EnConTea

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

Issue - 6 September 2009

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. The project's objective is to remove barriers and to develop replicable strategies for energy efficiency and energy conservation interventions in the tea processing industry in south India. The 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

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EDITORIAL

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

As I write the editorial for the sixth issue of the newsletter, I have in front of me, co-incidentally, the quarterly progress reported given to me by the implementation team. I realize that the project has done good work in reaching out to all factories in south India with very relevant information, and has created a good enabling mechanism for energy conservation. This quarter, in fact, we have had a plethora of events related to awareness creation. The project has for the first time reached out to factories in the north east by conducting an awareness meeting in Kolkata. The response to the same was very heartening and there were several requests for similar activities to be initiated in tea clusters in the east and north east. The Annual General Meeting of UPASI, the inauguration of the Kaikatty and the Energy lab at UPASI by the Chairman, Tea Board, the talk on energy efficient drying techniques by Mr. Lalit Meisheri, the buyer seller meet were all events for mainstreaming energy conservation in the tea industry.

But the one issue that needs to be addressed very seriously and very soon is the implementation of energy conservation measures in tea factories, because that is the ultimate indicator of the success of the hard work that we have all been putting in. Kaikatty and Highfields have taken the lead in moving to energy efficient equipment and I am told that about 20% electrical energy conservation has been achieved in Kaikatty. Mr. Swaminathan makes a very poignant statement after the implementation of energy audit recommendations when he says 'Kaikatty Industrial Cooperative Tea Factory has gained a competitive edge over others and is in a position to sustain even uncertain market conditions'.

I had highlighted this issue in my last editorial as well. I think the project implementation team may be missing out on some key issues impeding transition to energy efficiency. I am therefore suggesting to them that an external financial consultant be identified who would interact with the tea industry, assess financial risks and then work towards developing a risk management strategy for the tea industry. This activity has been mandated by the project as well. I welcome suggestions from the sector on how implementation can be given an impetus.

We have been grappling with issues relating to creation of additional briquetting infrastructure to increase supply of good quality briquettes to the industry at a reasonable cost. I have had meetings with briquette manufacturers, suppliers of raw materials and understood that creation of this infrastructure is possible and should be done. I hope that we have something positive to report in the next newsletter. Some other issues that we would take up in the coming months would be to enable tea estates to generate power for their needs from streams in their estates. The first such application for a subsidy from the Ministry of New and Renewable Energy has been forwarded and we would expedite more such applications from the tea estates.

Another idea that we are considering is to understand how tea factories can avail carbon credits for energy conservation activities. We think that we can come back to you with an awareness package about this in the next quarter but it would be great to see progress on the implementation front.

(For Internal Circulation Only)

VIEW POINT

INTERVIEW WITH MR. SUNIL GOYAL, EX-PRESIDENT BOUGHT LEAF TEA FACTORY ASSOCIATION

1. You are one of the few people who participated in conceptualization of the project and are observing project progress. According to you and from the perspective of a bought leaf factory, what should we be doing next?

Much has been discussed regarding these issues, in forms of seminars, conferences and presentations, which we have keenly been part of. Visualization and conceptualization are going great, but we should start implementing immediately. It is important that we meet to act upon the plans we make, and don't stop at their development. Let awareness programs continue, but simultaneously, the action part of it should develop more rapidly and strongly.

Further, the concepts we build should be viable and feasible. Though very attractive, when considering all the intrinsic details of certain initiatives, their implementation may not be beneficial for some bought leaf factories. Another point to be noted here is that any effort aimed at energy conservation should not be at the expense of quality.

2. You have often said that the bought leaf factories cannot invest large amounts in energy efficient equipment. Can you suggest financial measures that would stimulate adoption of costlier energy efficient equipment?

Making huge investments in new technology often poses risks and uncertainty to factory owners. They need guarantees that their large investments would make their operations more efficient and economical. Furthermore, reversing the whole set-up, if unsatisfactory, would again be very costly and time consuming. Discontinuing production even for a few days, would result in loss of output and profit.

The concept of saving energy is not new, but with TIDE, the Tea Board and other organizations stepping in, the focus has turned to these particular aspects.

