

**SIGNIFICANT OPPORTUNITIES REGISTER - METALS MANUFACTURING**

Company Name	Public Report Year	Opportunity Description	Opportunity Category	Equipment type
Alcan Gove Pty Limited	2009	Monitoring and reporting - Provision of accurate and timely energy management data, particularly the end use of steam which is not currently reported (eg: digestion and evaporation steam energy). The aim of the opportunity is to identify and reduce inefficiencies resulting from poor information and subsequently improve decision making processes leading to improved energy efficiency. Progress update: an <b>online tool was developed for energy consumption monitoring and energy balance</b> (determining energy inputs, outputs and users around the Gove Site) optimisation. A model of the Gove plant has been developed on which various scenarios can be run to optimise plant operation. This includes an application for viewing and archiving plant data. During 2010, an analysis will be undertaken to determine the energy savings. These improvements have given a clearer understanding of energy losses and also the opportunities where significant energy savings can be made.	Improvement in energy measurement and monitoring	Own use
Alcan Gove Pty Limited	2009	<b>Steam Trap audit and repairs</b> - Closure and recovery of steam wastage through leaking and faulty steam trap system. Progress update: following on from the Steam Trap audit and using its report recommendations, routine maintenance is ongoing. There are currently about 50 steam traps remaining to be repaired. This work is expected to be completed by the end of 2010. During 2011, an investigation will be undertaken to determine the energy savings achieved.	Changes in maintenance practices	Boiler for steam
Alcan Gove Pty Limited	2009	<b>Digestion Heat Exchangers (HEX) heat transfer coefficient improvements</b> - Increase in heat transfer by improved scale removal and cleaning procedures in process heaters to replace the need for live steam. Progress update: trials of the chemical additive which helps to maintain high heat transfer in heat exchangers, by inhibiting scale build up, were successfully completed in 2009 along with improved cleaning schedules. Full implementation of the chemical additive will be completed in March 2010. Further investigations into steam temperatures have commenced. New equipment to improve process heating efficiency is to be ordered and will be installed by mid 2011. A review of the strategic path forward and impact (including inhibitor consumption, asset management and cleaning frequency optimum) will be done in July 2010.	Changes in maintenance practices	Boiler for steam
Alcoa Australian Holdings Pty Ltd	2009	During the original sites assessments a need was identified to develop <b>cross site based Energy Teams</b> along with organisation charts detailing responsibilities of the team members. The location team provide input from a range of expertise, various departments, and management levels helping to ensure opportunities are identified and assessed thoroughly. Processes were also implemented where projects are captured in specific site registers.	Changes in management systems	Own use
Alcoa Australian Holdings Pty Ltd	2009	Reduce Bakes gas consumption through <b>implementing radio communication system to allow monitoring and control</b> . The introduction of faster wireless communication increases the amount of data transfer between the gas feed control, "autofire" system and the firing frames, eliminating data transfer queuing. This essentially increases the control and ability to adjust gas consumption and other operating parameters.	Investment in new technologies or new configurations of technologies not used before	Other direct combustion thermal equipment
Alcoa Australian Holdings Pty Ltd	2009	At the Portland Smelter, an opportunity was identified, trialled and implemented involving <b>reducing the number of A398 scrubbing units online at a time</b> . This involved running of only 7 (N-1) A398 reactors in each bank of 8 (N=8) to provide the required level of fume extraction yet enable the conservation of energy. By maintaining the units to provide required performance levels sufficient extraction can be provided while using less energy.	Improvement in process control	Electric motors – fans
Alcoa Australia Rolled Products Pty Ltd	2009	Site - Meter installations. <b>Installing new electrical and gas meters</b> and routinely maintaining and calibrating meters in parts of both sites will improve the energy data captured and allow for improved accuracy in estimating energy saving opportunities. The installation of meters will be scheduled for 2010 and will allow Alcoa ARP to report energy data with a greater level of accuracy into the future and thereby ensure efficient manufacturing operations.	Improvement in energy measurement and monitoring	Own use
Alcoa Australia Rolled Products Pty Ltd	2009	Sheet Finishing - Coil Coating Line. Savings in energy consumption and greenhouse gas emission can be achieved by <b>adjusting instrumentation associated with the Coil Coating Line</b> and decreasing the Lower Explosive Limit (LEL). At present the full energy savings have not been directly quantified but Alcoa ARP recognizes the reduction in dilution air and heating requirements will contribute energy savings. The project is proposed for completion 2010.	Improvement in process control	Own use
Alcoa Australia Rolled Products Pty Ltd	2009	Shutting Down Ingot Casting Furnace DC3. Pt Henry melting and holding furnaces are old designs and do not have the ability to turn off when not needed. In low production volume situations, the furnace gas is reduced to "low fire" to keep remnant metal in the heel of the furnace in a molten state. This low fire state consumes considerable gas for no productive output. A <b>redesign of the production flow paths through the operations will reduce furnace demands</b> to a level where the furnaces associated with casting complex DC#3 can be shut down permanently, allowing all production requirements being supplied by casting complex DC#2. This redesign maximizes efficiencies for DC#2 and minimizes gas consumption. The project will be implemented Q1 2010.	Improvement in process control	Furnace
Alcoa Australia Rolled Products Pty Ltd	2008	Hot Rolling Mill - <b>Rebuild of Preheat furnace #3</b> . Preheat furnace #2 rebuild was completed in 2007 and significant energy savings were achieved. Preheat 3 has 10%+ energy loss per cycle due to the poor condition of the refractory, door opening frame and seal. Savings estimated at 4% of preheat energy input. The project is proposed for completion July 2010.	Investment in the same but more efficient technologies	Furnace
Alcoa of Australia	2008	<b>Cogeneration facility Condensate heat recovery</b> – joint activity with Alinta. Projected benefit from project – 0.2 GJ/t of alumina. Project is to use heat in condensate from steam generated by Cogen plant to warm boiler feed water. Status - Engineering completed. Funds approved. Construction planned for September 07 with commissioning by November 2007.	Investment in new technologies or new configurations of technologies not used before	Boiler for steam
Alcoa of Australia	2008	Installation of larger CRD heaters in Digestion at Pinjarra Projected benefit from project – 0.1 GJ/T. The plan is to <b>replace smaller heaters with larger more energy efficient ones</b> . Status – Preliminary engineering work being undertaken to firm up costs and potential benefits.	Investment in the same but more efficient technologies	Other direct combustion thermal equipment

Alcoa of Australia	2008	Installation of larger CRD heaters in Digestion at Wagerup. Projected benefit from project – 0.13 GJ/t. Project is to <b>replace old small heaters with larger more efficient ones</b> . Status – Preliminary engineering work undertaken – Capital allocation for 2008 approved.	Investment in the same but more efficient technologies	Other direct combustion thermal equipment
Alcoa of Australia	2008	Installation of new 25A vapour line at Kwinana. Projected benefit from project – 0.1 GJ/t. Project is <b>install an additional vapour line to the desilication tank to use the waste heat from digestion vapour</b> instead of rejecting it to the atmosphere. Status – Engineering progressing.	Investment in the same but more efficient technologies	Heat losses
Alcoa of Australia	2008	<b>New 35J causticiser heat exchanger installation</b> at Pinjarra Projected benefit of project is – 0.03 GJ/t. Project is to install a heat exchanger to indirectly heat caustic liquor in the causticisation plant and reduce the need for injecting steam. Status – Blitz to be raised	Investment in new technologies or new configurations of technologies not used before	Heat losses
Alcoa of Australia	2008	<b>Insulation to be fitted on thickeners</b> at Pinjarra Project benefit from project – 0.01 GJ/t. Project is to install insulation on the tanks to prevent heat loss and reduce energy required to keep the liquor hot. Status – Funds allocated through maintenance budget – Blitz to be raised.	Investment in new technologies or new configurations of technologies not used before	Heat losses
Alcoa of Australia	2008	<b>Insulation to be fitted on 35J Causticiser</b> at Wagerup. Project benefit from project – 0.01 GJ/t. Project is to install insulation on the tanks to prevent heat loss and reduce energy required to keep the liquor hot. Status – Funds allocated through maintenance budget – Blitz to be raised.	Investment in new technologies or new configurations of technologies not used before	Heat losses
Alcoa of Australia	2008	<b>Improved Heater cleaning</b> utilising new technology and equipment – best practice from the US. Allows heater tubes to be cleaned quickly and efficiently saving energy through better heat transfer. Project nearing completion.	Changes in maintenance practices	Heat losses
Alcoa of Australia	2008	<b>Investigate alternative heating units to replace existing diesel heaters</b> in Arundel Heavy Vehicle Workshop (UI) By converting existing diesel heater (4 units) to electric heater (6 units) could result in a saving of 348 GJ/day of use. Status – Investigation under way, though no budget or funds allocated at this point in time.	Investment in the same but more efficient technologies	Other direct combustion thermal equipment
