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| 1 | ID: 56 | Title of measure | Sector: Iron & Steel Industry |
| 2 | Survey Year: 2007 | Introduction of burners in preheat- zone in furnace 1 & 2 in Rail and Structural Mill | Technology: Burners |
| 3 | Name of the Company | : Bhilai Steel Plant, Seel Authority of India Limited, Chattisgarh, INDIA | |
| 4 | Agency that executed the project | : In-house | |
| 5 | Year of Implementation | : 2006-07 | |
| 6 | <p>Unit Profile: Bhilai Steel Plant, a unit of Steel Authority of India Limited is a public sector undertaking and was conceived under Indo-USSR Treaty. The plant is located at the central position of India, which is one of the major iron belt of India. Bhilai Steel Plant produces wide range of products. This includes Rails, Wire Rods, Plates and Merchant products. Bhilai steel plant registered sales turnover of US\$ 3.38 billion in the year 2006-07.</p> | | |
| 7 | <p>Description of Energy Conservation Measure:- The in-house team, with the help of RDCIS, Ranchi, introduced the side burners in the Furnace. 1 & 2 of Rail and Structural Mill. This measure has improved the heat distribution inside the furnace and there by Furnace productivity was improved. The Sp. Heat consumption was reduced by 10 Mcal/T (6000 Gcal/Year).</p> | | |
| 8 | <p>Picture Before Modification</p>  | | <p>Picture After Modification</p>  |
| 9 | Total investment : | Negligible | |
| 10 | First year energy cost savings : | 67,500 US\$ | |
| 11 | First year additional savings beyond energy (i.e. water, raw materials etc.): | Nil | |
| 12 | Annual gas consumption before, thousands of m ³ | 195,000 | |
| 13 | Annual gas consumption after, thousands of m ³ | 192,000 | |
| 14 | First year gas savings, thousands of m ³ | 3,000 | |
| 15 | First year tons of CO ₂ mitigated | 8,358 | |
| 16 | Assumed sustainability, years | 10 | |
| 17 | Expected tons of CO₂ mitigated throughout life cycle | 83,580 | |

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|----|---|---|--|
| 1 | ID: 57 | Title of measure | Sector: Iron & Steel Industry |
| 2 | Survey Year: 2007 | Installation of 40 kVA energy savers at Pump House | Technology: Energy Saver (Energy Efficient Transformer) |
| 3 | Name of the Company | : Rashtriya Ispat Nigam Limited, Visakhapatnam, INDIA | |
| 4 | Agency that executed the project | : In-house | |
| 5 | Year of Implementation | : 2006-07 | |
| 6 | <p>Unit Profile: Rashtriya Ispat Nigam Limited is the corporate entity of Vishakhapatnam steel plant. The plant has a capacity to produce 2.656 Mt of saleable steel of which 2.410 Mt is finished steel. Visakhapatnam steel plant is among the premier steel mills in India earning revenue of US\$ 1.36 billion. The commitment to energy conservation has reflected in the energy policy of RINL where in it is committed to reduce specific energy consumption by 1% per year up to 2010AD.</p> | | |
| 7 | <p>Description of Energy Conservation Measure:- There are 40 Nos. of Street Light Fitting of HPSV 400 watts for illuminating the Pump House 11, 16 & 18. 40 kVA energy savers were installed in above places. There is provision to change the supply voltage. Accordingly, each light fitting will get 230 V AC from 6 PM to 11:30 PM and afterwards the supply will come down to 194 V. Installation of above system reduced electricity consumption by 20%. The load current reduced from 30A to 22A with installation of Energy saver at PH 11 and 40 Amps to 26Amps at PH-18.</p> | | |
| 8 | <p>Rashtriya Ispat Nigam</p>  | <p>Picture After Modification</p>  | |
| 9 | Total investment : | | Not known |
| 10 | First year energy cost savings : | | 950 US\$ |