If a factory doesn't have the required spare capital, companies like ELPRO could assist it with funds for better energy efficient technology. The best option would be if the Tea Board offers the industry interest free loans to invest in energy saving devices. Factories could periodically pay back this amount, using revenues and savings generated through their investments, without being burdened by the payment of additional interest upon their loans. This resembles a hire-purchase scheme, or a concept of partly funded options.

3. The sector faces enormous fuel stress. Do you think it would be a good idea for each factory to invest in its own briquetting units if the project can help develop linkages with loose biomass suppliers similar to the current firewood supply linkages?

The usage of briquettes was one of the first issues TIDE focused on. Currently, bought leaf factories are using 100% firewood for fuel needs. If we were to put up our own briquetting units, we'd also have to incorporate storage requirements, transportation and processing facilities, etc. This would mean we venture into backward integration. Bought leaf factories operate on a smaller scale and running a briquetting unit is not necessarily within their capacity, leading to operational constraints.

Briquette suppliers exist, however, the problem is often with the briquette quality due to incorrect composition of the briquette. Raw materials used for the briquette should suit factory requirements and be available in abundance, for it to be a workable proposition for entrepreneurs who are willing to set-up briquetting units in suitable locations as a separate business venture. Each briquette supplier can work area-wise, which also solves certain transportation and storage issues. One such commercial enterprise can easily provide briquettes to 15+ bought leaf factories.

4. Most equipment manufacturers think that they could drop prices of equipment for the bought leaf sector if the tea factories could aggregate their equipment needs and place bulk orders. Do you think this would work?

Aggregating equipment needs may be quite challenging, as the timing and type of requirements in different factories may vary greatly. Also, several other factors influence the factory owner's decision to make a certain capital investment.

On the other hand, if suppliers of such equipment could be called to a common platform, such as our Bought Leaf Tea Mfrs Association, this would result in an organized approach. As a whole, we could decide upon one or two vendors from whom to procure equipments we require. We would repeatedly approach the same vendors to source our needs and perhaps work out a certain scheme or agreement, from which factory owners as well as equipment suppliers could benefit.

Perhaps, companies like ELPRO could come forward with such a proposal along with finance options. Once established, one can prove oneself worthy of business and identify further business potential.

5. There is much talk of carbon revenues for the tea sector. But this would require that the sector take a collective or a consortium approach for making a case for carbon credits to the sector. How do you think the sector in general and the bought leaf factories in particular could organize themselves as a consortium to enable carbon finance?

This is indeed a very important topic which has not yet been deeply looked into. Perhaps, many factory owners are not clearly aware of this concept, to actually consider it and make use of its benefits.

For this, perhaps an agency should step in, create awareness and allow interested factory owners to take part in such a consortium. Whoever heads this consortium would lead the trade, find appropriate buyers and move them into the business. This would suggest the development of a big scale organization of small scale industries.

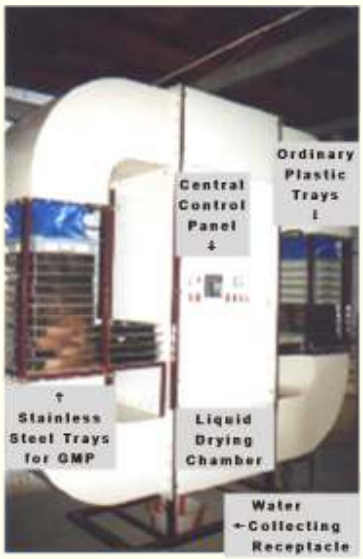
DEHYDRATION AT ROOM TEMPERATURE

By Mr. Lalit D. Meisheri

ARTICLE

Tech-Know-Consultants, a process innovator and consulting organization headquartered in Mumbai and led by Mr. Lalit D. Meisheri, a graduate Chemical Technologist from IIT, Bombay has explored several options in a conscious effort to develop constructive measures of energy conservation in drying operations …

Drying, a unit operation with multi dimensional applications in several industries, led me to innovate a new drying technique - **"Dehydration at Room Temperature (Ambient Conditions)"** - which has proven to be a major breakthrough for dehydration of natural produce. Perhaps the most eminent feature of this new drying technique is that it allows moisture removal while preserving premium flavor, color and aroma of the produce, along with full nutritional / phyto chemical content, which is particularly essential during seasonal variations of produce. Moreover, this dehydration technology functions without the harmful effects of pollutant flue gases with CO, NO_x and CO_2, high humidity due to release of moisture or heat content, all of which contribute to global warming, and sans high capital investments that arise through the conversion of calorific value in burning wood or fossil fuels into thermal energy.



