

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

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This Newsletter is published for the Coal Association by CRL Energy Ltd.

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Climate change policy review

In May 2005, the Ministry for the Environment completed revised projections of New Zealand's greenhouse gas emissions. These revised forecasts indicate that New Zealand may fall short of meeting its Kyoto Protocol target by 36 million tonnes (Mt) of CO₂-e. When the Government agreed to ratify the Kyoto Protocol, adopt its current strategic climate change goal, and adopt the main elements of current climate change policies, a surplus of 50 Mt was expected.

The Government has announced a review of its climate change policies directing Treasury, the Climate Change Office and other officials to report back to Cabinet by 31 October. It was argued that the current policies were designed as a set of first steps in a relatively benign environment that has now changed, especially in light of the revised projections that indicate New Zealand will not meet its emissions reduction target for 2008-2012. The review will investigate how New Zealand should respond to this forecast deficit. It will also give consideration to updating the current high level climate change goal of "towards a permanent downward path for total gross emissions by 2012".

The review has four objectives:

1) To identify at a high level the mix of policies for Commitment Period 1: (CPI) 2008-12 and beyond - both domestic and at Kyoto level;

2) To identify the implications for economic and social policy objectives of continuing with the current climate change policies or adopting any alternative or additional climate change policies that emerge in the course of the review;

3) To identify the broad implications of revised projections for amending or replacing policies; and

4) To recommend the details of a negotiating mandate New Zealand will deliver at the first meeting of Kyoto parties in Montreal in November.

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CRL Energy seeks sequestration answers at Argonne National Lab

As part of the New Zealand/United States Bilateral Climate Change Partnership suite of programmes, CRL Energy and the Advanced Photon Source (Synchrotron) of the Argonne National Laboratory near Chicago, collaborated on an introductory investigation of CO₂ uptake in coals by use of small angle X-ray scattering (SAXS).

Dr Tony Clemens, Research Manager at CRL Energy travelled to the US to undertake the research.

"CO₂ is preferentially adsorbed onto the surface of the coal, releasing methane which can be harvested. Two or three molecules of CO₂ are adsorbed for each molecule of methane released, thereby, providing an excellent storage sink for CO₂."

Although there are methods available to measure the CO₂ capacity of coals, there have been no reliable means of direct observation of accompanying changes to coal structure and the implications for long term storage.

SAXS is a technique for structural investigations on a nanometer length scale

(1-300 nm). Typical samples consist of macromolecules or colloids in solution and measurements are performed in situ.

"SAXS technology applied to coals is in its infancy, but this preliminary work clearly showed that it is able to provide reliable and reproducible information on pore size changes and distribution with CO₂ uptake as it occurs," says Dr Clemens.

Four New Zealand coals (ranging from lignite through to sub-bituminous) and three bituminous coals from the Argonne Premium Coal sample bank were successfully investigated. The results were presented to members of the US delegation to the Partnership during their July 2005 visit to New Zealand.

Future work will concentrate on expanding the coal data set and experimental parameters (temperature and pressure), correlating with CO₂ uptake volume measurements and developing the technique into a new globally applicable method for predicting sequestration behaviour of selected coal seams.



Chris Baker

Clear path for coal to 2020 and beyond

By Chris Baker, Chairman, Coal Association of New Zealand Inc.

Over a year ago in the 2004 Coal Association Annual Review, I noted that “A number of events . . . have brought a welcome exposure and focus to coal in New Zealand”. I also noted that a key barrier to increased use of coal in New Zealand was the “widely held perception that climate change and New Zealand’s obligations under the Kyoto Protocol are not compatible with increased coal use”.

These two comments remain relevant today. Our view now has gone long term with a focus on implementing a sustainable strategy that will see coal being an important contributor to the New Zealand energy sector in 15 and 30 years time.

