HINDUSTAN ZINC LIMITED
RAMPURA AGUCHA MINE

National Energy Award for Excellence in Energy Management

Presented By

R S Sarupria
AGM (EOHS)

R P Govil
AGM (Electrical)

ISO-9001,14001, OHSAS-18001, SA-8000 & 5S Certified Unit and Four Star Rating for Safety & Health by British Safety Council
Hindustan Zinc is India’s largest and the world’s second largest integrated producer of zinc & lead, with a global share of approximately 6.0% in zinc.

**VISION**

Be a world-class company, creating value, leveraging mineral resources and related core competencies

**MISSION**

- Be a globally lowest cost zinc producer, maintaining market leadership
- One million tonne Zinc-Lead metal capacity by 2010.
- Be innovative, customer oriented, and eco-friendly
- maximizing stake-holder value.

### Hindustan Zinc –Mining Assets

<table>
<thead>
<tr>
<th>Location</th>
<th>Lead-Zinc Ore R&amp;R:</th>
<th>Reserve:</th>
<th>Resource:</th>
<th>Reserve Grade Zn:</th>
<th>Reserve Grade Pb:</th>
<th>Ore Production Capacity:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rajpur Dariba</td>
<td>7.80 Mt</td>
<td>34.41 Mt</td>
<td>6.25%</td>
<td>1.95%</td>
<td></td>
<td>0.9 mtpa.</td>
</tr>
<tr>
<td>Lead-Zinc</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rajpur Agucha</td>
<td>75.71 Mt</td>
<td>44.65 Mt</td>
<td>14.23%</td>
<td>1.99%</td>
<td></td>
<td>6.15 mtpa.</td>
</tr>
<tr>
<td>Rampura</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maton</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sindesar Khurd</td>
<td>10.74 Mt</td>
<td>50.08 Mt</td>
<td>5.45%</td>
<td>2.95%</td>
<td></td>
<td>0.3 mtpa. Will increase to 1.5 mtpa.</td>
</tr>
<tr>
<td>Kayar (Planned)</td>
<td>9.01 Mt</td>
<td>34.41 Mt</td>
<td>10.6%</td>
<td>1.7% Pb</td>
<td>0.35 mtpa</td>
<td></td>
</tr>
<tr>
<td>Rock Phosphate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maton</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zawar Mining</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Map not to scale
**Hindustan Zinc – Smelting and Power Assets**

### Chanderiya Smelting Complex
- **Capacity**
  - Zn: 525,000 tonnes
  - Pb: 85,000 tonnes
  - Ag: 168 tonnes
- **Power:**
  - Coal Based: 234 MW
  - DG set: 14.81 MW
  - Waste Heat Recovery: 13.7 MW

### Dariba Complex - Phase III
- **Hydrometallurgical Zinc Smelter:**
  - 210,000 tpa Zinc
  - Lead Smelter (*)
  - 100,000 tpa Lead
  - Captive Power Plant: 160 MW (*)

### Zinc Smelter Debari
- **Hydrometallurgical Zinc Smelter:**
  - 88,000 tpa Zinc

### Zinc Smelter Vizag
- **Hydrometallurgical Zinc Smelter:**
  - 56,000 tpa Zinc

### Samana, Gujarat
- **88.8 MW Wind Power Plant**

### Gadag, Karnataka
- **34.4 MW Wind Power Plant**

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**Carbon Emission Reduction**

- Adoption of energy efficient technology & equipment, recovering waste heat, and generating green energy through wind power plant
- Carbon foot-print for FY 2009 - 10 is 3.39 million MT of CO2.
- Implemented CDM projects having CER potential of 3, 70,772 /annum (~ 10% of GHG emissions)
- Participated in Carbon Disclosure Projects (CDP) during last three years
- Green energy ~ 123 MW of WPP + 21 MW of power generated from waste heat recovery plants
- Several projects taken up; 3 projects registered at UNFCCC as CDM projects
- ~ 45,000 CER & ~ 2,63,000 VER sold during FY 2010; revenue of Rs. 6.4 Crore
- ~ 1,15,000 CER issued recently

