Project in the News

Indian Express
July 12th, 2008

Dinakaran
August 31st, 2008


COST MANAGEMENT

INDIAN EXPRESS, July 12th 2008

Good response to Tea Board's energy audit scheme

Express News Service
Coonoor, July 11

THE Tea Board's energy audit scheme for Nilgiri bought-leaf factories, launched on Wednesday has got a good response with 13 factories applying for it on the day one itself.

Nilgiris factories spend around Rs 41 crore annually on energy consumption. Nearly 9,000 lorries bring firewood from the plains for their use, causing environmental pollution. "With suitable modification of the machines and processing systems, it should be possible to save some 20 per cent of the energy cost. Our energy conservation project is supported by United Nations Development Programme (UNDP) Global Environment Facility and implemented by Technology Informatics Design Endeavour (TIDE). It engages accredited energy auditors and monitors the progress. Detailed energy audits would be the first step to conserve thermal and electrical energy. Up to 75 percent of the audit cost would be borne by the project," said R D Nazeem, Tea Board executive director.

Highlighting the findings of preliminary energy audits conducted in 118 factories, B J Ashwini Kumar, TIDE project manager, said that energy consumption bench-marks have been identified.

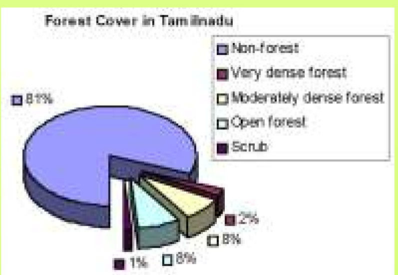
TIDE project engineer N Radhakrishnan said that experiments have proved the use of quality briquettes instead of fuel wood, resulting in a saving of a rupee per kg of manufactured tea.

Dr Sethumadhavan of Anna University outlined the processes, benefits and opportunities arising from audits for energy conservation.

Detailed energy audits would be the first step to conserve thermal and electrical energy

Did you know ?

- Tea estates in the South, numbering about 1.2 lakhs, emit 7.5 lakh tonnes of carbon di-oxide every year [*Source - The HINDU, Sept 9th, 2008*]
- Estimates of domestic tea comsumption in 2008 is said to be 802 million kgs, where the per capita consumption would be 701 grams per head [*Source - The Tea Board*]
- According to the Forest Survey of India (FSI) report 2005, the forest cover in Tamilnadu is 23,044 km^2 which is 17.72 % of the geographic area. [*Source - The Forest Survey of India*]



Announcements

Implementation of energy efficiency interventions

In response to the findings and recommendations of the detailed energy audits, the project will commence the implementation of recommendations in few of the tea factories. The implementation will be carried out in partnership with an ESCO (Energy Service Company) who will be able to guarantee the energy and fiscal savings resulting from adoption of recommendations of the audits. The project has already completed an assessment of suppliers of critical equipments (such as motors) and would be sourcing them from reputed firms. The implementation activities are expected to commence in October 2008.

Energy audits in tea factories

The project will continue to conduct detailed energy audits in tea factories. The project has received requisition from factories, and will conduct the audits for electrical and thermal energy use with the assistance of certified energy auditors and ESCOs.

Call for Innovators

Have you used or are you aware of an innovative idea to improve the energy efficiency in tea factories? Share it with us and it could be featured in the issue of EnConTea

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Issue - 2 September 2008

EnConTea

A Quarterly Newsletter of the Project -
Energy Conservation in Small Sector Tea Processing Units in South India

EDITORIAL

Mr. R.D. Nazeem, I.A.S., Executive Director, Tea Board
National Project Director of the Project

Welcome back to the second issue of EnConTea. The past three months have been very eventful and fruitful. The project has continued to assess various strategies to bring about energy conservation in tea factories.