Alcoa of Australia	2008	Investigate diesel burn rates higher than the average burn rate (>91.48 L/hr) for 730E haul trucks at Huntly (UI). <b>Ensuring diesel burn rates do not exceed the average (≤91.48 L/hr)</b> will save on average 20.4 L/hr at Huntly (over 5 haul trucks). Projected Benefit = 1416 GJ/yr. Status – Investigation underway by maintenance crew.	Improvement in process control	Road transport equipment
BHP Billiton Limited	2008	<b>Steam dump valve replacement</b> - Nickel West. Status: Implemented. Area: Power Station. The Kalgoorlie Nickel Smelter (KNS) generates part of its electrical load by two steam turbine generators from steam raised from the smelting off gasses. It was identified that two steam dump valves used to bypass the steam turbine generators and dump directly into the air cooled condensers were leaking large quantities of steam in their normally closed position. As a result this was reducing the amount of steam available for electrical generation. It has been calculated that savings of approximately 54 TJ can be realised annually.	Improvement in process control	Heat losses
BHP Billiton Limited	2008	<b>Alloy recovery from launder sands</b> – TEMCO. Status: Implemented. Area: Smelter. This project involves the recovery of alloy from waste sands. The sands are used in the process where alloy is removed from the furnaces. Recovering alloy from the sands has resulted in an energy saving of 37.7 TJ.	Improvement in process control	Furnace
BHP Billiton Limited	2009	<b>Waste Slag Recovery</b> – TEMCO. Status: Implemented. Area: Smelting. Waste slag produced by the Ladle process has a high Silicomanganese (SiMn) alloy content. The waste slag has been stockpiled on site. The slag is now being processed to recover the SiMn alloy. The recovered alloy will be remelted in the furnaces. This achieves a savings in electricity consumption per tonne of recovered alloy, equivalent to a total energy savings of 226 TJ per year. A related benefit of this project is the ability to dispose of 80,000 tonnes of clean slag following the removal of the valuable SiMn alloy content, hence creating a useful "by-product" that can be sold elsewhere.	Improvement in process control	Electrolytic processes
BHP Billiton Limited	2009	<b>Automation of Sootblower drains</b> - Worsley Alumina Status: Under Investigation Area: Powerhouse Operations Maintenance The objective of this project is to reduce the steam used to blowdown the soot built up in the boiler plant. A business improvement team has implemented automated alarming to ensure the steam to the soot blowdown is turned off once the blowdown cycle is complete. This has resulted in an energy reduction equivalent to 35 TJ per year. More trials are under way, to further reduce steam used.	Improvement in process control	Boiler for steam
BlueScope Steel Limited	2008	Coke making Port Kembla Steelworks. <b>Improved Coke Ovens Heating Efficiency</b> . The production of coke requires the use of fuel gases and electrical equipment to operate the coke ovens. It is proposed that the energy efficiency of the heating process could be improved for at least three coke ovens facilities. A fourth more modern facility may also have some incremental improvement possible. Using more highly developed computer models to control heating would provide fuel gas savings. Similarly improved automation and more efficient motors on fans would save electricity. If the proposed Steelworks co-generation plant is approved and built then the fuel gas saved at the coke ovens can then be utilised to generate electricity. The Steelworks co-generation plant is currently undergoing a feasibility assessment and is yet to be approved for implementation. Estimated Capital Cost: \$5.0 Million. Potential Energy Savings per annum: 295,650 GJ	Improvement in process control	Coke oven
BlueScope Steel Limited	2008	Electrical Improvements. Facilities for personnel based on site at the Coke Ovens were identified as an area where improvements could be made in energy efficiency. Current areas being investigated include <b>smart sensors on lights, turning off machines when not required and education programs</b> to ensure office and amenity energy use is minimised wherever possible. Estimated Capital Cost: \$315,000. Potential Energy Savings per annum: 15,873 GJ	Improvement in process control	Own use
BlueScope Steel Limited	2008	Coal Moisture. The feedstock to a coke ovens plant is a blended combination of coals. <b>Reducing the moisture content of the coal blend</b> may improve the quality of coke made at the Coke Ovens. This in turn allows the Blast Furnaces, which use the coke as a fuel, to increase productivity and decrease the energy intensity of producing iron. An investigation is underway to determine if coal drying is feasible with modifications to existing plant. Estimated Capital Cost: \$6 Million. Potential Energy Savings per annum: 274,499GJ	Improvement in process control	Blast furnace
BlueScope Steel Limited	2008	Iron making - Port Kembla Steelworks <b>Variable Speed Fan Drives</b> The sinter plant utilises a number of large fans powered by large electric motors. An investigation is underway into the feasibility of updating the existing electric drive motors to new variable speed motors. Rather than running the fans at a constant speed all of the time, their operation can then be optimised to save energy by reducing their speed when operations allow. Estimated Capital Cost: \$800,000. Potential Energy Savings per annum: 56,100 GJ	Investment in new technologies or new configurations of technologies not used before	Electric motors – variable speed drives
BlueScope Steel Limited	2008	Post Upgrade Project Improvements. Major upgrade work at the sinter plant is planned for 2009 as part of the Ore Preparation Upgrade project. On completion of the upgrade project a possibility may exist to further <b>improve the energy efficiency of the plant by modifying the depth of the sinter bed</b> that is fed through the plant. This would allow sinter to be produced at even lower energy intensity. Investigations are planned once the upgrade project is complete and new plant operating conditions are established to determine if this idea is technically feasible. Estimated Capital Cost: \$2.85 Million. Potential Energy Savings per annum: 267,000 GJ	Improvement in process control	Furnace

BlueScope Steel Limited	2008	<b>Sinter Plant Coke Breeze Size Improvement.</b> The Sinter Plant uses significant amounts of small coke particles (called breeze). By changing the crushing equipment, the breeze particle size distribution can be tightened to a narrower size distribution. This makes the sintering process more efficient and less energy is consumed as a result. Estimated Capital Cost: \$7 Million Potential Energy Savings per annum: 410,410 GJ	Improvement in process control	Furnace
BlueScope Steel Limited	2008	Cold Rolling Department at Springhill Works. <b>Variable Speed Drives on Coolant Pumps.</b> The current roll coolant pumps use standard constant speed electric motors. The pumps are currently required to run at full speed 100% of the time. When coolant is not required a bypass system is used. The use of variable speed electric motor drives on the pumps would save electricity by allowing the pumps to be slowed down when the mill is stopped and coolant is not required. The cost of installing the variable speed drives is approximately \$250,000. The savings in electricity are in the order of 3000 MWh per year. Estimated Capital Cost: \$250,000. Potential Energy Savings per annum: 10,832 GJ	Investment in new technologies or new configurations of technologies not used before	Electric motors – variable speed drives
BlueScope Steel Limited	2008	Hot Coils in Pickle Line. Currently the steel coils fed into the Pickle Line are typically at ambient temperature after cooling down from the precursor hot rolling process. It has been proposed that <b>with improvements in upstream logistics, feeding hot coils into the pickle line could be possible</b> The proposed coil temperature would be some 20-50 degrees Celsius above the current feed temperature. This would save steam that is currently required to heat to the process. The significant safety issue of handling the hot coils would need to be addressed before implementation could be considered. Estimated Capital Cost: \$100,000. Potential Energy Savings per annum: 8,500 GJ	Improvement in process control	Boiler for steam
BlueScope Steel Limited	2008	<b>Reduce Mill Fume Exhaust.</b> By reducing the flow-rate of fume exhaust from the Coupled Cold Mill Pickle Line, the mass of air that needs to be moved is reduced. The current 355kW electric motor on the exhaust fan could then be replaced with a significantly smaller motor. An investigation into how the reduction could be achieved and the impact of the reduced flow-rate is proposed. Estimated Capital Cost: \$100,000. Potential Energy Savings per annum: 2,709 GJ	Improvement in process control; Investment in the same but more efficient technologies	Electric motors – fans
BlueScope Steel Limited	2008	Western Port - Hot Strip Mill. <b>Integrated Furnace Temperature Model.</b> The project's focus is the development of an improved slab temperature model. The Hot Strip Mill uses a natural gas furnace to heat 12.5 metre long steel slabs weighing up to 30 tonnes to approximately 1275°C. These slabs are then hot rolled into coils approximately two kilometres in length with a minimum thickness of 1.6 millimetres. This improved model is expected to allow optimisation of slab temperature within the furnace, based on the products' manufacturing designs. This will enable optimisation of the furnace operation reducing energy consumption. Estimated Cost: \$550,000. Potential Energy Savings per annum: 144,000 GJ	Improvement in process control	Furnace
