



Coal Association of New Zealand Inc.

Annual Review 2004



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Coal Association of New Zealand Inc.

Directors

| | |
|--------------------|------------------|
| C Baker - Chairman | (Other) |
| B Bragg | (Coal Producers) |
| B Francis | (Coal Producers) |
| G Perkins | (Coal Producers) |
| R Pullein | (Coal Users) |
| S Riddell | (Coal Producers) |
| N Shewan | (Coal Users) |

Officers

| | |
|-----------|--------------|
| Secretary | T W Matheson |
| Treasurer | R McGregor |

Representatives

| | |
|--------------|------------|
| EXITO | M Reynolds |
| | M Pizey |
| Mines Rescue | D Stewart |

Coal Producer Members

| | |
|---------------------------|-------------------------|
| Birchfield Coal Mines Ltd | Menzies Mining Company |
| Burkes Creek Mining | Mt Somers Mines Ltd |
| Canterbury Coal Company | New Creek Mining |
| Cascade Mining Ltd | New Vale Coal Co. Ltd |
| Francis Mining Co. Ltd | O'Reilly's Opencast Ltd |
| Glencoal Energy Ltd | Rogers Mining Ltd |
| Harliwich Carrying Co | Solid Energy NZ Ltd |
| Heaphy Mining | Victory Lime 2000 Ltd |
| Kai Point Coal Co. Ltd | Waituna Coal Mine |
| MacDougall Mining | |
| McLaughlin Mining | |

Associate Members

| | |
|-----------------------------------|---|
| A W Taylor Industrial Coal Ltd | Metso Minerals (New Zealand) Ltd |
| Alliance Group Ltd | Montgomery Watson Ltd |
| Bruce Grant Consultants | National Institute of Water and Atmospheric Research (NIWA) |
| Canterbury Health | Natural Gas WEL Energy |
| Coal Distributors (Auckland) Ltd | NZMP (Edendale) |
| Coal Marketing Services | NZ Steel Ltd |
| Coal Power Ltd | Oderings Nurseries, Christchurch |
| Doug Hood Contractors | Otago Regional Council |
| G L Bowron Ltd | Phillips Fox |
| Genesis Power | Pike River Coal Ltd |
| Golden Bay Cement | Port of Greymouth |
| Heinz-Wattie Ltd | Robert H Hall Group Ltd |
| Holcim (New Zealand) Ltd | Sea-Tow Ltd |
| Huntly Retail Distribution Centre | SGS NZ Ltd |
| Kenham Holdings Limited | Shipherd Nurseries |
| Kenroll Industrial Coal Ltd | Sinclair Knight Merz |
| Lincoln University | Skellerup Industries Ltd |
| Lion Breweries South | University of Canterbury |
| Lyttelton Port Company Ltd | University of Otago Physics Dept. |
| McDonald's Lime Ltd | Valley Wood & Coal |
| Meridian Solutions | Websters Hydrated Lime Co Ltd |
| Meritec (Worley Consultants) | |

The year to March 2004 has been a challenging and rewarding year for the coal industry and for the Coal Association. A number of events, in addition to the activities of individual players in the industry and the Association itself, have brought a welcome exposure and focus to coal in New Zealand.

Over recent years the Government's focus and enthusiasm for renewable energy has been a barrier to the rational development of the energy sector in New Zealand, and to the coal industry. Linked to this issue there has been and continues to be a widely held perception that Climate Change and New Zealand's obligations to the not yet in force Kyoto Protocol, are not compatible with increased coal use.

These issues were brought into sharp focus during the year when Meridian Energy abandoned Project Aqua. The logic was always that an appropriately located coal fired power station would be of greater benefit to the New Zealand electricity generation sector than additional hydro capacity in the South Island. However, it took the demise of Project Aqua to highlight the importance of New Zealand's coal reserves and to encourage some constructive debate about New Zealand's energy options.

There are two key issues that support the increased use of coal in New Zealand. The first is:

It is obvious that a portfolio approach to energy generation in New Zealand is required, including both supply and demand side options. With the rapid depletion of Maui however, coal is the one option that provides security of supply, at a reasonable cost. Reserves are certain. Coal, as an important component of the energy mix gives New Zealand the best opportunity to maintain our competitiveness in the primary and resource sectors that are energy intensive and that comprise such a large part of our economy.

The second issue is:

There is a widely held perception that New Zealand, being a signatory to the Kyoto Protocol, should not use coal. This is nonsense. Rather, coal has a vital and pivotal role in the provision of energy internationally, now and clearly for the next few decades, or longer. No other energy source is as cost effective and so widely available in New Zealand. Other technologies will develop over time and the world will transition to low cost, low emission energy technologies. However, until there is a viable technology alternative for developing countries as well as a large number of developed countries, investment in the technologies that capture and store CO₂ released by coal utilisation should be and is a priority internationally. New Zealand should have the same view.

The Coal Association promotes this perspective. Support and investment in carbon capture and storage and Hydrogen technologies, membership of international research and information agencies (International Energy Agency Clean Coal Centre and IEA GHG R&D programme), and dissemination of information within New Zealand are helping to achieve a more rational development of energy sector policy in New Zealand. The Coal Association's rolling five year strategy is committing more funds and resources into these areas. In addition, we are looking to the Australian coal sector whose Coal21 programme, a partnership between industry, government and the research sector, aims to develop the technologies to significantly reduce emissions from coal fired electricity generation while "*maintaining our international competitiveness*". Coal, and consequently energy, is a major comparative advantage for the Australian economy, and the Coal Association's strategy is to lever off the Australian initiatives for the benefit of New Zealand.

Looking at local developments in the industry, a detailed summary 'The Year in Review' is included in this Annual Review for 2004 (page 5).



Chris Baker

“With the depletion of Maui however, coal is the one option that provides security of supply, at a reasonable cost.”

The Coal Association reported a surplus of \$4.6k for the March 2004 financial year against the budgeted deficit of \$150k. Association expenses were generally in line with budget but some planned project expenditure was not incurred.

The budget for the 2005 financial year forecasts a deficit of \$290k. This deficit is being funded from existing resources and is in line with our strategy to optimise the coal industry's position in the current political and energy environment. The five year plan requires significant additional funds being applied to the areas of research, information and promotion.

CRL Energy continues to trade profitably, albeit sometimes in difficult conditions and has established itself as an independent and credible centre of research and consulting knowledge. This is a credit to that organisation, and a key asset for the coal industry.

Looking forward key priorities and activities for the Association in 2004/05 and beyond are:

- * Promoting and supporting research consistent with our long term vision regarding coal technologies; and
- * Addressing the barriers, through better quality information and better dissemination of that information, to optimal use of coal in New Zealand. Two key initiatives that support this strategy are:
 - Arranging visits, seminars, exposure for international experts in relevant fields of research; and
 - Organising a technical and policy focused tour(s), to Australia, for selected stakeholders and policy makers.

Challenges remain, but technology opportunities, supported by sound research and sound strategies, provide a clear and bright path for our industry to 2020 and beyond.



Chris Baker
Chairman

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Climate change policies and their potential effect on coal production and utilisation; the long-term role of coal to provide a significant contribution to New Zealand's energy sector; and the future introduction of Air Standards by the Ministry for the Environment are all issues which have kept the Coal Association busy making submissions to Government and helping members negotiate the complex path through climate change initiatives in the past financial year.

To ensure the Coal Association's resources are best focused to address the barriers to coal use in New Zealand, the Association has also been reviewing its strategy and five-year plan.

The Association has also been supporting ongoing research into areas such as hydrogen technology, carbon sequestration, and acid mine drainage, projects which have all made significant progress in this past year.

Coal Association Strategy

New Zealand faces a significant consumer energy and electricity supply gap over the medium term, which will adversely impact on the country's prosperity. A range of supply and demand side options exists to fill this gap. The Coal Association's objective is for coal to be a major contributor, with general public support, to the supply side solution.

Coal Association's plan to achieve this objective is:

- ✱ To link to, and form alliance(s) with, international projects to scope, develop, demonstrate and implement near zero emissions coal-based energy production that will achieve major reductions in the emission of traditional pollutants and to remove and sequester CO₂ emissions from the combustion of coal.
- ✱ To promote and provide relevant New Zealand based R&D and to adapt those projects and related technologies to New Zealand conditions.
- ✱ Use the outcomes of these projects and research to inform government, industry and the wider public both as an input to policy development and to gain greater acceptance for the use of coal.
- ✱ Facilitate the demonstration, commercialization and early uptake of clean coal technologies identified for New Zealand.

- ✱ Form alliances with national coal customers and other stakeholders to facilitate the uptake of coal as a major contributor to energy supply in New Zealand.
- ✱ Foster greater public awareness and positive acceptance of:
 - the current and potential contribution of coal to the wealth of New Zealand;
 - the use of clean coal technologies for near zero emissions coal-based energy production to significantly reduce or eliminate the emission of traditional pollutants;
 - the potential for the removal and sequestration of greenhouse gas emissions and the role these technologies will play internationally; and
 - the mining of coal in New Zealand being undertaken in an environmentally responsible way.
- ✱ Gain a higher profile with industry generally and the general public as a credible organization that can speak authoritatively on issues relating to coal production and coal use in New Zealand.

The Association has developed a five year plan to achieve these objectives.

Energy Security

As New Zealanders recovered from the 2002 electricity supply crisis, June 2003 saw the Government establishment of a seven-member Electricity Commission to govern aspects of the electricity industry. The Commission is charged with the task of securing reserve generation to ensure electricity supply security in very dry years without power savings campaigns.

On announcing the Commission at the Energy Federation of New Zealand (EFNZ) conference in Wellington, the Minister of Energy, the Hon. Pete Hodgson, identified fossil fuels as having a key role in the provision of the reserve capacity.

"Security is being under-provided because it is a shared good. Some security-enhancing investments are not being made because, although they may be beneficial from a nation-wide economic perspective, the investor may not be able to capture enough of the benefits that accrue to all

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consumers from that investment. An example might be the absence of a sufficient coal stockpile at Huntly this year to cope with the demands of a very dry year.”

EFNZ chairman and Managing Director of CRL Energy Ltd, Dr Rob Whitney, emphasised several points in his summing up of the EFNZ conference. “There are plenty of fuel reserves in New Zealand, including coal, renewables and potentially natural gas. The market needs the right structure and incentives to deliver on security of supply.”

“The recent electricity crisis has resulted from the system being constrained in terms of short-term energy supply rather than power generation capacity. This means there is not a convincing case for the need for additional reserve generation. The priority for the commission should be to improve the existing market.”