The primary activity undertaken by the project during the past three months has been the completion of preliminary energy audits in bought leaf and estate factories in Nilgiris district and the initiation of detailed energy audits. The preliminary energy audits show that there is a huge scope for improvement of energy efficiency in tea factories. The audits reveal that 1.45 kg of wood and 0.53 kWh of electricity are used to produce one kg of made tea. Considering these consumption levels as benchmarks of energy consumption in tea factories in the Nilgiris, the project will initially assist factories that are using thermal and electrical resources in excess of this benchmark to achieve reductions using cost effective measures. This will mainly be done through detailed energy audits that will give specific suggestions for reductions in both electrical and thermal energy consumption. In partnership with recognized energy auditors, detailed energy audits have been customized to evaluate energy consumption in individual tea factories and to offer solutions to improve energy efficiency. Towards ensuring effective implementation of the recommendations of the detailed audits, the project has also contacted various energy service companies (ESCOs) and is in the process of developing strategies for providing ESCO services to the tea industry.

The project's experiments in tea factories have clearly shown that replacing fuel-wood with agricultural residue, high calorific value briquettes can reduce the cost of tea processing by up to Rs.1/kg. However, challenges exist in ensuring the regular supply of good quality briquettes considering the diverse demands on agricultural residues. The project has collected information on briquette suppliers in the surrounding regions of Mettupalayam, and shared this information with tea factories. A laboratory, where buyers can get the quality of the briquettes and fuel-wood assessed is also being set up.

Alongside these initiatives, the project work is also focusing on mainstreaming renewable energy use in the tea industry. The project is assessing the performance of solar air heating systems that are found in a few factories. We shall be initiating more of such activities in the coming months. The project has also undertaken assessments of wood consumption patterns in tea factories. It is seen that most factories lack a covered space for storing fuel-wood. Open storage of fuel-wood results in high moisture levels in the wood, and consequently, lower energy efficiency. Drying sheds limit the amount of moisture absorbed by wood and also allow the wood to dry, thus enabling the realization of the actual calorific value of the wood. Similarly, ensuring that the furnace or the hot air generator is properly insulated will also lead to tangible savings in wood usage. Experiments on the effects of good wood storage practices on reducing wood consumption are being carried out as part of the project.

The project website – EnConTea (www.encontea.org) is now online. The website contains basic information on the project and it has been planned to add useful resources (such as articles on energy efficiency) that can benefit the industry. I invite you to visit the site and provide your inputs.

Building a reputation for good quality and environmentally responsible production will ensure that the Indian Tea Industry will be a model for others to emulate. This project will continue to work towards promoting energy conscious practices and hence bring in an environmentally responsible image to the tea industry. The response of the industry to the project has been extremely encouraging. We welcome your suggestions, comments, and criticisms and look forward to your continued support.

INSIDE

VIEWPOINT

Interview with **Mr. DP Maheshwari**, President, UPASI.

1. How do energy consumption practices vary across different tea growing regions of the country?

There is a wide variation in the types of fuels being used in various tea growing regions. Starting from South India, where vegetable (agricultural) waste briquettes and firewood are most commonly used, in West Bengal it is coal whereas in Assam it is either gas or coal and in a few odd cases LDO (Light Diesel Oil). This has come about with the availability of various fuels in these areas. In South India, over time, fuels used have changed from Furnace oil to Leco (coal) to Coal and presently to vegetable waste briquettes and firewood.

2. What would be the possible alternative energy sources for heating/drying/withering? Are they currently in use in any of the factories in the Coonoor/Southern Indian region?

Here again there cannot be a common source of energy in all the areas; it depends on the fuels available and its economic feasibility. For the present, it is going to be gas, coal and firewood as well as vegetable waste briquettes. In certain areas, paddy husk in briquetted form is also being tried. In South India, a few factories did try using LPG as a source of energy for heating, drying and withering but given its high cost, use of LPG has now been discontinued. If exploratory efforts lead to natural gas from the Godavari basin to be piped to the tea gardens in South India, then it could be a very cheap source of energy.

3. What do you perceive as BARRIERS to bring about energy conservation/efficiency methods in the tea manufacturing processes?

