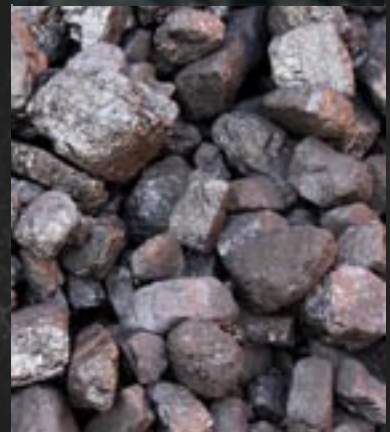
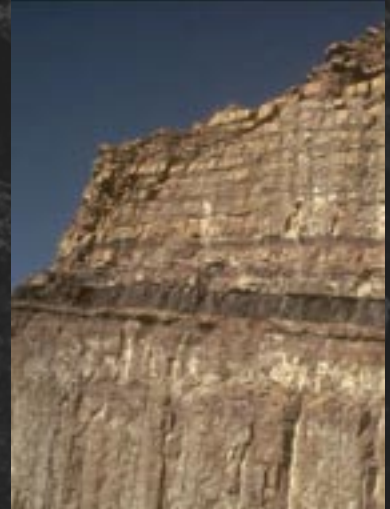


Annual Review 2007

Coal Association of New Zealand Inc.



Coal
Association of
New Zealand



Contents

Page 2

Coal Association of New Zealand Inc - Members list



Financial Statements

Page 11

Statement of Financial Performance

Page 12

Statement of Movements in Equity



Page 5

The Year in Review



Page 3

Chairman's Report
Coal Association of New Zealand



Page 13

Statement of Financial Position

Page 14

Statement of Cashflows

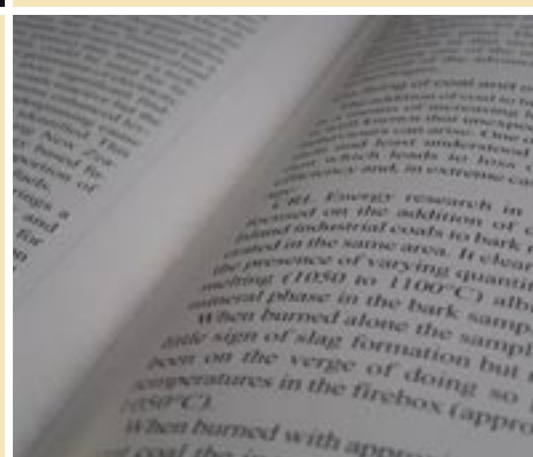


Page 8

Coal Association Seminars, Publications, and Submissions

Page 10

Clean Coal Technologies





**Research Highlights from
CRL Energy Ltd**

Page 21

Surprising results from HEEP survey
- how households use energy



Page 15

Notes to the Financial
Statements



Page 24

CRL Energy's role in New Zealand's
'EnergyScape'



Page 23

Desulphurisation plant a success



Page 20

Auditors' Report



Page 24

Pathways to mineral wealth

Coal Association of New Zealand Inc.

Directors

C Baker - Chairman	(Other)
A Broome	(Other)
D Elder	(Coal Producers)
B Francis	(Coal Producers)
B Highsted	(Coal Producers)
A Melhuish (seconded 2007)	(Coal Users)
G Perkins	(Coal Producers)
R Pridmore (resigned 2007)	(Other)
R Pullein	(Coal Users)
N Shewan	(Coal Users)
C Van Oosterom (seconded 2007)	(Coal Users)

Officers

Secretary	T W Matheson
Treasurer	R McGregor

Representatives

CRL Energy Board	A Broome
	B Francis
EXITO	B McDonald
Mines Rescue	D Stewart

Coal Producer Members

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

Associate Members

A W Taylor Industrial Coal Ltd	McDonald's Lime Ltd
Alliance Group Ltd	Meritec (Worley Consultants)
Bionutral Laboratories Corporation	Metso Minerals (New Zealand) Ltd
Coal Distributors (Auckland) Ltd	Ministry of Economic Development
Coal Marketing Services	Montgomery Watson Ltd
Coal Power Ltd	National Institute of Water and Atmospheric Research (NIWA)
DLA Phillips Fox	NZ Coal Processors Ltd
Doug Hood Contractors	NZ Steel Ltd
Energy for Industry (formerly Meridian Solutions)	Pike River Coal Ltd
G L Bowron Ltd	Port of Greymouth
Genesis Energy	SGS NZ Ltd
Golden Bay Cement	Shipherd Nurseries
Heinz-Wattie Ltd	Sinclair Knight Merz
Huntly Retail Distribution Centre	Skellerup Industries Ltd
Kenroll Industrial Coal Ltd	South Port NZ Ltd
Kingett Mitchell	Southtile Ltd
L&M Coal Ltd	Summit Wool Spinners
Lincoln University	TNL Group Ltd
Lion Breweries South	University of Canterbury
Lyttelton Port Company Ltd	Vector Ltd
Mangapapa B2 Incorporation	Websters Hydrated Lime Company Ltd

In my 2006 Chairman's report I noted that the year had been a significant one for the Coal Association and for coal in general, both in New Zealand and globally. This year has been no different.

Looking first at the Association's affairs, there are three particular highlights.

Firstly, the sale of 50% of CRL Energy to NIWA, settled on 1 April 2006, has to date been successful for the CRL Energy business, and has been a positive outcome for the Association.

Secondly, the sale of the Gracefield building was concluded in March 2007. The sale price exceeded earlier expectations and the Association is now in a strong position in terms of resources.

Thirdly, the Association has played a significant role in bringing together a Government and industry partnership to develop and advance a carbon capture and storage (CCS) strategy in New Zealand. I have provided more details on this below.

In May 2007 the Association held a strategic planning session in Christchurch. The session was triggered by the perception that the world had moved significantly since our previous five-year plan was put in place, and the need to consider a range of strategic options for the industry that recognize the changing external environment and to lever off the resources available to the Association.

A range of industry participants were invited to the session. Attendees included the Association Board plus representatives from Fonterra, Genesis Energy, Kai Point and Pike River. Essentially, the key issues that arose from the session were that the current work focusing on coal technology, the NZ CCS Strategy and working with Australia through the COAL21 program and the CO2CRC, membership and participation in international organizations (IEA Clean Coal Centre, IEA Greenhouse Gas R&D Programme and the World Coal Institute) was appropriate and should be maintained, but that the Association needed to develop a communication strategy to improve the understanding of coal and coal technologies amongst a broad set of stakeholders.

At the time of writing this report a strategic plan had been drafted by Doug Holden, currently the Communications Manager for the Australian Coal Association,

for consideration by the Board.

Climate change, and policies adopted by the New Zealand Government to respond to the threat of climate change, continues to be the single most important issue the coal sector faces in New Zealand. Events in the international arena over the last year, including the Stern Report, Al Gore's movie, a barrage of evidence and reports that further support the need for climate change action, have had considerable impact amongst the public, and therefore with politicians.