| 11 | First year additional savings beyond energy (i.e. water, raw materials etc.): | | Nil |
| 12 | Annual electricity consumption before, | MWh | 76 |
| 13 | Annual electricity consumption after, | MWh | 61 |
| 14 | First year electricity savings, | MWh | 15 |
| 15 | First year tons of CO ₂ mitigated | | 15 |
| 16 | Assumed sustainability, years | | 10 |
| 17 | Expected tons of CO₂ mitigated throughout life cycle | | 150 |

| 1 | ID: 58 | Title of measure | Sector: Iron & Steel Industry | | | | | | | | |
|---------|--|--|--|------|--|---------|--------|---------|-------|---------|-----|
| 2 | Survey Year: 2007 | Modification of the contact clamps | Technology: Contact Clamps | | | | | | | | |
| 3 | Name of the Company | : Manganese Ore (India) Limited, Ferro Manganese Plant, Balaghat Mines, Madhya Pradesh, INDIA | | | | | | | | | |
| 4 | Agency that executed the project | : M/s Metsa Engg., Kolkata | | | | | | | | | |
| 5 | Year of Implementation | : 2006-07 | | | | | | | | | |
| 6 | <p>Unit Profile: Manganese ore(India) Limited is one of the largest Manganese ore producing company in India as well as all over world. MOIL produces almost 55% total production of High grade Manganese ore produced in India. MOIL operates a 10000 TPA capacity Ferro-Manganese plant at Balaghat (Madhya Pradesh), producing 78% grade of High Carbon Ferro Manganese. The annual sales turnover of the unit in 2006-07 was reported US\$ 9.92 million.</p> | | | | | | | | | | |
| 7 | <p>Description of Energy Conservation Measure:- There were frequent breakdown of the plant due to failure of contact clamps provided for holding of electrode and giving power to the electrode. By means of Quality Circle the design of contact clamps has been changed as below. The breakdown details contact clamps for last three years are as follows</p> <table border="1"> <thead> <tr> <th>Year</th> <th>Breakdown due to failure of contact clamp in Hrs</th> </tr> </thead> <tbody> <tr> <td>2004-05</td> <td>300.50</td> </tr> <tr> <td>2005-06</td> <td>44.00</td> </tr> <tr> <td>2006-07</td> <td>Nil</td> </tr> </tbody> </table> <p>Failure of contact clamp causes complete breakdown of plant. It requires preheating of raw material which is the wastage of electricity. The savings due to reduction in downtime</p> <p>Savings = Breakdown time x KW per hour /1000000 In 2006-07 in Lac KWH = $44 \times 3800 / 1000000$ = 0.167 million kWh</p> | | | Year | Breakdown due to failure of contact clamp in Hrs | 2004-05 | 300.50 | 2005-06 | 44.00 | 2006-07 | Nil |
| Year | Breakdown due to failure of contact clamp in Hrs | | | | | | | | | | |
| 2004-05 | 300.50 | | | | | | | | | | |
| 2005-06 | 44.00 | | | | | | | | | | |
| 2006-07 | Nil | | | | | | | | | | |
| 8 | Picture Before Modification | Picture After Modification | | | | | | | | | |
| |  |  | | | | | | | | | |
| 9 | Total investment : | 1,500 US\$ | | | | | | | | | |
| 10 | First year energy cost savings : | 16,700 US\$ | | | | | | | | | |
| 11 | First year additional savings beyond energy (i.e. water, raw materials etc.): | Nil | | | | | | | | | |
| 12 | Annual electricity consumption before, MWh | — | | | | | | | | | |
| 13 | Annual electricity consumption after, MWh | — | | | | | | | | | |
| 14 | First year electricity savings, MWh | 167 | | | | | | | | | |
| 15 | First year tons of CO ₂ mitigated | 167 | | | | | | | | | |
| 16 | Assumed sustainability, years | 10 | | | | | | | | | |
| 17 | Expected tons of CO₂ mitigated throughout life cycle | 1,670 | | | | | | | | | |

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| 1 | ID: 59 | Title of measure | Sector: Iron & Steel Industry |
| 2 | Survey Year: 2007 | Replacement of existing glass reinforced fan blades by Fiber Glass reinforced plastic Fans | Technology: FRP Fan Blades |