Almost all the machinery currently in use in the Tea Factories was designed 100 years ago. No technological intervention has come about since then. An exception has been the introduction of a Fluid Bed Dryer. The machinery still incorporates the heaters that were designed earlier, using indirect fire, mass of casting (it is a set of cast iron tubes for indirectly heating of air for drying tea). To bring in effective change and save energy, the machines have to be redesigned; in specific the heaters and processing machineries consume maximum fuel energy and must be reworked. The CTC consumes the most electricity because of its high Horse Power (H.P.). Work has been done in this regard by TRA (Tea Research Association) and a commercial concern in Gurgaon. A 40 H.P. machine has been developed to do the work of three CTC machines that run on 100 H.P. It is in a pilot stage and yet to be tried out in the field. Changes in the heaters and the CTC machines where fuel as well as electrical energy is used intensively will result in marked energy efficiency and huge monetary savings.

4. Given the rising cost of power and its erratic supply, why has the issue of refining the processes and using alternative sources/technologies not been addressed over such a long period?

It cannot be said that efforts have not been made; all efforts made have been within the framework of the existing machineries and available fuel forms. Over the years, each tea company has devised its own ways to effect savings of fuel and electrical energy. Over the last eight years, the situation has worsened hindering the proper running of the operations. This has resulted in no attention being paid for any development work.

5. What activities implemented through the project would gain the support of all categories of tea processing units i.e. bought leaf units, estate factories and large companies and motivate them to be involved in energy conservation practices?

To my mind, the cost of power and fuel is so high that any know-how for energy savings will invite support from every section of the tea industry. Specifically, interventions proposed by the project for savings, which does not call for much initial investment, would be very popular. Other schemes that have a good cost to benefit ratio towards saving of energy would also be adopted by the tea industry.

6. As a stepwise approach, how should the technologists of TIDE impart their know-how and help tea planters with energy conservation practices and use of efficient technologies?

You have already taken the first step by conducting energy audits in each of the factories so we can know of the strength and weakness in energy usage of each factory. Issues can be further taken that do not require any major changes but will result in savings. Thereafter, the implementation of other proposed steps such as change of fuel, introduction of equipments, etc. will take the system forward.

7. Are there any such conservation practices and alternative technologies put to use in tea factories in other regions of India?

In South India, where the cost of production is very high, tea producers have to put in efforts to bring in fuel savings. In other parts of the country, such as in North East India, fuel is cheaper and readily available, hence not much work has been done towards saving electricity. However, a limited number of efforts have been taken up by factories like installation of Automatic Voltage Regulator, Capacitors, etc.

8. How do our tea processes compare in energy efficiency with those across the globe?

Kenya has got the best use of technology as far as savings in fuel energy is concerned. Most of their factories use steam boilers where energy efficiency is 80% as against our use of heaters in South India with only 60-65% efficiency. As far as consumption of electrical energy, there is not much difference in the technology being used in various countries.

4. Development of a database of equipment suppliers to tea factories

Tea factories purchase tea-processing equipments such as air heaters, dryers, Crush Tear Curl (CTC) machines from various suppliers. A database of equipment suppliers has been developed with the information got from tea factories and UPASI. The objective of the initiative is to work with the equipment suppliers, identify energy efficient equipments, and undertake collaborative activities to improve the energy efficiency of existing equipments by providing the needed technical know-how. This database is to be updated regularly by the project team and made available to the tea factories and the project's technical advisory committee. Members of the project's technical advisory committee visited Teakrafts, a manufacturer of tea processing equipments and conducted detailed discussions on the various equipments being supplied to tea factories, on 22nd August 2008.

The project team at the premises of an equipment supplier

5. Assessment of wood consumption patterns and wood storage facilities in tea factories

Wood is the primary source of fuel for thermal processes in south Indian tea factories. Project interventions relating to thermal energy intend to identify and promote energy efficient air heaters and dryers. In order to assess the current wood consumption patterns in tea factories, the project conducted a detailed study of the fuel wood in use - type of wood used, burning rate (in relation to leaf loading), wood moisture, excess air and feeding rate. An assessment of the wood storage facilities in tea factories was also undertaken. The project initiatives plan to promote wood storage structures (low-cost sheds, passive solar structures) that would help lower the moisture levels of wood.

