

Coal Newsletter

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Coal to hydrogen future here now



Ltd in Lower Hutt as a milestone in the future of New Zealand's energy security. "Coal can and will provide a source of hydrogen to meet New Zealand's energy demands well into the future. For those who think that a hydrogen economy is a long way off, look to the world stage to see what is really happening. Most of the world's largest automobile manufacturers have begun commercial production of fuel cell vehicles, typically

in batches of 10 to 100 vehicles. The United States has set itself a target of reducing production costs of fuel cells down to a level comparable to that of internal combustion engines by 2015, so the middle of next decade will see the wide scale use of fuel cell vehicles.

"In addition, there are 69 hydrogen refuelling stations in use around the world right now in countries as diverse as the US, India, Spain, Germany, Iceland, Australia and Portugal which are powering up buses in public transport fleets. New Zealand can not afford to be left behind.

"The use of coal for energy production is the ideal scenario for at least the next few decades until better renewable technologies are available. New Zealand's current renewable hydro, wind and solar

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On Monday 23 February, 2004, the Hon Harry Duynhoven, Associate Minister of Energy, pulled a lever releasing the first measure of lignite into a newly developed coal gasifier. This was the defining moment in the launch of the new coal technology package for the hydrogen energy economy.

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

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

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

By the year 2010, coal, New Zealand's greatest established energy reserve, will be an increasingly important, secure and competitive energy resource fuelling New Zealand's domestic and international markets

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

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Chris Baker

Coal solution for competitive energy

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

New Zealand has vast coal resources and Clean Coal technologies provide a pathway for New Zealand to retain, and build on, the competitive advantage that energy has provided for our economy over the last 40 years and more.

This pathway is consistent with international technology development and it is important for New Zealand business that Government policy does change to recognise that coal has a vital role to play in the portfolio of energy options that will drive economic growth in the future.

Recently, New Zealand had the good fortune to host the Executive Committee meeting of the IEA GHG R&D programme (International Energy Agency Greenhouse Gas Research and Development programme). The IEA is the energy arm of the Organisation for Economic Co-operation and Development (OECD) and is "An intergovernmental body committed to advancing security of energy supply, economic growth and environmental sustainability through energy policy co-operation".

The IEA GHG R&D programme is an international collaboration of countries and major corporations which aims to:

- Evaluate technologies for reducing emissions of greenhouse gases;
- Disseminate the results of these studies; and,
- Identify targets for research, development and demonstration and promote the appropriate work.

New Zealand has belonged to this program for eight years through a consortium that is lead by the Coal Association of New Zealand.

To coincide with the committee meeting, the Coal Association, in partnership with CRL Energy Ltd and Solid Energy New Zealand Ltd, hosted a seminar on Geological Sequestration of CO₂. This seminar was well attended by the research, business, government and environmental sectors.

New Zealand's good fortune arose from the fact that the IEA GHG R&D committee meeting brought together a number of world experts in the technologies related to GHG reduction in general, and Carbon

Capture and Storage in particular. These experts included Dr Kelly Thambimuthu – Chairman of the said committee, a member of the IPCC Working Group III, co-ordinating lead author currently writing a special assessment report on CO₂ Capture and Storage, Vice Chair of the Technical Group of the Carbon Sequestration Leadership Forum (CSLF), which is an international collaborative initiative launched in 2003 by the USA and 15 other countries to foster the development of carbon sequestration technologies as a climate change mitigation option. Also present was Dr John Topper, the Executive Director of the IEA Clean Coal Centre based in London.

New Zealand coal resources provide a major strategic asset for this country. To put this resource in perspective, the energy content of our coal resource is equivalent to 50 Maui gas fields – enough to supply the country's energy needs for hundreds of years. Energy has been a key contributor to New Zealand's economic growth over the last 40 years and more. Our economy is therefore energy intensive (second only to Canada in the OECD), and, it would logically follow, our energy resources and energy strategy have a vital role to play in shaping New Zealand's future economic prospects.

However, policy makers do not appear to consider our coal reserves a strategic asset.

Why is that?

Part of the reason is the high carbon intensity of coal, and the notion that if we increase consumption of coal in New Zealand, we will be renegeing on our responsibilities under the Kyoto Protocol and the global response to Climate Change.

Is that a justifiable reason?

The reality is that coal will continue to make an essential contribution to global energy supply for decades to come. The technologies simply do not exist for that not to be the case – given current and predicted population and energy growth rates. The IEA predicts that from 2010

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“coal will continue to make an essential contribution to global energy supply for decades to come. The technologies simply do not exist for that not to be the case.”

