



Rio Tinto

The Rio Tinto
Foundation for
a Sustainable
Minerals Industry

Annual review January 2006 – 30 June 2007

Overview - A government and business research and development alliance

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The Rio Tinto Foundation for a Sustainable Minerals Industry was established in 2002. The Foundation reflects Rio Tinto’s commitment to the Australian Government to find ways in which the minerals industry can contribute to sustainable economic development.

The Foundation supports research and technical development that will help the minerals industry to meet environmental challenges. Equally, it supports projects that address the social and cultural effects of resource development on isolated communities.

The aim is to develop practical innovations. To this end, the Foundation conducts a variety of programmes using Rio Tinto staff and links to researchers and technology providers around the world.

The Australian Government is funding the Foundation with a loan of \$35 million, with Rio Tinto contributing a similar amount. The Foundation commitment was agreed as part of the Australian Government’s assistance for the establishment of the Yarwun Alumina Refinery in Gladstone, Queensland.

Foundation objectives were met in 2007 when expenditure on approved commitments achieved the target level of \$70M. This, therefore, is the final report on the Foundation’s activities.

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Chairman's report



This Review covers the final 18 months of the Rio Tinto Foundation for a Sustainable Mining Industry which formally concluded in mid 2007.

The challenge of making the minerals industry a contributor to a sustainable global society is immense. No one pretends that the Foundation has done more than encourage the industry to undertake what will be a long and arduous journey. However, there is no doubt in my mind that the Foundation has helped Rio Tinto to take important steps in that journey. And, I am equally sure that the experiences of the past five years will be used to shape the nature and direction of Rio Tinto's ongoing efforts to conduct its mining and mineral processing activities in an increasingly sustainable fashion.

The Foundation was funded by a \$35 million loan from the Commonwealth Government that was to be matched by a corresponding amount from Rio Tinto. As the Review shows, those monies were fully expended and Rio Tinto continues to fund a number of the ongoing projects.

You will also see that the Foundation has had some signal successes. These are gratifying, but it is the promise revealed by progress in some of the longer term projects that suggests that the Foundation's legacy will be felt for years to come.

Whatever successes eventuate from the Foundation they are due, in part, to the composition of its advisory board. I'd like to acknowledge the valuable insights provided by the eminent representatives from government, academia and industry. Their breadth of experience and objectivity helped anchor the Foundation's activities in the real world; a world that – while it recognises the need for economic growth and resource development – has other, very real, concerns and hopes.

This is also an appropriate time to thank the secretariat, led by the executive directors, and the members of the working group. The latter were drawn from across the Rio Tinto Group and it was their preparation of project submissions and reporting that enabled the advisory board to make sound choices.

In reading the Review, one is struck by the variety of projects. Many, such as those to do with mineral processing or smelting, involve very large capital sums spent on complex technology. They are pretty close to the frontiers of science, and quite difficult for the non technologist to comprehend. Others, such as those that deal with water or energy management, or those that seek to mitigate the noise and waste that were once accepted as an inevitable consequence of mining, are easier to understand. Yet others that look at the relationship between the obvious economic and environmental consequences of mining and its less apparent long term impact on the social and cultural values of affected communities are novel. They are a belated acknowledgement that, ultimately, sustainability is a concept that requires a comprehensive approach.

If sustainable mining is to be a reality, miners will need to continue reinventing their industry – both in terms of its technology, and in terms of how the world views it. This will not happen overnight, nor will the transformation be easy. Nevertheless, that change must happen if generations to come are to enjoy the security and material comfort that the developed world takes for granted.

I think that history will show that the Rio Tinto Foundation for a Sustainable Minerals Industry, in its short existence, served to concentrate the effectiveness of a global company's efforts in this vital area. Moreover, through its collaboration with partners in Australia and overseas, the influence of the Foundation will be felt throughout the industry and, eventually, throughout society.

Charlie Lenegan
Chairman

Where project funds were allocated:

Foundation Loan Funded	\$35,000,000
Rio Tinto Funded	\$40,439,000
Total allocations	\$75,439,000
Communication and networking	\$2,500,000
General sustainability	\$19,527,921
Greenhouse coal gasification	\$11,033,780
Energy/efficiency	\$34,879,391

Where project funds were spent:

Foundation Loan Funded	\$35,000,000
Rio Tinto Funded	\$36,793,000
Total allocations	\$71,793,000
Communication and networking	\$505,181
General sustainability	\$17,922,957
Greenhouse coal gasification	\$12,156,650
Energy/efficiency	\$35,916,685



I think myself privileged to have been executive director of the Rio Tinto Foundation for a Sustainable Mining Industry for the past three years. I was able to build on the good work of my predecessor, Dr Mike Hollitt, and was in the role long enough to witness the changes that have expanded the original vision of those who conceived the Foundation.

The task of the working group has been to vet the projects proposed by Rio Tinto's operations in Australia. The working group has examined the contribution those projects might make to increasing the sustainability of our industry. After screening for practicality, fit with agreed sustainability criteria and potential return, the best were presented to the Foundation's board. Those that were eventually chosen and funded by the Foundation have been carefully monitored, assessed and reported on at regular intervals. This has been an onerous and exacting task carried out by busy people with major responsibilities outside the Foundation.

I would like to express my gratitude for their sterling work.

The Foundation's working group and secretariat represent the administrative machinery that makes possible the scientific, technological and other advances that are the Foundation's justification. Yet, the very act of bringing together experts from throughout the Group's businesses for a common purpose, itself led to a heightened consciousness of sustainability and issues such as climate change.

Everyone involved in the organisation of the Foundation's work has, I think, learned from the experience. We have returned to our work places with a greater appreciation of the challenges our industry, indeed, the world faces. We have learned that sustainability has a human dimension. Our understandable concern for technological progress must not blind us to the importance of winning community support for our efforts. It was this appreciation that saw the Foundation's remit expand to include projects that required input from the social sciences.

The Foundation has spent and accounted for the funds allotted to it. A handful of projects returned a negative result and were terminated earlier than expected. Conversely, other projects opened up new lines of enquiry.

In November 2006, the Board was invited to a special ceremony to celebrate the opening of the world's first official HIsmelt® plant in Kwinana, Western Australia. HIsmelt® is a direct smelting technology that produces a premium grade iron ore product in a way that has significant environmental and economic advantages. Rio Tinto's research into this technology began a quarter of a century ago and it has been Australia's largest research and development project at a cumulative investment of around A\$1 billion.

From its inception in 2002, the Foundation has recognised that HIsmelt® was a 'flagship' project, that is one where success has potentially global ramifications. This review contains a brief study of a research project aimed at enhancing the effectiveness of the HIsmelt® project carried out under the auspices of the Foundation. It was particularly pleasing to hear the Foundation's contribution acknowledged at the opening, which was performed by the then Federal Minister for Industry, Tourism and Resources, the Hon Ian MacFarlane MP.