Following the failure of the carbon tax, the Government embarked on a relatively lengthy period of policy consideration – the output from which was the release for consultation of a number of papers in March this year. These papers dealt with energy efficiency, energy strategy, pre and post 2012 climate change policy options, forestry and agriculture. In terms of climate change policy, submissions provided broad support for emissions trading as the primary mechanism to establish a cost for CO₂ in the market, and to thus encourage behavior that might reduce New Zealand's GHG emissions – with a very strong caveat from the industry sector regarding timing and protecting the competitiveness of firms competing internationally.

The Government's proposal for emissions trading was released in September 2007. As presented, the proposal represents a real threat to the coal and fossil fuel sector, and to the broader economy. The proposal is ambitious in terms of scope and timing, and, as it is presented, will impose significant costs in the productive sectors of the New Zealand economy, with little prospect of a commensurate environmental benefit. On the brighter side however, there are a number of significant elements of the proposal, particularly those that relate to the allocation of free units to the 'trade exposed'¹ sector, that are to be decided during 2008 and are therefore able to be influenced.

A clear priority for the Government has been to maintain New Zealand's 'clean green' image. The Minister of Energy in particular has made light of the economic impact of the proposal and the potential for carbon leakage to occur as a result of these ambitious emissions trading plans.

The Australian Government has also



Chris Baker

progressed proposals for an emissions trading scheme – but at a more measured pace than New Zealand, and with a clear priority being to maintain international competitiveness.

The Association has been, and will continue to be, active to achieve a more acceptable outcome for coal users and, by definition, for significant energy users in the New Zealand economy.

Turning back now to the New Zealand CCS Strategy. The strategy is a partnership between industry and Government – contributors include; the Foundation for Research and Technology (FRST); Crown Minerals; the Coal Association; Solid Energy; L&M Mining; and Genesis Energy. Funding of \$1.4m (GST incl) has been committed for three years, FRST being the primary funder (\$1m per annum), and to date a contract has been let to GNS to assess CO₂ storage reservoir options in Taranaki and the Waikato areas. In addition, the partnership has joined the CO2CRC, myself being the representative on that Board with an Alternate from FRST.

This is an important activity, both because it commits Government funds in this high priority technology area, and because it strengthens the ties across the Tasman in an area where we in New Zealand should simply be followers. These activities are key to positioning coal as 'part of the solution' rather than 'the cause of the problem' and will greatly assist the industry in its vision to ensure that "Coal is accepted as a secure, competitive and environmentally sustainable energy resource essential to New Zealand's prosperity".

Board Changes

Unfortunately, during the year we lost the excellent contribution of Dr Rick Pridmore to the Board. Dr Pridmore was formerly the CEO of NIWA, and is now an independent consultant. His contribution to the Board was always of the highest quality and the industry was fortunate to have him as a Board member. We wish Rick well in his future endeavors. On a positive note, I am very pleased to welcome Allan Melhuish of Genesis Energy, and Chris Van Oosterom of Fonterra on to the Board. Chris and Alan were co-opted onto the Board earlier in the year and, as required by the constitution, will stand for election at the AGM.

Financial Results

During the 2007 year the Association resolved to change the balance date of the organization to 30 June. This change was simply to align with CRL Energy and our NIWA partners. For the 15 months of this financial year the Coal Association budgeted

for a shortfall of \$73.6k. The actual shortfall after allowing for depreciation recovered on sale of fixed assets and interest received was \$25.1k. The major reason for the under spend was a delay in finalizing the details for the NZ CCS Strategy. The representation work programme was ahead of budget, particularly in relation to climate change issues, and the research work programme a corresponding amount under budget, mainly through the delayed CCS payment identified above.

The budget for the 2007/08 financial year forecasts a deficit of \$221k. 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 Board is currently debating the relative importance of, for CANZ, investment in representation and research activities.

Key Priorities

Looking forward key priorities and activities for the Association in 2008 and beyond are:

- The Government's Emissions Trading Policy and the associated economic risks.
- Developing and implementing the communication strategy
- Working with Government and advancing the CCS strategy
- Working across the political spectrum, particularly the National Party, to ensure coal and coal technologies are understood and accepted as part of the energy mix.

Challenges remain, but I am confident that we are pursuing activities that maintain and grow the environmental credibility of coal as a fuel, and the contribution coal makes in the energy sector in New Zealand.



CHRIS BAKER
CHAIRMAN
OCTOBER 2007

¹ Trade exposed is the current term used to describe competitive at risk firms – those firms that are competing, either in the domestic or international market, against international producers and are substantially unable to pass on additional costs.

This past financial period has been one of activity for the Coal Association as we ramp up our role in representing the coal industry. Numerous submissions have been tabled by the Association (see pages 8 and 9) on behalf of the industry in a political environment where several events and predictable trends are shaping our business and the long-term outlook for coal.

On the home front

The last financial period began with the sale of 50% of the Coal Association's shares in CRL Energy to NIWA on 1 April 2006. The move made the NIWA group of companies the largest energy research provider in New Zealand, and has seen CRL Energy further diversifying its role in energy research. Some of CRL Energy's research activities have been highlighted in this report (see pages 21 to 24).

The New Zealand scene

While the Government continues to publicly push for a fossil fuel-free future, recent figures released by Crown Minerals Statistics have revealed that 2006 was another record year for New Zealand coal production, with national coal production reaching 5.77 Mt from four operational underground and 22 opencast mines (Pike River mine is being developed for coking coal exports, but first production is not expected until 2008). Production was approximately equal quantities of bituminous and sub-bituminous coals. Over 60% of production was from Rotowaro and Stockton opencast mines, with a further 16% from the two largest underground mines, Huntly East in the Waikato and Spring Creek at Greymouth.

The value of coal mined in New Zealand during 2006 was a record \$678M, illustrating the continuing strong market value of New Zealand coals, both domestically and abroad.

In October this year, the Government-owned coal producer, Solid Energy, announced a record net surplus after tax of \$94.1M (year to 30 June 2006: \$85.5M) for the year ended 30 June 2007, following record coal sales of 4.8Mt (year to 30 June 2006: 4.67 Mt), including record sales in New Zealand of 2.61 Mt (year to 30 June 2006: 2.2 Mt).

Exports and Imports

However, Solid Energy also announced that their coal exports were down 11% to 2.19 Mt (year to 30 June 2006: 2.47 Mt). Work to collect and relocate native land snails and ongoing protest action at Stockton Opencast Mine delayed access to high-quality hard coking coal, causing the company to cancel five shipments in May/June this year.

Total exports of bituminous coal for 2006, produced entirely from the West Coast, reached 2.61 Mt bringing in revenue of \$350M. Coal was exported mainly to India and Japan, with smaller quantities going to Chile, South

Africa, Brazil, China, USA and Australia.

New Zealand also imported some 1 million tonnes of foreign thermal coal to the North Island (primarily for feedstock at Huntly Power Station), indicating that a substantial domestic production shortfall still exists, despite Solid Energy's increase in domestic sales and the continued strong output from mines in the Waikato (2.29 Mt).

