

HASSAN DAIRY, A UNIT OF HASSAN CO-OPERATIVE MILK PRODUCERS' SOCIETIES' UNION LTD., INDUSTRIAL ESTATE, INDUSTRIAL ESTATE, HASSAN – 573 201. KARNATKA.

UNIT PROFILE:

HASSAN CO-OPERATIVE MILK PRODUCERS SOCIETIES UNION LTD, was established with an aim to support small, marginal farmers and agricultural labourers through dairy development. As the farmers are not sure of receiving a remunerative price for their agricultural produce more and more farmers are taking up dairying as their main occupation rather than subsidiary occupation for their livelihood. The milk union is committed to accept all the milk offered by the milk producers in the milk shed area and hence there is a considerable increase in milk procurement during 2004-05, 2005-06 & 2006-07. We at Hassan Milk Union believe that it is a social obligation on part of the union to pay remunerative price to the farmers and hence we have entered new and far off markets like ,Pune and kolhapur in Maharastra, Trivendrum and Kollam in Kerala.



We also believe that it is a **Co-Operative Social Responsibility (COSR)** to conserve and manage energy efficiently in order to bridge the gap between energy supply and demand.

Hassan dairy, is a unit of Hassan Co-Operative Milk producers. Union Limited registered under the Karnataka co-operative act and was commissioned during the year 1982. The rated capacity when commissioned was 60 TKPD (Thousand Kgs per day) and was subsequently expanded to 120 TKPD by NDDDB under the turn key project in the year 2000. The Union has under its jurisdiction 2 chilling centers and 1 mini dairy. The dairy receives milk in cans from dairy co-operative societies

spread over in the districts of Hassan and Chickmagalore and also through tankers from Bulk Milk Coolers,(installed in Rural areas) chilling centers and mini dairy situated in the districts of Hassan, Chickmagalore and Kodagu.

Bulk Milk Coolers and Automatic Milk Collection units have been installed to improve the quality and transparency. It is targeted to handle more than 50% of the milk through Bulk Milk Coolers by 2010.

Hassan Dairy is an ISO 9001:2000 certified (by M/S TUV) organization committed to implement Quality Management System and efforts are on to implement HACCP(ISO:22000) at the earliest.

The dairy processes the milk and packs the following qualities of milk:

1. Toned milk with 3.1% Fat & 8.5% Solids not fat
2. Standardised Homogenized milk with 4.6% Fat & 8.5% Solids not fat
3. Double toned milk with 1.5% Fat & 9% Solids not fat

In addition, the following milk products were manufactured during the year2006-2007.

* Ghee	324.40 TL
* Curd	1690.37 MT
* Peda	13.97 MT
* Butter milk	609.07 TL

The dairy markets milk and milk products under the brand name “NANDINI” which happens to be registered brand name of “Karnataka Milk Federation”, the apex institution at the state level.

Hassan dairy is assisted both technically and financially by National Dairy Development Board, Anand, Gujarat under operation flood and vision schemes.

The Commitment:-

Hassan Dairy considers energy management as a team approach and has included this under the “**TOTAL QUALITY MANAGEMENT(TQM)**” Wherein a continual approach has been bestowed to sustain the achievements made with due stress on improvement of product quality.

Cross functional teams were formed and the philosophy of energy management and quality improvement on a sustainable basis were inculcated among all the

employees by way of display of posters, lectures and discussions. HRD experts were also invited to help building up of leadership qualities amongst employees. The dairy also practices the 5 “S” house keeping principles with due stress on Kaizen-a continual improvement.

ENERGY CONSUMPTION:

The energy consumption in the years 2004-2005, 2005-2006 and 2006-07 along with the milk handled is as follows:

DESCRIPTION	UNIT	2004-2005	2005-2006	2006-2007
Milk Handled	M T	73428.09	80346.25	85937.82
Total energy cost	Rs in Lakhs	97.902	101.261	96.459
Energy cost v/s Manufacturing expenses	Percent	11.82	14.29	13.98
Total energy consumption – Electrical	Lakhs kWh	17.770	18.024	17.160
Specific energy consumption – Electrical	KWh/Tonne	24.201	22.434	19.969
Total energy consumption – Thermal	Million Kcals	2336.46	2539.70	2526.17
Specific energy consumption – Thermal	Million Kcals/Tonne	0.03182	0.03161	0.02940

Energy Profile:-

The energy profile of the dairy includes Electricity and Firewood mainly. HSD is used for power generation. The energy cost is 13.98% of the total manufacturing cost of the dairy.

