18th National Award for Excellence in Energy Management – 2017

Asia’s 1st ISO-50001 certified Smelter
Core Purpose
“Vedanta is a globally diversified natural resources company with low cost operations. We empower our people to drive excellence and innovation to create value for our stakeholders. We demonstrate world-class standards of governance, safety, sustainability & social responsibility”
VEDANTA LIMITED, JHARSUGUDA

5 LTPA Aluminium Smelter

12.5 LTPA Aluminium Smelter

1215 MW CPP

2400 MW IPP
MAKING OF ALUMINIUM

100%
Pot Room:
- GP – 320 Prebake Technology
- No. of lines – 2
- No. of pots in each line – 304
- Pot amperage – 328 kA
- Design Capacity – 0.5 MTPA

Carbon:
- GAP – 2 Paste plants
- Bake Oven – 4 Bake furnaces.
- Anode Rodding Plant

Cast House
- Ingot Casting Mill – 3 Lines
- Wire Rod Mill – 2 Lines
- Billet Casting Line – 1 Line
**PRODUCT MIX**

### Ingot Casting Machine
- **Technology**
  - BEFASA, Spain
- **Plant Capacity**
  - 450 KTPA
- **Product Destination**
  - Apar Industries Ltd.
  - Jindal Aluminium Limited.
  - STX, Daechang, Dreample (Korea)
  - Southern Aluminum (China), etc

### Wire Rod Mill
- **Technology**
  - SOUTHWIRE, USA
  - Properzi, Italy.
- **Plant Capacity**
  - 120 KTPA
- **Product Destination**
  - Polycab Wires Pvt. Ltd.
  - Havell’s India Ltd
  - Nepal Wires (Nepal)
  - Etsec (Kenya), etc

### Billet Casting Machine
- **Technology**
  - WAGSTAFF, USA
- **Plant Capacity**
  - 120 KTPA
- **Product Destination**
  - Century Extrusions Limited
  - Alom Extrusions Limited (Turkey)
  - Hyundai Aluminum (Vietnam)
  - Wespeco (South Africa), etc
THANKS CII

You taught us to share & improve together
DC Energy consumption = $2.98 \times \text{Volts/pot}$

Current Efficiency

Focus is on DC energy reduction

Conservation: It doesn't cost. It saves
IF … THEN

1 tonne of Aluminium needs ~13500 kwh

WHY ALUMINIUM?
ENERGY CONSUMPTION TRENDS

SPECIFIC AC CONSUMPTION (kWh/MT)

2013-14: 13819
2014-15: 13807
2015-16: 13939
2016-17: 13877
Target 17-18: 13595

Potline-1 operated at reduced current of 250KA from Feb to May’16 due to abnormal transformers failure.

SPECIFIC ENERGY CONSUMPTION IN GJ/MT

2013-14: 53.56
2014-15: 53.34
2015-16: 53.84
2016-17: 53.9
Target 17-18: 52.8

SPECIFIC FUEL CONSUMPTION (Kg/MT)

2013-14: 53
2014-15: 48
2015-16: 47
2016-17: 47
Target 2017-18: 45

Koshish karne walon ki haar nahi hoti
## ENCON PROJECTS (Last 3 Yrs)

### Intellect Investment Projects

<table>
<thead>
<tr>
<th>Category</th>
<th>No of ENCON projects</th>
<th>Energy Savings (MkWh)</th>
<th>Energy Savings (MKcal of fuel)</th>
<th>Saving in Million Rs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC</td>
<td>2</td>
<td>2.3</td>
<td>-</td>
<td>6</td>
</tr>
<tr>
<td>Auxiliary</td>
<td>90</td>
<td>20</td>
<td>-</td>
<td>49</td>
</tr>
<tr>
<td>Fuel</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>92</strong></td>
<td><strong>22.3</strong></td>
<td>-</td>
<td><strong>55</strong></td>
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</tbody>
</table>