Demand for coal, both in New Zealand and internationally, is strong and independent projections continue to forecast coal’s growth, particularly in developing countries but also in the United States and parts of the European Union. Concurrently, international investment in research and development in the technologies that can address coal’s impact on the environment – clean coal and carbon capture and storage (CCS) technologies – measures billions of dollars in the US, Australia, the EU and China. Also, CCS technologies are increasingly being seen, and acknowledged globally, as one of the key responses to climate change.

It is in this global context that the Coal Association has been addressing coal’s environmental credentials. Three key strategies have been pursued:

a) Technical tours – several tours to Australia have been run, attendees included MPs, government officials and industry representatives. These tours are aimed at exposing attendees to the importance of coal in Australia and globally, and providing a detailed knowledge of the range of research and development programmes being undertaken;

b) Seminar series – a number of international experts in carbon capture, sequestration, gasification, etc.

technologies have been invited to New Zealand for lectures, interviews and one-on-one discussions; and

c) International collaboration – The Coal Association belongs to the International Energy Agency (IEA) GHG R&D Programme, the IEA Clean Coal Centre, and has recently joined the World Coal Institute (WCI), and the Australian COAL21 programme.

The COAL21 programme is particularly important as we challenge the “anti coal” lobby. The objective of this government, industry and research partnership is to reduce or eliminate greenhouse gas emissions arising from the use of coal in electricity generation in Australia. Our participation puts the coal industry in New Zealand on the “front foot” in the environmental debate, and provides real traction to influence both policy and research.

Looking forward key priorities and activities for the Association in 2005/06 and beyond are:

- Representation of the industry, particularly at national level, to encourage rational policy making in the energy sector. Ongoing initiatives to support this strategy are:
 - COAL21 programme participation and membership of the coal-related IEA groups;
 - The associated dissemination of information and issues in New Zealand;
 - Seminar series; and
 - Technical tours – a key target here will be energy and related industries MPs in the new Parliament post elections in September 2005.
- Promoting and supporting research consistent with our long term vision regarding coal technologies.

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.

Asia-Pacific accord complements Kyoto

By Wayne Hennessy, CRL Energy Ltd.

A US-led Asian-Pacific accord on spreading technology to fight global warming was announced at the end of July as complementary to the Kyoto Protocol rather than an alternative.

The six-country Asia-Pacific Partnership on Clean Development and Climate between the US, Australia, China, India, Japan and South Korea aims to promote clean energy technologies (including clean coal, natural gas, methane capture, hydro, nuclear power and carbon capture and storage) rather than setting binding goals for cutting emissions of greenhouse gases. The US Government said the partnership offered “voluntary practical measures” rather than an “energy diet”. The Foreign, Environment and Energy Ministers of the six participating nations have been invited to attend a meeting in Adelaide in November this year to sort out implementation details.

The June international G8 summit of industrialised nations confirmed continuing US and Australian opposition to Kyoto. Other members of the new partnership have ratified Kyoto but, as developing countries, China, India, and South Korea are not yet bound by emission reduction targets. The inclusion of Japan, which has undertaken Kyoto obligations, lends credibility to the claim that this is not just a “Kyoto outsiders’ club”.

The US says the new partnership will tackle poverty as well as global warming by developing “clean, affordable and secure” technologies. “Stagnant economies are one of the world’s greatest environmental threats,” according to the media statement, adding that poor countries cannot be asked “to preserve the environment at the expense of their own survival”. The Australian Prime Minister, John Howard, claimed “the fairness and effectiveness of this proposal will be superior to the Kyoto Protocol”. However, the US Deputy Secretary of State described the partnership as a “complement, not an alternative” to Kyoto.

The agreement has been widely seen as launching a competitor to the Kyoto Protocol model of emission reduction targets. Official talks on a successor to Kyoto post-2012 are due to start at the late November COP11 in Montreal. Most experts said the pact was unlikely to undermine Kyoto, partly because it was limited and echoed the 1992 UN Framework Climate Convention on Climate Change that most nations concluded was inadequate to curb a build-up of greenhouse gases caused by human activity. One analyst claimed “The world tried (non-binding goals)...in 1992 and not much

happened. This is more or less repeating that effort, but with more vague goals and fewer countries.” The head of European Commission foreign policy, Javier Solana, welcomed the initiative but stated the US-led deal “has nothing to do with other, much bigger initiatives, which are of a global nature.”