The total connected load is 750 KW and the contract demand is 300 KVA. There are standby motors to take over in case of breakdown or preventive maintenance.

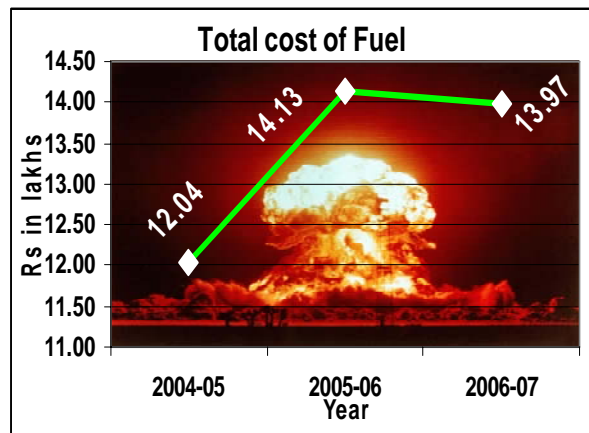
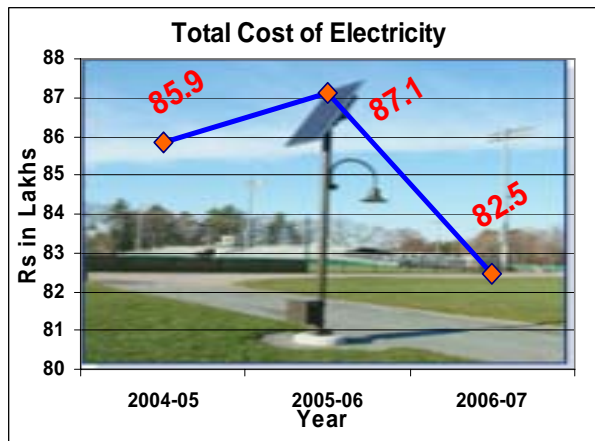
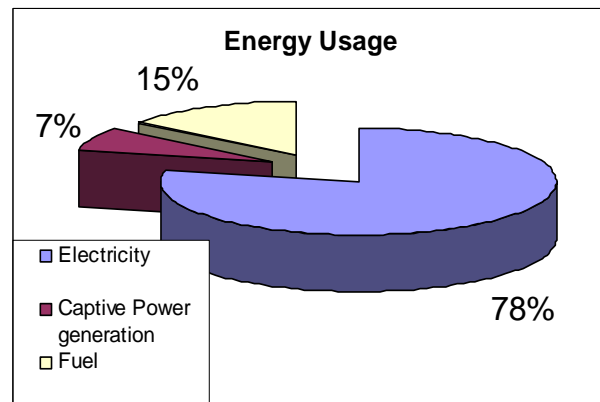
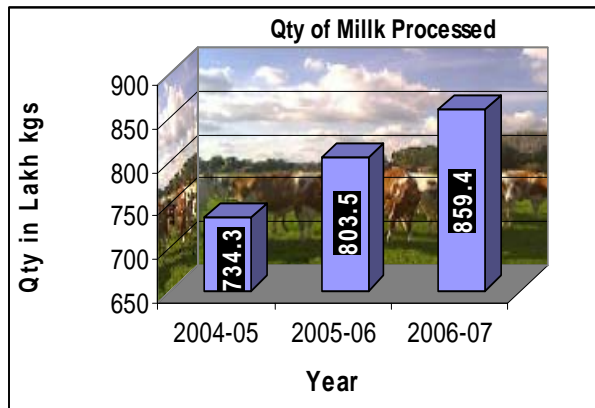
Electricity occupies the top position in the energy profile, since 78% of the total energy cost is spent on electrical energy. 70% of the total electrical energy is consumed for operating refrigeration system. Hence, major thrust was given in conserving energy in this area.

Thus, the connected load in this section 258 KW. The total running hours of ammonia compressors and chilled water pumps ranges between 20-23 hours per

day. At any given point of time 3 ammonia compressors and 4 chilled water pumps will be in operation while the rest are utilized as standby.

