

## Energy Conservation Achievements 2003-04

Steam was supplied to the UHT plant from the boiler located in the main dairy, which is 350 mtrs away from the UHT plant. The UHT plant required high pressure of 6 Kg/Cm<sup>2</sup> for its processing activities. The steam pressure drop of 2 Kg/Cm<sup>2</sup> was observed at the UHT plant. Hence we are forced to keep the pressure of the boiler at main dairy at 10Kg/Cm<sup>2</sup> and this resulted huge steam losses. In order to overcome this a new boiler of 2 MT/hr capacity was installed & commissioned at UHT plant. This resulted in a phenomenal saving of Furnace oil to the tune of 9.65 Lakhs in the first year itself.

### Future Plan

- |   |    |                            |
|---|----|----------------------------|
| • Savings potential identified, recurring annual. | -- | Rs. 180 Lakhs              |
| • Savings as % of energy bill.                    | -- | 63%                        |
| • Payback.  | -- | 8 Months                   |
| • One-time investment.                            | -- | Rs. 115 Lakhs              |
| • Implementation target.                          | -- | Dec 31 <sup>st</sup> 2004. |
| • Savings achievable.                             | -- | > Rs. 150 Lakhs            |

### Strategy Followed

- Use of external energy consultants.
- Identifying energy champions in each department to co-ordinate the energy projects.
- Training for employees on Kaizen, TQM & TEM for attitudinal change.
- Commitment of top management.
- Implementation of ISO : 9001-2000 Quality Management System.

### Energy Policy

**WE CONTINUOUSLY STRIVE TO IMPROVE OUR INTERNAL QUALITY AND OPERATING SYSTEM BY EDUCATING AND MOTIVATING WORK FORCE TO ACHIEVE HIGHEST PRODUCTION WITH LEAST ENERGY CONSUMPTION AND SAFE GUARDING ENVIRONMENT.**

## *The Organisation*

**Kolar Dist. Co-operative Milk Producers' Societies Union Ltd.,**

### **KOMUL: An Overview**

Kolar Dist. Cooperative Milk Producers' Societies Union Ltd., (KOMUL) is Karnataka's **highest** Milk Producing District organisation. It is a District level apex body of milk cooperatives, which aims to provide remunerative returns to the farmers by eliminating the middlemen and also serve the interest of consumers by providing **quality** Milk & milk products.

It consists of 1429 Dairy Co-operative Societies as primary members and 2.2 Lakhs members collecting 7.0 Lakh Kgs of milk/day with a weekly payment of 5 crores to the members having 47 Bulk Milk Coolers & 50 Community Machine Milking Parlours producing less microbial load high quality milk, which is comparable to International Standards. Dairy along with Chilling Cnetres [ First in Southern India ] has obtained certification for ISO : 9001-2000 Quality Management System and in the process of certifying HACCP, Food

Safety Management System. Marketing 1 lakh ltrs/day in retail packs and 35,000 ltrs of UHT milk, one and only co-operative dairy to have ASEPATIC packing unit in Karnataka.

Once the Dist. was named as Land of Gold & Silk, is making inroads in Quality Milk Production. It is KOMUL first installed "Bulk Milk Coolers & Community Milking Machines" at Society level in the state of Karnataka to get the quality milk required for UHT milk packed at Kolar Dairy under the brand name of **nandini 'Good-Life'**.

Presently Union has full pledged dairy at Kolar with an installed capacity of **2.0 LLPD**, and three chilling centers at Chinthamani, Sadli, & Gowribidnur with **1.0 LLPD** capacity each respectively. KOMUL started marketing of liquid milk in polythene sachets in entire Kolar District and parts of Bangalore City since 1994. The Mnemonic Symbol of NDDDB was adopted by the Union from April' 2002 to market the liquid milk. The custom packing of Set Curds production was undertaken for **GCMMF** under the brand name of **Amul Masti-Dahi** during Aug'2001.

KOMUL started the Energy Management Programme during the year 2001 in co-ordination with KMF, NDDDB & IRMA, Anand. Team - TEM was constituted and awareness among the staff was created to reduce the Energy cost to improve the profits. To further augment the energy savings the external energy consultant was appointed in 2004.

