MANUAL ON ENERGY CONSERVATION MEASURES IN RICE MILL CLUSTER GANJAM, ORISSA

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ZENITH ENERGY SERVICES PVT LIMITED
HYDERABAD

CHAPTER 1 INTRODUCTION

1.1 About BEE'S SME Program

The Government of India has enacted the Energy Conservation Act – 2001 due to high energy saving potential in industries, agriculture, domestic and transport sectors; to reduce the gap between demand and supply; to reduce environmental emissions through energy saving; and to effectively overcome the barriers. The Act provides the much-needed legal framework and institutional arrangement for embarking on an energy efficiency drive.

The Bureau of Energy Efficiency (BEE), an agency of the Union Ministry of Power, has introduced a programme "BEE SME Program" to help small and medium enterprises (SMEs) to use energy efficiently.

As a part of the implementation of "BEE-SME Programme" about 35 SME clusters were identified. After ground-level situation analysis, 29 of them have been selected for further activities in consultation with the Ministry of Micro, Small and Medium Enterprises (MoMSME).

According to the Indian Institute of Foreign Trade, SMEs contribute about 6% of the country's GDP. Although energy is an important input required for economic and social development, attaining higher energy efficiency is considered an important element in meeting India's future energy challenges and ensuring its energy security.

The SME sector is facing rising energy costs and on the other hand, prices and cost pressures are soaring. The government, from time to time, has offered various fiscal incentives and other interventions to SMEs, as well as help for technology up-gradation and improvements in performance efficiency, but a program for energy saving of this kind is novel and has tremendous potential.

Ganjam Rice Mills Cluster has been identified as one of the clusters to implement the BEE-SME Program. BEE has entrusted M/s Zenith Energy Services (P) Ltd to implement the project.

1.2 Project Objectives

The BEE SME Program is aimed at improving Energy Efficiency of Small and Medium Enterprises by technological interventions in the various clusters of India. The Energy Intensity in SME is intended to be enhanced by helping these industries in the mostly energy intensive cluster units identified 29 SME clusters of India to through improve Energy efficiency and performance through technology interventions and also develop the consistent steps for successful implementation of energy efficiency measures and projects in the cluster units and also financial planning for the SME owners.

The project also aims at creating a platform for dissemination of best practices and best available technologies in the market for energy efficiency and conservation and to create awareness among cluster unit owners and also the demonstration projects may stimulate adoption of successful/available technologies.

The BEE SME program have been designed in such a way that to deal with specific needs of the industries in the SME sector for energy efficiency and designed to overcome all the common barriers for implementation of energy efficient technologies and equipments/processes. The following are proposed to be covered under BEE SME program:

1. **Energy Use and Technology Studies** – The studies are aimed for status of the technologies installed, energy use pattern and its cost, operating practices, identification of the technologies and measures for improving energy efficiency etc
2. **Conduct Dissemination Program –** Disseminate the technologies and measures identified & best practices in cluster units in reducing energy consumption.
3. **Implementation of EE measures –** Preparation of bankable and replicable detailed project reports for facilitating the cluster unit owners for implementation. The DPR's to be prepared for a minimum of 5 technologies for various capacities
4. **Identification of the Local Services Providers –** The program also aimed for identification of local service providers and provide capacity building to facilitate them for implementation of the technologies in the clusters
5. **Facilitation of Innovative Financing Mechanisms –** The program also aims for encouraging the SME owners in implementation of technologies through innovative financing schemes. The project also aims to impart training for the officials of various financial institutions like SIDBI and local lead bankers of the clusters location for evaluating energy efficiency related projects.

The BEE SME program model developed is innovative and designed in such a way that the involvement of various stakeholders like SME owners, consultants, technology providers, local service providers, financial institutions etc to facilitate :

- To identify the technologies and process up-gradation from various the detailed studies undertaken by the consultants.
- Active involvement of financial Institutions to overcome financial barriers and development of a financial model for the technologies/equipments identified which are readily available and at best possible interests.

1.3 Expected Project Outcome

The BEE SME program aims at improving energy efficiency in various cluster units of the country. On overall, the program creates opportunities for all the stakeholders in the cluster viz. SME owners, local service providers, equipment suppliers and financial institutions.

Initially, a situation analysis had been carried out and detailed information pertaining to the technologies employed, energy use pattern and financial strengths of SME's in the cluster were established.

The present BEE SME Program implementation in Ganjam Rice Mills Cluster, the following outcomes are expected

Energy Use and Technology Analysis

The detailed comprehensive energy use and technology studies in various cluster units has explored the information on status of Ganjam Rice Mills Cluster, production capacities, present status of the technologies employed, energy consumption pattern, identified all possible measures for energy efficiency and conservation, techno-economic feasibility of the identified measures, energy saving potential in the units surveyed and in total cluster units, technologies and equipments available locally, technical capabilities of LSP's for implementation, environmental impact due to reduction in energy consumption, etc. The major projects to be implemented which have more impact on energy conservation and common technologies which are more or less applicable for all the cluster units were identified for preparation of bankable detailed project reports and incorporated in the manual

Implementation of EE measures

To facilitate SME owners for implementation of energy efficiency measures by developing the bankable detailed project reports for a minimum of 5 technologies for various capacities as per the suitability of cluster unit sizes. These DPR's can be replicated as per the unit suitability for availing loans from financial institutions. The DPR contains various technical and financial indicators like IRR, NPV, ROI, etc for projecting the project viability in terms of technical and financial. A total of 15 DPR's will be prepared

Capacity Building of LSP's and Bankers

The local service providers and equipments suppliers has already been identified in Ganjam Rice Mills Cluster and the capability building programs planned for various stakeholders like local service providers, bankers and equipments suppliers to facilitate them for implementation of the energy efficiency measures.

A Conclusion dissemination workshop to be conducted to provide the information for all the stakeholders for the status and achievement of the program

1.4 Project Duration

The total duration of the project is 18 months and the details of the duration for each activity are furnished in Figure 1 below:

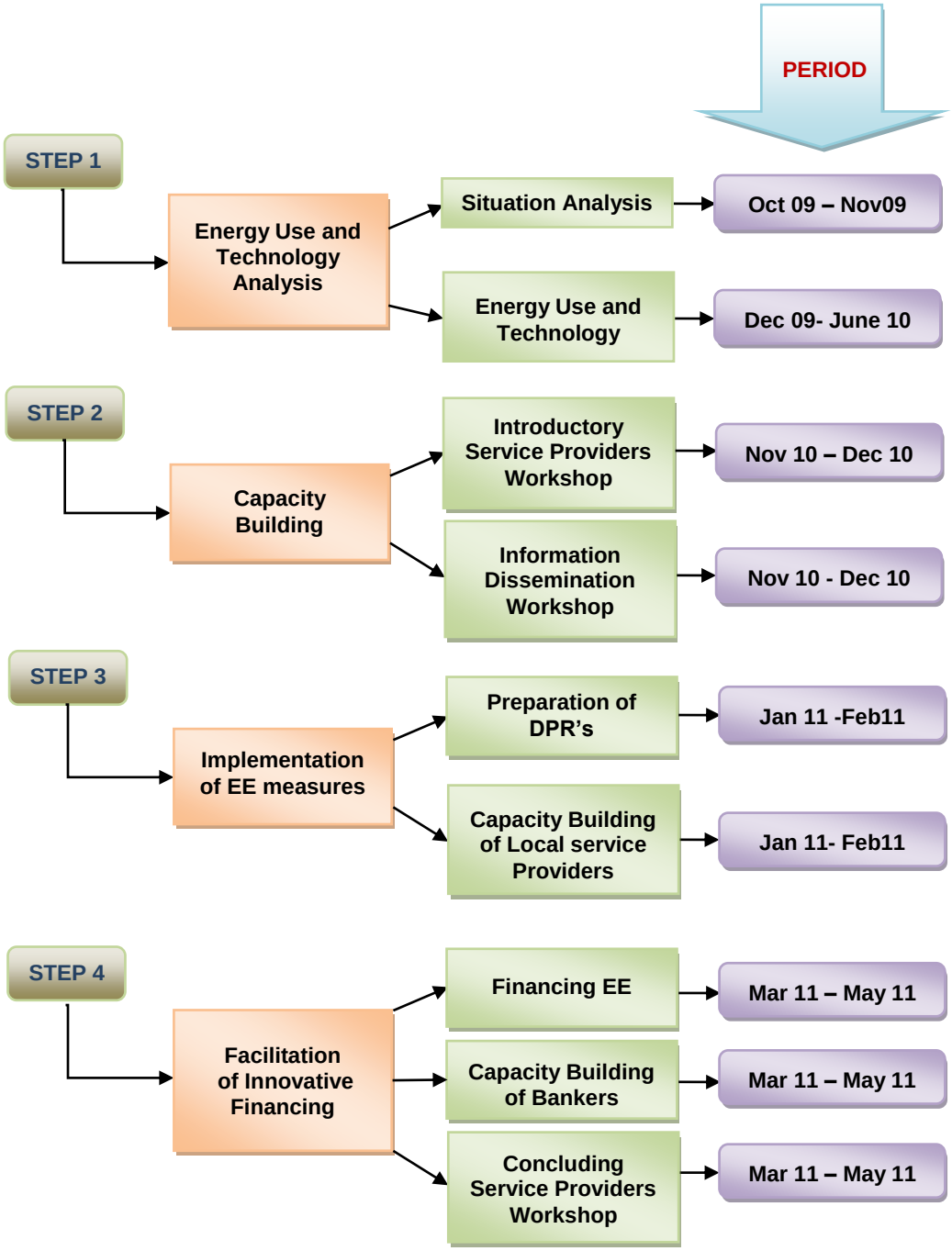


Figure 1: Project Duration

1.5 Identified Clusters under the BEE SME Program

The BEE has identified 29 SME Clusters to implement the BEE SME Program for energy efficiency improvement and the list of chosen clusters are furnished below in Table 1.1:

Table 1.1: List of clusters identified for BEE SME Program

S. No.	Cluster Name	Location
1.	Edible oil cluster	Alwar
2.	Machine components cluster	Bangalore
3.	Ice slabs cluster	Bhimavaram
4.	Brass cluster	Bhubhaneswer
5.	Sea food processing cluster	Cochin
6.	Fire bricks cluster	East &West Godavari
7.	Rice mills cluster	Ganjam
8.	Milk processing cluster	Gujarat
9.	Galvanizing and Wire drawing cluster	Howrah
10.	Foundry cluster	Jagadhri
11.	Limestone cluster	Jodhpur
12.	Tea processing cluster	Jorhat
13.	Foundry	Ludhiana, Batala, Jalandhar
14.	Paper processing cluster	Muzzafar Nagar
15.	Sponge iron cluster	Orissa
16.	Dyes and chemicals cluster	Vapi
17.	Bricks and tiles cluster	Varanasi
18.	Rice mills cluster	Ganjam
19.	Dyes and chemicals cluster	Ahmedabad
20.	Brass cluster	Jamnagar
21.	Textile cluster	Pali
22.	Textile cluster	Surat
23.	Tiles cluster	Morvi
24.	Textile cluster	Solapur
25.	Rice mills cluster	Warangal
26	Tiles cluster	Mangalore
27	Textile cluster	Tirupur
28	Coir cluster	Alleppey
29	Glass cluster	Firozabad

1.6 About the present study

BEE has awarded the Ganjam Rice Mills cluster study to Zenith Energy Services Pvt. Ltd(ZESL) based on the competitive bidding under BEE SME program. ZESL had taken the task of implementing the program and two full time energy auditors were deployed in the cluster and a project office had been established at Ganjam with all facilities like state of art energy audit instruments, Laptops, Printers, and Internet etc. As a part of the program, the details of the studies undertaken in cluster units are furnished in Table 1.2.

Table 1.2: The details of the studies undertaken in cluster units

S.No	Type of audits	No. of units covered
1	Preliminary Energy Audits	20
2	Detailed Energy Audits	20
3	Technology audits	20

The studies were conducted covering all types of industries and capacities in the cluster and the reports were submitted to all individual units for implementation of measures identified. Based on the studies carried out and data analysis, a cluster manual had been prepared for the following:

- Cluster details
- Products manufactured
- Energy forms used, costs, availability and consumption pattern
- Technologies/equipments installed
- Efficiencies levels of the equipments installed
- Measures & technologies/equipments identified for energy conservation and saving, Investment required
- Simple payback period
- Various barriers for implementation
- Local Service Providers details

1.7 Structure of the Report

The present report has been divided into the following Chapters:

Chapter 1: Introduction
Chapter 2: Overview of Ganjam Cluster
Chapter 3: Energy Audit and Technology Assessment
Chapter 4: Conclusions

Chapter 1: This chapter discusses about BEE SME program, project objectives, project outcomes and about the present study.

Chapter 2: Discusses broadly about the cluster, classification of units, energy situation, energy forms used and their availability, production capacities of the units, products manufactured, manufacturing process, technologies employed, current policies of various state and central government for energy efficiency and energy conservation, various issues and barriers in implementation of EE measures and technology up-gradation etc.

Chapter 3: Highlighted the methodology adopted, observations made on process and technologies, energy consumption profile, efficiencies of the equipments installed, housekeeping practices adopted, availability of data and information, technology gap analysis, energy conservation and measures identified, cost benefit analysis, Local service providers availability, technology providers availability, etc

Chapter 4: Highlighted the environmental benefits and quantification of GHG emission reduction expected due to implementation of the measures identified for energy saving.

CHAPTER 2
ABOUT GANJAM CLUSTER

2.1 Overview of Ganjam SME Cluster

2.1.1 Cluster Background

Rice is the staple food of majority of Indians and specifically in eastern Indian. Paddy is one of the major crop cultivated in the eastern states especially in the state of Orissa. The rice comes out of milling of paddy and rice milling is an important activity in the state.

Rice mills are the lifeline for the economic development of rural India. The rice mills are generally located in the rural areas and near to paddy growing area. There are about 250 rice mills in ganjam rice mills cluster covering Berhampur, Hinjilicut, Bhanjanagar and Ganjam areas.

The cost of energy as a percentage of paddy cost varies anywhere between 1%-1.5%. The rice milling units in the cluster use grid electricity as the main source of energy.

2.1.2 Product Manufactured

The major activity of the cluster rice mill units is processing of paddy for production of rice to cater domestic market and providing levy for Food Corporation of India (FCI). The rice produced in these mills are of medium and high quality and is marketed through dealer network in different places of the state.

2.1.3 Classification of units

The **Ganjam Rice Mills** Cluster units can be broadly classified:

2.3.1.1 Classification based on production

In **Ganjam Rice Mills** Cluster, there are about 250 units, the rice mills can be categorized into two types based on production capacity, and they are:

- Less than 10 TPD
- Above 10 TPD

There are 108 rice mills having production capacity less than 10 TPD and balance 142 rice mills falls under second category having production capacity more than 10 TPD. The classification based on production capacity is furnished graphically in Figure 2.

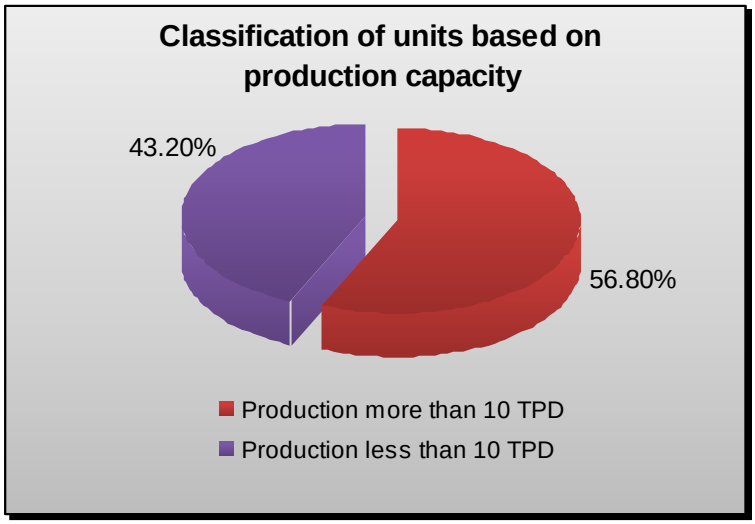


Figure 2: Classification of units based on production facilities

2.1.3.2 Classification based on annual energy bill

Out of 250 units, 21 units have energy bill below Rs.1.00 lakh per annum, 221 units have energy bill between Rs.1.00 lakh to Rs. 5.00 lakhs per annum and the balance 8 units have annual energy bill above Rs. 5 lakhs. The classification of the rice mills based on annual energy bill is furnished graphically in Figure 3.

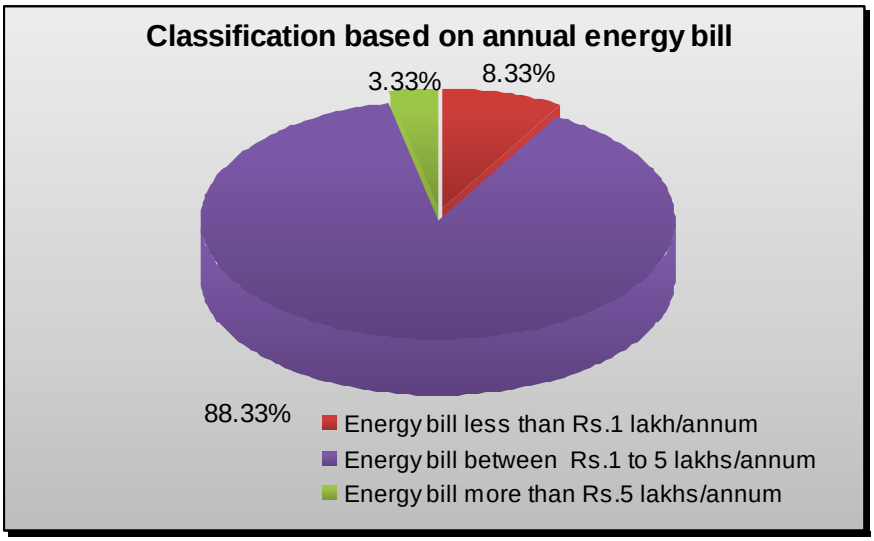


Figure 3: Classification of units based on annual energy bill

2.1.4 Raw materials used

The main raw material for **Ganjam Rice Mills** Cluster units is paddy.