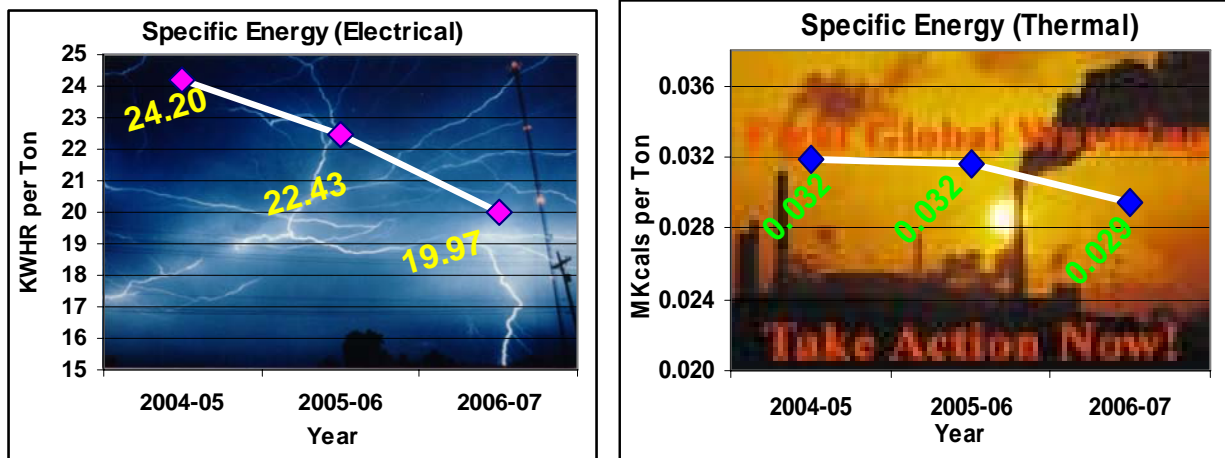
Firewood occupies second position in energy profile. The firewood is purchased from the Karnataka state forest department who are very judicious in deforestation keeping in view the ecological balance (Only eucalyptus is being supplied). The firewood constitutes 15% of the total energy. The major user of this energy is the milk processing section wherein more than 75% of the thermal energy is utilized.

Energy consumption analysis: (Base year 2005-06)



- ✓ **Increase in milk procurement : 6.95%**
- ✓ **Reduction in KWHr consumption : 4.79%**
- ✓ **Reduction in quantity of fuel used : 7.90%**
- ✓ **Reduction in total cost of energy : 4.74 %**

The above reduction in over all utilization of energy despite increase in milk procurement is mainly due to the concerted efforts of TEM core team and sub-section teams by way of monitoring the consumption on a continuous basis.



The specific energy consumption has also reduced considerably over 2005-06.

- ★ Reduction in Specific energy (electrical) : 10.99 %
- ★ Reduction in Specific energy (Thermal) : 6.99 %

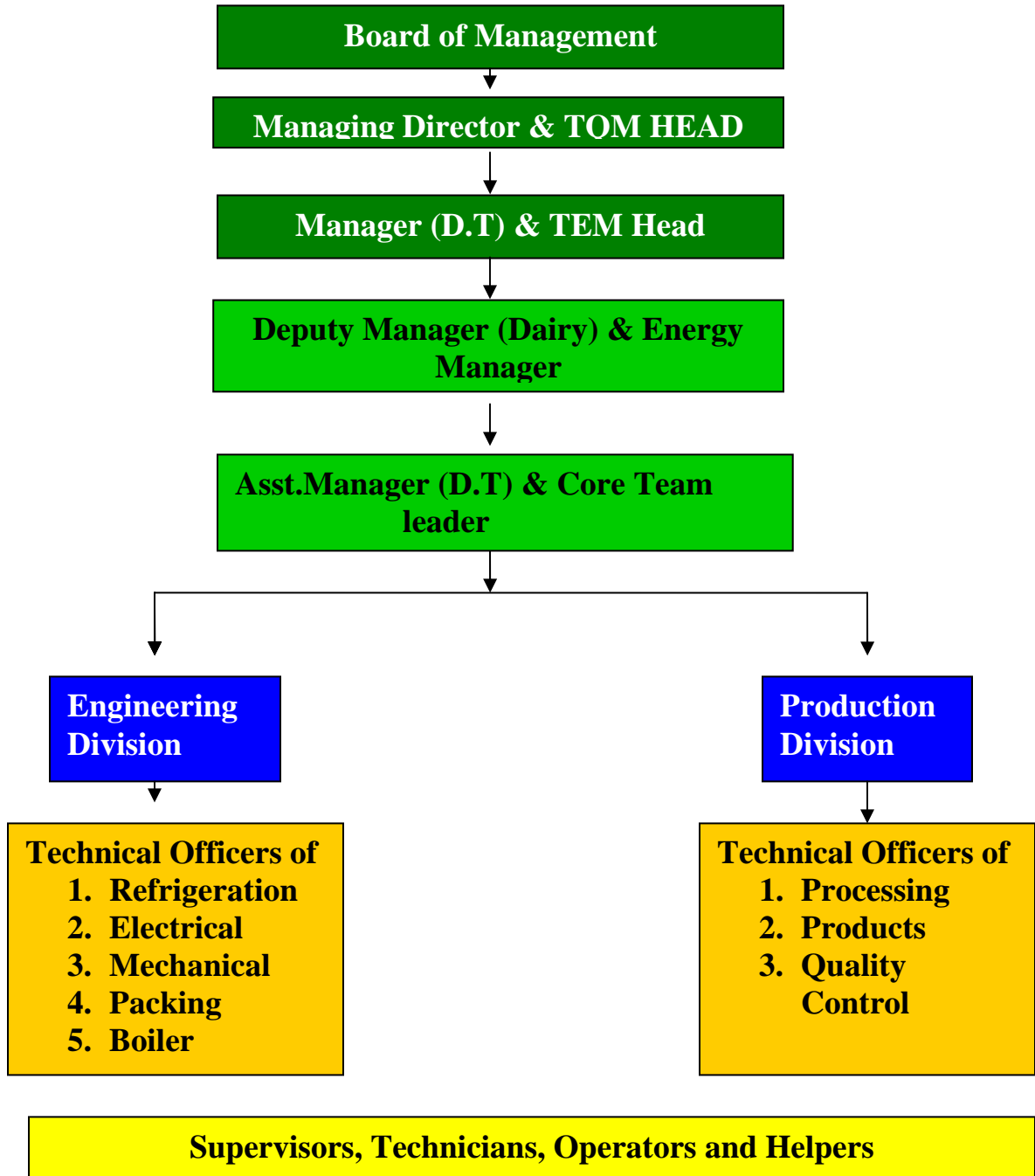
Percentage reduction compared to the planned target :-