<table>
<thead>
<tr>
<th>Details of Projects</th>
<th>Potential CER</th>
<th>Status/ Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.4 MW Waste heat recovery based power plant at CSC</td>
<td>51,609</td>
<td>Registered with UNFCCC</td>
</tr>
<tr>
<td>88.8 MW Wind power project of HZL at Gujarat</td>
<td>158,127</td>
<td>Registered with UNFCCC</td>
</tr>
<tr>
<td>34.4 MW Wind power project of HZL at Karnataka</td>
<td>65,036</td>
<td>Registered with UNFCCC</td>
</tr>
<tr>
<td>Waste heat recovery LCV project at CSC</td>
<td>33,000</td>
<td>Registration expected by Nov’10</td>
</tr>
<tr>
<td>8 MW Waste Heat Recovery Boiler at DZS</td>
<td>44,000</td>
<td>Registration expected by Nov’10</td>
</tr>
<tr>
<td>4.3 MW Waste Heat Recovery Boiler at CSC</td>
<td>19,000</td>
<td>Registration expected by Oct’10</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>3,70,772</strong></td>
<td></td>
</tr>
</tbody>
</table>

*Note: Map not to scale

(*) Under implementation
Renewable Energy

- Towards our efforts to produce green energy, 123.2 MW of wind power plants have been installed and commissioned at Gujarat and Karnataka.
- We have obtained United Nations Framework Convention on Climate Change (UNFCCC) registration for both of our wind power plants.

Total wind power capacity 123.2 MW
- 88.8 MW commissioned in Samana, Gujarat
- 34.4 MW commissioned in Gadag, Karnataka

Replacement of Thermal Energy with RES
- HZL is aiming to generate 21 MW through waste heat recovery.
- Presently we have 16.7 MW of power generation capacity from our waste heat recovery plants at Chanderiya and Debari unit and have obtained United Nations Framework Convention on Climate Change (UNFCCC) registration for above project.

RAM – An overview

World Class Asset
- Largest Zinc Mine in World
- One of the lowest cost zinc mine
- Modern efficient mining operation
RAM – An overview

Commissioned: 1991 (0.9 Mtpa)

Ore Production: 6.15 mtpa (2009-10)

Ore Beneficiation: 6.50 mtpa (2009-10)

Power Requirement: 50 MW/Year

Reserve & Resource: 120.36 Million Ton
(As on 1/4/2010)

13.69% Zn, 1.95% Pb

Machineries Capacity

Mine

Dumper: 95 MT, 240 MT

Excavator: 15 m³, 34 m³

Mill

SAG Mill: 3 nos

Ball Mill: 6 nos

Ranking of Mines

2010

Rampura Agucha: 655

Red Dog: 545

Century: 505

Mount Isa Pb/Zn: 348

Antamina: 344

Source: Brook Hunt 2010 Q1

Note: All figures are in Kt Zn metals

Rampura Agucha - Largest Zinc Mine in the world
Specific Energy Consumption (SEC)

SEC in Ore beneficiation reduced by 17% from the year 2000-01 to 2007-08.

The marginal rise in year 2008-09 is due to commissioning of beneficiation plant of capacity 1.25 Mtpa.

The marginal rise in year 2009-10 is due to commissioning of beneficiation plant of capacity 1.5 Mtpa.

Energy Consumption (Benchmark)

As such there is no specific benchmark for specific energy consumption in lead zinc mine at both national and international level.

However as per the study of Brookhunt - 2009 Rampura Agucha Mine ranks 3rd as compare to other mines.

Reference: www.brookhunt.com
Road Map to Achieve Global Best

- Energy Policy formulation
- External & Internal Energy Audits
- Implementation of effective energy monitoring system
- Generation of daily MIS and structured reporting system.
- Implementation of energy improvement projects scheme
- Installation of variable frequency drives (VFD) & its optimization
- Installation, Replacement & Modification in existing energy consuming equipments.
- Enhancement in capacity utilization of machineries/equipment
- Optimization of process parameters
- Better maintenance planning and use of latest condition monitoring tools.
- Capacity expansion of Zn-Pb beneficiation plant

Installation, Replacement & Modification

**Installation of Vertical Turbine (VT) pump at Banas Pump House**

**Before**

- Pumping From Radial Well
- Storage at Banas Reservoir
- Storage at Sahapura Reservoir
- Storage at RA Mine Reservoir

**Present**

- Pumping From Radial Well
- Storage at Sahapura Reservoir

Water pumping from Banas pumping station to Shapura pumping station.
- Pumping of water from radial well to reservoir at Banas.
- Pumping of water from Banas Reservoir to Shahpura pump house reservoir.