Some experts welcomed the partnership as building on existing agreements on sharing more efficient energy technology and a possible sign that the US and Australia were taking climate change more seriously. Underlying the agreement is the notion that the practical approach to the problem of human induced climate change is to develop and diffuse new technologies, not to restrict countries’ ability to use existing technologies. Some experts acknowledge that it will not be long before developing countries’ emissions outstrip those of the developed world, but it will be difficult to persuade China (with per capita GDP about US\$1100) or India (where it is even lower) to do anything that might retard their economic growth.

Climate Change Minister Pete Hodgson was diplomatic in his response to the Asia-Pacific Partnership, noting the language being used by the six nations indicated they see it working alongside the Kyoto Protocol rather than replacing it. “We should welcome anything that might assist the further development of technology that will be good for the climate change issue. This agreement is an important one involving the two biggest science research engines of the world (the US and Japan), one of which had ratified Kyoto and one of which hasn’t.”

He commented that New Zealand is also working on several research projects alongside its Kyoto commitments, including one with Australia on agricultural emissions and another with the US including extracting hydrogen from coal.

The Employers & Manufacturers Association (Northern) welcomed the deal, suggesting New Zealand should be going down a similar road instead of being part of the Kyoto Protocol. “The pact focuses on accelerating the development of new technology to capture carbon emissions, not on the carbon tax, which will artificially hike the price of energy in New Zealand. Its aim is to encourage investment in technical innovation, not in more complex bureaucracy.” The EMA added the new agreement will see New Zealand and Australia’s economic policies diverge, rather than drawing us together in a single market.

Changes to Air Quality NES

By Wayne Hennessy, CRL Energy Ltd.

One of the final Cabinet decisions taken by the Government leading up to this month's elections was to approve urgent changes to the regulations implementing the National Environmental Standards on Air Quality that have now come into force. Most notable was the long awaited easing of the heavy handed "no resource consents" requirement if a council is not making sufficient progress towards achieving the tough ambient PM₁₀ standard by 2013.

The main change is that the restrictions will only apply in areas breaching the standard (like Christchurch, Nelson and several towns) if the resource consent applicant's discharge is "likely to increase significantly the concentration of PM₁₀ in the airshed". The term "significance" is said to be well tested in environmental law cases. Councils will now be able to choose a curved line path (not just a straight line path) to standard achievement, giving more time for the tough home heating replacements in the transition to 2013.

Apart from these changes, the most important one for industry is that councils will be able to require resource consent applicants in breaching areas to offset their emissions by funding emission reduction of other

sources (say replacing older woodburners) in the airshed (most likely to apply to PM₁₀, but possibly SO₂ in some areas and NO_x and CO in Auckland). The implications for industry in Christchurch, Nelson and several towns could be huge, depending on how council officers apply the regulations.

A resource consent application in Christchurch for a coal boiler has already been refused on the grounds of 'significance' and is to be appealed to the Environment Court. The difficulty of the NES PM₁₀ target is already being used to "encourage" greater particulate emission savings from applicants and in reviews of existing consent conditions. To some degree this is understandable because air quality officers will have to demonstrate that industries are playing their part when many householders are about to face major solid fuel heating restrictions. However, the offset scheme in particular could be used as an extra excuse to impose unreasonably expensive cleanup requirements on coal users.

The Coal Association sees it has a role in assisting coal users facing unduly heavy restrictions while resource management lawyers and council officers sort out the implementation of this scheme in the next few years.

NZ Steel and Holcim seek NGAs

As part of ongoing efforts to cut greenhouse gas emissions, protect jobs, and protect the international competitiveness of New Zealand Steel Ltd, the Government and the company recently announced they are entering talks for a Negotiated Greenhouse Agreement (NGA). Following hard on the heels of New Zealand Steel, cement and lime manufacturer, Holcim New Zealand Ltd, announced it would enter similar talks.