BlueScope Steel Limited	2008	<b>Evaluate Pump Configuration of Water Systems.</b> The objective of this study is to identify opportunities to more efficiently control pump cycle times and operation on the Hot Strip Mill water systems. Estimated cost-\$100,000. Potential Energy Saving per annum: 17,208 GJ	Improvement in process control	Electric motors – pumps
BlueScope Steel Limited	2008	<b>Compressed Air Usage.</b> This project will review the efficiency of the Hot Strip Mill compressed air systems. It will focus on elimination of leaks as well as the identification of opportunities to use more efficient equipment. Estimated cost: \$350,000. Potential Energy Savings per annum: 4,287 GJ	Changes in maintenance practices; Investment in the same but more efficient technologies	Electric motors – air compressors
BlueScope Steel Limited	2009	Steelmaking Port Kembla Steelworks <b>Increase Oxygen Top Bottom Blowing Availability at Steelmaking</b> The oxygen top bottom blowing (OTB) stirring system enables improved metallurgical results in the Basic Oxygen Steelmaking plant. Operation with OTB reduces alloy consumption and improves yield. It is proposed to improve the availability of the OTB system by optimising refractory tuyere life, and through improved operating and maintenance practices. Energy efficiency is increased as a result of an improved heat balance and reduced yield losses. Estimated Capital Cost: nil Potential Energy Savings per annum: 2,766 GJ	Improvement in process control	Other direct combustion thermal equipment
BlueScope Steel Limited	2009	Springhill Works Paint-line Incinerators – Natural Gas Savings No.3 Paint Line (CPL3) uses incinerators on each of its two ovens to destroy the volatile organic compounds generated by the paint curing process. These necessary environmental controls previously required more than half of the total natural gas consumed at CPL3. Using <b>variable pressure controls in the curing oven and a modified control system strategy</b> , the air volume entering the incinerator was reduced and the solvent load was increased. With a higher solvent concentration, the feed into the incinerator provides an additional energy source, saving 20% of the natural gas required to achieve the target incineration temperatures. Estimated Capital Cost: \$40,000 Potential Energy Savings per annum: 44,288 GJ	Improvement in process control	Oven
BlueScope Steel Limited	2009	<b>Operational Efficiency Improvements - Metallic Coating Line No 6 (MCL6)</b> The production of galvanised steel requires that input feed is of a certain cleanliness. Given the high quality and cleanliness of the input feed from the Western Port Cold Mill an opportunity exists to examine the potential closure of the MCL6 Cleaning Section. Should the closure of the cleaning section of MCL6 not affect the overall product quality significant energy savings would be achieved. It is likely that certain strip transport equipment will require modification to ensure accurate strip tension control continues to be achieved. A feasibility study is required to be undertaken to confirm the quality and tension control assumptions made in this initiative. Estimated Capital Cost: \$180,000 Potential Energy Savings per annum: 32,010 GJ	Improvement in process control	Own use
Bradken Limited	2008	Each Bradken steel foundry uses natural gas in heat treatment ovens and ladle heaters. The gas burners are relatively old and do not include <b>modern design recuperative burners or pulse firing control system</b> designs. Potential savings have been claimed to be up to 25% of gas use by the burner or oven. Capital cost is high and potential payback periods ranged from 3.0 years to 7.7 years. Retrofitting existing equipment can be very expensive.	Investment in new technologies or new configurations of technologies not used before	Oven
Bradken Limited	2009	Each Bradken steel foundry uses electricity to melt scrap steel to produce new castings. An international benchmark of 550 kWh/t of molten metal has been identified. A range of options has been identified to improve the various sites performances. Some facilities are already performing better than this benchmark. The options include <b>better operating practices, better furnace control systems and scrap metal preheating using natural gas.</b> Potential payback periods range from 0.2 years to 3.7 years depending upon the age and support equipment of the existing furnaces	Improvement in process control	Furnace
Bradken Limited	2009	Each Bradken steel foundry uses natural gas in ovens to heat treat steel to meet customer product quality requirements. An identified opportunity is to <b>upgrade oven insulation to reduce heat losses</b> from the oven walls and so increase gas burner efficiency. Potential savings vary from site to site depending upon gas use.	Investment in the same but more efficient technologies	Oven
Bradken Limited	2009	Each Bradken steel foundry uses natural gas burners to pre-heat ladles for handling molten metal. An identified opportunity is to <b>pre-heat the burner air using the hot exhaust gas.</b> This reduces the gas consumption to achieve the desired temperatures needed in that application. One facility has installed one of these units and the efficiency gains are being determined. Payback periods estimated by different consultants varied considerably.	Investment in new technologies or new configurations of technologies not used before	Other direct combustion thermal equipment

Bradken Limited	2009	Each Bradken site is reviewing practices for <b>turning off equipment when not in use</b> . In many situations the energy savings are minor. However, it does involve employees, increasing staff and employee awareness of energy conservation	<b>Changes in the staff operation of equipment</b>	<b>Own use</b>
Crane Group Limited	2008	<b>Compressed Air Use - Reduction of Air Pressure and sequencing compressors.</b> The current pressure setting for compressors is excessively high (100-115psi) resulting in increased leakage and compressors maintaining on load for excessive periods when air demand is not required. Reduction of each compressor's "Cut In" and "Cut Out" points to reduce the overall pressure and provide the better sequencing of compressors allows one standby compressor to be turned off, thereby eliminating its largely "off-load" consumption. Costs of implementation - \$1250. Expected energy saving is estimated at approximately 100MWhr p.a. Other Benefits: Expected - Reduction of wear on compressors with associated increase in working life.	<b>Improvement in process control</b>	<b>Electric motors – air compressors</b>
Crane Group Limited	2008	<b>Annealing Furnace - Reduction of Standby Losses during weekends.</b> An annealing furnace currently is in production mode for only 4 days per week. By reducing its operating temperature during "standby" periods and timing its return to operating temperature, its heat losses can be reduced by more than the cost of reheating it. Costs of implementation - \$2000. Expected energy saving is estimated at approximately 123MWhr p.a.	<b>Improvement in process control</b>	<b>Furnace</b>
Crane Group Limited	2009	Air Compressor use reduction - By <b>utilizing excess combustion air blower capacity to replace the existing compressed air cooling</b> of two gas burner units, it allowed the complete shutdown of all air compressors during non-production times. The energy savings from this opportunity are estimated at approximately 48,000 kWhr p.a.	<b>Improvement in process control</b>	<b>Electric motors – air compressors</b>
Crane Group Limited	2009	<b>Production Planning</b> - By improving the production planning processes for equipment not being used 24hrs/day, machine operation was converted from an "ad hoc" process to being run on a "campaign" basis. In doing so it allowed the equipment to be shutdown completely rather than merely "idled" awaiting the next run. The energy savings from this are estimated at approximately 150,000 kWhr p.a.	<b>Changes in management systems</b>	<b>Own use</b>
Crane Group Limited	2009	<b>Machine shutdowns</b> - Both the processes used to shutdown equipment when not used for production and the operator training in machine shutdown were improved so as to reduce non-production related energy demands. The energy saving from this are estimated at approximately 150,000kWhr p.a.	<b>Improvement in process control</b>	<b>Own use</b>
Crane Group Limited	2009	Cooling water pump - due to a change in process a major water cooling pump was no longer needed to deliver such a high flow rate and pressure as it was designed to produce. As a result, the unit was largely choked and operated very inefficiently. The replacement of the pump set with one that is sized for the current requirement resulted in a <b>reduction in motor size from 100kW to 22kW</b> , with a corresponding increase in efficiency. The energy savings from this are estimated at approximately 250,000 kWhr p.a.	<b>Investment in the same but more efficient technologies</b>	<b>Electric motors – pumps</b>
Delta Group Holdings Pty Ltd	2008	In the Zinc Casting Plant there are 21 heater lids on the 'Jumbo' ingot casting line. The heater lids cover the exposed zinc surface after the molten metal is poured into moulds. This prevents rapid freezing of the metal at the surface which causes cracks and surface deformation. Each of the heater lids has an 8kW element, and due to equipment design these element were on at all times. <b>Modifications to the equipment have been made so the elements can be switched off when this production line is not operational.</b> The total energy saving is 484MWh per year, equal to 503 tonnes of greenhouse gas emissions.	<b>Improvement in process control</b>	<b>Other direct combustion thermal equipment</b>
Delta Group Holdings Pty Ltd	2009	<b>Heat loss reduction in coil lines</b> Donhad is a manufacturer of forged steel grinding media, engineering forgings and a range of specialized fasteners for use in the mining and mineral processing industry. During the production of grinding media, steel bars are heated to approximately 1100°C using a series of induction heating coils. There are areas between coil boxes currently uncovered allowing heat to be lost due to radiation. Providing heat shielding in these areas will reduce the amount of heat lost to the atmosphere and reduce the amount of power required to heat the bar. Estimated Capital Cost : \$15,000 Potential Energy Saving per annum: 1,996 GJ	<b>Investment in new technologies or new configurations of technologies not used before</b>	<b>Heat losses</b>