Improvement Action
- Installation of Vertical Turbine pump to obtain single stage pumping
- Higher efficiency pump was installed to consume less power.
  - Cost involved: Rs. 1.2 million
  - Unit Saved: 0.98 million
  - Annual Saving: Rs 5.2 million
**Project:** Reduction of Specific LT power consumption in stream III compressors

**Technical Details:**

<table>
<thead>
<tr>
<th>Before modification</th>
<th>After Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loading % of 132 KW: 75</td>
<td>Loading % of 132 KW: 83</td>
</tr>
<tr>
<td>Loading % of 90 KW: 35</td>
<td>Loading % of 90 KW: 0</td>
</tr>
</tbody>
</table>

**Benefits:**
- Reduce the LT power consumption
- Complete Stoppage of 90 KW compressor
- Complete elimination of spare consumption and maintenance cost of 90 KW compressor.
- Additional option for dryer usage.

| Cost involved | Rs. 0.35 Lakh |
| Unit Saved    | 1.8 Lakh |
| Annual Saving | Rs. 8.2 Lakh |

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**VFD Installation & Optimization**

Optimized the power consumption in all cooling tower pumps by installing VFD

- Flow Optimization across each user
- Maintaining of temp diff. around 4 – 6°C depending on critical requirement
- VFD Installation to the pump
- Maintaining constant pressure

| Cost involved | Rs. 1.25 Lakh |
| Unit Saved    | 1.1 Lakh |
| Annual Saving | Rs. 6.16 Lakh |
Installation of VFD in Tailing 3rd Battery of stream I
By installing new VFD of 200 KW in Tailing 3rd Battery and varying its speed according to the flow resulting in power saving as below:

- Cost involved: Rs. 5 Lakh
- Unit Saved: 0.8 Lakh
- Annual Saving: Rs. 3.73 Lakh

Installation of VFD on conveyors under filter no PF-4 & 8 of stream I
- Cost involved: Rs. 1.5 Lakh
- Unit Saved: 1.6 Lakh
- Annual Saving: Rs. 6.0 Lakh

Installation of VFD on reciprocating feeder of secondary crusher (33D)
- Cost involved: Rs. 0.8 Lakh
- Unit Saved: 1.1 Lakh
- Annual Saving: Rs. 6.0 Lakh

Stream II SAG mill power consumption optimization by increasing throughput.
- Cost involved: Rs. Nil
- Unit Saved: 114.1 Lakh
- Annual Saving: Rs. 616 Lakh

Optimization of Power consumption in Compressors of stream III.
- Cost involved: Rs. 0.5 Lakh
- Unit Saved: 3.7 Lakh
- Annual Saving: Rs. 16.9 Lakh

Optimization of air flow in flotation cells to reduce Power consumption in Stream III
- Cost involved: Rs. Nil
- Unit Saved: 1.1 Lakh
- Annual Saving: Rs. 5.0 Lakh

Optimization of pumping of water in stream III from reservoir tank.
- Cost involved: Rs. Nil
- Unit Saved: 2.5 Lakh
- Annual Saving: Rs. 10.9 Lakh
Optimization of fans and Interlocking of dust disposal pump with dust draft fan – Primary & Secondary crusher

Cost involved : Rs. 2.0 Lakh
Unit Saved : 2.6 Lakh
Annual Saving : Rs. 14 Lakh

Installation, Replacement & Modification

Lighting Load
- Power Consumption Depends Directly on Voltage Applied
- Illumination reduces slightly with reduction in Voltage

Lowering the voltage by 10% resulted in
- Small reduction (1 to 2%) in illumination
- Proportional (10%) reduction in power consumption.
- Improved life of Lamps

Cost involved : Rs. 1.0 Lakh
Unit Saved : 1.8 Lakh
Annual Saving : Rs. 9.5 Lakh
Installation, Replacement & Modification

Automatic Star-delta Converter in stream II

- Application: Motors under fluctuating load
  - 1213-1, U-60, 19A, 46A, 1601 & 1606
- Automatic star-delta-star converter has load sensor & Timer
- Capacity $\propto V^2$

![Load Sensor Diagram]

- Energy Saving
- Protection

Cost involved: Rs. 1.2 Lakh
Unit Saved: 1.6 Lakh
Annual Saving: Rs. 9 Lakh

Optimization of 1st stage and 2nd stage cyclone feed pumps to reduce pump power in stream III

- Cost involved: Rs. Nil
- Unit Saved: 1.2 Lakh
- Annual Saving: Rs. 5.5 Lakh

Review and Installation of more photocell in lighting circuit and optimization of light fitting location.

- Cost involved: Rs. 0.01 Lakh
- Unit Saved: 0.5 Lakh
- Annual Saving: Rs. 0.55 Lakh

Convert Lightly Loaded Motors in Permanent Star Mode in all stream.