The concept also revolves around certain principles that control the efficiency of the plant design. Conditions of the ambience around the product support moisture transfer at a consistent rate. In the initial phase, the temperature of the medium could be at its lowest (27 - 34°C), depending on the requirements of given products. The velocity and flow rate of gaseous substances across the product are also critical in constructing the plant design.

In addition, this new drying system offers distinct benefits such as excellent retention of chemical composition of the product, vital rehydration characteristics and low power consumptions (0.5kwH per kg of water removed). The amount of power required equals to 1/7th of the present energy requirement for drying purposes.

Functional advantages of the plant include the utilization of ordinary plastic to handle the products without adverse effects, as temperatures are within ambient conditions. Per unit of power consumed, 2 - 3 kgs of moisture can be removed from the product. And very importantly, the device is environmental friendly and safe to use. The moisture removed from the product is condensed, resulting in almost distilled quality water, a by-product which can even generate revenue. In operation the plant is nearly noiseless, thus allowing it to be set up and run in any locality.

Technological aspects have been tested and confirmed by eminent food technologists, health nutritionists and epidemiologists. The process has been awarded with a certificate of **"Innovation 2007 - Ideas in Practice"** at an event organized by IIT, Bombay Alumani, Pune Chapter jointly with TiE (The Indus Entrepreneur, USA). The process was evaluated by Dr. N.D. Joshi, Ex. R & D Director of Thermax, Pune.

Another issue of concern is that temperatures beyond a certain limit can have detrimental effects on made tea, mainly impairing its quality.

Withering is also a critical process, which has a major say in the quality of made tea. From the viewpoint of a process engineer, this is controlled moisture removal at a predetermined rate. It is opined that the ideal time for withering should be 14 - 16 hours to reduce about 16% of moisture content. Engineer Mr. Ramamoorthy agrees that under Coonoor / Ooty weather conditions of high humidity, it is not possible to obtain the best or ideal withering requirements, and hence, the resultant product of made tea will not be at its best. With expertise in the field of moisture removal, I tried various rates of moisture removal and reduced withering time to 4-6 hrs.

Manufacturing green tea also involves arresting the fermentation process / deactivating enzymes and drying to a desired state of moisture, whereby the product delivers the best of poly-phenols. This active chemical has been found to degenerate because of the present thermal treatment it passes through. With very fine desired process control to remove moisture from tea leaves, I am confident of delivering premium products – green made tea, black made tea or white made tea.

During extensive discussions with scientists from UPASI, tea factory owners of Coonoor and scientific personnel at the Tea Research Institute at Valparai, a critical issue cropped up that still remains to be answered: "Why are tea leaves exposed to high temperatures at a magnitude of 120 - 130 °C, once they are exposed to 35 - 40 °C to arrest fermentation (deactivation of enzyme activity)?".

In fact, this damages flavoring compounds of tea, which the processor is expected to retain at its best, as flavor is a key characteristic for tea drinkers. Further, because of high temperatures tea obtains a black color, instead of fermented copper brown.

Most people of the tea industry state that "high temperatures serve drying purposes". However, as demonstrated through my innovative drying technique, very high temperatures are not required.

With cooperation from all stakeholders of the tea industry, it is possible to arrive at appropriate process conditions along with desired equipments, to consistently deliver the finest products. I invite everyone with knowledge of the industry to share the same with us, for the benefits of growers, processors and marketers of tea. I take this opportunity to work towards the possibility of creating a completely new

ARTICLE

EMERGING OPTIONS FOR CONSERVATION OF THERMAL ENERGY: BIOMASS BRIQUETTES

By Mr. Praveen, Mr. Manigandan & Mr. Radhakrishnan

The high thermal energy requirement for tea withering and drying is a persistent problem faced by tea manufacturers. The project has collected data of thermal energy consumption in tea factories in different tea producing regions of south India. The data shows that most factories use firewood for their thermal energy needs, but there are factories that also use coal or biomass briquettes. For various reasons, most factories would prefer briquettes, but past experiences in tea factories show that if the briquette is not of an acceptable quality, then it would damage the air heater and choke the heat exchanger tubes.