| 3 | Name of the Company | : Rashtiya Ispat Nigam Limited, Visakhapatnam, INDIA | |
| 4 | Agency that executed the project | : In-house | |
| 5 | Year of Implementation | : 2006-07 | |
| 6 | <p>Unit Profile: Rashtriya Ispat Nigam Limited is the corporate entity of Vishakhapatnam steel plant. The plant has a capacity to produce 2.656 Mt of saleable steel of which 2.410 Mt is finished steel. Visakhapatnam steel plant is among the premier steel mills in India earning revenue of US\$ 1.36 billion. The commitment to energy conservation has reflected in the energy policy of RINL where in it is committed to reduce specific energy consumption by 1% per year up to 2010AD.</p> | | |
| 7 | <p>Description of Energy Conservation Measure:- The Pump house –4 of the unit meets water requirements of captive power plants. The Cooling Tower-16 is operated by cooling tower fan which are driven by 16 kW motors. The effectiveness of cooling tower is less due to the inherent nature of glass reinforced blades due to its high weight. The torque requirements are very high. Existing glass reinforced fan blades are replaced with Fiber Resistant Plastic fan blades. About 19 fans were replaced with Fiber Glass reinforced plastic Fans blades. The air velocity improved from 6.5 to 6.9 m/sec and operating current reduced from 100 Amps to 95 Amps. Above activity resulted in reduction of motor load and reduced electricity consumption.</p> | | |
| 8 | <p>Picture Before Modification</p>  | | <p>Picture After Modification</p>  |
| 9 | Total investment : | Not known | |
| 10 | First year energy cost savings : | 166,425 US\$ | |
| 11 | First year additional savings beyond energy (i.e. water, raw materials etc.): | Nil | |
| 12 | Annual electricity consumption before, | MWh | 10,982 |
| 13 | Annual electricity consumption after, | MWh | 8,319 |
| 14 | First year electricity savings, | MWh | 2,663 |
| 15 | First year tons of CO ₂ mitigated | 2,663 | |
| 16 | Assumed sustainability, years | 10 | |
| 17 | Expected tons of CO₂ mitigated throughout life cycle | 26,630 | |



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|----|---|--|---|
| 1 | ID: 60 | Title of measure | Sector: Iron & Steel Industry |
| 2 | Survey Year: 2007 | Door & Door Framr Regulation In Batteries of Coke Oven | Technology: Process control |
| 3 | Name of the Company | : Rourkela Steel Plant, Seel Authority of India Limited, Chattisgarh, INDIA | |
| 4 | Agency that executed the project | : In-house | |
| 5 | Year of Implementation | : 2006-07 | |
| 6 | <p>Unit Profile: Rourkela Steel Plant (RSP) a unit of Steel Authority of India Limited (SAIL) was started in late fifties in collaborations with leading Steel makers from the Federal Republic of Germany. Rourkela Steel Plant produces a wide variety at special purpose Steels. The steel plates are used in ship building and high pressure vessels, Silicon Steel in electrical industries, corrugated Galvanized sheets for roofing, pipes for the oil and gas industries, Tin plates for packaging industries etc.</p> | | |
| 7 | <p>Description of Energy Conservation Measure:- The in-house team took up the activity for insertion of ceramic fibre to seal the gap between door and door frame of each oven of Coke Ovens, after every pushing on round the clock basis. The same team is also straightening the knife edge of the door after each pushing so that the door can seat properly.</p> | | |
| 8 | <p>Picture Before Modification</p>  | | <p>Picture After Modification</p>  |
| 9 | Total investment : | Negligible | |
| 10 | First year energy cost savings : | 67,500 US\$ | |