Delta Group Holdings Pty Ltd	2009	<b>Improved insulation of heated process tanks</b> The hot dip galvanizing process requires a number of separate chemical pre-treatment processes to clean the steel prior to the application of the galvanized zinc coating. Some of these pre-treatment processes are carried out at elevated temperatures, with process solutions contained within processing tanks heated by natural gas using immersion heating technology. Improvements to the insulation of the exposed surfaces of these processing tanks will reduce the natural gas required to maintain solution temperatures, as well as provide additional benefits by reducing the associated steam emissions and water consumption. Estimated Capital Cost: \$18,000 Potential Energy Saving per annum: 1,712 GJ	<b>Investment in the same but more efficient technologies</b>	<b>Other direct combustion thermal equipment</b>
Delta Group Holdings Pty Ltd	2009	<b>Improved spin plant furnace operation.</b> Delta Galvanizing operates two separate galvanizing process areas at this site. There is a plant referred to as the "Structural Plant" which is used for the processing of large steel fabrications, and the "Spinning Plant" which is used to galvanize small steel items such as brackets, fasteners etc. Following chemical pre-treatment, steel items for galvanizing are immersed in a kettle of molten zinc operated and maintained by natural gas at temperatures between 450°C and 460°C in order to produce a zinc coating on the steel. There are both process based and investment based energy savings available with the operation of this furnace. Improvements are proposed to both internal and external insulation of the furnace, as well as to furnace controls to optimise the firing efficiency of the furnace. Estimated Capital Cost: \$32,000 Potential Energy Saving per annum: 2,574 GJ	<b>Investment in the same but more efficient technologies</b>	<b>Furnace</b>
Hydro Aluminium Kurri Kurri Pty Ltd	2008	<b>The usage of compressed air was reviewed</b> as part of the NSW Energy Savings Action Plan audit. The audit identified that there were energy and related GHG reduction opportunities in reviewing and repairing air leakages in areas that are not restricted by Health and Safety procedures. Phase 1 of the project identified electricity savings of 1,480,600 kWh pa and a GHG reduction of 1327 tonnes pa and was implemented in December 2007. There are further opportunities identified in the monitoring and control of compressed air usage, with a current project proposal to implement air metering to the production activities onsite.	<b>Changes in maintenance practices; Improvement in process control</b>	<b>Electric motors – air compressors</b>
Hydro Aluminium Kurri Kurri Pty Ltd	2008	The smelter technology on site is constantly being upgraded and a significant upgrade to Pot Line 1 was undertaken to <b>replace the pot feeding system of "side working" with a "point break" process.</b> The evaluation of the project identified a significant reduction in both energy and GHG emissions. The project was approved with a capital budget of \$29.3 million and post implementation reviews have identified annual energy savings of approx 111 TJ pa. In 2005 potline 1, PFC emissions totalled 733,300 tCO2e. This was reduced to 43,300 tCO2e for the fin year Jul 07 to Jun 08. This allowed Hydro to create NSW Large User Abatement Certificates for each year for the abatement of on-site industrial production-related greenhouse gas emissions not directly related to the consumption of electricity.	<b>Investment in new technologies or new configurations of technologies not used before</b>	<b>Other direct combustion thermal equipment</b>

Hydro Aluminium Kurri Kurri Pty Ltd	2009	<p><b>AMPS Management Process:</b> Hydro Aluminium has developed its own production system called AMPS (Aluminium Metal Production System) into the Kurri Kurri smelter management process.</p> <p>AMPS has 5 foundation principles:</p> <ul style="list-style-type: none"> <li>• Standardized Work Processes</li> <li>• Defined Customer Supplier Relationships</li> <li>• Optimized Flow</li> <li>• Dedicated Teams</li> <li>• Visible Leadership</li> </ul> <p>AMPS will continue to impact on all aspects of our business (HSE, environment, cost &amp; efficiency). It visualizes performance, promotes improvement from all levels and relies heavily on benchmarking with best practices of all Aluminium smelters across the globe.</p> <p>AMPS is about having people knowing what our business objectives are and engaging them in improving procedures, equipment or technology to either meet or surpass those objectives. For example, power and carbon consumption per kilogram of metal produced can be improved by implementing standard operating procedures, standardize the processes across the teams and achieve compliance to these standard operating procedures.</p>	Changes in management systems	Own use
Hydro Aluminium Kurri Kurri Pty Ltd	2009	<p><b>Current Efficiency Improvement</b> As part of our ongoing strategy to improve overall performance &amp; reduce waste, the Electrolysis Department implemented several continuous improvement &amp; capital projects during 2008/2009. Continuous improvement projects include anode effect duration reduction through changes to quenching pattern, introduction of AMPS &amp; critical process teams, change to Potline 1 burn-off rules to improve anode setting, current efficiency workshop &amp; brainstorming sessions, lower power start up curve, improved power addition on anode change &amp; individual cell voltage optimisation. Capital projects included the introduction of Butt Referencing to Potlines 2 &amp; 3 and the implementation of 200mm longitudinal slots to all anodes. The net result of these improvements saw an energy saving of 0.8% of energy consumption through improving the current efficiency of the plant.</p>	Improvement in process control; Investment in new technologies or new configurations of technologies not used before	Electrolytic processes
Hydro Aluminium Kurri Kurri Pty Ltd	2009	<p><b>Compressed Air Monitoring System</b> During 2008/2009, Hydro installed a compressed air monitoring system, which enables the main consumers of compressed air to monitor their consumption. The compressed air monitoring system also enables the smelter to monitor power consumption and other key compressors operating parameters. Information from this system is reviewed on a continuous basis by means of a SCADA system. Compressed air consumption is a KPI on the smelter weekly report and it is reviewed and actioned if consumption increases above the set target.</p>	Improvement in process control	Electric motors – air compressors
Metal Manufactures Limited	2009	<p>A completed energy efficiency project was to <b>upgrade the flame detection technology</b> on the preheat furnace at the extruder. The improvement resulted in greater operational control of the heating system, providing qa gas saving of 15%. Although the project was initially assessed in terms of energy efficiency opportunities, other benefits to the business, such as a reduction in downtime and maintenance costs, lead to a project payback of 1.1 years.</p>	Investment in the same but more efficient technologies	Furnace
Metal Manufactures Limited	2009	<p>The <b>use of Vortex burners in shaft furnaces</b> is aimed at creating a vortex (spiral) gas flow in the furnace allowing greater surface contact time and increasing the heat transfer rate. These burners require changes to the furnace shell and are installed at a furnace reline. Initial savings were quoted at up to 5% improved heating efficiency. Reports from furnace designers and users indicated that the quoted efficiencies were grossly exaggerated. This project will not be progressed.</p>	Investment in new technologies or new configurations of technologies not used before	Furnace
Metal Manufactures Limited	2009	<p><b>Increasing the height of the Shaft Furnace at the KCR</b> would allow longer residence time in the furnace and improved heating. With furnace shell potentially requiring replacement at the end of 2011, this would be the ideal time to implement this improvement. Investigations have commenced into the feasibility and costs involved. There is the potential for up to 5% improved heating efficiency</p>	Investment in the same but more efficient technologies	Furnace
Metal Manufactures Limited	2008	<p><b>Conversion of CBC induction furnace to gas:</b> By changing from an electric to gas fired holding furnace, energy consumption could be reduced from 1080 megawatt hours (3888GJ) of electricity to 2000 Gigajoules of energy from natural gas. The cost saving would be \$45,000 per annum in energy costs, based on predicted energy price increases and current production volumes. The payback period, based on energy savings alone, is greater than 4 years, however there are other benefits to the business that help justify this project. This opportunity is still under investigation.</p>	Investment in the same but more efficient technologies	Furnace
Metal Manufactures Limited	2008	<p>KCR Launderers. An opportunity has been implemented, involving <b>turning off a number of gas burners at the KCR without affecting the process or the quality of the melt</b>. Trials began in June 2008, with gas supplying burners at number 1 Launder being turned off. After a successful start up, gas supplying one of the two pour-pots was also turned off. This has resulted in a reduction in gas consumption from 0.23 GJ / tonne to 0.15 GJ / tonne.</p>	Improvement in process control	Other direct combustion thermal equipment
Metal Manufactures Limited	2008	<p><b>Modification for Loading Cathode into Shaft Furnace KCR</b>. An opportunity is under investigation to change how cathode is loaded into the shaft furnace. The cathode would be split from bundles into the individual sheets using a conveyor system, increasing the surface area and melting efficiency. This has the potential for a gas saving of 6% based on results at similar facilities.</p>	Improvement in process control	Electrolytic processes
