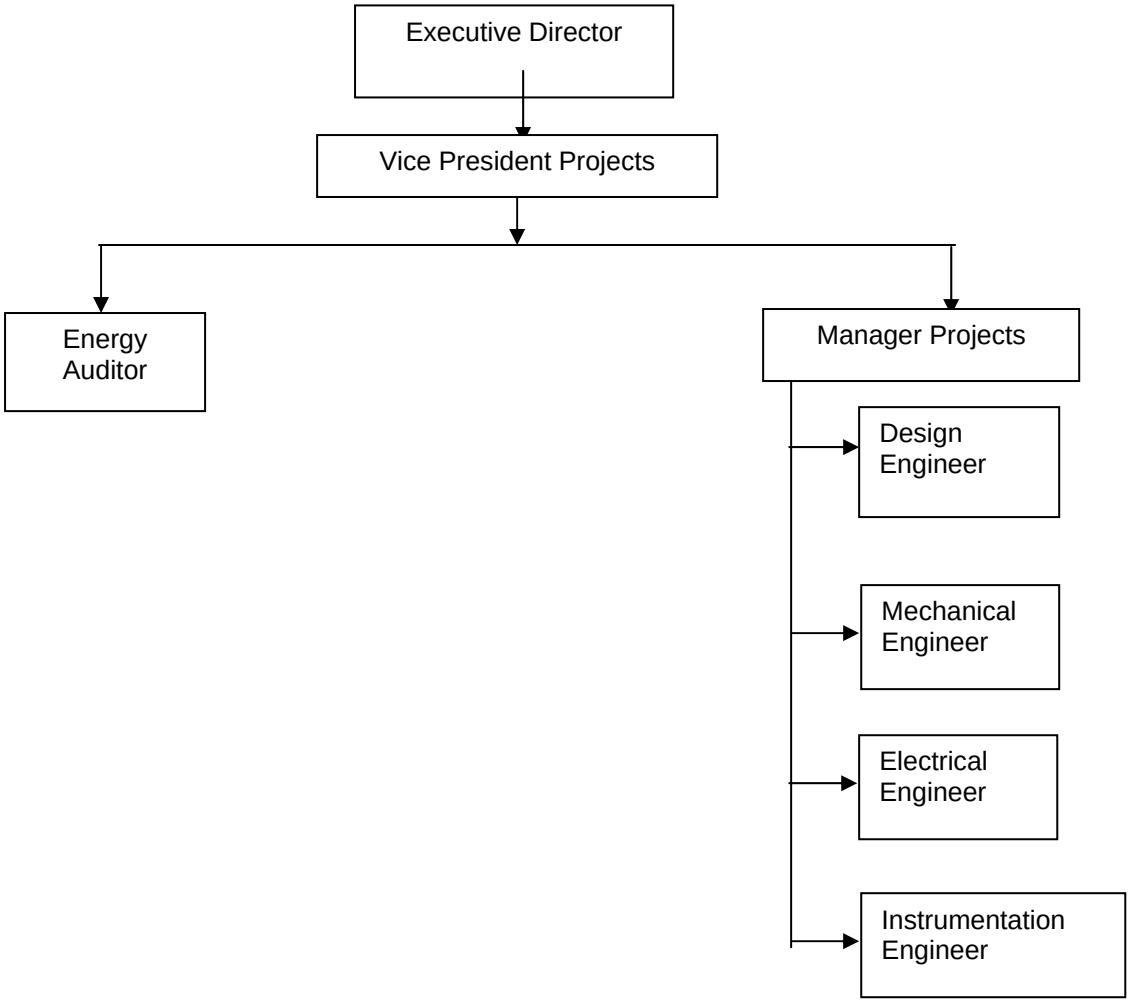
• To increase awareness of energy issues among members of the Industry and encourage 'energy responsible' attitudes.

MANAGEMENT ARRANGEMENTS

• The Policy will be determined by, and implemented under the authority of, Energy Conservation Cell.