- specific energy (electrical) : 8.15 %
- specific energy (Thermal) : 0.61 %

The energy conservation measures implemented during the year has contributed to the reduction, namely

- A. Installation of Heat recovery unit for refrigeration system
(Hassan Dairy is the first unit to install this technology for the entire refrigeration system amongst KMF unions)
 - B. Installation of Mechanical milk packing machines in place of energy intensive pneumatic machines.
 - C. Installation of energy efficient milk pasteurizer (with 90% regeneration efficiency)
- (Details of the above are narrated in Annexure – B)

Organization Profile



Energy saving projects implemented during 2006-07:

1. Installation of Heat recovery unit(De-super heater) in Refrigeration system.

Refrigeration and boiler constitute more than 65 -68 % of operating energy cost of dairy. As much as dependability of these systems is important, operating plant efficiency and consistency in performance is also required to limit processing cost of milk. Built-in improvement in operating efficiency constitutes major saving opportunities in dairy utility system.

De-superheater installed in ammonia circuit between compressor discharge and condenser, removes high temperature gas heat and passes entire gas to condenser to condense similar to normal refrigeration cycle. Gas heat removed in de-superheater heats circulating water to 55⁰ – 70⁰ C. This hot water is stored in 10KL hot water tank to meet fluctuating demand of hot water in plant . The hot water is pumped to an over head insulated tank (2KL) and then distributed to all the user sections including boiler.



Installed capacity	120 TR nominal
Operating load	90 TR
Type of savings established	
Free Hot water generation	19.45 kL per day @ 62 ⁰ C
Compressor operation	Reduced operating hours :3/4 an hr. per day
Condenser operation	Operating one 30TR condenser and Switching off 60TR condenser when the load is only 60TR

Avoided investment	90 TR compressor working with 60 TR evaporating condenser. Avoided additional 30 TR condenser installation (as the existing condensers are 11 years old) .
	Saved 1250 liters /day evaporation loss of water in cooling tower
Savings achieved	
Fire wood savings (Boiler efficiency : 54%)	Rs. 1.949 lakh per year
Electricity saving	Rs 1.521 lakh per year
Total saving	Rs 3.47 lakh per year
Avoided investment	30 TR condenser installation = Rs. 4.0 lac
Investment for de-superheater system	Rs. 7,93,000 /-
Simple Pay back	2.2 years
Benefits that are not quantified above	
1. Reduced boiler operating hours(operation of ID fans, feed pump and radiation/line losses).	
2. Reduced or avoided maintenance of boiler	
3. Reduced heat loss and CO ₂ emission to atmosphere	

2. Replacement of energy intensive Pneumatic packing machines with Mechanical machines:

The old and energy intensive pneumatic milk packing machines(03Nos double head) have been replaced with energy efficient mechanical machines(with PLC). The pneumatic machine requires a constant pressure of compressed air at 6 kg/cm². The mechanical machine does not require compressed air for its operation.