2.2 Energy Consumption scenario of the Cluster

The main energy source for rice mills of the cluster is grid electricity. Electricity is required for operating the prime movers of rice mill machinery like elevators, paddy cleaners, rubber shellers, separators, whiteners/cones and blowers.

2.2.1 Fuels used and price

No fuels are used in the cluster. The prevailing price of grid electricity in the cluster are furnished below in Table 2.1.

Table 2.1: Prevailing price of grid electricity in the cluster

S.No	Fuel type	Price range (Rs.)
1	Electricity	4.20 per kWh

2.2.2 Electricity Consumption

The annual electricity consumption of the three typical rice mill units of various production capacity in the cluster is furnished in Table 2.2 below:

Table 2.2: Annual energy consumption of the three typical rice mill units

Details	Value	Unit -1 (8 tons/day)	Unit -2 (27 tons/day)	Unit -3 (40 tons/day)
Electricity	kWh/annum	18,571	85,714	2,00,000

The annual consumption of electricity of all rice mills of the cluster are furnished table 2.3 below:

Table 2.3: Annual energy consumption of all rice mills of the cluster

S.No	Type of energy	Consumption	Tons of oil Equivalent (TOE)
1	Electricity	kWh/annum	1248
	Total	1,45,15,000	**1248**

2.2.3 Specific Energy Consumption

The specific energy consumption for various rice mill units of the cluster had been evaluated and the average value of the cluster is furnished below in Table 2.4:

Table 2.4: Specific energy consumption

Equipment	Units	Minimum SEC	Maximum SEC	Average SEC (for whole cluster)
Electricity	kWh/ton	11	20	15.5

2.3 Manufacturing process

2.3.1 Paddy Processing

2.3.1.1 Pre-cleaning

The paddy contains foreign material such as straw, weed seeds, soil and other inert material. If this are not removed prior to shelling the efficiency of the rubber sheller and the milling recovery is reduced.

The pre-cleaners separate three groups of materials:

The first separation is done by scalping or removing the objects that are larger than the grain. Either a flat oscillating screen or a rotary drum screen that allows the grain to pass through but retains straw.

The second separation retains the grains but allows broken grains, small stones and weed seeds to pass through. Aspirator is installed to remove the dust and light empty grains.

2.3.1.2 Rubber Sheller

The objective of a hulling/dehusking operation is to remove the husk from the paddy grain with a minimum of damage to the bran layer and, if possible, without breaking the brown rice grain. Since, the structure of the paddy grain makes it necessary to apply friction to the grain surface to remove the husk; it leads to breaking of some of the rice.

The paddy is fed into the center of the machine through a small hopper. A vertically adjustable cylindrical sleeve regulates the capacity and equal distribution of the paddy over the entire surface of the rotating disc, paddy is forced between the two discs (rubber sheller)and as a result of pressure and friction most of the paddy is dehusked (hulled), where husk and brown rice are separated.

2.3.1.3 Separator

The output from the huller is a mixture of brown rice, husk, broken paddy etc. The huller aspirator removes the lighter material such as husk, bran and very small broken rice. The remainder passes onto the paddy separator where the unhulled paddy rice is separated from the brown rice. The amount of paddy present depends on the efficiency of the husker, and normally less than 10%. Paddy separators work by making use of the differences in specific gravity, buoyancy and size between paddy and brown rice. Paddy rice has a lower specific gravity, higher buoyancy, and is physically bigger, longer and wider than brown rice

The compartment type of paddy separator uses the difference in specific gravity and the buoyancy to separate paddy and brown rice. When paddy and brown rice move over an inclined plane, they move at different speeds depending on their specific gravity, their shape and contact area, smoothness of inclined surface and the co-efficient of sliding friction. Brown grains are smaller, heavier, rounder and smoother and will slide faster than paddy grains. The processing capacity of the compartment separator is dependent on the compartment area. For

a 2-ton/hr capacity rice mill, a 45-compartment separator made up of 15 compartments on each of three decks is used.

2.3.1.4 Whitening and Polishing

In the process of whitening, the skin and bran layer of the brown rice are removed. During polishing of the whitened rice, the bran particles still sticking to the surface of the rice are removed and the surface of the rice is slightly polished to give it a glazed appearance. For further whitening if required as per the market demand or for export market, the polished rice is further processed in the silky machine for additional polishing.

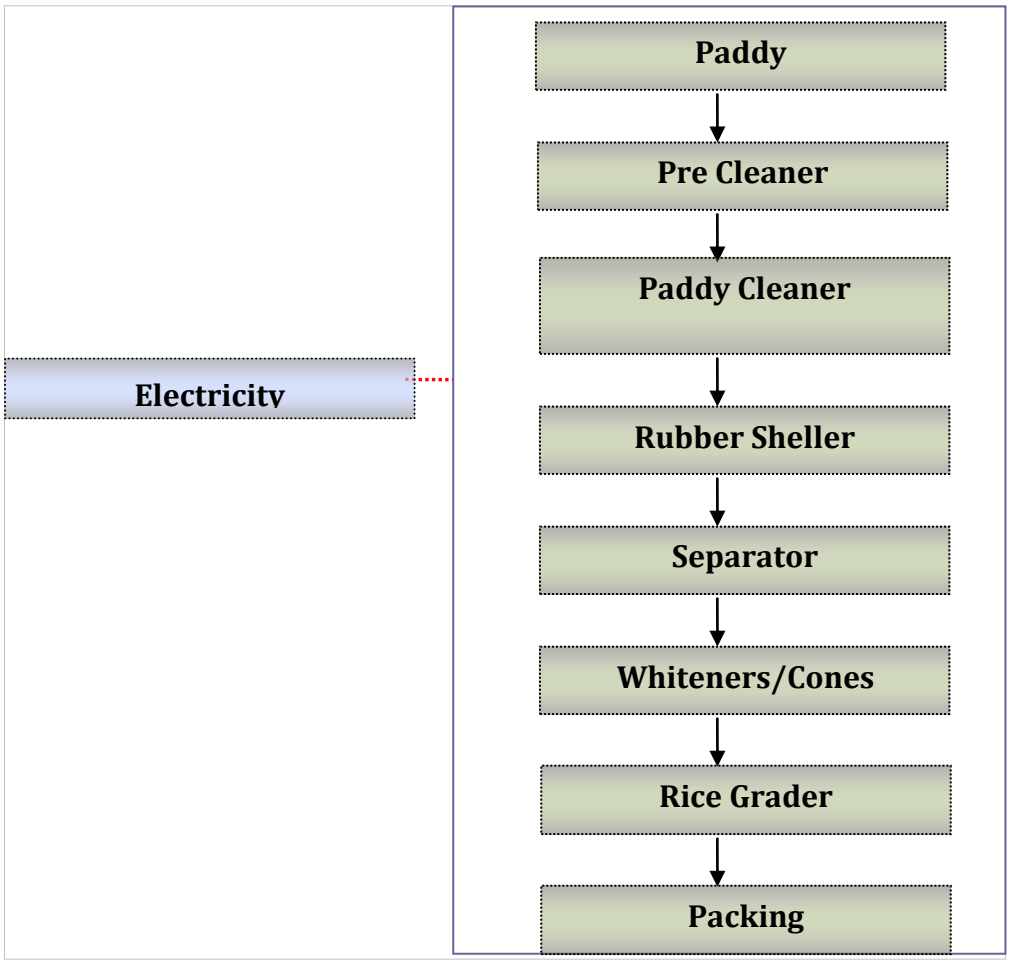
2.3.1.5 Rice grader

After polishing, the white rice is separated into head rice, large and small broken rice by a sifter. Head rice is normally classified as kernels, which are 75-80% or more of a whole kernel. The sifter is made up of a series of oscillating or cylindrical screens through which the rice passes. The output from the bottom screen is the very fine broken tips and is called the "brewers".

2.3.1.6 Elevators

The elevators are used at different stages of milling for transferring paddy, brown rice and white rice during the milling process

Figure 4 The detailed process flow diagram of a rice mill is furnished below.



2.4 Current policies and Initiatives of Local bodies

No policies are currently available for energy conservation and efficiency projects at the state level and is under development.

2.5 Major barriers for implementation of Energy Efficiency

2.5.1 Energy Availability

The major energy source for the rice mill units in the cluster is grid electricity. Though, the electricity is available, the power cuts are imposed for about 2 hours in day due to power shortage. The voltage supply by the state electricity board is poor and is found to be only 300 volts-350 volts in about 30% of the rice mills, there may be due to overloading of the distribution transformers.

2.5.2. Technological Issues

The major technical barriers that prevented the implementation of energy efficiency measures are as below:

- Lack of awareness and information about the technologies available in the market
- No knowledge among the workforce about energy conservation and efficiency
- The majority of the supervisors in cluster units are non technical and illiterates and are working based on experience.
- Dependency on local technology suppliers who do not have sufficient knowledge on efficient equipments

2.5.3 Lack of Technical know-how & Organizational capacity

The majority of the unit owners do not have technical expertise, knowledge or training about energy efficiency, and are dependent totally on local technology suppliers or service companies, who normally rely on established and commonly used technology. Further, the SME owners mainly concentrate on trading activities, which is crucial for the rice milling industry and least priority for energy related activities and machinery.

The rice mill owners would implement the equipments/ technologies based on the success stories of the equipment/technologies installed in the neighbouring industries in the area/cluster.

Though, some of the owners are interested in implementing energy efficiency measures, the lack of knowledge and technical know-how, made them to depend on the local suppliers.

These are however can be overcome by motivating them to attend the awareness programs and detailed report on the benefits of the measures identified and cost benefit analysis. Further, sourcing of expertise on maintenance service provider or training by the equipment supplier will definitely overcome the barriers.

2.5.4 Financial Issues

In the whole cluster, very few units taken initiation for implementing the energy efficiency equipments as a part of expansion or quality improvement.

The other units either don't have adequate financial strength or not interested investing in new technologies to avoid risk due to fear of the business as the rice milling industry sector is an agro based and largely dependence on government policies .

Further, the units owners are not aware of monetary benefit due to implementation of energy efficiency measures and also present losses of the existing technologies/equipments.

CHAPTER 3 ENERGY AUDIT AND TECHNOLOGY ASSESSMENT STUDY

3.1 Methodology adopted

3.1.1 Energy use and Technical Assessment study

3.1.1.1 Pre-energy audit activities

The pre-energy audit activities comprised collection of preliminary information from cluster units for products manufactured, production capacity, status of technologies / equipments installed, willingness of the unit for the study and implementation of the measures identified.

3.1.1.2 Preliminary Energy Study

The following methodology has been adopted for preliminary energy audit study:

a) Collection of past energy consumption details and energy bill

b) Establish specific energy consumption, if possible

c) List out major energy consuming areas of the plant

d) Level of technologies adopted (latest or old, crude or efficient, local or reputed company make)

e) Status of instruments installed in the plant and necessary instrumentation required for the detailed study

f) Identify areas for special attention for low cost measures with quick payback period

g) Understanding detailed manufacturing process with energy and material balance

h) Identify areas for detailed study and measurements required

i) Collect bottleneck areas of the plant for detailed study

3.1.1.3 Detailed Energy Study

The following methodology has been adopted for conducting detailed energy study:

- Monitoring of energy related parameters of various equipment / machines using portable instruments of ZESL
- Collection of operating data from various measuring instruments / gauges installed in the plant
- Collection of past operating data / historical data from log books and data registers

- Compilation of design data / name plate details of various equipment from design manuals and brochures
- Discussions with concerned plant personnel to take note of operating practices and shop-floor practices being followed in the plant and to identify specific problem areas and bottlenecks if any with respect to energy consumption
- Critical analysis of data collected / monitored by ZESL
- Technology status of the equipments installed
- Detailed process flow of the plant
- Identification of energy wastage areas and quantification of energy losses
- Identification of suitable measures for reducing energy wastages
- Identification of areas for reuse and recycle

Table 3.1: The details of the studies undertaken in cluster units

S.No	Type of audits	No. of units covered
1	Preliminary Energy Audits	20
2	Detailed Energy Audits	20
3	Technology audits	20

3.1.1.4 Technology Audit

The methodology adopted for conducting technical audit is as follows:

- Identify major equipments and technologies of the plant
- Whether the equipments installed is local make or reputed company make
- Various energy sources available in the vicinity of the cluster
- Energy use and specific energy consumption details
- Identify major constraints for installing energy efficient equipments
- Whether energy efficient equipment suppliers are available locally and identify the suppliers
- The strategy followed for selection of equipment suppliers by the management
- Any research or survey carried out prior to selection of the technologies adopted and available
- Detailed interviews with the management for the interest in adopting new technologies for efficiency improvement
- Financial strength and investment that can be made for the improvement of energy efficiency by the plant management

3.2. Observations made

3.2.1 Manufacturing Process and Technology employed

There are about 250 rice milling units in the cluster, which are engaged in the processing of paddy for rice production. The main raw material is paddy and is procured/purchased the farmers through various local agents. The process is more or less identical in all rice mills of the cluster.

The process flow diagram of a typical rice milling unit of the cluster is furnished in the Figure 5 below:

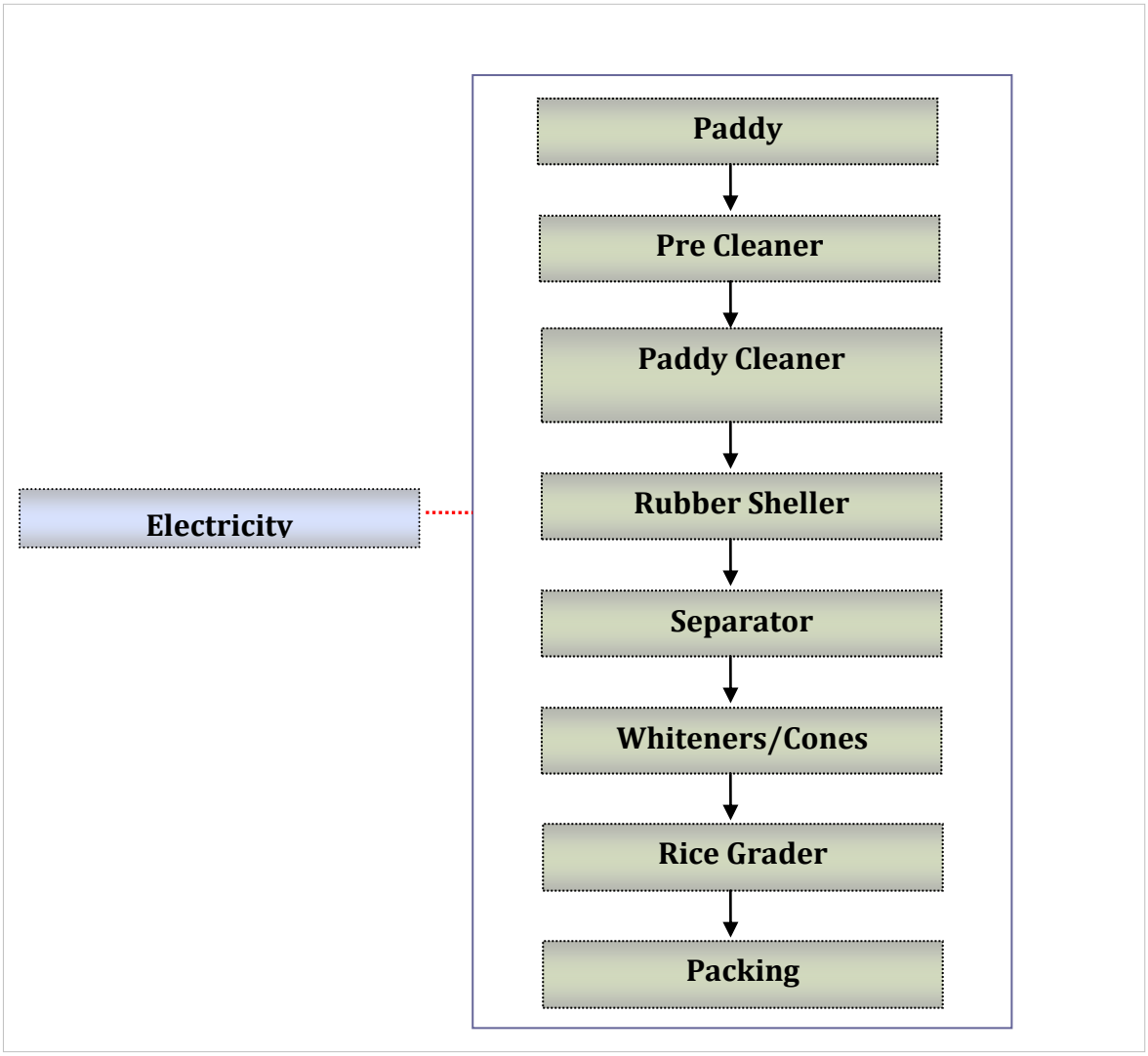


Figure 5: Process flow chart

(For a typical rice milling unit in the cluster)

The comprehensive study of the units carried out by ZESL has revealed the following:

i) The status of present technologies installed in cluster units is poor as compared to the technologies and practices / equipments available in the market. Various technological gaps have been identified in the cluster units as under and these may be due to lack of awareness on the technologies available and non availability of LSPs or equipment suppliers.

ii) Though, the managements are interested in implementation, the energy loss areas and EE technologies could not be identified by the management/workers or LSPs for implementation due to lack of awareness. Hence, the unit owners are depending entirely on illiterate workers and the local technology suppliers for their low cost and their availability any point of time.

iii) Further, the sector faces deficiencies such as lack of technical manpower, technical knowledge among workforce and unit owners and largely concentrated on the trading related activities by the owners.