Consumption

On the consumption side the Ministry of Economic Development's latest Energy Data File shows that total coal consumption remained steady or slightly increased in 2006 at 93.3 petajoules (observed), or 92.4 PJ (calculated), despite reports of a consumption decline. Electricity generation was the main coal user using 51.7 PJ or 55% of total consumption (2005 - 50.4 PJ) - this represents some 12% of New Zealand's total electricity generation. However, now that Genesis Energy's new E3P combined cycle gas turbine has come successfully online this year, we may well see a decline in consumption for electricity generation from 2007 onward.

The industry sector used approximately 35 PJ (2005 - 34.5PJ). New Zealand iron and steel accounted for 20% of coal consumption and a further 18% was used for other industry, primarily meat, dairy and other food processing, cement, lime, wool and timber products. The commercial heating sector accounted for 4% of coal consumption, while the horticulture/agriculture, transport and residential sectors used the remaining 3%.

International trends

According to the latest figures from the World Coal Institute, the total hard coal production in 2006 was 5370Mt (million tonnes), an 8.8% increase over the previous year and 92% growth over the past 25 years.

In 2005, coal contributed over 25% of global primary energy needs and generated 40% of the world's electricity. In 2006, coal generated 80% of electricity in Australia, 93% in Poland and South Africa (2005 figure), 78% in the People's Republic of China, 71% in Israel (2005 figure), 69% in Morocco and India (2005 figures), 59% in the Czech Republic, 58% in Greece, and 50% in the United States.

Approximately 13% (around 717 Mt) of total hard coal production is used by the steel industry - almost 70% of global steel production is directly dependent on coal feedstock.

As well as electricity generation and steel production, coal is also used in cement manufacturing, alumina refineries, paper manufacturers, and the chemical and pharmaceutical industries.

The future of coal

Although the International Energy Agency (IEA)

The Year in Review

long-range forecasts out to 2050 and beyond are for little overall change in the demand for coal, changes in Government policy in New Zealand are likely to have a significant impact on the industry here. Two recent developments include the Government's September 2007 announcement of an Emissions Trading Scheme in conjunction with a goal of achieving 90% renewable electricity generation by 2025 (currently about 70%).

The other significant development is the Government's new New Zealand Energy Strategy announced in October 2007. The strategy has reiterated that the Government does not want any new fossil fuel burning power generators built for the next 10 years unless they were needed for emergency back-up.

Prime Minister Helen Clark speaking at the launch of the strategy said she wanted the sector to focus on renewable energy unless new coal and gas-fired stations were needed to ensure security of supply. Energy Minister David Parker said the state owned generators - which dominate the sector - had been told not to proceed with any plans to add thermal power generators to their baseload ability. In this environment, it is doubtful that Genesis Energy's planned Rodney plant would get the go ahead.

Prime Minister Helen Clark said the Government would decide by the end of year whether to regulate for a ban to cover the private energy sector - mainly dominated by Contact Energy.

Government policy aside, it is hard to imagine how coal will not continue to be in demand for baseload and standby electricity generation, given that at present coal-fired generation provides one of the cheapest most reliable forms of electricity generation.

Of the 42,056 GWh of electricity generated in New Zealand for year 2006, hydro, gas, coal and geothermal generation accounted for 55%, 22%,

12%, and 8% of the total electricity generation, respectively. Other fuel types including oil, biogas, waste heat, wood, and wind represented the remaining 3%.

The Energy Strategy, which does not include nuclear or any new major hydro developments, calls for an extra 5000MW of wind power by 2030. This represents a significant challenge, from a public perception and acceptance perspective (this amount of wind power would have a large geographical footprint), in terms of grid stability and power quality, and in relation to the increased demand for, and cost of, standby generation requirements for this amount of intermittent renewable generation capacity.

Electricity demands aside, a possible scenario is that beyond 2030, the demand for hydrogen fuel will grow substantially. For New Zealand to meet that demand we may well turn to near zero emission lignite-derived hydrogen (see CRL Energy's report on research in this area on page 23).

CCS technologies

On a brighter note, the Coal Association was pleased to host a

seminar in June this year by noted geologist and CO2CRC Chief Executive, Dr Peter Cook. Dr Cook updated the audience on the Otway Basin CO₂ injection pilot plant established this year in south-western Victoria - this is Australia's first geosequestration demonstration with the end aim of the project being to demonstrate that geological sequestration can be used safely to make deep cuts in emissions of greenhouse gases to the atmosphere.

Dr Peter Cook said the new well, known as CRC-1, enabled geologists to confirm their computer modelling of the underground storage site before injection of up to 100,000 tonnes of carbon dioxide commences. During the initial research phase of the injection trial, geologists conducted a detailed analysis of the rock samples taken from the new well to confirm the existence of suitable rock sequences for geosequestration.

"One of the most important elements of the project is to demonstrate to the community, government regulators and industry that geosequestration works and that carbon dioxide can be stored safely and monitored in rocks deep



The beginning of drilling of CRC-1 in Nirranda South, in the Otway Basin in south-western Victoria, Australia. Photo: CO2CRC.

in the subsurface,” Dr Cook said.

“Monitoring activities are already in place in readiness for the injection of carbon dioxide in the second half of this year, subject to final planning and environmental approvals.

Those environmental approvals were granted by the EPA Victoria in August this year. The EPA issued a Research Development and Demonstration Approval for injection of carbon dioxide; the carbon dioxide will be injected into the deep geological formation, and then monitored to verify that the carbon dioxide is securely stored.

Following the approval, Dr Cook said “This is the result of [Australian] Government confidence in the processes we have in place to ensure the secure injection and long term storage of carbon dioxide in the demonstration project without damage to the environment.

The project to monitor the environment around the injection and storage site and verify the secure storage of the carbon dioxide in a depleted gas reservoir is the most extensive undertaken anywhere in the world, and includes monitoring of the atmosphere, groundwater and subsurface.

CO2CRC anticipates beginning the injection of carbon dioxide at the Otway Project late this year.

New Zealand coal producer, Solid Energy is a founding shareholder in the CO2CRC-related company formed

for the Otway project. With a commitment of more than A\$2 million in CO2CRC, Solid Energy says their investment is part of a 20-year, NZ\$100 million investment it is making in clean coal technology and new energy developments.

For further information on the pilot project see www.co2crc.com.au.

On the New Zealand scene, the Coal Association has played a pivotal role with the Foundation for Research, Science and Technology, Ministry for Economic Development, Solid Energy New Zealand Ltd, Genesis Energy, and L&M Mining to form a New Zealand Carbon Capture and Sequestration (NZ CCS) Strategy. The Steering Group for this strategy recently announced an investment of approximately \$1 million per annum for 17 months (a total of \$1,420,000 GST incl) in preliminary studies on the feasibility and practicality of carbon capture and storage (CCS) in New Zealand. GNS

is the main contractor, with CRL Energy providing significant input into the project. In addition, the NZ CCS Strategy has joined the CO2CRC as a Core Participant, and has appointed the Chairman of the Coal Association, Chris Baker, as its representative, with Ruth Berry (FRST) as the alternate, on the Board of the CO2CRC.

