

**Issue - 15** 

# **EDITORIAL**



I write this editorial with mixed feelings.

After waiting for almost a year, we now have a Chairman for the Tea Board. It is my pleasure

and privilege to welcome Mr MGVK Bhanu IAS as the Chairman of the Project Steering Committee of the project. One of the first tasks that he did after taking over was to Chair the Project Steering Committee meeting. As you can read in his interview on the next page, he has many ideas for institutionalizing energy conservation. Their implementation would require time and focused effort. We are however trying to do everything that he has suggested in the short life span of the project.

The project is now in its extended phase and would end by July 31 this year. This issue would be the last publication of the newsletter - the 15th in the series. We have produced it without delay every quarter and we hope that you have found it informative. Even if the newsletter publication stops, I have instructed the project team to continue informing the about interesting industry any information through less formal channels. I know that the project is even at this late stage still exploring ideas for energy conservation. More important is that there is no slow down in the discovery of energy conservation options for the tea industry.

In this issue we feature two new options for energy conservation. The Dual speed motor operating the flue gas exhaust fan has been investigated thoroughly and findings reported in this issue. Data shows that although it may consume a bit more electricity, the amount of firewood saved because of its installation is very attractive with a

Mr. R. Ambalavanan, IA & AS, Executive Director, Tea Board National Project Director

payback period of a couple of months possible. Woodbridge tea factory has installed a variation of the hot water generator and it appears that this is a financially sound investment as well.

The project has shown that when there quality regular and good is communication, the industry reaction is very good. The response to the distribution of 'Destination Efficiency' the CD on energy conservation to about 1000 tea factories all over India has been very good. I think this initiative would give a boost to energy conservation measures in the tea industry.

It would be a fitting conclusion to this close project if we it with announcement energy of conservation awards. The project team is out in the field collecting data implementation of on energy conservation measures and I seek vour co-operation so that the same can be quantified. In addition to using this data for energy awards, it would also be publicized in the media to build a green image for the Indian tea industry.

Finally I would like to wish all tea stakeholders a very happy and prosperous 2012.

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### **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 inhibit efficiency that the realization of large energy saving potential in the tea sector. This 4year 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 financial of barriers that inhibit energy investment in conservation equipment
- c. Adoption and procurement of energy efficiency/renewable energy equipment /practice
- d. Learning, knowledge sharing and replication



# INTERVIEW WITH MR. MGVK BHANU IAS

Chairman, Tea Board of India

We take this opportunity to welcome the

Chairman Tea Board, Mr. MGVK Bhanu IAS as the Chairman of the Project Steering Committee of the Encontea project. We had an opportunity to interact with him at length on the subject of energy conservation in tea industries during the Project Steering Committee meeting held in Chennai on December 2, 2011. We have been inspired by his suggestions on mainstreaming and institutionalizing energy related issues. Given below are a few excerpts from the interview that Encontea did with him:

# Sir, why do you believe that energy security is crucial for the development of the tea sector in India?

The Indian tea production is set to touch a record high of 990 million kgs this year. Of course higher tea production means that the consumption of energy for tea making is also rising. Your data shows that the cost of energy is rising every year especially the cost of firewood used for tea drying. Again your project intervention has shown that it is possible to reduce the energy consumption and so energy cost and ensure that the cost of production of Indian tea remains competitive. Energy cost unlike labour cost is something that can be managed very easily by the tea industry. It is important that the industry secures this advantage at the earliest. Energy security means that the tea industry all over India is sure of where its energy is coming from and that it is available as and when required. We will work towards energy security and energy conservation is the first step towards that.

#### You had recommended the development of a road map for energy conservation for the tea industry. What are your thoughts on this road map?

I have a few suggestions for the road map but I suggest that the project engage with the tea industry to develop this further.

The cost of energy is a very high component in tea making. We must be alert to the developments in the energy sector so that the tea industry benefits from early adoption of innovations. The tea industry does not have a track record of working closely with energy experts. So to my mind it is very important that the Tea Board associate with an institution that understands both energy and tea on a long term basis. If this institution is built up as a centre for excellence in energy for tea, then the sector would be regularly advised on new developments, possibilities etc. With the very dynamic international scenario on climate change, it is important that the Tea industry is equipped to respond to new realities.

