Energy efficiency in Mining Sector

Presented by

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Need of energy efficiency improvement in Mining sector

- Indian mining industry produces 90 minerals including coal
- Energy cost in mining accounts for 10-11% of production cost in Indian mining industry
- Energy saving potential in mining sector is about 5-8% based on study by CIMFR.
Mining Process

DRILLING → BLASTING → EXCAVATION

STORAGE ← SIZING/FINISHING ← TRANSPORTATION OR, HOISTING

Major Energy Inputs: Diesel, Electricity
Mining - Methods

Depending upon the depth of the deposition & mine conditions. The classification of mines can be done as follows:

1) Open cast Mines

2) Underground Mines
## Energy saving achieved by major mining industries-CIMFR study on mining sector

<table>
<thead>
<tr>
<th>Energy Audit Projects</th>
<th>% Energy saving</th>
<th>Saving in (Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Audit of Umrer Open Cast Coal mine, WCL, Maharashtra</td>
<td>5</td>
<td>22 Lakhs</td>
</tr>
<tr>
<td>Energy Audit of 9 Mines of M/s Manganese Ore (I) Ltd, Nagpur, Maharashtra</td>
<td>8</td>
<td>182 Lakhs</td>
</tr>
<tr>
<td>Energy Audit study of Nimbeti opencast Limestone mine, Shree cement, Rajasthan</td>
<td>8.4</td>
<td>262 Lakhs</td>
</tr>
</tbody>
</table>
Sankey diagram of Energy usage in an opencast coal mine (OCM)

- Shovel (2.42%)
- Dragline (14.57%)
- Pumping (17.85%)
- Excavators (20.43%)
- Dump trucks (32.52%)
- Coal handling (5.72%)
- Light vehicle (3.78%)

Total energy (100%)
### Energy efficiency improvement in Opencast mine (Shree cement Ltd)

<table>
<thead>
<tr>
<th>Category</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual electricity consumption</td>
<td>54 lakh units</td>
</tr>
<tr>
<td>Annual Diesel consumption</td>
<td>8364 kL/year</td>
</tr>
<tr>
<td>Present Specific fuel consumption</td>
<td>0.44 litres/ton</td>
</tr>
<tr>
<td>Proposed SFC after implementation</td>
<td>0.34 litres/ton</td>
</tr>
<tr>
<td>Annual Lime stone handling</td>
<td>7,780,000 tons/year</td>
</tr>
<tr>
<td>Monetary savings</td>
<td>Rs.2.26 cr. (8.4%)</td>
</tr>
</tbody>
</table>
Energy conservation measures (OCM)

- Optimization of fuel consumption in dump trucks and excavators
- Use of High capacity, efficient diesel engine for dump trucks and excavators
- Improvement of maintenance of HEMMs
- Introduction of energy efficient motors
### INPUT ENERGY PROFILE OF AN UNDERGROUND MANGANESE MINE

**Balaghat U/G Mine, MOIL**

<table>
<thead>
<tr>
<th>INPUT ENERGY</th>
<th>Qty.</th>
<th>Eq. energy in kcal</th>
<th>% of total energy input</th>
<th>Energy cost (Lakhs)</th>
<th>% of Total energy cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity (kWh)</td>
<td>5173076</td>
<td>4.44 x 10^9</td>
<td>72.19</td>
<td>268.7</td>
<td>87.12</td>
</tr>
<tr>
<td>Diesel (Lits) (kg)</td>
<td>209305 171630</td>
<td>1.71 x 10^9</td>
<td>27.80</td>
<td>39.7</td>
<td>12.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.15 x 10^9</td>
<td>100</td>
<td>308.4</td>
<td>100</td>
</tr>
</tbody>
</table>
MAJOR ELECTRICAL ENERGY CONSUMING AREAS

Thrust areas

Annual Savings estimated

Compressed Air System: 149520 kWh
Pumping system: 105120 kWh
ventilation Fan: 87600 kWh
Demand Savings: 1284 kVA

Total savings: Rs. 23.81 Lakhs
Savings in energy: 8%
Variation of Specific Energy Consumption in U/G mines

Parameter that affects Specific energy consumption:

1. Depth
2. Material handling rate
3. Energy efficiency of Mining equipment
Energy conservation measures (U/G Mines)

- Energy efficient motors and Pumps
- Optimization of piping network
- Power factor and maximum demand control
- Efficient utilization of compressed air for drill
- Energy efficient screw compressors
Conclusion

- The Indian mining industry though less energy intensive, implementing various energy saving measures will improve energy efficiency by 5-8%.
- Energy benchmarking and Targeting will help in improving energy efficiency in mines.
Thank You