Assessment of hot air generator at a tea factory

Fuelwood lying in the open in a tea factory

6. Performance assessment of solar air heating systems in tea factories

The use of solar air heating systems for pre-heating the air that enters into the air heater (heat exchanger in the hot air generator) can reduce the consumption of wood in tea factories. Solar air heating systems are operational in Glendale tea factory and Golden hills tea factory. The project has started monitoring the performance of the solar air heating systems based on its technical and commercial parameters with the intent of promoting it in other factories of the clusters.

7. Review of the ESCO approach to energy efficiency in tea factories

Energy efficiency in tea factories is low due to the lack of technically trained manpower and energy efficient technologies. The provision of ESCO (Energy Service Companies) services with performance guarantees could contribute to energy conservation in tea factories while significantly addressing technical and financial barriers. The project, therefore, has interacted with various ESCOs and invited them to develop a strategy for providing energy services to tea factories. Of the nine detailed energy audits completed, five of them have been designed as investment grade energy audits by the project.

8. Second meeting of the Project Steering Committee

The second meeting of the project steering committee was held on 24th July in Udyog Bhawan, New Delhi. Mr. P.K. Chaudhery, Additional Secretary (Commerce), and Mr. Mangat Ram Sharma, Director (Plantations) reviewed the progress of the project and provided inputs. The project progress and plans were also explained to Mr. Jairam Ramesh, Hon. Minister of State for Commerce and Industry, Govt. of India.

Mr. Jairam Ramesh being briefed about the project activities

9. Second meeting of the project's technical advisory committee

The second meeting of the project's technical advisory committee was held on 22nd August in Coimbatore. The committee reviewed the technical activities of the project, the methodology and findings of the energy audits, and provided inputs.

Mr. Chaudhery inaugurating the project office seen alongside are Mr. Nazeem and Mr. Basudeb Banerjee

10. Establishment of project office in Coonoor

The new project office of the Tea Board's energy conservation project was inaugurated on 9th September at Coonoor by Mr. P.K. Chaudhery, Additional Secretary (Commerce), Govt of India. The project office, in the Tea Board's campus, will house the project management unit and operate under the guidance of Mr. RD Nazeem, Executive Director, Tea Board. Mr. Basudeb Banerjee, Chairman, Tea Board and Mr. Nazeem were present on the occasion. The office can be reached at 0423-2222090 and will be open on weekdays.

PROGRESS REPORT

Project Activities during the Period - July 2008 to September 2008

1. Exposure programs on energy management and conservation in tea factories

During the period April 2008 to June 2008, the project organized a series of exposure programs on how to conserve energy and manage energy needs was conducted for tea factory owners and their staff. These programs were organized with the support of United Planters Association of South India - Krishi Vigyan Kendra (UPASI-KVK), at UPASI, Coonoor. The feedback from the factory owners sought that regional programs in Kotagiri, Kundah, Gudalur, Ooty and Coonoor should be conducted in regional languages to facilitate the participation of factory staff. Therefore, The project organized regional exposure programs in English, Tamil and Badaga languages considering the profile of the participants.

a. Exposure program at Gudalur on July 18th, 2008.

The project organized an exposure program for owners and staff of tea factories in Gudalur region. The program was organized with support

Mr. Radhakrishnan N delivering a talk on energy efficiency in tea factories

Gudalur. There were 32 persons representing nine tea factories who attended the program. Subsequent to this program, three of the factories applied for detailed energy audits. Considering the large scale of operations of tea factories in Gudalur region, the response of the factories to the program was positive.

b. Exposure program at Kotagiri on August 23rd, 2008

An exposure program on energy conservation was organized for owners and staff of tea factories located in Kotagiri and Aravenu. There were 18 persons representing seven tea factories who attended the program.

2. Preliminary energy audits in estate tea factories

During the period May 2008 – July 2008, the project completed preliminary energy audits (PEAs) in 118 bought leaf factories in Nilgiris district. Estate factories in Nilgiris district sought enquiries to energy audit their factories. The project initiated PEAs in estate tea factories once the permission of the Project Steering Committee was obtained. As of 10th September, PEAs of 28 estate factories have been completed.