For the same reasons it is important that the Tea Board interacts regularly with other Ministries that deal with energy related issues. For example the Tea Board can work closely with the Bureau of Energy Efficiency in the Ministry of Power for a green rating for tea factories. It can also establish a relationship with the Ministry of New and Renewable Energy so that good MNRE schemes can be leveraged for the tea industry. This is especially true for the north east region where the subsidies are attractive.

The tea industry must seek champions from among themselves in the energy space. The Tea Board looks forward to recognizing Energy Champions who have set new international bench marks in energy conservation. Institution of awards for energy consumption in the tea sector is a very good idea so that energy conservation is something that each tea factory aspires for on a regular basis. This would also ensure that Indian teas acquire a green image and the same is reinforced every year.

#### Tea production in India is increasing every year. Do you think a green branding for Indian teas would help in securing better prices in the export market in addition to everything that is already being done?

This is conceptually a good idea but it has to be thought through very seriously and attempted cautiously. Is there an internationally defined benchmark in energy consumption by tea factories world wide? There must be norms for defining the minimum energy consumption below which a green label is justified. This would require standards to be developed and perhaps the involvement of an external certifying agency.

But it is a good idea to start creating awareness in the media about the energy conservation measures taken by the tea industry to create a 'feel good' sentiment about Indian tea. This can be done by writing articles on the achievements of the project, making presentations to important people, initiating similar activities in Assam as bulk of Indian tea is produced there and many more such measures.

# Sir, Do you have any advice for the project for the remaining six months of its duration?

I see that you have limited your involvement to developing and recommending energy conservation measures in tea factories. But there is a large human resource working in tea gardens. I think it is important that their energy needs are also addressed. I would suggest that you explore interesting low cost options for labour residences in tea estates like solar home lighting systems, toilet linked biogas plants and offer to them comforts and conveniences. Recently our work force is becoming affected by human – animal conflict in tea growing areas. I suggest that you find ways to address these issues as well.

I am also encouraged that multi lateral agencies like the UNDP-GEF have chosen to work in the tea sector and have created awareness and impact. I thank them for this support and I look forward to continued support from them in the coming years as well.

# **DUAL SPEED MOTOR FOR INDUCED DRAFT FLUE GAS FAN**

#### **1. PREAMBLE**

Currently firewood consumption goes unchecked in most furnaces largely because of manual feeding of firewood. There are several variables associated with firewood combustion like fuel quality, size, regularity of firewood feeding etc. The practice of unchecked firewood consumption and uncontrollable hot air temperature for tea drying can be overcome by managing the hot air flow rate properly.

The TIDE Technical Team (TTT) has developed a Dual Speed Motor operated Flue gas exhaust fan as a part of its continuing efforts to reduce firewood usage in furnaces for tea drying. This has been developed as an alternate to VFD controlled ID Fan because it is both rugged in operation and can also operate in dusty conditions prevalent in the thermal section of tea factories. The flue gas fan of the furnace is operated by the Dual Speed Motor with cut in - cut off set temperatures for slow & high speed respectively instead of the conventional single speed motor.

The operation of Dual Speed Motor – run – flue gas fan is similar to that of VFD operated flue gas fan except that the dual speed motor operates at only 2 select speeds compared to the VFD operated motor that can run at varying speeds. Several performance studies conducted by TTT has clearly shown that the motor / fan needs to operate only at 2 speeds (100 % and 60 % of rated speed) to achieve the required results. Hence the exploration of the option of Dual Speed Motor replacing costlier & sophisticated VFD controlled motor.

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inflow and also burning rate of firewood. The required hot air temperature for tea drying is automatically regulated. The dual speed motor can effectively control fuel combustion and consequently maintain the required hot air temperature at the dryer inlet.

#### 3. STUDY OUTCOME

The TTT studied the performance of Dual Speed Motor (DSM) in three factories. The three most important parameters measured are the specific fuel consumption, the power and the power factor. The results are summarized below:

Factory 1: Drier Mouth Tea (DMT) Production : 33 lakh kg/y

This factory currently has no VFD control for Flue Gas fan operation '



Note :

2.5

SFC : Specific Fuel Consumption (kg wood / kg DMT)

Power : kW

: Power Factor

Gain :

Firewood = + 11.6 % (Rs 8.6 lakhs / y) = + 3.1 % ( Rs 26 000 / y) Power Net = Rs 8.86 lakhs / y