Pneumatic packing machine



Mechanical packing machines

The operation of 200CFM air compressor driven by 50Hp motor and 5Hp cooling water circulation pump was discontinued.

Average operation / day	9 hrs
Electricity Savings per year	1.347 lakh KWHr
Savings per annum	Rs. 6.09 Lakh
Investment (for three machines)	Rs 17.97 lakh

3. Installation of Energy efficient 10KLPH Milk pasteurizer:

Milk pasteurizers plays an important role in dairy industry. Entire quantity of milk received is pasteurized before it reaches the customers. Regeneration efficiency of the pasteurizer and the temperature of pasteurization are the major contributors to cost of milk processing. Normally the temperature of pasteurization is set by the operator higher than the prescribed standard to have 'safety cushion'. The Temperature of the pasteuriser can be controlled as per the set norms if the pasteuriser has auto controls. Reduction in pasteurization temperature will considerably reduce the required heat load of cooling and heating medium. We could reduce the pasteurization temperature by 4°C after continuously monitoring the bacterial count in the processed milk.



Old Pasteuriser



New pasteuriser

Comparison of Energy efficiency features:

Particulars	Old Pasteuriser	New pasteuriser
Through put	8KL/Hr	10KL/Hr
Milk to chilled ratio required	1:3	1:2
Milk to Hot water ratio	1.2	1:1.2
Connected load	7.5 KW	5.5 KW

3. AC/ Solar hybrid LED street Lighting System:

The Dairy requires street lights through night as there will be movement of vehicles carrying milk. At present there are 42 bi-poles in the premises fitted with conventional fluorescent tubes of 40W X 2 X 2(160W) each. The average electricity bill is around Rs 2.4 lakh per year.

The TEM team initiated a renewable energy project for street lighting. Two rounds of discussions were held and it was decided to have an expert's opinion.

Sri. Uday, Solar Energy Expert, was invited to carry out a study and as per the report, solar panels with 20WP, 25 AH sealed maintenance free batteries can be installed using the existing poles either as standalone or with centralized system.

Total estimated investment	Rs 8.92 lakh
Envisaged savings / year	Rs 2.4 lakh
Pay back with depreciation 80%	Rs 7.13 lakh
Net investment	Rs 1.79lakh
Savings over 15 years	Rs 36 lakh

Projects proposed for the year 2008-09

1. Replacement of Fire wood boiler with multi-fuel boiler (agri waste-coffee husk, rice husk, bagass, coconut shell etc., as fuel):-

This project was envisaged to be implemented during the year 2006-07, due to financial constraints (as we had to provide funds for a new Dairy at Kudige, Coorg District) the same was postponed to 2008-09 and will be taken up under "Vision-2010"

The agriculture waste is available in the area at a cheaper rate are coconut shell, paddy straw/husk, bagass and coffee husk. We intend to procure the above fuel through our co-op. societies spread over three districts. Project proposal has already been submitted to NDDDB to change the existing boiler with high efficiency multi fuel boiler under Vision 2010. The proposed Multi-fuel boiler is estimated to consume additional electricity around 0.1702lakh Kwhr per year, as the multi fuel boiler needs additional Induced draught fan, shredder and conveyor, but the savings in fuel will offset the increased electrical consumption. Estimated savings is **Rs. 4.04 Lakhs**. Proposed investment is Rs. 15 lakhs.

2.Pre-Chiller for returned chilled water:-

The temperature of the returned chilled water from process to IBT ranges between 6-8 °C. Plate type chillers can be used along with Ice bank system to reduce power consumption. The returned chilled water from the process is first

chilled in plate type chillers (instead of directly pumping to Ice bank tank) using vaporised ammonia (at -10°C) as cooling medium. The returned chilled water would be chilled to at least 4°C and the heat gain by ammonia ranges between $4-5^{\circ}\text{C}$. Approximate power saving of 0.3 BKw/TR can be achieved. At -5°C the compressor can handle more quantity of ammonia delivering more capacity than at -10°C .

If a nominal 15 hrs. of operation is considered the total savings per year would be 52560 Kwhr resulting in saving of **Rs. 239670** per annum. The proposed investment is **Rs. 6 lakhs**. The payback period is **2.5 years**.