Preliminary energy audit in progress in a tea factory

3. Detailed energy audits in tea factories

The project realizes that identification of opportunities for energy conservation in tea factories is the first step towards conserving energy in tea factories. Subsequent to the completion of preliminary energy audits in bought leaf tea factories, the project has initiated detailed energy audits of tea factories. Widespread interaction with stakeholders helped the project assess that information and financial barriers had to be addressed to encourage factory owners to conduct energy audits in their factories. The information barrier was addressed by sharing information about energy audits during the exposure programs for factory owners and their staff. The financial barriers were eased by developing a scheme wherein the costs of energy audits in tea factories would partly be borne by the project.

The project activity identified energy auditors as approved by the Bureau of Energy Efficiency, Govt. of India. It defined the terms and negotiated the price of energy audits. A flat rate of Rs.50000 (service tax extra) was fixed as the cost of the detailed energy audits

Mr. Nazeem launching the energy audit scheme

irrespective of the size of the tea factory. The project identified three slabs of tea factories based on tea production during the period of 2007-08.

The balance amount is to be met by the project that would pay the auditors upon submission of the detailed audit reports. The auditor would enter into an agreement with the factory, and conduct the audits. Staff of the project is expected to coordinate and monitor the audits.

The scheme was launched by Mr. RD Nazeem, Executive Director, Tea Board on 9th July 2008 at a meeting of factory owners in Coonoor. The project has received until now 32 applications from various tea factories of which nine detailed audits have been completed. The draft reports of the audits have been given to the factories. The final reports (incorporating the recommendations of the technical advisory committee of the project) are to be submitted by the end of September.

Detailed energy audit in progress in a tea factory

Factories categorized on tea production	Energy audit expenses by owners
Tea produced < 2.5 lakhs kgs	Rs 18,680
Tea produced 2.5 to 10 lakhs kgs	Rs 23,680
Tea produced > 10 lakhs kgs	Rs 28,680

The table lists the costs to be borne by the owner under each category.

ENERGY EFFICIENT MOTORS

By **Mr. Narayana Sharma**

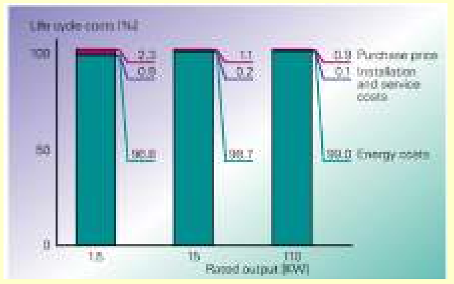
Efficiency is an important factor to consider when buying or rewinding an electric motor. This fact sheet shows you how to obtain the most efficient motor at the lowest price and avoid common problems. It answers the following frequently asked questions:

1 Why is improving motor efficiency important?
2. What is an energy-efficient motor?
3. When should I consider buying an energy-efficient motor?
4. When is an energy-efficient motor cost effective?
5. Should I rewind a failed motor?
6. What design factors should I consider when choosing a new motor?
7. How should I begin a motor efficiency improvement program?

1. Why is improving motor efficiency important?

Over half of all electrical energy consumed is used by electric motors. Improving the efficiency of electric motors and the equipment they drive can save energy, reduce operating costs, and improve our nation's productivity.

Energy efficiency should be a major consideration when you purchase or rewind a motor. The annual energy cost of running a motor is usually many times greater than its initial purchase price. For example, even at the relatively low energy rate of Rs.4.50/kWh, a typical 7.5kW (10 HP) continuously running (7000 hours annually) motor at 75 % load uses almost Rs. 2,06,032/- worth of electricity annually, about seventeen times its initial purchase price. See Graph below.



2. What is an energy-efficient motor?

Motor efficiency is the ratio of mechanical power output to the electrical power input, usually expressed as a percentage. Considerable variation exists between the performance of standard and energy-efficient motors (see chart below). Improved design, materials, and manufacturing techniques enable energy-efficient motors to accomplish more work per unit of electricity consumed.

Energy-efficient motors offer other benefits. Because they are constructed with improved manufacturing techniques and superior materials, energy-efficient motors usually have constant efficiency from 60% to 80% load, longer insulation and bearing lives, lower waste heat output, and less vibration, all of which increase reliability.