## PRE-COOLING OF MILK

Presently milk is being chilled by plate heat exchanger using chilled water from IBT. Trials have been conducted to pre-cool the milk by using water, which has been cooled, by tower cooler. In the same PHE water has been used to cool milk. The average temperature of milk recorded was 28°C. And the tempr of water was 22°C. Milk was cooled to 24°C

Following are the Calculations:

|   |   |                |
|---|---|----------------|
| Qty. of Milk Chilled  | : | 20,000 Lts     |
| Initial Tempr. Of Milk  | : | 28 deg. C      |
| Final Tempr. Of Milk  | : | 24 deg. C      |
| Drop in Tempr.  | : | 4 deg C        |
| Heat Removed from the Milk<br>(20000X 1.03X0.94X4)                | : | 77,456 KCal    |
| TR Saved  | : | 25.65 TR       |
| Specific Power Consumption<br>Of the Chilling Center              | : | 1.47           |
| Time Taken to Process   | : | 1.0 hr         |
| Electrical Power Saved<br>(25.65X1.47)                            | : | 37.70 Units    |
| Cost of power Saved<br>(Considering Condenser Water pump running) | : | Rs.140.00/hr   |
| Milk Received at CC 1.0 Lakh Lts/day<br>for One Year Savings      | : | Rs.2,55,500.00 |

In our opinion **pre-cooling of milk is not thought over anywhere in India.** The PHE can be designed for pre-cooling of milk in the Chiller. The above trials taken in one Milk Chilling Center handling 1.0 Lakh Lts/day. Considering two more chilling centers and main dairy chilling about 6.0 Lakh Lts/day savings amounts to Rs.15.33 Lakh per year.

**LIST OF ENERGY SAVINGS PROPOSALS IDENTIFIED BY - KOLAR MILK UNION, KOLAR**

| Area  | TEM No. & Savings Opportunity Area/Proposal Description  | Recurring annual savings Rs. Lacs | One time cost of Implementation Rs. Lacs | Pay back months |
|---|--|-----------------------------------|--|-----------------|
| <b>Boiler</b><br>Annual saving : Rs. 51 lacs;<br>Inv : Rs. 15 Lacs; PB : 4 months           | TEM B1 : Operate one boiler (JNM) instead of two boilers (JNM & AERW)  | 20.03                             | 2.50                                     | 1               |
|   | TEM B2 : Use low cost steam heating instead of electrical heating for preheating the furnace oil in AERW Boiler                          | 1.11                              | 0.40                                     | 4               |
|   | TEM B3 : Use solid fuel instead of furnace oil in old boiler (AERW Type)   | 29.80                             | 12.00                                    | 5               |
| <b>Compressors</b><br>Annual saving : Rs. 2.1 lacs;<br>Inv : Rs. 0.5 Lacs;<br>PB : 3 months | TEM C1 : Eliminate Air leakage losses  | 1.35                              | 0.50                                     | 4               |
|   | TEM C2 : Reduce operating pressure from present range of 7to 7.5 kg/cm <sup>2</sup> g to 6-6.5 kg/cm <sup>2</sup> g                      | 0.70                              | 0.01                                     | 0               |
| <b>Electrical</b><br>Annual saving : Rs. 16 lacs;<br>Inv : Rs. 34 Lacs;<br>PB : 21 months   | TEM E1: Use Electronic Ballast in Place of Conventional Magnetic Ballast in 2 x 40 Watts T L Fittings with energy efficient polylux lamp | 4.50                              | 4.80                                     | 13              |
|   | TEM E2 : Provide automatic time programmable controllers for street lights   | 0.36                              | 0.70                                     | 23              |
|   | TEM E3 : Providing energy saver for lighting system  | 1.88                              | 2.00                                     | 13              |
|   | TEM E4 :Judicious Max Demand control to minimize unwarranted payments to KEB   | 2.16                              | 0.36                                     | 2               |
|   | TEM E5 : Stop the Running 200 KVA DG and provide UPS to Reduce the operating Cost of UHT Plant   | 6.50                              | 22.00                                    | 41              |
|   | TEM E6 : Replace Panel indication Filament Lamps with energy efficiency LED  | 0.30                              | 0.98                                     | 39              |

| Area  | TEM No. & Savings Opportunity Area/Proposal Description   | Recurring annual savings Rs. Lacs | One time cost of Implementation Rs. Lacs | Pay back months |
|---|---|-----------------------------------|--|-----------------|
| <b>Refrigeration System</b><br>Annual saving : Rs. 39 lacs;<br>Inv : Rs. 34 Lacs;<br>PB : 10 months | TEM R1: Provide automatic capacity controls over the compressors, to consume less power   | 0.54                              | 0.75                                     | 17              |
|   | TEM R2 : Provide heat recovery system for refrigeration system  | 13.30                             | 6.00                                     | 5               |
|   | TEM R3 : Save energy by providing independent refrigeration system for the cheese cold storage  | 5.27                              | 6.00                                     | 14              |
|   | TEM R4 : Replace expensive electrical heating in curd incubating room with steam heating system   | 1.80                              | 1.50                                     | 10              |
|   | TEM R5 : Provide separate cooling tower water to pre cool the milk before chilling with IBT water   | 10.36                             | 9.50                                     | 11              |
|   | TEM R6 : Save energy by rectifying the cooling towers   | 7.43                              | 2.00                                     | 3               |
|   | TEM R7 : Provide dunnage in the deep freezer room   |                                   | 3.00                                     |                 |
|   | TEM R8 : Avoid Solar Radiation over the IBTs  |                                   | 5.00                                     |                 |
| <b>Process System</b><br>Annual saving : Rs. 39 lacs;<br>Inv : Rs. 34 Lacs;<br>PB : 10 months       | TEM Pr1 : Stop water wastage in crate washer system, to conserve water and thermal energy loss  | 0.30                              | -  | Immediate       |
|   | TEM Pr2 : Insulate the stainless steel piping carrying milk in process hall to reduce refrigeration load  | 3.69                              | 1.50                                     | 5               |
|   | TEM Pr3: Insulate the stainless steel piping carrying milk from process hall to UHT section   | 0.49                              | 1.50                                     | 37              |
|   | TEM Pr4: Provide independent Refrigeration equipment for Butter Milk storage room in place of ammonia cooler connected to main equipment to save energy | 1.74                              | 1.00                                     | 14              |
|   | TEM Pr5 : Avoid double processing of UHT milk to save energy  | 45.00                             | 15.00                                    | 4               |