Nyrstar Australia Pty Ltd	2008	<p><b>Energy Recovery from Waste Steam via installation of a Turbo Alternator</b>(Roast Department). Currently waste steam is being vented to the atmosphere, with no recovery of the contained energy. Installation of a 6.7 MW Turbo-alternator could generate electricity from the energy contained in the vented steam, offsetting purchased electricity and reducing boiler feed water use and additives consumption. This project is under investigation, implementation will require substantial capital investment and will be considered when business conditions permit. Estimated energy savings are 196,560 GJ per annum.</p>	Investment in new technologies or new configurations of technologies not used before	Boiler for steam
Nyrstar Australia Pty Ltd	2008	<p><b>Changing electrolysis cathode edge strip type</b> (Electrolysis Department). Zinc metal is produced by electrolytic deposition onto aluminum cathode plates. The cathode edge strips currently used do not last the service life of the cathode plate resulting in electrical short circuits, poorer quality zinc and increased potential for injuries through additional manual processing steps. These can be reduced by changing to 'Limpact' edge strips. This will improve energy efficiency in the Electrolysis. This project is under investigation. Estimated energy savings are 9,000 GJ per annum</p>	Investment in new technologies or new configurations of technologies not used before	Electrolytic processes
Nyrstar Australia Pty Ltd	2009	<p><b>Zinc recovery improvements</b> (implemented) Improving zinc metal recovery from concentrates purchased will increase the energy efficiency of zinc production. The extent of the improvement in specific energy consumption will be verified in the next reporting period. Potential energy saving = Improvement in specific energy consumption, amount yet to be verified.</p>	Improvement in process control	Electrolytic processes

Nyrstar Australia Pty Ltd	2009	<b>Improve monitoring of zinc dust consumption in purification</b> (implemented) Zinc dust is added in the electrolysis solution purification process. At times, zinc dust consumption can be in excess of process requirements due to incorrect calibration of the dust addition screw, poor accuracy of the on stream analyzer or operator error. Improved monitoring of zinc dust would minimise zinc dust usage and save energy related to zinc dust production. The verification of energy savings for this period will occur in the next reporting period. Potential energy saving = 9,000GJ/yr	Improvement in process control	Electrolytic processes
Nyrstar Australia Pty Ltd	2009	<b>Steam Injection in the Blast Furnace</b> (To Be Implemented) Injection of waste steam into the blast furnace has the potential to reduce the amount of coke required in the combustion process as well as improves the metal content of the resultant product. A trial program has been undertaken confirming that this opportunity is worthy of further investigation. Estimated energy savings are 80,000 GJ per annum, and could be as much as 115,000 GJ per annum.	Investment in new technologies or new configurations of technologies not used before	Blast furnace
Nyrstar Australia Pty Ltd	2009	<b>Tuning of Airflows to the Refining Pans</b> (Under Investigation) The Lead Refinery has up to 24 pans and 4 kettles heated with natural gas fired burners. Excess tempering air is being heated and then exhausted to atmosphere. Tuning of excess air rates in conjunction with heat recovery will reduce gas consumption. Estimated energy savings are 75,000 GJ per annum.	Improvement in process control	Other direct combustion thermal equipment
Nyrstar Australia Pty Ltd	2009	<b>Alternative Steam Supply for the Leach Plant</b> (Under Investigation) Better control of waste steam generated from the Slag Fuming Plant will allow the Leach Plant's steam supply to be met by the Slag Fuming Plant with top ups only from the Presha Boiler. This would reduce the Presha Boiler's load, reducing the boiler's fuel costs (natural gas) as well as reducing fugitive emissions from the boiler. Estimated energy savings are 41,000 GJ per annum.	Improvement in process control	Boiler for steam
OneSteel Limited	2009	<b>Reheat Furnace Optimisation</b> (Sydney Rolling Mill) A project was initiated at the start of 2009 to reduce the gas use per tonne of product through the reheat furnace to design level. This was initiated through the company's Six Sigma process, which uses defined tollgates and statistical methods to solve complex problems. The team working on the project have a set target for consumption of natural gas for each tonne of cold charged product that equates to a gas saving of approximately 10%. Work has been done to improve existing heating profiles within the furnace and to improve spacing of billets to achieve uniform heating through the charged billets. The secondary advantages to the project are increased throughput and a reduction in scale loss, thus improving yield. The project is due for completion in November 2009.	Improvement in process control	Furnace
OneSteel Limited	2009	<b>Reducing Electricity Consumption During Shutdown Periods</b> (Sydney Steel Mill/Newcastle Rod Mill) The economic downturn at the end of 2008 / start of 2009 resulted in reduced production at many OneSteel mills. A Six Sigma project was initiated to produce a standard framework for reducing electricity consumption during down periods. The initial work focused on the Newcastle Rod Mill and the Sydney Steel Mill as they already had good tracking of consumption to provide a reliable baseline. The framework developed started with engagement of the management team of the site. An audit was completed for each site during a shutdown period to identify opportunities, with an extensive shutdown checklist developed by the team and site representatives. The checklist is distributed at the start of each shutdown period, and the result for each shutdown is tracked using a visible LEAN Manufacturing process. A comparison of the 2008 and 2009 shutdowns for the Newcastle Rod mill has shown an average MWh reduction of 21 % for each shutdown period longer than 24 hours.	Changes in management systems	Own use
OneSteel Limited	2009	<b>Upgrade of Sub-Metering</b> (Laverton Steel Mill) A significant opportunity identified at Laverton Steel Mill was the limited extent of sub-metering. A project has now been initiated to install electricity and gas sub-meters that will allow accurate measurement of consumption by each major Department. This project is also investigating appropriate software that will enable energy usage data to be displayed in an effective manner. Expected energy savings of the first phase sub-meters are in the region of 11,300 GJ/yr. Improved metering will also allow for more accurate assessment and review of other energy efficiency opportunities. A portion of the first phase sub-meters are scheduled to be installed in the first half of 2010.	Improvement in energy measurement and monitoring	Own use
OneSteel Limited	2009	<b>Installation of Variable Speed Fans</b> (Waratah Steel Mill) At the OneSteel Waratah Steel Mill fume from the electric arc furnace is drawn through a fabric filter for cleaning using two 350kW fans. Previously these fans were often run with their flow-control dampers partially closed to avoid overloading the fan electric motors. A more energy efficient way to reduce flow, and therefore motor load, is the use of variable speed drives to slow the speed of the fans, and so a project was developed to install variable speed drives on the fans. This project was supported by the NSW Governments Climate Change Fund through a cash grant for 65% of the total project cost of \$262,000. The project was completed in February 2009.	Investment in new technologies or new configurations of technologies not used before	Electric motors – variable speed drives
Pechiney Consolidated Australia Pty Ltd	2009	Smelting Energy Reduction. The fundamental aluminium electrolysis process uses a large amount of electricity. <b>Close management of the electrolysis process</b> and the implementation of a number of projects involving close management and changing of operating parameters, in this area has further optimized energy savings in the electrolytic process. Savings of 312,000 GJ were realized compared to a business as usual approach	Improvement in process control	Electrolytic processes
Pechiney Consolidated Australia Pty Ltd	2009	<b>Compressed Air Energy.</b> Compressed air is used as a form of energy across the site for operating cylinders, dampers and alumina feeders. TAC operates nine large air compressors on a central reticulation system. A key project implemented in this area involved the review of the control system and savings of 28,000 GJ have been realized.	Improvement in process control	Electric motors – air compressors
Pechiney Consolidated Australia Pty Ltd	2009	<b>Natural Gas Reduction.</b> A number of processes at Tomago Aluminium use natural gas and opportunities identified have been implemented in this area. Key projects look at optimising natural gas usage. A gas reduction project was completed in the metal casting area furnaces that involved the tuning of the natural gas burners. This work has resulted in a saving of 3,000GJ	Improvement in process control	Furnace
Pechiney Consolidated Australia Pty Ltd	2009	A number of projects have been implemented in 2008-2009 that have delivered smaller savings. The projects have included <b>photocopier rationalisation, conversion of electric hot water systems to heat pump system and improved air conditioning timing</b> Whilst the energy savings are relatively small, the projects were completed to raise awareness of energy efficiencies with the workforce.	Improvement in process control; Investment in new technologies or new configurations of technologies not used before	Electric motors – HVAC and refrigeration equipment; Other electrical equipment - IT, communications, visual etc.