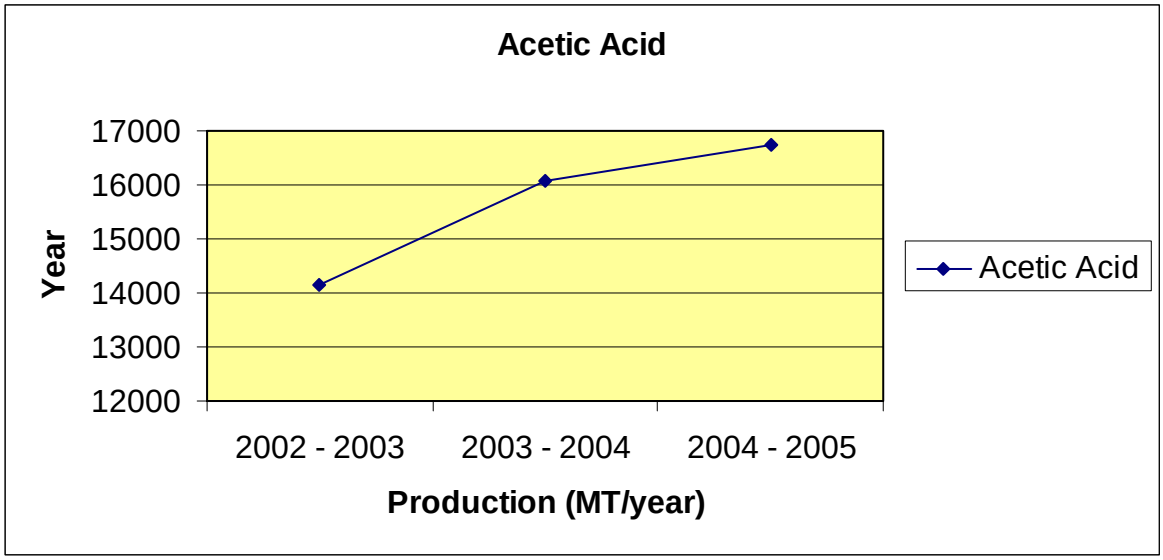
• The Environmental Policy Working Group will be responsible for advising Energy Conservation cell on these matters.

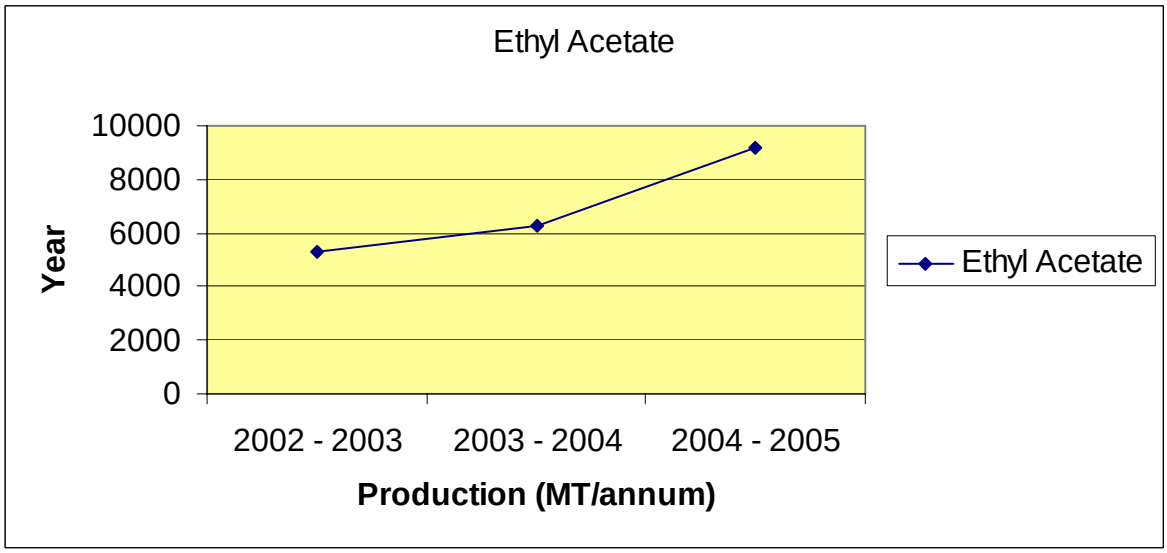
• The Environmental Policy Working Group will have a complementary role in energy and water management use among a wider range of environmental issues, and will have a key role in increasing awareness of such issues in the Industry.