| 11 | First year additional savings beyond energy (i.e. water, raw materials etc.): | Nil | |
| 12 | Annual gas consumption before, thousands of m ³ | -- | |
| 13 | Annual gas consumption after, thousands of m ³ | -- | |
| 14 | First year gas savings, thousands of m ³ | 8,760 | |
| 15 | First year tons of CO ₂ mitigated | 24,405 | |
| 16 | Assumed sustainability, years | 10 | |
| 17 | Expected tons of CO₂ mitigated throughout life cycle | 244,050 | |

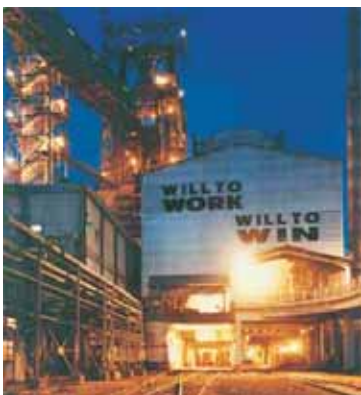

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| 1 | ID: 61 | Title of measure | Sector: Iron & Steel Industry |
| 2 | Survey Year: 2007 | Recycling of Tar sludge in to coke ovens | Technology: Coke Ovens |
| 3 | Name of the Company | : Rashtiya Ispat Nigam Limited, Visakhapatnam, Andhra Pradesh, INDIA | |
| 4 | Agency that executed the project | : In-house | |
| 5 | Year of Implementation | : 2006-07 | |
| 6 | Unit Profile: | <p>Rashtriya Ispat Nigam Limited is the corporate entity of Vishakhapatnam steel plant. The plant has a capacity to produce 2.656 Mt of saleable steel of which 2.410 Mt is finished steel. Visakhapatnam steel plant is among the premier steel mills in India earning revenue of US\$ 1.36 billion. The commitment to energy conservation has reflected in the energy policy of RINL where in it is committed to reduce specific energy consumption by 1% per year up to 2010 AD.</p> | |
| 7 | Description of Energy Conservation Measure:- | <p>Coking coal after selective crushing and proper blending is subjected to destructive deistillation (heating in the absence of air) in the Coke Ovens. After heating for nearly a period of 16-18 hours at a temperature of about 1100°C, coke is obtained and is used as a fuel as well as reducing agent in the Blast Furnace. During Coke making process, volatile matter present in the coal becomes coke oven gas. While cooling coke oven gas, tar present in the gas is condensed in hydraulic main, Primary Gas Cooler & Electro Static Precipitator. Tar separated in Decanters is called tar sludge. In tar storage tank, sludge settles down and deposited at the bottom. Every year the sludge is cleaned from the storage tank. The tar sludge was dumped beyond tar plant boundary, which is causing land degradation. Since it contains carbon, it can be used in coke oven along with coal charge. Tar sludge is dumped near Yard-2 conveyor. The Yard-2 conveyor charges coal into coke oven. A connection was made to Yard-2 conveyor with inclined conveyor. Tar sludge is charged to the inclined conveyor, which feeds to the yard – 2 conveyor carrying coal. About 1734 tons of Tar sludge is recycled in to coke oven batteries and replaced Coking coal to the extent of 1734 tons.</p> | |
| 8 |  | |  <p style="text-align: center;">Coke Ovens</p> |



| | | |
|----|---|---------------|
| 9 | Total investment : | - |
| 10 | First year energy cost savings : | 10,000 US\$ |
| 11 | First year additional savings beyond energy (i.e. water, raw materials etc.): | Nil |
| 12 | Annual coal consumption before, tons | - |
| 13 | Annual coal consumption after, tons | - |
| 14 | First year coal savings, tons | 1,734 |
| 15 | First year tons of CO ₂ mitigated | 2,462 |
| 16 | Assumed sustainability, years | 10 |
| 17 | Expected tons of CO₂ mitigated throughout life cycle | 24,620 |

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|----|--|--|--|
| 1 | ID: 62 | Title of measure | Sector: Iron & Steel Industry |
| 2 | Survey Year: 2007 | Installation of VFD's for Shell cooling Tower pumps and Return water pumps | Technology: Variable Frequency Drives |
| 3 | Name of the Company | : Sesa Industries Limited, Panjim, Goa, INDIA | |
| 4 | Agency that executed the project | : In-house | |