Not all the Foundation's projects have the scale or potential to put the industry on the path to sustainability that is embodied in HIsmelt®. Yet scale is not everything, nor is the size of an investment a dependable guide to the ultimate worth of a project. By strategic partnering with governments, universities, other research institutions, non-government organisations and civil bodies it has proved possible to leverage the Foundation's contribution.

I would like to conclude this executive director's report by expressing my thanks to the board members and to my colleagues on the working group and the secretariat. And, I'd particularly like to thank the Rio Tinto project managers for their support.

Bruce Kelley

Executive director

Structure and processes

The Rio Tinto Foundation for a Sustainable Minerals Industry is governed by an advisory board of six members, including one representative each from Government, academia and industry and three from Rio Tinto. The Advisory Board directs the Foundation in compliance with the Foundation's charter and rules.

The advisory board is supported by a working group that links into Rio Tinto's businesses. The working group prepares project submissions, ranking their contribution to sustainable development.

The advisory board meets four times a year to consider the project submissions from the working group. Individual reports on previously approved projects and the secretariat are reviewed and the project portfolio is assessed.

A secretariat, led by the executive director, prepares advisory board papers, keeps records and compiles and prepares reports. The executive director is not an advisory board member.

The advisory board allocates funds to the Foundation's projects. Rio Tinto's business units and the Technology group manage approved projects within guidelines and limits set by the advisory board.

Innovative project proposals having sustainable development merit that meet Rio Tinto's tests of business practicability are reviewed. Funding is reserved for projects with the best potential for producing positive impact and which best meet sustainable development criteria.

Government loan funding is allocated to qualifying projects that have no other form of Government funding. Rio Tinto contributions to collaborative projects for which Government funds are separately provided, for example Cooperative Research Centres, are recognised as part of the Rio Tinto expenditure contribution.

Each financial year the Foundation produces a report of its activities. The Review is audited according to the requirements of the charter and rules of the Foundation.

Advisory board



Mr Charlie Lenegan was appointed Chairman of the Rio Tinto Foundation for a Sustainable Minerals Industry in March 2004. Mr Lenegan is Managing Director of Rio Tinto Australia, responsible for Rio Tinto's corporate activities in Australia. Previously his responsibilities have covered the Group's marine business and Kelian Equatorial Mining as well as senior roles in Rio Tinto businesses in Indonesia, Australia and Zimbabwe. Mr Lenegan's directorships include Coal & Allied Limited, ERA Limited, Dampier Salt Limited and various industry bodies.



Mr John Ryan was Deputy Secretary of the Department of Industry, Tourism and Resources. His responsibilities included resources and energy policy, energy market reform and sustainable development. Previously, Mr Ryan was the head of Invest Australia, the government agency responsible for investment attraction and facilitation and head of The Industry Policy Division, responsible for policy advice on finance, taxation, small business, innovation and general industry issues.



Mr Bernard Wheelahan is chairman of the Bass Strait Oil Company Limited, Pacific Hydro Pty Ltd and The Council on Australian Latin American Relations. He is also deputy chairman of Transfield Services Ltd. Until mid 2003, he was the Chair of the Co-operative Research Centre for Sustainable Resource Processing. Mr Wheelahan has been a director of a number of companies and joint ventures including Normandy Mining Ltd., Shell Venezuela, Woodside Energy, Shell Australia, The Gribbles Group and the North West Shelf Gas Project Joint Venture.



Professor Vicki Sara is Chancellor of the University of Technology, Sydney. She is also Chair of the Australian Stem Cell Centre and a Director of the Australian Centre for Plant Functional Genomics and the Australian Institute for Commercialisation. She is a Fellow of the Australian Academy of Science and the Australian Academy of Technological Sciences and Engineering. She has been Chair and Chief Executive Officer of the Australian Research Council, Vice-chair of the OECD's Global Science Forum and a member of the Prime Minister's Science, Engineering and Innovation Council and CSIRO Board.



Mr Phillip Strachan is the chief financial officer of Rio Tinto Alcan. Phillip joined the Rio Tinto Group in 1981 and has held a number of positions at Hamersley Iron, Rio Tinto Aluminium, and in head offices in London and Melbourne. He was general manager Finance at Rio Tinto Indonesia for five years before being appointed to his present position in 2000. A Bachelor of Commerce and a CPA, Mr Strachan is a director of the Great Barrier Reef Foundation and a member of the National Executive of the Group of 100, an association of Australia's senior finance executives.



Dr Robin Batterham is Global Practice Leader – Innovation of Rio Tinto. He joined Rio Tinto in 1988 following a research and management career in CSIRO. His qualifications are in chemical engineering and he gained his PhD from Melbourne University in 1968 where he is now also a Professor in the Department of Chemical and Biochemical Engineering. His current role covers emerging scientific and technical issues, external R&D and the delivery of major step change technologies into the operations. From 1999-2005 he was Chief Scientist of Australia and his leading role with the Government helped facilitate investment of an extra \$8.3bn for science and innovation in Australia. Dr Batterham is presently President of the Australian Academy of Technological Sciences and Engineering (ATSE).

Outcomes of the Rio Tinto Foundation for a Sustainable Mining Industry

This is the final Annual review of the Rio Tinto Foundation for a Sustainable Minerals Industry whose five year term officially ended in mid 2007.

When the Foundation started in 2002, it was a way for Rio Tinto to demonstrate to the Federal Government the minerals industry's commitment to sustainable economic development. That commitment, in turn, was instrumental in getting approval for the construction of the Yarwun alumina refinery in Gladstone, Queensland.

This is, therefore, an appropriate time to ask whether the Foundation fulfilled its purpose. Did it justify the investment of more than \$70m, \$35m provided as a loan by the Federal Government and the balance from Rio Tinto?

Research suggests that the broad answer is yes; for example, seven of the Foundation's many projects are estimated to have already made substantial savings. When projected, those savings exceed the total cost of the Foundation's establishment and activities.

Other projects will continue to completion, funded by Rio Tinto. They hold the tantalizing promise of making significant reductions in energy consumption and emissions in, for example, the smelting of aluminium and iron ore.

A handful of projects proved valuable insofar as they showed which paths not to follow. Yet others produced results that will benefit not only Rio Tinto Group businesses, but also other companies within the minerals industry as well as other industry sectors – farming for example. Ultimately, all Australians will reap the benefits. Nor will the knowledge and technology gains be confined to Australia. Many of the advances that take us closer to our goal of operating sustainably undoubtedly have global applications.