3.2.2 Energy Consumption profile

The supply and consumption pattern of energy inputs are analyzed in the cluster and the details are furnished below:

3.2.2.1 Electricity

The majority units of the cluster use grid electricity for the rice mill operation. The prevailing price of grid electricity used in the cluster is furnished below table 3.2:

Table 3.2: Prevailing price of grid electricity in cluster unit

S.No	Fuel type	Price range (Rs.)
1	Electricity	4.20 per kWh

The specific electricity consumption of three typical rice mill units is furnished below table 3.3:

Table 3.3: Specific energy consumption

Details	Value	Unit -1	Unit -2	Unit -3
Electricity	kWh	18,571	85,714	2,00,000
Specific Electricity consumption	kWh/ton	11	13	17

3.2.2.2 Electricity

Tariff Description	Consumption Slab range in kWhr (Units) and billing period (One month)	Fixed charges per service for one month	Energy Charges Paise /kW hr (unit)	Monthly Minimum in Rupees
LT Tariff 5	Consumption from 0 units to 750 units per month	Rs.30/-	420	Rs.40/KW or part thereof of the contracted load.
	Consumption from 751 units and above per month	Rs.30/-	420	

3.2.3 Capacity Utilization

The processing of paddy for production of rice involves milling. The capacity utilization of rice mills is 60%-70% .

3.2.4 Housekeeping practices

Based on the detailed energy audits carried out in the cluster units, no unit is adopting good operating practices. There may be due to the lack of awareness and knowledge.

3.2.5 Availability of data and Information

The data and information pertaining to electricity consumption is available for latest months only. The unit owner are not willing to provide the data for quantity of paddy processing. However, the data such as energy consumption and production monitored during the field visits have been used for evaluating specific energy consumption and potential for energy saving.

3.2.6 Any other relevant Aspect

Majority of the operators and helpers deployed in the cluster units are non technical and illiterates and their knowledge is based on the past experience. They do not have technical skills and knowledge on energy conservation. This is one of the important factors for inefficiency of the equipments deployed.

3.3 Technology gap analysis

3.3.1 Technology up-gradation

i) The equipments installed in the units are poor as compared to the technologies/ equipments available in the market. The various technological gaps were identified in the cluster units and these may be due to lack of awareness on the technologies available, quantum of energy loss, lack of awareness among the workforce and unit owners, etc.

ii) There is a need for these industries to adopt energy efficient technologies.

iii) The rice milling cluster units fall under unorganized sector with low engineering, limited technology innovation and as well as low level of human resource on knowledge of technology, and operational skills. The sector also faces deficiencies such as the lack of access to technology and technology sharing and the inadequacies of strong organizational structure, professional attitude etc.

iv) There are many technologies and energy efficient equipments available in the market and local service providers are dealing with these technologies.

3.3.2 Process up gradation

Though, there is potential for process up gradation in the cluster units for improving the quality and enhancing production, many industry owners are not willing for process up gradation due to high initial investment. The details of equipment-wise technology gaps identified and technology interventions are furnished below:-

Table 3.4: Technology gaps identified rice mill technology interventions

S.No	Equipments	Technology Gaps Identified	Technology Interventions
1	**Common Drive System**	• All machinery are driven by a common shaft drive leading to high transmission losses and more power consumption.	• Install individual motors for all equipments
2	**Paddy Cleaner**	• The paddy cleaners are of local make and consuming more power due to inferior design	• Install energy efficient paddy cleaner.
3	**Separator**	• The separators are of local make and consuming more power due to inferior design	• Install energy efficient separator.
4	**Elevators**	• The elevator buckets are of iron and MS materials and consuming more power due to heavy weight	• Plastic buckets for elevators
5	**Electric Motors**	• The motors installed are very old and rewinded number of times and hence consuming more power.	• Install new energy efficient motors.

6	***Voltage Stabilizer***	• *The voltage supply is poor and very low due to overloading of the EB distribution transformers and hence over drawl of the current and power consumption.*	• *Install voltage stabilizers.*

3.4 Energy Conservation measures identified

3.4.1 Description of proposals including technology/product specifications

The various proposals have been identified for implementation in the cluster units for reducing energy consumption consisting of high, medium and No/ low investment measures

The milling process combines a number of operations that produces rice from paddy. The process involves:

3.4.1.1 Common Drive System

Background

In about 50 % of the rice mills, the rice mill equipments such as pre-cleaner, paddy cleaner, separator, rubber sheller, whitener/cone, grader are driven by a single common shaft drive system. In these common drive system, all the rice mill machinery like paddy cleaner, rubber sheller, whitener/cone, separator, rice grader and elevators are connected to a single common shaft driven by a single electric motor. All the equipments are connected by a long belt drives transmitting mechanical energy to the rice mill equipments. The present single drive system has the following disadvantages w.r.t power consumption:

- High transmission losses due to longer belt drive systems.
- Low efficiency of the motor during under loading, when one or two equipments are operated
- Possibility of operation of motor for idle running for longer periods.
- More chances of production loss due to single motor drive system
- Low power factor due to partial load operation.
- Even for small equipment operation like elevator or paddy cleaner need to be operated higher capacity motor hence more losses.

Figure 6: Common Shaft System

Recommendations:

As discussed above, the single and common drive system with long transmission driven is inefficient and consumes more power consumption. It is recommended to replace the present single and common drive motor system with individual drive system. The individual drive system consists of an individual motor for each equipment separately and are operated as per the requirement. Apart from reduction in transmission losses, the power consumption is also

reduced due to avoidance of part load operation and idle operation of the equipments. The capacity of motors to be installed for individual machines is furnished below in table 3.5:

Table 3.5 Suggested capacity of the motors for individual equipments

S.No	Equipment	Suggested HP
1	Elevators	1 HP (for 2 elevators)
2	Chaluni 2 no's	1 HP each
3	Rubber Sheller	7.5 HP
4	Cones 2 no's	10 HP each
6	Separator	2 HP

As per the studies carried out in similar type of industries in the cluster units, it is estimated that about 30% of total power consumption of the rice mill can be reduced. The cost benefit analysis of installing individual motors and drive system is furnished below in table 3.6:

Table 3.6 Cost benefit analysis on individual motors in a typical unit

Details	Value	Units
Total power consumption per annum	28,857	kWh
% savings expected	30	%
Power savings per annum	8,657	kWh
Monetary savings per annum(@Rs.4.20 per kWh)	0.36	Rs.in lakh
Investment required	1.00	Rs.in lakh
Income due to dispose of old machinery	0.25	Rs.in lakh
Net investment required	0.75	Rs.in lakh
Payback period	25	Months

There are about 125 rice mill units have common shaft drive system, where are the equipments are driven by a common shaft. Further, there are about 87 rice mills where some of the equipments like separator, rubber sheller and pre cleaner are operated by common shaft and other equipments by individual motors. The individual drive system can be implemented in 212 rice mills and the monetary savings is estimated as Rs.79.74 lakhs. The investment required is estimated as Rs.177.00 lakhs and the pay back period is about 2 years.

3.4.1.2 Separator

Background

The separators are used for separating broken rice, unfinished rice and finished rice. Majority of the separators installed in the rice mills units are local make. The separators are of inferior design and consuming more power.

Recommendations:

It is recommended to replace the present separators with new reputed company make separators such as suri engineering works, ricetec, milltech etc., The reputed make separator consumes less power due to better design and productivity is also more for the same capacity. The following are the features of reputed make Separator:

- Precise construction assures stone less paddy
- Negligible loss of paddy
- Vibro Motors assure noiseless trouble free operations
- Self cleaning system for maximum operating efficiency
- Removes immature grains along with other impurities

Figure 7: Separator

The cost benefit analysis of replacing the present local make separator with new reputed make separator is furnished below:

Table 3.7 Cost Benefit Analysis for Separator in a typical unit

Details	Value	Units
Total power consumption of the present separator per annum	6,480	kWh
% savings expected	50%	%
Power savings per annum	3,240	kWh
Monetary savings per annum(@Rs.4.20 per kWh)	0.14	Rs. in lakhs
Investment required	0.40	Rs. in lakhs
Income due to dispose of old machinery	0.10	Rs. in lakhs
Net investment required	0.30	Rs. in lakhs
Payback period	26	Months

There are about 250 rice mill units in the cluster. The efficient separators can be implemented in about 150 rice mills. The monetary savings is estimated as Rs.25.17 lakhs due to implementation of the activity. The investment required is estimated as Rs.74.00 lakhs and the payback period is 3 years.

3.4.1.3 Paddy Cleaner

Background

The paddy cleaner is used for removing immature grains and waste from the paddy. Majority of the paddy cleaner in the cluster units are of local make and are of inferior design and consuming more power for the same production w.r.t the equipments available in the market.

Recommendation

It is recommended to replace the present paddy cleaner with new reputed company make paddy cleaner such as milltech, ricetec, suri engineering works etc., The reputed make paddy cleaner is efficient and consumes less power and also the productivity is also more for the same capacity.

Figure 8: Paddy Cleaner

The cost benefit analysis of replacing the present paddy cleaners with new paddy cleaners is furnished below:

Table 3.8 Energy Saving Potential for Paddy Cleaner

Details	Value	Units
Total power consumption of the present paddy cleaner per annum	9,600	kWh
% savings expected	50%	%
Power savings per annum	4,800	kWh
Monetary savings per annum(@Rs.4.20 per kWh)	0.20	Rs. in lakhs
Investment required	0.40	Rs. in lakhs
Income due to dispose of old machinery	0.10	Rs. in lakhs
Net investment required	0.30	Rs. in lakhs
Payback period	18	Months

There are about 250 rice mill units in the cluster. The new efficient paddy cleaners can be implemented in 150 rice mills. The monetary savings is estimated as Rs.22.21 lakhs. The investment required is estimated as Rs.60.00 lakhs and the payback period is 3 years.

3.4.1.4 Elevators

Background

The elevators are the most common type of equipment found in rice milling industries. The elevators are used for transferring the paddy, semi finished and finished rice. The detailed studies undertaken in various rice mills, it is found that majority of the rice millers are using iron or MS material buckets for elevators. The iron or MS buckets consume more power due to heavy weight than the plastic buckets. There are about 15 elevators in a typical unit of the cluster. All elevators are connected by 1 HP motor each.

Figure 9: Elevator iron buckets

Recommendation

The replacement of iron and MS buckets with plastic buckets for elevators will reduce the power consumption by 10 %.

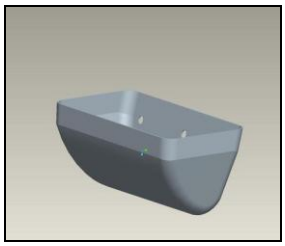


Figure 10: Elevator plastic buckets

The cost benefit analysis is furnished below table 3.9:

Table 3.9 Cost Benefit Analysis for Elevators in a typical unit

Details	Value	Units
No. of elevators	15	nos
No of hours of operation/day	15	hrs
No of days of operation /annum	300	days
Total power consumption of elevators	50,625	kWh/year
% Savings expected	10	%
Power savings per annum	5,062	kWh
Monetary savings per annum(@Rs.4.20 per kWh)	21,263	Rs.
Investment required	30,000	Rs.
Payback period	17	months

The plastic buckets can be taken up in 208 units of the cluster. The monetary savings is estimated as Rs.4.97 lakhs. The investment required is estimated at Rs. 11.00 lakhs and the payback period is 2.3 years.

Benefits:

- Low electricity consumption
- Reduces GHG emissions
- Easy cleaning of the buckets

3.4.1.5 Voltage Stabilizer

Background

The power distribution by the state electricity board is very poor in the cluster. About 20-30% of the units are facing low voltage problem due to overloading of electricity board distribution transformer. Based on the detailed energy studies conducted in the cluster, the voltage supply

is measured to be between 297 volts to 350 volts. The current drawn by the motors is high due to low voltage and failure of the motors.

Recommendation

It is recommended to install voltage stabilizer for constant and optimum voltage supply. By optimizing voltage supply, the power consumption of the rice milling equipments reduces by 10%-15% of the total power consumption.

Figure 11: Voltage Stabilizers

The cost benefit analysis of installing voltage stabilizer is furnished below:

Table 3.10 Cost Benefit Analysis for Voltage Stabilizers

Details	Value	Units
Total power consumption of the unit per annum	44,862	kWh
% savings expected	15%	%
Power savings per annum	6,729	kWh
Monetary savings per annum(@Rs.4.20 per kWh)	0.28	Rs. in lakhs
Investment required	0.50	Rs. in lakhs
Payback period	21	Months

The voltage stabilizers can be installed in 75 units in the cluster. The monetary savings is estimated as Rs.21.19 lakhs. The investment required is estimated at Rs. 37.50 lakhs and the payback period is 21 months.

3.4.1.6 Energy Efficient Motors

Background

Based on detailed energy audits conducted in the cluster units, about 30% of the units are more than 10 years old. The motors installed are old and rewinded number of times due to frequent burning of the motors.

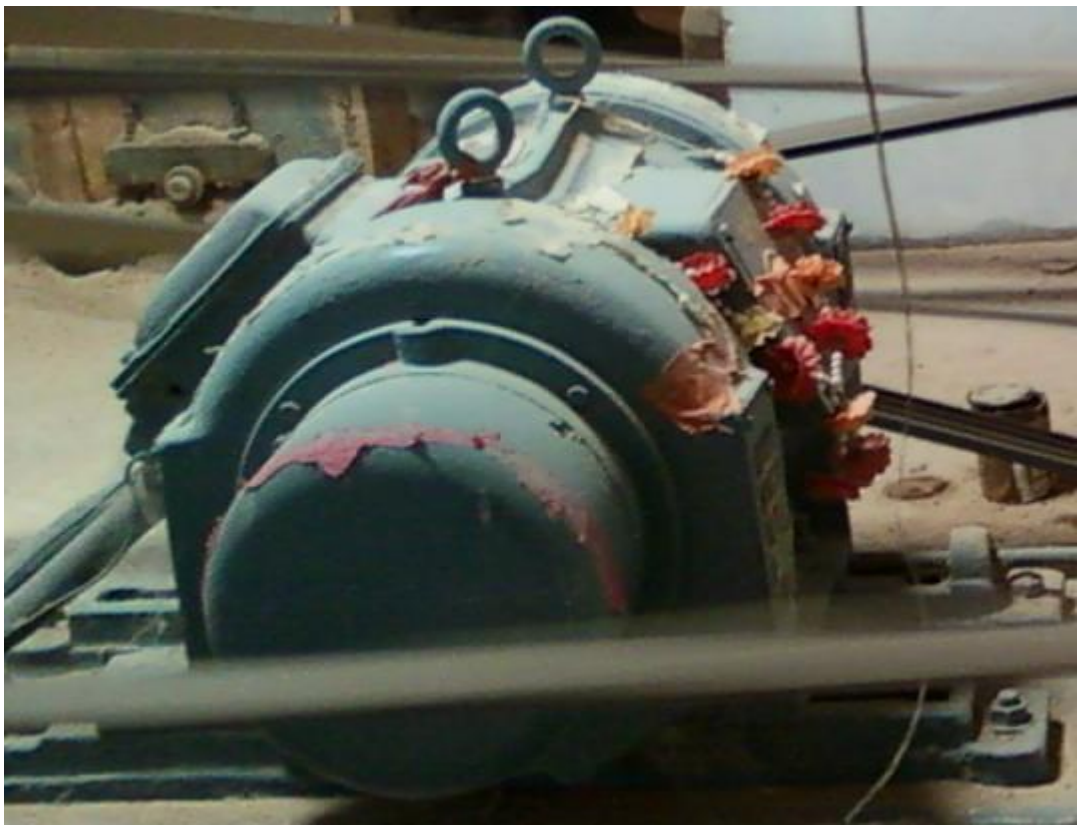


Figure 12: Old and Rewinded Inefficient motor

Recommendation

It is well known fact that the rewinded motors have less efficiency than the new motors. The studies indicate that the efficiency of the rewinded motors drops by 5%-10% for the repeated rewinded motors. Hence, it is recommended to install new energy efficient motors by replacing old and rewinded motors.

Figure 13: Energy efficient motor

The cost benefit analysis is furnished below:

Table 3.11 Cost Benefit Analysis for Energy Efficient Motors for Whole Cluster

Details	Value	Units
Total power consumption of energy efficient motors per annum	39,60,000	kWh
% savings expected	10%	%
Power savings per annum	39,600	kWh
Monetary savings per annum(@Rs.4.20 per kWh)	16.63	Rs. in lakhs
Investment required	25.00	Rs. in lakhs
Payback period	18	Months

The installation of energy efficient motors can be taken up in 50 units in the cluster. The monetary savings is estimated as Rs.16.63 lakhs. The investment required is estimated at Rs. 25.00 lakhs and the payback period is 18 months.

3.4.2 Life cycle analysis for the suggested Energy saving proposals

The life cycle analysis for each of the suggested energy saving proposal has been prepared as per the Indian industry norms, government policies, and as per the guarantee provided by the equipment/technology suppliers and presented below.