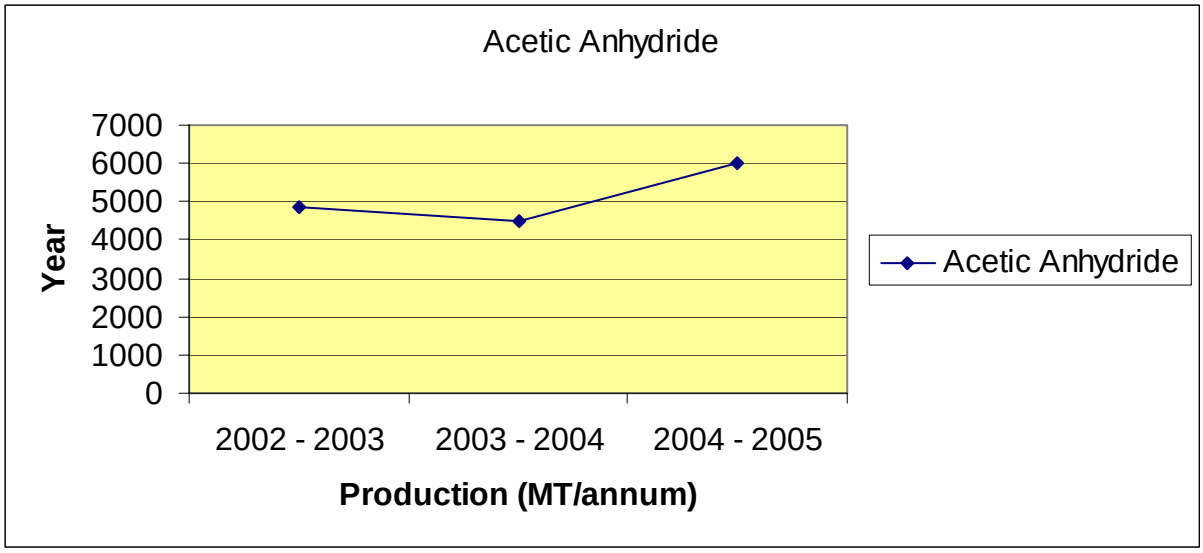


Values and Graphs of Important Parameters:

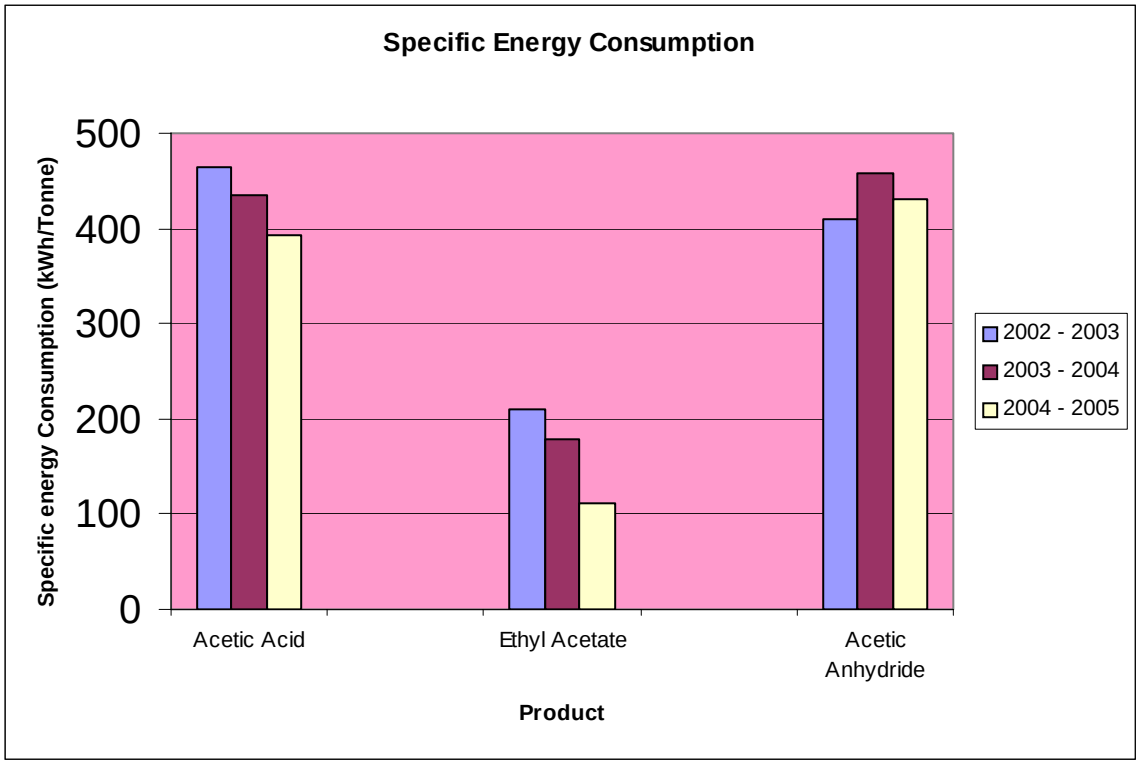
Productions (TPA)	2002 - 2003	2003 - 2004	2004 - 2005
Acetic Acid	14146	16067	16737
Ethyl Acetate	5321	6300	9150
Acetic Anhydride	4842	4500	6000



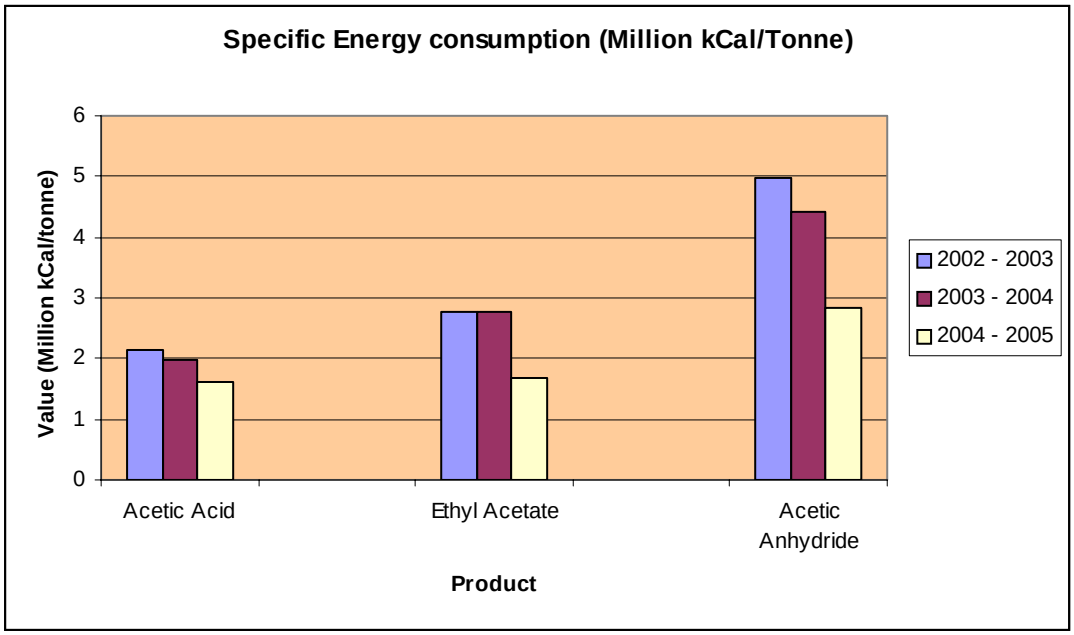



Acetic Anhydride
7000
6000
5000
4000
3000
2000
1000
0
Year
2002 - 2003
2003 - 2004
2004 - 2005
Production (MT/annum)
Acetic Anhydride