One of the reasons that it is not possible to quantify precisely how closely the Foundation has come to fulfilling its original charter is that, in its five year existence, the Foundation's view of what constituted a sustainability project evolved. At the start, the emphasis was very much on finding technological solutions to the challenge of

mining sustainably. Projects focussed on minimising energy and water consumption, reducing emissions, pollutants, noise, dust and waste, as well as adopting a smaller operational footprint. Many of the projects resulted in economies that could be calculated as tonnes of CO₂e or hectares of land disturbed and gigalitres of water consumed. This meant that different approaches could be tested and outcomes compared. It soon became apparent, however, that the path to a sustainable minerals industry had to include the social and cultural impacts of resource development. In order for technological solutions to be effective, they have to be accepted by those whose lives they affect. It's now understood that winning public trust and acceptance is an essential part of any sustainability strategy.

The Foundation therefore began to balance its portfolio with a leavening of projects that examined the regional impact of operations on the wealth, health and well-being of its employees and neighbours.

Rio Tinto has always understood that technological research and development plays a vital part in keeping its operations globally competitive and profitable. It has, at any one time, numerous projects underway that are intended to improve some aspect of the Group's economic, environmental and social performance. What the Foundation did was to bring many of these disparate projects into a single process that rated them and permitted some form of comparison. It helped to inject a sense of discipline and priority.

The fact that the board included eminent representatives from government, academia and other industries proved especially valuable in ensuring that proposals were subjected to a rigorous selection process by people with an unusually wide breadth of experience.

The multi-disciplinary working group, drawn from a range of Rio Tinto's Australian operations, was asked to select projects for the board to consider. In carrying out this task, the working group became a central repository of information and a point where knowledge of what worked and what didn't work was exchanged between Rio Tinto's internal product groups. This was a particularly timely development, given that it coincided with the rapid growth in concern for the potential impacts of climate change that occurred over the life of the Foundation.

The very existence of the Foundation drew attention to the importance of research within the Group. In some cases, this heightened profile helped a new project to get management support. Becoming part of the Foundation's portfolio was an assurance that a project would meet high governance standards, possibly build useful links with Government and external institutions, and be conducted in a prudent and rigorous manner.

Rio Tinto businesses do not want to lose the benefits that the Foundation has created. Therefore, we are examining ways to maintain the impetus and focus created by the Foundation. Greater collaboration between business units and between Rio Tinto and other companies is one such benefit. Another is the way in which the Foundation has helped operations to align their research and development more thoroughly to the theme of sustainability and the need to anticipate the consequences of climate change. And yet another, the realisation that the social and cultural impacts of resource development deserve the same analytical and long term thinking that marks the technical and environmental aspects of our businesses.

A quick survey of the case studies, project reports and snapshots contained in this report show the multiple fronts on which the minerals industry is waging its campaign to reinvent itself in terms of sustainability.

The Rio Tinto Foundation for a Sustainable Mining Industry may have concluded, but its influence will continue to be felt for many years to come.

Charlie Lenegan

Chairman

Advanced energy efficient smelting technologies

Case study

Drained Cathode Cell Project

Aluminium smelting is energy intensive and contributes substantial green house gas emissions, particularly when using fossil fuelled electricity. Drained Cathode Cell (DCC) technology would enable aluminium smelters to make energy savings of between 10 and 15 per cent and reduce other greenhouse gas emissions.

The Foundation approved \$8.5 million for the first stage of the DCC project, which started in 2004 at the Rio Tinto Alcan (RTA) Bell Bay smelter. In July 2005, a further \$9 million was approved for stage two. Foundation funding finished in September 2006, and the project has continued with Rio Tinto Alcan Smelting support.

The DCC project involves the development, testing and demonstration of aluminium reduction cells that have a much reduced energy consumption and, possibly, higher process intensity (amperage) than conventional reduction cells. A DCC loses less heat than a conventional cell because it has additional sidewall insulation, reduced molten liquid levels and has eliminated the aggressive metal pad/bath interface next to the sidewall of the cell. Voltage can be lower because a solid cathode is not prone to high and low frequency metal pad height fluctuations. It does not, therefore, constrain the anode to cathode distance (ACD) to avoid shorting. A DCC uses a special wettable coating that protects the carbon cathode from rapid corrosion by the molten bath.

As a result of delays in the design, construction and commissioning of a novel vibrocompaction press, four DCCs were manufactured using isostatic pressing techniques. The vibrocompaction press was recently commissioned and has commenced production of the first full specification Mk II design cathodes.

Eliminating the metal pad resulted in the projected heat loss savings. Cells can operate efficiently using much less energy, provided the coating and composite components remain undamaged.

As usually happens in highly innovative programmes, surprising results and problems have appeared. Some of these are valuable and show what works under the demanding conditions within a cell without a metal pad. Others have arisen from changes to the smelter's external operating environment. Sometimes, it has been difficult to determine the real cause of a particular event.

Nevertheless, the testwork to date has given us a better understanding of both drained and conventional cells in areas such as:

- the impact of the cathode slope
- operation and design of high current density cells at minimal ACD
- operation and design of highly insulated cells
- the use of slotted anodes

To further improve the technology, work is now underway to:

- use the vibrocompacted composite coatings to produce a higher quality and better performing composite coating that will reduce cathode wear problems.
- improve metal and bubble drainage by changing the cathode shape.
- improve anode carbon behaviour to restore cell performance.
- modify the anode design to improve bubble drainage and bath flows.

Not all these initiatives can be completed in 2007. RTA will construct MkII a, b & c cells and develop a further prototype in 2007, incorporating some of the initiatives described above.

Composite development activities at RTA Technology and at the Bell Bay smelter have helped to explain the widely varying composite strengths produced within a monolithic component. They identified ways to increase composite strength without impacting its propensity to crack by optimising the binder composition. Material testing has recommenced in composite test cell four.

Despite setbacks and delays to the programme, the DCC team is confident that the above programme will resolve outstanding problems. Success would lead to a drained cell with practical operational features, reduced greenhouse gas generation (associated with a lower anode effect frequency) and significant energy savings.

TiB₂ coated cathode development

Titanium diboride has excellent wear resistance properties and can be used to coat conventional aluminium reduction cells. The technology has previously been successfully trialled at RTA smelters in Tasmania and New Zealand. The intention was to see if its use could be extended to the RTA Boyne Island smelter. The failure of the coated cell technology at Boyne Island suggests that large, magnetically compensated cells present special challenges. This implies that its use will be restricted to smaller conventional cells and purpose built drained cells (which don't require magnetic compensation) until the problems are overcome.

Anode current energy loss reduction

This project successfully achieved voltage savings of 55mV in the stub to carbon connection of the consumable anode in the reduction smelting process at the Tiwai Point smelter in New Zealand. The power saving resulted from a series of design modifications and process improvements.

Inert anode fundamentals

This project looked at critical issues relating to a combined inert anode/wettable cathode technology (RTA's TiB₂ composite) and to the electrochemical behaviour of cermet and metallic inert anodes. It was shown that RTA composite cathode technology can be used in inert anode/drain cell technology when the latter technology is developed. Some progress was made in understanding the electrochemistry of cermet and metallic inert anodes.