Wgtn wind farm wins CCs

Plans for Wellington's first wind farm have won carbon credits from the government.

The Wainui Hills Wind Farm could start generating electricity as early as next year. The wind farm has the potential to reduce emissions of greenhouse gases equal to almost 600,000 tonnes of carbon dioxide between next year and the end of the first commitment period of the Kyoto Protocol in 2012. In return, it will receive up to 378,000 carbon credits, or Kyoto emission units.

Chief Executive of Wainui Hills Wind Farm Graeme Neilson said the planned wind farm of up to 30 megawatts will have between 10 and 17 turbines and produce enough electricity to power up to 10,500 homes, or a city the size of Masterton.

"The Government's award of emission units has brought a wind farm for Wainuiomata and Wellington a step closer to reality. The likely value of the units means

that we now hope to be in a position to start public consultation on our plans and seek the necessary resource consents within the next three to six months," Graeme Neilson said.

"If we can achieve the average price for these units that the Dutch Government has paid in its latest tender round for emission units, the contract we're being awarded today will be worth around \$4 million to the project."

The wind farm and the reduction in emissions it would achieve may not be financially viable without the award of emission units, demonstrating the value of the Projects to Reduce Emissions programme in stimulating projects that would not otherwise be carried out.

The wind farm is one of 15 projects awarded emission units last December in the first tender round for the Projects to



Coal solution for competitive energy

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to 2030 total global energy supply will grow approximately 35 percent. A range of technologies will contribute to that demand growth – current and emerging technologies that use coal, gas, hydro, wind, solar, biomass, nuclear, hydrogen, tide, and perhaps other options. The IEA also predicts that coal supply / demand will grow by 33.5 percent over that same time period, driven primarily by energy demand in developing countries – China, India, etc.

If that growth in coal use is going to occur, and that is the current, independent, "best estimate", then the most important technologies from a global Climate Change perspective have to include those technologies that capture and store the Carbon generated by using that coal. You would then argue, from both a New Zealand strategic perspective and from a global Climate Change response perspective, that New Zealand policy should be actively embracing Carbon Capture and Storage (CCS) technologies and associated fossil fuel use, not ignoring those technologies and fuel option as current policy does.

That is why we were fortunate to have those world experts in New Zealand. In an interview with Radio NZ, Dr Kelly Thambimuthu said "advances in technology

of so-called 'dirty fuel' such as coal are as necessary as subsidies to renewable technology to meet a country's emissions reduction target. We (Canada) are 90 percent dependent on fossil fuels. We are not going to go away from that sort of dependence in the Kyoto time frame. Indeed, all our forecasts show that it'll be the same in 2030".

In the same interview, Dr John Topper was quoted, "no responsible government anywhere in the western world should really be discounting any fuel source and particularly any indigenous fuel source without at least doing the research and development and assessing the results and the likely future for those particular technologies. And actually I would suspect that here in New Zealand once you've done the research and got some results and began to see what's possible you might actually reverse what appear to be current policies."

CCS technologies are a key part of the greenhouse gas emission reduction strategies of many developed countries, including Australia, Canada, Norway, the Netherlands, the United Kingdom and the United States.

New Zealand Government policy appears to be unaware of these international energy and technology trends – but they ignore

"no responsible government anywhere in the western world should really be discounting any fuel source and particularly any indigenous fuel source . . ."

CLIMATE BRIEFS

By Wayne Hennessy,
CRL Energy Ltd.

Russian Ratification

Russia's Presidential elections are to take place shortly, and it is expected that Putin will retain his position. However it is unlikely that Putin will turn his attention to the Kyoto Protocol in the immediate term.

The view was expressed that Putin may well wait for the results of the US Presidential election in November 2004 before making any final decision on whether or not to ratify the Kyoto Protocol.

Ratification will become critical by 2005 if the Protocol is to come into force in an orderly way, and any progress is to be made on commitments by developing countries.

COP10

This is likely to go ahead this year in November/December in Buenos Aires. However further meetings are less likely without Russian ratification as it becomes more and more difficult to have anything concrete to discuss.

UK draft NAP for EU Emissions Trading

The draft United Kingdom National Allocation Plan (NAP) proposes rules for the hand out of some 714 million EU Allowances for the UK alone with a potential total value of 3.5 to 10.7 billion Euros assuming an EU Allowance price of 5 to 15 Euros. Obviously the total number of EU Allowances to be handed out across the whole of the EU will be much larger.