#### 2. OPERATING PRINCIPLE

The operation is similar to VFD controlled ID fan wherein the fan speed gets altered (increased or reduced) based on the set Hot Air Temperature at the Drier inlet. When this set temperature is reached, the ID fan automatically shifts to a lower speed (60 % of rated) reducing the air inflow for firewood combustion thus bringing the furnace operation to a sim mode. This in turn brings down the wood consumption. When the hot air temperature starts falling, the motor picks up speed until it reaches full speed, increasing the air











#### **Factory 2 :** DMT Production : 8 lakhs kg / y This factory has VFD controller. Tested with DSM also

**Factory 3 :** DMT Production : 7 lakhs kg / y This factory has VFD controller. Tested with DSM also

0.78

Power

0.37

Power

0.92

Power

Only VFD

0.3

PF

0.3

PF

0.4

PF

Only DSM

1.0

0.5

0.0

0.9

0.6

0.3

0.0

1.0

0.5

0.0

- 14.9 %

Rs 1.46 lakhs / y

0.912

SFC

0.84

SFC

0.78

SFC

<u>w.r.t VFD</u> + 7.1 % (( Rs 1.54 lakhs / y )

(Rs 7 854 / y)

No DSM+ No VFD



C	hin	
Ge	111	

<u>w.r</u>	<u>.t No Control</u>
Firewood	= + 14.5 % ( Rs 3.15 lakhs / y )
Power	= - 18 % ( Rs 9 430 / y )
Net	= Rs 3 lakhs / y

#### Note:

Data shows that the Dual Speed Motor operated ID fan consumes more power compared to the VFD controlled ID fan. This higher power consumption in DSM is due to its operation in Delta connection. The DSM cannot be made to operate in Star Connection. The cost incurred due to extra power consumption is quite insignificant (< 5%)

#### 4. CONCLUSION

The key to decision making (besides of course the ruggedness and durability of the dual speed motor and its low cost – around Rs 50 000 ) is the fuel saving possible through this shift. The data presented shows that under any circumstances shift to dual speed motor has resulted in a definite and substantial firewood conservation. Considering that the cost of firewood is very much higher than the cost of energy consumed by different motors operating ID fans, it is strongly recommended that factories must consider shift to the dual speed motor.

# HOT WATER GENERATOR – HOT NEWS

Woodbridge Tea Factory, Gudalur had recently commissioned a 2 million kcal / h capacity Hot Water Generator for tea drying. In this factory a single HWG is connected to 2 Dryers having a combined output of 1000 kg / h of Tea. The HWG was commissioned in October 2011. A performance study on the same was undertaken at the behest of Woodbridge Tea Factory by the Tide Technical Team in December 2011.

At the time of the study, only one Drier was in operation because of reduced arrival of leaves into the factory. The fuel fired in the HWG was a combination of biomass briquettes and firewood (as expected this was moist and having a lower calorific value). The measured specific fuel consumption in this trial has come down to less than 0.6 kg / kg of Drier Mouth Tea (which was in the range predicted by TIDE experts). This was an enormous saving in firewood. when old furnaces were used by the factory the fuel consumption was 1.5 kg / kg DMT. Currently, both the conventional furnaces / heaters have been dismantled and only the HWG is used. This is supplying all the thermal energy needed for the total tea drying.

Appreciation goes to Mr B Eswaran M.Tech, General Manager and a technocrat with more than 30 years of experience in the tea industry for taking this bold step which has handsomely rewarded the factory. Asaving of Rs 80 lakhs/y is expected because of this decision.

The HWG is supplied by Thermosolutions (I) Pvt Ltd, Dindigul

# PRE DRYING OF BIOMASS FOR GOOD QUALITY BRIQUETTES

It is well known that for a briquette to be of good quality, with good strength and high calorific value, the moisture content in the raw material should be brought down to 10-12% before it is briquetted.

TIDE Technical Team conducted a study on moisture content in biomass and in briquettes. The study showed that any briquettable biomass powdery or otherwise (for example saw dust, coffee husk etc.) that comes to the briquetting unit has a minimum moisture content of 35%.

This means that to get a good quality briquette, it is important that the biomass be compulsory dried before it is taken up for briquetting.