Queensland Alumina Limited	2008	Re-location of resources for both operations and maintenance to <b>improve cleaning efficiency</b> and availability of heat recovery equipment in digestion. Requires nil capital cost and minimal increase to operating cost for reduction in coal use. Currently being implemented and expect gains by the end of 2008.	Improvement in process control	Heat losses
Queensland Alumina Limited	2008	Capital to improve acid cleaning facilities that will allow <b>more efficient cleaning of heat recovery equipment in digestion.</b> Currently being implemented and expect gains by the end of 2008.	Changes in maintenance practices	Heat losses

Queensland Alumina Limited	2008	<b>Install additional Plate Heaters on boiler feed water to maximise use of waste steam</b> Currently being investigated and expect a decision by the end of 2008.	<b>Investment in new technologies or new configurations of technologies not used before</b>	<b>Boiler for steam</b>
Queensland Alumina Limited	2009	<b>Boiler Oil Reduction:</b> Plant testing has shown that the oil needed to maintain operational stability can be reduced by careful modification to burner configuration.	<b>Improvement in process control</b>	<b>Boiler for steam</b>
Queensland Alumina Limited	2009	<b>Calcination Combustion Control:</b> Refinements to the control system have been designed with the aim of reduced excess air whilst maintaining stability.	<b>Improvement in process control</b>	<b>Other direct combustion thermal equipment</b>
Queensland Alumina Limited	2009	<b>Precipitation Yield Stressing Program:</b> Process adjustments optimizing productivity throughout the Bayer circuit has allowed improved yield and consequently improved energy efficiency.	<b>Improvement in process control</b>	<b>Electrolytic processes</b>
Rio Tinto Limited	2009	Boyne Smelters Limited. S230 Machined anode bottom slots - Anode bottom slots improve performance by reducing electrical resistance caused by gas bubbles under the anode. An <b>alternative slot forming process will be tested</b> in the third quarter of 2009 in order to optimise future plant conversion. Progress update: This project was successfully implemented in 2009.	<b>Investment in research and development, testing and trialling</b>	<b>Electrolytic processes</b>
Rio Tinto Limited	2009	Boyne Smelters Limited. S230 anode bottom chamfers - The existing S230 anode has square bottom edges. During the life of an anode these edges burn away and the anode adopts a rounded shape, resulting in reduced process efficiency. The project scope is to provide <b>anodes with chamfered edges in order to improve the anode profile</b> . This will save gross carbon used on each anode and allow the anode to release bubbles more effectively during the first four days of operation. This will be investigated further in 2009. Progress update: Investigation of this project demonstrated its viability. Implementation commenced in 2009 and will continue in 2010.	<b>Investment in new technologies or new configurations of technologies not used before</b>	<b>Electrolytic processes</b>
Rio Tinto Limited	2009	Boyne Smelters Limited. <b>Improvements to compressed air systems</b> - This includes three related opportunities for the elimination of the unload operational mode, installation of a four inch cross-over valve and adjusting the control parameters on compressors to air lines one and two in order to reduce power consumption significantly. The current operating strategy for the three compressors is to operate two at full load with a third fluctuating to meet system demand. Controlling all three compressors below full load using the inlet guide vanes will avoid operation of any compressor in bypass mode. Progress update: Implementation of these projects has been successful and work is currently underway to quantify energy savings.	<b>Improvement in process control; Investment in new technologies or new configurations of technologies not used before</b>	<b>Electric motors – air compressors</b>
Rio Tinto Limited	2009	Boyne Smelters Limited. S230 Anode Slot Forming Trial - This project builds on the lessons learnt from modelling and trial work at Boyne Smelters that demonstrates the benefits of venting process generated gases from the underside of the anode. The subsequent <b>reduction in cell resistance improves energy efficiency</b> . A trial of an alternative slot forming process will be undertaken in 2010 that is expected to achieve energy efficiency gains at significantly lower cost.	<b>Investment in research and development, testing and trialling</b>	<b>Electrolytic processes</b>
Rio Tinto Limited	2009	Boyne Smelters Limited. <b>Optimisation of compressed air systems</b> - Following the success of three previous compressed air efficiency projects, four additional projects will be implemented in 2010. These improvements are: conduct an air leak reduction programme tiers one and two, implement control system improvements in the compressor house and improve load matching with the Gas Treatment Centre fans. These projects will also significantly improve the reliability of the compressed air system.	<b>Changes in maintenance practices; Improvement in process control</b>	<b>Electric motors – air compressors</b>
Rio Tinto Limited	2009	RTA Yarwun. Improve production throughput - <b>Improving process control and stability</b> should realise an efficiency improvement in the energy consumed per tonne of alumina refined. Progress update: Plant stability improved throughout 2009, resulting in record production at slightly below nameplate capacity. Specific energy usage improved by 1.1 per cent over 2008 usage. Further improvement is expected in 2010.	<b>Improvement in process control</b>	<b>Own use</b>
Rio Tinto Limited	2009	RTA Yarwun. <b>Hydrate bypass at calcination</b> - Decreasing the product mix of fully calcined alumina to alumina hydrate may reduce the refinery's energy consumption. Progress update: High level evaluation of this technology was completed in 2009. Preliminary indications are that hydrate bypass at calcination results in improved specific energy consumption. However, whilst this technology has been implemented at other operations, further investigation of its suitability at Yarwun is required due to equipment design and expected impacts on product quality. Trial work in early 2010 will allow a more quantitative evaluation of the impacts of this technology on energy efficiency and product quality.	<b>Improvement in process control</b>	<b>Other direct combustion thermal equipment</b>
Rio Tinto Limited	2009	RTA Yarwun. <b>Dust collection improvements - dust load control</b> This project involves improving the dust collection and disposal system in the calciners to increase calciner efficiency. Dust loads incur an energy loss as they are circulating within the calciners. Improved control and management of dust loads should lower the energy intensity of this process. Progress update: This opportunity was furthered in 2009, with laboratory trials of potential solutions having commenced and shown promising results. Investigation will be completed in 2010.	<b>Investment in research and development, testing and trialling</b>	<b>Other direct combustion thermal equipment</b>
Rio Tinto Limited	2009	RTA Bell Bay. <b>Smart lighting fitting</b> (in the change house) - to reduce electricity consumption upgrade lighting to tri phosphor lights. Better light intensity enables a reduced number of fittings to be used. This opportunity has been coupled with installation of a lighting and heating control system to replace the existing manual systems. However, energy and associated figures relate only to smart lighting. Progress update: This project has been implemented and savings were verified in 2009.	<b>Investment in new technologies or new configurations of technologies not used before</b>	<b>Lighting systems</b>
Rio Tinto Limited	2009	RTA Bell Bay. Total replacement of air conditioning units - <b>replace all existing air-conditioning (A/C) units with more efficient units</b> across site. Progress update: This project was reviewed in 2009 and a decision made to adopt a partial rather than total replacement of inefficient air conditioning units. Set point temperature control for all air conditioning units was implemented as a low cost administrative measure to compensate for the suspension of the total replacement project.	<b>Investment in the same but more efficient technologies</b>	<b>Electric motors – HVAC and refrigeration equipment</b>
Rio Tinto Limited	2009	RTA Bell Bay. <b>Improve street lighting</b> - replace existing street lighting with high efficiency street lighting across site. Progress update: An LED lighting trial was conducted. It demonstrated that this project was unviable. Replacement of existing street lighting will not progress.	<b>Investment in the same but more efficient technologies</b>	<b>Lighting systems</b>
Rio Tinto Limited	2009	RTA Bell Bay. <b>Compressor control system and operation mode</b> - In 2010 a three-stage compressed air optimisation project will be implemented. In stage one, system-wide monitoring will be installed. In stage two a demand side reduction programme will be implemented including the analysis of data and use of alarms to identify and implement improvements in areas of excessive usage. In stage three, supply side reductions will be identified and implemented to improve the alignment between demand and efficient operation of the compressors.	<b>Improvement in process control; Investment in new technologies or new configurations of technologies not used before</b>	<b>Electric motors – air compressors</b>
Rio Tinto Limited	2009	RTA Bell Bay. <b>Optimisation of Metal Products gas usage</b> - Heating demand for holding furnaces is variable. Furnaces are often pre-heated for extended periods of time in preparation for metal processing. When they rise above the desired holding temperatures they are opened in order to cool. In 2010, the metal products team will implement a "furnace optimisation" project to improve furnace temperature control through improved coordination of metal delivery. The first stage of the project will quantify the gas savings which are expected to be significant.	<b>Improvement in process control</b>	<b>Furnace</b>