Also on the energy security front, many other nations have or are developing energy policies, which are highly influenced by circumstances similar to New Zealand’s. As a result there are common interests in a range of studies and research activities carried out by relevant International Energy Agency Implementing Agreements.

To enhance our collaboration with these nations, the Coal Association, with support from Genesis Energy and Solid Energy, joined the International Energy Agency Clean Coal Centre (IEA CCC) late last year. The



Association’s entry into the CCC allows New Zealand access to in-depth reviews of issues central to using coal, particularly power generation and advanced technologies. If any Coal Association members would like to find out more about some of the reports that are available please contact Trevor Matheson at CRL Energy Ltd.

Climate Change

In mid-2003, the Government finalised its policy for large emitters of greenhouse gases to negotiate deals exempting them from carbon tax, and the Marsden Point oil refinery negotiated the first successful NGA.

The agreement means refinery operator the New Zealand Refining Company will not have to pay the carbon tax due to be introduced in 2007, which would otherwise have been applied to the energy used by the plant. As part of the deal, the Marsden Point oil refinery has made a commitment to improving its energy efficiency to “World’s best Practice” by 2012.

Following in the refinery’s footsteps, mid-November saw the Government invite four more firms to negotiate an NGA: the glass container manufacturer ACI Glass, Kawerau paper mill operator Norske Skog Tasman, and gold mining companies Newmont Waihi and GRD Macraes.

The Convenor of the Ministerial Group on Climate Change, the Hon. Pete Hodgson said “The commencement of negotiations for these NGAs is a significant step in the implementation of climate change policy, which is designed to enable New Zealand to meet its obligations under the Kyoto Protocol. NGAs will constrain greenhouse gas emissions while protecting the international competitiveness of New Zealand businesses. They encourage

businesses to pursue the economic and environmental advantages of best practice in emissions management.”

Many more companies have applied for NGAs in 2004 and assessments are ongoing. The Greenhouse Policy Coalition of industries, which includes the Coal Association, has questioned whether the Climate Change Office is adequately resourced to negotiate the number of applications this year.

In August 2003, the Minister announced that ‘Projects to Reduce Emissions’ are expected to be a significant source of early gains in reducing New Zealand’s greenhouse gas emissions. Mr Hodgson was speaking to an Energy Federation meeting on the “Projects to Reduce Emissions” scheme, which will reward emission-reducing projects with internationally tradeable carbon credits created by the Kyoto Protocol.

The New Zealand Climate Change Office conducted the first round of tenders for Projects in September and October 2003 and received 46 bids for the four million emission units on offer. In December it announced the first 15 successful projects which included:

- Wellington’s first windfarm, the Wainui Hills Wind Farm will receive 378,000 carbon credits for a wind farm up to 30 megawatts with between 10 and 17 turbines;
- Genesis Energy were awarded 330,000 tonnes of CO₂ credits for doubling existing Hau Nui wind farm (+5MW later this year) and 19MW at Awhitu Peninsular next year (depending on consent process);
- Te Rere Hau Windfarm, New Zealand Windfarms a proposed 50 MW wind farm in Manawatu;
- Toronui Mini-Hydro Power

Coal Association



Scheme, Esk Hydro Power a proposed mini-hydro scheme on the Pask family's Toronui station in northern Hawkes Bay; and

- Awapuni Landfill, Palmerston North City Council a proposed scheme for generating electricity from landfill gas.

“With Projects, we identify activities that reduce greenhouse gas emissions, account for those reductions under the Protocol and reward the activities using Assigned Amount Units – those things we usually refer to as emission units or carbon credits.

“The Government sees this policy as a key measure to encourage greenhouse gas reductions before the introduction of an emissions charge in 2007. We want to support businesses and individuals with innovative ideas for reducing emissions, by providing an incentive to make their projects happen.”

Mr Hodgson says the Climate Change Office gives weight when ranking proposals to projects that will achieve emissions reductions before 2008, primarily to encourage projects that would contribute to New Zealand's near-term electricity security.

Also on the emissions front, December 2003 saw the Coal Association lodge a submission with the Ministry for the Environment on the proposed National Environmental Standards (NES) for Air Quality. The submission stated that the Coal Association opposed the proposed PM₁₀ and sulphur dioxide standards on the grounds that they would have a significant impact on the operations of many coal users. Further, the Ministry for the Environment should not proceed with the development of standards until evidence is presented that persuasion of regional councils using the 2002 advisory guidelines is not working and compulsory standards are needed.

The Coal Association still believes the adoption of ambient air quality standards is unnecessary to maintain air quality, and at the least a National Policy Statement process should first be undertaken to determine whether there are environmental problems needing the national interest to be addressed.

The Coal Association considers this proposal should not have been presented without a credible assessment of the costs and benefits to the range of industries in each regional council area. It was not satisfactory to conduct the consultation process “in parallel” with the preparation of the cost benefit analysis of the proposal and its alternatives.

Despite the submissions, in June 2004, MfE announced that the package was likely to soon receive Cabinet approval. The Coal Association believes that MfE has failed to provide a robust analysis to justify punitive policies towards regional councils rather than encouragement and education. In May 2004, MfE published its cost benefit analysis of the proposed NES. The paper claimed that total costs of the NES package to 2020 would be \$111 million compared with \$318 million benefits (both in net present value) from reductions in premature deaths,



hospitalisations and reduced activity days off work.

The paper assumed on the basis of a brief survey that costs to industry would be \$100,000 at each of 10 industrial sites each year. The benefits from industrial measures have not been separated from emissions improvement benefits from home heating and transport, a new wood burner standard and prohibitions on various dioxin producing activities. It is reasonable to assume that because home heating has been identified as the major contributor to PM₁₀ (fine particulate) pollution situations, further reductions in industrial PM₁₀ emissions would be shown to be extremely costly for any benefits achieved.

Domestic heating has been shown to be the main source of PM₁₀ problems and many councils are already undertaking sensible measures to restrict open fires and older, smoky enclosed burners while encouraging low emission burners. The NES risk to industrial coal users is that councils may be under pressure from constituents to blame industrial PM₁₀ emissions when these are already well controlled through resource consent processes.

As 2013 approaches, industries will be left in a state of uncertainty as to how MfE and individual non-complying councils will interpret the requirement that no new resource consents will be granted where a plant is considered a primary source of PM₁₀ emissions. Further details of the proposed air standards are outlined in the June 2004 Coal Newsletter, along with some of the Coal Associations objections to the scheme.

In addition to the Coal Association submission, Solid Energy and a number of Canterbury industries and unions co-operated with Environment Canterbury in a strongly worded submission opposing the MfE approach to the standards.



Environment Waikato also made a strong statement opposing the proposed standards.

However, despite the Coal Association's objections to the looming National Environmental Standards other relationships with MfE are flourishing. In another climate change initiative, the Coal Association is one of several industry and business groups participating in a two-year joint project with MfE entitled 'Educating Business Energy Consumers in Climate Change Solutions'. The project is being coordinated by CRL Energy on behalf of the Energy Federation of New Zealand (EFNZ).

Research

In the past financial year, CRL Energy and Industrial Research Limited, with funding from the Foundation for Research, Science and Technology and additional support from Solid Energy and the Coal Association, have been developing a technology platform for moving New Zealand towards a hydrogen-based energy system. The move towards hydrogen energy is a global one and is rapidly gaining momentum, driven

by the need to meet increasing energy demand using clean technologies, the need for energy security, and advances in hydrogen utilisation technologies such as fuel cells.

Coal will be an integral part of enabling New Zealand and the world to make the transition to a hydrogen energy future. New Zealand has an estimated 8.6 billion tonnes of economically recoverable coal reserves which should reliably meet New Zealand's energy needs for hundreds of years. Much of these reserves are particularly suited for hydrogen rich gas production. The aim is to exploit this suitability and to develop a totally new 'carbon-based fuel to clean hydrogen to electricity' technology package suitable initially for distributed energy generation and ultimately for large-scale implementation. A zero emission process can be achieved by separation and storage of the CO₂ by-product.

A milestone for this research project was launched on 23 February, 2004, when the Associate Minister of Energy, the Hon. Harry Duynhoven, pulled a lever to release a measure of lignite into a 50kW advanced technology coal gasifier.

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Using heat and air coal entering the gasifier is reduced to a char, then steam is added to the char to produce a syngas product - a mixture of hydrogen and carbon monoxide. Next up filtration separates the hydrogen and carbon byproducts.

The syngas product from coal gasification may, with minimal clean-up, be used in engines to produce electricity. With a little more clean-up it may be used in a combined cycle gas turbine/steam turbine plant. Further clean-up makes it suited for use in solid oxide and molten carbonate fuel cells – the ones best suited for larger scale electricity production – while rigorous clean-up yields high purity hydrogen for use in the alkaline and proton exchange membrane fuel cells suited for smaller scale distributed generation and powering motor vehicles.

The launch of the gasifier was witnessed by international delegates from the United States, Europe, the United Kingdom, Canada and Australia. CRL Energy's Managing Director, Dr Rob Whitney, hailed this lever pulling event at CRL Energy

Ltd in Lower Hutt as a milestone in the future of New Zealand's energy security.

Carbon sequestration symposium

February 2004, saw another major event for the Coal Association, the Carbon Sequestration Symposium, which hosted a squad of international delegates from the United States, Europe, the United Kingdom, Canada and Australia, who presented leading edge research and demonstration projects on the capture and storage of carbon dioxide as a viable option for achieving large reductions of CO₂ emissions.

The Coal Association, in partnership with CRL Energy Ltd and Solid Energy New Zealand Ltd, hosted the symposium in Wellington. The meeting was also supported by the International Energy Agency Greenhouse Gas Research and Development Programme, the Ministry for Economic Development and the Royal Society of New Zealand.

With the growing concern regarding the effect of GHG emissions on

Coal Association

the global climate, cutting greenhouse gas emissions has become of fundamental importance. Projects which reduce greenhouse gas emissions not only reduce the impact on global warming, but also reduce Carbon Tax, and earn New Zealand carbon credits.

Capture of carbon byproducts from coal utilisation, followed by storage in geological formations, is fast becoming one option to decrease the amount of carbon dioxide being emitted to the atmosphere. Possible sinks include depleted oil and gas wells, deep saline aquifers and unminable coal seams and offer the potential to sequester very large amounts of CO₂ for very long periods of time.