### Investment Projects

<table>
<thead>
<tr>
<th>Category</th>
<th>No of ENCON projects</th>
<th>Energy Savings (MkWh)</th>
<th>Energy Savings (MKcal of fuel)</th>
<th>Saving in Million Rs.</th>
<th>Investment in Million Rs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC</td>
<td>6</td>
<td>37</td>
<td>-</td>
<td>92</td>
<td>14</td>
</tr>
<tr>
<td>Auxiliary</td>
<td>24</td>
<td>9</td>
<td>-</td>
<td>21</td>
<td>22</td>
</tr>
<tr>
<td>Fuel</td>
<td>1</td>
<td>-</td>
<td>17062</td>
<td>61</td>
<td>15</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>31</strong></td>
<td><strong>46</strong></td>
<td><strong>17062</strong></td>
<td><strong>174</strong></td>
<td><strong>51</strong></td>
</tr>
</tbody>
</table>
## MAJOR ENERGY SAVING PROJECTS

<table>
<thead>
<tr>
<th>Sl.No</th>
<th>Project description</th>
<th>Energy saving in MkWh/Annum</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dead Pot voltage reduction</td>
<td>13.8</td>
</tr>
<tr>
<td>2</td>
<td>Implementation of 100% graphitized cathode</td>
<td>8.3 &gt; &gt; &gt; 360</td>
</tr>
<tr>
<td>3</td>
<td>Improvement in rectifier conversion efficiency</td>
<td>2.3 &gt; &gt; &gt; 7.2</td>
</tr>
<tr>
<td>4</td>
<td>Reduction in HTM Heater Power consumption</td>
<td>1.8</td>
</tr>
</tbody>
</table>
Today’s Wastage Is Tomorrow’s Shortage
INNOVATION - DEAD POT REDUCTION

- Instead of stopping pots after failure we have condition based planned cut out.
- 30% reduction in TAT and reduced average cut out voltage loss.
- Number of dead pots reduced from 25 to 4.
- Improved practices in disconnecting and reconnecting of pots to reduce voltage drop.
- Voltage of Dead Pots /day – 1.23 mV

Energy Conservation: 13.8 MWh/ Annum

No of Dead Pot- 25 No.
Voltage of Dead Pots /day – 6.6 mV
Power Consumption Dead Pot/Day- 47563 KWH
Power Consumption in KWH/MT- 37

No of Dead Pot- 4 No.
Voltage of Dead Pots /day – 1.23 mV
Power Consumption Dead Pot/Day- 9641 KWH
Power Consumption in KWH/MT- 7
INNOVATION - 100 % GRAPHITIZED CATHODES

Power saved is power produced
- Replaced 30% graphitic cathode by 100% graphitized cathode.
- Cathode resistance dropped from 25 to 15 micro-ohm mtr.
- DC power consumption reduced from 13635 to 12958 Kwh/MT.
- Current efficiency improved from 93% to 95%.

Energy Conservation: 8.3 >>> 360 MkWh/Annun
RECTIFIER CONVERSION EFFICIENCY

- Rectifier transformers are used in converting AC power to DC power for electrolytic process
- Conversion loss reduced from 1.7% to 1.6%
- DC power saving of 13.3kWh/MT
- Noise level reduced considerably
- Scheduled overhauling plan made (5 years)

Total energy saving – 2.3 MkWh/Annum >> > 7.2 Mkwh/Annum
ANODE MAKING

COKE

FINE COKE 0.8 - 3 mm

MEDIUM COKE 3 - 6 mm

COARSE COKE 6 - 12 mm

BALL MILL PRODUCT 0 - 0.8 mm

FINE BUTT 0 - 3 mm

COARSE BUTT 3 - 12 mm

GREEN SCRAP 0 - 12 mm

CRUSHING & SCREENING

Pitch to KNEADER

Pitch dosing pump

HTM Heater

High Temperature HTM Oil to Pitch line

KNEADER

COOLER

VIBRO COMPACTOR

ANODE

ANODE COOLING TUNNEL

STORAGE AREA

Opportunities are everywhere
HTM HEATER- SIX SIGMA PROJECT

- HTM Heaters use significant energy in anode making.
- Rescheduling of maintenance activities from fortnightly to monthly.
- Heating was stopped during the long monthly shutdown.
- Flow meter was installed to stop overheating of heater elements.
- Thyristor insulation and heat sink modified.
- Number to HTM heater tripping reduced from 68 to 30/month.
- Power consumption reduced from 68.83 KWH/MT to 63 KWH/MT.