| 5 | Year of Implementation | : 2006-07 | |
| 6 | <p>Unit Profile: Sesa Industries Limited commenced operations in 1994 and is engaged in the manufacture and sale of Pig Iron. The Pig Iron Plant at Amona has two Mini blast furnaces with working volume of 173 M³ each. Annual production is 250,000 tons of Pig Iron and 60,000 tons of slag which is dried to 2% moisture and sold for use in the cement industry. The annual turnover of the company in 2006-07 is US\$ 95 million.</p> | | |
| 7 | <p>Description of Energy Conservation Measure:- The in-house team had already installed the variable frequency drives for Boiler ID fan & Glendon ID fan. Encouraged by significant energy saving achieved, the unit has installed VFD's for its main cooling tower pumps in the month of April 2006. After installation of the VFD the average power consumed by cooling pump reduced by approx 33%.</p> | | |
| 8 | Blast Furnace at Sesa Industries | Picture After Modification | |
| |  |  | |
| 9 | Total investment : | | 30,000 US\$ |
| 10 | First year energy cost savings : | | 34,100 US\$ |
| 11 | First year additional savings beyond energy (i.e. water, raw materials etc.): | | Nil |
| 12 | Annual electricity consumption before, | MWh | 2,352 |
| 13 | Annual electricity consumption after, | MWh | 1,680 |
| 14 | First year electricity savings, | MWh | 671 |
| 15 | First year tons of CO ₂ mitigated | | 671 |
| 16 | Assumed sustainability, years | | 10 |
| 17 | Expected tons of CO₂ mitigated throughout life cycle | | 6,710 |

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|----|--|---|---|
| 1 | ID: 63 | Title of measure | Sector: Iron & Steel Industry |
| 2 | Survey Year: 2007 | Reduction of fuel consumption in Sinter Ignition furnace | Technology: Contact Clamps |
| 3 | Name of the Company | : Rashtiya Ispat Nigam Limited, Visakhapatnam, Andhra Pradesh, INDIA | |
| 4 | Agency that executed the project | : In-house | |
| 5 | Year of Implementation | : 2006-07 | |
| 6 | <p>Unit Profile: Rashtriya Ispat Nigam Limited is the corporate entity of Vishakhapatnam steel plant. The plant has a capacity to produce 2.656 Mt of saleable steel of which 2.410 Mt is finished steel. Visakhapatnam steel plant is among the premier steel mills in India earning revenue of US\$ 1.36 billion. The commitment to energy conservation has reflected in the energy policy of RINL where in it is committed to reduce specific energy consumption by 1% per year up to 2010 AD.</p> | | |
| 7 | <p>Description of Energy Conservation Measure:- Sintering is a process in which heat is produced by combustion of coke breeze, which is a moving bed of fine sized materials such as iron ore dust, sludge etc so as to agglomerate the loose particles into a compact porous mass(called sinter) for use in blast furnace as raw material for iron making. Sinter Ignition furnace uses mixed gas for burning of agglomerate. In earlier modification, the working zone length of ignition furnace was reduced to 50% and accordingly 10 out of 20 burners were blanked. All the six window boxes below the furnace were throttled in order to control the pressure in the working zone. However, the pressure control was poor due to the negative influence of the idle zone on the working zone, as there was no partition wall between these two zones. The in-house team studied this problem and the idle zone was provided with additional air supply lines. These are from the existing air supply fan to the furnace. As a result of filling of the vacuum /empty space in the idle zone of furnace, the pressure control of the firing/working zone has improved and temperature control also became very smooth. In addition to this, wind boxes 4,5&6 were fully opened for the purpose of sintering. As a result of improved control over furnace atmosphere and reduced false air influence in fuel combustion, the fuel consumption reduced. The specific heat consumption reduced from 34 Mcal/t to 32 Mcal/t during the year.</p> | | |