Preheating and pre-reduction of iron ore and coal (Circofer project)

This project sought ways to treat coal and iron ore before injection into Rio Tinto's HIs melt[®] ironmaking process in order to improve overall process efficiency, lower greenhouse emissions and increase the production of hot metal. The preferred technology was Outokumpu Technology's Circofer[®] process whose circulating fluidized bed technology lends itself to CO₂ capture and sequestration.

HIs melt[®] multiple hot air blast lances

The steel industry is interested in an eight metre diameter version of the six metre diameter smelt reduction vessel currently used in the HIs melt[®] plant in Kwinana, Perth.

Because of weight and size constraints, this project looked at using multiple hot air blast lances in place of the single, central hot air blast currently used at Kwinana. Cost analysis and other considerations pointed to multiple hot air lances as being the best choice for the larger smelt reduction vessel. Patents have been filed and multiple non-swirl hot air blast lances are incorporated in the design of the eight metre diameter vessel.

HIs melt[®] collection, compression & sequestration of CO₂

This project looked at the feasibility of geosequestering the CO₂ from HIs melt[®]'s Kwinana plant. It has established some capital costs and ruled out onshore sequestration in favour of an order-of-magnitude study of offshore sequestration.

HIs melt[®] hot metal utilisation in steel making

This project developed HIs melt[®] hot metal handling and operating practices for the Basic Oxygen Furnace (BOF) and the Electric Arc Furnace (EAF) steelmaking routes. It resulted in a series of solutions, accredited by experienced iron and steel operators and engineers, that will allow the successful integration of HIs melt[®] plant with a BOF or EAF.

Funds Applied to Advanced energy efficient smelting technologies projects - To 30 June 2007

Project	Allocation	Expenditure
Integration with preheating process	\$3,900,000	\$3,695,828
CO ₂ Sequestration	\$150,000	\$61,263
Multiple hot air blast	\$255,000	\$1,250,000
Hotmetal utilisation in steel plant operations	\$250,000	\$250,000
Circofer Pre-feasibility study	\$2,000,000	\$3,528,628
Drained cell technology	\$18,155,000	\$18,155,000
Anode current energy loss reduction	\$574,000	\$549,014
Inert Anode	\$440,000	\$528,204
Coated cell commercialisation	\$925,000	\$1,023,974
Total	\$26,649,000	\$29,041,911

Sustainable energy futures

Case study

Excellence in energy management

The Excellence in Energy Management (EEM) project was set up to develop and apply diagnostic tools to identify and prioritise energy improvement opportunities across Rio Tinto operations and to monitor their implementation.

The aim was to develop and apply a rigorous process to manage and reduce energy use and greenhouse gas emissions for all Rio Tinto operations. The result was a process that systematically identified ways to reduce energy consumption and ways that such improvements could be sustained. The project dovetails with other Rio Tinto sustainability initiatives.

The key features of this EEM initiative are:

- Identifying energy related issues, using proven tools and an energy management diagnostic tool that engage management and operating staff at all levels. A systematic five-step approach ensures that the outcome is sustained.
- Identifying benefits and opportunities for improvement in energy efficiency through reducing power demand and the use of alternative fuels.
- Developing a database and case studies to demonstrate the effectiveness of energy and greenhouse gas reduction programmes.
- Sharing data and transferring experience and knowledge between business units.
- Changing the way energy use is considered and managed through effective training and awareness.
- Benchmarking across the Group and the industry to identify best practice targets.
- Establishing a comprehensive energy use and emissions breakdown across a business unit site in order to assess development impacts.

Since 2002, the project has tested an energy review methodology at a wide range of Rio Tinto sites in terms of both location and product. Product types have included aluminium, copper, gold and uranium.

The successful methodology has two distinct focuses:

- Managing energy and GHG emissions.
- Identifying technical opportunities to improve energy efficiency and reduce GHG emissions.

The EEM methodology is being used successfully at 36 Rio Tinto sites and its deployment continues.

At Rio Tinto, sites using the EEM process have identified energy reduction opportunities in the range of five to 15 per cent. These opportunities generally involve improvements to existing operating practices, or relatively minor capital investments with short pay-back periods. In total, the combined NPV of projects identified has been estimated at US\$170 million. The associated annual reduction in GHG emissions is estimated at 403,000 tonnes CO₂ e.

Global energy technology strategy program (GTSP) – Phase II

Batelle's GTSP is one of the few integrated, global climate change emissions abatement modelling programmes. Its technological focus makes it particularly pertinent to the energy supply and minerals sectors. Phase II of the GTSP outlined the magnitude and the uncertainty of the abatement challenge, the value of a broad technology portfolio in minimising abatement costs and the cost benefits of research, development and demonstration projects.

FutureGen

FutureGen is an initiative to build a research plant with integrated CO₂ sequestration and hydrogen-based power production. The project is being developed by the FutureGen Industrial Alliance, Inc (an international, non-profit consortium of coal mining and coal-based utilities), with major funding from the U.S. Department of Energy. Rio Tinto Energy has been a member of the Alliance since 2002 and is represented on its board. Mattoon, Illinois was chosen as the site for the plant in late 2007- however, the U.S. DOE has indicated a desire to discontinue support for the project in light of the cost escalation seen in the power sector. The Alliance is currently seeking broad-based congressional support to continue U.S. federal government support for the project.

Funding – Cooperative Research Centre for Greenhouse Gas Technologies (CO₂CRC)

This CRC researches the logistical, technical, financial and environmental issues associated with capturing carbon dioxide and storing it in deep geological formations.

Hydrogen generation and storage

This collaboration with the Universities of NSW and Wollongong, and Monash University aimed to develop better processes and new materials for generating and storing hydrogen.

Hismelt® hydrogen production

This project established that the Hydromax process was not suitable for use with Hismelt® technology as a way to produce hydrogen. However, Hismelt® technology was shown to have significant value in a substantially modified and simplified Hydromax flow sheet.

Enhanced CO₂ biofixation via gene shuffling

This project investigated whether the biological fixation of CO₂ in algae was an alternative to geosequestration and whether the resulting biomass could be used as a fuel. An original project had suggested that new enzymes with significant CO₂ fixation activity had been identified in vitro. These results could not be reproduced.

Pilbara Wind Power

This project established that wind power has the potential to be integrated into the Western Power grid in WA. The major technical issue was finding aerogenerators sufficiently robust to withstand the high winds sometimes experienced in the Pilbara.