CRL Energy's sequestration expert, Dr Trevor Matheson organised the international symposium, where delegates described long-term projects by Norway in the North Sea and Canada in Saskatchewan where millions of tonnes of CO₂ have been injected into geological formations for many years without any evidence of leakage.

"Very detailed monitoring programmes to validate the retention of CO₂ were described. Other speakers described research and demonstration projects being undertaken in the Netherlands, the UK, Australia and the US by governments and public/private consortia.

"It was obvious during the course of the symposium that many countries regarded CO₂ capture and storage as an important plank in their emissions reduction strategy. It was also obvious that fossil fuels were identified as being a key global energy source well into the future. All of the countries represented (Australia, Canada, Norway, the Netherlands, United States, United Kingdom) were considering a portfolio of measures to reduce CO₂ emissions, but all acknowledged that fossil fuels would play a key role for many years





Mile Valley, an area which the Government-owned State Coal Mines began prospecting in 1930. The miners were not too put out, they only had to move down the road to the new Spring Creek Underground Mine.

And finally, the first half of 2004 has seen the completion of the \$30 million upgrade at Lyttelton Port. The upgrade should see the port company's coal handling facilities moving coal to a ship faster, minimising the amount of time coal is piled up at the port. Solid Energy sees the upgrade as an important step towards overcoming transport constraints for moving their coal.

while the transition to a renewable future evolved.

"It became evident that New Zealand is lagging behind the rest of the developed world in R&D into CO₂ capture and storage. It is a particularly relevant area of research given the vast deposits of coal that New Zealand has available as an energy source and the research in place on the use of these resources to develop a hydrogen economy as an alternative energy future. This zero emission future can only be achieved if the CO₂ produced is prevented from venting to the atmosphere," says Dr Matheson.

More information about these and other research projects can be read about in the Research Highlights section in this Annual Report (see pages 17 to 20).

Diversifying

This past year has also seen some of our members looking to diversify their activities. In September 2003, Solid Energy entered into the biomass business with the purchase of Pellet Fuels NZ Ltd, they also formed a new company called Solid Energy Renewable Fuels Ltd. And in 2004, Kenham Holdings announced

their expansion into coal seam gas and oil exploration. CRL Energy Ltd, the Association's 70 percent-owned research arm has also seen extensive diversification from coal to a much wider remit of energy, including hydrogen from coal, in the past year.

August 2003 saw the end of an era of sorts with the closure of the Strongman 2 Underground Mine. The mine was situated in the Nine



Coal to hydrogen research

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Thomas, L.E. *May 2003*. "New Zealand's Fuel Cell Future". Reviewed by Matheson, T.W., Clemens, A.H. *et al.* Published by Energy Efficiency and Conservation Authority (EECA).

Thomas, L.E. *2003*. "Hydrogen, Fuel Cells, Energy". Reviewed by Matheson, T.W., Pearce, S. *et al.* Published by Royal Society of New Zealand. Alpha 118.

Climate change, greenhouse gas and CO₂ mitigation research

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Clemens, A.H., Kessels, J.R., Matheson, T.W. and Pearce S.M. *November 2003*. "The Prospect for Future Coal Utilization/CO₂ Mitigation in New Zealand". 12th International Conference on Coal Science, Cairns, Australia.

Gazo, C. and Rackley, J. *November 2003*. "Review of Existing Climate Change Tools for Small to Medium Sized Businesses". Progress report to the Sustainable Management Fund, Ministry for the Environment.

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Hennessy, W.W. *2004*. "Inventory of HFC, PFC & SF₆ emissions for New Zealand 2002-2003". Report by CRL Energy Ltd to the New Zealand Climate Change Office.

Kessels, J.R. and Hennessy, W.W. *2004*. "The impact of emissions trading on the coal industry." IEA Clean Coal Centre report CCC/86.

Kessels, J.R. and Rackley, J. *September 2003*. "A Guide to Estimating Greenhouse Gas Emission Reductions from New Zealand Projects". Published by CRL Energy Ltd.

February 2004. "A Viable Option for Achieving Large Reductions of CO₂ Emissions". A symposium on geological sequestration of CO₂ organized by CRL Energy Ltd in partnership with Solid Energy New Zealand Limited and the Coal Association of New Zealand Inc. held in Wellington.

Acid Mine Drainage Research

Black, A., Trumm, D.T., Cavanagh, J., Harding, J., de Joux, A., Moore, T.A., and O'Halloran, K. *September 2003*. "Developing remediation strategies for New Zealand sites impacted by Acid Mine Drainage (AMD). A case study, Sullivan Mine, West Coast, New Zealand". Sixth International Symposium on Environmental Geochemistry, 7-11 September 2003, Edinburgh.

Black, A., Trumm, D., and Lindsay, P. *2004 - in press*. "Impacts of coal mining on water quality and metal mobilisation: case studies from West Coast and Otago". *In: Metal Contaminants in New Zealand, From Sources and Transport to Effects on Ecology and Human Health*. Editors: Tim Moore, Amanda Black, Jose Centeno, Jon Harding, Dave Trumm, Published by Caxton Press.

O'Halloran, K., Black, A., Bradley, A., Cavanagh, J., Harding, J., de Joux, A., Moore, T., and Trumm, D. *October 2003*. "Assessment and remediation of A New Zealand west coast Acid Mine Drainage (AMD) site". Society for Environmental Toxicology and Chemistry, September 28 - 1 Oct, 2003, Landcare Research, New Zealand.

Trumm, D.T., Black, A., Cavanagh, J., Harding, J., de Joux, A., Moore, T.A., and O'Halloran, K. *July 2003*. "Developing assessment methods and remediation protocols for New Zealand sites impacted by Acid Mine Drainage (AMD)". Sixth International Conference on Acid Rock Drainage 2003, 12-18 July 2003 in Cairns, Queensland, Australia.

Trumm, D.A., Black, A., and Gordon, K. *September 2003*. "Remediation strategies for acid mine drainage (AMD) at Sullivan Mine, West Coast, New Zealand". AusIMM conference, 2-5 September 2003, Greymouth, New Zealand.

Trumm, D.A., Black, A., Gordon, K., Cavanagh, J., and de Joux, A. *2004 – in press*. "Acid mine drainage assessment and remediation at an abandoned West Coast coal mine". *In: Metal Contaminants in New Zealand, From Sources and Transport to Effects on Ecology and Human Health*. Editors: Tim Moore, Amanda Black, Jose Centeno, Jon Harding, Dave Trumm, Published by Caxton Press.

Other research

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Rossouw, P. *June 2004*. "Literature survey on international residential energy-use models applicable to New Zealand". Report HEERA F/1/1, Wellington.

Rossouw, P. *April 2004*. "End-use energy demand in New Zealand's residential sector: Development of the HEERA Residential energy-use model". Report HEERA F/1/2, Wellington.

Rossouw, P. *30 June 2004*. "HEERA and the Household Energy Efficiency Project". Workshop PowerPoint presentation. Report HEERA F/1/3, Wellington.

Newspaper and magazine articles on Coal Association sponsored research

"Hydrogen Fuel Cells May Lead to Clean Energy", The Dominion Post, Business Section, 24 February, 2004.

"Hydrogen Fuel Cells Step Into Future", The Press Christchurch Business Day C3, 24 February, 2004.

"Hutt Rockets Ahead – Hydrogen Future Fuel of Choice", Hutt News, 2 March 2004.

"The Coal Rush", New Zealand Geographic Feature Article, Number 68, July-August 2004, pp 38 - 57

"Kiwi Researchers On Verge of International Breakthrough in Hydrogen Technology", New Zealand Energy and Environment Business Week, Vol 1, No. 12, 7 July 2004.

Other Publications

Four Issues of the Coal Newsletter

The Coal Association Newsletter is circulated to over 1,300 energy professionals throughout New Zealand and internationally.

Coal Association Annual Review 2004.

It has been a year of consolidation for CRL Energy Ltd following a major business restructuring into four units – Analysis and Environmental, Geology, New Technologies, and Carbon – and the appointment of new managers. Sales growth of 10 percent was less than expected and resulted in a profit for the year of \$63,100 before tax.

While sale growth and profit were down on last year, sales grew consistently on a month-by-month basis as the year progressed. This growth follows CRL Energy's diversification from coal to a much wider remit of energy. It also reflects a new interest in emerging and modern energy technologies. A direct result of the groundwork carried out this last financial year has been record sales and profit in the first quarter of the new financial year for 2004/2005.

CRL Energy has continued to drive the move to a hydrogen future in New Zealand with the launch of our new technology package for the hydrogen energy economy. The Hon Harry Duynhoven, Associate Minister of Energy (see page 18) officiated and released the first measure of lignite into a newly developed coal gasifier. Using heat and air the gasifier reduces the coal to a char to produce a syngas product, which can be used in engines to produce electricity. With varying degrees of clean up the gas may be used in a combined cycle gas turbine/steam turbine plant, in solid oxide and molten carbonate fuel cells (best suited for larger scale electricity production), and with rigorous clean-up, high purity hydrogen is yielded for use in fuels cells suited for smaller scale distributed generation and powering cars and other motor vehicles. It was pleasing to see the international interest in the project, with observers from the United States, Europe, the United Kingdom, Canada and Australia.

Fossil fuels will continue to be an essential part of New Zealand's energy mix, and CO₂ sequestration will be a key to the continued use of fossil fuels in New Zealand and to a hydrogen-based energy economy. In the same week as the launch of the gasifier, CRL Energy, in partnership with Solid Energy New Zealand Limited and the Coal Association of New Zealand, hosted a meeting of international experts in Wellington to present and discuss the capture and storage of carbon dioxide in geological formations as a viable option for achieving large reductions in CO₂ emissions.

CRL Energy is committed to CO₂ sequestration research and is actively seeking investment for research in this area. We believe that New Zealand can be energy self sufficient with substantially reduced CO₂ emissions from the energy and transport sectors. To achieve this we need CO₂ sequestration in combination with hydrogen energy from coal, and realistic use of our good range of renewable energy options.

A consortium study entitled "Educating Business Energy Consumers in Climate Change Solutions" co-ordinated by CRL Energy on behalf of the Energy Federation of New Zealand and the Ministry for the Environment Sustainable Management Fund has been started in this last financial year. CRL Energy now runs the secretariat of the Energy Federation of New Zealand (EFNZ), and in this role has run two successful one-day conferences on the Electricity Commission and Climate Change Projects, and a number of lunchtime seminars.