This is the first such NAP to be produced by the 25 actual and pending EU Member states pursuant to the EU-wide GHG Emissions

Wgtn wind farm

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Reduce Emissions programme and is the fourth planned wind farm to be awarded emission units from the government.

The Government received a total of 46 bids for the four million emission units offered in the Projects to Reduce Emissions tender.

Four other successful projects have been announced. They are:

- Genesis Power has been awarded 330,000 tonnes of CO₂ credits for doubling existing Hau Nui wind farm (+5MW later this year) and 19MW at Awhitu Peninsular next year (depending on consent process)

- Te Rere Hau Windfarm, New Zealand Windfarms a proposed 50 MW wind farm in Manawatu;
- Toronui Mini-Hydro Power Scheme, Esk Hydro Power a proposed mini-hydro scheme on the Pask family's Toronui station in northern Hawkes Bay;
- Awapuni Landfill, Palmerston North City Council a proposed scheme for generating electricity from landfill gas.

Details of the other 10 projects awarded emission units will be announced as agreements are signed by the project owners and the Government.

New US coal rush

Coal is poised to make a comeback in the United States, stoked by the demand for affordable electricity and the rising price of other fuels.

At least 94 coal-fired electric power plants - with the capacity to power 62 million American homes - are now planned across 36 states.

The plants, scheduled to start coming on line as early as next year, would add significantly to the US's generating power, help keep electricity prices low and boost energy security by offering an alternative to foreign oil and gas.

"The situation has changed 180 degrees in the last year so that we're almost back to point where we were in the 1970s with a slew of coal-fired plants on the drawing board," said Robert McIlvaine, president of Northfield, Ill., a company that tracks energy industry development.

After a decades-long drought when few large coal plants were added to the power grid, "it's become a flood. We've been getting a new one announced almost every week since December."

The jump in proposed coal-fired plants over the past three years - which would add 62 gigawatts or another 20 percent to the US's current coal-generating capacity - was documented in a report last month by the National Energy Technology Laboratory,

an arm of the US Department of Energy. But experts caution that perhaps no more than half of all proposed plants will ever be built. It can take seven to 10 years for a coal power plant to go from planning to construction - and legal action and public protests can halt them.

Illinois leads the comeback with 10 proposed coal-fired plants that would create 8 gigawatts of new power capacity, the NETL report says.

From the point of view of energy security, such moves make sense, proponents say. The US is considered the Saudi Arabia of coal. It sits on 250 years' worth of reserves. Coal already generates about half the nation's electricity.

The economics also have swung in the fuel's favor. Low-cost, low-emission, natural-gas turbines sprouted like mushrooms in the 1990s and their contribution to the nation's generating capacity reached 19 percent. But in the past four years the cost of natural gas has roughly tripled: from US\$2 per 1 million British thermal units of heat generated to over US\$6 per million BTUs. By contrast, coal costs less than US\$1 per million BTUs. That has put utilities in the position of paying more for the gas they burn to make power than they can get for the electricity it produces.

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capabilities are expensive by comparison and simply do not produce enough energy to meet our demands - a situation which will only get worse over the next twenty years. By 2023 New Zealand will need to increase electricity generation capacity by the equivalent of five Clyde dams, three Huntly Power Stations, or 20,000 wind turbines if we are to meet projected demands," says Dr Whitney.

Dr Don Elder, Chief Executive Officer of Solid Energy New Zealand Limited and a partner of CRL Energy and the Coal Association of New Zealand in the hydrogen project, noted that "the reality is that New Zealand has approximately 10 billion tonnes of known recoverable coal reserves which equates to approximately 50 Maui gas fields. Nearly all of that coal is well suited to gasifier technology.

"As the Maui gas field fast runs out and no replacement has yet been found, we have no choice but to utilise this available resource. Clean-coal technologies avoid compromising the environment as we find a way to make a responsible transition to renewables for the production of hydrogen."

Carbon sequestration symposium

In the same week as the launch of the gasifier, CRL Energy, in partnership with Solid Energy New Zealand Ltd and the Coal Association of New Zealand, hosted a meeting of international experts in Wellington to present and discuss the capture and storage of carbon dioxide as a viable option for achieving large reductions of CO₂ emissions. The meeting was also supported by the International Energy Agency Greenhouse Gas Research and Development Programme, the Ministry for Economic Development and the Royal Society of New Zealand.

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

credits.