- Cost involved: Rs. 0 Lakh
- Unit Saved: 1.6 Lakh
- Annual Saving: Rs. 9.0 Lakh
### Energy Conservation Project

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of Project</th>
<th>Annual Saving</th>
<th>Investment (Million)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Units (Million)</td>
<td>Rs (Million)</td>
</tr>
<tr>
<td>2007-08</td>
<td>17</td>
<td>19.28</td>
<td>104.10</td>
</tr>
<tr>
<td>2008-09</td>
<td>12</td>
<td>6.39</td>
<td>28.31</td>
</tr>
<tr>
<td>2009-10</td>
<td>11</td>
<td>2.45</td>
<td>11.13</td>
</tr>
<tr>
<td>2010-11 (Estimated)</td>
<td>11</td>
<td>1.82</td>
<td>8.20</td>
</tr>
</tbody>
</table>

### Best Practices Through Associates

- **Purchasing of 240 ton Komatsu dumpers fitted with auto-retarder system.**
- **This system converts thermal energy (heat) generated while applying brake into electrical energy.**
- **Generated electrical energy is used for the operation of electrical retarder in vehicle brake system instead of drawing energy from vehicle battery.**
- **Energy efficient bearings in motors**
- **Addition of Fuel additive to improve the engine efficiency, thereby reduction in fuel consumption.**
Employees Involvement & Team Work

Employees Involvement

- Training: on energy conservation and environmental awareness
- Audit: Internal & External energy audit
- Improvement Project: Promoting more and more energy conservation projects and rewarding the project team
- Workshop: Participation in technical workshop relevant to energy conservation (eg OEM)
- Others
  - Periodic circulation of Do's and Don’ts for the effective use of power at colony and mines, Banners and Posters.

Team Work

Most of the energy projects are executed by inter departmental team

Monitoring & Reporting Systems

- Energy conservation projects are reviewed on monthly basis
- There is a standard format for registering a energy project.
- Periodic monitoring are done as per the milestone setup for the project.
- The monitoring of projects is governed by the project head along with the respective department head
- The time schedule and methodology adopted for monitoring is decided by the project leader
- The reporting system for projects at unit level is operational review (OR) meeting chaired by unit head
- At corporate level project report is presented on monthly basis in front of COO of company by corporate EOHS head.

Sample Reporting Format

<table>
<thead>
<tr>
<th>S.No</th>
<th>Activity</th>
<th>Potential (KWH)</th>
<th>Owner</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Vendors/ Associates & Recognitions

Energy Conservation Technology/ Audits
Energy Audits by Confederation of Indian Industries (CII)

Vendors
- ABB
- Siemens
- L&T
- CGL etc.

Recognitions
- CII-National Award for Excellence in Water Management, 2009
- Golden Peacock Environment Management Award, 2009
- National Energy Conservation Award, 2006
- FIMI Environmental Excellence Award, 2007
- Greentech Environment Gold Award, 2007
Recognitions

Energy Efficient Unit Award
MEMCW 2010

FIMI National Environment Award
(Gem Granite)

Environment Projects

q Water Conservation & Pollution Control
q Air Pollution Control
q Green belt development
q Noise and Vibration control
q Solid waste Management
Water Conservation & Pollution Control

- Continuous reduction in Specific water consumption. Whereas beneficiation plant capacity enhanced by more than 6.0 folds
- Use of Water Evaporation Retardant Chemical on tailing dam water surface
- Installation of 2 nos of STP at mine and colony.
- Construction of reclaim reservoir of capacity 50000 m³.
- All spillages from the industrial area are collected recycle back to process
- Recycling of mine pit & tailing dam water to reclaim reservoir
- Garland Drains around the mine pit and dump for collection and reuse of run off water.
- Maintaining zero discharge outside mine premises

Air Pollution Control

Sources of Pollution
- Drilling & Blasting
- Hauling
- Crushing & Transportation
- Concentrate Stock Pile

Management Practices
- Wet drilling operations
- Use of chemical wetting agents for dust suppression on haul roads
- Truck / dumper tyre washing system at weigh bridge
- Dust extraction systems at primary, secondary crusher and fine ore bins
- Semi-Autogenous Grinding (SAG) Mill to eliminate dry secondary and tertiary crushing
- Covered conveyor belts
- Mechanical road sweeper
- Plantation on inactive waste dump benches
Environment: Green Belt

- A green belt of 50 to 100 m wide has been developed all around the periphery of mining complex.
- Till date more than 3.0 Lakhs saplings has been planted.