The Managing Director, Dr Rob Whitney, participated in a World Energy Council (WEC) Study 'Drivers of the Energy Scene' that offers a fresh analysis of the dynamics of energy markets. CRL Energy has completed a second study in the WEC research programme into cross border investment (Emissions Trade in greenhouse gas reduction projects), which concluded that the United Nations Framework Convention on Climate Change - Fast Track Clean Development Mechanism (CDM) Process and guidelines would facilitate the processing of small-scale CDM projects. The company has now initiated the first stage of a new study to be conducted in China. The study will examine the viability of integrated coal gasification combined cycle (IGCC) as a cross border project that promotes clean coal power generation technology with higher efficiency and lower emissions than traditional coal-fired power generation technologies.



Alan Broome

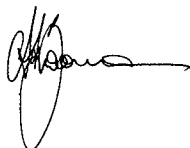
“ . . . This growth follows CRL Energy's diversification from coal to a much wider remit of energy. It also reflects a new interest emerging and modern energy technologies. A direct result of the groundwork carried out this last financial year has been record sales and profit in the first quarter of the new financial year for 2004/2005.”

In our testing services, the analytical laboratory has developed new skills in rock analysis, particularly those relating to the potential for acid mine drainage. This is an area that is attracting attention as a result of an increasing focus on environmental issues in New Zealand. Our Gracefield laboratory also offers a wide range of IANZ accredited solid fuel, chemical and microbiological water tests. Demand from local manufacturers has resulted in the reactivation of the Home Heating Test Centre and its re-accreditation by IANZ. The imminent introduction of National Environmental Standards for air quality has increased the demand for testing domestic solid fuel burning appliances. A parallel demand has occurred for CRL Energy expertise in tuning industrial boilers to minimise emissions.

The successful completion of a Foundation for Research, Science and Technology (FRST) research programme assessing the impacts of acid mine drainage (AMD) and implementing remediation plans (page 17) identified a new research area that won support from FRST for new investment: Namely, using environmentally acceptable practises when extracting minerals in New Zealand. The new research programme led by CRL Energy, with sub-contractors from Landcare Research, the University of Canterbury and the University of Otago, commenced in July 2004. The new research is an evolutionary step from the past four years of research by CRL Energy on the assessment and trial remediation of acid mine drainage. The six-year programme is concentrating on mining regions of the South Island.

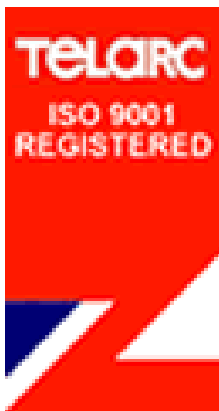
In the coming year the local and international growth in demand for coal offers a range of opportunities for our geology and testing (water and coal) field services. Our two major (multi-million dollar) FRST contracts (for hydrogen and AMD related work) provide significant opportunities for leverage of the Intellectual Property developed in the course of the research programmes. Additional opportunities lie in the testing and development phase of coal seam gas and the need for testing and monitoring of emissions, whether they come from industrial or domestic sources.

CRL Energy has demonstrated in the last year an ability to continue to grow and to move into new markets and to provide a range of RS&T services for all parts of the Energy Sector. Our staff has been a key part of this, and I would like to thank them all for the commitment they have shown to CRL Energy and our customers throughout the year. We will continue to develop a committed and highly qualified team of energy technologists of all disciplines. As part of this we have created and appointed new managers for four business teams. This will allow our senior executives to concentrate on the strategic growth of CRL Energy in existing and new markets, and to help us achieve our goal of becoming New Zealand's pre-eminent energy RS&T organisation.



A.J. Broome
Chairman CRL Energy Ltd.

About CRL Energy Ltd



CRL Energy Ltd is an energy and environmental consulting company, with a strong research and testing base and a specialist knowledge in all aspects of the energy chain. As well as specialist knowledge in new energy technologies such as hydrogen and biomass conversion, we have a strong history in all aspects of fossil fuel energy, particularly coal research, offering research, consultancy and testing in the areas of exploration and mining, fuel quality and use, and environmental monitoring.

CRL Energy is a Telarc Registered Supplier to ISO9001. Our chemical laboratories and energy test centres provide a solid practical basis for all our work. We have on-going research contracts with the Foundation for Research, Science and Technology, Technology New Zealand, Energy Federation of New Zealand, World Energy Council, and the New Zealand coal industry.

Our main laboratories, test facilities and library are on the Science Campus at Gracefield, Lower Hutt. We also have:

- A geology and hydrology team based at our Christchurch office on the University of Canterbury Ilam campus.
- An environmental team in Hamilton based on the Ruakura Science Campus.
- A coal and water testing laboratory, and mine geology service in Greymouth.





Analysis & Testing

CRL Energy offers a comprehensive range of solid fuel analytical tests, with IANZ accreditation for the most important tests. We offer both chemical and petrographic analysis.

CRL Energy's capability includes fuels, such as gas, wood and biomass. We have over twenty years of experience in sampling and analysing export coal shipments for New Zealand's largest coal producer. Our Greymouth and Gracefield laboratories offer IANZ accredited chemical and microbiological water sampling and testing services, whether for drinking water or waste water.



Home Heating Test Centre

CRL Energy Ltd's Home Heating Test Centre provides a comprehensive service for testing solid fuel burning heaters and cookers for power output and efficiency, particulate emissions, and thermal installation clearances. The Home Heating Test Centre laboratory has International Accreditation New Zealand (IANZ) accreditation for Applied Physics Testing for solid fuel fired appliances in accordance with NZS/ISO/IEC 17025:1999 - an internationally recognised standard for technical competency. The Home Heating Test Centre team also offers research and development advice and planning of test programmes for new batch fed or continuous feed heater designs and non-standard test fuels, as well as expert advice on design for clean burning combustion systems and help with troubleshooting for operating or design faults.



Geological, Geotechnical Engineering & Hydrogeological Services

The mix of geo-consulting skills available from CRL Energy can be applied to any type of land development, from small subdivisions to large-scale mining.

The geological team at CRL Energy's Christchurch Office gives clients an integrated service for the interpretation of geological data, from the exploration stage through to mining and production.

Our petrographic and palynological expertise and our seam modelling techniques offer clients a premium service for exploration and characterisation of coal deposits. CRL Energy is leading the way in coalbed methane exploration from New Zealand's low rank coal deposits.



Energy & Fuels

CRL Energy's combustion test centre offers testing programmes tailored to meet the needs of individual clients. Our 50kW combustion test rig can test and evaluate fuel performance under controlled conditions. Our gasification bench-scale test rig is ideally suited to measuring char reactivities, with the capability of rapid and accurate measurement of gas mixtures.

CRL Energy wins contracts for research on New Zealand coals and their utilisation from a number of clients, including the Foundation for Research Science and Technology.



Environmental Monitoring

CRL Energy's acid mine drainage (AMD) research team are experts in the latest remediation technologies, such as limestone dosing and wetland development schemes, to mitigate the impacts of metal pollution on water and aquatic life and habitat.

CRL Energy measures particulate emissions from wet or dry gas streams and offers a size distribution analysis. Size fractions as low as 2.5 microns can be quantified.

We offer at-source pollutant gas emissions measurement with our portable gas analyser.

Our dust deposition monitoring service will measure ambient dust present at work sites and near stockpiles. We can help companies to reduce carbon dioxide emissions by advising on boiler efficiencies.



Climate Change

We have an excellent reputation in providing a wide range of climate change related services such as research, consultancy and education.

The New Zealand Government ratified the Kyoto Protocol in December 2002. By ratifying the Protocol the government has agreed to reduce New Zealand's greenhouse gas emissions to their Kyoto Protocol target, which is based on 1990 emissions. The target under which New Zealand has agreed to at Kyoto, based on national greenhouse gas emissions inventories for the first commitment period (2008 - 2012) is 365 million tonnes CO₂ equivalent. However according to a business as usual scenario New Zealand's actual greenhouse gas emissions will be 14 - 20% higher than this target.

In order to meet this target the Government is introducing a climate change policy that includes a carbon charge. Climate Change has become an issue that will have an impact on all New Zealanders, especially New Zealand businesses.

CRL Energy tackles acid mine

Acid Mine Drainage (AMD) is a significant environmental problem facing the coal mining industry in New Zealand. It occurs when sulphide-bearing minerals in rock are exposed to air and water, producing acid as a result of sulphide oxidation. This acid can mobilise arsenic and metals (e.g. aluminium, boron, copper, nickel and zinc) found in waste rock and tailings into ground and surface water. To make matters worse, types of bacteria that occur naturally can significantly increase the rate of sulphide oxidation given the right conditions. The resulting metal pollution can contaminate drinking water sources and detrimentally affect aquatic life and habitat.

At a workshop in Greymouth, CRL Energy Ltd presented their current research and findings as well as introducing a new six-year project focused on reducing water quality impacts from mining (see Research Highlights - "Sustainable Mining"). This new programme is based at the abandoned Sullivan Mine, north of Westport.

Presenters from the University of Canterbury, West Coast Regional Council, Solid Energy and CRL Energy identified a number of mine sites including the Stockton and Denniston Plateau as being in need of remediation work, which could well continue for decades.

The Stockton mine alone produces some 30,000 million litres of AMD per year. CRL Energy have been working closely with Solid Energy on a number of trials currently being carried out at Stockton and Sullivan including limestone dosing to treat acid seep, and an engineering wetland pilot scheme.

Acid mine drainage can develop at several points throughout the mining process: in underground workings, open pit mine faces, waste rock dumps, tailings deposits, and ore stockpiles. It is a problem around the world, acid generation can last for decades, centuries, or longer, and its impacts can travel many miles downstream. Roman mine sites in Great Britain continue to generate



Sustainable Mining

Using environmentally acceptable practices when extracting minerals in New Zealand has become a critical requirement. With this in mind, a new research programme lead by Dr Tony Clemens, Amanda Black and Dave Trumm of CRL Energy Ltd, with sub-contractors from Landcare Research, University of Canterbury and the University of Otago began in July 2004. The programme's goal is to provide industry and environmental regulators with a standardised decision-making framework so that sound environmental resource management and environmentally sustainable mining practices can be used. The programme is being funded by the Foundation for Research, Science and Technology with co-funding from Solid Energy New Zealand.