Table 3.12: Life cycle analysis for energy saving proposals suggested

S.No	Energy Saving Proposal	Life cycle analysis
1	Individual motor Drive System	The life of the individual motors is considered at 15 years. The depreciation is considered at 80% by straight line method.
2	Separator	The life of the separator is considered at 15 years. The depreciation is considered at 5.28% by straight line method.
3	Paddy Cleaner	The life of the paddy cleaner is considered at 15 years. The depreciation is considered at 5.28% by straight line method.
4	Plastic buckets for elevators	The life of the plastic buckets for elevators is considered at 10 years. The depreciation is considered at 5.28% by straight line method.
5	Voltage stabilizers	The life of the voltage stabilizers is considered at 10 years. The depreciation is considered at 5.28% by straight line

		method
6	Energy efficient motors	The life of the energy efficient motors is considered at 15 years. The depreciation is considered at 80% by straight line method.

3.4.3 Cost of Implementation

The investment required for various energy saving proposals identified for **Ganjam Rice Mills** Cluster units is furnished below.

Table 3.13: Details of cost of implementation

S.No	Equipment Details	Capacity	Investment (Rs. In Lakhs)
1	Individual Drive System	-	177.00
2	Separator	2 TPH	74.00
3	Paddy Cleaner	2 TPH	60.00
4	Plastic buckets for elevators	-	11.00
5	Voltage stabilizers	-	37.50
6	Energy Efficient Motors	-	25.00

3.4.4 Monetary savings

As per the detailed studies carried out on various equipments of **Ganjam Rice Mills Cluster** units, the monetary savings and payback period have been estimated for each proposal and the details are furnished below:

Table 3.15: Monetary Savings and Payback Period for the suggested energy saving proposals

S. No	Equipment Details	Investment (Rs. in Lakhs)	Monetary savings (Rs. in lakhs)	Payback period (years)
1	Individual motor Drive System	177.00	79.74	2
2	Separator	74.00	25.17	3
3	Paddy Cleaner	60.00	22.21	3
4	Plastic buckets for elevators	11.00	4.97	2
5	Voltage stabilizers	37.50	21.19	2
6	Energy Efficient Motors	25.00	16.60	2

3.4.6 Issues/barriers in implementation of EE proposals

The major barriers identified for implementation of the proposals in the cluster units are described below:

- One of the major barriers is the lack of awareness and information among the cluster owners on energy / monetary losses, EE technologies, and energy efficiency. A few demonstration projects may motivate them to take up the projects.
- Majority of the cluster unit owners doesn't have financial strength for implementation of the energy efficient equipment.
- Though, LSPs are available in the cluster, they don't have technical strengths for supply of efficient equipments.

3.4.7 Availability of Technologies in Local / National

For majority of the technologies and proposals identified, the equipments suppliers/ dealers / branch offices are available in Bhubaneswar, Cuttack, as Ganjam and Berhampur are small towns and majority of the rice mills are located in Berhampur and surrounding villages. Among the technologies / equipments identified for implementation for Ganjam Rice Mills cluster units, some of the measures can be implemented by the local service providers and the balance equipments can be procured at nearest city i.e., Bhubaneswar, Vijayawada and Kakinada. The detail of equipment which can be implemented by LSPs and those needs to be procured from other cities is furnished below:

Table 3.16: Details of technologies available for the suggested proposals

Sl.No	Equipment details	LSPs (Bhubaneswar)
1	Common Shaft System	√
2	Separator	√
3	Paddy Cleaner	√
4	Plastic buckets for elevators	√
5	Voltage Stabilizers	√
6	Energy Efficient Motors	√

Note: √ Available

3.5 Identification of Technologies/Equipments for DPR preparation

The majority of the industries in the cluster are engaged in the processing of paddy for production of rice. The manufacturing processes and equipments installed are identical for most of the cluster units.

Based on the detailed studies carried out, there is considerable potential in all cluster units for energy conservation and efficiency.

As the process and equipments are more or less similar in all cluster units, all the technologies/ equipments identified can be replicated as per the requirement and detailed project reports for the specific technologies prepared also can be replicated for different units as per the capacity requirement.

The technologies/equipments considered for preparation of detailed project report are furnished in Table 3.17:

Table 3.17: The list of technologies for DPR preparation

S.No	Technology/equipment	No. of DPR's	Capacities
1	Replacement of the common shaft drive with individual drive system	3	1 ton/hr, 1.5 ton/hr, 2ton/hr
2	Separator	3	1 ton/hr, 2 ton/hr, 3ton/hr
3	Paddy Cleaner	3	1 ton/hr, 2 ton/hr, 3ton/hr
4	Energy efficient motors	3	30 HP, 40 HP, 50 HP
5	Voltage stabilizers	3	25 KVA, 50 KVA, 100 KVA

3.6 Environmental benefits

3.6.1 Reduction in GHG emissions

The major GHG emission reduction source is CO_2 due to implementation of the technologies identified, as the technologies will reduce grid electricity. The total GHG emission reduction is estimated at 2,102 t CO_2/ annum due to implementation of the various energy saving proposals in the cluster.

3.6.2 Reduction in other emissions

The technologies identified upon implementation for the **Ganjam Rice mills** Cluster units will reduce Electricity consumption and hence, there is no impact on other emissions.

Table 3.18: Estimated annual fuel/electricity savings in the cluster

S. No	Energy conservation measure	Annual Energy/Fuel saving Per Annum	Annual Monetary saving (Rs. lakhs)	Implementation cost (Rs. Lakhs)	Simple payback period (Years)	Short listed for DPR preparation (Yes/No)	No of units can be implemented
1	Common drive system with individual motors	19,09,530 kWh	79.74	177.00	2.2	Yes	212
2	Separator	5,99,225 kWh	25.17	74.00	2.9	Yes	150
3	Paddy Cleaner	5,28,750 kWh	22.21	60.00	2.7	Yes	150
4	Elevators	1,18,354 kWh	4.97	11.00	2.3	No	208
5	Voltage stabilizers	5,04,703 kWh	21.19	37.50	1.7	Yes	75
6	Energy efficient motors	3,96,000 kWh	16.63	25.00	1.5	Yes	50
	TOTAL	**40,56,562 kWh**	**130.05**	**272.50**	**13.30**	**-**	**-**

Table 3.19: Estimated annual fuel/electricity savings in the cluster

S. No	Fuel	Total fuel savings/annum in the cluster
1	Electricity	**40,56,562 kWh**

CHAPTER 4 SYSTEMATIC APPROACH FOR ENERGY CONSERVATION BY TEM/SGA

4.1 Introduction

Energy is one of the most important resources to sustain our lives. At present we still depend a lot on fossil fuels and other kinds of non-renewable energy. The extensive use of renewable energy including solar energy needs more time for technology development.

In this situation Energy Conservation (EC) is the critical needs in any countries in the world.Of special importance of Energy Conservation are the following two aspects:

(1) Economic factors

(2) Environmental impacts

4.2 Economic factors of Energy Conservation

Energy saving is important and effective at all levels of human organizations – in the whole world, as a nation, as companies or individuals. Energy Conservation reduces the energy costs and improves the profitability.

Notably, the wave of energy conservation had struck the Indian intelligentia 3 years earlier when a Fuel Policy Committee was set up by the Government of India in 1970, which finally bore fruits three decades hence in the form of enactment of the much awaited Energy Conservation Act, 2001 by the Government of India. This Act made provisions for setting up of the Bureau of Energy Efficiency, a body corporate incorporated under the Act, for supervising and monitoring the efforts on energy conservation in India.

Brief History of energy efficiency movement in India and associated major milestones are as follows

- 1974: setting up of fuel efficiency team by IOC, NPC and DGTD (focus still on industry)
- 1975: setting up of PCAG (NPC main support provider) : focus expanded to include agriculture, domestic and transport
- 1978: Energy Policy Report of GOI: for the first time, EE as an integral part of national energy policy – provided detailed investigation into options for promoting EE
- Post 1980, several organizations started working in EC area on specific programs (conduct of audits, training, promotion, awareness creation, demonstration projects, films, booklets, awareness campaigns, consultant/product directories)
- Some line Ministries and organizations like BICP, BIS, NPC, PCRA, REC, Ministry of Agriculture, TERI, IGIDR, CSIR, PETS (NPTI)
- State energy development agencies

- Industry associations
- All India financial institutions

The Government of India set up Bureau of Energy Efficiency (BEE) on 1st March 2002 under the provisions of the Energy Conservation Act, 2001. The mission of the Bureau of Energy Efficiency is to assist in developing policies and strategies with a thrust on self-regulation and market principles, within the overall framework of the Energy Conservation Act, 2001 with the primary objective of reducing energy intensity of the Indian economy. This will be achieved with active participation of all stakeholders, resulting in accelerated and sustained adoption of energy efficiency in all sectors

Private companies are also sensitive to energy costs, which directly affects their profitability and even their viability in many cases. Especially factories in the industrial sectors are of much concern, because reduced costs by Energy Conservation mean the more competitive product prices in the world markets and that is good for the national trade balance, too.

4.3 Environmental impacts of Energy Conservation

Energy Conservation is closely related also to the environmental issues. The problem of global warming or climate change is caused by emission of carbon dioxide and other Green House Gases (GHG). Energy Conservation, especially saving use of fossil fuels, shall be the first among the various countermeasures of the problem, with due considerations of the aforementioned economic factors.

4.4 Total Energy Management (TEM)

Every point in factories has potential for Energy Conservation. Total Energy Management is implemented, by all the people's participation, step by step utilizing "Key Step Approach" in a systematic manner, as shown below:

1) Top management policy/Goal
   - Develop a policy statement
   - Set targets
2) Proper EC Organization including Assignment of Energy Manager
   - Establish proper EC organization (utilizing SGA)
   - Assignment of Energy Manager
3) Data collection and Analysis
   - Collect data on current energy use
   - Analyze the collected data

- Identify management strength and weakness
- Analyze stakeholders' needs
- Anticipate barriers to implement
- Estimate the future trend

4) Selecting EC Measures/Projects
   - Selecting EC Measures
   - Selecting EC Projects
   - Make out a plan/program
5) Prioritizing
6) Developing an Action Plan
7) Training the related members
8) Awareness-raising and Motivation
9) Implementing the Action Plan (including monitoring and controlling
10) Evaluation (Management review)
11) Analysis for future planning (Standardization and Dissemination)

The following figure shows these Key Steps for implementing Energy Conservation activities.

Steps of the Key Step Approach.

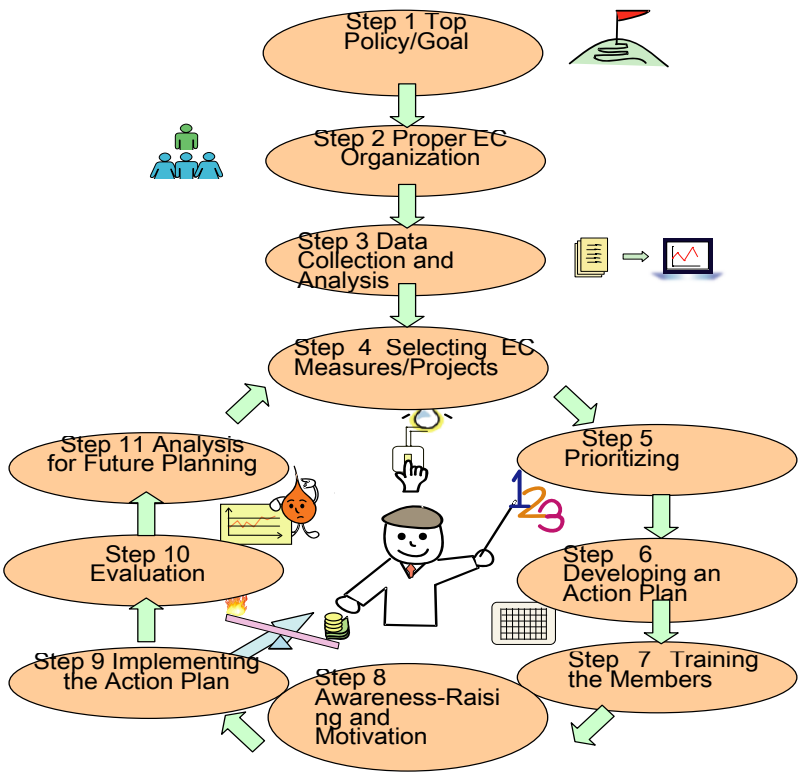


Figure 14: Key Step Approach

Each step is explained in this order as below:

Step 1: Top Management policy/Goal

It is the most important for the success of Energy Conservation activities within companies or factories to have clear and official commitment of top management – either the corporate top (senior) management or factory managers. The top (senior) management shall announce explicit commitment to the Energy Management (or Energy Conservation) and behave along this line – for example, participate in EC (Energy Conservation) events and encourage the people there for EC promotion.

This Handbook is primarily meant for Energy Managers for the use of EC promotion within factories, on the assumption that top management has already committed to that. However, there may be cases where top management would learn about Energy Management (or Energy Conservation) by this Handbook, or Energy Managers would make efforts to persuade top management to support or commit to Energy Management (or Energy Conservation) with the help of this Handbook.

(1) Develop a policy statement

It is desired that the top (senior) management announces the "Energy Policy Statement". This is very effective to let people inside and outside the company clearly knows the management's commitment to Energy Management (or Energy

Conservation). The format of the energy policy statement is various, but it usually includes the goal or objective of the company and the more concrete targets in the field of Energy Management (or Energy Conservation). It often shows the major measures and timetables. The statement shall match the company's mission statement or overall management strategy plan.

(2) Set targets

The targets shall be concrete and specific so that everyone can understand it.

Step 2: Proper EC Organization including Assignment of Energy Manager

In some countries, where the EC Promotion Act is in force, the designated factories have obligation of assigning Energy Managers. In relation to Energy Management, however, the word "Energy Managers" is here used as a Manager or a Coordinator, separate from the above-said legal obligation, who works exclusively for Energy Management (or Energy Conservation) purposes, ranging from gathering energy-related information to drafting EC plans/programs and promoting or coordinating during implementation. To the proper Energy Management, this type of Energy Manager is indispensable. How to position this Energy Manager within the company organization is also an important issue and needs careful decision. In some cases, Energy Committee, with members from the major departments, may be formed to assure the company-wide or factory-wide cooperation, as shown in the following figure.

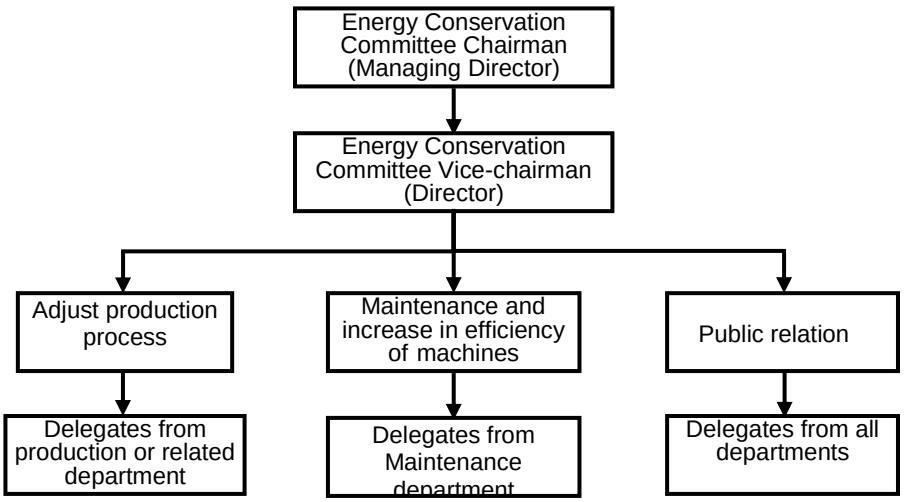


Figure 15: Example of energy conservation committee's organization

Actually there are many ways of forming EC organization, depending on the situation of factories or institutions, such as the size, kind of business, etc. In any case, it is very effective to utilize SGA (Small Group Activities) and there are also many ways to do that. The important thing is to design and make out the organization carefully to meet the purpose. In practical sense to do that, there may be the following five widely applicable ways of establishing the organization.

(1) Utilize Line (Formal) Job-related Organization for TEM purpose

(2) Use TPM Organization for TEM purpose

(3) Use TQM Organization for TEM purpose

(4) Add Employee Suggestion System to Energy Conservation Organization for TEM purpose

(5) Utilize another organization for TEM purpose

The easy and practical way may be starting from easy form of TQM, or QCC (Quality Control Circle) activities.

Furthermore, because TPM is closely related to job-related organization, (1) and (2) may be often give the same kind of results. (An example of this form is shown in Part 3, 2 “How is SGA related to Energy Conservation?” (page 21).

Step 3: Data collection and Analysis

Before trying to make out any future programs or action plans, it is essential for the company or factory management to understand the current situation in a proper and accurate manner. This includes not only the status of their own operation but also other relevant information such as competitors’ operation, circumstances around the company and their trend in future, positioning the company itself in the local and global markets, and so on.

The key steps for this purpose are shown below:

(1) Collect data on current energy use and analyze them

The current data of energy consumption shall be obtained by measurement, calculation or estimation for the individual operation units (energy cost centers) with classification of kinds of energy (fuels types, utility types, etc.). The data shall be gathered regularly and arranged/summarized daily, weekly, monthly, by seasons or annually. Then the data shall be checked for the past historical trend and interpreted with relation to operational modes and production scales. That shall also be utilized for the forecast of future trends.

(2) Identify Management Strength and Weakness

Then the data shall be compared with the best practice data or benchmarks in the industry. If such reference data are hardly available, the historical data of their own operation and estimated data for the competitors would be utilized for this purpose. At the same time, the strength and the weakness of the company shall be evaluated considering the competitors’ situations in the local and global markets. This would serve the purpose of making out a realistic Energy Management plan later.

(3) Analyze stakeholders' needs

Stakeholders are top (and senior) management, middle managers, staff/engineers and workers/operators. Other stakeholders in the normal business sense, such as the shareholders and lenders, need not be considered here for the moment. The needs and intention of those stakeholders shall be summarized and taken into consideration.