Certification

ISO 14001 – 2004
- Effective integration of environmental parameters in unit operation activities, maintains legal compliances, conservation of natural resources and prevention of pollution.

ISO 9001: 2008
- Quality improvement in finished product

OHSAS 18001 – 2007
- Identification of Hazard and its risk evaluation, healthy workplace and safe work practices

SA 8000
- No child labour discrimination in contractor work area

5S certified
- Improvement in work culture and House Keeping

BSC 4 star rating: This year we are going for 5 star rating
Safety work culture and practices
### Energy Conservation Project (2007-08)

<table>
<thead>
<tr>
<th>S. No</th>
<th>Projects</th>
<th>Annual Saving</th>
<th>Payback Period (month)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Units (million)</td>
<td>Rs (million)</td>
</tr>
<tr>
<td>1</td>
<td>Water reclamation through open channel</td>
<td>4.08</td>
<td>22.0</td>
</tr>
<tr>
<td>2</td>
<td>SAG mill power optimization through throughput increase.</td>
<td>11.41</td>
<td>61.6</td>
</tr>
<tr>
<td>3</td>
<td>By passing of regrinding mill discharge pump in case of idling of regrinding mill</td>
<td>0.20</td>
<td>1.1</td>
</tr>
<tr>
<td>4</td>
<td>Lighting optimization in grinding &amp; reagent area</td>
<td>0.33</td>
<td>1.8</td>
</tr>
<tr>
<td>5</td>
<td>Interlocking of DE fan and magnets</td>
<td>0.05</td>
<td>0.3</td>
</tr>
<tr>
<td>6</td>
<td>Installation of VFD on conveyors under filter PF-4 &amp; 8</td>
<td>0.16</td>
<td>0.9</td>
</tr>
<tr>
<td>7</td>
<td>Installation of VFD on feeder 33D</td>
<td>0.11</td>
<td>0.6</td>
</tr>
<tr>
<td>8</td>
<td>Replacement of Existing Mill overhead Tank pump by energy efficient pumps</td>
<td>0.33</td>
<td>1.8</td>
</tr>
<tr>
<td>9</td>
<td>Installation of VT pump at Banas</td>
<td>0.98</td>
<td>5.3</td>
</tr>
<tr>
<td>10</td>
<td>Interlock the dust disposal pump with dust draft fan – Primary &amp; Secondary crusher</td>
<td>0.26</td>
<td>1.4</td>
</tr>
</tbody>
</table>
### Energy Conservation Project (2007-08)

<table>
<thead>
<tr>
<th>S. No</th>
<th>Projects</th>
<th>Annual Saving</th>
<th>Investment Made Rs (million)</th>
<th>Payback Period (month)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Units (million)</td>
<td>Rs (million)</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Optimise the power consumption of mill – 2 cooling tower pump by installing VFD</td>
<td>0.11</td>
<td>0.6</td>
<td>0.125</td>
</tr>
<tr>
<td>12</td>
<td>Install Energy Saver &amp; Optimize Lighting Voltage at 210 V</td>
<td>0.18</td>
<td>1.0</td>
<td>0.1</td>
</tr>
<tr>
<td>13</td>
<td>Provide Automatic Star-del-Star Converter</td>
<td>0.16</td>
<td>0.9</td>
<td>0.12</td>
</tr>
<tr>
<td>14</td>
<td>Convert Lightly Loaded Motors In Permanent Star Mode</td>
<td>0.16</td>
<td>0.9</td>
<td>Nil</td>
</tr>
<tr>
<td>15</td>
<td>Improve cooling tower performance by immediate maintenance/ replacement</td>
<td>0.10</td>
<td>0.5</td>
<td>0.45</td>
</tr>
<tr>
<td>16</td>
<td>Install Variable Frequency Drive to Zinc Filter Pump</td>
<td>0.16</td>
<td>0.9</td>
<td>0.9</td>
</tr>
<tr>
<td>17</td>
<td>Increasing the Capacity and installation of VFD in Lead Scavenger Pump</td>
<td>0.49</td>
<td>2.6</td>
<td>0.375</td>
</tr>
<tr>
<td></td>
<td><strong>Total Saving</strong></td>
<td><strong>19.28</strong></td>
<td><strong>104.1</strong></td>
<td><strong>6.2</strong></td>
</tr>
</tbody>
</table>