EnergyScope: progressing towards a secure energy future

Last but not least, CRL Energy’s involvement in the FRST-funded New Zealand EnergyScope project announced earlier this year is an important step for the company. The project will create a data framework which relates key parameters (e.g., cost, risk, greenhouse gas emissions)



The desulphurisation tower is successfully cleaning up the syngas stream, part of CRL Energy’s Coal to Hydrogen research. Photo: CRL Energy.

across the entire New Zealand energy network. Users will then have a tool to forecast the impacts of given policy measures, such as comparing the effects of an energy future dominated by carbon sequestration and biofuels, with a future dominated heavily by renewable electricity and electric cars.

EnergyScope is well underway and details of CRL Energy’s involvement can be found on page 24 of this report. A ‘Situation Analysis Report’, identifying practical or preferred options for the future, will be published later this year.

EnergyScope is the first major undertaking of a new alliance of five key energy research providers: NIWA, CRL Energy, Scion, GNS Science, and Industrial Research Ltd.



Dr Peter Cook at a CCS seminar in Wellington. Photo: Louise Thomas

Seminars, Publications and Submissions

COAL ASSOCIATION SEMINARS

The Coal Association, through CRL Energy Ltd, organised a well-attended Wellington-based seminar in the last financial period:

Seminar on CO₂ Capture and Sequestration. 28 June 2007.

The seminar included a presentation from noted geologist, Dr Peter Cook, Chief Executive for the Cooperative Research Centre for Greenhouse Gas Technologies. Dr Cook briefed the seminar attendees on the Otway Basin sequestration project in Victoria, Australia.

The Association is increasing its lunch time seminar programme this financial year. We recently hosted Dr Geoff Morrison, Programme Manager, IEA-Clean Coal Centre (UK) in September 2007. Check our Website at <http://www.coalassociation.org> for coming events.

PUBLICATIONS FROM 1 APRIL 2006 TO 30 JUNE 2007

Two issues of the Coal Newsletter

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

Eleven issues of the Coal e-news.

Circulated via E-mail to interested energy professionals and available from the Coal Association website. If you would like to join the E-mail list for this publication please contact Dr Trevor Matheson. E-mail: t.matheson@crl.co.nz

Coal Association Annual Review 2006.

Coal Association Website

In the last financial period, CRL Energy Ltd on behalf of the Coal Association has kept the Association's website at <http://www.coalassociation.org> fully updated with the latest coal facts and figures. All of the above Coal Association publications and seminar overheads are available from the website, as well as archives of older publications and presentations. The site attracts hundreds of unique visitors, making thousands of hits each month.

SUBMISSIONS BY THE COAL ASSOCIATION TO 30 JUNE 2007

The Coal Association has been very busy in the last financial period making submissions to Government and local government on behalf of the industry. Submissions have included:

To the Ministry of Economic Development (MED) on the draft New Zealand Energy Strategy

This submission stressed that New Zealand has reserves of coal that can provide affordable, environmentally sustainable and secure energy for hundreds of years. A key policy objective for the New Zealand Energy Strategy (NZES) must be to deliver the lowest cost energy possible while achieving a high level of security for economic prosperity. There is widespread concern in industry that the objectives of the NZES have focused too much attention on reducing greenhouse gas emissions instead of balancing with other sustainability issues of energy security, energy affordability and economic productivity. Without suitable economic and cost benefit analysis, trade-offs and tensions were not clearly evident.

The NZES needed to be supported by a robust analysis of energy demand and supply in each economic sector and of options to reduce net greenhouse gas emissions in the short and long term. There was no discussion of the enormous cost to electricity consumers of early retirement of the Huntly Power Station by 2015 and large amounts of gas-fired generation by 2030. Other scenario studies warn that New Zealand will require a diverse range of energy sources to meet future needs, including both fossil and renewable sources. New Zealand will also need to ensure it is able to adopt new technologies such as coal gasification and carbon sequestration, as these are developed in other countries. The Carbon Capture and Storage venture between the New Zealand Government and industry is an example of the partnerships that will be needed for other solutions in the area of energy and climate change.

To EECA on the draft New Zealand Energy Efficiency and Conservation Strategy (NZECS)

In addition to many of the points in the MED submission (above), this submission highlighted that the draft NZECS was proposing a more interventionist stance with minimal cost benefit analysis to justify specific

proposals. Consequently it was not possible to meaningfully respond to the consultation questions. The Coal Association recommended an expert panel be established to provide independent advice to Ministers on the quality of energy and climate change policy cost benefit analysis. It was also recommended that an effective contribution to New Zealand's energy strategy would be to expand incentives for research, development and deployment of existing and new low emission technologies including clean coal technologies.

To the MED on the Transitional Measures discussion paper

Industry submissions in general were scathing of the inadequate consideration of competitiveness and cost benefit issues in this paper considering pre-2012 price measures. The Coal Association submitted that the paper needed to be rewritten once a robust (peer reviewed) analysis allowed the weighing up of costs and benefits, including competitiveness impacts, for each proposed measure in each sector. It was pointed out that a lose/lose result (for the economy and the environment) would be if some New Zealand production went offshore yet the same goods were produced abroad in a more carbon intensive way. A win/win climate change policy will take into account New Zealand's economic aspirations: a growing population and a higher standard of living will inevitably use more energy.

The Coal Association accepts that ultimately the global economy will adopt a price of carbon, most likely in the form of an emissions trading scheme that includes developing and developed countries. However, the competitiveness issues for New Zealand energy users require that price based policies in New Zealand are broadly aligned with those of our trading partners. The debate is therefore about the form and timing of a price based measure. Small to medium enterprises, as well as large emitters, would be opposed to energy price rises when there is no clear environmental gain that will be achieved for the costs imposed.

To MfE on the discussion paper on Measures to Reduce Greenhouse Gas Emissions in New Zealand Post-2012

This report demonstrated willingness by the Ministry for the Environment (MfE) to engage constructively with business stakeholders on the important factors of certainty of direction, flexibility in execution, an ability to compete fairly, and a willingness to enter into long-term research and policy partnerships. The Coal Association endorsed the need to ensure that policy signals are credible, so that sound long term investment decisions can be made in the knowledge that climate change policy will be enduring and consistent over time. It is essential that a high priority be given for international R&D partnerships as highlighted in the Energy Research Investment Strategy because New Zealand needs to be a "fast follower" for promising technologies.

The Coal Association recommended an expert panel be established to provide independent advice to Ministers on the quality of energy and climate change policy cost benefit analysis and to independently evaluate the policy progress of our trading competitors.

To the Ministry of Agriculture and Forestry (MAF) on Sustainable Land Management and Climate Change Consultation

As well as general issues raised in other submissions, the Coal Association stated that any sustainable land management policy allows for generators and industries to purchase forestry carbon offsets.

To the Otago Regional Council on Air Quality Plan Variations

The Coal Association supported the Otago Regional Council's updating its plan to accommodate the National Environmental Standard for PM₁₀ and this provided a good framework for coal users renewing their consents or those with new applications. The airsheds split would allow more detailed monitoring and planning in line with the effects based nature of the Resource Management Act. It was also constructive to see the opportunity to provide offsets in areas not meeting the standard. The Coal Association questioned how the Otago Regional Council intends implementing conditions on existing industries (within its discretionary powers) and stated it would like to be involved in any group negotiations with operators on their plans for emission control upgrades.