(4) Anticipate barriers to implement

Making out a realistic and practical program also needs consideration of anticipated barriers for the implementation of Energy Management program or action plan.

Some possible examples of such barriers are:

- Insufficient understanding and support by top management
- Insufficient understanding and cooperation of managers within factories
- Insufficient awareness of people to get successful results
- Insufficient capability of people due to lack of training
- Insufficient available technology due to lack of information
- Insufficient availability of manpower for EC activities within factories
- Insufficient budget for EC activities due to the company's financial status

(5) Estimate the future trend

The future trend of energy supply-demand balance is estimated based on checking and analysis of the historical data. That data of future trend would also be a basis of the program of excellent-Energy Management.

In analyzing the collected data and developing ideas of Energy Conservation, it is very often useful to think of the following techniques of finding problems and solutions:

Suppress: Using during the time in which it is not necessary to use. Examples include using electricity before or after working hours or when there is no one working.

Stop: Using equipment when it is not necessary. Examples include using all lightings during break time.

Reduce: Amount, pressure, temperature, speed, or brightness, or quality that exceed requirement. Examples include reducing intensity of lighting if not necessary.

Prevent: Prevent leakage or loss of energy. Examples include reducing space that leads to outside in order to prevent the leakage of heat into air.

Improve: Improve or repair machines to increase efficiency or modify manufacturing process to the one which enables us to conserve energy more. Examples include changing transparent sheet over the roof.

Store: Re-use the discarded energy. Examples include re-using heat from exhaust fume in order to reduce use of electric heater to warm heavy oil.

Change: Change how to use, type of energy, or energy sources to a suitable one from technical or economic point of view. Examples include changing the grade of heavy oil to an appropriate one or changing furnace systems or welding machines to the ones that use gas.

Increase Production

Examples include improving production process. This will lead to the reduction of energy usage per production amount.

Step 4: Selecting EC Measures/Projects

Based on the aforesaid understanding of the current status and position of the company (factory), various EC measures are studied and many EC Projects are proposed. Comparison among these measures and projects are made with consideration of a lot of factors, such as technical, economic, intangible, and so on.

Then a plan/program is developed based on these study results. To do this, it is very important to consider the following issues:

The plan/program shall be realistic, practical and attainable with due consideration of many related elements and management resources of the company or factory. It also shall be expressed in terms of the measurable or quantifiable parameters, including Fuel Usage Index, Electricity Usage Index, Energy Usage Index, etc. It usually includes a lot of managerial measures of Energy Management (or Energy Conservation) promotion activities such as motivation techniques, means to improve awareness, training, and so on. In other words, the following items are often useful in comparing and selecting alternative plans:

1. Effects of energy conservation: Activities that can conserve energy more than others are more promising.
2. Investment amount: Activities that require less investment are more promising.
3. Pay-back period: Activities with short pay-back period for investment amount in equipment are more promising because all energy conservation will be profits after pay-back period.
4. Length of implementation: Activities that can be performed in a short period are more promising because they do not influence production process of the factory.

5. Number of personnel required: Activities that require a large number of personnel tend to be burdensome.
6. Importance to executives and reputation of the company: Some activities provide little financial benefit but cause good image or reputation.
7. Risk of the project: Some activities bring about big financial benefits but involve high risk from various factors. In this case projects have less importance.

Step 5: Prioritizing

Many EC measures and projects are prioritized based on the internal studies including comparison among their alternatives, in the manner explained in the above.

Step 6: Developing an Action Plan

The priority consideration then gives birth to the Action Plan. The plan shall be clear, practical and comprehensive with proper schedule and budgeting.

Shown below is an example of such a plan.

Table 4.1: Example of energy saving plan

Detail of the plan	Length (Months)						Person in charge	Budget	Inspected by
	1	2	3	4	5	6			
1. Turn off electricity when there is no one around							Mr. Prayat		
2. Turn off air-conditioner 30 minutes before stop working							Miss Aom		
3. Reduce welding machine's current according to the specification of the metal used for welding							Mr. Matthayas		
4. Close welding machine after working							Miss Thanom		

Step 7: Training the related members

This issue is very important to secure the success of project Implementation, because the people are the most important resources that determines the success of the plan.

Step 8: **Awareness-raising and Motivation**

To have the total power of "all members' participation" combined together, it is also very crucial how to raise awareness and motivation of related people within the company (or factory).

Shown below is an example of awareness raising plan.

Table 4.2: Example of awareness raising campaign

Detail of the plan	Length (Months)						Person in charge	Budget	Inspected by
	1	2	3	4	5	6			
1. Display the results of energy conservation every month	*	*	*	*	*	*	Mr.Prayat	-	Mr. Laaied
2. Evaluate every month	*	*	*	*	*		Miss Aom	-	Mr. Laaied
3. Perform energy conservation activity every 6 months	*					*	Mr. Matthayas	-	Mr. Laaied
4. Perform "Finding measures" activity in order to make energy conservation plan	*					*	Miss Thanom	-	Mr. Laaied
5. Provide rewards to sections that have achieved high efficiency						*		-	

Step 9: Implementing the Action Plan (including monitoring and controlling)

The organizational force established in the said planning step shall be utilized fully to ensure smooth implementation of the program. Energy Manager and/or the committee shall continue working to promote the activities and report to top management on the status quo.

The actual records of implementation shall be closely watched and monitored. If some problems arise, or some variance between the planned figures and the actual record is observed, then necessary actions shall be taken immediately.

Step 10: Evaluation (Management Review)

After the program is completed, the report shall be submitted to the top (senior) management. The results shall be assessed and analyzed for any good and bad points. The lesson shall be utilized as a feedback in the subsequent plan/program.

Thus the activities are repeated to form a cyclic movement.

The result of evaluation must be announced on the board in order to inform employees, so that they will be given motivation for the next activities. Evaluation can be divided into 2 types as follows.

- Short-term evaluation for the follow-up of the performance
- Long-term evaluation for the evaluation of the whole project that will be used for the future planning

Evaluation can be made in the following 3 levels.

1. **Self Audit:** Self evaluation that is made in a small group or a department based on the predefined form. (Inspection may be made every month).

2. Upper **Manager Audit:** Evaluation that is made by the section/department manager intended to raise performance of the activity. (Inspection may be made every 3 month).
3. **Top Management Audit:** Evaluation made by the executives of the organization that will be used for the evaluation of annual bonus. (Inspection may be made every 6 month).

In some cases, top management could think of adopting external people (outside consultants) to evaluate the results of Energy Conservation activities. Even in those cases, internal evaluation should be made to gain the fruits as much as possible.

Step 11: Analysis for future planning (Standardization and Dissemination)

The successful results and the lessons learned are to be analyzed and arranged into the standard form which can be easily utilized by anyone in the factory. The standardized documents or information are to be disseminated all over the company.

Moreover, Energy Conservation should be incorporated as a part of daily jobs and performed continuously in a systematic manner. For this purpose, activities for energy conservation must be incorporated as a part of company's basic or business plan. If a problem is found as a result of evaluation, improvement or modification will be done and the objectives will be achieved. If the results reach or exceed the objective, information must be gathered in order to set it as a "Work Standard," which will be used in setting a new activity plan.

4.4 Small Group Activities (SGA)

Small Group Activity (SGA) gives employees the problem solving tools they need to eliminate obstacles to Total Productivity, the cumination of zero break-downs, zero defects, and zero waste. Enterprising employees identify the problem, be it in "man, material, method, or machine," and develop cost-effective and practical methods for solving the problem.

4.5 Importance of SGA

SGA are activities by group of employees at operator (working Group) level. They aim to solve problems that occur at the place taken care of by each employee and put emphasis on participation and team work. Factories can apply small group activities to many kinds of work along with normal work or other measures that are already underway. The burden on employees will not increase because of small group activities. They are not only bringing benefits to factories but also boosting the knowledge and ability in performing jobs of employees, improving communication among employees, increasing creativity, and make it possible to express their own proposal with less hesitation to management. As a result,

employees will start to think "This is our problem." This SGA can be applied to Energy Conservation, too, with successful results, as shown in Figure 28.

4.6 How SGA leads to Energy Conservation?

An excellent example of organizational structure that promotes energy management emphasizing participation is that they form overlapping small groups as in figure 14. The feature of this structure is that a small group for energy management is distributed to various sections as in figure 15, which is a recipe for success of Total Energy Management (TEM) and makes various communications and management of activities more efficient and effective.

Small group activities for total energy management (TEM) are the activities in which employees of all levels in production or management, starting from the top to the bottom, participate in order to reduce loss related to their own job by improving their job. In order for the activities to succeed, management of all levels must provide support in necessary training and equipment, communication of policies, and the setting of problems to solve

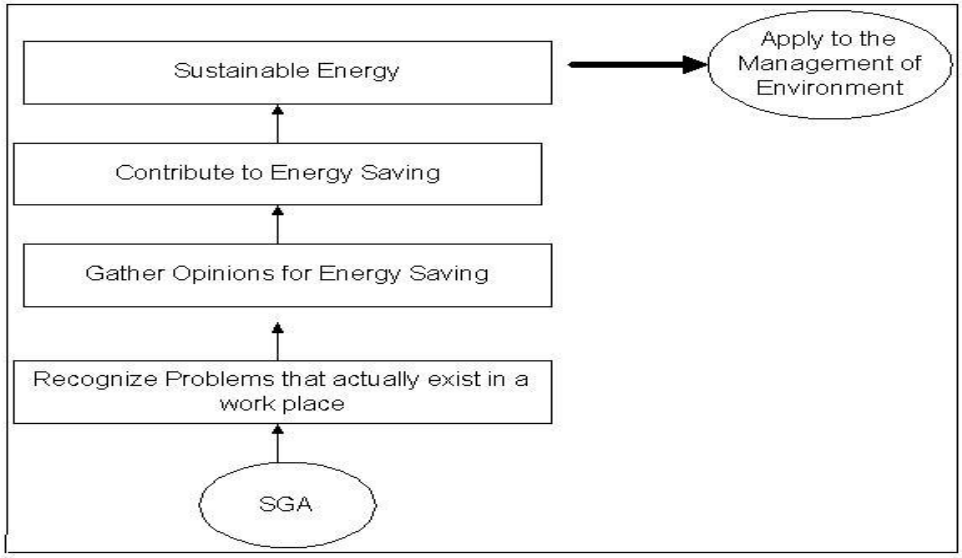


Figure 16: Relationship of SGA and energy saving

Small group activities for TEM can be divided into 4 or 5 levels depending on the scale of the organization. This division is in order to emphasize the fact that everyone must improve in their job under the responsibility to each other. It also enables us to make improvement without overlapping. The following example shows utilizing the existing job-related organization as much as possible, as already mentioned in Part 2, 2."Strategy for Improving the Efficiency of Energy Usage further", Step 2 Proper EC Organization including Assignment of Energy Manager.

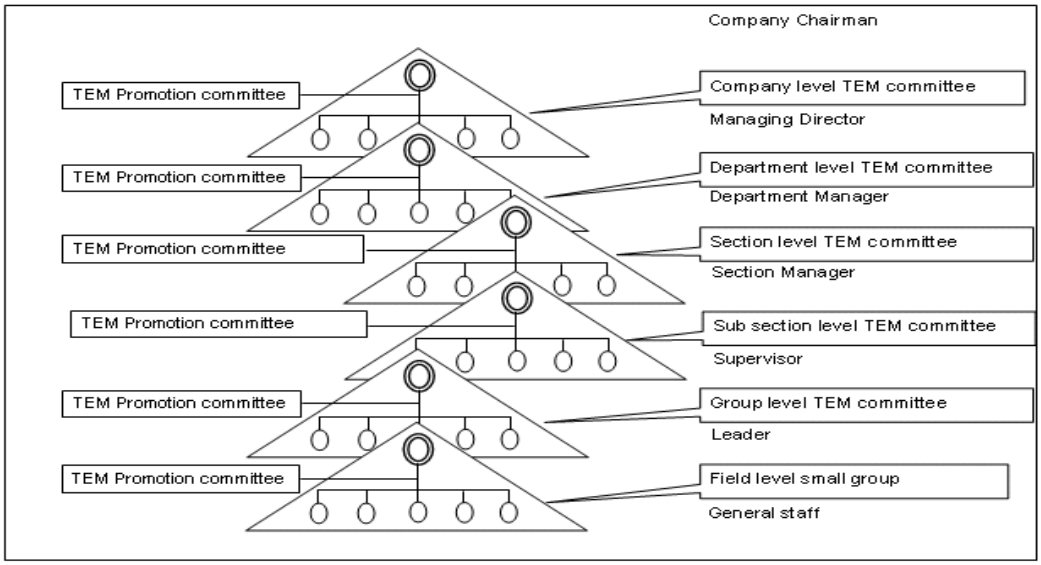


Figure 17: Positioning of SGA in Main Job Structure

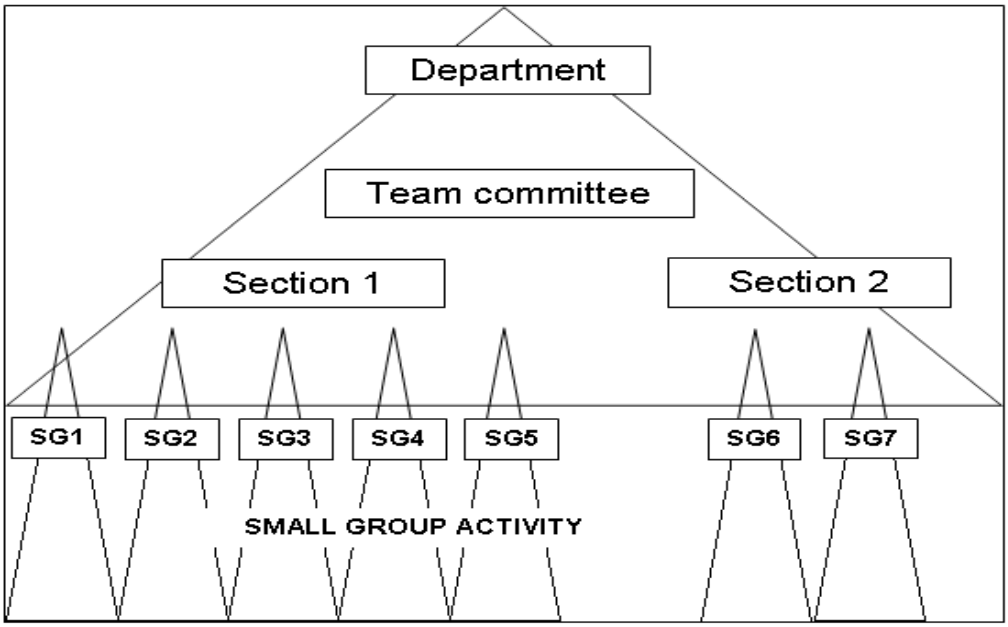


Figure 18: Positioning of SGA in Main Job Structure

4.7 Executives level

- Define the policy and target for Total Energy Management
- Follow-up and manage activities to make sure that activities are implemented according to the policy
- Consider opinions and suggestions from the promotion office
- Consider reports from promotion committee from various levels

4.8 Level of Total Energy Management promotion office

- Make sure that whole activities are done in the correct direction, without delay and smoothly
- Find a suitable method that makes it possible to implement activities continuously and without slowdown
- Listen to opinions and suggestions from small groups in order to use for improving
- Provide advice for Total Energy Management to various groups
- Persons in charge of the office must be those with good personal relationship, friendly, and with spirit of good service

4.9 Medium level

- Define the policies of each department that are consistent with the policy of the Total Energy Management and the target of the company
- Define numerical targets to sub-groups apart from the target of the company as a whole
- Follow-up the progress in order to provide to sub-groups
- Report the progress along with suggestions and opinions to upper level committee periodically

4.10 Workers/Operators level

- Implement small group activities with various themes and achieve target
- Report progress and problems encountered during implementation to upper level committee periodically
- Ask for support, suggestions, and opinions from upper level committee

4.11 Responsibility of Energy Conservation committee

- Gather and analyze information on costs related to energy every month
- Analyze and solve problems related to energy
- Find a method for energy conservation
- Prepare energy conservation plan
- Follow-up the result of implementing the plan
- Perform activities such as public relationship for encouraging employees to participate
- Offer training to small group in each department

4.12 Steps of Small Group Activities for Energy Conservation

Small group activities for Energy Conservation can be done by using “10 Stages for Success”, based on “PDCA Management Cycle”, as shown below and in pictorial forms

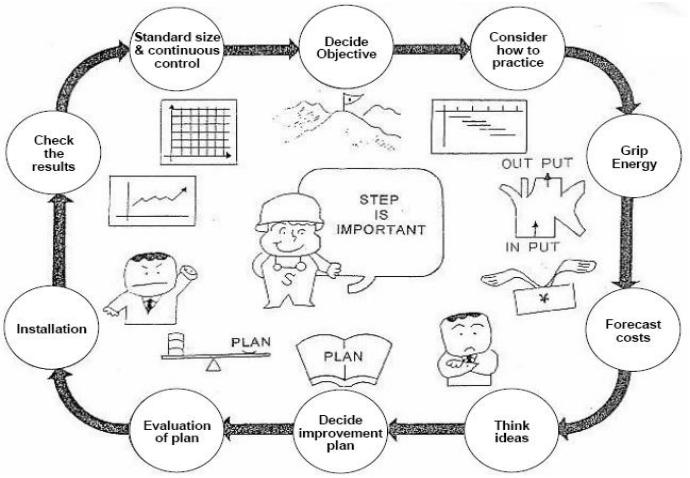


Figure 19: Steps of Small Group Activities

- Plan: Make an efficient plan in order to improve operation
- Do: Implement according to the plan
- Check: Check if implementation was according to the plan
- Act: Judge what to improve, what to learn and what to do from what we have checked

Please note that these stages are substantially the same as “Key Steps” explained earlier, but put more stress on utilization of SGA. So readers could read and use either method up to their preference.