Firms that obtain an NGA receive exemptions to the carbon tax in return for moving to world's best practice in emissions management. New Zealand Steel is part of BlueScope Steel, which operates in Australia, USA and Asia as well as New Zealand and the Pacific Islands. In order to compete in these worldwide markets, the company said its performance has to be up to best international standards.

The company has invested heavily in environmental control equipment and an NGA will provide a stable base for future operations and growth. It produces over 600,000 tonnes per year of steel products from basic raw materials of local black sand and Huntly coal. The products range from heavy steel plates for structural applications through to Colorsteel sheets for domestic housing and pipes for water reticulation. New Zealand Steel is the largest single site employer in the country, and is a major export earner, as well as providing the

raw materials for much of New Zealand industry.

According to Climate Change Minister, the Hon. Pete Hodgson: "Those firms that engage with the NGA process recognise the need to take action on climate change at the same time as structuring their operations to remain competitive in a world that now prices emissions. I'm pleased to acknowledge New Zealand Steel's leadership in this regard."

Holcim New Zealand General Manager Cement, Jeremy Smith said "This is a very important issue for Holcim New Zealand, so we're obviously very pleased to be invited to proceed to negotiations. We first undertook a voluntary agreement to reduce our emissions in 1995. Following on from that success, we think the opportunity to pursue an NGA fits in very well with the company's existing sustainable development goals."

The Government has already signed NGAs with Oceana Gold, the New Zealand Refining Company, and just this month with New Zealand Aluminium Smelters. It is in negotiations with ACI Glass Packaging, Carter Holt Harvey, Fletcher Building, Newmont Waihi, and Norske Skog Tasman. The Government recently announced a streamlining of the NGA process to reduce the time and costs involved. Firms of any size whose international competitiveness might otherwise be at risk from the C tax can apply. CRL Energy notes that the Government has yet to demonstrate how cost effective the streamlined NGA process will be for small to medium coal users.

New NGA for NZAS

The Government announced on 14 September that it has reached agreement on the framework for a Negotiated Greenhouse Agreement (NGA) with New Zealand Aluminium Smelters (NZAS). Firms that obtain a NGA receive exemptions to the carbon tax in return for moving to world's best practice in emissions management.

"I'm pleased that industry and the government are continuing to make progress on tackling climate change at the same time as maintaining the competitiveness of New Zealand business," says Convenor of the Ministerial Group

on Climate Change Pete Hodgson. "The conclusion of the framework for agreement has been an excellent example of cooperation between NZAS and the government to achieve environmental outcomes and protect the competitiveness of New Zealand industry. We look forward to working further with the Government on this important issue," says NZAS Chairman Tom Campbell.

NZAS at Tiwai Point produces some 334,000 tonnes per annum, putting the site among the top 20 largest aluminium smelters in the world.



New Zealand Aluminium Smelter at Tiwai Point.

New director for Solid Energy board

John Spencer has been appointed to the board of coal producer and distributor, Solid Energy New Zealand Ltd, by the Minister of State Owned Enterprises.

Chairman of Tainui Group Holdings Limited and a former Chief Executive of the New Zealand Dairy Group prior to the formation of Fonterra, John has held a number of senior management positions in New Zealand and overseas. He is currently the Deputy Chairman of the National Institute of Water and Atmospheric Research Limited (NIWA) and a Director of Tower Limited and several other private companies.

2005 NZ Minerals Conference

There are still places available at the 'Realising New Zealand's Mineral Potential' conference, on 13 to 16 November 2005, at the Carlton Hotel in Auckland.

A range of industry leaders, commentators and researchers from the US, Australia and New Zealand will address issues such as 'State of the art' research on epithermal and mesothermal gold; and Coal and lignite's place in New Zealand's energy future.

See www.nzmineralsconference.org.nz for the programme and fees.