### Energy Conservation Project (2008-09)

<table>
<thead>
<tr>
<th>S. No</th>
<th>Project Description</th>
<th>Annual Saving</th>
<th>Investment Made Rs (million)</th>
<th>Payback Period (month)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Units (million)</td>
<td>Rs (million)</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Quicker ramp up of Stream 3</td>
<td>4.92</td>
<td>21.78</td>
<td>Nil</td>
</tr>
<tr>
<td>2</td>
<td>Optimisation of pumping of water in stream 3 from reservoir tank.</td>
<td>0.25</td>
<td>1.09</td>
<td>Nil</td>
</tr>
<tr>
<td>3</td>
<td>Exploring possibility of eliminating pressing air( 55 KW) in stream3 with compromising the moisture content of lead and zinc concentrate.</td>
<td>0.25</td>
<td>1.09</td>
<td>Nil</td>
</tr>
<tr>
<td>4</td>
<td>New reclaim (canal) sump pump to be operated through level switches.</td>
<td>0.29</td>
<td>1.31</td>
<td>Nil</td>
</tr>
<tr>
<td>5</td>
<td>Lagoon pump 1A and IB to be operated through sump level.</td>
<td>0.05</td>
<td>0.22</td>
<td>Nil</td>
</tr>
<tr>
<td>6</td>
<td>Avoid V-belt burning in mainly 110, 115 pumps of stream1</td>
<td>0.25</td>
<td>1.09</td>
<td>1</td>
</tr>
</tbody>
</table>

Cond.
<table>
<thead>
<tr>
<th>S. No.</th>
<th>Project Description</th>
<th>Annual Saving</th>
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</tr>
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<tbody>
<tr>
<td></td>
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<td>Rs (million)</td>
<td>(month)</td>
</tr>
<tr>
<td></td>
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</tr>
<tr>
<td>7</td>
<td>Streamlining of level switches in wherever VFD is installed</td>
<td>0.10</td>
<td>0.44</td>
<td>Nil</td>
</tr>
<tr>
<td>8</td>
<td>Operation of 303 A./B pump and cooling tower fans to be optimized.</td>
<td>0.10</td>
<td>0.44</td>
<td>Nil</td>
</tr>
<tr>
<td>9</td>
<td>Making 1205 VFD on line</td>
<td>0.05</td>
<td>0.22</td>
<td>Nil</td>
</tr>
<tr>
<td>10</td>
<td>Identify the lightly loaded sump pump and convert them to permanent star connection.</td>
<td>0.05</td>
<td>0.22</td>
<td>Nil</td>
</tr>
<tr>
<td>11</td>
<td>More photocell in lighting circuit, Relocation of light fittings.</td>
<td>0.05</td>
<td>0.22</td>
<td>Nil</td>
</tr>
<tr>
<td>12</td>
<td>Optimizing crusher conveyor area lighting</td>
<td>0.05</td>
<td>0.22</td>
<td>Nil</td>
</tr>
<tr>
<td></td>
<td>Total Saving</td>
<td>6.39</td>
<td>28.31</td>
<td>1</td>
</tr>
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</table>

### Energy Conservation Project (2009-10)

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Project Description</th>
<th>Annual Saving</th>
<th>Investment Made</th>
<th>Payback Period</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Units (million)</td>
<td>Rs (million)</td>
<td>(month)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Optimisation of Power consumption in Compressors of stream3</td>
<td>0.37</td>
<td>1.69</td>
<td>0.05</td>
</tr>
<tr>
<td>2</td>
<td>Modification of Present cooling Tower system in Stream3</td>
<td>0.11</td>
<td>0.52</td>
<td>0.1</td>
</tr>
<tr>
<td>3</td>
<td>Air audit of stream1 process and Instrument air.</td>
<td>0.30</td>
<td>1.37</td>
<td>0.6</td>
</tr>
<tr>
<td>4</td>
<td>Installation of Air compressor Exhaust Duct</td>
<td>0.03</td>
<td>0.13</td>
<td>0.1</td>
</tr>
<tr>
<td>5</td>
<td>Reduction of existing power consumption by maintaining BP throughput in Stream3</td>
<td>0.57</td>
<td>2.59</td>
<td>NIL</td>
</tr>
<tr>
<td>6</td>
<td>Installation of VFD in Tailing 3rd battery</td>
<td>0.08</td>
<td>0.37</td>
<td>0.5</td>
</tr>
</tbody>
</table>

Cond..
### Energy Conservation Project (2009-10)