The new research is an evolutionary step from the past four years of research by CRL Energy on the assessment and trial remediation of acid mine drainage (AMD). This past research has concentrated primarily on the closed Sullivan Mine, north of Westport. The development

of the framework in the new research has four broad objectives:

- Identifying potential AMD environmental risks significant to each of the primary mining regions;
- Categorising the degree of impacts from AMD on the ecology of the receiving aquatic ecosystems and the processes that drive aquatic ecosystem recovery;
- Identifying best strategies to sufficiently remediate impacted ecosystems and strategies to prevent ecosystem degradation; and,
- Combining the results from the above objectives into a standard decision-making framework – a process that will include wide consultation with representatives from the mining industry and regulators.

CRL Energy expects that the framework will not compromise either economic or environmental targets. The six-year duration research programme will be concentrated in mining regions of the South Island.

Coal to hydrogen future here now

The promise of hydrogen

The promise of a hydrogen-based energy economy is clean and secure energy for all, forever. At a time of raised awareness of local and global impacts of pollution, on-going instability in the Middle East and the uncertainty of supply, this is an extremely attractive proposition. Combining this with the significant advances that are being made in the high efficiency fuel cell technologies used to convert hydrogen to energy and the hydrogen energy option becomes not only attractive but achievable.

New Zealand's Contribution

Billions of dollars are being invested into hydrogen energy research around the world as the transition to hydrogen energy begins. Much of this work is focused on developing and demonstrating large scale technologies. There are opportunities for New Zealand to benefit from being a technology shaper rather than a taker - particularly in the area of small scale hydrogen technologies for distributed energy generation.

Hydrogen can be produced from water (using electricity) and from coal or natural gas. Coal-based production technology currently looks most promising for early delivery of a hydrogen economy. With over 10 billion tonnes of coal reserves, almost all ideal for hydrogen production, New Zealand is positioned to be leaders in the development of the hydrogen energy economy.

Recognising this, in June 2002, the New Zealand government through the Foundation for Research, Science and Technology (FRST) announced a \$6 million investment "Hydrogen Energy for the Future of New Zealand" as a first step in New Zealand's transition towards a hydrogen energy economy.

The programme is a partnership between major research providers CRL Energy, with expertise in coal gasification and gas clean-up, and Industrial Research Ltd, with expertise in gas clean-up, fuel cells and power conditioning for small scale distrib-



uted electricity generation. Unitec and the Department of Chemical and Process Engineering, University of Canterbury, are sub-contractors to the programme and Solid Energy is providing additional support. The programme is overseen by a Governance Panel comprised of senior industrial representatives from Solid Energy, BP New Zealand and Meridian Energy and including one representative from FRST.

In addition to the government, Solid Energy and the Coal Association have initiated and invested in related areas of advanced technological and environmental issues. These include the development of a Hydrogen Roadmap for the Coal Industry and technologies and options for sequestration of the CO₂ by-product of hydrogen production from coal.

New Zealand has sufficient coal reserves to last for many centuries. Much of this coal is very reactive and ideally suited towards a new clean coal technology called fluidised bed gasification. One major aim of the "Hydrogen Energy for the Future of New Zealand" Programme is to take

full advantage of this property and prove the concept of a totally new hydrogen-based energy system that leads from coal via gasification to hydrogen and from hydrogen via a fuel cell to electricity.

The immediate target of the "Hydrogen Energy for the Future of New Zealand" programme is to prove this new package at the 50 kW scale – sufficient to meet the needs of 10 to 20 houses or of a small sized commercial operation.

The coal gasifier – the first step in making hydrogen from coal

The coal gasifier, which was officially launched on Monday 23 February, 2004, is a container into which is fed coal, air (or oxygen) and steam. Inside, three critical events take place. Firstly, volatiles are released from the coal to produce a char. Secondly some of the char and volatiles are combusted to generate heat and thirdly the remaining char reacts with steam to produce hydrogen and carbon monoxide. The last of these is the coal gasification reaction. It requires heat to drive it and this is provided by the combustion step. It can also be catalysed by the

presence of calcium and it so happens that many New Zealand coals contain calcium in the correct form to perform this catalyst role – hence their high reactivity.

Syngas, a mixture of hydrogen and carbon monoxide, emerges from the gasifier along with carbon dioxide and smaller amounts of other products. A clean up line is used to remove any condensates, particulates and sulphide gases from the syngas stream before it is passed to a filter or membrane for hydrogen separation. The hydrogen then passes to an alkaline fuel cell for electricity production. This is the most demanding of all fuel cells (indeed the most demanding of all the known hydrogen conversion technologies) in terms of hydrogen purity demands, but one well suited to distributed electricity generation applications.

Issues facing a hydrogen energy economy

The transition to hydrogen energy represents a fundamental change to society as far reaching as the introduction of the automobile.

There are seven big challenges to making the transition to hydrogen. All are increasingly being targeted for major government and industry investment globally. They are:

Production

Hydrogen, like electricity or petroleum is an energy carrier – not an energy source. Although the most abundant element in the universe, it cannot be mined or harnessed on earth in the way solar, wind or coal can. It must be produced from these sources.

There are existing commercial processes for production such as coal gasification, natural gas reformation and electrolysis using electricity generated from renewable energy sources. Improvements in hydrogen production efficiency and costs are required for all these methods and promising new methods, including biological production, need further development. Production from fossil fuels requires a particular emphasis on gas clean-up and improving costs of separation, capture and sequestration of the CO₂ by-product.

Delivery

Once produced, an extensive network is required to deliver the hydrogen to where it is to be used. The delivery system must be reliable, safe, convenient and cost effective. Many developed countries already have hydrogen based industries and a mini-hydrogen energy delivery system based on pipelines, or by road using cylinders, tube trailers or cryogenic tankers. The alternative of moving the energy source and producing the hydrogen on site may also be part of a nation's future hydrogen delivery system.

Storage

For a vehicle to achieve a range of 250 to 300 km requires about 3 kg of on-board hydrogen. Left untouched, this amount of hydrogen would occupy a very large and impracticable volume. One option is to compress it and store it in on board in high pressure, high strength storage tanks, such as used in fuel cell concept vehicles. Compression is an energy demanding process and an alternative is to use high density storage in reversible metal hydrides, carbon nanotubes and chemical hydrides such as sodium borohydride. These technologies are still in the developmental stage.

Conversion technologies

Hydrogen can be used in engines and turbines as well as fuel cells. Fuel cells have higher energy generating efficiencies than engines and turbines but to date no single fuel cell technology is able to meet all the performance and cost parameters demanded by consumers.

Consumer applications

Convincing the consumer to choose hydrogen for power, heat and transport needs may not be easy. Few consumers will willingly pay a cent more for the privilege of clean and secure energy, desirable as it may be. The most high profile application of hydrogen is in the transport sector where vehicles will have to be as affordable as the existing conventional petroleum combustion engine option, have comparable or better range, startup reliability, ruggedness, acceleration and speed.

Education

Informing consumers, industry leaders and public policy makers about

hydrogen energy is a critical issue.

Codes of Practice

The widespread use of hydrogen will require uniform international codes and standards for design, manufacture and operation of all aspects of a hydrogen energy system.

Future developments of the Hydrogen Energy Programme

The hydrogen based energy system developed by the "Hydrogen Energy for the Future of New Zealand" programme is well suited for building the expertise and knowledge platform to launch New Zealand into a hydrogen energy economy. It is also a component of the multi-component, highly flexible zero emissions coal fired plant of the 21st Century. These plants are likely to become a significant part of the worldwide energy landscape during the transition towards the hydrogen energy economy.

This plant will begin with coal gasification. Its flexibility is based on the fact that the syngas product may, with minimal clean-up be used in engines to produce electricity. With a little more clean-up it may be used in a combined cycle gas turbine/steam turbine plant. Further clean-up makes it suited for use in solid oxide and molten carbonate fuel cells suited for larger scale electricity production, while rigorous clean-up yields high purity hydrogen for use in the alkaline and proton exchange membrane fuel cells suited for smaller scale distributed generation and transport applications.

The coal fired plant of the 21st Century will contain all these components along with decarbonisation achieved by CO₂ separation, capture and geological sequestration.

A natural extension of the hydrogen based energy system being developed by the existing programme is to incorporate it into a demonstration of a larger scale coal-fired energy plant containing all the above technologies and capabilities. This is an ambitious project which CRL Energy, Solid Energy and the Coal Association are committed to achieving for New Zealand.

WEC cross border project studies

In the past financial year, CRL Energy, on behalf of the Energy Federation of New Zealand Inc. (EFNZ), has completed a second study in the World Energy Council (WEC) research programme into cross border investment (Emissions Trade in greenhouse gas reduction projects). The Clean Development Mechanism (CDM) feasibility study was undertaken in the Philippines with several existing partners from a previous study and new ones from The Philippines and Australia and examined a wind farm and geothermal project. The study concluded that the United Nations Framework Convention on Climate Change - CDM Fast Track Process and guidelines would facilitate the processing of small-scale CDM projects.

CRL Energy has now initiated the first stage of a third study to be conducted in China. The study will examine the viability of integrated coal gasification combined cycle (IGCC) as a cross border project that promotes clean coal power generation technology with higher efficiency and lower emissions than traditional coal-fired power generation technologies.

An IGCC system uses coal gasification (as opposed to simple coal combustion). When coal is brought into contact with steam and oxygen, thermochemical reactions produce a fuel gas, largely carbon monoxide and hydrogen, which when combusted can be used to power gas turbines. Integrated Coal Gasification Combined Cycle (IGCC) power generating systems are presently being developed and operated in Europe and the USA.

These systems give increased efficiencies by using waste heat from the product gas to produce steam to

drive a steam turbine, in addition to a gas turbine. Existing commercial systems achieve efficiencies close to 45 percent.

With recent advances in gas turbine technologies these systems are capable of reaching above 50 percent. IGCC systems additionally produce less solid waste and lower emissions of SO_x, NO_x and CO₂. Over 99 percent of the sulphur present in the coal can be recovered for sale as chemically pure sulphur. Presently in China where most power plants are relatively small, average efficiency is about 28 percent compared to an OECD average of 38 percent.

The first study for the WEC explored the feasibility of Japanese investment in the Tararua Stage 2 Wind farm. It looked at several innovative options on how best to make the Tararua Stage 2 wind farm project proceed. The conclusion was that the best option was an early allocation and international trade of New Zealand's Kyoto assigned amount units. The first study was carried out in 2001 with several international partners that included Trust Power and CRL Energy in New Zealand, Resourceslaw International from Australia, and five of the major Japanese Energy Companies. These companies include Tokyo Electric Power (one of the two largest electricity companies in the world), Tokyo Gas, Chubu Electric Power, Kansai Electric Power and Osaka Gas.