To the Tasman District Council on Air Quality discussion paper

The Coal Association supported the phasing out of high emission open fires and enclosed burners in localities like Richmond as the most efficient way of addressing the major PM₁₀ emission sources. Commercial, school and industrial boilers using coal have equipment to reduce particulate emissions to a level (per kilogram of coal) that is much lower than for enclosed burners. In general, they are well managed to avoid inefficient operation and consequent complaints from neighbours. Consequently, the Tasman District Council should address the question of whether the costly resource consent process is the most appropriate means of controlling smaller boilers. Records of maintenance and fuel type/usage would be quite reasonable requirements for smaller boilers for low compliance costs.

Clean Coal Technology



Technology and R&D have been a key focus of the Coal Association over the last few years, the principle driver for this focus being to influence and promote solutions to the environmental challenges faced by coal. Some of the activities undertaken by the Coal Association around clean coal technologies are:

1. The Coal Association has played a key role in convening the FRST-led Government and industry carbon capture and storage (CCS) partnership. This group has funds committed of \$1.4m per annum for three years, has joined the Australian-based Cooperative Research Centre for Greenhouse Gas Technologies (CO2CRC), and has negotiated its first contract for CCS research in New Zealand.

The vision for the New Zealand CCS Partnership is for New Zealand to be capable of adopting CCS technologies as and when it is appropriate and necessary to do so.

CO2CRC is one of the world's leading collaborative research organisations focused on carbon dioxide (CO₂) capture and geological storage (geosequestration). It has major support from industry, research parties and government organisations, along with international collaborators.

2. The Coal Association was the first international member of the Australian COAL21 programme. This is an Australian Government, industry and research partnership, with the vision of "Reducing greenhouse gas emissions arising from coal-based electricity generation." COAL21 is a 'brand' in Australia that provides the framework for all CCS related research, development, demonstration and deployment. Between the Australian Government and industry approximately \$2 billion has been committed to this area of research under the COAL21 umbrella.

3. Sponsor Membership of the IEA Clean Coal Centre (CCC) – as part of a consortium with Genesis Energy and Solid Energy (SE). IEA CCC provides unbiased information on the sustainable use of coal world-wide. Funded by member countries and industrial sponsors IEA CCC products include in-depth topical reports and online databases of coal information. IEA CCC also provides direct advice, facilitation of R&D and networks.

4. Membership of the IEA Greenhouse Gas (GHG) R&D Programme – lead organisation of a New Zealand consortium with MED, CRL Energy, GNS Science, Industrial Research Ltd (IRL), National Institute of Water and Atmospheric Research (NIWA) and SE. The IEA GHG R&D Programme is an international collaborative research programme which focuses its efforts on studying technologies to reduce greenhouse gas emissions. The programme has three main activities which are:

- a. Evaluation of technologies aimed at reducing greenhouse gas emissions;
- b. Promotion and dissemination of results and data from its evaluation studies; and
- c. Facilitating practical research, development and demonstration activities.

5. Associate member of the World Coal Institute (WCI). The WCI is a non-profit, non-governmental organisation of coal enterprises and associations - the only international body working on a worldwide basis on behalf of the coal industry. Its key objective is to provide a voice for coal in international energy and environment policy and research discussions.

Financial Statements of the Coal Association of NZ Inc.

for the period ended 30 June 2007



Coal Association of New Zealand Incorporated

Financial Statements

For the period ended 30 June 2007

Statement of Financial Performance	page 11
Statement of Movements in Equity.....	page 12
Statement of Financial Position.....	page 13
Statement of Cash Flows	page 14
Notes to the Financial Statements	pages 15 - 19
Auditors' Report.....	page 20

Financial Performance

Coal Association

COAL ASSOCIATION OF NEW ZEALAND INCORPORATED

STATEMENT OF FINANCIAL PERFORMANCE

FOR THE PERIOD ENDED 30 JUNE 2007

	Note	June 2007 \$	March 2006 \$
Operating Revenue	2	397,520	397,899
Operating Expenses	3	(526,103)	(558,006)
Operating Surplus (Loss)		(128,583)	(160,107)
Other Income			
Depreciation Recovered on Sale of Fixed Assets		39,629	-
Capital Gain on Sale of Building		1,072,698	-
Loss on Disposal of Shares		(53,956)	-
Interest Received		63,835	3,382
Equity Accounted Earnings of Associate		66,259	64,500
Net (Loss) Surplus		1,059,882	(92,225)

The attached NOTES form part of these Financial Statements

COAL ASSOCIATION OF NEW ZEALAND INCORPORATED

STATEMENT OF MOVEMENTS IN EQUITY

FOR THE PERIOD ENDED 30 JUNE 2007

	Note	June 2007 \$	March 2006 \$
Net (Loss) Surplus		1,059,882	(92,225)
Movement in Asset Revaluation Reserve	4	(661,644)	380,000
Asset Revaluation Reserve transferred to Accumulated Funds		661,644	-
Movement in Minority Interest		-	(342,301)
Movements in Equity for the Year		1,059,882	(54,256)
Opening Equity		2,178,344	2,232,870
Closing Equity		3,238,226	2,178,344

The attached NOTES form part of these Financial Statements

COAL ASSOCIATION OF NEW ZEALAND INCORPORATED

STATEMENT OF FINANCIAL POSITION

AS AT 30 JUNE 2007

	Note	June 2007 \$	March 2006 \$
Members Funds and Shareholders' Equity			
Accumulated Funds		3,238,226	1,516,700
Asset Revaluation Reserve	4	-	661,644
TOTAL MEMBERS' FUNDS AND SHAREHOLDERS' EQUITY		3,238,226	2,178,344
<i>Represented by:</i>			
Current Assets			
ANZ Banking Group - Operating Accounts		86,216	32,871
ANZ Term Deposit		2,493,174	-
Accounts Receivable		60,040	45,476
Prepayments & Accrued Income		53,051	5,000
GST		3,496	-
Total Current Assets		2,695,977	83,347
Non-current Assets			
Property, Plant & Equipment	5	2,224	1,267,530
Investments in Associates	6	620,359	1,108,201
Total Non Current Assets		622,583	2,375,731
TOTAL ASSETS		3,318,560	2,459,078
Current Liabilities			
Accounts Payable		18,556	35,949
Current Portion of Hire Purchase & Secured Loans	7	-	214,557
Income In Advance		14,699	-
Related Party Transactions		47,079	30,228
Total Current Liabilities		80,334	280,734
TOTAL LIABILITIES		80,334	280,734
NET ASSETS		3,238,226	2,178,344