Characteristics of *briquettes* and *firewood*:

FEATURE	QUALITY BRIQUETTE	FIREWOOD
Source:	*Average of 24 Samples Analyzed In Lab*	*Average of 8 Samples Analyzed In Lab*
Calorific Value	4086 Cal/g	3750 Cal/g
Ash Content	10.68%	7%
Moisture Content	7.81%	22%
Fixed Carbon	18.19%	11.44%

These features in briquettes can be obtained with a control on the quality of raw materials used in briquetting. Briquettes have been made using a variety of loose biomass / agricultural waste, such as saw dust, coffee husk, groundnut shell, castor husk, etc. Operators get used to a particular type of fuel, but for consistent quality, it is advisable to make briquettes with select biomass.

The experience of Sushil Shiv Plantations in use of briquettes is worth mentioning. From the conventional mode of firewood based operations, it has preferred to shift to briquettes made of 80% saw dust, 10% groundnut shell and 10% castor husk, depending on their availability. Mr. L. Suresh, owner of the plantation, says that handling firewood was cumbersome. Moreover, during wet months, wood stored outdoors becomes damp and difficult to burn. Besides being economical, briquettes offer other conveniences and comforts like easy stacking, handling, less smoke and soot. Better air quality near the furnace results in higher efficiency of workers. Data collected from tea factories show that tea factories use on an average 1.5 kg of firewood per kg of made tea. Briquettes have a higher calorific value and low moisture content, and it has been observed that 1 kg of made tea requires just 0.8 kg of briquettes. Hence, despite costing Rs. 4000 per ton, briquettes are more economical than wood.

The major challenge in shifting to briquettes as a fuel for the tea industry in south India is its availability and cost. The Encontea project team investigated how briquettes were made, and raw materials used, considering implications of cost, equipment suppliers, etc.

The briquetting process:

In biomass briquetting, loose biomass of low particle size is passed through a hopper into a conveyor and briquette press, where it is compressed without any bindings or chemicals to form briquettes. Raw materials are bound through heat and high pressure. It also doesn't require any heating prior to drying. This type of briquetting technology is commonly known as “Binderless Technology”.

Raw materials for briquetting, their availability and cost:

Several raw materials, such as rice husk, palm, castor husk, coffee husk, saw dust, jute sticks, bagasse, groundnut shell, etc. are used to produce briquettes. The cost of briquettes depends on the raw materials, the energy and labor, as well as factors of packing and transportation to the site. For example, the cost of saw dust is Rs. 1500 – 2000 per ton at Mettupalayam, whereas the cost of groundnut shell is Rs. 2000 – 2600 per ton. As the availability of biomass may undergo seasonal variations it may be required to mix and match the raw materials for high quality briquettes.

Infrastructure required for briquetting and their approximate costs:

In order to set up a briquetting facility, the major requirement is space and electricity. Typically a covered shed measuring 70ft x 50ft = 3500 sqft, and a height of 25 feet would be required to install briquetting equipment. Additionally an open space of 10,000 sqft with a cement plastered floor would be required to dry the materials.

Equipment suppliers:

Besides a briquetting machine and its accompanying devices, a biomass dryer may be required if a briquetting unit is located in a region with high rainfall or mist.

Various manufacturers and suppliers of briquetting equipment have been identified, each of which offers its products at the following rates:

