BRIEF ON BASELINE STUDY FINDINGS OF SELECTED SECTOR/ INDUSTRIES.

Energy Efficiency in Industries
Nepal Energy Efficiency Programme (NEEP)
Background

- Scope for efficient use of energy in Nepalese industries.

- GON and GOG signed agreement for NEEP to promote efficient use of energy

- GIZ and WECS as implementing agencies – FNCCI has established EEC

- Consulting Company awarded by GIZ to conduct a baseline study of industries comprising eight sectors of industries namely Cement, Pulp & Paper, Food, Metal, Soap & chemicals, Hotel, Brick, and Cold storage
## Selection

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Sector of Industry</th>
<th>Population</th>
<th>Sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cement</td>
<td>35</td>
<td>26</td>
</tr>
<tr>
<td>2</td>
<td>Pulp &amp; Paper</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>Food</td>
<td>139</td>
<td>51</td>
</tr>
<tr>
<td>4</td>
<td>Metal</td>
<td>64</td>
<td>21</td>
</tr>
<tr>
<td>5</td>
<td>Soap &amp; Chemicals</td>
<td>38</td>
<td>19</td>
</tr>
<tr>
<td>6</td>
<td>Hotel</td>
<td>188</td>
<td>39</td>
</tr>
<tr>
<td>7</td>
<td>Brick</td>
<td>435</td>
<td>27</td>
</tr>
<tr>
<td>8</td>
<td>Cold Storage</td>
<td>23</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>929</td>
<td>200</td>
</tr>
</tbody>
</table>
Cement Sector
Observations

- Two types of cement plants
  - Limestone based
  - Clinker based
- Limestone based plants use electrical as well as thermal energy (coal) as fuel for Sintering process
- Clinker based plants use electrical energy
- Motors used are old, rewound and of standard efficiency
- NEA supply is from 66/33/11 kV with TOD metering
- Capacitor banks are installed to improve P.F.
- Face problem of voltage fluctuation and low voltage supply
- Production hampered by load shedding
Pulp & Paper Sector
Observations

- Electrical as well as thermal energy from rice husk in boiler
- Capacitor banks used to improve power factor more than 0.9
- Combustion efficiency is not checked for boilers
- Steam leakages observed
- Insulation not satisfactory
- Frequent non-scheduled power cuts result in production loss
- High cost of Generated electrical energy
Food Sector
Food Sector

Sub-sectors

- Beverage
- Biscuit
- Dairy
- Noodle
- Sugar
- Vegetable oil & Ghee
Observations

- Food industries consume both electrical and thermal energy.
- Diesel boiler used most for backup.
- Use of inefficient motors.
- Steam leakages are observed.
- Improper Insulation
- Power factor not manage well.
Metal Sector
Observations

- Iron and Steel industries are installed with heavy motors and electrical energy is mainly used for the drives of rolling mill, billet sharing, pumps, compressor, blowers and wire plant motors.

- Motors are old and re-winded.

- Capacitor banks are used to improve power factor.

- Furnace is used mainly with coal, FO and diesel and workplace is warm/hot indicating insufficient insulation.

- Frequent power cuts affect production.
Soap & Chemical Sector
Observations

- Laundry soap is the main product
- Small scale pan boiling units use firewood medium and large units use rice husk fired boiler
- Only few industries uses capacitor bank
- Combustion efficiency is not checked
- Leakages are seen
- Insulation not adequate – pipes, flanges and valves are not insulated
Brick Sector
Observations

- Majority of brick industries are BTK (fixed chimney)
- Energy use in brick kiln is coal and coal is imported from India
- Electricity is used for lighting and drives
- No significant disturbance in production by load shedding
- Insulation inefficient
- Inefficient coal feeding practice
Cold Storage Sector
Observations

- Potatoes and fruits are the main products stored
- They consume only electrical energy for cooling process
- The rate of electricity charge is subsidized 50% by NEA
- All units have DG for backup.
- Motor loadings are not checked
- Power factor is low – none used capacitor banks
- Many incandescent lamps are used
- Air curtains are not used
## Energy Intensity regional VS Baseline

<table>
<thead>
<tr>
<th>Sector</th>
<th>Electrical Intensity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Regional (kWh/MT)</td>
</tr>
<tr>
<td>Cement Limestone Base</td>
<td>105</td>
</tr>
<tr>
<td>Cement Clinker Base</td>
<td>35</td>
</tr>
<tr>
<td>Pulp &amp; Paper</td>
<td>1175</td>
</tr>
<tr>
<td>Metal</td>
<td>200</td>
</tr>
<tr>
<td>Soap &amp; Chemical</td>
<td>-</td>
</tr>
<tr>
<td>Brick (BTK Fixed)</td>
<td>-</td>
</tr>
<tr>
<td>Cold Storage</td>
<td>-</td>
</tr>
</tbody>
</table>
## Energy Intensity regional VS Baseline

<table>
<thead>
<tr>
<th>Sector</th>
<th>Thermal Intensity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Regional (MJ/MT)</td>
</tr>
<tr>
<td>Cement Limestone Base</td>
<td>3,138</td>
</tr>
<tr>
<td>Cement Clinker Base</td>
<td>-</td>
</tr>
<tr>
<td>Pulp &amp; Paper</td>
<td>16,412</td>
</tr>
<tr>
<td>Metal</td>
<td>1,500</td>
</tr>
<tr>
<td>Soap &amp; Chemical</td>
<td>-</td>
</tr>
<tr>
<td>Brick (BTK Fixed)</td>
<td>2,215 MJ/1000 pcs</td>
</tr>
<tr>
<td>Cold Storage</td>
<td>-</td>
</tr>
</tbody>
</table>
Areas of Potential Savings

- Efficient motors
- Power factor improvement
- Improvement in insulation of the cold pipelines, storage room walls and ceiling
- More efficient belt and pulleys
- Partition of cooling areas, installation and effective use of air curtains
- Regular cleaning and maintenance of condenser pipes
- Replacement of incandescent lamps
- Minimization of leakages of compressed ammonia gas
Recommendations

- Energy audits must be carried out periodically in all the industries so that opportunities are known and understood.
- Awareness & training about EE.
- Financing for the implementation of energy saving options – mobilize financial institutes and banks.
- Keeping the record of data and monitoring.
Recommendations

- **Institutionalizing energy audit expertise**
- **Focus on best practices and best available technology on energy**
- **Policy with mandatory periodic energy audits and reporting**
- **Involve educational institutions for offer course on EE**
- **Competition and award for improvement in EE by sector**
Thank you