Figure 20: SGA CIRCLE

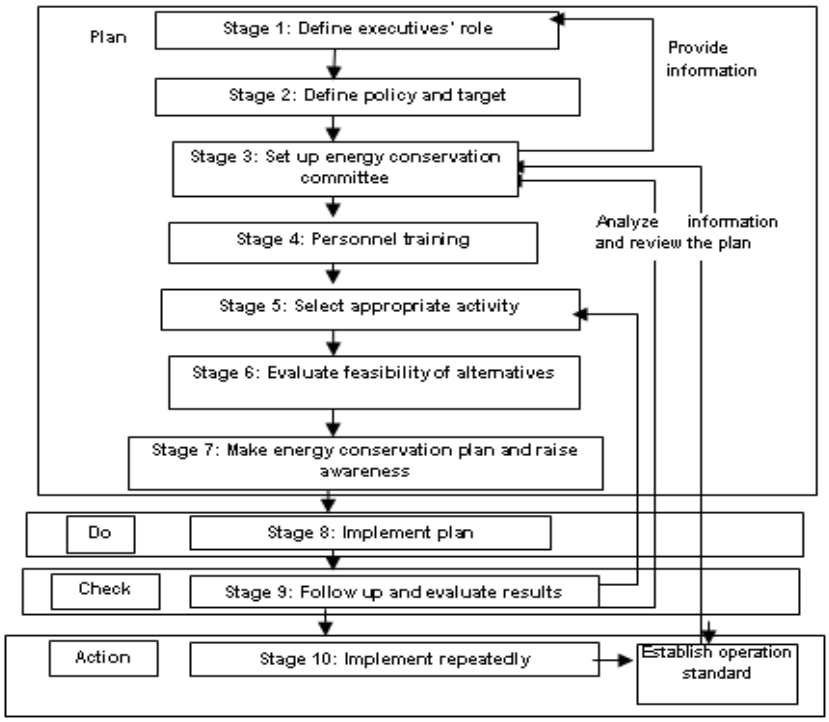


Figure 21: 10 STAGES

Stage 1: Define Executive's Role

In promoting small group activities, support must be provided such as basic environmental support. Therefore, executives must provide follow up support to employees of their companies.

- Establish a special unit that provides support to small group activities
- Prepare a system for managing small group activities in the company
- Prepare annual plan for small group activities
- Prepare a venue for meeting, consultation, advice or suggestion
- Establish a system for giving rewards to high achieving employees
- Establish a reporting system starting from informing what to do until reporting of the results
- Establish a fair system for evaluating results
- Establish a system for providing support and training to employees

Stage 2: Define Policy and Target

- Executives must announce a policy of supporting small group activities.
- Energy conservation committee must act as an advisor in order to set a numerical target that is consistent with total energy management (TEM) policy and the target of the organization. Specific targets must be set for each group.

We can see that responsibilities in stages 1 and 2 are mainly those of executives and committee. Responsibility of employees will become clearer from stage 3 and afterwards.

Stage 3: Set up Energy Conservation Committee

The principle of small group activities (SGA) is to divide into groups based on the scope of responsibility. The size of the group will depend on the size of organization. However, size of the group should not be too large. Usually a size of 5 to 10 persons is considered appropriate. It is important to define responsibilities clearly so that every member of the group can have their responsibility and participate in the activities.

Stage 4: Personnel Training

This stage will help employees to have more knowledge and understanding, have new ideas, and have more belief in their own responsibility.

Stage 5: Select Appropriate Activity

In doing small group activities, each member must be able to think, express their own ideas, and make decisions based on reality and by investigating electrical equipment, machines, and office equipment that exist in the area of their responsibility. Items to consider include size, number, where to use, situation of usage, current situation, and the number of hours usage per day.

By this we can evaluate the current situation of energy usage. Also by judging if there are more machines than needed, we can choose suitable activities and real problems for the organization.

Stage 6: Evaluate feasibility of alternatives (Analyze problems and decide on the measures and activities in each point)

Each group will gather ideas on the reasons for the problems, obstacles, and how to solve problems in order to decide on the problems, measures, and importance of activities and thus evaluate on the feasibility of activities to do based on advice from department manager. Basically, the following activities are not suitable for small group activities.

- Highly technical issues
- Issues that require a long time or many people to implement

  We have identified the following problems through small group activities.
- Issues on material quality or production that influence energy usage
- Behavior on energy usage
- Efficiency of machines or equipment that uses energy
- Awareness toward environment and energy usage
- Safety costs for energy conservation

Stage 7: Make Energy Conservation Plan and Raise Awareness

Each group must prepare its activity plan. Generally, implementation for small group activities takes 6 months to 1 year. Activities to be implemented should correspond to the objectives of each group. Besides, it might help to listen to opinions of all organizations in order to receive support from all other organizations.

Stage 8: Implement Plan

Implement according to the plan of each group.

Stage 9: Follow Up and Evaluate Results

After implementing the plan, each member of small groups will follow up and evaluate the result by analyzing result, search for strong and weak points of activities, find a way to improve the activities and report on general achievement.

Stage 10: Implement Repeatedly

Energy conservation is an activity that must be implemented repeatedly. Therefore, it is necessary to implement each activity repeated and make improvement to each activity. If we are satisfied with the results, by achieving the objectives of activities, we should provide rewards in order to give motivation for continuing the small group activities and implement creative activities.

4.13 Dos and Don'ts in Energy Conservation

- Don't Emphasize the mistakes in the past. It is better to talk about the present.
- Don't Be worried about the theory or principles. Don't spend too much time in discussion or analysis of problems in meeting rooms.
- Don't Think that an activity can be done perfectly from the beginning. It is necessary to do the job continuously by having experiences and judging by ourselves.
- Do Start with an activity that requires small amount of investment.
- Do Raise awareness so that all employees understand the necessity and importance of energy conservation and participate in it.
- Do Start the activity now without postponing to tomorrow.

4.14 Tools that are Used Often for Small Group Activities for Energy Conservation

4.14.1 5S

5S is a contraction derived from the Japanese words **Seiri, Seito, Seiso, Seiketsu,** and

Shitsuke. It is simple methodology that is also extremely useful in practical and realistic life. 5S is a set of actions to be followed through every day activities to advance the operational surroundings and circumstances. 5S is made in order to provide fortification to every personage in diverse profitable and industrialized fields. 5S is an extremely practical contrivance and skill set for anyone who wants to generate a more prolific environment within the workplace or who wants to make it their profession to make other people's businesses more proficient and productive. 5S occupy a list of products including eyewear, ear protectors and safety gears. Look into these different products that make up the significance of an industrialized security supply.

Lean Six Sigma experts promise or guarantee for the efficiency of 5S as an enlightening enhancement to better working surroundings in an association. If you dig up Six Sigma guidance that is paid for by your company, you will be in a position to work for your company and make things better for you as well as for everyone. 5S is very useful in lots of industries and job markets, but can often fail simply because of the lack of recognition concerning changes in the office.

5S consists of five steps that are crucial for the completion of 5S. The 5S steps are described as follows-

Figure 22: Five steps

1) Seiri / Sort: This is very logical term in, which identification of the contents take place, data base of the products have been created and, then any kind of sorting take place just to arrange the products and removal of unwanted items. Classification of the products is

necessary, which is called Red Tagging. It is important just to identify factors, right from whether it is needed, existing amount obligatory amount, occurrence of necessity, and so on.

2) Seito / Systemize: This step in 5S process consists of removal of unwanted items permanently and one more task that to be take place is decision that means you have to decide that what is required to be in what place. Place the items in such manner that you could retrieve them within 30 seconds of requirement.

3) Seiso / Brush away/ Sweep- Examine al the items on the daily basis. The process is not that much time consuming, but essential to clean up your workplace and most required in 5S. The conscientiousness to keep the office clean should be circulated between everyone in the group.

4) Seiketsu / Homogenize- This important step of 5S involves the visual control, which is important to keep your organization well- organized and clean. It is a complete evaluation to improve the working conditions.

5) Shitsuke / Self Control- This step is quite essential, but critical because it involves all the discipline to ensure the 5S standards, it also takes charge of dedication and commitment.

4.15 QCC (Quality control circle)

QCC (Quality control circle) means controlling quality through group activities. For this, it is necessary to work hand in hand and achieve objective quality or customers' request. With this, we can find weak points, find the cause of problems, gather ideas for problem solving and systematically prepare quality and thus, solve problems such as material loss, production costs, working hours, or productivity. This is also a very useful tool to tackle with Energy Conservation problem. So many factories or institutions are encouraged to utilize this tool.

CHAPTER 5
CONCLUSIONS

5.1 Summary of Energy saving measures identified for the Cluster

The summary of the energy saving proposals identified for Ganjam Rice Mill Cluster units is furnished below in Table 30:

Table 5.1: Summary of energy saving proposals identified for Ganjam Rice Mills Cluster

S. No	Energy Saving Proposals
1	Individual Drive System
2	Paddy Cleaner
3	Separator
4	Plastic buckets for elevators
5	Voltage stabilizers
6	Energy efficient motors

5.2 Technology gap assessment for Energy saving proposals Identified for the Cluster

The technology gap assessment had been carried for each of the energy saving proposal recommended and is furnished below.

Table 5.2: Technology gap assessment for the suggested energy saving proposals

S.No	Technology Identified	Gap Assessment
1	**Common shaft drive system to Individual driven motors**	• High transmission losses due to long belt drive system. • High power consumption
2	**Separator**	• Separators are of local make and inferior design consuming more power than the separators available in the market
3	**Paddy Cleaner**	• Paddy Cleaners are of local make and inferior design consuming more power than the paddy cleaners available in the market.
4	**Plastic buckets for elevators**	• High power consumption due to more weight of iron and MS buckets
5	**Voltage stabilizers**	• Poor voltage supply due to overloading of the EB electricity distribution transformers.

6	**Energy efficient motors**	• Old and rewinded motors and hence low efficiency and more power consumption.

5.3 Techno–Economic analysis for suggested Energy saving proposals

The techno economic analysis of various energy saving proposals identified for **Ganjam Rice Mill Cluster units** is furnished below

Table 5.3: Techno – Economic analysis for various energy saving proposals suggested

S.No	Energy saving proposal	Techno economic analysis	Remarks
1.	**Individual Drive System**	• The technology will reduce transmission losses and electricity consumption due to avoid of long belt drives	Technically and financially viable
2	**Separator**	• The technology will reduce electricity consumption due to efficient separator.	Technically and financially viable
3	**Paddy Cleaner**	• The technology will reduce electricity consumption due to efficient paddy cleaner.	Technically and financially viable
4	**Plastic buckets for elevators**	• The technology will reduce electricity consumption due to less weight of plastic buckets.	Technically and financially viable
5	**Voltage Stabilizers**	• The technology will improve voltage supply.	Technically and financially viable
6	**Energy Efficient Motors**	• The technology will reduce electricity consumption due to high efficiency.	Technically and financially viable

5.4 Barriers in Implementation of identified Energy saving proposals

Table 5.4: Barriers in implementation for various energy saving proposals suggested

S.No	Energy saving proposal	Barriers identified	Steps to overcome barriers
1	**Individual Drive System**	• Lack of awareness on the losses and benefits. • High initial investment	• Training programs, Demonstration and motivation • Providing soft loans may motivate the unit owners for implementation
2	**Separator**	• Lack of awareness on the losses and benefits.	• Training programs, Demonstration and motivation

		• High capital investment.	• Providing soft loans may motivate the unit owners for implementation
3	**Paddy Cleaner**	• Lack of awareness on the losses and benefits. • High capital investment.	• Training programs, Demonstration and motivation. • Providing soft loans may motivate the unit owners for implementation.
4	**Plastic buckets for elevators**	• Lack of knowledge on the benefits and economics	• Training programs
5	**Voltage Stabilizers**	• Lack of awareness on the losses and benefits. • High capital investment.	• Training programs, Demonstration and motivation. • Providing soft loans may motivate the unit owners for implementation.
6	**Energy Efficient Motors**	• Lack of awareness on the losses and benefits. • High capital investment.	• Training programs, Demonstration and motivation. • Providing soft loans may motivate the unit owners for implementation.

5.5 Short listed Technology/Products for DPRs

The following technologies were identified for preparation of detailed project reports for **Ganjam Rice Mills** Cluster:

- Replacement of common drive system with individual drive system.
- Energy efficient separator
- Energy efficient paddy cleaner
- Voltage stabilizers
- Energy efficient motors

5.6 Summary of level of awareness on Energy savings and Energy saving Technologies in Ganjam Cluster

The level of awareness on energy saving among the SME owners in the cluster is poor. About 5% of the unit owners have good conscious on energy saving technologies and is limited. The owners are more concerned about the market and procurement of paddy at competitive rates rather than on energy, as energy cost share as a percentage of cost negligible.

The energy saving technologies are implemented based on success stories in the cluster units and practical demonstration of the energy saving technologies in the units.

Though the clusters units are in operation since last 4 decades, the achievement on energy efficiency in the cluster units is poor and same old technologies are continued.

Some of the demonstration projects in the cluster may motivate the SME owners in implementation of the energy saving technologies.

LIST OF ANNEXURE

ANNEXURE – 1

1. Common Shaft Drive System by Individual Drive System

Details	Value	Units
Total power consumption per annum	28,857	kWh
% savings expected	30	%
Power savings per annum	8,657	kWh
Monetary savings per annum(@Rs.4.20 per kWh)	0.36	Rs.in lakh
Investment required	1.00	Rs.in lakh
Income due to dispose of old machinery	0.25	Rs.in lakh
Net investment required	0.75	Rs.in lakh
Payback period	25	Months

2. Reputed make energy efficient separator

Details	Value	Units
Total power consumption of the present separator per annum	6,480	kWh
% savings expected	50%	%
Power savings per annum	3,240	kWh
Monetary savings per annum(@Rs.4.20 per kWh)	0.14	Rs. in lakhs
Investment required	0.40	Rs. in lakhs
Income due to dispose of old machinery	0.10	Rs. in lakhs
Net investment required	0.30	Rs. in lakhs
Payback period	26	Months

3. Reputed make energy efficient paddy cleaner

Details	Value	Units
Total power consumption of the present Paddy Cleaner per annum	9,600	kWh
% savings expected	50%	%
Power savings per annum	4,800	kWh
Monetary savings per annum(@Rs.4.20 per kWh)	0.20	Rs. in lakhs
Investment required	0.40	Rs. in lakhs
Income due to dispose of old machinery	0.10	Rs. in lakhs
Net investment required	0.30	Rs. in lakhs
Payback period	18	Months

4. Plastic buckets for elevators

Details	Value	Units
No. of elevators	15	nos
No of hrs	15	hrs
No of days	300	days
Total power consumption of elevators	50,625	kWh/year
% Savings expected	10	%
Power savings per annum	5,062	kWh
Monetary savings per annum(@Rs.4.20 per kWh)	21,263	Rs.
Investment required	30,000	Rs.
Payback period	17	months

5. Lighting

S.No	Particulars	Existing	Proposed	Unit
1	Type of lamp	40W/4ft FTL	T5 Lamp	-
2	Wattage of lamps	40	28	W
3	Watt loss per ballast	12	2	W
4	No. of lamps to be replaced	8	8	No.
5	Average Operating Hours per day	12	12	Hours/Days
6	Energy consumption	1747.2	1008	kWh/year
7	Energy savings		739.2	kWh/year
8	Energy cost savings		3881	Rs./ year
9	Initial cost / lamps		500	Rs.
10	Initial investment cost		4000	Rs.
11	Payback period		12	Months

6. Voltage Stabilizer

Details	Value	Units
Total power consumption of voltage stabilizer per annum	44,862	kWh
% savings expected	15%	%
Power savings per annum	6,729	kWh
Monetary savings per annum(@Rs.4.20 per kWh)	0.28	Rs. in lakhs
Investment required	0.50	Rs. in lakhs
Payback period	21	Months

7. Energy Efficient Motors

Details	Value	Units
Total power consumption of energy efficient motors per annum	79,200	kWh
% savings expected	10%	%
Power savings per annum	7,920	kWh
Monetary savings per annum(@Rs.4.20 per kWh)	0.33	Rs. in lakhs
Investment required	0.50	Rs. in lakhs
Payback period	18	Months

ANNEXURE – 2

Details of technologies/services providers for the cluster

1. **R.K Associates**

   Manufacturer of all types of rice mill machinery.
   Address: Padhuanpada, Proof Road, Balasore,
   Orissa-756001,India.
   Mobile/CellPhone: +(91)-9438286089/9337749353
   Website**: http://www.indiamart.com/kalingaassociates/**

2. **Suri Engineering Works**

   Manufacturer of all types of rice mill machinery.
   4/4, IDA, Nacharam,
   Hyderabad, Andhra Pradesh, India.
   Contact number:040-27150282/27177726
   Contact person: K.Rameshwar Reddy

3. **Rice-tec Machinery**

   57/p, phase-1, IDA, Jeedimetla,
   Hyderabad, Andhra Pradesh, India.
   Contact number:040-23195938, 9440624435/9246373477
   Contact person: Bhanu Prakash

4. **Nitin Enterprises**

   6-17-7, pandhirivari street, t-nagar,
   Rajahmundry, Andhra Pradesh, India.
   Contact number:0883-2449496/2449497/9493338285/9989996265
   Contact person: Soma Raju

5. **Padmasree Mill Store**

   5-5-79, ground floor, 9A, srinivasa commercial complex,
   Ranigunj, Secunderabad, Andhra Pradesh, India.
   Contact number:040-66323236/9440074447

6. **Baba Auto Mechanical Works**

   c-12/b, IDA, Hyderabad, Andhra Pradesh, India.
   Contact number:040-27207565/9985455770
   Contact person: Ravi Shankar

7. **Sree Srinivasa Enterprises**

   5-5-76/F-8, 1st floor, srinivasa commercial complex, ranigunj,
   Secunderabad, Andhra Pradesh, India.
   Contact number:040-66494488/9396624488
   Contact person: srinivas

8. **Milltec Machinery Pvt Ltd**

   51-A, 1st phase, bommasandra industrial area, banglore-560099,
   Karnataka, India.
   Contact number:9845390091/9437078798/9845528431
   email: marketing@milltecmachinery.com

9. **Voltage Stabilizers**

   Astor Golden Electronics and Communications
   292/4264 Sriguru kalyanmandapam lane,
   Bhubaneshwar-751013, Orissa, India.
   Contact number:0674-2360310/9861090335
   Contact person: B.K.Sharma
   Mail id: rtnbksharma@gmail.com, astorbbsr@yahoo.com,

ANNEXURE – 3

Financial schemes (if any) available with local banks for improving energy efficiency in the cluster

1. Credit linked capital Subsidy scheme (CLCSS).

Under this scheme, the ministry of MSME is providing subsidy to upgrade technology (Machinery/plant equipments). Subsidy limit per unit is Rs. 15 lakh or 15% of investment in eligible machinery/Plant equipments whichever is lower. For more details of the scheme visit: www.laghu-udyog.com/scheme/sccredit.htm

2. SIDBI Financing Scheme for Energy Saving Projects in MSME sector under JICA Line of Credit

The Japan International Corporation Agency (JICA) has extended a line of credit to SIDBI for financing Energy Saving projects in Micro, Small and Medium Enterprises (MSMEs). This project is expected to encourage MSME units to undertake energy saving investment in plant and machinery to reduce energy consumption, enhance energy efficiency, reduce CO_2 emissions, and improve the profitability of units in the long run.