Total energy saving – 1.8 MkWh/ANNUM
Yearly Saving : 1.86 MkWh/Annum
# MINOR ENERGY SAVING PROJECTS

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Project description</th>
<th>Yearly saving in Million KWh</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ETP power optimization</td>
<td>0.40</td>
</tr>
<tr>
<td>2</td>
<td>Sniff panel modification</td>
<td>0.15</td>
</tr>
<tr>
<td>3</td>
<td>CMW lighting load segregation</td>
<td>0.15</td>
</tr>
<tr>
<td>4</td>
<td>Eliminate Idle Running of GAP motors</td>
<td>0.12</td>
</tr>
<tr>
<td>5</td>
<td>Pump coating</td>
<td>0.12</td>
</tr>
<tr>
<td>6</td>
<td>Air slide fan running hour optimization</td>
<td>0.11</td>
</tr>
<tr>
<td>7</td>
<td>Auto Stop CWP5 after Billet casting cool down</td>
<td>0.10</td>
</tr>
<tr>
<td>8</td>
<td>New cooling tower running hour optimization</td>
<td>0.10</td>
</tr>
<tr>
<td>9</td>
<td>Heating ramp heater temperature set point optimization</td>
<td>0.09</td>
</tr>
<tr>
<td>10</td>
<td>LED lights installation</td>
<td>0.08</td>
</tr>
<tr>
<td>11</td>
<td>Day tank heater Set point Optimization</td>
<td>0.06</td>
</tr>
<tr>
<td>12</td>
<td>Process power optimization</td>
<td>0.06</td>
</tr>
<tr>
<td>13</td>
<td>Homo furnace MCC room partitioning for improvement in heaters thyristor cooling</td>
<td>0.05</td>
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<tr>
<td>14</td>
<td>Carbon area lighting automation</td>
<td>0.04</td>
</tr>
<tr>
<td>15</td>
<td>Light replacement 70W fitting to 36W tube light</td>
<td>0.03</td>
</tr>
<tr>
<td>16</td>
<td>Bulk storage heater temperature set point optimization</td>
<td>0.03</td>
</tr>
<tr>
<td>17</td>
<td>Slot cutter run time optimization</td>
<td>0.03</td>
</tr>
<tr>
<td>18</td>
<td>Cold well pump 02 impeller anti corrosion coating</td>
<td>0.03</td>
</tr>
<tr>
<td>19</td>
<td>Reduction of Running hours of Billet Cutting Machine Saw</td>
<td>0.02</td>
</tr>
<tr>
<td>20</td>
<td>Grouping M1 conveyor run time optimization.</td>
<td>0.02</td>
</tr>
<tr>
<td>21</td>
<td>Interlock in stacking crane to reduce idle time running of Air-conditioning uni</td>
<td>0.02</td>
</tr>
<tr>
<td>22</td>
<td>Installation of Occupancy Sensor</td>
<td>0.01</td>
</tr>
<tr>
<td>23</td>
<td>Timer installed in boundary light</td>
<td>0.01</td>
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<tr>
<td>24</td>
<td>Cooling tower cooling fan run time optimization</td>
<td>0.01</td>
</tr>
<tr>
<td>25</td>
<td>RO lighting circuit automation</td>
<td>0.01</td>
</tr>
<tr>
<td>26</td>
<td>RPH lighting load segregation</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td><strong>Total energy saving</strong></td>
<td><strong>1.86</strong></td>
</tr>
</tbody>
</table>

Each idea counts
CORROCOAT COATING OF CENTRIFUGAL PUMPS

- Corrocoat Epoxy resin glass coating was used
- Pump casing and impeller was coated with Corrocoat
- This reduced turbulent flow and increased laminar flow
- Friction of water flow reduced
- Energy consumption of pump was reduced

Before

After

Energy Conservation: 0.12 MkWh/ annum
REDUCTION OF RUNNING HOURS OF BILLET CUTTING MACHINE SAW

- Billet Cutting Saw (45kW) used to cut the billet.
- It takes around 10 seconds to position the billet.
- Cutting saw was rotating even when Billet was not in cutting position.
- A delay timer of 7 seconds was provided to start the saw rotation only when the billet is almost at its cut position.

| Annual Energy consumption before | 0.02 MkWh |
| Energy consumption after         | 0.006 MkWh |
| Energy tariff, Rs/ kWh           | 2.5       |

Energy Conservation: **0.11 MkWh/annum**
ETP POWER OPTIMIZATION

- In ETP there are 3 units with the capacity of 100m³/hr.
- ETP cleans the effluent water before RO treatment.
- Water turbidity varies with seasons and hence filter blockage.
- We implemented automatic back wash cleaning instead of time based cleaning
- Significant reduction in unwanted cleaning.