Manufacturer	Address	60mm Briquetting Machine	90mm Briquetting Machine	Dryer	Hammer Mill
Hi-Tech Agro Projects Pvt. Ltd.	Flat No. 70, Sector 6 Faridabad – 121 006, Haryana Tel: (0) 1292 243 943 E-Mail: hitechagro@airtelmail.in	Rs. 9.5 LAKH	Rs. 15 LAKH	Rs. 8.5 LAKH	Rs. 7.5 LAKH
Agni Engineering & Industries	No. 15/2, IRTT College Road, Chethode Erode – 638316, Tamil Nadu Tel: (0) 9443 033 525 Web: www.agnigroupcos.com	Rs. 12.5 LAKH	Rs. 17.5 LAKH	Upon Request	Upon Request
National Bio Fuels	No. 441/5 – A1, Nehru Nagar Shanthimadu Press Colony Post Coimbatore – 641 019, Tamil Nadu Tel: (0) 9842 830 767 E-Mail: nationalbiofuels@rediffmail.com	-	Rs. 12 LAKH	-	-
Jay Khodiyar Machine Tools	Samrat Industrial Area, No. 2 Opp. Kanneria Oil Industry Rajkot – 360 004, Gujarat Tel: (0) 2812 388 115, (0) 9825 385 661 E-Mail: jkbriquettings@gmail.com sanjaytilala@jaykhodiyargroup.com Web: www.jaykhodiyargroup.com	Rs. 9 LAKH	Rs. 14.5 LAKH	Rs. 8.5 LAKH	Rs. 3.5 LAKH
Real Tech Engineering Coimbatore	#172 C, Jayprakash Nagar, 3rd Street Sanganoor Road, Ganapathy Post Coimbatore – 641 006, Tamil Nadu Tel: (0) 9843 642 151	Rs. 7.75 LAKH	-	-	-

Major operations in a briquetting unit are:

1. Organizing the loose biomass as raw materials in the correct proportions
2. Drying raw materials and mixing them in required proportions
3. Feeding raw materials into the briquetting press
4. Collecting briquettes from the briquetting press
5. Packing & dispatching the briquettes

Issues involved in setting up a briquetting unit for a factory or a cluster of factories:

In order to establish a reliable supply of biomass briquettes, it is preferable if a single factory or a group of factories get together to set up their own briquetting unit. The factories would have control of the raw material going into the briquettes and the costs would also be lower.

The currently available biomass briquetting technology can use any type of biomass or agro residues. In case the initial feed material is larger in size, a hammer mill and / or cutter can be used to reduce their size appropriately. A typical briquetting unit with capacity of 750kg of briquettes per hour (briquettes size 5 to 7 cm in diameter and 10 to 40 cm long) would require a connected load of 35 to 40kw per hour. The equipment includes the briquetting press, material handling units, hammer mill grinder and the erection charges. The unit would require one skilled worker and six unskilled workers besides a supervisor / manager.

The project would extend all facilities for tea factories and others interested in installing dedicated briquetting units for the tea sector. It is currently engaged in identifying sources of suitable raw material, their cost, equipment suppliers and suitable locations for starting briquetting units. Tea factories interested in setting up briquetting units are requested to contact the Project Office (Coonoor, Tamil Nadu) – (042) 3222 20 90, or Mr. Manigandan – (0) 9976 354 920.

INAUGURATION OF UPASI ENERGY SERVICE FACILITY

The United Planter's Association of South India (UPASI) through its Krish Vigyan Kendra (KVK), has been undertaking various activities to improve the efficiency of energy use in the tea sector. Scientists of UPASI-KVK have led technical teams in identifying opportunities to save energy in the tea sector and have implemented various activities relating to technological assessment and adaptation. These activities have resulted in research outputs that have been promoted for adoption by the sector. As part of the Encontea project, energy audits have been undertaken in bought leaf and estate factories, creating mechanisms to implement the recommendations of energy audits.

In order to assist measures of energy conservation, an Energy Service Facility (ESF), managed by UPASI-KVK was set up. This lab would offer fuel and energy equipment testing facilities to the sector.

Mr. Basudeb Banerjee, Chairman of Tea Board India, inaugurated the UPASI ESF on 3rd September 2009.

This newly established energy lab provides tea factories the opportunity to test the quality of fuel, as well as to measure and monitor the performance of their electrical equipment.

For further details on UPASI Energy Service Facility, please contact:

Program Coordinator & Head - UPASI KVK, Glenview, P.O. Box No.11, Coonoor - 643 101, The Nilgiris, Tamil Nadu (India)

Phone: (0 423) 223 07 72, 222 19 72
Fax: (0 423) 223 20 30
E-Mail: oty_kvkvnr@sancharnet.in

The project plans to extend this facility further by equipping it with a set of energy efficient motors, fans etc for the tea factories to become familiar with energy efficient equipment. It also proposes to create a knowledge centre on energy efficiency with computers and operators for information storage and retrieval. Only information within the public domain would be available through this facility.