<table>
<thead>
<tr>
<th>S. No</th>
<th>Project Description</th>
<th>Annual Saving</th>
<th>Investment Made Rs (million)</th>
<th>Payback (month)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Units (million)</td>
<td>Rs (million)</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Optimisation of air in flotation cells to reduce Power in Stream3</td>
<td>0.11</td>
<td>0.50</td>
<td>NIL 0</td>
</tr>
<tr>
<td>8</td>
<td>Optimisation of 1st stage and 2nd stage cyclone feed pumps to reduce pump power in stream3</td>
<td>0.12</td>
<td>0.55</td>
<td>NIL 0</td>
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<tr>
<td>9</td>
<td>Reduction of power by avoiding double running of pumps in stream3</td>
<td>0.15</td>
<td>0.68</td>
<td>NIL 0</td>
</tr>
<tr>
<td>10</td>
<td>Reduction in Running of Spillage Pumps to reduce power consumption in stream3</td>
<td>0.10</td>
<td>0.46</td>
<td>NIL 0</td>
</tr>
<tr>
<td>11</td>
<td>Energy audit for stream 1,2 &amp; 3</td>
<td>0.50</td>
<td>2.28</td>
<td>0.4 1</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>2.45</td>
<td>11.13</td>
<td>1.75</td>
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### Energy Conservation Project (2010-11)

<table>
<thead>
<tr>
<th>S. No</th>
<th>Project Description</th>
<th>Annual Saving</th>
<th>Investment Rs (million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>VFD in lead Scavanger Concentrate Pump 1205 B (30 KW)</td>
<td>0.03</td>
<td>0.14</td>
</tr>
<tr>
<td>2</td>
<td>Star Delta converter in 1209 Lead III cleaner concentrate pump to save power</td>
<td>0.05</td>
<td>0.23</td>
</tr>
<tr>
<td>3</td>
<td>Running of One higher rating pump (110kw) instead of two pumps (90 Kw) in 1310 A/B</td>
<td>0.288</td>
<td>1.30</td>
</tr>
<tr>
<td>4</td>
<td>Installation of VFD in 25 Mtr thickener flocculant dosing pump to optimise running of pump.</td>
<td>0.006</td>
<td>0.03</td>
</tr>
<tr>
<td>5</td>
<td>Installation of VFD in 55 Mtr thickener flocculant dosing pump to optimise running of pump.</td>
<td>0.006</td>
<td>0.03</td>
</tr>
<tr>
<td>6</td>
<td>Optimisation of running hours of Sump Pump 1801</td>
<td>0.06</td>
<td>0.27</td>
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</tbody>
</table>
### Energy Conservation Project (2010-11)

<table>
<thead>
<tr>
<th>S. No</th>
<th>Project Description</th>
<th>Annual saving</th>
<th>Investment Rs ( million)</th>
<th>Anticipated (million)</th>
<th>Rs (million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Optimisation of running hours of Sump Pump 1803</td>
<td>0.05</td>
<td>0.23</td>
<td>Nil</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Replacement of Street light fitting by CFL</td>
<td>0.01</td>
<td>0.05</td>
<td>0.06</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Replacement of all Tube light fitting by T-5amps &amp; CFL</td>
<td>0.01</td>
<td>0.05</td>
<td>0.05</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Installation of Small Size Blower or HT VFD in blower motor in Stream 3</td>
<td>1.3</td>
<td>5.80</td>
<td>9.00</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Installation of Energy Saver in Filter Conveyor CV-11 of stream 3</td>
<td>0.025</td>
<td>0.11</td>
<td>0.20</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>1.82</strong></td>
<td><strong>8.20</strong></td>
<td><strong>9.92</strong></td>
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</tbody>
</table>