Energy Conservation: 0.4 MkWh/ annum

There is always scope for improvement
SNIFF PANEL MODIFICATION

- While Billet casting one extra pump (Cold well pump#5) 160kW need to be run.
- As pump house is in remote area there would be a ideal time of 2.5 hours after completion of the casting.
- Eliminated Idle running time of 45 min by providing local control in the billet area.

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Energy consumption before</td>
<td>0.80 MkWh</td>
</tr>
<tr>
<td>Energy consumption after</td>
<td>0.76 MkWh</td>
</tr>
<tr>
<td>Energy tariff, Rs/ kWh</td>
<td>2.5</td>
</tr>
</tbody>
</table>

Energy Conservation: **0.04 MkWh/ annum**
In CMW store, provision of Master switch was missing.
Due to which many lights used to run for 24 hrs.
No proper nomenclature of MCBs.
Master switch for every feeder is provided so that user will switch ON/OFF as per requirements
Also automation of internal lighting circuit done for energy saving.

Glimpses of action taken :-

Energy Conservation: 0.15 MkWh/ annum
ENCON EFFORTS – A NOTCH UP

Energy Audit by CII

Clamp Drop 2011

Fuse Technology 2012

EnMS Implemented

Slotted Anode 2013

ISO 50001 Certified
ENCON award from BEE and CII

Cathode & HFO 2014

ENCON award from BEE, CII & GMEA

HFO & Conversion Efficiency 2015

FICCI audit
M&V audit-PAT
NECA -2nd Prize

Russian Gov. Award-Best Energy Efficient project realized abroad

Technology up gradation in potline for energy reduction 2016

Energy Management Insight award

Make energy conservation a worldwide motivation.
ENERGY MANAGEMENT

“Neither a Campaign, Nor an Initiative- Its our Habit & Culture”
ENERGY MANAGEMENT SYSTEM (ISO-50001)

- Energy Policy
- Energy Audit, Corrective & Preventive action
- Monitoring, Measurement Analysis & Review
- Objective, Targets & Action Plan
- EnPI & Sub-EnPI
- Energy Review
- Opportunity List

1st Smelter in Asia ISO-50001 certified
REVIEW STRUCTURE

Formation of Energy Cell

APEX Committee

CORE Committee

COORDINATING Committee

SGA Team

“Bottom to Top Approach”
ENERGY POLICY & OBJECTIVES
(2016-2017)

ENERGY POLICY & OBJECTIVES

ENMS OBJECTIVES

- Reduce DC Energy Consumption
- Reduce Auxiliary Energy Consumption
- Reduce HFO Consumption
- Reduce Diesel Consumption

Energy Policy

The Aluminium Smelter Plant-1 of Vedanta Limited-Jharsuguda, a leading player in its sector, strives to build world class capabilities in every facet of its business operations and affirms its commitment to:

- Continual improvement in energy performance by providing necessary resourced and information required to achieve energy management objectives and targets.

- Ensure compliance of all necessary and applicable legal and other requirements related to organization’s use, consumption and efficiency.

- Incorporate energy efficient designs, equipment and process in all the future projects.

- Purchase of energy-efficient products on merit basis as per life cycle costing.

- Create awareness towards energy conservation in the organization.

Date: 1st Dec’2015

Dayanidhi Behera
Head Aluminium Operation
Vedanta Limited, Jharsuguda
**EnMS & IMS OBJECTIVES**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>System</th>
<th>Linkage to Policy/Plant Level Objective</th>
<th>Objective/Target Titles</th>
<th>UOM</th>
<th>Baseline</th>
<th>Target</th>
<th>Timeframe</th>
<th>Prime Responsibility</th>
<th>Reference Management Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>EnMS</td>
<td>Continual Improvement</td>
<td>To reduce pot DC energy consumption</td>
<td>KWH/MT</td>
<td>13760</td>
<td>13087</td>
<td>March 17</td>
<td>Energy manager/MR</td>
<td>EnMS/MRJ/EnMP.001</td>
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<tr>
<td>2</td>
<td>EnMS</td>
<td>Continual Improvement</td>
<td>To reduce Auxiliary Energy Consumption</td>
<td>KWH/MT</td>
<td>415</td>
<td>388</td>
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<td>EnMS/MRJ/EnMP.002</td>
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<tr>
<td>3</td>
<td>EnMS</td>
<td>Continual Improvement</td>
<td>To reduce HFO consumption.</td>
<td>Kg/MT of anode</td>
<td>46.3</td>
<td>43.5</td>
<td>March 17</td>
<td>Energy manager/MR</td>
<td>EnMS/MRJ/EnMP.003</td>
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<td>4</td>
<td>EnMS</td>
<td>Continual Improvement</td>
<td>To reduce Diesel consumption.</td>
<td>Ltr/MT</td>
<td>2.87</td>
<td>2.65</td>
<td>March 17</td>
<td>Energy manager/MR</td>
<td>EnMS/MRJ/EnMP.004</td>
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</table>