Rio Tinto Limited	2009	RTA Bell Bay, Potlines Southern Bay <b>Lighting upgrade</b> - In 2009, the economic viability and technical characteristics of upgrading lighting in the Potlines Southern Bay was investigated. High Intensity Discharge (HID), High Pressure Sodium lamps mounted in a standard Eco Indy High Bay luminaire equipped with electronic control (Active Reactor) system were tested. As well as measuring energy savings the investigation included a review of maintenance costs for the previous three years. The main component of the maintenance cost was found to be unplanned repairs and replacement of failed ballast/linaires due to ageing of the lighting system components and cabling. This in turn leads to increase in voltage drops and poor lamp starting conditions. <b>The project was found to be viable. Implementation has commenced and will be completed in 2010.</b>	Investment in the same but more efficient technologies	Lighting systems
Simcoa Operations Pty Ltd	2009	Replace steel pressure rings on Furnace 2 with copper pressure rings - <b>Improve the electrical efficiency of the furnace by replacing steel components with copper.</b> Estimated total investment is \$1,070,000 (this includes fabrication and installation and production loss during installation). Energy saving has been calculated as 10,213 GJ. Total saving is \$256,800 per annum, which also includes other benefits such as increased production. A decision as to proceed with this project is pending.	Investment in the same but more efficient technologies	Furnace
Simcoa Operations Pty Ltd	2009	<b>Optimise use of ladle pre-heater natural gas</b> - Minimise the consumption of natural gas used to cure and pre-heat ladles. Historical practice was to have a heated ladle on standby, which consumed natural gas. New practice is to anticipate the need for a new ladle and begin preheating a cold ladle prior to placing into service. The energy savings from this project has been revised based on trials conducted in 2009 and is now estimated to be approximately 15,227 GJ per annum. This project was implemented in 2009.	Improvement in process control	Other direct combustion thermal equipment
Simcoa Operations Pty Ltd	2009	<b>Shroud redesign</b> - Install a segmented shroud to minimise plant downtime. A segmented design will minimise furnace downtime because maintenance can be undertaken more efficiently. Long periods of downtime are associated with higher energy consumption per unit of production. Estimated total investment is \$700,000 (this includes fabrication and installation and production loss during installation). Energy saving has been calculated as 4,874 GJ (calculations are based on past shutdowns for shroud water leaks). Total benefit is \$387,000 p.a (includes other benefits such as production, reduced maintenance and electrode replacement). This project was implemented in 2009.	Investment in the same but more efficient technologies	Furnace
Sims Group Ltd	2008	<b>Ingot holding furnace pressure control:</b> Ingot holding furnace operation consumes 40,000GJ natural gas or 20% of total site energy use Implementation cost: \$11,000. Natural gas reduction: 7,000GJ/yr (\$25,500/yr). Accuracy: 10%. Business response: Implemented	Improvement in process control	Furnace
Sims Group Ltd	2008	<b>Liquid holding furnace pressure control:</b> Liquid holding furnace operation consumes 23,000GJ natural gas or 11 % of total site energy use Implementation cost: \$11,000. Natural gas reduction: 2,200GJ/yr (\$8,000/yr). Accuracy: 10%. Business response: Commenced	Improvement in process control	Furnace
Sims Group Ltd	2008	<b>Liquid crucible preheating parameter control:</b> Liquid crucible operation consumes 11,000 GJ natural gas or 6% of total site energy use Implementation cost: \$4,500. Natural gas reduction: 1,000GJ/yr (\$3,500). Accuracy: 25%. Business response: Under investigation	Improvement in process control	Other direct combustion thermal equipment
Sims Group Ltd	2008	Upgrade of the Gillman Shredder to <b>install a more energy efficiency shredder motor and a new air system incorporating a VSD on the main fan:</b> The shredder accounts for the vast majority of energy used on site. Electricity reduction: A total saving of 1.5 kWh/tonne is indicated by post-implementation data (650 GJ pa) and will be firmed up as monitoring of performance is ongoing. Accuracy: metered performance over a short period. Business response: Implemented.	Investment in the same but more efficient technologies	Electric motors – variable speed drives
Sims Group Ltd	2008	Upgrade of the Rocklea Shredder to <b>install a more energy efficiency shredder motor and a new air system incorporating a VSD on the main fan:</b> The shredder accounts for the vast majority of energy used on site and is currently one of the more energy intensive units operating across the group. It is therefore expected that substantial savings are achievable with this upgrade. Electricity reduction: Expected to be in the order of 4,000 GJ pa. Accuracy: <30%. Business response: to be implemented.	Investment in the same but more efficient technologies	Electric motors – variable speed drives
Sims Group Ltd	2009	Laverton Aluminium Opportunity #4: <b>Liquid holding furnace baghouse bypass system.</b> • The liquid holding furnace consumes 23,000GJ per year, or 11 % of total site energy use • Implementation cost: \$50,000 • Natural gas reduction: 4,000 GJ per year • CO2-e reduction: 500t • Accuracy: 10% • Business response: under investigation	Investment in new technologies or new configurations of technologies not used before	Furnace
Sims Group Ltd	2009	Sims metal has identified an opportunity to improve the energy efficiency and the operating cost of the metal shredder in the St Mary's Sydney site. The improvement will involve the <b>implementation of a new rotor that will result in an energy saving of approximately 10% on a per-tonne basis</b> and a significant reduction in consumables costs, whilst maintaining product quality and specification. The project is planned for implementation in early F10, and sub-metering installed at the shredder level will enable energy savings to be determined with a good degree of accuracy before the end of F10. A 10% energy saving on a per-tonne basis at the shredder is equivalent to approximately 3,000 GJ (electricity) savings per year based on F09.	Investment in the same but more efficient technologies	Electric motors - other
Sims Group Ltd	2009	Laverton Aluminium Opportunity #5: <b>Main plant compressor VSD upgrade.</b> • Upgrade from the existing direct drive compressor and utilize VSD technology. Main plant air compressor consumes 500MWh or 20% of site electricity consumption • Implementation cost: \$100,000 • Electricity reduction: 180 MWh per year (648 GJ pa) • CO2-e reduction: 220t • Accuracy: 25% • Business Response: Under investigation	Investment in the same but more efficient technologies	Electric motors – variable speed drives
Sun Metal Holdings Limited	2008	In three large reactor vessels, there were originally two rows of blades on the agitators which stirred the vessels and mixed in reagents. High reagent use was attributed to excessive agitation and the top row of blades were removed. <b>Agitation was also reduced to a total of 10 minutes per hour.</b> Power consumption of the 55kW motors was significantly reduced, the total energy saving is 1069MWh per year which equates to 1,112 tonnes of greenhouse gas emissions saved. This has proven the process improvement with minimum expense, and evaluation of variable speed drives under process control computerized operation to make further energy savings and process improvement is now underway.	Improvement in process control	Electric motors - other

Sun Metal Holdings Limited	2009	<b>Reconfiguration of cooling system.</b> In the Utilities area of the refinery, 11 water cooling towers operate. Hot water from heat exchangers is sent to the cooling towers in a closed circuit. The water exits the cooling tower and is sent back to heat exchangers or to other units for further cooling. The 11 cooling towers cool the circulating water to 28 degrees C. Below this temperature some of the fans may be switched off. This switching on and off of towers was controlled manually until recent modifications to the circuit and control logic made it possible to inter-lock cooling tower fan operation with cooling water temperature. When the temperature drops below a set point one of the towers is switched off immediately, if the temperature continues to drop a second tower is switched off. The reverse is applied as the cooling water temperature increases. It is estimated that by operating with this automated control, two of the towers are switched off for 3 hours more each day than previously. Power consumption of the 75kW fan motors was significantly reduced, the total energy saving is 170MWh per year which equates to 177 tonnes of greenhouse gas emissions saved.	Improvement in process control	Electric motors – fans
Sun Metal Holdings Limited	2009	The Electrical Maintenance Department investigated <b>replacement of existing standard motors used on site with 'high efficiency' motors</b> . For example a 55kW high efficiency motor operating under normal circumstances in the refinery represents a power saving of 15.1MWh over a one year period, compared to a standard motor. The decision was made to replace Warehouse inventory of standard motors with high efficiency motors when ordering new equipment. It is estimated that at least 15 motors will be replaced during the next 12 months, of sizes varying from 15kW to 150kW, equal to a saving of 260MWh of power consumption and 270 tonnes of greenhouse gas emissions.	Investment in the same but more efficient technologies	Electric motors - other