Funds Applied to Sustainable energy projects - to 30 June 2007

Project	Allocation	Expenditure
Global technology strategy	\$1,115,000	\$1,012,735
CO2CRC industry contribution	\$1,400,000	\$653,613
Hydrogen from metal bath reactor	\$829,000	\$829,000
Hydrogen generation and storage	\$400,000	\$445,006
Enhanced biofixation	\$2,500,000	\$1,981,113
Pilbara wind power generation	\$186,391	\$186,391
Excellence in energy management	\$700,000	\$703,086
FutureGen	\$1,100,000	\$1,063,830
Total	\$8,230,391	\$6,874,774

Water management and control

Case study

Floating module cover system to reduce evaporation

Mine operations lose water through evaporation, especially from tailings ponds and water storage facilities. There is presently no simple cost effective method for reducing evaporation. This project aims to develop a cost effective floating module cover that will reduce losses through evaporation, allowing greater recycling and less reliance on new water.

The development stages of the floating module design have included:

- developing and testing a prototype module design as part of a PhD project to assess the module's stability and potential to reduce evaporation;
- developing small scale models of the floating module for wind tunnel testing;
- using a 3D flow model of the die used in the injection moulding to assist with the design of the full scale mould;
- building a full size die and welding machine for manufacturing the floating modules.

In December 2006, Rio Tinto commenced a twelve month demonstration trial of the floating modules at the Northparkes mine, in New South Wales. The demonstration trial consists of two water storage dams built side by side. One dam is a control and the other is covered with floating modules manufactured by Nylex Corporation Pty Ltd. The trial aims to:

- measure module performance (water evaporation, wind stability, material stability, water quality and the module restraining system);
- provide experience in handling the modules, and
- demonstrate the design to Rio Tinto business units and community, farming and government groups.

This trial also tested some modified versions of the floating modules in order to simplify the design and reduce manufacturing costs.

The demonstration trial to date has generated very positive results that indicate that evaporation in a floating module covered dam can be reduced by up to 90 per cent. This is

equivalent to 50,000 L/day/hectare for the Northparkes mine site during summer. The modules have proved to be stable on the dam even during windy days. Their presence does not impede the collection of rainwater nor do they affect the quality of the water in any way.

In 2007, the NSW Minerals Council awarded Northparkes Mines its Environmental Excellence Award for the floating module cover system.

Negotiations have been completed with an Australian plastics manufacturer to license the commercial production and marketing of the floating modules. There is now a working die that can be used to manufacture floating modules. This will allow other Rio Tinto mines, as well as other industries and the wider community, to use the technology. The floating modules are being marketed internally via posters and brochures, collaborative forums and internal conferences. Marketing to the wider community is being done through conferences, reports in the local Parkes media and in mining journals.

Towards excellence in water management (EWM)

This project (2003 – 2006) resulted in a set of diagnostic tools and a methodology to identify and prioritise water management issues at Rio Tinto operations. These tools have been applied successfully at a growing number of operating sites, as well as at the planning and construction stages of new projects.

Water reinjection at Yandicoogina

Many of the Pilbara's iron ore deposits are below the water table. Discharging ground water directly into existing creeks is thought to affect the long term sustainability of the ground water. This project trialled the reinjection of such water into an adjacent aquifer. A dewatering strategy was subsequently developed that is expected to be of use in similar hydrological environments.

Tailings management

Recognising how much water is lost on a mining site in the tailings and process water circuit, this project aims to minimise that loss by optimising the thickener, pumping and tailings storage capacity.

Lake Lonsdale barrier trials

This project tested the efficacy of using an injectable sealant system to control groundwater. The work was carried out on the Lake Lonsdale embankment, near Stawell, in Victoria. Its successful results have been communicated to other Rio Tinto business units and to other companies interested in reducing permeability and improving artesian conditions.

Funds Applied to Water management and control Project - to 30 June 2007

Project	Allocation	Expenditure
Subterranean barriers	\$595,741	\$595,741
Excellence in water management	\$1,200,000	\$1,271,830
Reducing evaporation losses	\$200,000	\$197,052
Tailings management	\$950,000	\$1,684,495
Ion exchange	\$65,000	\$65,000
Floating module	\$1,123,588	\$727,997
Reinjection of excess water at Yandicoogina	\$502,250	\$343,889
Total	\$4,636,579	\$4,886,004

Case study

Future Reef

The Great Barrier Reef is one of the world's most important natural assets. It is the world's largest coral reef ecosystem, stretching more than 2,300km along the northeast coast of Australia.

On an international scale, the Great Barrier Reef is much more than a natural showpiece. It poses many unanswered questions about our planet, making it a prime focus for scientific research. While little is known about the precise impact of climate change on the Great Barrier Reef, scientists do agree that coral reefs are being affected.

In November 2005, Rio Tinto Alcan (RTA) entered into a partnership with the Great Barrier Reef Foundation (GBRF) to support research-based initiatives to protect Australia's Great Barrier Reef.

Future Reef is a world first collaboration between industry and science in climate change reef research and is an active, \$1 million, four-year partnership. The University of Queensland is the research provider and runs the Heron Island Research Station where the partnership's two programmes are based.

The first programme is a four year Ocean Acidification research project - the world's first significant investigation into the impact of increased concentrations of carbon dioxide (CO₂) in oceans and on the Great Barrier Reef.

The second is a four year employee programme. This initiative involves Rio Tinto Alcan employees from its Australian operations working alongside reef experts on Heron Island to collect data for the research project.

The Great Barrier Reef Foundation was founded in 1999 by business leaders seeking to mobilise private sector resources to contribute to the preservation of the Great Barrier Reef. It is the only fundraising body focused solely on the Great Barrier Reef and is committed to raising national awareness about both the value of the Reef and its fragility.

As one of the many businesses operating within the Great Barrier Reef area, RTA recognised the potential contribution of GBRF and joined as a founding member in 2000. The Future Reef partnership is the result of this long standing relationship.

Future Reef formally commenced in January 2006 when a team of highly experienced and respected marine scientists from The University of Queensland's Centre for Marine Studies began preparing their Heron Island Research Station headquarters for the research program.

Scientists spent most of 2006 building new reef mini-environments, or mesocosms, in 2000 litre aquariums. Here they are varying carbon dioxide levels in the aquarium water, to simulate changing ocean acidification. They are also monitoring what happens to coral and other marine life as acidity changes.

In addition to the research programme, the employee programme commenced in March 2006 when the first group of 'Reef Searchers' visited Heron Island and participated in the research programme. The expedition gave employees an opportunity to learn more about climate change and thus encouraged them to drive energy efficiency across RTA's integrated aluminium business.

Two more expeditions followed in July and November of 2006 so that a total of 30 RTA employees have now participated in the programme.

In October 2006, the Future Reef partnership reached a significant milestone when it assisted the University of Queensland to secure a linkage grant worth \$475,000 from the Australian Research Council. The grant has enabled the University's scientists to significantly expand the scope of the research project into the impact of ocean acidification on the Great Barrier Reef.

As the world's largest aluminium producers, Rio Tinto Alcan's footprint in Queensland is almost exactly aligned with the Great Barrier Reef. The company ships its products and raw materials through the Reef and its main concentration of assets is located around Gladstone - the gateway to the Great Barrier Reef. Maintaining this access route is a fundamental business need for RTA.