Electrical & Thermal Energy Measuring Equipments

Following are some of the energy measuring equipments available in the UPASI ESF to use in tea facilities by technical experts:

1. Energy Manager:
   This apparatus measures parameters of electrical energy, such as current, voltage, kilowatts and power factors in motors.
2. Infrared Thermometer:
   This measures temperature of the dhool and hot air.
3. Thermo Anemometer:
   This instrument measures temperature, air velocity in the withering trough.
4. Digital Tachometer:
   This instrument determines the RPM of motors / fans.
5. Lux Meter:
   This measures the level of light intensity.
6. Thermo Couple Thermometer:
   This is typically used to measure the temperature of hot air in the drier.
7. Hot Air Oven:
   This is used to check the percentage moisture of the wood as per the ISO method.
8. Muffle Furnace:
   This is used to measure the ash content (in%) of solid fuels like firewood and briquettes.
9. Bomb Calorimeter:
   This is used to determine the calorific value of fuels like firewood, briquettes, coal etc.
10. Digital Wood Moisture Meter:
    This is a quick and approximate method to check the moisture percentage in solid fuels.
11. Flue Gas Analyzer:
    This instrument measures CO, Co_2 levels, and excess air as a percentage in the flue gas.

EVENTS

INAUGURATION OF ENERGY EFFICIENT EQUIPMENT AT KAIKATTY INDCO

By Mr. Swaminathan (Deputy Director / Special Officer, Kaikatty INDCO Tea Factory)

The tea industry's competitiveness strongly depends on its control over the “Cost of Push” factors. Unless tea factories maintain their CoP at optimum levels, they may not be able to overcome a crisis in the global market. It is always a question of “Perform or Perish”, performance depending on the competitive edge over others.

Figure 1: *Mr. Basudeb Banerjee, Chairman of Tea Board, inaugurating energy efficient equipment in Kaikatty INDCO Tea Factory.*

To meet challenges such as power shortage and rising fuel costs, we took the lead in energy conservation measures, with support from the Tea Board, Anna University and TIDE. Kaikatty Industrial Cooperative (INDCO) Tea Factory, is the first factory in south India to implement energy conservation measures. The new installations were inaugurated on 2nd September '09 by the Chairman of the Tea Board, Mr. Basudeb Banerjee.

True to the saying “Energy saved is energy generated”, implementation of 70% ENCON measures lead to substantial energy savings, i.e. a reduction from 0.6 units / kg of made tea to 0.5 units.

To achieve such tremendous improvements, the following energy saving devices were installed:

- In the withering section, aluminum blade fans with a standard motor of 7.5HP were replaced with 5 nylon blade fans using an EFF1 motor with a capacity of 3.7kw, saving 9.3kw of power.
- In the rolling section, CTC motors with capacities of 22.5kw, 22.5kw, 18.5kw and 18.5kw for Cut1, Cut2, Cut3 and Cut4 correspondingly, were replaced with 4 EFF1 motors holding a capacity of 18.5kw, 18.5kw, 15kw and 15kw respectively. 82kw of power requirement was reduced to merely 15kw.
- To control and maintain the air temperature and fuel ratio in the drying section, an ID-FD fan controller was installed.
- Automatic Power Factor Controller (APFC) was installed to improve the energy factor and run equipments more efficiently.

The above mentioned energy saving measures required an investment of Rs. 7 lakh and it has further been proposed to implement the remaining 30%, such as the replacement of the V-belt with a flat belt, installation of a hot air fan controller, design and erection of a chimney to operate the ID fan only in damp conditions, etc. Once executed, the factory can freeze its energy requirements at 0.45 units/kg of CTC tea and 0.4 units/kg of orthodox tea.

Moreover, reductions in fuel consumptions are projected at 20 truck loads per year (i.e. 2'00'000 kgs/year), resulting in further savings of Rs. 5 lakh. The simple payback period is only 1 year.

Now the Kaikatty Industrial Cooperative Tea Factory has gained a competitive edge over others and is in a position to sustain even uncertain market conditions.

BUYER & SELLER’S MEET COONOOR, 10TH SEPTEMBER ‘09

The Encontea project has completed 40 audits in tea factories. The audit reports not only captured the existing energy consumption patterns in each tea factory, but also made specific recommendations for implementation. The project therefore decided to organize a series of buyer seller meets to inform tea factories about the different types of energy efficient equipment available, the equipment suppliers, costs and other technical and commercial aspects of energy efficiency.