The Environment:

The Dairy has a well established effluent treatment plant with recent technology. It has an un-aerobic static bed digester(UASB) with extended aeration system. The UASB digests 60% of the bio-degradable constituents of waste water and methane gas is generated. We are looking for a safe technology to utilize the methane gas for operating generator.

The most of treated water is being utilized in fodder plots and the rest is used for our teak plantation(around 2500). Fodder plots have been developed to cater free fodder slips to our milk producers.



Before



After



UASB Digester



Teak Plantation



New Sand filtration beds under construction.



New solid waste disposal yard

The operation and maintenance of the waste water treatment plant has been outsourced to M/S Chembio- tech lab, Bangalore (Eco consultancy firm) on annual contract basis.

Two nos of sand filtration beds were constructed (at a total cost of Rs 2.23lakhs) to filter the treated water in order to reduce the suspended solids before it goes to the sprinklers.

Solid Waste Management:

The solid waste management is a difficult affair in a dairy as we generate lot of bio-non degradable wastes like waste polythene film and polythene bags. A solid waste disposal yard was constructed at a total cost of Rs 1.31lakhs to segregate and store solid waste. On annual contract basis this waste is disposed off to recyclers.

Actions have been initiated to obtain the EMS 14001:2004 certification and documents are being developed with the help of consultant.

The Safety:

The on-site emergency plan is in place. All the safety measures suggested by the statutory authorities like Inspectorate of Factories and Boilers & Inspectorate of Electrical Installations have been implemented. The statutory requirements as per Karnataka State Prevention and Control of Pollution Act 1981 have been fulfilled. There has been no incidence of accidents from past 6 years.

Green Energy Project:

Pongamia oil for Diesel Generators:

Trials were conducted to operate Diesel Generator with an admixture of diesel and pongamia oil at a ratio of 85:15 . The trials were encouraging. The present

cost of diesel is Rs.36.36/ltr. Pongamia oil is available locally for commercial use at Rs.29/ltr. As Jathropa oil is not available for commercial use in our milk shed area, we intend to use pongamia oil as an admixture with diesel as we do not have facilities for esterification / transesterification to convert the same to bio diesel.

We are in touch with Dr. Balakrishne gowda, coordinator, Bio-diesel park, Hassan, for technical guidance. Preparation of a comprehensive action plan is underway.

AWARENESS PROGRAMS

1) For Employees:-

Sri.V. Kanitkar well known energy consultant and auditor was specially invited to study the refrigeration system. The teams had lot of insights regarding the importance of efficiency analysis of refrigeration and steam generation systems during the discussion .

Awareness and refresher programs were conducted during 2006-07 to all the members of the core team and sub section teams by eminent faculty from leading energy consultancy firms in the field of Boilers, and refrigeration system.

‘KAIZEN’ linked suggestion box system is in place in order to encourage and implement innovative energy saving ideas by the staff. The management has agreed to reward a cash prize of Rs 5000/-(max) for those motivated employees who provide innovative, implementable ideas and their name with photograph will be displayed in the notice board.

2) **CHILDREN EDUCATION PROGRAMS:**

Awareness programs were organized for school children regarding energy conservation with a power point presentation both at schools and our own premises. As per the available records 3469 children(from 56 Schools) and staff visited Hassan Dairy as part of their educational tour .Children were educated regarding need for energy conservation along with health and nutritional aspects of milk and milk products with the help of audio visual aid. The cartoon film “Bijlee” screened was appreciated by all the children.

The Management is generous enough to sanction funds for printing 200 flex banners(every year) with energy conservation slogans in local language for schoolchildren. The said banners were distributed to schools and to our retailers located near the schools.



EC awareness banners for school children.



EC awareness programme



Screening of cartoon film "Save Bijlee"

3) FARMERS EDUCATION PROGRAMS:

Under Total Quality Management Programme we have given more thrust to Clean Milk Production (CMP). As TQM is a philosophy, we have taken up farmers education / awareness programs through our co-operative societies. Along with CMP, awareness was also created regarding the following aspects.

- * Efficient use of electrical energy
- * Use of non conventional / renewable energy like solar, gober gas
- * use of smokeless chulas.
- * Use of CFL lamps in place of incandescent bulbs.

4) AWARENESS PROGRAMS AT COLLEGES

- * A technical paper was presented regarding "Total Energy Management issues and challenges" at the prestigious B.N.M.I.T Institute of Management Studies, Banashankari, Bangalore by our Energy Manager Sri. G.S.Govindaraju.(on their invitation)