On behalf of the Board of the Association


Chairman, Chris Baker
4 October 2007

The attached NOTES form part of these Financial Statements

COAL ASSOCIATION OF NEW ZEALAND INCORPORATED

STATEMENT OF CASH FLOWS

FOR THE PERIOD ENDED 30 JUNE 2007

	Note	June 2007 \$	March 2006 \$
CASH FLOWS FROM OPERATING ACTIVITIES			
<i>Cash was provided from</i>			
Receipts from Customers		326,263	313,861
Rent		68,333	85,000
Interest Received		48,713	5,190
		443,309	404,051
<i>Cash was applied to</i>			
Payments to Suppliers and Employees		552,156	536,316
Interest Paid		2,920	10,302
		555,076	546,618
Net Cash Inflow (Outflow) from Operating Activities	10	(111,767)	(142,567)
CASH FLOWS FROM INVESTING ACTIVITIES			
<i>Cash was provided from</i>			
Sale of Investments		500,145	-
Sale of Property, Plant & Equipment		2,372,698	-
		2,872,843	-
<i>Cash was applied to</i>			
Purchase of Plant & Equipment		-	(2,094)
Purchase of Investments		(2,493,174)	-
		(2,493,174)	(2,094)
Net Cash Inflow (Outflow) from Investing Activities		379,669	(2,094)
CASH FLOWS FROM FINANCING ACTIVITIES			
<i>Cash was provided from</i>			
Gross Proceeds of Hire Purchase Contracts and Loans		-	214,557
		-	214,557
<i>Cash was applied to</i>			
Purchase of 30% Balance of Shares in CRL Energy Ltd		-	(345,000)
Repayment of Hire Purchase Contracts and Loans		(214,557)	-
		(214,557)	(345,000)
Net Cash Inflow (Outflow) from Financing Activities		(214,557)	(130,443)
Net Increase (Decrease) in Bank Balances		53,345	(275,104)
Add: Bank Balances at the Start of the Year		32,871	473,370
Cash to Minority Interest		-	(165,395)
Bank Balances at the End of the Year		86,216	32,871
<i>Represented by</i>			
ANZ Banking Group - Bank Balances		86,216	32,871
		86,216	32,871

The attached NOTES form part of these Financial Statements

COAL ASSOCIATION OF NEW ZEALAND INCORPORATED**NOTES TO THE FINANCIAL STATEMENTS****FOR THE PERIOD ENDED 30 JUNE 2007**

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 for Coal Association of New Zealand Incorporated are presented. The financial statements comprise the Association and its interest in its associate.

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 New Zealand Institute of Chartered Accountants.

Associates

Associates are entities in which the Association has significant influence, but not control, over the operating and financial policies. The financial statements include the Association's share of the net surplus and reserves of associates on an equity accounted basis.

Differential Reporting

The Association qualifies for differential reporting as it is not publicly accountable and not large as defined in the framework. Differential Reporting Standards have been applied except FRS 10 Statement of Cashflows.

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**NOTES TO THE FINANCIAL STATEMENTS****FOR THE PERIOD ENDED 30 JUNE 2007**

Income Tax

The Association has tax exempt status under the Income Tax Act 2004.

Leases

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

Depreciation is provided on all assets 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.

Web site development	36% to 48%
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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.

15 Months Trading

The current year's trading is from 1 April 2006 to 30 June 2007, to align with CRL Energy and NIWA balance date of 30 June. The comparatives are for 12 months.

COAL ASSOCIATION OF NEW ZEALAND INCORPORATED

NOTES TO THE FINANCIAL STATEMENTS

FOR THE PERIOD ENDED 30 JUNE 2007

2. OPERATING REVENUE

	2007	2006
	\$	\$
Research & Consulting Fees	306,674	269,100
Rent	68,333	85,000
Subscriptions	17,413	37,200
Sundry	5,100	6,599
Total Operating Revenue	397,520	397,899

3. OPERATING EXPENSES

	2007	2006
	\$	\$
<i>Operating Expenses Include:</i>		
Auditor's Remuneration	6,776	3,501
Bad Debts	350	350
Chairman's Fee	114,017	40,000
Depreciation	4,935	17,798
Interest Expense	2,920	10,302

4. ASSET REVALUATION RESERVE

	2007	2006
	\$	\$
Opening Balance	661,644	281,644
Asset Revaluation	-	480,000
Less Asset Revaluation Attributable to Subsidiary	-	(100,000)
Transfer to Retained Earnings	(661,644)	-
Closing Balance	-	661,644

5. PROPERTY, PLANT & EQUIPMENT

	2007	2006
	\$	\$
<i>Land and Buildings</i>		
At Valuation	-	1,300,000
Accumulated Depreciation	-	(39,996)
	-	1,260,004
<i>Furniture & Fittings</i>		
At Cost	-	4,264
Accumulated Depreciation	-	(3,895)
	-	369
<i>Plant</i>		
At Cost	-	6,350
Accumulated Depreciation	-	(6,350)
	-	-
<i>Website Development</i>		
At Cost	10,564	10,564
Accumulated Depreciation	(8,340)	(3,407)
	2,224	7,157
Total Net Book Value	2,224	1,267,530

COAL ASSOCIATION OF NEW ZEALAND INCORPORATED**NOTES TO THE FINANCIAL STATEMENTS****FOR THE PERIOD ENDED 30 JUNE 2007****6. INVESTMENT IN ASSOCIATE**

The Association's investment in the associate includes its share of the net surplus and reserves of the associate on an equity accounted basis.

Name of Entity	Interest Held by Group	
	2007	2006
CRL Energy Limited	50%	100%
	2007	2006
Investment in Associate	620,359	1,108,201

The associate has a balance date of 30 June. This has been changed from 31 March.

7. SECURED LOANS

	2007	2006
	\$	\$
ANZ Banking Group	-	214,557
	-	214,557
Less Current Portion	-	(214,557)
Term Liability	-	-

8. OPERATING LEASES

The Group has operating lease commitments for the premises in Hamilton, Greymouth and Christchurch.

The future operating lease commitments are as follows:

	2007	2006
	\$	\$
Within One Year	272,907	85,000
Term Portion	1,534,542	-
	1,807,449	85,000

9. RELATED PARTIES

Coal Association of New Zealand Inc. (CANZ) owns 50% 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.

COAL ASSOCIATION OF NEW ZEALAND INCORPORATED

NOTES TO THE FINANCIAL STATEMENTS

FOR THE PERIOD ENDED 30 JUNE 2007

10. RECONCILIATION OF NET SURPLUS (LOSS)
TO CASH FLOWS FROM OPERATING ACTIVITIES

	2007	2006
	\$	\$
Net Surplus (Loss)	1,059,882	(92,225)
Add / (Less) Non-cash Items		
Depreciation	4,935	17,798
Depreciation Recovered	(39,629)	-
Capital Gain on Sale of Building	(1,072,698)	-
Loss on Disposal of Shares	53,956	-
Equity Accounted Earnings of Associate	(66,259)	64,500
	(1,119,695)	82,298
Add / (Less) Movement in Working Capital		
(Increase) Decrease in Accounts Receivable	(14,564)	402,406
(Increase) Decrease in Prepayments & Accrued Income	(48,051)	257,448
(Increase) Decrease in Inventories & Work in Progress	-	150,341
Increase (Decrease) in Accounts Payable	(17,393)	(363,155)
Increase (Decrease) in Income in Advance	14,699	(37,416)
Increase (Decrease) in Related Party Transactions	16,851	30,229
(Increase) Decrease in GST	(3,496)	-
	(51,954)	439,853
Items Attributable to Investment Activities	-	(443,493)
Net Cash Inflow (Outflow) from Operating Activities	(111,767)	(13,567)



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AUDITORS' REPORT

To the Readers of the Financial Statements of the Coal Association of New Zealand Incorporated (the Association)

We have audited the accompanying financial statements of the Association. The financial statements provide information about the past financial performance and financial position of the Association as at 30 June 2007. 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 fairly reflect the financial position of the Association as at 30 June 2007 and the results of its operations and cash flows for the period ended on that date.