To be considered energy efficient, a motor's performance must equal or exceed the nominal full-load efficiency values provided by the BIS Standard IS 12615. Specific full-load nominal efficiency values are provided for each kW, enclosure type, and speed combination.

A motor's performance must equal or exceed the efficiency levels given in the standard, for it to be classified as "Energy Efficient." The EC Act 2001 requires that most general purpose motors manufactured for sale in India after April 01, 2008, meet IS 12615 minimum efficiency standards. The Act applies to 0.37 kW to 160 kW (2 & 4 pole), 0.37 kW t 132 kW(6 pole) and 0.37 kW to 110 kW (8 pole) general-purpose, T-frame, single-speed, foot-mounted, continuous-rated, polyphase, squirrel-cage, induction motors conforming to BIS 325. Covered motors are designed to operate with 415 volt power supplies, have open or "closed" (totally enclosed) enclosures, and operate at speeds of 720, 1000, 1500 or 3000 rpm.

3. When should I consider buying an energy-efficient motor?

Energy-efficient motors should be considered in the following circumstances:

- For all new installations
- When purchasing equipment packages, such as compressors, HVAC systems, and pumps
- When major modifications are made to facilities or processes to facilities or processes
- Instead of rewinding older, standard efficiency units
- To replace oversized and under loaded motors
- As part of a preventive maintenance or energy conservation program.

The cost effectiveness of an energy-efficient motor in a specific situation depends on several factors, including motor price, efficiency rating, annual hours of use, energy rates, costs of installation and downtime and your firm's payback criteria.

4. When is an energy-efficient motor cost effective?

The extra cost of an energy-efficient motor is often quickly repaid in energy savings. In typical industrial applications, energy-efficient motors are cost effective when they operate more than 4000 hours a year, given a 2-year simple payback criterion. For example, with an energy cost of Rs. 4.50/kWh, a single point of efficiency gain for a continuously operating EFF1 20-hp motor (7000 hours annually) with a 75% load factor saves 5972 kWh, or Rs. 26,874/- annually, against an old motor. Thus, an energy-efficient motor that offers four points of efficiency gain can cost up to 20% more than a standard model and still meet a 2-year simple payback criterion.

Whenever possible, obtain actual price quotes from motor distributors to calculate simple paybacks. Motors rarely sell at full list price. The following techniques can help you determine whether an energy efficient motor is cost effective:

1. Calculate the rupee savings and simple payback from using a more efficient motor, taking into account motor size, price, efficiency, annual hours of use, load factor and electricity costs

2. Use the following formulas to calculate the annual energy savings and simple payback from selecting a more efficient motor. Simple payback is defined as the time required for the savings from an investment to equal the initial or incremental cost.

Annual Energy E Savings

Savings = kW x L x 0.746 x hr x C x{(100/Estd)-(100/Eee)}

E Savings = Expected annual rupee savings

kW = Motor rated kW

L = Load factor (percentage of full load/100)

hr = Annual operating hours

C = Average energy costs (Rs/kWh)

Estd = Standard motor efficiency rating, %

Eee = Energy-efficient motor efficiency rating, %

Simple Payback

For a new motor purchase, the simple payback is the price premium divided by the annual rupee savings:

When calculating the simple payback for replacing an operating motor, you must include the full purchase price of the motor plus any installation costs:

Simple payback (years) =(Price premium) / (Annual rupee savings)

Simple payback (years) = (Motor price + Installation charge)/ Annual rupee savings

5. Should I rewind a failed motor?

Although failed motors can usually be rewound, it is often worthwhile to replace a damaged motor with a new energy-efficient model to save energy and improve reliability. When calculating operating costs for rewound motors, deduct one efficiency point for motors exceeding 40 hp and two points for smaller motors. Have motors rewound only at reliable repair shops that use low temperature (under 700°F) bakeout ovens, high quality materials, and a quality assurance program based on manufacturers' recommendations.