3. Eligible Sub Projects/ Energy Saving Equipment List under JICA line of Credit:

- Acquisition (including lease and rental) of energy saving equipments, including newly installing, remodeling and upgrading of those existing
- Replacement of obsolete equipments and/or introduction of additional equipment which would improve performance
- Equipments/ Machinery that meets energy performance standards/Acts
- Introduction of equipments that utilize alternative energy sources such as natural gas, renewable energy etc., instead of fossil fuels such as Oil and Coal etc.
- Clean Development Mechanism (CDM) projects at cluster level that involves change in process and technologies as a whole, duly supported by technical consultancy will be eligible for coverage.

Financial parameters:

The financial parameters for appraising the project are:

Parameter	Norms
Minimum Assistance	Rs. 10 lakh
Minimum promoters contribution	25% for existing units; 33% for new units
Interest rate	The project expenditure eligible for coverage under the line will carry a rate of interest rate of 9.5-10% p.a
Upfront fee	Nonrefundable upfront fee of 1% of sanctioned loan plus applicable service tax
Repayment period	Need based. Normally the repayment period does not extend beyond 7 years. However, a longer repayment period of more than 7 years can be considered under the line if necessary

Eligibility criteria for units (Direct assistance):

- Existing units should have satisfactory track record of past performance and sound financial position.
- Projects will be screened as per Energy Saving List, which is available in SIDBI website.
- Units should have minimum investment grade rating of SIDBI.
- Projects which may result environmental impacts and negative social impacts are also not eligible under this scheme.

For further details eligible energy saving equipments/machinery, projects can be financed under this scheme and details of scheme, please contact the nearest SIDBI branch office or refer to SIDBI website (**www.sidbi.in**)

TECHNOLOGY UPGRADATION FUND SCHEME (TUFS)

A scheme devised by Govt. of India, Ministry of Power, to enable SSI units (Rice mill unit) to induct State-of-the-art technology in which technology levels are bench marked in terms of specified machinery for each sector of **rice mills** industry. Machinery with technology levels lower than that specified will not be permitted for funding under the TUF scheme.

Eligible Borrowers Sole Proprietorships, Partnerships, Co-operative Societies, private / public limited companies.

- Existing units with or without expansion and new units
- Existing units proposing to modernize and/or expansion with state-of-the-art-technology
- New units which are being set up with appropriate technology

Quantum Of Loan & Mode Of Assistance Assistance shall be need based and NO CEILING on project cost/amount of loan. Assistance shall be by way of Term Loan.

Margin 15 to 25% of the project cost

Security 1st charge on fixed assets financed under the scheme Additional security such as personal guarantees, pledge of promoters share holdings as determined by Bank on merits of the case

Incentive Available Under The Scheme

Interest Reimbursement at the rate of 5% of the interest payment made by the unit to Bank on the loan outstanding. No Interest Reimbursement will be available for the extended period of loan or during the NPA status of the loan.

Repayment Within 7 years including moratorium up to 1 year

ANNEXURE – 4

Name and address of units in the cluster

Name of Rice Mill	Contact Person	Address
Ambika Rice Mill	Munna Babola Patro	Gurumurthy Pentho, Aska Road, Berhampur, Ganjam Dist
Bajarangi Rice Mill	Biranjani Biswal	Sukunda, Ganjam Dist
Balaji Traders	E.T.Rao	Sundarada, Nuapada(p.o), Ganjam Dist
Banamali Rice Mill	Tapan Kumar Panda	Hinjilicut, Ganjam Dist.
Bibudatta Rice Mill	Bibudatta Panigrahi	Hinjilicut, Ganjam Dist
Chandra Sekhar Rice Mill	Sri Ram Murthy	Chatrapur, Ganjam Dist
Dandakali Rice Mill	Dandapani Dalai	Kaudia, Konkarada(p.o), Ganjam Dist
Debraj Choudary Rice Mill	Debraj Choudary	Khajuria Road, Berhampur, Ganjam Dist
Devi Rice Mill	Nirmani Patro	Sihala, Ganjam Dist
Durg Rice Mill	Bansanidhi Sahoo	Humber, Chatrapur (p.o), Ganjam Dist
Ganapathi Rice Mill	Bijay Chandra Sahu	Lathi, Ganjam Dist
Ganesh Rice Mill		Kalashandhapur, Aska(p.o) Ganjam Dist
Ganesh Rice Mill	Gouranga Sahu	Digaphandhi, Ganjam Dist
Gopinath Rice Mill	Manoj Kumar Sahu	Beside FCI godowns, Jagnathpur, Ganjam Dist
Gouri Shankar Rice Mill	Mahendra Kumar Patro	Sanakhasthuli, Badakhasthuli(p.o), Ganjam Dist
Hare Krishna Rice Mill	Nilkanta Chowdary	Dumdumi, Padmapur(p.o), Ganjam Dist
Jagateswar Rice Mill	Bhimasen Sahu	Mahjigaon, Padmapur(p.o), Ganjam Dist
Jagnath Rice Mill	Satyanaryan Basantha	Purshottampur, Ganjam Dist
Jagnath Rice Mill		Bananai, Ganjam Dist
Janatha Rice Mill	Raghaval Raju	Near Busstand, Digaphandhi, Ganjam Dist
Kartikeswar Rice Mill	Rajendra Prasad Patro	Sihala, Ganjam Dist
Kartyani Rice Mill		Sapuapalli, Hinjilicut (p.o), Ganjam Dist
Kothari Rice Mill	Koti Patro	Patrapur, Ganjam Dist
Kumareswar Rice Mill		Kumari, Purushottampur(p.o), Ganjam Dist
Laxmi Nurisungnath Rice Mill	Kishore Chandra Sahu	Lathi, Ganjam Dist
Loknath Rice Mill	Bhagawan Sahu	Sukunda, Ganjam Dist
Maa Kalua Rice Mill	Jithendra Kumar Sahu	Ballipada, Kukudakhandhi(p.o), Ganjam Dist
Maa Laxmi Rice Mill	Parmanand Patro	Ankuli, Berhampur(p.o), Ganjam Dist
Maa Mahuri Kalua Rice Mill	Bipin Bihari Patro	Anantai, Ganjam Dist
Maha Bahu Rice Mill	Pradhan	Konkarada, Ganjam Dist
Maruthi Rice Mill	Krishna Chandra Sahu	Chikiti Pentho, Ganjam Dist
Narayani Modern Rice Mill	Prabhat Kiran Subhudhi	Chikiti Pentho, Ganjam Dist
Padhy Rice Mill	Umakanth Padhy	Radhadeipur, Pattapur(p.o), Ganjam Dist
Padmalaya Rice Mill	Udaynath Pal	Aska Road, Berhampur, Ganjam Dist
Panda Rice Mill	Manoj Kumar Panda	Chikiti Pentho, Ganjam Dist
Parbati Rice Mill	Balaji	Kukuakhandhi, Ganjam Dist
Patro Rice Mill	Kailashnath Patro	Haldiapadar, Berhampur(p.o), Ganjam Dist
Pratap Chandra Rice Mill	Pratap Chandra Sahu	Sihala Road, Konisi, Ganjam Dist
Radha Krishna Rice Mill	Ambika Prasad Sahu	Sihala Road, Konisi, Ganjam Dist
Radha Raman Rice Mill	Jithendra Padhy	Pattapur, Ganjam Dist
Sadhana Rice Mill	Manoj Kumar Sahu	Narendrapur, Ganjam Dist
Sathyabhama Enterprises	Amiya Ranjan Sabat	Aska Road, Berhampur, Ganjam Dist

Name of Rice Mill	Contact Person	Address
Shankar Rice Mill	Amar Kumar Sahu	Sanakhasthuli, Badakhasthuli(p.o), Ganjam Dist
Shiva Shankar Chuda and Rice Mill	Sadananda Sahu	Konisi, Berhampur (p.o), Ganjam Dist
Sidha Bhairabhi Rice Mill	Santhosh Kumar Sahu	Amapur, Daspur(p.o), Ganjam Dist
Somnath Rice Mill	Chitta Ranjam Padhy	Gosaninuagaon, Berhampur, Ganjam Dist
Sri Ganesh Rice Mill	Tarun Kumar Patro	Sihala, Ganjam Dist
Sri Ganesh Rice Mill	Madhav Charan Das	Khajuria Road, Berhampur, Ganjam Dist
Sri Krishna Rice Mill	Balaram Sahu	Hinjilicut, Ganjam Dist
Sri Raghunath Rice Mill	Dipak Kumar Jena	Patrapur, Ganjam Dist
Sri Sai Rice Mill	Jithendra Kumar Patro	Hinjilicut, Ganjam Dist
Subash Rice Mill	Subash Chandra Mahapatro	Mahjigaon, Padmapur(p.o), Ganjam Dist
Subram Rice Mill	Subram Sahu	Konisi, Berhampur (p.o), Ganjam Dist
Suman Rice Mill	Mangulu Sahu	Chikiti Pentho, Ganjam Dist
Suprabha Rice Mill	Pradeep Kumar Panda	Hinjilicut, Ganjam Dist
Tara Tarini Rice Mill	Subash Chandra Panigrahi	Nuapalli, Purushottampur(p.o), Ganjam Dist
Trupthi Traders	Surat Chandra Sahu	Haldiapadar, Berhampur(p.o), Ganjam Dist
Trirupathi Venkateswara Rice Mill	Rajendra Kumar	Sundarada, Nuapada(p.o), Ganjam Dist
Urmilla Rice Mill	Jithendranath Das	Purushottampur, Ganjam Dist
Vyshnavi Rice Mill	Gopi	Nimakhandhi, Ganjam Dist

ANNEXURE – 5

Quotations

MILLTEC

QUOTATION BOOK FORM/CONTACT REVIEW

SL. NO.		DATE	16-11-2010
M/S.VENKATARAMANA RICE MILL CHEVELLA Dist : RANGA REDDY		MILTEC MACHINERY PVT.LTD. NO.51-A, IST PHASE, KIADS INDL, AREA, BOMMASANDRA, BANGALORE - 560 099 080-27831128 FAX : 080-27831129	
C.PERSON	Mr:K.Kishor	C.PERSON	'-DO-
PH. NO.		PH. NO.	
FAX NO.		FAX NO.	
MOBILE NO.	95026-88949	MOBILE NO.	
E-MAIL ID		E-MAIL ID	
KST. NO.		KST. NO.	
CST NO.		CST NO.	
TIN NO.	Applied	TIN NO.	

MACHINE DETAILS

SL. NO.	ITEMS	SPECIFICATION	QTY	UNIT RATE	TOTAL AMOUNT	REMARKS
'01	SHEL-N1	Pneumatic Sheller	ONE	2,70,000-00	2,70,000-00	RAW / BOILED
02		10 HP,1000 RPM Motor	ONE	25,000-00	25,000-00	
03.	STAR-N2	Rice Whitener	ONE	2,00,000-00	2,00,000-00	
04.		30 HP,1500 Motor	ONE	49,000-00	49,000-00	
05.	POLY-M2	Supern Glazer	ONE	1,50,000-00	1,50,000-00	
06.		25 HP,1500 Motor	ONE	44,000-00	44,000-00	
07.		Water pump	ONE	42,500-00	42,500-00	
08.		7.5 HP, Air Blower	ONE	44,000-00	44,000-00	
09.		950 mm Cyclone	ONE	28,000-00	28,000-00	
10		Airlock with G.Motor	ONE	45,500-00	45,500-00	
`11.		Magnet	ONE	11,000-00	11,000-00	
`12.						
`13.						
`14.						
`15.						
`16.						
`17.						
`18.						
19						
20						
21						
22						
23						
24						
25						
26						

POLISHING SECTION

NEW RICE MILL

PROPOSED SET UP :

TOTAL	9,08,600-00
P & F	10,000-00
5% SALES TAX	45,930-00
E & C	20,000-00
3%PROVISION TAX	
CESS 2% ON SERVICE TAX	
GRAND TOTAL	9,84,530-00
ADVANCE RECD	
BALANCE	

Payment Conditions:
Delivery Committed :
Payment Terms :
Short Supply :
Road Permit :
Agent :
Remarks :

MACHINES HAS TO BE DESPATCHED ON RECEIPT OF FULL PAYMENT

APPLICABLE | NOT APPLICABLE

Sri Srinivasa Marketing, Secunderabad. Cell No.9396624488

PREPARED BY

AUTHORISED BY

TIN NO. 28165210932

☎ (O) 040-66494488
Cell : 93966 24488

Sree Srinivasa Enterprises

5-5-76/F-8, 1st Floor, Srinivasa Commercial Complex, Ranigunj, Secunderabad.

Ref. : SE/

Date : Dt / 16-11-2010

QUOTATION

To,
M/s.VENKATARAMANA RICE MILL
C H E V E L L A
Dist : RANGA REDDY

S.no.	MACHINE DESCRIPTION	QUANTITY	RATE	PRICE
1	Paddy Cleaning Service with Aspirator with 2 Motor	ONE	90,000-00	90,000-00
2	Paddy Cleaner with De-Stoner with 3 Motor	ONE	1,10,000-00	1,10,000-00
3	Husk Separator with 3 HP Motor	ONE	65,000-00	65,000-00
4	Paddy Separator with 2 HP motor	ONE	1,25,000-00	1,25,000-00
5	Multi Grader (Brokens) 1 HP Motor	ONE	1,25,000-00	1,25,000-00
6	Double Elevator's - with 1 HP Motor	4 Nos.	85,000-00	85,000-00
				8,55,000-00
–		4%Vat Tax		34,200-00
	Loding & Transportation Charges Extra	TOTAL		8,89,200-00

(Rs : Eight Lakhs Eighty Nine Thousands Two Handred only)

Thanking You

for SREE SRINIVASA ENTERPRISES

Prop :
(K>SRINIVAS)

DEALERS : RICE MILL MACHINERY AND SPARE PARTS

QUOTATION

S. No	Model	Description	Capacity	Unit Price	Qty.	Quoted Price
1	CPC-80	Combined Paddy Cleaner with 5Hp/1440rpm Blower with 7.5Hp/1440rpm motor	4.0 MTPH On Paddy Capacity	2,06,250/-	1 No	2,06,250-00
2	Shell-3A	Pneumatic Sheller Plus with imported Vibro feeder without motor	3 MTPH On Paddy Capacity	3,00,000/-	1 No	3,00,000-00
3	Ps-8T	Paddy Seperator-8Tray with 2Hp/960rpm motor	2.5 MTPH On Paddy Capacity	1,32,812/-	1 No	1,32,812-00
					Sub Cost :	6,39,062 -00
					Forwarding charges @ 1%:	6,390 -00
					Total: Cost:	6,45,452-00
					CST : @ 2% against Form 'C'/ @ 4% Without Form 'C' :	25,818 -00
					Commissioning Charges Rs.5000/- for each machine (5000 x3 No):	15,000-00
					Grand Total:	**6,86,270-00**

(Rupees Six lacs eighty six thousand two hundred and seventy only)

MOTORS REQUIRED FOR THE ABOVE MACHINES

S No	Description	Unit Price	Qty	FINAL RATES
1	Motor 10 HP/960 rpm suitable Rubber Sheller	23,546/-	1 No	23,546-00
	Grand Total			**23,546-00**

QUOTATION

S. No	Model	Description	Capacity	Unit Price	Qty.	Quoted Price
1	Ps-10T	Paddy Seperator-10Tray with 2Hp/960rpm motor	3.0 MTPH On Paddy Capacity	1,43,750/-	1 No	1,43,750-00
					Sub Cost :	1,43,750 -00
					Forwarding charges @ 1%:	1,437 -00
					Total: Cost:	1,45,187-00
					CST : @ 2% against Form 'C'/ @ 4% Without Form 'C' :	5,807 -00
					Commissioning Charges Rs.5000/- for each machine (5000 x1 No):	5,000-00
					Grand Total:	**1,55,994-00**

(Rupees One lac fifty five thousand nine hundred and ninety four only)

Baba Auto Mechanical Works

Plot no: c-12/b, IDA, Uppal, Hyderabad-500 039

30 years of Excellence in customer satisfaction

TIN: 28790212598 DATE: Wednesday, November 24, 2010

NAME : **ZENITH ENERGY SERVICES PVT LTD**

VILLAGE : HYDERABAD

DISTRICT :

STATE : ANDHRA PRADESH

PHONE : 9502688948

We thank you for enquiry and have pleasure on Quoting as follows. We trust the same meets with you approval and look forward to receive your valued order.