Coal extraction resumes at Spring Creek

Coal extraction at Spring Creek Underground Mine, near Greymouth, has had a "positive start" with all productivity targets achieved since extraction resumed on 10 August, says Solid Energy Chief Operating Officer, Barry Bragg.

Under a six-month mine plan approved through to the end of February 2006 coal is now being extracted by hydraulic monitor in "panel one", the area which has been under development.

In the meantime Solid Energy's technical team has started developing a further 12-month mine plan for development and extraction through to the end of February 2007. This plan will use the results from further geological exploration and confirmation of the mine's performance in the current plan.

"Progress will continue to be regularly measured against the development and production targets set out in the mine plan to ensure that the operation is sustainable and that it has a long term future. If targets are not consistently met the future of the mine will be reviewed. The economics of the mine remain marginal," says Mr Bragg.

Coal extraction at Spring Creek Mine was suspended in November 2004 due to concerns about slow development rates and coal quality issues.

Climate Change policy review

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Questions that will be looked at include:

- What is the best balance between further mitigation policies and Kyoto flexible mechanisms?
- Who is best placed to undertake decisions about this balance?
- How would any devolution of New Zealand's emission reduction obligations be achieved?
- What should the broad direction of any further, or alternative, policies to mitigate New Zealand's emissions be?
- What are the implications of these policies for New Zealand's strategic climate change goal and does this need to be updated?

The Review will also look at the broad

implications for New Zealand more generally if current, alternative or additional climate change policies are adopted.

The Greenhouse Policy Coalition (GPC) has accepted a proposal from Castalia Strategic Advisors to prepare a review of climate change policy from an industry perspective.

The main objective of this review is to bring together the existing knowledge about the key drivers of New Zealand's emissions in a way that sets out the key insights about the options available, and the hard choices that would have to be made. It also aims to set out an authoritative perspective on the likely demand for electricity and the most plausible efficient expansion path for the generation sector.

Coming Events

2005 ICCS&T

- international conference on coal science and technology, Okinawa, Japan, 9-13 October 2005, Ms Yoshimi Kunugi-Nishina, AIST Tsukuba Central 1, Tsukuba, Ibaraki 305-8561, Japan, Tel: +81 29 861 8423, Fax: +81 29 861 8417, Email: y-nishina@aist.go.jp, <http://unit.aist.go.jp/energy/iccst/>

Cooperative Research Centre for Coal in Sustainable Development

Annual Conference, Brisbane, Australia, 25 Oct 2005, www.ccsd.biz

World Coal Conference

Coaltrans Silver Anniversary 23-26 October 2005, Le Palais de Congres de Paris, Paris, France

Internet: www.coaltransconferences.com

The Clearwater Coal Conference

Coal Technology Association and The International Technical Conference on Coal Utilization and Fuel Systems 21-25 May 2006, Clearwater, Florida, US

For further information please contact: Barbara Sakkestad, Phone: 301/294-6080, Fax: 301/294-7480, E-mail: barbarasak@aol.com

15th international coal preparation congress & exhibition: designing for the environment

Beijing, China, 17-20 October 2006, Ms. Sun Jiaohua, China National Coal Association, 21 Hepingli Beijie, Beijing 100713, China, Email: sjiaohua@chinasafety.gov.cn

CRL Energy leads environmental clean-up



Vertical column experiment using Blackball AMD

Acid Mine Drainage (AMD), a type of acid rock drainage, is an environmental problem which has plagued man for centuries. In the United Kingdom, Roman mining sites continue to generate acid drainage some 2000 years after mining operations have ceased. The problem occurs when sulphide-bearing minerals

in rock are exposed to air and water by mining activity. A breakdown of the sulphides releases acid and can mobilise trace elements such as arsenic, zinc, nickel and others from waste rock and tailings into ground and surface water. A team of scientists from CRL Energy, Landcare Research, and Canterbury University, is waging war on AMD and adapting successful remedies for a global problem. The team began their six-year programme in July 2004 by mapping the extent, level and impact of AMD in the West Coast and Southland Regions.