**YEAR: 2016-17**

**REVIEW PERIODICITY: Monthly**

**SYSTEM: MRJ**

**PLANT OBJECTIVES & TARGETS**

**DATE: 01.04.2016**

Prepared By: IMS Coordinator  Reviewed By: Quality Coordinator  Approved by: MR

**UOM – Unit of Measurement**
GREEN SUPPLY CHAIN AND BEST PRACTICES

E-DMS DOCUMENT CONTROL & APPROVAL

ENERGY EFFICIENT PROCUREMENT

E-CER (CAPEX PROJECT) ENERGY IMPACT ASSESSMENT

MES ONLINE FLASH REPORT

“Automation leads to Perfection”
ENERGY MONITORING & REPORTS

Energy Management SCADA

<table>
<thead>
<tr>
<th>Parameters &amp; Monitoring Frequency</th>
<th></th>
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<tbody>
<tr>
<td>High Energy Consumers</td>
<td>Daily</td>
</tr>
<tr>
<td>Fuel Consumption</td>
<td>Daily</td>
</tr>
<tr>
<td>Compressed Air Consumption</td>
<td>Daily</td>
</tr>
<tr>
<td>Water Consumption</td>
<td>Daily</td>
</tr>
</tbody>
</table>

SEC Report to Plant Head

Section Wise Report to Energy Managers

Daily reports to HODs

“Monitor to Control”
### Corrective Action

**RCA for identified Deviation**

<table>
<thead>
<tr>
<th>PHENOMENON ANALYSIS FORM : EnMS Deviation</th>
<th>Ref no: Deviation</th>
<th>Record No: ENMR-01/17</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identified Deviation: periodically review and update documents as necessary.</td>
<td>PLANT No 3100</td>
<td></td>
</tr>
</tbody>
</table>

**FILE REF: EnMS/IA/IA**  
**NC No: 3**

**PLANT No: 3100**  
**DATE: 22.05.2017**

**START DATE: 18.06.2017**  
**START TIME: 10:30 am**  
**STOP TIME: 01:30 pm**

**Standard Clause:** 4.5.5a

**PLANT No: 3100**  
**DATE: 22.05.2017**

**START DATE: 18.06.2017**  
**START TIME: 10:30 am**  
**STOP TIME: 01:30 pm**  
**Standard Clause:** 4.5.5a

**Determined Root Cause:** Loop sheet was not uploaded in DMS.

**Objective Evidence Observed:**  
SOP linkage with Operating criteria was not evidenced.

**Why:**  
Operating criteria like dry mis temperature, preheater to be revised as per new changes

**FOLLOWING PREVENTIVE & CORRECTIVE ACTIONS TO BE TAKEN IN FUTURE TO AVOID BREAKDOWN (To be written by APPROACH LEADER / In charge after consulting others who are either affected or contribute to analysis):**

**ACTION PLAN**  
Schedule made for every fifteen days once for checking all SOP & SMP.  
**01.07.2017**  
Completed

**REMARKS OF RESIDENT ENGINEER FOR FINAL CLOSURE:**

1. Approval for reasons of NC: Awareness

---

**Engineer:** G Gopikrishnan  
**Head-Operations:** Prakash R

**Team:** G Gopikrishnan, Alif Zishan, Soumya Kant Lenka, Amit Kunal, Rajesh Tiwary, Soumya Tripaty, Siddharth patnaik.
ENCON INITIATIVES