Most briquetting units prefer open sun drying or yard drying. This option is not recommended because of limited hours of sunshine and the relatively long time required to bring down the moisture level to under 10% by sun drying alone. To enable supply of good quality briquettes to the tea industry (also because there is no off - the - shelf solution available for powdery biomass drying), the encontea project supported Sri Ra Ra Biofuels a few years ago to invest in a Biomass Drier as a preliminary step to briquetting. This Powdery Biomass Drier was installed by Sri Ra Ra Biofuels in its premises at Karamadai and the same was monitored by the TTT.

The aim of the study was performance optimization of this system. The study was conducted for 6 days in 2 phases, varying some operating parameters to

Pre dryer for biomass in a briquetting unit

achieve optimization. The detailed Process Flow Diagram was published in the last issue of ENCONTEA newsletter. Data collected shows that the cost of pre drying of Biomass is about Rs 400 / ton including cost of heat and power. This is reasonable considering that to get 1 ton of good quality briquette about 300 kg of moisture has to be evaporated from the raw material.

The optimization of process parameters would continue so that the cost of drying biomass can be reduced to the lowest possible under existing situations.







### **ENCON TIPS**

A few easy to recall tips to reduce your energy bills in your factory

#### Lighting

- 1. Use Natural Light as much as possible
- 2. Painting the walls in a light colour reflects light and makes the room appear brighter. Also an energy conservation measure
- 3. Use Light Energy Savers for office Lights
- 4. Select Ballast & Lamps with high PF and that are long lasting
- 5. Upgrade Fluorescent Lights to CFL or LED (ultimate)
- 6. Use LED lights- Power Saving: 70 80 %, Less Maintenance, long Life and Nil Heat Generation

#### Motors

- 1. Balance the 3 phase supply
- 2. Check Under & Over Voltage conditions
- 3. Properly size the motor to the load for optimal efficiency
- Provide proper heat ventilation (for every 10°C increase in motor operating temperature over recommended peak, the motor life is estimated to be halved)
- Demand Efficiency restoration after motor coil rewinding (improper winding results in efficiency loss)
- Use EE Motors for Continuous (or) near Continuous Operation

#### Drives

- 1. Check belt tension regularly
- 2. Use synthetic lubricants for larger gear boxes
- 3. Use flat belt as alternative to V-belt drives

#### Fans

- 1. Use smooth, well rounded air inlet cones for fan air intakes
- 2. Minimize fan inlet & outlet obstructions
- 3. Minimize bends in ductwork
- 4. Optimize / minimize fan speeds
- 5. Use low slip or flat belts
- 6. Clean screen, filters & fan blades regularly



"The light at the end of the tunnel has been replaced by a 15 watt green bulb."

#### Housekeeping

- 1. Provide Double Earthing to motors
- 2. Provide emergency ON OFF buttons at the site of operation
- 3. Maintain the earth pits' resistance at the desired level
- 4. Use separate MCBs for lightings
- 5. Install lightning arresters at the top of buildings

#### **Demand Side Management Control**

- 1. Install Maximum Demand Controller (MDC)
- 2. Install Automatic Power Factor Controller (AFPC)
- 3. Check for health of capacitor banks regularly
- 4. Provide individual capacitor banks in each load centers

#### **Thermal System**

- 1. Provide closed shed for firewood storage
- 2. Split firewood to smaller pieces before firing
- 3. Use firewood (split ones) only after a minimum of 7 days of storage
- 4. Provide Dual Speed Motor or VFD Controller for ID fan
- 5. Use briquettes of calorific value higher than 4 000 kcal / kg.

### "DESTINATION EFFICIENCY" RELEASED AT THE UPASI ANNUAL CONFERENCE.



Hon. Minister Shri Mallikarjun Kharge releasing the CD "Destination efficiency" produced by the Project

In the past 2 – 3 years the UPASI Annual Conference has been regularly having one speaker on energy related issues. This year was a little different. Instead of a speaker reaching out to a few members in the audience, the CD produced by the Encontea project detailing energy conservation measures was released on 23rd October 2011 by Shri. Mallikarjuna Kharge, Union Minister for Labour & Employment in the valedictory function of the UPASI conference. Smt. P. Jayapradha, M.P and Shri. P. Viswanathan, M.P. also spoke on the occasion. 1000 copies of this CD were mailed to all the tea factories in India to spread the message that energy conservation is very easy. This CD has been very well received generating renewed interest in energy conservation when the Encontea project is heading towards closure

The Encontea project had also put up a stall at the exhibition which was inaugurated by Shri. C. N. Nataraj, President, UPASI. In addition to showcasing the gradual transition of the Tea Board premises as a green space, the stall also displayed posters on renewable energy options for the tea industry. Posters on thermal gasifiers and biogas plants were very well received. Charts informing about the activities carried out in the project like detailed energy audits, post implementation studies etc were also show cased. The attractive LED lights caught the eye of the visitors. Distinguished visitors to the stall included Ms. Sheela Thomas, IAS Chairman of Rubber Board who was particularly keen to understand the efforts and achievements in CO2 emission reduction and Tea Board's contribution towards the greening of the tea industry.