Using a geodatabase, Dr James Pope, CRL Energy Applied Research Manager, collated existing available rock (geochemical) and water data (quality, flow and precipitation events) from targeted areas. Dr Pope's team also selected specific sites in each region and designed a sampling plan for a more detailed evaluation which will be completed in December 2005.

To assess the impact of AMD on ecology, a team led by Dr Jon Harding, a fresh water ecologist from the University of Canterbury's Biology Department, entered

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Energy Scenarios to 2050



Dr Rob Whitney, Managing Director, CRL Energy Ltd.

CRL Energy's Managing Director, Dr Rob Whitney, has been selected as part of study group participating in a World Energy Council (WEC) Study "Scenarios to 2050", this is the creation of new scenarios motivated by the WEC vision of the evolution of the world energy scene.

This major study to develop new WEC Energy Scenarios follows earlier WEC work such as Energy for Tomorrow's World (1993) and Global Energy Perspectives (1998). Scenarios for 2050 will be based on updated assumptions about the main drivers of energy supply and demand and the Study group will work in partnership with expert data and modelling institutions.

Updated Terms of Reference will be considered by the Studies Committee at a meeting in Sri Lanka this September.

Dr Whitney says he expects that the predictions will be based on three basic scenarios which had appeared in the WEC publication; Energy for Tomorrow's World. These are: High Growth, Reference or Middle Course, and Ecologically Driven.

"I believe that huge amounts of coal, oil and natural gas will be consumed over the next half-century.

"We'll be projecting global carbon dioxide emissions by scenario. Depending upon the different scenarios, the global carbon intensity of primary energy supply is expected to start declining at various points and speeds between the years 2000 and 2050.

"It will be an interesting exercise, and perhaps provide a primer for governments to work from. At present around the world, energy is unevenly distributed with resulting detrimental impacts on environment and human health. Health, water, food, and education cannot be improved unless modern energy becomes available to all."

CRL Energy team leads environmental clean-up

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data on water chemistry and aquatic biota. Dr Harding has previously worked on producing a Mine Impact Rating (MIR) based on invertebrate species present in streams in the West Coast region. He has studied the impacts on 77 different types of invertebrates collected at 54 stream sites. His team is now working on an initial draft of water quality thresholds to identify ecological impact; they will also undertake an extensive algal survey, including identifying taxonomic tolerances, in a range of mine impacted systems.

Having almost finished quantifying the extent of the problem in New Zealand, the team is now shifting its focus to clean-up methods. Work on identifying best strategies to remediate impacted ecosystems and prevent ecosystem degradation is being led by CRL Energy environmental scientist, Dave Trumm. By mid-2005 the team had categorised sites in West Coast and Southland into 'severe', 'moderate' and 'minor' impacted, and are in the process of developing management strategies for 'minor', 'moderate' and 'severe' sites, and after extensive trials at the 'severely' impacted Sullivan Mine, north of Westport, they now move forward to set-up small scale trial remediation systems at 'minor' and 'moderate' impacted sites.

Mr Trumm explains that although the labels of 'severe', 'moderate' and 'minor' may sound as if they are solely related to the environmental impact that AMD has at each site, the ratings are also based on the degree of effort required to treat a site. This can be influenced by a number of variables including topography, acidity, water flow rates and volume of water. "For example, a site with a high water flow is difficult to clean up even if the water chemistry isn't that bad."

"Our goal in the Sullivan Mine site study was to evaluate the AMD. Look at the chemistry, look at the geochemistry and find out what rock units were responsible for the AMD and work out how long the AMD might last for based on how much pyrite was present in the rock."

Pyrite is the most common sulphide mineral which, when exposed to oxygen and water, oxidises and produces acid that leaches metals from waste rock.

"We evaluated all the different types of remediation systems that people used elsewhere in the world for AMD and grouped them into either oxidising or reducing type systems. We decided on three different trial systems. One was an open limestone channel, a vertical-flow wetland or successive alkalinity producing (SAPs) unit, and the third system we trialled was an anoxic limestone drain (ALD). An open limestone channel is exactly what it sounds like, a long open ditch or channel filled with limestone, but like the ALD, dissolution of the limestone can decrease over time due to iron oxide precipitation coating the limestone.