Auditors' Responsibilities

It is our responsibility to express an independent opinion on the financial statements presented by the Board and report 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 by the Board in the preparation of the financial statements; and
- whether the accounting policies are appropriate to the Association's circumstances, consistently applied and adequately disclosed.

We conducted our audit in accordance with New Zealand Auditing Standards issued by the New Zealand Institute of Chartered Accountants. 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 interest in, the Coal Association of New Zealand Incorporated.

Unqualified Opinion

In our opinion the financial statements fairly reflect the financial position of the Association as at 30 June 2007 and the results of its operations and cash flows for the period ended on that date.

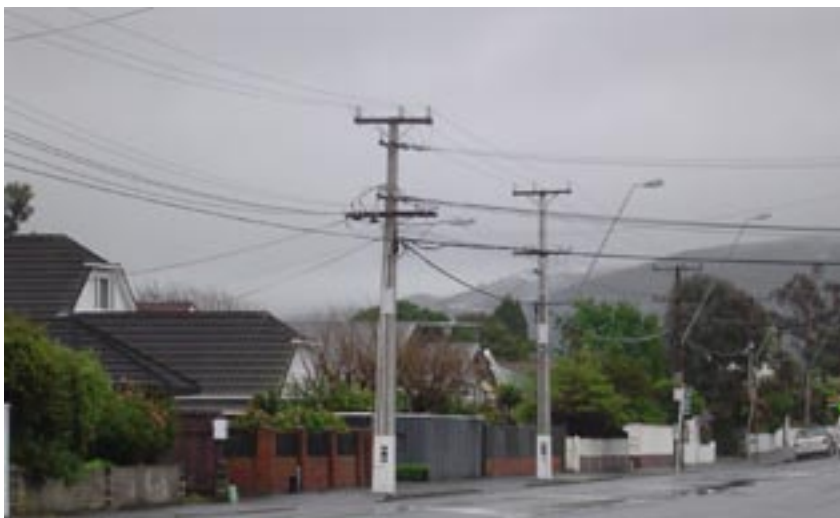
Our audit was completed on 4 October 2007 and our unqualified opinion is expressed as at that date.

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

Sherwin Chan & Walshe
Chartered Accountants
Lower Hutt

Surprising results from 10-year HEEP programme

If domestic solid fuel heaters (such as wood and coal burners) were removed from the energy equation tomorrow, New Zealand would need another power station at least half the size of Huntly and there would be a resulting major strain on existing electricity distribution networks. This is one of the remarkable findings from a BRANZ Ltd study examining energy use in New Zealand households, where it was found that a staggering 56% of space heating and 5% of water heating is provided by solid fuel burners.



The long-term study of 400 randomly selected households from Invercargill to Kaikohe, dubbed HEEP (Household Energy End-use Project), collected a wide variety of raw data which is helping BRANZ research partner CRL Energy, develop an energy model of the residential sector.

Over the lifetime of the study HEEP monitored 440 hot water cylinders, 65 wetbacks, 206 solid fuel burners, 7 solid fuel ranges, 42 open fires, 175 portable LPG heaters, as well as all the normal range of household appliances - stoves, fridges, fridge/freezers, televisions, stereos and so on. Data was recorded every ten minutes for all fuels and hot water systems used in the study houses. In all houses, temperatures in the bedroom and living room were also recorded every ten minutes – about 1,200 temperature files.

This was then matched to a detailed household energy audit, physical inspection and occupant survey. Every electric appliance in the house is documented, and if 'plugged in' its power use recorded. These datasets now hold details on energy use and location of over 10,000 appliances.

In conjunction with the Centre for Research, Evaluation and Social Assessment Ltd (CRESA) and John Jowett (consultant statistician) powerful statistical tools were then used to explore these datasets, and to extract algorithms.

Dr Pieter Rossouw, energy efficiency research scientist and senior modeller at CRL Energy Ltd in Gracefield, Lower Hutt, has implemented algorithms based on the HEEP data to create the Household Energy End-use Resource Assessment (HEERA) model. An earlier version of the model has already been tested in national and regional analysis of energy efficiency and the electricity system.

The finished HEERA model is now being used to not only understand the existing energy relationships in New Zealand dwellings, but also to model the impact of policy on this relationship, such as insulation regulations and implementing energy efficiency standards – with the resultant reduction in certain types of solid fuel burners.

Specifically, Dr Rossouw explains that the HEERA model is currently being used to examine the impact of different types of heaters on New Zealand's electricity network. As well as all the usual energy variables, some of the other variables include aspects of the house (climate, region, floor area) and the occupants (tenure, income, the number of and life stage).

"The model supports a wide range of 'what-if' type questions. Some of the interesting results being looked at include the impact of mandatory insulation in 1978, and what would happen if older houses are insulated. The model has shown that while insulation may have led to improvements in energy efficiency this did not necessarily translate into energy savings or reductions, as newer houses often have larger floor areas. In addition, insulation may have reduced space heating energy, but most of these energy reductions have come from non-electric fuels."

Principal scientist on the study from BRANZ, Nigel Isaacs, says there were a number of other unexpected findings from the data gathering exercise. "As well as the surprising amount of space heating provided by solid fuels, HEEP monitoring found that houses heated by open fires, portable electric and LPG heaters are



Dr Pieter Rossouw - "insulation may have reduced space heating energy, but most of these energy reductions have come from non-electric fuels."

"Who would have thought all those little lights and background appliances were using about the same electricity as space heating?"

the coolest, while houses with central heating or enclosed solid-fuel burners are the warmest. The LPG heating was a surprise as LPG heaters can produce a lot of heat, but most are used sparingly.

"Bearing in mind that thermal insulation became mandatory in 1978, we found that newer homes are warmer. However, they are usually warmer all year round which could be a problem in hot summer temperatures. We are investigating the reasons for this."

HEEP has also undertaken the world's first nationwide study of baseload and standby electricity uses. Standby is the electricity used by an appliance when it is waiting to be used, while baseload is the electricity used by appliances that are on all the time. Baseload appliances are typically appliances such as a fridge and/or freezer, heated towel rail, and electric clocks, and items on standby

typically include anything with a light on such as TVs, VCR, DVDs, stereos, clothes dryers, dishwashers, microwaves, portable phones, instantaneous gas water heater and computers. The study found that on average a household used about the same electricity on baseload and standby as for electric space heating.

"Who would have thought all those little lights and background appliances were using about the same electricity as space heating?" said Mr Isaacs.

Another surprising result of the study was the high number of faulty refrigeration appliances in New Zealand homes.

"We found around 16% (1 in 6) refrigeration appliances were faulty. The owners were probably unaware there was even a problem, as the fridge still made a noise and food might have been kept cool. But insulation degrades or gets wet, coolant leaks, door seals fail, or the thermostat or controller fails, all causing the appliance compressor to run continuously or in a faulty manner with poor temperature control."