By formalising a partnership with the GBRF, RTA has been able to establish and build relationships with key stakeholders to which the GBRF has access. The GBRF has a close working relationship with those organisations responsible for the reef as well as a network of organisations involved in the national response to climate change including government, science and industry groups.

In addition, the 'Reef Searcher' employee programme is providing RTA with opportunities to engage its employees in its long term emissions reduction initiatives. Programme participants are learning about climate change and its effects in a practical environment, encouraging them to implement improvement initiatives both at work and at home.

Other partnership outcomes include:

- making a real contribution to the sustainable development of the Great Barrier Reef
- benefiting the Australian community in a long-term, meaningful and lasting fashion
- delivering research that is relevant globally to the protection and preservation of reefs in a warming world
- providing an example of good practice between science and industry that will encourage others to form partnerships in the interests of sustainable development

The Future Reef partnership underwent an annual independent health check at the end of 2006. Results showed that the partnership and its two programmes are progressing well and meeting their objectives. Of particular note however, was the recommendation that the partners engage a part-time partnership manager to ensure Future Reef provides maximum benefits and opportunities to its partners. RTA and GBRF accepted the recommendation and the process of recruiting a suitable manager has begun.

Argyle Diamonds regional development and participation agreement

The Argyle Diamond Mine in WA's Kimberley region wants Aboriginal communities to derive sustainable benefits from the mine. The agreement therefore deals with: increasing direct community participation in the operation; business development; localisation and partnerships to improve health and other social and economic indicators.

The company believes that the agreement, which has been formally registered as an Indigenous Land Use Agreement by the National Native Land Title Tribunal, is a prerequisite for attaining a number of important goals - among them an Aboriginal employment rate of 40 per cent by 2008.

Argyle Diamonds extended stakeholder study

This project was part of the Argyle Underground Study that examined the economic and non economic repercussions of going underground at Argyle in order to extend the mine's life. Knowledge and methodologies from the extended study have become a resource for the universities involved, Rio Tinto, stakeholders, and the industry in general.

Spent aluminium smelter cell lining

This project is a collaboration between Rio Tinto and Cement Australia that has shown that calciner ash can be a commercially reliable feedstock for making cement. Calciner ash is a form of processed spent cell lining, which has hazardous properties.

Sustainable mining towns

This project aims to make Rio Tinto towns more sustainable and to develop a strategic framework for company interaction with mine dependent towns. Its findings will be incorporated into Rio Tinto business unit plans for normalising town management.

Important Bird Areas in Australia

This project helps Birds Australia to identify areas of international importance for bird conservation in Australia. These Important Bird Areas can be used by mine planners to minimise and offset threats to biodiversity.

Northparkes Mines sustainable farming

The Northparkes Mines Sustainable Farming project demonstrates and promotes the sustainable farming techniques that Northparkes Mines conducts on its buffer zone land.

Hlsmelt® slag utilisation

This project investigates uses for the high calcium slag that is obtained from the direct smelting of iron using the Hlsmelt® technology. Potential applications include: using it in cement; as a road base, and as a soil remediation treatment among other agricultural uses.

Reducing aluminium smelter dust and fumes emissions

The goal of the smelter emissions project was to reduce fluoride emissions from Rio Tinto Alcan smelters through the use of reduction line monitoring and dry scrubber technology. The goal is to keep all smelter emissions within legal limits and meet a number of internal targets. While the former goal has been met, emission levels – while improving – are still approaching the internal target.

SODAR inversion monitoring

This project aims to establish an atmospheric monitoring and prediction facility in order to identify conditions that are likely to cause 'overpressure amplification' and to result in exceeding blasting licence limits.

Real time noise and dust monitoring

This project aims to upgrade the effectiveness of existing dust and noise controls by developing a 'real time' monitoring and feedback system to alert operational staff.

Fly ash utilisation

This project documented an analytical technique for classifying fly ash. It also increased understanding of how fly ash can be used in the remediation of copper acid rock drainage.

Jabiru region sustainability project

The intention was to create a shared vision of a sustainable future for the inhabitants of the Jabiru region, site of ERA's Ranger uranium mine and the Jabiluka uranium deposit. The project finished in 2004 and, having created an effective collaborative forum capable of weighing options for the town and the region, was judged a success.

Funds Applied to Regional sustainability Project - to 30 June 2007

Project	Allocation	Expenditure
Argyle regional development	\$6,540,000	\$5,690,415
Argyle extended stakeholder study	\$150,000	\$201,553
Community economic development	\$1,000,000	\$1,146,648
Sustainable farming	\$33,600	\$39,500
Jabiru sustainability	\$200,000	\$136,038
Kwinana waste management	\$20,000	\$4,300
Spent cell lining	\$624,000	\$895,983
Fly ash utilisation	\$31,422	\$31,422
Smelter dust and fume	\$4,380,000	\$2,974,812
Three Springs water study	\$50,000	\$24,658
Sustainable mining towns	\$345,000	\$345,000
Real time noise and dust monitoring	\$1,170,330	\$1,058,801
Sodar Inversion Monitoring	\$193,400	\$110,504
Important bird area	\$153,590	\$377,319
Total	\$14,891,342	\$13,036,953

Mine life and site remediation

Case study

Excellence in closure management (ECM)

The main purpose of this project was the development and piloting of a diagnostic framework and methodology (the “ECM diagnostic”) to assist operations to develop and implement closure plans. The scope included developing “second tier” products to help operations to address gaps and opportunities in their closure planning.

The approach considered closure holistically; encompassing financial, operational, technical, environmental and social aspects of closure. Its implementation sought to deliver sustainable, positive post-closure legacies.

Early work on the ECM diagnostic (Phase One; 2004) focussed on developing a diagnostic methodology for evaluating closure plans and work programmes. The initial diagnostic framework benefited from broad cross-functional input.

The diagnostic was piloted at Weipa in December 2004 and feedback from participants indicated that:

- the diagnostic method was a useful framework for identifying gaps and risks;
- the workshop increased understanding of the Weipa closure plan and the key issues, and
- the results provided a basis for an improvement plan.

Phase Two, in 2005, aimed to develop and extend the ECM diagnostic method for broader application across the Rio Tinto Group. Improvements were made to the diagnostic methodology and supporting IT tool during early 2005, based on experience at Weipa.

More pilot studies were conducted at the Iron Ore Company of Canada (IOCC) and Energy Resources of Australia (ERA) during 2005 and the diagnostic method was further improved. The diagnostic was subsequently utilised at Bell Bay (Q3 2005) and Rio Tinto Coal Australia (RTCA) operations in the Hunter Valley (Q4 2005). These engagements marked the rollout of the ECM diagnostic as a robust, standardised, value-adding approach to closure planning.