Sun Metal Holdings Limited	2009	<b>Installation of more sensitive 'flame detector' in fluid roasters.</b> Zinc concentrate is converted to zinc calcine by burning of the concentrate in fluid bed roasters. Zinc calcine (ZnO), produced by burning the sulphide concentrates with air direct oxygen addition, is the soluble zinc form which is the primary feed for the Leaching Plant. The roasters operate at about 950°C, at this temperature the roasting reaction sustains itself, generating enough heat for the reaction to proceed without additional heat supply. However, when a roaster is shutdown and has cooled, it requires heat supply to start the reaction again. This heat is supplied by diesel burners which heat the roaster bed until the temperature has reached a point at which the reaction can once again proceed of its own accord. Fuel supply to the burners during this start-up period is controlled by a flame detection system. Recent modifications to the system include a different type of flame detector which is more sensitive. The previous less-sensitive detectors would often not detect the flame during start-up resulting in a 'flame out' and loss of heat from the roaster bed. The new detectors have resulted in better control of diesel	Investment in the same but more efficient technologies	Other direct combustion thermal equipment
Sun Metal Holdings Limited	2009	<b>Installation of local control switching in the train wagon unloading area.</b> Upon review of lighting requirements by the Roasting Department it was determined that savings could be achieved by installation of local control switches in the train wagon unloading area. In this area there are 119 lights ranging from 72W to 400W. The area is mostly underground and as such the lights must be on whenever trains are being unloaded and people are working in the area. Previously the lights were on at all times. However now in conjunction with standard operating procedures for the area, the lights are switched off whenever there are no trains being unloaded or people in the area. Savings made possible by this lighting modification are equal to 133MWh per year of power consumption and 138 tonnes of greenhouse gas emissions.	Investment in new technologies or new configurations of technologies not used before	Lighting systems
Tiwest Pty Ltd	2008	Investigation of new centrifuge mill - The site currently uses cage mills to break down any agglomerates of pigment particles in slurry. <b>Investigations into the use of new technology centrifuge mills</b> are currently being undertaken to determine if the technology can be used for milling pigment. If the new technology proves to be feasible, it is estimated that a 60% reduction in energy used by the wet milling process may be achieved. This could equate to electricity savings of approximately 52,000GJ per year (a 1.1 year payback period).	Investment in research and development, testing and trialling	Own use
Tiwest Pty Ltd	2008	<b>Use of chilled water instead of cooling water-</b> Titanium tetrachloride (TiCl4), is separated from the waste gas stream by Primary, Secondary and Tertiary Condensation. Currently secondary condensation uses cooling water to cool and condense the TiCl4 by approximately 20°C, then tertiary condensation uses a blend of methanol and water to cool and condense the TiCl4 by a further 60°C. During the plant expansion project, an additional chilled water unit will be installed allowing TiCl4 to be cooled and condensed more efficiently in the secondary condensation stage (as the chilled water unit is significantly more efficient at removing heat than the methanol chiller). This should result in a significant energy savings. This project has a payback period significantly greater than 4 years, however Tiwest will be implementing it as part of the coming plant expansion due to the projects wider business benefits.	Investment in new technologies or new configurations of technologies not used before	Own use
Tiwest Pty Ltd	2009	<b>Replacement of tunnel driers</b> - At the Kwinana Pigment Plant two natural gas fired tunnel driers are currently being replaced by swirl fluidized driers (which are significantly more energy efficient) in the plant expansion. The swirl driers are due to be commissioned in early 2010 and the tunnel driers will be progressively decommissioned after. Energy savings from the new swirl fluidized driers will be calculated from the amount of natural gas being used for the individual units. Expected savings of natural gas from replacement of the tunnel driers is approximately 341,100GJ per year.	Investment in new technologies or new configurations of technologies not used before	Dryer
Tiwest Pty Ltd	2009	<b>Waste heat recovery power generation</b> – At the Chandala Process Plant, a 'feasibility' study has been completed examining the utilisation of waste heat losses from the Synthetic Rutile kiln to provide the site with its independent steam turbine power generation facility. If viable, there is potential to possibly export surplus electricity produced to the main power supply grid. Energy savings would be calculated from full provision of electricity by the independent power generation facility rather than obtaining it from the main power grid supply. Expected savings from this opportunity is approximately 306,000GJ per year. Payback however on this initiative is very marginal.	Investment in new technologies or new configurations of technologies not used before	Cogeneration / Combined heat and power
Tiwest Pty Ltd	2009	<b>Waste heat recovery for product drying</b> – At the Chandala Process Plant, another significant opportunity at the 'concept' stage is the utilization of waste heat from the Synthetic Rutile kiln for the drying of Heavy Mineral Concentrate, titanium and zircon products within both the Dry Mill and Synthetic Rutile plants. The proposal would entail the use of a heat exchanger in the waste gas system in order to provide an alternative energy source rather than natural gas for the drying of feed and products. Expected savings from this opportunity is approximately 408,000GJ per year.	Investment in new technologies or new configurations of technologies not used before	Dryer
Vinidex Pty Ltd	2008	Chilled Water System - Smithfield. Chilled water is used in the Extrusion Plant at the Smithfield plant to cool process water in spray tanks on each line. In financial year 07/08, a new chiller of 1000 kW capacity was commissioned to replace a 1991, 140kW model chiller to improve the efficiency of the plant allowing also for expansion of current system in future. The energy savings have been achieved by utilising the <b>latest technology in ammonia refrigeration</b> which is an environmentally friendly refrigerant, with a high coefficient of performance (cooling capacity/power unit). The total cost of the project was over \$300,000 with forecast annual savings of 45 MWh in electricity, 42kW in summer peak demand and 30 kW in winter. That is equivalent of 48t of CO2-e per annum. This project was also part of the Energy Savings Action Plan.	Investment in the same but more efficient technologies	Electric motors – HVAC and refrigeration equipment
Vinidex Pty Ltd	2008	Southern Region Consolidation. In the year 2007/08, Vinidex merged two of its Melbourne pipe manufacturing operations. The Clayton operation closed down and moved to the Sunshine site. With the purchase of the adjacent land, the Sunshine site was able to accommodate all equipment and products from the Clayton site. <b>Savings in energy was achieved through better utilisation of space and land,</b> reducing need for transport and storage, streamlining management processes and operating new equipment of higher efficiency and throughput. The savings could be easily demonstrated by comparing the energy and gas bills for two operations before and after the merger. It is estimated that energy usage was reduced by 20% while gas consumption went down by 13% from the previous year. That was equivalent to saving 20,000GJ in the first year.	Changes in management systems	Own use

Vinidex Pty Ltd	2008	<b>Efficiency of Top 10 Fittings:</b> A program has commenced in our Moulding Operations to <b>improve production efficiency of the highest volume fittings</b> . The objective of the program is to increase equipment capacity by reviewing the number of allowable cavities in each die. The program includes modification of tooling, trialling and testing new temperature profiles, process conditions, flow rates and optimising cycle time to ensure quality is not affected by the changes. In doing so, the efficiency of the plant will be improved, producing the same amount of fittings with less energy consumption. Anticipated to reduce energy by 300 kWh or about 1000 GJ.	<b>Improvement in process control</b>	<b>Own use</b>
Vinidex Pty Ltd	2009	<b>Extrusion Scrap Reduction over 0-&lt;4 years</b> A program has commenced throughout our Extrusion operations to improve production related processes and equipment to reduce our scrap level. The program includes better maintenance, pre-start checks, planning skills and cultural changes and process control systems to achieve the goal. In doing so, the efficiency of the plant will be improved, producing the same amount of pipe products with less energy consumption. Anticipated to reduce energy by approximately 8,350 GJ.	<b>Changes in maintenance practices; Changes in the staff operation of equipment; Improvement in process control</b>	<b>Own use</b>
Vinidex Pty Ltd	2009	<b>Nesting of pipe products for interstate road transport</b> from our Wagga Plant 0-<2 years. A program has commenced at our PP plant to nest smaller pipes inside larger pipes to reduce the interstate road transport costs and CO2 foot print. The reduction in transport emissions is calculated as 1,812 GJ.	<b>Improvement in process control</b>	<b>Road transport equipment</b>

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