Sector Highlights

Census of Manufacturing Establishments (CME) carried out in the fiscal year 2011/12 by the Central Bureau of Statistics (CBS) has kept Metal Industry into three different classes namely a) basic iron and steel, b) structural metal products, and c) forging pressing and stamping of metal. Iron rod, steel rod, stainless steel, cast iron pipe, tin sheet etc are some of the export items of this industry. The number of basic Iron and steel industries in Nepal is 20 with employment of 4,917 persons (CME, 2012/13). The sub-sector output value is estimated to be NPR 31.10 billion and contributes the input value of NPR 27.34 billion with addition of about NPR 3.75 billion. The average installed capacity of the plants in this sub-sector is 113 Tons per Day (TPD) and average production is 63.7 TPD (GIZ/NEEP 2012).

Energy Use

Main sources of energy used in the Iron and Steel industries in Nepal are furnace oil, electricity and coal. Coal is mainly used in the re-heating furnace for billet heating. Furnace oil or diesel is also used in place of coal by some industries. Nepal Electricity Authority (NEA) is the only supplier of Electricity. All industries have installed Diesel Generator for backup power supply during power outage mainly for the lighting and maintenance activities of the industries. However, the production ceases during the load shedding.

The energy cost on product value is 3% for the iron and steel sector. Energy saving potential for the sector is estimated to be 6% for Electrical and 23% for thermal.

Experiences from the past have identified many energy saving options for the iron and steel sector that are highly profitable with the payback period of equal or less than 4 years.

<table>
<thead>
<tr>
<th>Option</th>
<th>Payback of investment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Saving by Compressed air leakage avoidance</td>
<td>Immediate</td>
</tr>
<tr>
<td>Waste heat recovery by installing metallic recuperator</td>
<td>Immediate</td>
</tr>
<tr>
<td>Fuel Oil Preheating</td>
<td>Immediate</td>
</tr>
<tr>
<td>Reheating Furnace Automation</td>
<td>Less than 1 year</td>
</tr>
<tr>
<td>Power Factor Improvement from 0.8 to 0.95</td>
<td>8-14 Months</td>
</tr>
<tr>
<td>Fuel Substitution</td>
<td>1 to 2 years</td>
</tr>
<tr>
<td>Adoption of Variable Frequency Drive for Combustion Air Fan Drive of Reheating Furnace</td>
<td>2 to 3 years</td>
</tr>
<tr>
<td>Energy Saving in Water Pumping of rolling mill and Pump Oil Cooling</td>
<td>3 to 3.5 years</td>
</tr>
</tbody>
</table>

Table 2: Energy saving option and payback period of investment for Steel & Metal sector (EEC/NEEP, 2015)

---

1 GIZ/NEEP, 2012: Baseline study of selected industries
2 EEC/NEEP, 2015: Pre-market assessment of audited industries

---

Figure 1: Energy use in Nepalese Iron and Steel industry (GIZ/NEEP, 2012)
Energy Saving Tips

Shearing
- Use EE drives and motors
- Proper upkeep of shear blades
- Maintain proper alignment and lubrication

TM Treatment
- Use of VFD pumps
- Use of FRP blades and efficient fan in cooling towers
- Use of EE pumps and drives
- Use of EE Spray nozzles and timely replacement

General measures
- Ensuring proper fuel storage, handling, and preparation, for achieving good combustion conditions
- Recover maximum heat from flue gases
- Balance kilowatt loading on three phases of supply
- Shift loads to off-peak times where possible (load management)
- Correct power factor to well above 0.95 by installing additional capacitors and automatic power factor controllers
- Use variable-speed drives for large variable loads

Re-heating (furnace)
- Operating with lowest possible stack temperature for fuel economy
- Monitor O2/CO2/CO rations and control excess air
- Use ceramic fiber linings in the furnace
- Provide temperature controllers
- Use of re-generating burners
- Insulate all hot surfaces and repair damaged insulations

Re-rolling
- Crop length optimization
- Use of antifriction bearings
- Computerized roll pass design
- Improved lubrication
- High voltage (HT) Ac motor for rolling mill

Case Study

Energy Audit conducted by EEC under NEEP, recorded specific energy consumption (SEC) of 102 kWh/Ton of electricity and 477 Mcal/Ton of Coal in one of the re-rolling mills with a total capacity of 33,000 T/year. The industry was able to reduce its specific energy consumption to 95 and 281 respectively after implementing the recommended energy efficiency measures: investing NPR 25 millions, the industry was able to make a saving of NPR worth 38 million annually.

<table>
<thead>
<tr>
<th>During Energy Audit (SEC)</th>
<th>After Implementation (SEC)</th>
<th>Savings Per Ton</th>
<th>Total Production</th>
<th>Annual Savings made</th>
<th>Monetary Savings made</th>
<th>Total Investment Made</th>
</tr>
</thead>
<tbody>
<tr>
<td>102 kWh/T and 477 Mcal/T @ Coal</td>
<td>95 kWh/T and 281 Mcal/T</td>
<td>7 kWh and 196 Mcal</td>
<td>33,000 T/Year</td>
<td>231,000 kWh and 6,468,000 Mcal</td>
<td>2,079,000 @ 9/kWh and 35,933,000 @ 25/ Kg of Coal and 4500Kcal/Kg of Coal</td>
<td>Rs. 25,604,000</td>
</tr>
</tbody>
</table>

Table 3: A success case from NEEP (EEC/NEEP, 2015)

Contact details

If you are interested to know more about energy efficiency, please, do not hesitate to contact us!

- If you are a business man get information about energy saving opportunities in your company and get an energy audit done by our professional expert team
- If you are an engineer explore the articles in our energy efficiency knowledge website and participate in our training programs
- If you are a banker... participate in our awareness raising seminars and explore the new market of energy efficiency investment.
- If you are an energy auditor... register in our database of energy efficiency professionals and be listed on our webpage.
- If you are a supplier for energy-efficient technology register in our online B2B portal and list your products and services.