| Area  | TEM No. & Savings Opportunity<br>Area/Proposal Description   | Recurring<br>annual<br>savings<br>Rs. Lacs   | One time<br>cost of<br>Implement-<br>ation<br>Rs. Lacs | Pay<br>back<br>months |
|---|--|--|--|-----------------------|
| <b>Pumps</b><br>Annual saving : Rs. 39<br>lacs;<br>Inv : Rs. 34 Lacs;<br>PB : 10 months | TEM P1 : Trim condenser and Cooling<br>tower water circulation pumps to<br>save wasteful energy          | 2.71   | 0.40   | 2                     |
|   | <b>Steam System</b><br>Annual saving : Rs. 18 lacs;<br>Inv : Rs. 4 Lacs;<br>PB : 3 months                | TEM S1 : Collect Condensate from 3<br>Identified Points in new Boiler House<br>for use With feed water | 0.40   | 0.10                  |
|   | TEMS2 : Stop wastage of steam<br>through traps and by pass in Peda<br>pan and butter melting m/c         | 0.94   | 0.23   | 3                     |
|   | TEM S3 : Arrest steam leaks through<br>valves gland, joints  | 8.78   | 0.60   | 1                     |
|   | TEM S4 : Arrest leakage of High<br>pressure water from new boiler  | 0.20   | 0.09   | 5                     |
|   | TEM S5: Arrest steam leakage into the<br>idle steam header between new<br>boiler and Old boiler          | 0.77   | 0.05   | 1                     |
|   | TEM S6 : Remove the unwanted<br>moisture separators with steam traps                                     | 0.65   | 0.08   | 1                     |
|   | TEM S7 : Improve the dryness<br>fraction of steam to get more heat<br>units                              | 0.83   | 0.34   | 5                     |
|   | TEM S8: Use temperature controllers<br>on can & crate washers to reduce<br>steam consumption             | 2.28   | 1.30   | 7                     |
|   | TEM S9: Use lower pressure<br>steam 2bar instead of 5bar to reduce<br>steam consumption in process areas | 3.56   | 1.50   | 5                     |
|   | <b>TOTAL</b>   | <b>179.7</b>   | <b>104.7</b>   | <b>7</b>              |

## CLASSIFICATION OF PROJECTS ACCORDING TO PAYBACK

| Payback period months | No. Of proposals | TEM Nos.  | Recurring Annual savings | One-time Investment Rs. Lacs | Average Payback months |
|-----------------------|------------------|---|--------------------------|------------------------------|------------------------|
| No Investment         | 1                | C2  | 0.7                      | 0.01                         | Immediate              |
| < 3 months            | 9                | B1, E4, P1, R6, S1, S2, S3, S5, S6                          | 43.87                    | 6.32                         | 2                      |
| >3 and < 6 months     | 9                | B2, B3, C1, PR2, PR5, S7, S9, S4, R2                        | 98.84                    | 37.33                        | 5                      |
| > 6 and <12 months    | 3                | R4, R5, S8  | 14.44                    | 12.30                        | 10                     |
| > 12 months           | 8                | E1, E2, E3, E5, E6, Pr1, Pr3, Pr4, R1, R3, R7, R8           | 21.88                    | 48.73                        | 27                     |
|                       | 1                | TEM : Training, Awareness, Motivation, Metering etc. budget | Enduring benefits        | 10                           | NA                     |
|                       | <b>31</b>        | <b>TOTAL GROSS</b>  | <b>180</b>               | <b>115</b>                   | <b>8</b>               |
|                       |                  | <b>Less : Overlap in savings between proposals</b>          | <b>30</b>                | <b>-</b>                     | <b>-</b>               |
|                       |                  | <b>Net savings achievable</b>                               | <b>150</b>               | <b>115</b>                   | <b>9</b>               |