CO₂ capture and sequestration

CO₂ Capture and Sequestration research is part of a strategy for reducing and eliminating CO₂ emissions from energy production using carbon-based fuels. Fossil fuels will remain a major energy source for the foreseeable future and technical solutions for emission reduction are realistic and achievable.

The programme aims to develop another environmentally safe CO₂ mitigation option for New Zealand. More specifically CRL Energy is proposing to develop new technologies to manage carbon by capture and secure storage, initially in geological formations. This research is an important initiative by which New Zealand can meet its commitments under the Kyoto Protocol.

The initial focus has been to identify New Zealand geological formations, including depleted gas fields, deep coal seams and saline aquifers, as these are likely to provide the first large-scale opportunity to sequester concentrated CO₂ emissions. An initial scoping study has identified a range of options. Key rating factors include capacity and location. This will be followed by laboratory studies to evaluate screening criteria such as caprock integrity, trapping and transfer mechanisms and long-term stability. The programme will also evaluate and trial appropriate capture technologies, including the use of ash residue from fossil fuel conversion processes, at the laboratory scale.

Earlier this year in February, CRL Energy, in partnership

with Solid Energy New Zealand Limited and the Coal Association of New Zealand, hosted an international carbon sequestration symposium in Wellington. CRL Energy's sequestration expert, Dr Trevor Matheson, said that many countries regarded CO₂ capture and storage as an important plank in their emissions reduction strategy.

"All of the countries represented (Australia, Canada, Norway, the Netherlands, United States, United Kingdom) were considering a portfolio of measures to reduce CO₂ emissions.

"It became evident that New Zealand is lagging behind the rest of the developed world in R&D into CO₂ capture and storage. It is a particularly relevant area of research given the vast deposits of coal that New Zealand has available as an energy source and the research in place on the use of these resources to develop a hydrogen economy as an alternative energy future. This zero emission future can only be achieved if the CO₂ produced is prevented from venting to the atmosphere," says Dr Matheson.

For more information about the symposium, see "The Year in Review" on pages 9-10. Proceedings from the symposium are also available on the CRL Energy Web site at www.crl.co.nz.

Who's who at CRL Energy Ltd

SHAREHOLDERS

Coal Association of New Zealand Inc.
ACIRL Ltd

BOARD

A J Broome Chairman
B J Bragg Solid Energy International
B S Francis Francis Mining Co. Ltd
S C Thompson Royal Society of New Zealand
F Woskoboenko HRL Pty Ltd

EXECUTIVE

Rob Whitney, PhD Managing Director
Trevor Matheson, PhD Manager - Operations
Tony Clemens, PhD Manager - Research Business

STAFF

Luda Aptekar, NZCS - Gracefield, laboratory technician
Maurice Arnott, NZCE - Hamilton, environmental technical officer
Rachel Baggs, MSc - Greymouth, junior geologist
Amanda Black, MSc - Christchurch, environmental scientist
Mark Boniface, BE (Hons) - Gracefield, chemical and process engineer
Deborah Braddock, MSc - Gracefield, carbon management climate change adviser
Rodney Brown - Gracefield, engineering technician
Ramon Brown, BE (Hons) - Gracefield, principal engineer, hydrogen energy systems.
Caroline Cudby, - Gracefield, PA to Managing Director
Trevor Dine, NZCS - Gracefield, Manager analytical and environmental business
Cito Gazo, BSc, MBA - Gracefield, energy engineer research analyst, safety officer
Desmond Gong, ME - Gracefield, combustion res. engineer, gasification, emissions monitoring
Kerry Gordon, MSc. Hons. - Greymouth, field geologist
Tom Grace, BSc - Christchurch, field technician
Shaun Hayton, PhD - Christchurch, Manager geological services
Ann Herbert - Gracefield, accounts and financial administrator
Tracey Johns - Christchurch, part-time administration and IT
Grant Murray, NZCS - Gracefield, solid fuels laboratory manager
Chris Nelson, MSc Hons. - Christchurch, engineering geologist, emissions testing, safety officer
Nigel Newman, PhD - Christchurch, geochemist, export and oil sampling supervisor
Steven Pearce, PhD - Gracefield, Manager new energy technologies
Sarah Pope, MSc - Christchurch, coal geologist - coal bed methane
Julia Rackley, BRS - Christchurch, climate change/energy research analyst, safety coord.
Pieter Rossouw, DSc - Gracefield, EERA project manager
Ben Rumsey, BSc - Gracefield, laboratory technician
Karyn Sayers, BSc - Hamilton, environmental technical officer
Dave Trumm, MSc - Christchurch, environmental hydrologist
Poata Tuisamoa - Gracefield, coal preparation technician
Sue Watkins - Gracefield, receptionist, accounts payable

ON-CALL CONSULTANTS

Wayne Hennessy, MSc - Nelson, Research Associate, climate change and related issues.
Rob Christie - Tauranga, Associate scientist, environmental, marketing
Jean McCracken, BA, Dip Libr - Librarian, Energy Library
Louise Thomas, BSc, Cert (Envi Sci) - Science communication, editing and writing

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Financial Statements of the Coal Association of NZ Inc.

for the year ended 31 March 2004



Coal Association of New Zealand Incorporated

Financial Statements

For the year ended 31 March 2004

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|--|---------------|
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| Auditor's Report..... | page 33 |



COAL ASSOCIATION OF NEW ZEALAND INCORPORATED & SUBSIDIARY

STATEMENT OF FINANCIAL PERFORMANCE

FOR THE YEAR ENDED 31 MARCH 2004

| | Note | Group | | Parent | |
|--|--------|---------------|---------------|---------------|---------------|
| | | March 2004 | March 2003 | March 2004 | March 2003 |
| | | \$ | \$ | \$ | \$ |
| Operating Revenue | 2 | 2,872,788 | 2,753,390 | 403,528 | 538,737 |
| Operating Expenses | 3 | (2,829,238) | (2,587,837) | (398,900) | (462,309) |
| Operating Surplus Before Taxation | 43,550 | 165,553 | 4,628 | 76,428 | |
| Taxation on Operating Surplus | 4 | 19,400 | 39,903 | - | - |
| Net Surplus After Taxation | | 24,150 | 125,650 | 4,628 | 76,428 |
| Adjust for Minority Interests in Subsidiary | | (12,577) | (19,702) | | |
| Net Surplus after Taxation Attributable to Parent | | 11,573 | 105,948 | | |

The attached NOTES on pages 5 to 10 form part of these Financial Statements



COAL ASSOCIATION OF NEW ZEALAND INCORPORATED & SUBSIDIARY
STATEMENT OF MOVEMENTS IN EQUITY
FOR THE YEAR ENDED 31 MARCH 2004

| | Note | Group | | Parent | |
|---|------|---------------------|---------------------|---------------------|---------------------|
| | | March 2004 \$ | March 2003 \$ | March 2004 \$ | March 2003 \$ |
| Net Surplus After Taxation: | | | | | |
| Parent | | 11,573 | 105,948 | 4,628 | 76,428 |
| Minority | | 12,577 | 19,702 | - | - |
| Movement in Asset Revaluation Reserve | 5 | 4,984 | - | 4,984 | - |
| Total Recognised Revenues and Expenses | | 29,134 | 125,650 | 9,612 | 76,428 |
| Ordinary Dividends Paid | | (9,600) | (7,050) | | |
| Movements in Equity for the Year | | 19,534 | 118,600 | 9,612 | 76,428 |
| Equity at Start of Year | | 2,251,910 | 2,133,310 | 1,781,908 | 1,705,480 |
| Equity at End of the Year | | 2,271,444 | 2,251,910 | 1,791,520 | 1,781,908 |

The attached NOTES on pages 5 to 10
form part of these Financial Statements



COAL ASSOCIATION OF NEW ZEALAND INCORPORATED & SUBSIDIARY

STATEMENT OF FINANCIAL POSITION

AS AT 31 MARCH 2004

| | Note | Group | | Parent | |
|---|------|------------|------------|------------|------------|
| | | March 2004 | March 2004 | March 2003 | March 2004 |
| 2003 | | | | | |
| | | \$ | \$ | \$ | \$ |
| Members Funds and Shareholders' Equity | | | | | |
| Accumulated Funds | | 1,663,822 | 1,652,249 | 1,609,876 | 1,605,248 |
| Asset Revaluation Reserve | 5 | 281,644 | 276,660 | 181,644 | 176,660 |
| Realised Capital Gain | | 2,000 | 2,000 | - | - |
| | | 1,947,466 | 1,930,909 | 1,791,520 | 1,781,908 |
| Minority Interest | | 323,978 | 321,001 | - | - |
| TOTAL MEMBERS FUNDS AND SHAREHOLDERS' EQUITY | | 2,271,444 | 2,251,910 | 1,791,520 | 1,781,908 |
| Represented by: | | | | | |
| Current Assets | | | | | |
| ANZ Banking Group | | 378,638 | 443,818 | 419,323 | 386,814 |
| Accounts Receivable | | 406,137 | 578,643 | 45,607 | 40,740 |
| Accruals | | 178,044 | 118,463 | 2,577 | 1,561 |
| Prepayments & Accrued Expenses | | 78,693 | 10,032 | 5,000 | - |
| Income Tax | 4 | 21,055 | - | - | - |
| Inventories | | 10,431 | 14,378 | - | - |
| Work in Progress | | 154,478 | 94,447 | - | - |
| Total Current Assets | | 1,227,475 | 1,259,781 | 472,507 | 429,115 |
| Non-current Assets | | | | | |
| Property, Plant & Equipment | 6 | 1,450,738 | 1,282,630 | 816,010 | 817,258 |
| Investments in Subsidiaries | 7 | - | - | 600,000 | 600,000 |
| Total Non Current Assets | | 1,450,738 | 1,282,630 | 1,416,010 | 1,417,258 |
| TOTAL ASSETS | | 2,678,214 | 2,542,411 | 1,888,517 | 1,846,373 |
| Current Liabilities | | | | | |
| Accounts Payable | | 267,708 | 246,711 | 14,126 | 31,764 |
| Provision for Holiday Pay | | 42,908 | 37,855 | - | - |
| Current Portion of Hire Purchase | 8 | 23,482 | - | - | - |
| Income In Advance | | 31,044 | - | - | - |
| Related Party Transactions | | - | - | 82,871 | 32,701 |
| Income Tax | 4 | - | 5,935 | - | - |
| Total Current Liabilities | | 365,142 | 290,501 | 96,997 | 64,465 |
| Non-current Liabilities | | | | | |
| Term Portion of Hire Purchase | 8 | 41,629 | - | - | - |
| Total Non-current Liabilities | | 41,629 | - | - | - |
| TOTAL LIABILITIES | | 406,771 | 290,501 | 96,997 | 64,465 |
| NET ASSETS | | 2,271,444 | 2,251,910 | 1,791,520 | 1,781,908 |