### REPORT ON THE PROJECT STEERING COMMITTEE MEETING

The 8th meeting of the project steering committee of the Encontea project was held in Chennai on December, 2011. It was our privilege to welcome Mr. M G V K Bhanu IAS, Chairman, Tea Board who is also the Chairman of the PSC to this meeting. Also attending the PSC for the first time was the recently appointed Chairman of Tamil Nadu Energy Development Agency Mr. Sudeep Jain IAS.

The meeting began with an introduction to the energy related issues in tea making and then went on to discuss the work done in the project, the work plan for the remaining period of the project, the achievements and the challenges. The project team was very motivated by the interest shown by the Chairman in project activities and the suggestions made by him. At the end of this meeting the new activities that the project team would undertake are:

Development of a road map for energy conservation and renewable energy for the tea industry. The technology options for energy use reform are constantly evolving and it is important that there is some mechanism in place for the tea industry to be constantly kept aware of new options for reducing the energy bill in tea making.

Renewable energy is the energy of the future. Although currently it is more expensive than conventional grid based power, assessments of renewable energy options for the tea industry must be made in the interest of long term energy security for the sector. The project would investigate different renewable energy options and assess their technoeconomics considering their suitability for the tea



Mr. MGVK Bhanu IAS Chairman, chairing the meeting of the Project Steering Committee

sector. Some convergence with the Ministry of New and Renewable Energy and with the Bureau of Energy Efficiency would be identified.

The Tea Board would benefit by an ongoing association with a competent institution that could be developed as a centre of excellence in energy studies in tea. The tea project can make an assessment of different organizations and prepare a short list for the consideration of different stake holders in the tea industry.

The Chairman also recommended that a brief and powerful multi media presentation be developed that would highlight the achievements of the project for a larger audience.

The project looks forward to implement these suggestions in the limited duration of the project so that there is an enduring mechanism to address energy related issues of the tea industry.

### JAYSHREE TEA'S BRIQUETTING UNIT COMMISSIONED

Jayshree Tea is the first tea factory to have taken the pioneering initiative of setting up its own briquette making facility. The plant comprising two briquetting units each of 750 kg/hr capacity was commissioned on December 7, 2011. The plant is presently operating on a single shift and supplying briquettes to its Sholayar and Kallyar factories at Valparai but there are plans to expand to two shifts with a proposed production of 20 tons of briquettes. The reported calorific value of the briquette is 4300 kcal/kg.



Jayshree tea's diversification into biomass briquettes

Extension of tea making infrastructure to also include a briquetting unit is a very welcome and cost effective decision. With briquette making largely de-mystified for the tea industry, it is recommended that more factories explore this diversification option.

#### **Editorial Team**

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### STAKEHOLDER CONSULTATION IN FEBRUARY 2012

The project is proposing to have a final stakeholder consultation in February 2012. This consultation is planned to capture the achievements of the project, present data on energy conservation achieved and to develop the way ahead strategy for the tea sector in energy related issues without the formal mechanism and funding in a project mode.

We would communicate the date and time to you sufficiently in advance and request your participation in large numbers.

### FAREWELL

The Encontea project is scheduled to close in June 2012. We are now in the closure mode consolidating and analyzing the results, The current newsletter would be 15th and final newsletter that the project would produce. We hope that you have found the newsletters informative. We have enjoyed bringing to you the project developments through this medium. We began with a print order of 350 and are now printing 1000 copies which are circulated to all tea factories in the country.

We may however, have something of interest to communicate to you between now and June. We would do so through small interesting write ups or case studies which we would post to you.

It would be good to have your response to the series of newsletters that captures the evolution of the project. The soft copies of the newsletter would be available on the Encontea web site. (www.encontea.org)



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