| 8 | <p>Picture Before Modification</p>  | | <p>Picture After Modification</p>  |
| 9 | Total investment : | - | |
| 10 | First year energy cost savings : | 121,675 US\$ | |
| 11 | First year additional savings beyond energy (i.e. water, raw materials etc.): | Nil | |
| 12 | Annual gas consumption before, thousands of m ³ | 96,900 | |
| 13 | Annual gas consumption after, thousands of m ³ | 91,200 | |
| 14 | First year gas savings, thousands of m ³ | 5,700 | |
| 15 | First year tons of CO ₂ mitigated | 15,880 | |
| 16 | Assumed sustainability, years | 10 | |
| 17 | Expected tons of CO₂ mitigated throughout life cycle | 158,800 | |

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|----|---|---|---|
| 1 | ID: 64 | Title of measure | Sector: Iron & Steel Industry |
| 2 | Survey Year: 2007 | Power saving in Oxygen Plant by reducing the delivery pressure | Technology: Control Systems |
| 3 | Name of the Company | : Tata Steel Limited, Jamshedpur, Jharkhand, INDIA | |
| 4 | Agency that executed the project | : In-house | |
| 5 | Year of Implementation | : 2006-07 | |
| 6 | <p>Unit Profile: Established in 1907, Tata Steel is Asia's first and India's largest private sector steel company. Tata Steel is among the lowest cost producers of steel in the world. It has its captive raw material resources and the state-of-the-art 5 MTPA (million tonne per annum) plant at Jamshedpur, in Jharkhand State. Tata Steel has recently included in its fold NatSteel, Asia (2 MTPA) and Millennium Steel (now Tata Steel Thailand) (1.7 MTPA) creating a manufacturing network in eight markets in South East Asia and Pacific rim countries. Soon the Jamshedpur plant will expand its capacity from 5 MTPA to 7 MTPA by 2008.</p> | | |
| 7 | <p>Description of Energy Conservation Measure:- Oxygen is supplied for Iron & Steel making through pipeline network. One of these is high pressure network and is operating at 32 kg/sqcm .The other is a low pressure network operating at 6 kg/sqcm. For steel making high pressure oxygen is required whereas for Blast furnaces, the requirement of oxygen is at 6 kg/sqcm as the oxygen is injected in the cold blast main of the blast furnaces. Oxygen being supplied from the in-house oxygen plant to G Blast furnace was being supplied at high pressure through the pipeline network inside the plant and just before the injection point, the pressure was reduced to 6 kg/sqcm through Pressure Reducing Station. The requirement of G Blast furnace oxygen was such that it matched the 2 x 275 TPD oxygen plant capacity hence the oxygen supply network was modified and air compressors of 2 x 275 TPD oxygen plant made to operate at a pressure of 16kg/sqcm in place of 32 kg/sqcm. Thus by reducing the supply pressure, power saving of 6 kWh/ ton of oxygen was achieved.</p> | | |
| 8 | <p>Picture Before Modification</p>  | | <p>Picture After Modification</p>  |
| 9 | Total investment : | | 250,000 US\$ |
| 10 | First year energy cost savings : | | 37,675 US\$ |
| 11 | First year additional savings beyond energy (i.e. water, raw materials etc.): | | Nil |
| 12 | Annual electricity consumption before, | MWh | 78,694 |
| 13 | Annual electricity consumption after, | MWh | 78,092 |
| 14 | First year electricity savings, | MWh | 602 |
| 15 | First year tons of CO ₂ mitigated | | 6,020 |
| 16 | Assumed sustainability, years | | 10 |
| 17 | Expected tons of CO₂ mitigated throughout life cycle | | 6,020 |