"The vertical-flow wetland is a system that strips dissolved oxygen out of the water so it reduces the metal. With iron for example, it reduces the iron that is already in a ferric state back to a ferrous state and then drops it out as iron sulphide. In essence you reverse the process of oxidation by dropping out the metals in the wetland. The lower part of the wetland

unit has a limestone layer, topped by an organic layer such as compost. The limestone increases the alkalinity so it raises the pH and the water comes out nice and clean.

"The ALD is an abiotic system of buried limestone. It is used in a situation where your AMD already has a low dissolved oxygen content. In the trials, our dissolved oxygen was too high but we decided to try the system anyway to see how effective this type of system would be under these conditions. After a few weeks we found that the dissolution of the limestone had slowed down quite a bit. It was no longer treating the AMD sufficiently and the limestone rocks in the unit became coated in ferric hydroxide.

"We trialled these techniques at the Sullivan mine, rated as 'severe'. We will be trialling systems similar to these at a 'minor' and 'moderate' site. Our target is to have a fully operational system installed at one 'minor' rated site in about a year's time.

"We also ran a small experiment at the Blackball Mine, where we passed AMD through a vertical limestone column. It was an experiment to see if a limestone-leaching bed would treat it. It was very effective at treating the AMD. Then we conducted a 96 hour toxicity test on macro invertebrates in the area and found that there was a significantly reduced death rate in the population when the water was treated with limestone in this manner.

"All of these methods which we tried are known as passive treatment systems. The alternative active chemical treatment of AMD is an expensive, long term liability. By contrast, passive treatment systems do not require continuous chemical inputs and use natural processes to clean contaminated water."

Mr Trumm says that of the field trials, the vertical-flow wetland treatment of the AMD at the Sullivan Mine was by far the most promising of the three methods.

As well as the work by CRL Energy's and University of Canterbury scientists, Drs Kathryn O'Halloran, Jo-Anne Cavanagh and Rowan Buxton of Landcare Research have lent their expertise in environmental care areas, as has Dr Dave Craw from the University of Otago, with geological and geochemical expertise.

All those involved in the programme are contributing to a standard decision-making framework, which is being led by Amanda Black, environmental scientist with CRL Energy. The development of the decision-making framework is also strategically guided by a Governance Panel made up of representatives from Solid Energy, Francis Mining, Oceana Gold, West Coast Regional Council, Environment Southland, the Ministry for the Environment, and the Department of Conservation.

The completed framework will help New Zealand get a return from its mineral deposits by providing comprehensive guidelines to assess a site for its potential to extract mineral wealth with an acceptable level of environmental impact, and best-practice methods for mitigating and rectifying any environmental impact.

AMD research is supported by the Foundation for Research, Science and Technology.

Coal Association of New Zealand Inc.

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Associate Membership

Did you know that you can join the Coal Association, even if you are not a coal producer, by becoming an Associate Member?

Why should you join?

The Coal Association needs the support of Associate Members more than ever, so that New Zealanders can retain access to the plentiful and economic fuel coal. Your support is vital, as the Association attempts to reduce the impact of economic measures, designed to help meet New Zealand's Kyoto Protocol obligations. As an Associate Member, you can keep up to date with happenings in the energy industry by reading the Coal Newsletter, which is sent out quarterly, and the Annual Review, which every Associate Member receives with an invitation to the Annual General Meeting.

Other benefits of Associate Membership are:

- opportunities to participate in Coal Association activities;
- opportunities to make your voice heard through Coal Assn initiatives;
- free access to information held by CRL Energy Ltd;
- free short consultations with CRL Energy staff; and
- free updates of recently published coal information.

What does it cost?

An annual fee of \$350 +GST.

How do I join?

Ring CRL Energy 04 570 3715 for the details.



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