Specific Energy Consumption (kWh/tonne)	2002 - 2003	2003 - 2004	2004 - 2005
Acetic Acid	464	434	393
Ethyl Acetate	210	178	111
Acetic Anhydride	410	457	430



Specific Energy Consumption (Million kCal/tonne)	2002 - 2003	2003 - 2004	2004 - 2005
Acetic Acid	2.14	1.97	1.63
Ethyl Acetate	2.78	2.78	1.68
Acetic Anhydride	4.98	4.41	2.84



Major Energy Conservation Projects Implemented during Year 2004 – 2005

1. **Installation of Plate Type Heat Exchangers for recovering Heat from Plant:**
   In total 5 no. Plate Type Heat Exchangers supplied by M/s Alfa Laval (Pvt.) Ltd. have been installed in the plant. These Heat Exchangers have hot process stream on one side and cold hot stream on the other side. The two streams exchange heat with each other thus reducing load on further heating and cooling equipments in the process.
   Total No. of Plate type Heat exchangers installed = 5
   Total Cost of Heat Exchangers = Rs. 13.0 lacs

   Steam Saved = 20 TPD = 6600 TPA
   This is equivalent to 4356.0 Million kCal of heat per annum
   Total amount saved (@Rs. 340/T steam) = Rs. 22.44 Lacs per Annum
   Payback period = 208 days

2. **Installation of Variable Frequency Drive**
   The working of VFD system is based on the converter and inverter modulus system. In converter section 3 ϕ AC supply of standard frequency is being converted in DC with the help of Thyristor based rectifier and after that variable DC gets converted in variable frequency of AC voltage with the help of Pulse Width Modulated (PWM) inverter.
   This variable frequency accordingly varies the speed of induction motor. Now to make the change automatic, we need a reference point or say feedback for converter system that we can supply from Differential Pressure Transmitter measuring flow, level etc and giving 4-20 mA analogue supply. Hence VFD can be used to control flow, level etc with the help of motor because it also has an inbuilt PID function for continuous process control. Same application for Air Blower, air control in which no ventilation of excess air is required because it will provide as much controlled quantity as will be required.
   Power Consumption before installation of VFD = 12000 kWh per day
   Power Consumption after installation of VFD = 9500 kWh per day
   Total power Saving = 2500 units per day = 825000 kWh per annum
   Power Saving (@Rs.4.0 per kWh) = Rs. 33.00 Lacs
   Investment on VFDs = 14.00 Lacs
   Payback = 155 days

3. **Replacement of two no.s Reciprocating compressors with Screw Type Compressors**

   Atlas Copco Compressor (Screw type) has been installed for supply of Compressed Air to Acetic Acid Plant. Atlas Copco Compressor is single stage, oil-injected screw compressors driven by electric motor and enclosed in a sound-insulated bodywork.

Due to its design and screw type compressing system, this compressor is efficient for Power Saving and also requires less maintenance.
Atlas Copco compressor is most efficient in today's date and gives the best results for power saving.
Air is drawn through the filter and unloader is compressed in compressor element. Compressed Air and oil are discharged through check valve to air receiver/ oil separator in which oil is separated from compressed air. The air is blown through minimum pressure valve to air cooler. The cooled air is discharged through condensate trap and outlet valve towards the air net.
Atlas Copco compressor comprises of regulating system, which keeps the net pressure within the programmable pressure limits by automatically loading and unloading the compressor depending on the air consumption.