Further opportunities to “fine tune” the framework and supporting software tools were identified in December 2005, with those changes made in January 2006. Throughout 2006, further diagnostic engagements were conducted at RTCA’s Tarong mine and at Rio Tinto Alcan’s Boyne Smelters. By year end, nine operating sites across Canada and Australia had used the diagnostic.

The development of “second tier” products to help operations to improve their closure planning occurred in 2005 and 2006. ERA developed such a second tier closure product in the form of a “road map” tool involving a generic risk-based decision tree method for prioritising and tracking closure studies and associated decision-making. In addition, guidance documentation was prepared to describe the process for developing a closure plan and cost estimate to meet the requirements of the Rio Tinto closure standard.

In Q4 2006, efforts turned to providing a common understanding of the closure study processes and level of scope definition expected in a closure plan at different stages of development (concept, pre-feasibility, feasibility), in order to underpin the ±20 per cent cost estimate requirement specified in the closure standard.

There are closure plan improvement programmes in place at most of the operations that have used the ECM diagnostic approach. At Weipa, IOCC and ERA, for example, the diagnostic outcomes contributed to the preparation of detailed action plans (and/or roadmaps) for updating existing closure plans. These three operations all subsequently committed to comprehensive work programmes under the auspices of newly created closure working groups

Remediation technology development

This project focused particularly on the development of technology that improves the remediation of environmental contamination. It has involved collaboration with overseas research groups. One cost effective technology that deals with groundwater contamination and that has been deployed successfully at several Rio Tinto sites is monitored natural attenuation. Another line of research has been conducted through the University of South Australia and involves developing phytotoxicity guidelines applicable to Australian conditions.

Metallurgical margin improvements (MMI)

MMI is a programme to identify ways to improve the performance of mineral processing plants. It recognises that the economics of treating ore are defined by revenue as well as by operating costs. The programme has identified the need to revitalise technical performance at many mine sites and contributed to the corporate initiative ‘Improving Performance Together’.

Gravity gradiometer

This project is a collaboration between Rio Tinto and researchers at the University of Western Australia who conceived the technology involved in constructing an airborne gravity gradiometer many times more sensitive than current models. Flight trials of the first instrument are scheduled during 2008.

Mining Marra Mamba ore below the water table

This project applies innovative techniques to dewater, mine and process Marra Mamba iron ore from below the water table. It enhances the sustainability of the iron ore operations and promotes best practice in water management, biodiversity and waste management.

Diesel fuel additives

This project demonstrated the effectiveness of a range of diesel fuel additives in increasing fuel efficiency and reducing greenhouse gas emissions from Rio Tinto's mobile plant.

Hunter Valley green offsets

The Green Offset strategy was developed to compensate for the loss of habitat caused by the extension of the Warkworth coal mine. It includes the protection and management of 758ha of land in non-disturbance areas and the management of 889ha in habitat management areas until the latter is required. In addition to a contribution to research, there is a programme to regenerate and rehabilitate woodland as well as an advisory group to monitor implementation.

Chalcopyrite heap leach

The aim was to improve the economics of mining and processing chalcopyrite copper orebodies by making them susceptible to heap leaching. The project established conditions for high copper recovery from chalcopyrite ores in columns and developed a way to predict the mineralogical capability of copper ores. The project also developed a costing and financial model to define the most economic heap/dump leach scenario for this technology.

Argyle underground project

This project was a pre-feasibility study of aspects of an underground operation at the Argyle diamond mine. As well as examining the potential for reserve extension, waste reduction, renewable energy opportunities and GHG reductions, the project considered how the extension might improve regional economic conditions.

Comminution efficiency

This project, carried out in collaboration with the CSIRO, AMIRA, the Julius Kruttschnitt Mineral Research Centre and Nottingham University, looked at ways to reduce the energy required to grind material into a fine powder in order to recover the valuable minerals. Several subsequent improvements have been demonstrated at Rio Tinto operations.

Hismelt® improved solid waste management in Kwinana

This project looked at how the waste of one industry at Kwinana in WA might have an economic value to another industry in the region.

International caving study

This long-term study of caving mechanics has been conducted by the Sustainable Minerals Institute at the University of Queensland since 1997. The ultimate aim is to promote block caving in order to reduce land use impact and the energy demands of conventional mining methods.

Funds Applied to Mining, mine life and remediation project - to 30 June 2007

Project	Allocation	Expenditure
Comminution efficiency	\$500,000	\$769,896
Bauxite activation	\$485,000	\$78,000
Three Springs talc ore sorter	\$1,100,000	\$822,041
Chalcopyrite heap leach	\$1,935,000	\$1,950,542
Remediation technologies	\$750,000	\$864,665
Green offsets	\$174,000	\$106,891
Argyle underground	\$200,000	\$245,913
Cohesive material	\$200,000	\$0
Excellence in closure management	\$482,780	\$394,378
Metallurgical margin improvement	\$769,000	\$887,543
Solid waste management	\$25,000	\$25,000
Block caving	\$600,000	\$0
Gravity gradiometer	\$3,600,000	\$5,878,656
Diesel additives fuel trials	\$213,000	\$133,125
Total	\$11,033,780	\$12,156,650

Communication and networking

Funding the Sustainable Resources Processing CRC (SRPCRC)

This project supports the SRPCRC in meeting its objectives. These objectives cover a wide range of sustainability issues that are relevant to Rio Tinto including, over the next three to five years; improved operating efficiencies, decreased demand for energy and water; reduced waste and lower greenhouse gas emissions.

Among the organisations that collaborate with and support SRPCRC are: the CSIRO; the University of Queensland; Sydney University, Curtin University; ANSTO, and around twenty companies.

Funds Applied to Communications and networking project - to 30 June 2007

Project	Allocation	Expenditure
SRP CRC contribution	\$2,450,000	\$455,181
MCA workshop	\$50,000	\$50,000
Total	\$2,500,000	\$505,181

Partners and contributors in the Foundation projects include:

Australia

ACMER (Australian Centre for Mining Extension and Research)	Commonwealth Department of Employment and Workplace Relations (DEWR)	Geoscience Australia	NSW Department of Agriculture
Alcan	Cooperative Research Centre for Coal in Sustainable Development	Goldfields Revegetation	NSW Department of Conservation and Conservation.
Alchemix	Cooperative Research Centre for Greenhouse Gas Technology	Great Barrier Reef Research Foundation (GBRRF)	Office of Indigenous Policy Coordination (OPIC)
Alcoa	Cooperative Research Centre for Sustainable Resource Processing	Gundjehmi Aboriginal Corporation	Orica
Anglo Gold	Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CARE)	Holcim	RMIT University
ANSTO	CSIRO (Land and Water)	Hunter Coal Industry JV	Sandvik Tamrock
APS	CSIRO (Manufacturing and Infrastructure Technology)	Ian Wark Research Institute (University of South Australia)	Schlumberger
Arcadis	CSIRO (Mathematics and Statistics)	Indigenous Community Volunteers (ICV)	Sustainable Minerals Institute (University of Queensland)
Ash Development Association of Australia	CSIRO (Minerals)	Indigenous Stock Exchange (ISX)	Sydney University
Australian Coal Association Research Program (ACARP)	CSIRO (Mining and Exploration)	International Network for Acid Prevention (INAP)	The University of Newcastle
Australian Cooperative Research Centre for Renewable Energy (ACRE)	Curtin University	Itasca Consulting Group	The University of Newcastle Research Associates (TUNRA)
Australian Minerals Industry Research Association (AMIRA)	DeBeers Consolidated Mines	Jabiru Town Development Authority	University of Adelaide
Australian National University (ANU)	Department of Industry, Tourism and Resources (DITR)	Julius Kruttschnitt Mineral Research Centre (JKMRC)	University of Melbourne
Australian Research Council (ARC)	Department of Infrastructure Planning and Natural Resources (DIPNR)	Kwinana Industries Council	University of New South Wales
Australian Workers Union	Energetics	LKAB	University of Queensland
BHP Billiton	Flinders University	Minerals Council of Australia (MCA)	University of South Australia
Cement Australia		Monash University	University of Western Australia
Central West Farming System		Murdoch University	University of Wollongong
Centre for Environmental Risk Assessment and Remediation (CERAR)		Murray Darling Basin Commission	Western Australia Limestone
Chevron Texaco		Natural Step Australia	Western Power
Cleanteq		Newcrest Mining Ltd	Wimmera Mallee Water
		Northern Land Council	Woodside
			Xstrata

International

Alchemix	Investigaciones Forestales, Agrícolas y Pecuarias, Mexico	Tribovent
Arizona State University		University of Aberdeen
Auckland University	International Institute for Applied Systems Analysis	University of Arizona
Battelle Memorial Institute		University of British Columbia
Center for Agricultural and Rural Development, Iowa State University	International Network for Acid Protection	University of Cape Town
Centre International de Recherche sur l'Environnement et le Developpement	Japan Science and Technology Corporation	University of Colorado
China Energy Research Institute	Joint Global Change Research Institute	Universidad Nacional de Cordoba, Argentina
Chinese Meteorological Administration	McGill University	University of Illinois
Codelco	Moscow Energy Research Institute	University of Lund
Codexis	National Center for Atmospheric Research (NCAR)	University of Maryland
Contaminated Land: Applications In Real Environments (CLAIRE)	National Institute for Environmental Studies	University of North Carolina
Council on Agricultural Science and Technology	Outokumpu Lurgi	University of Nottingham
Council on Energy and Environment (Korea)	Pacific Northwest National Laboratory	University of Oxford
Federal University of Rio de Janeiro	Potsdam-Institut fur Klimafolgenforschung	University of Sussex
FutureGen Industrial Alliance	QED Occtech	University of Wales-Bangor
Greenwich University	SMS-Demag	VAI
Indian Institute of Management	Stanford China Project	Voerde
Instituto Mexicano del Petroleo	Stanford Institute for International Studies	
Instituto Nacional de	Tata Energy Research Institute	
	Texas A&M	
	The Tyndall Centre for Climate Change Research, University of East Anglia	

Reconciliation of funds

Reconciliation of Government Loan Funds

Summary as at 30/06/2007:	Notes	AUD 000s	AUD 000s
Loan funds balance at 30/06/2007	1		35,000
Allocations:			
Approved expenditure		(35,000)	
Approved unexpended allocations		(0)	
Total allocated funds			(35,000)
Remaining funds available for allocation			(0)

Rio Tinto Contribution

Summary as at 30/06/2007:	Notes	AUD 000s
Approved expenditure		(36,793)
Approved unexpended allocations	2	(3,646)
Total Rio Tinto Contribution		(40,439)

Notes

Note 1: Government Loan Funds	AUD 000s
Balance brought forward at 1/7/2002	0
Advances to 31/12/2003	23,300
Advances from 01/01/2004 to 31/07/04	11,700
Loan repayments to 30/06/2007	0
	35,000

Note 2: Approved Unexpended allocation – Rio Tinto Funds	AUD 000s
Disbursement at 1/7/2002	0
Total Rio Tinto Funded projects approval	40,439
Approved expenditure	(36,793)
Approved unexpended allocation	3,646

Audit report

The Rio Tinto Foundation for a Sustainable Minerals Industry (“the Foundation”)

Independent Audit Report to the Advisory Board of the Foundation

Scope

We have audited the attached funds reconciliation of the Rio Tinto Foundation for a Sustainable Minerals Industry, which comprises the statement of position of government loan funds, the statements of disbursements and expenditure from government loan funds and the Rio Tinto contribution, and the related notes, as at 30 June 2007.

The Advisory Board Members are responsible for the preparation of the funds reconciliation, and have determined that the accounting policies used are appropriate to meet the needs of the Foundation and the users of the funds reconciliation. We have conducted an independent audit of the funds reconciliation in order to express an opinion on its preparation and presentation. No opinion is expressed as to whether the accounting policies used are appropriate to the needs of the Foundation.

The funds reconciliation has been prepared for distribution to the Foundation for the purpose of fulfilling Rio Tinto’s responsibilities as set out in the Charter and Rules of the Rio Tinto Foundation for a Sustainable Minerals Industry. We disclaim any assumption of responsibility for any reliance on this report or on the funds reconciliation to which it relates to any person other than the Advisory Board of the Foundation, or for any purpose other than that for which it was prepared.

Our audit has been conducted in accordance with Australian Auditing Standards. Our procedures misstatement, whether caused by fraud or other irregularity or error. In forming our opinion, we also evaluated the overall adequacy of the presentation of information in the Annual Report.

The audit opinion expressed in this report has been formed on the above basis.

Audit Opinion

In our opinion:

- The funds reconciliation statement gives a true and fair view of the state of affairs of the Rio Tinto Foundation for a Sustainable Minerals Industry at 30 June 2007; and
- The funds reconciliation statement has been properly prepared for the Rio Tinto Foundation for a Sustainable Minerals Industry at 30 June 2007.



Steve Baker

Canberra Executive Director

21 January 2008

Declaration of Chairman and Executive director

The funds reconciliation statement and annual report give a true and fair view of the state of affairs of the Rio Tinto Foundation for a Sustainable Minerals Industry as at 30 June 2007.



Charlie Lenegan

Chairman



Dr Bruce Kelley

Executive director

30 May 2008

Cover shot: Floating modules at Northparkes, NSW.
Image supplied by Rio Tinto.

For convenience, we use "Rio Tinto" to describe Rio Tinto Limited and Rio Tinto plc and their affiliated companies, although all of these are independently managed, separate and distinct entities. Rio Tinto plc and Rio Tinto Limited are combined in a dual listed companies structure as a single economic entity.

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