To stimulate adoption of energy efficient electrical equipment, a “Buyer and Seller's Meet” was organized on the 10th September 2009 at the UPASI KVK hall in Coonoor. Various manufacturers and suppliers of energy saving equipments were invited to participate in this meeting and present their products to interested buyers and tea manufacturers.

Figure 1: *Dignitaries present at the Buyer & Seller's Meet in UPASI KVK Hall, Coonoor.*

The meeting was a successful and informative event with vital exchange of information and know-how between buyers and sellers. Companies that introduced their products included: ABB Motors, Siemens Motors, Bharat Bijilee Motors, Stark Motors, Nest Electricals, Kirloskar and LG. 50 representatives of various tea factories and the UPASI Tea Research Institute, as well as scientists from KVK participated in the event.

Buyers and sellers actively interacted with each other, sharing and communicating technical and commercial aspects of various products offered. Some of the equipment manufacturers also visited various factories in the Nilgiris district to gain first hand exposure.

The main objective of the Buyer and Seller's meet was to speed up the implementation of detailed energy audits at tea factories. Simultaneously, this event brought together an array of buyers and sellers under one roof, making it easy for factory owners to meet individual representatives of different companies and compare products in order to make fruitful decisions regarding their factory requirements and advances.

AWARENESS PROGRAM ON ENERGY CONSERVATION IN TEA SECTOR, 28TH AUGUST '09, KOLKATA

The Encontea project has reached out to every tea factory in south India through awareness programmes and with stalls in tea industry exhibitions. The Tea Board was keen that the project reaches out to tea clusters in other parts of the country as well with awareness programmes.

The Encontea project and the Tea Board of India conducted a half a day energy awareness program on the 28th August '09, at the Williamson Magor Hall at the Bengal Chamber of Commerce and Industry, Kolkata. Speaking on the occasion Mr. Basudeb Banerjee said that energy costs constitute a high percentage of the cost of tea processing and complimented the project for initiating energy conservation activities in the tea industry. He said that the tea sector had adequate real estate for it to develop energy plantations and not rely on external sources for its energy needs. He was keen that similar activities be initiated in other tea clusters as well. He also said that the tea industry was keen on obtaining carbon credits for their energy conservation activities and suggested that the Encontea project explore and realize this revenue stream for the industry.

Figure 1: *(from left) Ms. Roshni Sen (Dy. Chairman, Tea Board), Mr. Basudeb Banerjee (Chairman, Tea Board) and Mr. R.D. Nazeem (Executive Director, Tea Board)*

Ms. Svati Bhogle from TIDE briefly introduced the context in which the project was developed and the process of steering the project through the UNDP project cycle. She gratefully acknowledged the support from UNDP for developing the project in a manner that reflected the needs of the industry and the funding priorities of the UNDP. Mr. R. D. Nazeem, Executive Director, Tea Board, Coonoor introduced the project, its objectives and activities to the audience. He said that although the tea making process was by and large similar in all tea clusters, the energy consumption patterns were different in south India and in the north east. South India largely used firewood for tea drying, whereas the north east region used natural gas. The energy conservation solutions would necessarily be different but the approach similar.

Dr. Sethumadhavan, Professor School of Energy Studies, Anna University, who had explored energy conservation options in south India and had also traveled to the north east to understand the energy situation there offered several energy efficient options for the north east. Better use of natural gas, especially its combined use for electrical and thermal applications, were especially relevant to the north east. The fact that in Assam tea is grown in the plains unlike in south India makes the region suitable for use of solar energy.

Dr. Ramamoorthy, scientist UPASI brought to the discussion aspects relating to quality of tea and energy use. He especially commended the north eastern factories for their good withering practices, especially the practice of using enclosed troughs. He said that the south Indian tea industry had several lessons to learn from the north east and that cross fertilization of ideas would be mutually beneficial to both the tea growing regions.

Mr. Nalin Kanshal of ELPRO Energy Dimension explained the importance of energy audits and the different financial mechanisms for implementation of the audit recommendations.