Power Consumption with Reciprocating Type Compressor = 5000 kWh per day per compressor
= 10000 kWh per day for 2 comp.

Power Consumption with Screw Type Compressor = 3500 kWh per day per compressor
= 7000 kWh per day for 2 comp.

Power Saving = 3000 units per day = 990000 kWh per annum
Savings (@Rs. 4.0 per kWh) = Rs. 39.60 Lacs
Cost of One Atlas Copco Compressors = Rs. 14.0 Lacs
Cost of two Atlas Copco Compressors = Rs. 28.0 Lacs
Payback = 254 days

4. **Installation of Hot Water Vapor Absorption Machine for Chilled water Generation:**

Earlier the Chilled water was generated by conventional chilled plants using shell and tube heat exchangers and Ammonia for Absorption.
The industry has shifted to Hot Water Vapor Absorption Machine supplied by Thermax India Ltd. This chilled water machine uses hot water instead of steam for chilled water generation. The Hot water is generated from the process and this waste heat is recovered for operation of the Vapor Absorption Machine. Thus utilizing waste heat and reducing steam consumption.

Capacity of one Hot Water Vapor Absorption Machine = 220 TR
Number of hot Water Vapor Absorption Machine = 440 TR
Cost of Machines = Rs. 80.0 lacs
Steam consumed before installation of HW VAM = 50.0 TPD
Steam consumed after installation of HW VAM = NIL
Savings (@Rs.340/T steam) = Rs. 56.1 Lacs
Payback = 510 days

5. **Insulation of all Cold and Hot Stream Pipelines in Plant:**
   The pipelines and equipments in the plant were provided with no proper insulation system that caused huge energy loses which were indirectly felt from the increase consumption of utilities available (Steam, Cooling water etc).
   Materials or combination of materials, which have air or gas, filled pockets or void spaces that retard the transfer of heat with reasonable effectiveness are thermal insulators. The process industry is full of pipelines and equipments, which have different temperature requirements i.e. some, require very high temperature while some require maintenance of low temperatures. Convection is the best mode of heat loses in this case. Pipelines and equipments directly exposed to the surroundings tend to loose heat thus affecting the process side, which then demand more utilities (Steam, Cooling water etc). Conservation of heat and thus the total energy conservation is an economic necessity, and thus insulation has to be provided to the hot surfaces in order to reduce heat losses.
   Steam Saving = 24 TPD = 7920 TPA
   Steam Saving in Cost (@Rs. 340 per T) = Rs. 26.92 Lacs
   Investment = Rs. 8.0 Lacs
   Payback = 107 days

6. **Furnace Oil Saving by small modification in the Furnace Burners:**
   In Acetic Anhydride Plant, the Furnace uses furnace oil for heating purposes. By small modification in the placement of the burners the oil spillage was stopped and besides this the heat losses were also avoided.
   The total saving in Furnace Oil has been 100 L per day
   Furnace Oil Saved = 33000 L per annum
   Saving of Furnace oil (@Rs. 11.42 per L) = Rs. 3.76 Lacs
   Zero Investment was done in the plant.