6. What design factors should I consider when choosing a new motor?

Motor Size: Size motors for efficiency. Motors should be sized to operate with a load factor between 65% and 100%. The common practice of over-sizing results in less efficient motor operation. For example, a motor operating at a 35% load is less efficient than a smaller motor that is matched to the same load.

Operating Speed: Select replacement energy-efficient motors with a comparable full-load speed for centrifugal load applications (pumps and fans). Induction motors have an operating speed that is slightly lower than their rated synchronous speed. For example, a motor with a synchronous speed of 1500 rpm will typically operate under full load at about 1475 rpm. Operating speed (full-load rpm) is stamped on motor nameplates.

The difference between the synchronous speed and the operating speed is called slip. Slip varies with load and the particular motor model.

Every pump and fan has a design speed. Centrifugal pump and fan loads are extremely sensitive to speed variations; an increase of just 5 rpm can significantly affect the pump or fan operation, leading to increased flow, reduced efficiency, and increased energy consumption. Whenever a pump or fan motor is replaced, be sure to select a model with a full-load rpm rating equal to or less than that of the motor being replaced.

Inrush Current: Avoid overloading circuits. Energy-efficient motors feature low electrical resistance and thus exhibit higher inrush currents than standard models. Size your control switchgear suitably.

7. How should I begin a motor efficiency improvement program?

Survey your motors. Gather nameplate information and obtain field measurements (voltage, amperage, power factor, operating speed) under typical operating conditions. Initially focus on motors that exceed minimum size and operating duration criteria. Typical selection criteria include:

- Three-phase TEFC motor
- Non-specialty motor
- 0.37 kW to 160 kW
- At least 2000 hours per year of operation
- Constant load (not intermittent, cyclic, or fluctuating)
- Older or rewound standard efficiency motors
- Easy access
- Readable nameplate.

Conduct motor replacement analyses and divide your motors into the following three categories:

Replace Immediately — Motors Offering Rapid Payback through Energy Savings, Improved Reliability,

These include motors that run continuously (typically 8000 or more hours a year), are currently inefficient (including oversized motors), must be reliable. Order an efficient replacement motor soon and install it at the next available opportunity, such as during a scheduled downtime.

Replace at Time of Failure — Motors with Intermediate Payback. When these motors fail, you will want to replace them with an energy-efficient model. Now is the time to contact motor dealers to review the efficiency and prices of available motors. After identifying the most cost-effective replacement model, you must decide whether to purchase it and keep it on hand as a spare, or wait to purchase it until the existing motor fails. This choice depends on how quickly an energy-efficient motor can be obtained through suppliers, how quickly a failed motor must be replaced, and how many motors of the same size and type are used in your facility.

Leave Present Situation as is — Motors with Extended Payback. These motors are already reasonably efficient or are used less than 2000 hours each year. They can be rewound or replaced with a similar motor.

Motors and drive systems have a long useful life. The cost of running a motor may increase significantly in the future. Energy efficiency improvements that are not justified today may become worthwhile in a few years, so periodically reevaluate paybacks and reliability. It is also important to operate your motor efficiently. Keep the following two issues in mind:

Power Quality: Address power quality problems. To improve motor reliability and efficiency, it is important to maintain the correct voltage and phase balance, identify and eliminate current leaks, and prevent harmonics in the electrical supply. It is a good idea to have an electrical engineer review the electrical system periodically, especially before installing a new motor or after making changes to the system and its loads. Consult the manufacturer before installing any motor under conditions of poor power quality.

Periodic Maintenance: It is important to maintain motors according to manufacturers' instructions. Although energy-efficient motors with higher temperature-rated insulation may be able to handle higher temperatures and other abuse, there is no reason to reduce maintenance. Motors should have good ventilation and be periodically inspected for increased vibration or power supply problems.