QUOTATION/ PERFORMA INVOICE.AP-214-2010

S.No.	DESCRIPTION	QTY.	UNIT RATE	AMOUNT
	Sri Laxmi paddy milling machinery 2ton capacity per hour on paddy			Indian Rupees
1.	PADDY CLEANER	ONE	80000=00	80000=00
2.	PADDY PRE CLEANER	ONE	54000=00	54000=00
3.	PNEUMATIC RUBBERSHELLER	ONE	150000=00	150000=00
4.	HUSK ASPIRATOR	ONE	45000=00	45000=00
5.	PADDY SEPARATOR- 5TRAY	ONE	115000=00	115000=00
6.	RICE WHITENER	ONE	145000=00	145000=00
7.	GLAZE MASTER	ONE	105000=00	105000=00
8.	AIR LOCK SYSTEM		125000=00	125000=00
9.	PLAIN SIFTER 100x5	ONE	115000=00	115000=00
10.	6" DOUBLE ELEVATOR	4NOS	54000=00	216000=00
11.	6" SINGLE ELEVATOR	ONE	30000=00	30000=00
	TOTAL			**1170000=00**
	VAT@	4%		**46800=00**
	TOTAL			**1216800=00**

NOTE: THE ABOVE MENTIONED MACHINERY ARE WITHOUT ELECTRICAL MOTORS, AIR COMPRESSOR & PANNEL BOARD

NOTE: ERECTION CHARGES RS 45000/- EXTRA WILL BE CHARGED, TRANSPORT AND TRANSIT INSURANCE EXTRA

NOTE: HANDLING CHARGES OF 3500/- EXTRA.

Customer's signature

For Baba Auto Mechanical Works

Authorized signature

Manufacturers of *Sri Laxmi* Brand Modern Rice mill machinery
FIND US: www.srilaxmiengineers.com , www.babaauto.com, Email:babaautomechanicalworks@gmail.com
Contact us: +91-40-27207565(Off phone & Fax), +91-9440050172, +91-9246150172(mobile)
OUR BANKERS: BANK OF INDIA, AZAMABAD BRANCH, CC A/C NO: 862630100033001
STATE BANK OF INDIA, RAMANTHAPUR BRANCH, CURRENT A/C NO: 30281208834

Baba Auto Mechanical Works

Plot no: c-12/b, IDA, Uppal, Hyderabad-500 039

REQUIRED MOTORS:-

PADDY CLEANER	2HP,960 RPM
PADDY PRE CLEANER	2HP ,1440 RPM
PNEUMATIC RUBBER SHELLER	10 HP, 1440 RPM
HUSK ASPERATOR	3 HP 1440 RPM
PADDY SEPARATOR	2 HP, 960 RPM
RICE WHITENER	25 HP, 960RPM (FLANGE)
GLAZE MASTER	20HP, 960RPM
AIR LOCK SYSTEM (ELECTRICAL MOTORS ARE SUPPLIED FOR AIR LOCK SYSTEM)	10HP, 2800, 1 HP ROTARY VALVE, 2HP, 1440RPM
100x5 PLAIN SIFTER (ELECTRIC MOTORS FOR PLAIN SIFTER ARE SUPPLIED)	1.5HP, 1440RPM,1 HP 2800 RPM
6"DOUBLE ELEVATORS	4nos x1HP, 1440 RPM
6"SINGLE ELEVATOR	1HP, 1440 RPM
AIR COMPRESSOR(10 KG PRESSURE)	2HP 1440 RPM

Note: 2 HP BLOWERS SUPPLIED WITH THE MACHINERY APART FROM THE ABOVE LIST

GENERAL TERMS AND CONDITIONS

THE PRICE	The confirmation of price is exclusive of electrical, packing, forwarding. Transit insurance, transportation, erection & trial run etc.
TAXES & DUTIES	TIN / CST Excise and other Govt. Levies Extra as applicable at the time of Delivery
FIRM ORDER	(a) The price confirmation is valid for the Firm order only (b) 40 % of the value as advance is treated as firm order; payment should be made in the form of demand draft of cheque only (c) in case, if the customer fails to pay 40% within in two weeks from the date of order the price confirmed is not valid and the rates will be applicable as the time at the time of delivery
DELIVERY ('X' GODOWN)	Delivery will be effective within 2 to 3 weeks from the date of receipt of full payment (a) For inter state transaction, 'C' Forms should be arranged (b) Customer should arrange their TIN / CST Registration certificate for effective delivery (c) Company is not responsible for the delay in delivery schedule effect by natural calamities strikes lock – outs, shortage of raw materials and power – cuts etc.
TERMS & PAYMENT	Balance payment should be arranged before the delivery of the machinery.
RISK IN TRANSIT	Company is not responsible for the loss or damage of goods of their documents in transit.
CANCELLATION NOTE	Orders once placed will not be cancelled, ALL THE LEGAL MATTERS ARE SUBJECT TO HYDERAABAD JURISDICTION ONLY

I / We accept all the above terms & conditions

Customer's signature

For Baba Auto Mechanical Works

Authorized signature

Manufacturers of *Sri Laxmi* Brand Modern Rice mill machinery
FIND US: www.srilaxmiengineers.com , www.babaauto.com, Email:babaautomechanicalworks@gmail.com
Contact us: +91-40-27207565(0ff phone & Fax), +91-9440050172, +91-9246150172(mobile)
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Baba Auto Mechanical Works

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30 years of Excellence in customer satisfaction

TIN: 28790212598 Wednesday, November 24, 2010

NAME : ZENITH ENERGY SERVICES PVT LTD

VILLAGE : HYDERABAD

DISTRICT :

COUNTRY : ANDHRAPRADESH.

PHONE : 9502688948

We thank you for enquiry and have pleasure on Quoting as follows. We trust the same meets with you approval and look forward to receive your valued order.

QUOTATION/ PERFORMA INVOICE-AP-212

S.No.	DESCRIPTION	POWER	AMOUNT
	Sri Laxmi paddy milling machinery 1ton capacity per hour on paddy		Indian Rupees
1.	PADDY CLEANER	2HP, 1440 RPM	60000=00
2.	6" RUBBERSHELLER	5HP, 1440RPM	45000=00
3.	DE- HUSK ASPIRATOR		30000=00
4.	PADDY SEPARATOR- 3 TRAY	2HP, 960 RPM	95000=00
5.	RICE WHITENER- 4 STONE	15HP, 960RPMFLANGE	125000=00
6.	BRAN PROCESSING SYSTEM	2HP,1440RPM	40000=00
7.	SIEVE ASPERATOR	2HP, 1440 RPM	40000=00
8.	DOUBLE ELEVATOR (3 HEIGHTS)	1HPx3NO1440RM	144000=00
	TOTAL		**579000=00**
	VAT @	4%	**23560**
	TOTAL		**602160=00**

NOTE: THE ABOVE MENTIONED MACHINERY ARE WITHOUT ELECTRICAL MOTORS AND PANEL BOARD

NOTE: ERECTION CHARGES EXTRA WILL BE CHARGED, TRANSPORT AND TRANSIT INSURANCE EXTRA

Customer's signature

For Baba Auto Mechanical Works

Authorized Signature

Manufacturers of *Sri Laxmi* Brand Modern Rice mill machinery
FIND US: www.srilaxmiengineers.com , www.babaauto.com, Email:babaautomechanicalworks@gmail.com
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STATE BANK OF INDIA, RAMANTHAPUR BRANCH, CURRENT A/C NO: 30281208834

Our Ref No – 2K1101252/KKB/RB, Dated –03-02-2011

DERAZ ENGINEERS
Excellence in every endeavour
www.derazengineers.com

Authorized Dealer

KSB INDUSTRIAL PUMPS

AODD PUMPS & TOOLS

SIEMENS MOTORS & DRIVES

ABB FLP MOTORS

FOURESS ENGINEERING (INDIA) LIMITED INDUSTRIAL VALVES

GEA PHE SYSTEMS

Atlas Copco AIR COMPRESSORS

SMC BUSINESS ASSOCIATE PNEUMATIC PRODUCTS

KLUBER LUBRICATION

3M ADHESIVES & TAPES

M/s. Zenith Energy.
10-5-6/B, My home plaza
Masabtank, Hyderabad
Ph: 040-23376630/23376631, Fax: 23322517
E-mail: krishna@zenithenergy.com

Kind Attn – Mr. Krishna - 9440234294

Dear Sir,

Sub –Quotation for SIEMENS make Motors.
Ref – Your mail Enquiry , Dt:02.02.2011

With reference to the above, we are pleased to submit our offer as given below

TERMS & CONDITIONS:

1. **PRICES** – F.O.R. OUR WORKS.
2. **DUTIES** – E.D@10.30% Extra.
3. **TAXES** - VAT@14.5% extra or CST@2% extra against form C
4. **DELIVERY** –Within 12 weeks after receipt of the same
5. **PAYMENT** – 25%Advance balance against Performa invoice prior to dispatch
   Documents through bank. In case of delayed payment OD Interest@18%p.a will be charged
6. **VALIDITY** - 15 days.
7. **DISCOUNT** - @50% on quoted price

We now request you to kindly place your valuable order on us.
Thanking you and assuring you of our best services at all times.

Yours faithfully,
For DERAZ ENGINEERS

03/02/11

(K.A.ABDUL RAZAKH)
CHIEF EXECUTIVE OFFICER

Note: For Further clarification Please contact to Mr.Kishore Babu (Manager-sales)
Cell: 9948353615

HO: Hyderabad 6-3-1177/90, "Deraz House", BS Maktha, Begumpet 500 016
Ph: 23402442, 23406843, 23404732. Fax: 040 - 23412165. Cell: 9948353601 e-mail: deraz@deraz.in, sales@deraz.in
BO: Vijayawada P-2, Navrang Apartments, Khanna Nagar 520 010. Telefax: 0866 - 2488330. Cell: 9948353611 e-mail: vja@deraz.in
BO: Visakhapatnam Flat No. 208, Sreemithra Heights, Opp: Bus Depot, Gopalapatnam 530 027. Cell: 9948353610 e-mail: vizag@deraz.in
BO: Tirupathi 19-7-97b, Gopalraju Colony, RC Road 517 501. Telefax: 0877 - 2246378. Cell: 9948353614 e-mail: tpt@deraz.in

SIEMENS MAKE, 415V, IP 55, CLASS F INSULATION, 50Hz SQUIRREL CAGE INDUCTION MOTOR - EFF2									
SL NO	KW	HP	RPM	FRAME SIZE	MLFB	Mounting	QTY IN NOS	UNIT PRICE IN RS	TOTAL PRICE IN RS
1	22	30	1440	180L	1LA0 186-4YA80	Foot	1	91740	91740
2	30	40	1440	200L	1LA0 207-4YA80	Foot	1	123805	123805
3	37	50	1440	225S	1LA0 221-4YA80	Foot	1	158895	158895
GRAND TOTAL									123805

SIEMENS MAKE, 415V, IP 55, CLASS F INSULATION, 50Hz SQUIRREL CAGE INDUCTION MOTOR - EFF1									
SL NO	KW	HP	RPM	FRAME SIZE	MLFB	Mounting	QTY IN NOS	UNIT PRICE IN RS	TOTAL PRICE IN RS
1	22	30	1440	180L	1SE0 186-4YL80	Foot	1	100850	100850
2	30	40	1440	200L	1SE0 207-4YL80	Foot	1	136160	136160
3	37	50	1440	225S	1SE0 221-4YK80	Foot	1	176550	176550
GRAND TOTAL									136160

SERVOMAX
SINCE:1982 AN ISO 9001: 2000 COMPANY

Servomax India Limited

- Distribution Transformers LT / HT - Up to 3Mva
- Industrial Voltage Stabilizers - L.T & H.T UPTO 5000Kva.
- Panel Boards - A.P.F.C and all types
- Isolation Transformers - up to 5000Kva
- K-1 Transformers
- K-20 Transformers - up to 2000kVA
- Surge Protection equipments
- Energy Saving Equipments and Solutions.
- Turnkey electrical solution - H.T & L.T.

All the above are backed by responsive customer support system, State of the art technology developed by R&D team and ISO quality system. This reflects our providing total solutions that enable our client to get the benefits of innovation, high savings, Quality power

Product Recommended :

50, 75 & 100 KVA Servo controlled Voltage Stabilizer - Air cooled		
Model	:	PS 50K, 75K & 100K 3P

Features of Servo Stabilizer

Protections :

- Low Voltage Protection
- High Voltage Protection
- Over load Protection
- Short Circuit Protection
- Single Phase preventer

High Reliability

Use solid state control circuits, No relays, No warm up time, Synchronous motor drive, Professional grade ICs and components are used

Trouble Free Operation

- Every unit is 'soak tested' for 48 hours
- Quick response time 10 Milli Sec (Half a Cycle)
- All transformers are copper-wound on CR laminations and double vacuum impregnated for high efficiency

SERVOMAX
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Servomax India Limited

- Excellent regulation as high as +/- 0.5%
- Zero wave-form distortion
- Plug-in type fiberglass PCBs with gold-plated fingers for better contacts to ensure excellent reliability and minimum down-time
- Unaffected by load power factor
- No Load losses are very low
- Very wide input operating ranges
- Reset - Manual / Auto reset with time delay
- Control Switch - Phase control- Individual phase control is provided
- Provision of cabling : Input / Output cable termination with provision for fixing cable glands
- Servo Motor Drive : Rugged AC step synchronous motor
- Enclosure - IP 32
- Mounting - floor mounted / Free on wheel

Technical Specifications:

Input Voltage	:	300-460 V 3 Ph AC
Out Put Voltage	:	415 V 3Ph AC
Line Frequency	:	47-53Hz.
Output Voltage Regulation	:	+/- 1%
Type	:	Unbalanced supply and Load conditions
Efficiency	:	≥98%
Speed of Correction	:	60 V per sec. (Air cooled)
Wave form distortion	:	Nil
Effect of Load power factor	:	Nil
Ambient Temperature	:	0-40°C
Duty Cycle	:	Continuous
Mode of System	:	Fully Automatic / Manual
Indications on	:	Input on
		Input Low
		Input High

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		Output On
		Output Cutoff
Controls on each Phase	:	Auto/Manual Selector Switch
		Increase/Decrease Selector Switch
		Volts adj. Potentiometer.
Metering	:	Voltmeter to read Input and Output
		Voltages with selector switch.
		Ammeter to read the Output Current in each ph with selector Switch(from 15 KVA 3 Ph onwards)
Panel Control	:	Input / Output Select Switch
		Auto / Manual select switch
		Increase / Decrease switch to control the output
		voltage in manual mode
		Volts adjust to set required output in auto mode
System Construction	:	As per IS : 9815 -1994

Price Schedule/Scope of supply

S.No	Product Descriptions	Basin Price in Rs	Quantity in No's	Total basic Price in Rs
01	50 KVA 3 Ph SCVS	84, 000/-	01 No's	84,000.00
01	75 KVA 3 Ph SCVS	1,22,000/-	01 No's	1,22,000.00
01	100 KVA 3 Ph SCVS	1,49,000/-	01 No's	1,49,000.00

SERVOMAX
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Servomax India Limited

Note: Purchase order raised on below address

Servomax India Limited

Plot no : 16 , 17 & 18 , Ida ,Phase – II ,

Cherlapally , Hyderabad-51

Commercial Terms

PRICES QUOTED IS	:	EX-WORKS BASIS.
PACKING & FORWARDING	:	**NIL.**
DUTIES	:	**EXTRA AS APPLICABLE** TO YOUR ACCOUNT CURRENT RATE OF EXCISE DUTY IS @ **10.3% EXTRA**; EDGP SHALL BE ROVIDED.
TAXES	:	EXTRA AS APPLICABLE TO YOUR ACCOUNT CURRENT RATE OF VAT @ **14.5%** WILL BE CHARGED EXTRA OR **2% AGAINST** FORM "C". IF ANY OTHER TAXES LIKE ENTRY TAX, OCTROI, ETC., SHALL BE EXTRA AT ACTUAL TO YOUR ACCOUNT.
DELIVERY PERIOD	:	**3-4 WEEKS** FROM THE DATE OF RECEIPT OF YOUR CLEAR TECHNO-COMMERCIALY PURCHASE ORDER.
WARRANTY PERIOD	:	**1 YEAR** FROM THE DATE OF INVOICE AGAINST ANY MANUFACTURING DEFECTS ONLY.
VALIDITY	:	**30 DAYS.**
PAYMENT	:	**50% ADVANCE** ALONG WITH PURCHASE ORDER AND BALANCE PAYMENTS AGAINST **PROFORMA INVOICE**
UNLOADING	:	SHALL BE IN **YOUR SCOPE.**
Transportation	:	Extra If Delivery is out of Hyderabad.

Yours Sincerely
For Servomax India Limited

T. Srinivas
Marketing Dept
98489 10144
E mail : tsrinivas@servomax.net; Servomax_srinivas@rediffmail.com.