The Foundation for Research, Science and Technology (FRST) and Building Research provided major funding for the project, with additional support from EECA, Transpower, Ministry of Social Development and Fisher & Paykel Ltd.

The Executive Summary and the full HEEP Year 10 Report are available for free download from the BRANZ website, or at a charge for the hard copy from the BRANZ Bookshop on the web site: www.branz.co.nz

Desulphurisation plant a success

Dr Tony Clemens, programme leader for the government-funded "Hydrogen Energy for the Future of New Zealand" research programme has recently announced the completion of several milestones in CRL Energy's efforts to produce high grade hydrogen from New Zealand lignite.

"Last year we had an objective to successfully operate a desulphurization plant sufficient to handle 10% of the 200 kW syngas stream produced by our coal gasifier here at CRL Energy. This proved to be very difficult but through hard work by the team we've overcome the challenge and I'm pleased to say that this has not only recently been achieved, but in addition the desulphuriser was easily able to clean up to 20% of the syngas stream."

This achievement represents the completion of a major milestone for the coal to hydrogen part of the programme, as, in order for the downstream syngas clean-up gear and fuel cell to work, it is essential that all traces of sulphurous gases are removed.

Last year the original desulphuriser (sulphur scavenger solution introduced into the gas stream) proved unable to remove all sulphur from the syngas stream. The team at CRL Energy had to redesign and build a completely new desulphurising tower (packed column with circulating caustic wash).

"The new tower is performing extremely well and is able to reduce hydrogen sulphide (H_2S) in syngas from in excess of 1200 ppm to the point where it is undetectable on equipment designed to read down to 0.1ppm."

A water gas shift reactor for treating volumes equivalent to 10% of the gasifier output has also been constructed and commissioned.

"Previous difficulties with activating the catalyst in the reactor have been resolved and a series of experiments were carried out in which catalyst bed temperature, steam feed rate and syngas flow were varied. Initial experiments used bottled syngas which mimicked the gasifier syngas, but we are now using genuine, gasifier-generated desulphurised syngas. The reactor was able to shift 60% of the CO in the syngas. This is sufficient to allow us to continue to the next stage."

The next stage is a condenser and drying tower assembly to treat the wet shifted gas prior to pressurization and passing to the fuel cell. Construction of the drying tower has already begun.

"In addition we now have all the parts needed for testing the ECN hydrogen separation membrane (ECN: Energy Research Centre of the Netherlands - a major international energy research organization) and the test facility is currently being assembled. We will be testing its ability to produce pure hydrogen from our desulphurised, dry, shifted syngas.

"In all we expect the syngas slipstream clean-up line will be fully integrated with the gasifier (including testing of the new ECN membrane for hydrogen separation) by Christmas this year," says Dr Clemens.

For further information about this research programme please see the CRL Energy website at <http://www.crl.co.nz/research/hydrogen.asp>



Attaching the desulphurisation tower (silver column on left) to the syngas stream from the coal gasifier (blue).



Dr Tony Clemens

"The new tower is performing extremely well and is able to reduce hydrogen sulphide (H_2S) in syngas from in excess of 1200 ppm to the point where it is undetectable on equipment designed to read down to 0.1ppm."

CRL Energy in New Zealand's 'EnergyScape'

In this last financial period, CRL Energy has won a contract worth \$600,000 (incl. GST) over 16 months from the Foundation for Research, Science and Technology (FRST) to develop a pathway showing how New Zealand could make the transition to a hydrogen energy economy if hydrogen becomes part of this country's energy future.

CRL Energy's research manager, Dr Tony Clemens, says that it is important to have such contingency plans in place as the future energy mix of New Zealand is likely to come from a variety of sources as fossil fuel supplies such as oil and gas dwindle.

"Countries, such as Iceland, are already demonstrating that hydrogen can play a vital role in public transport. In addition, almost every large car manufacturer in the world has a fuel cell programme."

The new research programme began on 1 March 2007 with specific objectives to identify the knowledge and expertise gaps that must be filled in order for New Zealand to transition to a hydrogen economy, identify the role that research investment may play in filling those gaps and produce an action plan to enable that research.

Already, the first stage in the process – the release of an issues document for raised awareness among selected high-level government and industry stakeholders has been completed.

"We canvassed a wide range of issues including the potential to use hydrogen to run vehicles and generate electricity; and how surplus electricity - from sources such as windpower, wavepower or ocean currents - could be used to split hydrogen out of water and store it until needed."

The project is also looking at other ways to produce hydrogen, ranging from the concept of extracting it from big coal deposits - and re-burying the unwanted carbon - to producing it from methane from digester systems making use of manure and other effluent from dairy farms. Chemical fuel cells can use hydrogen and oxygen via a catalyst to generate electricity, with heat and water the only waste.

"We received over 90% feedback from our issues document, and from that we are now proceeding to model the hydrogen supply chains deemed most likely to play a role in the development of New Zealand's hydrogen economy. From this analysis, the knowledge gaps should become obvious," says Dr Clemens.

The programme is one of three closely linked initiatives included within EnergyScape. The other two programmes are led by Scion and the National Institute of Water and Atmospheric Research (NIWA). NIWA's programme will incorporate energy demand modelling, and undertake a detailed appraisal of our climate-driven renewables (wind, hydro, marine, solar, bioenergy) and earth-based resources (geothermal, oil and gas, coal). Scion's programme will investigate bioenergy options such as how energy may be created from pine plantation waste, short rotation crops, forage crops, grasses, dairy farm wastes, algae on sewage ponds, and other biomass.

Between them these two programmes aim to identify gaps and construct research plans for the biomass resource and all other resources respectively. CRL Energy is heavily involved in all three and leads the hydrogen programme.

Delivering pathways to mineral wealth

The FRST-funded research programme, Delivering Pathways to Mineral Wealth and Environmental Sustainability, is designed to help New Zealand realise its mineral wealth with minimal impact on the environment.

The programme has developed a decision-making framework to facilitate and streamline the resource consenting process. Involvement from regulators, mining companies, land holders, and the community during the building of the framework was critical. The programme identifies likely levels of mine drainage, impacts on neighbouring aquatic ecosystems and develops a methodology for identifying the best remediation option. It then pulls all that information together into the decision-making framework. The broad scope of this programme requires a multidisciplinary approach and brings together geologists, chemists, biologists, geochemists and environmental scientists from CRL Energy, University of Canterbury, Landcare Research and University of Otago.

The direction of this research programme is set and monitored by a governance panel of representatives from a broad range of stakeholder organisations including mining companies, regional authorities, Department of Conservation (DoC) and Ministry for the Environment (MfE). Applied research that meets the requirements of the diverse stakeholder group is a challenge that the project team is passionate about.

During the past financial period the emphasis has shifted from the West Coast to the Southland region where a highly successful workshop was held to raise awareness among the Southland Regional Councillors and other interested parties about the aims of the programme and to get their feedback as to how it may best be structured to their needs.

For more information about this research programme, and for details of further progress on the four main objectives within the programme please see the CRL Energy website at http://www.crl.co.nz/research/mine_drainage.asp.



Our Vision

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