*Author **Mr. Narayana Sharma**, Project Associate-EE motors Program, International Copper Promotion Council (India), for the states of AP, Karnataka and TN. ICPCI promotes beneficial use of Copper. He also has expertise in testing induction motors at site for their efficiency.*

PRELIMINARY ENERGY AUDITS IN BOUGHT LEAF TEA FACTORIES IN NILGIRIS DISTRICT

Ashwini Kumar BJ, Project Manager, TIDE

One of the objectives of the Project – Energy Conservation in Small Sector Tea Processing Units in South India – relates to awareness creation among the target sector about energy efficiency / renewable energy technologies and their relation to profitability. As a first step the project will facilitate detailed energy audits of tea factories in each of the clusters. This will enable factory-specific recommendations that guide energy conservation interventions in individual factories to implement energy conservation practices. A preliminary energy audit (PEA) normally precedes the detailed energy audit. PEA is done to collect data. All factory-specific data is shared only with that factory, on forms of energy used in the factory, energy costs over a period of time, production details, process details and specific energy consumption and costs. Potential areas of energy conservation can also be identified. In the context of the present project, the findings of the PEAs would be useful to evaluate the energy consumption scenario at project inception, and compare it with end-of-the-project scenario.

PEAs were carried out during the period of May 2008 – July 2008 by the project staff in all bought leaf factories in Nilgiris District. Practical training to conduct PEAs was provided to project staff by Dr. Sethumadhavan, Director, Institute for Energy Studies, Anna University, Chennai. He is also the Chairperson of the Project's technical advisory committee. The project has identified 166 bought leaf factories in Nilgiris District and preliminary audits were carried out in 118 factories (excluding 43 inoperative factories, 3 newly-commissioned factories and 2 factories wherein data was unavailable) with reference to production and energy use during 2007-08.

Preliminary energy audit in progress in a tea factory

The major findings of the PEAs are as listed:

- The 118 factories produced 66.7 million kgs of made tea.
- 117 factories (due to non-availability of data in one factory) consumed 97231 tons of wood i.e about 9000 truckloads of wood. The specific wood consumption (i.e. quantity of wood required to produce 1 kg of made tea) was 1.45 kg.
- The average price of wood used in the factories was Rs.2525 per ton (varying from Rs.2761 in Kotagiri region to Rs.1864 in Gudalur region). The specific wood cost (i.e. cost of wood to produce 1 kg of made tea) was Rs. 3.64.
- The factories used 68.46 lakh units (kWh) of electricity (grid electricity only. Reliable data on captive power generation was not available).
- The specific electricity consumption (i.e. kWh required to produce 1 kg of made tea) was 0.55 unit. The specific electricity cost (cost of electricity to produce 1 kg of made tea) was Rs.2.62.
- Considering an average processing cost of Rs.16 to produce 1 kg of made tea, and energy cost (thermal + electrical) at Rs.6.26, energy costs constituted 39% of processing costs (this share varies from 37%-43% across various regions in Nilgiris District).

Based on the findings of the PEAs, factories that have high specific energy consumption and high specific energy cost have been identified. Priority is to be given to these factories to carry out the detailed energy audits. PEAs of estate factories in Nilgiris district are in progress. Upon completion of these audits, the project plans to carry out PEAs in other factories in South India, and publish the findings.

About this Newsletter

Tea processing requires large amount of thermal and electrical energy. In an effort to reduce energy consumption, and thus energy costs, the Tea Board of India has launched a project 'Energy Conservation in Small Sector Tea Processing Units in South India' aimed at promoting energy efficiency and renewable energy in the industry. A main objective of this project is creating awareness in the tea industry about energy efficiency and renewable energy and their relation to profitability, gathering data and information, and sharing knowledge. This newsletter has been released to meet this objective.

Project in Brief

The project - Energy Conservation in Small Sector Tea Processing Units in South India, has been initiated by the Tea Board to remove barriers to energy conservation and energy efficiency that inhibit the realization of large energy saving potential in the tea sector. This 4-year project is supported by the United Nations Development Programme - Global Environment Facility. This project has the objective of removing barriers and developing replicability strategies for energy efficiency and energy conservation interventions in the tea processing industry in South India. This objective would be achieved by:

a. Awareness creation among the target sector about energy efficiency / renewable energy technologies and their relation to profitability

b. Elimination of financial barriers that inhibit investment in energy conservation equipment

c. Adoption and procurement of energy efficiency / renewable energy equipment / practice

d. Learning, knowledge sharing and replication