



INTEGRATION environment & energy Bahnhofstrasse 9 D-91322 Grafenberg GERMANY



Federation of Nepalese Chambers Commerce and Industries Teku, Kathmandu Nepal



Energy Efficiency Centre FNCCI, Teku, Kathmandu Nepal

ENERGY SAVING POTENTIAL IN SELECTED SECTORS/INDUSTRIES



Energy Efficiency in Industries Nepal Energy Efficiency Programme (NEEP)

1









What is Energy Management?

Energy Management is the implementation of technical and organisational measures in an economical beneficial way for a lasting reduction in the energy costs and the environmental impact of the energy consumption.



Some Key Factors Involved in the Success of Energy Management

Top Management Involvement





Responsibility for energy use

saving achievement.



 Those responsible for production i.e., production costs - labor, materials and other costs - made responsible for controlling energy costs. The user of energy should be responsible for its control as well.

This is very vital. Top/Senior Management visibly

demonstrated their interest and concern in energy



Reasons for Energy Management







- Social responsibility
- Financial benefit
- Commercial profit
- Technical innovation
- Better working conditions



Objectives of energy efficiency







- Discover potential ways of energy saving and use in a more efficient ways.
- Increase profits by reducing production cost.
- Minimize excessive use of energy leading to environmental degradation.



Principles of Energy Efficiency



• Use energy at lowest price



Energy use at highest efficiency



• Utilize the most appropriate technology









Energy auditing methodology

- Step 1: Adopt your
 organization to energy
 management &
 conservation
- Stage 2:How and where to look for energy conservation opportunities
- Stage 3: Review
- Stage 3:Assessment
- Stage 4:Feasibility study
- Sustaining the efforts.













Selected sectors

- Brick
- Cement
- Food and Beverage
- Soap and chemical
- Metal
- Paper and Pulp
- Hotel
- Cold storage









Brick Sector

Energy Intensity 40% of manufacturing cost



usammenarbeit (GIZ) GmbH Brick -Bull trench kilns





Brick sectors

/	/
INTEGRATI environment & en	ON





- Batch type, clamp kilns
- Traditional BTK- Natural draught, induced draught – Stacking is different like straight line firing,
- Vertical Shaft brick

Kilns(VSBK)



Spoon size







- Use of large spoon of capacity 1.5 –2.0 kg leads to the wastage of fuel and over-burning of bricks. Therefore,
- Feed coal at uniform intervals with a spoon of capacity as 750-1000 gms.
- Large size spoon may be used rarely for raising the temperature in particular lines only.





Fuel Feeding Pattern(Fixed Chimney)





Fig: traditional practice

Which Benefits

- •Fuel saving
- •Minimize the Emission Level

Fig: improved practice (four line firing)



Fuel Feeding Pattern























FNCC

- Leakage on Wicket Gate leads on
- Combustion that means more energy(Coal) Consumption.
- Problem in Brick quality
- Problem in fire travel rate



TRIPAL





9

energy efficiency centre

e





Fig: improved practice

Fig: traditional practice



Minimizing surface heat loss in Brick Kilns.





- Fuel saving to minimizing the surface heat loss.
- Surface temperature before improvement = 70°C
- Surface temperature after improvement = 50°C

Annual saving = 150,0000

- Surface area = 8mx9m
- Energy saving by improvements = 17000 Kcal/hr
- Fuel saving = 10 Ton



Note: There are other benefits like minimization of pilli(unburnt) bricks etc.









Cement

Energy Intensity 45% of manufacturing cost







Cement Manufacturing – technologies

Limestone is the raw material used in the manufacture of cement.



The thermal energy consumption average is about 760 kcal/kg of clinker. Based on the study of the latest cement plants, the target energy consumption for a new cement plant could beast below:

Specific Electrical Energy consumption : 75 units/ton of OPC – 43



Specific Thermal Energy Consumption : 715 kCal/kg of clinker



Area of saving



Mines and Crusher Short-term

- Increase operating capacity of primary & secondary crusher
- Reduce idle run of crushers and belts
- Reduce idle operation of dust collection equipment



- Long-term
 - Install bulk analyzer for crushed limestone

Raw mill grinding & storage

- Install variable louvre system for roller mill
- Install high efficiency dynamic separator for roller mills
- Install belt and bucket elevator in place of pneumatic conveying
- Installation of efficient mill intervals diaphragm and liners
- Install slip power recovery system / VFD for raw mill fan / ESP fan





Area of saving





Compressors & Compressed Air System

- Install screw compressors with VFD in place of old compressors.
- Install compressed air traps for receivers
- Optimise compressor discharge pressure
- Eliminate compressor air leakages by a vigorous maintenance programme
- Maintain compressed air filters in good condition

Electrical System

- Use energy efficient lighting
- Distribute load on transformer network in an optimum manner
- Improve power factor
 - Individual compensation
 - Group compensation
 - Centralized compensation
- Replace over sized motors
- Replace with energy efficient motors
- Use VFD for low / partial loads