On behalf of the Board of the Association

The attached NOTES on pages 5 to 10 form part of these Financial Statements



COAL ASSOCIATION OF NEW ZEALAND INCORPORATED & SUBSIDIARY

STATEMENT OF CASHFLOWS

FOR THE YEAR ENDED 31 MARCH 2004

| | Group | | Parent | |
|---|------------------|------------------|----------------|----------------|
| | March 2004 | March 2003 | March 2004 | March 2003 |
| Note | \$ | \$ | \$ | \$ |
| CASH FLOWS FROM OPERATING ACTIVITIES | | | | |
| Cash was provided from | | | | |
| Receipts from Customers | 2,821,225 | 2,592,290 | 365,045 | 668,009 |
| Dividend Received | - | - | 22,400 | 16,450 |
| Interest Received | 15,033 | 15,167 | 11,633 | 8,442 |
| | <u>2,836,258</u> | <u>2,607,457</u> | <u>399,078</u> | <u>692,900</u> |
| Cash was applied to | | | | |
| Payments to Suppliers and Employees | 2,502,219 | 2,331,822 | 358,134 | 465,329 |
| Taxation Paid | 73,933 | 15,110 | - | - |
| Interest Paid | 3,663 | 3,969 | 55 | 211 |
| | <u>2,579,815</u> | <u>2,350,901</u> | <u>358,189</u> | <u>465,540</u> |
| Net Cash Inflow from Operating Activities | 13 13 256,443 | 256,556 | 40,889 | 227,361 |
| CASH FLOWS FROM INVESTING ACTIVITIES | | | | |
| Cash was provided from | | | | |
| Repayment of Loan | - | - | - | - |
| Cash was applied to | | | | |
| Purchase of Property, Plant & Equipment | (377,132) | (176,748) | (8,380) | - |
| | <u>(377,132)</u> | <u>(176,748)</u> | <u>(8,380)</u> | <u>-</u> |
| Net Cash Outflow to Investing Activities | <u>(377,132)</u> | <u>(176,748)</u> | <u>(8,380)</u> | <u>-</u> |
| CASH FLOWS FROM FINANCING ACTIVITIES | | | | |
| Cash was provided from | | | | |
| Gross Proceeds of Hire Purchase Contracts | 75,121 | - | - | - |
| | <u>75,121</u> | <u>-</u> | <u>-</u> | <u>-</u> |
| Cash was applied to | | | | |
| Payment of Dividend to Minority Interest | (9,600) | (7,050) | - | - |
| Repayment of Hire Purchase Contracts | (10,012) | (8,426) | - | - |
| | <u>(19,612)</u> | <u>(15,476)</u> | <u>-</u> | <u>-</u> |
| Net Cash Outflow from Financing Activities | <u>55,509</u> | <u>(15,476)</u> | <u>-</u> | <u>-</u> |
| Net Increase (Decrease) in Bank Balances | <u>(65,180)</u> | <u>64,332</u> | <u>32,509</u> | <u>227,361</u> |
| Add: Bank Balances at the Start of the Year | 443,818 | 379,486 | 386,814 | 159,453 |
| Bank Balances at the End of the Year | <u>378,638</u> | <u>443,818</u> | <u>419,323</u> | <u>386,814</u> |
| Represented by | | | | |
| ANZ Banking Group - Bank Balances | 378,638 | 443,818 | 419,323 | 386,814 |
| | <u>378,638</u> | <u>443,818</u> | <u>419,323</u> | <u>386,814</u> |

The attached NOTES on pages 5 to 10
form part of these Financial Statements



COAL ASSOCIATION OF NEW ZEALAND INCORPORATED & SUBSIDIARY

NOTES TO THE FINANCIAL STATEMENTS

FOR THE YEAR ENDED 31 MARCH 2004

1. STATEMENT OF ACCOUNTING POLICIES

Reporting Entity

The Coal Association of New Zealand Incorporated. (the "Association") is an Incorporated Society registered under the Incorporated Societies Act 1908.

The Financial Statements presented here are for the reporting entity Coal Association of New Zealand Incorporated and the consolidated Financial Statements of the Group comprising Coal Association of New Zealand Incorporated and its subsidiary, CRL Energy Limited (formally Coal Research Limited).

Basis of Preparation

These Financial Statements have been prepared in accordance with the Financial Reporting Act 1993.

These Financial Statements form a general purpose financial report which has been prepared in accordance with the generally accepted accounting practice as defined by the Institute of Chartered Accountants of New Zealand.

These Financial Statements have been prepared using the historical cost method modified by the revaluation of the buildings.

Basis of Consolidation

The Consolidated Financial Statements include the Association and its subsidiary accounted for using the purchase method. All significant inter entity transactions are eliminated on consolidation. In the parent entity Financial Statements, the investment in the subsidiary is stated at valuation.

Differential Reporting

The Group qualifies for differential reporting as it is not publicly accountable and there is no separation between the members and the governing body. Differential Reporting Standards have been applied except that pertaining to FRS 10 Statement of Cashflows and SSAP 12 Accounting for Income Tax.

Accounts Receivable

Accounts Receivable are stated at their expected realisable value, and adequate provision has been made for amounts not expected to be recovered.

Foreign Currencies

Transactions in foreign currencies are converted at the New Zealand rate of exchange ruling at the date of the transaction. Foreign monetary assets and liabilities are translated into New Zealand dollars at the exchange rate ruling at balance date. Exchange variations arising from these translations are included in the Statement of Financial Performance.

Goods & Services Tax

These Financial Statements are prepared on a tax exclusive basis. All items in the Statement of Financial Position are stated on a tax exclusive basis, with the exception of Accounts Receivable and Accounts Payable which include GST invoiced.



COAL ASSOCIATION OF NEW ZEALAND INCORPORATED & SUBSIDIARY

NOTES TO THE FINANCIAL STATEMENTS

FOR THE YEAR ENDED 31 MARCH 2004

Income Tax

The liability method of accounting for taxation has been followed. Provision has been made for taxation after taking full advantage of all deductions and concessions permitted. No provision has been made for deferred tax.

Intangible Assets

The costs associated with ISO 9002 are being amortised over its three year life.

Investments

Investments are stated at directors valuation.

Inventories

Inventories are stated at the lower of cost, determined on a first in first out basis, and net realisable value.

Leases

The Group leases certain land and buildings.

Operating lease payments, where the lessors effectively retain substantially all the risks and benefits of ownership of the lease items, are recognised in the determination of the net loss in equal instalments over the lease term.

Property, Plant & Equipment

The property is shown at net current value as determined by an independent valuer, A E Davis (ANZIV, SNZPI) of Holmes Davis Limited at 31 March 2004. Property is to be revalued on a cyclical basis every 3 to 5 years. The basis of the valuation was on the current market rental and sales analysis of nearby properties. The valuation assumes the highest and best use of the property was its current business use and accordingly the valuation was valued on that basis.

Depreciation is provided on all assets, except land, on a straight line basis at rates that will write off the value of the assets over their useful economic lives. The following depreciation rates are applied.

| | |
|------------------------|-----------------|
| Buildings | 2.00% |
| Furniture & Fittings | 8.00% - 48.00% |
| Alterations | 10.00% |
| Leasehold Improvements | 3.00% - 11.40% |
| Plant | 9.60% - 48.00% |
| Motor Vehicles | 18.00% |
| Library Books | 9.50% - 76.20% |
| Office Equipment | 21.60% - 48.00% |
| Leased Equipment | 36.00% |

Work in Progress

Work in Progress has been valued at the lower of cost or net realisable value on a percentage of completion basis, except that work in progress that has been completed and about to be invoiced has been valued at retail.

Changes in Accounting Policies

There have been no changes in accounting policies. All policies have been applied on bases consistent with those used in the prior year.



COAL ASSOCIATION OF NEW ZEALAND INCORPORATED & SUBSIDIARY

NOTES TO THE FINANCIAL STATEMENTS

FOR THE YEAR ENDED 31 MARCH 2004

| 2. OPERATING REVENUE | Group | | Parent | |
|----------------------------|-----------|-----------|---------|---------|
| | 2004 | 2003 | 2004 | 2003 |
| | \$ | \$ | \$ | \$ |
| Dividend Received | - | - | 22,400 | 16,450 |
| Interest Received | 15,033 | 15,167 | 14,210 | 10,003 |
| Research & Consulting Fees | 2,801,009 | 2,679,353 | 240,672 | 385,434 |
| Rent | 14,806 | 14,806 | 85,000 | 85,000 |
| Subscriptions | 35,546 | 38,650 | 35,546 | 38,650 |
| Sundry | 6,394 | 5,414 | 5,700 | 3,200 |
| Total Operating Revenue | 2,872,788 | 2,753,390 | 403,528 | 538,737 |

| 3. OPERATING EXPENSES | Group | | Parent | |
|--|---------|---------|--------|--------|
| | 2004 | 2003 | 2004 | 2003 |
| Operating Expenses Include: | \$ | \$ | \$ | \$ |
| Auditor's Remuneration | 6,019 | 9,250 | - | 3,750 |
| Chairman's Fee | 29,400 | - | 29,400 | - |
| Change in Provision for Doubtful Debtors | 2,813 | - | 2,813 | - |
| Depreciation | 214,009 | 216,890 | 14,612 | 14,612 |
| Foreign Exchange Loss | 1,606 | 2,318 | - | - |
| Interest Expense | 3,663 | 4,180 | 55 | 211 |
| Rental Expense on Operating Leases | 30,203 | 21,958 | - | - |

| 4. INCOME TAX | Group | | Parent | |
|--|----------|----------|--------|--------|
| | 2004 | 2003 | 2004 | 2003 |
| | \$ | \$ | \$ | \$ |
| Operating Surplus Before Taxation | 43,550 | 165,553 | 4,628 | 76,428 |
| Taxation thereon at 33% | 14,372 | 54,632 | - | - |
| Plus/(Less) Taxation Effect of: | | | | |
| Permanent Differences | 5,865 | (19,793) | - | - |
| Timing Differences | (836) | 5,063 | - | - |
| Taxation on Operating Surplus | 19,400 | 39,903 | - | - |
| Prior Year Taxation Due / (Refundable) | 5,935 | 3,675 | - | - |
| Tax Refund Received | - | (4,795) | - | - |
| Terminal Tax Paid | (5,935) | - | - | - |
| Transfers | - | 1,266 | - | - |
| Foreign Investor Tax Credit | 1,694 | 1,244 | - | - |
| Provisional Tax Paid | 38,477 | 30,564 | - | - |
| Resident Withholding Tax Paid | 284 | 2,014 | - | - |
| Available Tax Credits | 40,455 | 33,968 | - | - |
| Taxation Due / (Refundable) | (21,055) | 5,935 | - | - |