“If not now, WHEN?, If not you, WHO?”
## ENCON PROJECTS

<table>
<thead>
<tr>
<th>Sl.no</th>
<th>Title of Project</th>
<th>Year</th>
<th>Estimated Annual Savings, MkWh</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Revamping of homogenising furnace and upgradation of insulation</td>
<td>2017-18</td>
<td>3.577</td>
</tr>
<tr>
<td>2</td>
<td>Pot controller and lining design upgradation to improve specific DC energy consumption</td>
<td>2017-18</td>
<td>324</td>
</tr>
<tr>
<td>3</td>
<td>VFD installation for pumps and fans</td>
<td>2017-18</td>
<td>15.4</td>
</tr>
<tr>
<td>4</td>
<td>Conversion of Metal halide street lights to LED street lights</td>
<td>2017-18</td>
<td>0.55</td>
</tr>
<tr>
<td>5</td>
<td>Energy efficient coating on pumps</td>
<td>2017-18</td>
<td>0.29</td>
</tr>
<tr>
<td>6</td>
<td>Implementation of energy efficient lubricant</td>
<td>2017-18</td>
<td>NA</td>
</tr>
<tr>
<td>7</td>
<td>Interconnection hot water line with make up water line to switch off filter feed pump in casthouse</td>
<td>2017-18</td>
<td>0.482</td>
</tr>
<tr>
<td>8</td>
<td>Current efficiency improvement in pots to reduce specific DC energy consumption</td>
<td>2017-18</td>
<td>101</td>
</tr>
<tr>
<td>9</td>
<td>Use of graphite particle instead of resistor coke</td>
<td>2017-18</td>
<td>1.65</td>
</tr>
<tr>
<td>10</td>
<td>Solar Water heater for guest house</td>
<td>2017-18</td>
<td>0.12</td>
</tr>
<tr>
<td>11</td>
<td>Bio gas plant for interim canteen</td>
<td>2017-18</td>
<td>1.64</td>
</tr>
</tbody>
</table>
PEOPLE INVOLVEMENT

Energy Dash board on Shop floor

Energy discussion in daily War-room

Energy awareness in Tool Box Talk.

Awards & Recognition for Energy initiatives

“We value every small contribution”
## ENERGY CONSERVATION WITH TQM

<table>
<thead>
<tr>
<th>2016-17</th>
<th>NOS.</th>
<th>SAVING</th>
<th>INVESTMENT</th>
<th>NOS. OF PEOPLE INVOLVED</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>POWER (Million Units/Annum)</td>
<td>COST (Rs.in Million)</td>
<td>(Rs. In Million)</td>
</tr>
<tr>
<td>SIX SIGMA</td>
<td>2</td>
<td>3.11</td>
<td>8.1</td>
<td>0</td>
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<tr>
<td>QC</td>
<td>3</td>
<td>14.01</td>
<td>36.42</td>
<td>12.6</td>
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<td>KAIZEN</td>
<td>34</td>
<td>1.74</td>
<td>4.54</td>
<td>1.71</td>
</tr>
</tbody>
</table>

Conserve to Preserve
ENVIRONMENTAL PROJECTS & INITIATIVES

Air Pollution Management
- De-dusting units along with bag filters
- Introduction of Electro Static Precipitator (ESP)
- Installation of CAAQMS for continuous air quality monitoring

Water Pollution Management
- Online waste water monitoring system
- Storm water guard pond

Real time monitoring of ambient air

UF & RO Plant
**Water Conservation**
- Treatment and recycling of effluent water
- Principle of “Zero” effluent water discharge
- Upgrading ETP with Ultra-filtration & Reverse Osmosis for maximum water recycling.
- Storm water guard pond for management of storm water.
- Utilization of CPP waste water for Ash Handling plant.
- Recycling of Ash pond water for using in ash handling plant

**Rain Water Harvesting**
- A study on Rain Water Harvesting has been conducted by Andhra University and the report has been submitted to CGWA / OSPCB for their technical suggestion.
- Approval received from CGWA. Implementation of rain water harvesting structure will be done by FY 2018-19.
“Each one Plant one” taken on world Environment Day in which all employees & contractors have planted one tree across the location

Environment Incident Management System

Waste Management Systems under Sustainability Framework

Rehabilitation of Ash filled area by plantation

Green Jharsuguda Project – in PPP mode 100750 saplings at Behrapat, Lohrabudh & Banjari village
Efforts towards GHG emission reduction:

- GHG calculation done by M/s KPMG
- Shuttle service started to optimize light vehicle movement.
- 100% Alumina transportation through rail traffic.
- 100% Finished goods transportation by rake

<table>
<thead>
<tr>
<th>Year</th>
<th>Scope 1 emissions CO₂e (MT)</th>
<th>Scope 2 emissions CO₂e (MT)</th>
<th>Scope 3 emissions CO₂e (MT)</th>
<th>CO₂e MT</th>
<th>Mitigation Total Reduction in emission intensity since baseline year study CO₂e (MT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012 - 13</td>
<td>16330076</td>
<td>398</td>
<td>Not determined</td>
<td>16,330,474</td>
<td>Baseline Year</td>
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<td>2013 - 14</td>
<td>15948488</td>
<td>2,607</td>
<td>207,040</td>
<td>16,158,135</td>
<td>172,339</td>
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<td>2014 - 15</td>
<td>8673537</td>
<td>1,697</td>
<td>323,278</td>
<td>8,998,512</td>
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<td>2015 - 16</td>
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<td>3,99,815</td>
<td>1,55,44,560</td>
<td>6,13,575</td>
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</tbody>
</table>

*Increase in last 2 years is due to ramp-up of pots in Smelter-2
Harnessing Solar Energy

- Solar Cell & LED Lighting
- Solar Water Evaporator
- Eco Ventilators

Energy Saving 5000 Units/Annum

RENEWABLE ENERGY SOURCES
## UTILISATION OF WASTE

<table>
<thead>
<tr>
<th>Sl No.</th>
<th>Initiatives Taken</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Co-Incineration of Contaminated Carbon Dust and Anode Butts in CPP</td>
</tr>
<tr>
<td>2</td>
<td>Incineration of used Bag Filters in Baking Furnaces</td>
</tr>
<tr>
<td>3</td>
<td>Regulated consumption of Contaminated Alumina</td>
</tr>
<tr>
<td>4</td>
<td>Recycling of waste of Ramming Paste in Carbon Plant</td>
</tr>
<tr>
<td>5</td>
<td>Recycling of broken Cathodes in Carbon Plant</td>
</tr>
<tr>
<td>6</td>
<td>Recycling of Refractory Waste</td>
</tr>
<tr>
<td>7</td>
<td>Recycling of used steel stub pins in cast iron</td>
</tr>
<tr>
<td>8</td>
<td>Recycling of used steel collector bars</td>
</tr>
<tr>
<td>9</td>
<td>Recycling of effluent water for gardening</td>
</tr>
<tr>
<td>10</td>
<td>Rejected Anode butt utilization</td>
</tr>
</tbody>
</table>

*17% of hazardous waste are recycled inside the plant*
Cherish the earth through energy conservation.
One measurement is worth a thousand expert opinions.
Adoption of New technology of Cell lining (12650 Kwh/MT)

Cathode Modification Of Electrolysis Cells

Up-gradation of Pot Control & Feeding System

HFO SCADA level-2 upgradation

MV drive for FTP ID Fan

Today’s best is not tomorrow’s best
AWARDS & RECOGNITIONS

Energy Conservation Category

- National Award for the “Most Energy Efficient unit in Aluminium sector” from honorable President of India.
- “Russian Award “ for the “Best foreign project in energy efficiency” from Russian govt.
- Recognized as “Excellent Energy Efficient Unit” at 16th National Award for “Excellence in Energy Management” organized by CII.

Sustainable Performance Category

- CPP has won 16th National Award For Excellent Energy Efficient Unit-2015 By CII.
- International Green Apple Award for reduction in GHG emission by introduction of slotted anodes for Smelter-I.
- Silver Category IMEA Award by Frost & Sullivan.
- Engineering Excellence Award 2013 by Engineering Watch for best innovation and engineering Marvel.
- "Challengers Award - Mega Large Business" against "Frost & Sullivan’s Green Manufacturing Excellence Awards 2015".
- CSR award under two categories at “Odisha CSR conclave 2015”
- 16th Annual Genentech Environment Award 2015 in Gold category Sustainability Award
BE POSITIVE

POSITIVITY BRINGS CONFIDENCE

POSITIVITY BOOSTS CREATIVITY
Let us fly together for a greener tomorrow....