Food and Beverage



Soap and chemical





Metal Paper and Pulp



Scope





- Furnace
 - Steam generation and distribution
 - system
- Electrical



system

Cogeneration



Areas of saving



 Install economizer/air preheated for boilers furnace



Install automatic blow down system for boilers



Install VSD for boiler feed water pump

Electrical Areas

- Install capacitor banks to improve power factor
- Replace rewound motors with energy efficient motors
- Replace V-belts with synthetic flat belts
- Optimize voltage in lighting circuit by installing servo stabilizers
- Installation of neutral compensator in lighting circuit
- Replace rewound motors with energy efficient motors





Co-Generation, Steam & Condensate Systems

Convert chain grate/spreader stoker boilers to FBC



- Install co-generation system for medium sized paper plants
- Installation of dump condenser with cogeneration unit to manage the load
- Utilise flash steam from boiler blow down for deaerator heating
- Segregate Intermediate Pressure & High Pressure Boiler Feed Water Pump





Furnace

Characteristics of an Efficient







Furnace should be designed so that in a given time, as much of material as possible can be heated to an uniform temperature as possible with the least possible fuel and labour.





Rerolling Mill Furnace

Batch type furnace:





•Used for heating up scrap, small ingots and billets weighing 2 to 20 kg. for batch type rerolling.

•Charging and discharging of the 'material' is done manually and the final product is in the form of rods, strips etc.

•Operating temperature is1200 °C.



•Total cycle time can be categorized into heat-up time and rerolling time.

Continuous Pusher Type:

•The process flow and operating cycles of a continuous pusher type is the same as that of the batch furnace.

•Operating temperature is1250°C.

•The material or stock recovers a part of the heat in flue gases as it moves down the length of the furnace.

•Heat absorption by the material in the furnace is slow, steady and uniform throughout the cross-section compared with batch type.





Hotel and cold storage







Saving opportunity

Install input voltage regulators / controllers for energy efficiency as well as longer life expectancy for lamps where higher voltages, fluctuations

Operate Chillers, pumps, cooling towers as per load demand

Schedule HVAC equipment & systems as per time of

day,week or holiday operation.

Install timers or manual shut off in unoccupied areas.



INTEGRATIO

Replace energy efficient displays like LED's in place of lamp type displays in control panels / instrumentation areas, etc



Re- set the thermostat according to season

are expected.

Use VSD for secondary pumps , install three- way valves in AHU





Reduce load on chillers – use of lowest possible condenser & highest possible evaporator pressure by micro- processor control



For each ° C higher chilled water or lower condenser water temperature -- 1 % energy savings.

- Occupancy sensors
- FRB blades in cooling towers
- Direct coupling compressors in place of belt driven
- Temperature optimization
- Proper water treatment of cooling water- avoiding biological fouling.
- Improve fan air flow by blade angle adjustments.









CASE



Insulated heaters



40% cost saving in Electricity bill



INTEGRATION environment & energy





Motor Replacement







Parameter	STD	EE	STD	EE
Rated kW	11	9.3	15	15
Measured kW	6.5	6.5	12	12
ppearing efficiency	85	92	88	92
Operating losses kW	1.1	0.63	1.54	1.03
Difference in losses				
Ŵ	0.4	47	0.	51
Annual Operating				
nours	60	00	60	00
Saving in kWh	28	20	30	60
Jnit cost Rs/kWh	5.5		5.	.5
Cost Saving	15510		168	330
Payback	2 ye	ears	2 Ye	ears









Compton Greaves Motor NO. 1841 Image: Compton Greaves KW (hp) 5.5 (7.5) RPM 1440 V 415 (±6%) 7 85 % DUTY S1 CL B INS A 11 BEARINGS 6308 / 6208 LUB. LITHIUM II IP 54 MOUCTION MOTOR MADE MADE INDIA REF. ISS : 325-1978
S 200MLB4 St No. 842045
IP 55 Ins. CI. F. JAmb. HO C 77
Conn Hz kw hp rpm An
417 5 10 10 30 140 1470 th 54
Bearing D 6312/C3 Bearing N 6311/C3 N
Grease Oty DN 20/11
Helub Interval D/N - 6700/6900 Hrs 235 Akm
Gridde 100 Servo PLEX LC3 OR Equivalent Complex
SALE AND



Furnace door opening





P

energy efficiency centre





	Project Implementation Cost	Nominal
	(NRs.)	
	Initial fuel consumption / Ton	103 ltrs
	of Product	
	After condition ltrs/ton	83 ltrs
2		
	Savings per ton of product	20 ltrs



Ceramics









Wight difference 3.5 kg/batch Fuel: 10 litres/batch



Losses through Steam Leaks



Installation of Capacitor Banks

Finding:

Low power factor

Recommendation:

Install capacitors as per your requirement

Benefits:

- Reduced kVA demand
- Elimination of penalties
- Reduction in voltage drop
- Improved System Efficiency





Present Demand 797 KVA _ Present Power Factor 0.65 Proposed Power Factor = 0.95 NPR. 2,95,981 (235 KVA) **Demand Saving** =Trans & Distr. Saving = NPR.1,44,981 (26334 kWh) NPR.4,40,962 **TOTAL SAVINGS** NPR. 3,12,111 Investment



INTEGRATION



- Simple Payback Period =
 - 9 months









Thank you