The Association has tax exempt status under Section CB 4(1) of The Income Tax Act 1994.

| 5. ASSET REVALUATION RESERVE | Group | | Parent | |
|------------------------------|---------|---------|---------|---------|
| | 2004 | 2003 | 2004 | 2003 |
| | \$ | \$ | \$ | \$ |
| Opening Balance | 276,660 | 276,660 | 176,660 | 176,660 |
| Net Revaluations | 4,984 | - | 4,984 | - |
| Closing Balance | 281,644 | 276,660 | 181,644 | 176,660 |



COAL ASSOCIATION OF NEW ZEALAND INCORPORATED & SUBSIDIARY
NOTES TO THE FINANCIAL STATEMENTS
FOR THE YEAR ENDED 31 MARCH 2004

6. PROPERTY, PLANT & EQUIPMENT

| | <u>Group</u> | | <u>Parent</u> | |
|---------------------------------------|------------------|------------------|----------------|----------------|
| | <u>2004</u> | <u>2003</u> | <u>2004</u> | <u>2003</u> |
| | \$ | \$ | \$ | \$ |
| <u>Land and Buildings</u> | | | | |
| At Valuation | 820,000 | 870,000 | 820,000 | 870,000 |
| Accumulated Depreciation | (13,746) | (54,984) | (13,746) | (54,984) |
| | 806,254 | 815,016 | 806,254 | 815,016 |
| <u>Leasehold Improvements</u> | | | | |
| At Cost | 40,818 | 39,413 | - | - |
| Accumulated Depreciation | (17,040) | (14,139) | - | - |
| | 23,778 | 25,274 | - | - |
| <u>Furniture & Fittings</u> | | | | |
| At Cost | 106,805 | 94,446 | 4,264 | 4,264 |
| Accumulated Depreciation | (76,832) | (71,178) | (3,687) | (3,583) |
| | 29,973 | 23,268 | 577 | 681 |
| <u>Computer Equipment</u> | | | | |
| At Cost | 645,818 | 533,737 | - | - |
| Accumulated Depreciation | (535,427) | (482,075) | - | - |
| | 110,391 | 51,662 | - | - |
| <u>Plant</u> | | | | |
| At Cost | 1,212,241 | 1,138,273 | 6,350 | 6,350 |
| Accumulated Depreciation | (933,477) | (814,366) | (5,551) | (4,789) |
| | 278,764 | 323,907 | 799 | 1,561 |
| <u>Library Books</u> | | | | |
| At Cost | 93,925 | 88,000 | - | - |
| Accumulated Depreciation | (81,983) | (71,343) | - | - |
| | 11,942 | 16,657 | - | - |
| <u>Motor Vehicles</u> | | | | |
| At Cost | 63,811 | 60,233 | - | - |
| Accumulated Depreciation | (40,437) | (33,387) | - | - |
| | 23,374 | 26,846 | - | - |
| <u>Website Development</u> | | | | |
| At Cost | 8,380 | - | 8,380 | - |
| Accumulated Depreciation | - | - | - | - |
| | 8,380 | - | 8,380 | - |
| <u>Fixed Asset Under Construction</u> | | | | |
| At Cost | 157,882 | - | - | - |
| Accumulated Depreciation | - | - | - | - |
| | 157,882 | - | - | - |
| Total Net Book Value | 1,450,738 | 1,282,630 | 816,010 | 817,258 |



COAL ASSOCIATION OF NEW ZEALAND INCORPORATED & SUBSIDIARY
NOTES TO THE FINANCIAL STATEMENTS
FOR THE YEAR ENDED 31 MARCH 2004

7. INVESTMENTS IN SUBSIDIARIES

The Association's investment in a subsidiary comprise shares at valuation.

| Name of Entity | Interest Held by Group | | Principal Activity |
|--------------------|------------------------|------|---------------------------------|
| | 2004 | 2003 | |
| CRL Energy Limited | 70% | 70% | Energy & Environmental Research |

The subsidiary has a balance date of 31 March.

8. HIRE PURCHASE

| | Group | | Parent | |
|----------------------------|----------|------|--------|------|
| | 2004 | 2003 | 2004 | 2003 |
| | \$ | \$ | \$ | \$ |
| Equipment Finance Ltd | 57,995 | - | - | - |
| Fuji Xerox Finance Ltd | 7,116 | - | - | - |
| | 65,111 | - | - | - |
| Less Current Portion | (23,482) | - | - | - |
| Term Liability | 41,629 | - | - | - |
| Payable Less than One Year | 23,482 | - | - | - |

Security has been lodged over the assets subject to the above Hire Purchase Agreements, namely certain Computer Equipment and a Photocopier.

9. OPERATING LEASES

The Group has operating lease commitments for the premises in Hamilton, Greymouth and Christchurch. During the year an additional operating lease was signed for a motor vehicle.

The future operating lease commitments are as follows:

| | Group | | Parent | |
|-----------------------|--------|--------|--------|------|
| | 2004 | 2003 | 2004 | 2003 |
| | \$ | \$ | \$ | \$ |
| Within One Year | 40,792 | 11,237 | - | - |
| Between One-Two Years | 34,388 | 11,419 | - | - |
| | 75,180 | 22,656 | - | - |

10. RELATED PARTIES

Coal Association of New Zealand Inc. (CANZ) owns 70% of the share capital of CRL Energy Limited. During the year CANZ received from CRL Energy Limited revenue related to rental accommodation. In addition, CANZ paid to CRL Energy Limited expenditure related to energy related environmental research and consulting services.

11. SEGEMENT INFORMATION

The Group operates in one industry (research) and in one geographical area (New Zealand).

12. BANK OVERDRAFT FACILITY

CRL Energy Limited has a bank overdraft facility of up to \$50,000 with the ANZ Bank. The facility is secured by way of a registered debenture. The facility was utilised at various times during the year.

From 1 April 2004 this overdraft facility was extended to \$100,000.



COAL ASSOCIATION OF NEW ZEALAND INCORPORATED & SUBSIDIARY

NOTES TO THE FINANCIAL STATEMENTS

FOR THE YEAR ENDED 31 MARCH 2004

13. RECONCILIATION OF NET SURPLUS AFTER TAXATION
TO CASH FLOWS FROM OPERATING ACTIVITIES

| | Group | | Parent | |
|---|----------|-----------|----------|----------|
| | 2004 | 2003 | 2004 | 2003 |
| | \$ | \$ | \$ | \$ |
| Net Surplus after Taxation | 24,150 | 125,650 | 4,628 | 76,428 |
| Add / (Less) Non-cash Items | | | | |
| Depreciation | 214,009 | 216,890 | 14,612 | 14,612 |
| | 214,009 | 216,890 | 14,612 | 14,612 |
| Add / (Less) Movement in Working Capital | | | | |
| (Increase) Decrease in Accounts Receivable | 172,506 | (46,364) | (2,107) | 154,196 |
| (Increase) Decrease in Prepayments & Accrued Expenses | (68,661) | 23,814 | (5,000) | - |
| (Increase) Decrease in Inventories & Work in Progress | (56,084) | (6,756) | - | - |
| Increase (Decrease) in Accounts Payable | 20,997 | 38,371 | (20,398) | (33,816) |
| Increase (Decrease) in Provision for Holiday Pay | 5,053 | - | - | - |
| Increase (Decrease) in Income in Advance | 31,044 | - | - | - |
| Increase (Decrease) in Related Party Transactions | - | - | 50,170 | 17,502 |
| Increase (Decrease) in Accruals | (59,581) | (104,658) | (1,016) | (1,561) |
| Increase (Decrease) in Taxation | (26,990) | 9,609 | - | - |
| | 18,284 | (85,984) | 21,649 | 136,321 |
| Net Cash Inflow from Operating Activities | 256,443 | 256,556 | 40,889 | 227,361 |



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AUDITOR'S REPORT

To the Members of the Coal Association of New Zealand Incorporated

We have audited the Association and Group financial statements on pages 1 to 10. The financial statements provide information about the past financial performance and financial position of the Association and Group as at 31 March 2004. This information is stated in accordance with the accounting policies set out in Note 1 of the financial statements.

Board's Responsibilities

The Board is responsible for the preparation of the financial statements, which give a true and fair view of the financial position of the Association and Group as at 31 March 2004 and the results of their operations and cash flows for the year ended on that date.

Auditor's Responsibilities

We are responsible for expressing an independent opinion on the financial statements presented by the Board and reporting our opinion to you.

Basis of Opinion

An audit includes examining, on a test basis, evidence relevant to the amounts and disclosures in the financial statements. It also includes assessing:

- the significant estimates and judgements made in the preparation of the financial statements; and
- whether the accounting policies are appropriate to the Association's and Group's circumstances, consistently applied and adequately disclosed.

We conducted our audit in accordance with New Zealand Auditing Standards issued by the Institute of Chartered Accountants of New Zealand. We planned and performed our audit so as to obtain all the information and explanations which we considered necessary in order to provide us with sufficient evidence to obtain reasonable assurance that the financial statements are free from material misstatements, whether caused by fraud or error. In forming our opinion we also evaluated the overall adequacy of the presentation of information in the financial statements.

Other than in our capacity as auditors, we have no other relationships with, or interests in, the Association or its subsidiary.

Unqualified Opinion

We have obtained all the information and explanations we have required.

In our opinion:

- proper accounting records have been kept by the Association as far as appears from our examination of those records; and
- the financial statements on pages 1 to 10;
 - comply with generally accepted accounting practice in New Zealand; and
 - give a true and fair view of the financial position of the Association and Group as at 31 March 2004 and the results of their operations and cash flows for the year ended on that date.

Our audit was completed on 27 July 2004 and our unqualified opinion is expressed as at that date.

A handwritten signature in blue ink that reads "Sherwin Chan & Walshe".

Sherwin Chan & Walshe
Chartered Accountants



Our Vision

Coal is accepted as a secure, competitive and environmentally sustainable energy resource essential to New Zealand's prosperity