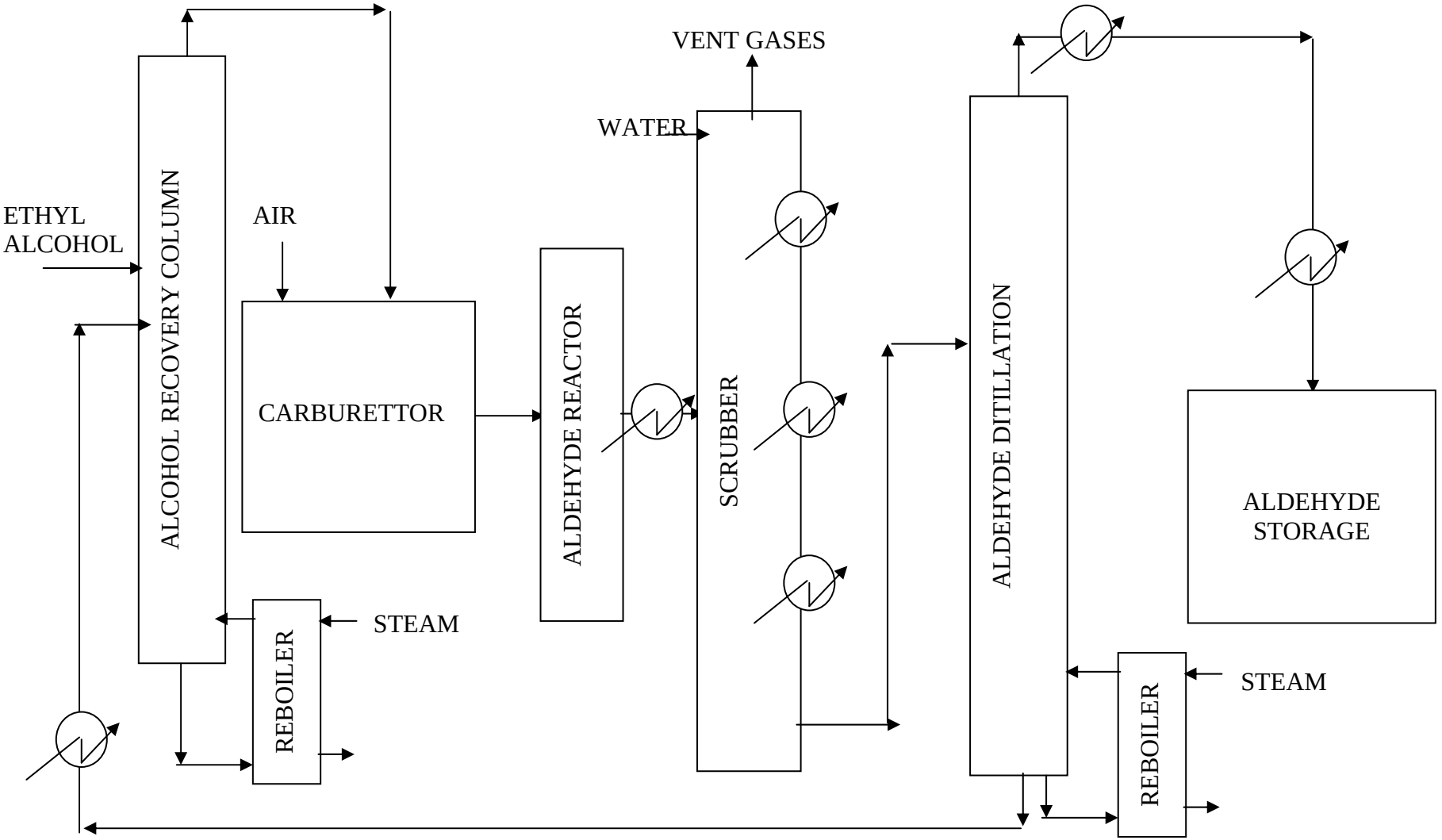
Besides this number of other small but significant energy saving projects like; Replacement of Faulty Steam Traps, Steam Distribution Header Redesigning, Control of leakage and seepage in Process and Utility Pipelines have been implemented in the year 2004 – 2005.

In the year 2005 – 2006, the company has planned for the following and the same is under implementation:

- **Cogeneration system using high pressure 4.0 MW steam turbine (back pressure) for captive power generation and process steam for heating.**
- **Replacement of inefficient Furnace with new Thermax designed furnace.**
- **Utilization of Vent gases (Constituting of nitrogen gas) for vacuum in process. Etc.**

The estimated cost of the above projects is Rs.1500 Lacs and the estimated payback is 24 months

PROCESS FLOWSHEET ACETALDEHYDE PLANT



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