The presentations were followed by an animated discussion on energy issues. The discussion captured issues relating to:

- Replacement of standard aluminum blade fans with nylon blade fans driven by energy efficient motors during withering process.
- Energy efficient motors in the rolling section, installing flat belts instead of V-belts.
- Downsizing motors in the fermentation section.
- Use of energy efficient motors in drying & grading section, using variable frequencies during drying to control & measure the temperature in the ID fan.
- Energy saving opportunities through installation of energy efficient lighting.
- Installation of an Automatic Power Factor Controller to improve the power factor upto 0.99.

The need for energy audits and information sharing was felt very strongly among the 65 participants at the meeting, representing officials from the Tea Board, several factory owners, members of the Tea Research Association and UNDP officials. The interest in energy issues among the tea factories is growing because of the increased awareness created on energy conservation measures and opportunities in the industry. The participants expressed their keenness to have similar activities extended to their regions.

Ms. Roshni Sen, Deputy Chairman, recapped the discussion and said the inputs provided by the meeting were indeed valuable. She exhorted the tea factories to think differently and reform tea making operations in India.

RESOURCES

A REPORT ON ENERGY SURVEYS CONDUCTED IN TEA FACTORIES

The mandate of the Encontea project is to enable tea factories in south India an economical transition to cleaner and more sustainable energy usage, which integrates well with their existing processing methods and needs. Currently, expenditures on energy account for roughly 35 – 40% of total tea production costs. Besides eroding the profitability of the tea sector, excessive consumption of fossil fuel based energy damages the environment and contributes to global warming.

Through a questionnaire that was mailed to all tea factories between the months of April and July 2009, the project assessed the viability of introducing renewable energy options, i.e. solar and hydro power, as a measure of energy conservation in the tea sector.

In south India potential regions for hydro power facilities have been identified in Valparai, Munnar, Vandiperiyar, Ooty and Coonoor. 12 factories were identified to be located nearby a stream, encompassing a combined electricity production capacity of approximately 3500 kilowatts. Power generation from a flowing stream is especially relevant to tea processing units located in the hills, with perennial streams that can be tapped for power generation. Water flow can be diverted through a penstock to hit the blades of a turbine at high pressures, causing it to spin. A generator, connected to this turbine, produces electricity. Tea estates can thus become independent power producers and reduce power purchases from the grid.

With respect to the issue of solar power generation, the project collected data on fuel consumption with and without the use of solar air heaters, information on south facing roof areas in tea factories, the production of tea and the volumetric air flow rate required for drying. 170 tea factories participated in the solar energy survey, of which 106 were identified to be south-facing and potentially suitable for installation of a solar air heating system. The ambient temperature during the day is 20 – 28 °C in most tea growing regions, and the solar air heater would have to raise it to nearly 130 °C before being fed into the drier. The solar flat plate collector uses one side of a south facing galvanized iron roof, whereby the hot air outlets of the collectors are connected to a blower through an insulated metal duct. The outlet of the blower, in turn, is connected to the ambient air and inlet of the hot air generator through a network of ducts.

The project proposes to develop suitable schemes and begin with actual installations of renewable energy solutions, with partial financial support from the MNRE. This newsletter and other communications from the project would continue to brief the industry on the potential for adoption of solar air preheaters and hydro power generation.

ANNOUNCEMENT

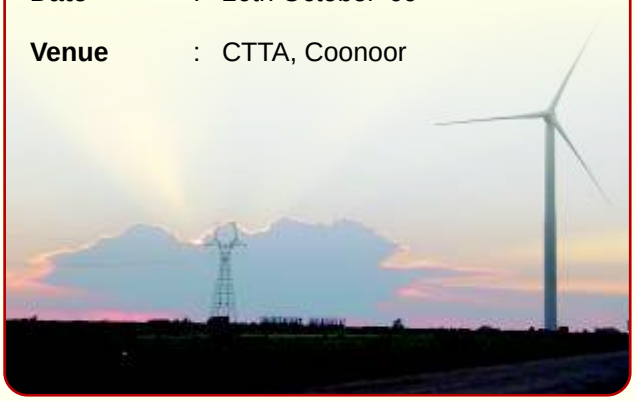
Exposure Program on Energy Conservation in Tea Processing Units: Buyer & Seller's Meet

Presentation: Dr. Sethumadhavan, Anna University

Participants : Dignitaries from Bought Leaf Tea Factories

Date : 26th October '09

Venue : CTTA, Coonoor



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