### Extent of Team Work

<table>
<thead>
<tr>
<th>Project Description</th>
<th>Source of Encon Idea</th>
<th>FY **</th>
<th>Extent of man-power involved **</th>
<th>Progress of implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modification of Present cooling Tower system in Stream 3</td>
<td>Middle Management</td>
<td>2009-10</td>
<td>Ameta, Sandeep Brar</td>
<td>Project Completed</td>
</tr>
<tr>
<td>Installation of Air compressor Exhaust Duct in Stream 3</td>
<td>Middle Management</td>
<td>2009-10</td>
<td>P. Durga Prasad, D. Pandiyar, Shishupal Kumar, Basar</td>
<td>Project Completed</td>
</tr>
<tr>
<td>Installation of VFD in Tailing 3rd battery, Stream 3</td>
<td>Middle Management</td>
<td>2009-10</td>
<td>Deepak Nandi, Hamesh</td>
<td>Project Completed</td>
</tr>
<tr>
<td>Optimisation of air in flotation cells to reduce Power in Stream 3</td>
<td>Middle Management</td>
<td>2009-10</td>
<td>A. S. Rao, Barani</td>
<td>Project Completed</td>
</tr>
<tr>
<td>Reduction of power by avoiding double running of pumps in stream 3</td>
<td>Middle Management</td>
<td>2009-10</td>
<td>M.K. Ghosh, A. S. Rao</td>
<td>Project Completed</td>
</tr>
<tr>
<td>Reduction in Running of Spillage Pumps to reduce power consumption in stream 3</td>
<td>Middle Management</td>
<td>2009-10</td>
<td>I. L. Jat Venkatachakam</td>
<td>Project Completed</td>
</tr>
<tr>
<td>Exploring possibility of eliminating pressing air (55 KW) in stream 3 with compromising the moisture content of lead and zinc concentrate</td>
<td>Middle Management</td>
<td>2008-09</td>
<td>Shishupal, Durga prasad, kuntal</td>
<td>Project Completed</td>
</tr>
<tr>
<td>New reclaim (canal) sump pump to be operated through level switches</td>
<td>Middle Management</td>
<td>2008-09</td>
<td>Moolchand, Kuntal, Nandi, Akhilesh</td>
<td>Project Completed</td>
</tr>
<tr>
<td>Avoid V belt burning in mainly 110, 115 sumps of stream 1</td>
<td>Middle Management</td>
<td>2008-09</td>
<td>N. Singh, Girish chandra, Dayal, Rastogi Manish</td>
<td>Project Completed</td>
</tr>
<tr>
<td>Streaming of level switches in wherever VFD is installed</td>
<td>Middle Management</td>
<td>2008-09</td>
<td>Deepak bakde</td>
<td>Project Completed</td>
</tr>
<tr>
<td>Identify the lightly loaded sump pump and convert them to permanent star connection</td>
<td>Middle Management</td>
<td>2008-09</td>
<td>Akhilesh</td>
<td>Project Completed</td>
</tr>
<tr>
<td>More photocell in lighting circuit, Relocation of light fittings.</td>
<td>Middle Management</td>
<td>2008-09</td>
<td>Rao, Baijai, Akhilesh</td>
<td>Project Completed</td>
</tr>
<tr>
<td>Water reclamation through open channel</td>
<td>Middle Management</td>
<td>2007-08</td>
<td>P.C. Shrimali</td>
<td>Project Completed</td>
</tr>
</tbody>
</table>
**Format for Project Registration**

**Water Conservation**

- **Evaporation Retardant Chemical**
  - Use of Water Evaporation Retardant Chemical to reduces the evaporation losses at tailing dam by 15-20% in summer season.

- **Waste Dump Plantation (New methodology)**
  - Sapling in gunny bag filled with pre-prepared mixture of topsoil, sand, manure, vermin compost, insecticides etc.

  - Resulted in significant reduction in water consumption and top soil conservation

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**Chemical Spray on Tailing Dam**

**Plantation on Waste Dump**
Source
- Mine Pit Water
- Run-off water from mine and waste dump area
- All spillages, overflows and other wash water
- Beneficiation Plant tailings
- Sewage Water
- Tailing Dam

Control Measures
- Mine water is pumped to reclaim water reservoir and gets recycled
- Waste dump is being made in 5 lifts of 20 m with final slope of 27°
- Garland Drains around the mine pit and dump for collection and reuse of run off water
- All spillages from the industrial area are collected recycle back to process.
- Beneficiation Plant tailings discharged in tailing dam, and supernatant water reclaimed and reused in plant.
- Treated sewage water is used for Plantation and Horticulture work, maintaining zero discharge.
- Clay lining at bottom of Tailing dam and LDPE lining on side embankment.
We are further contemplating major initiative towards sharing of important best practices amongst leading organisations to accelerate the pace of conservation. With this in view, we would like you to include in your presentation, the % breakup of time currently spent (average basis) of your senior executives in various functions, the break up of which may read like:

a) Technology Implementation - 8%
b) Manufacturing excellence - 10%
c) Materials Management - 7%
d) Marketing Coordination activities - 5%
e) Analysing Competitors Profile - 2%
f) Quality Management - 8%
g) .......... 
h) .......... 
i) Energy Conservation Measures - %