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

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

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

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

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

Insurer warns of climate change catastrophe

The world's second-largest reinsurer Swiss Re warns that the cost of climate change threatens to spiral out of control, forcing the human race into a catastrophe of its own making.

In a report revealing how climate change is rising on the corporate agenda, Swiss Re said the economic costs of global warming threatened to double to \$150 billion (81 billion pounds) a year in 10 years, hitting insurers with \$30-40 billion in claims, or the equivalent of one World Trade Centre attack annually.

"There is a danger that human intervention will accelerate and intensify natural climate changes to such a point that it will become impossible to adapt our socio-economic systems in time," Swiss Re said in the report.

"The human race can lead itself into this climatic catastrophe — or it can avert it."

The report comes as a growing number of policy experts warn that the environment is emerging as the security threat of the 21st century, eclipsing terrorism.

Scientists expect global warming to trigger increasingly frequent and violent storms, heat waves, flooding, tornadoes, and cyclones while other areas slip into cold or drought.

"Sea levels will continue to rise, glaciers retreat and snow cover decline," the insurer

The Coal Association of New Zealand would love to include more items in the Coal newsletter from our coal producer members. If you have any items of interest please contact either the CANZ secretary, Dr Trevor Matheson, or CRL Energy's Science Communications consultant Louise Thomas.

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The Coal Association would also like to update E-mail contact details from our members. Please send a brief E-mail to Ann Herbert, and include any other new contact details.

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Mines Rescue under review

The operations of Mines Rescue are currently under review as the organisation's responsibilities have burgeoned over recent times to the extent that existing staff are being placed under considerable stress.

CRL Energy's representative on the Mines Rescue Trust Board, David Stewart, says that Mines Rescue now provides emergency readiness and training in several non-coal areas including metaliferous mining operations, Tranz Rail tunnel training and emergency planning, urban tunnellers, as well as gas awareness training.

The organisation has also recently inherited the Huntly Mines Rescue station after some 20 years of negotiation.

'We have positions that need filling, both at Huntly and Rapahoe. And at present Mines Rescue is having some difficulty in maintaining core service requirements, whilst trying to satisfy the increasing demand for non-core work. As well as providing emergency services we have increasing demand for specialist mining and emergency service training within the scope of EXITO and other industry training organizations. We do have the venues, facilities and expertise to supply this type of training, but we do need more Mines Rescue personnel to meet these requirements,' says Mr Stewart.

There have been a number of callouts over the last period, particularly from the Terrace mine in the Buller area. Future expansion of mining activities, which will stretch current resources even further include potential mining operations such as: Pike River on the West Coast; Waimangaroa in the Buller; Oceana gold operations in Reefton area; Favona gold mine at Waihi; King Country Mining Ltd plans for the Mangapehi coalfield; and the proposed tunnels to meet Auckland City Council's transport plan.

The Trust commissioned a stage one review of Mines Rescue's operation from



Jamieson's Consulting Ltd which has been recently completed and circulated for comment. Following on from this David Stewart has been asked to complete a report in conjunction with Don Ladner, General Manager, Mines Rescue. This report will be submitted to the Trust Board for comment and it is expected that this will result in positive structural changes for the organisation.

New Hi-Tech Chromatographs

The Mines Rescue Brigade has recently purchased two Gas Chromatographs. The instruments have a direct phone and computer link to the Australian company who supplied them. This service allows for on-line calibration and immediate analysis and advice via the on-line link. Gas Chromatographs are used in mining to analyse gas composition samples to determine levels of toxic, flammable and/or indicator gases, but particularly to determine critical gases such as hydrogen, which cannot be readily measured by other

Sustainable Mining

By Amanda Black, CRL Energy Ltd.

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

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

- Identifying potential AMD environmental risks significant to each of the primary mining regions;
- Categorising the degree of impacts from AMD on the ecology of the receiving aquatic ecosystems and the processes that drive aquatic ecosystem recovery;
- Identifying best strategies to



sufficiently remediate impacted ecosystems and strategies to prevent ecosystem degradation; and,

- Combining the results from the above objectives into a standard decision-making framework – a process that will include wide consultation with representatives from the mining industry and regulators.

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

For further information on the new research programme please contact:

Amanda Black or Dave Trumm
CRL Energy,
Christchurch
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Approval for Pike River

On 12 March 2004, the Minister of Conservation, the Hon. Chris Carter, approved in principle an application for an access arrangement from the Pike River Coal Company to mine the coal deposits in the Pike River Catchment on the West Coast.

The Pike River Coal Company is proposing an underground mine that will extract between 600,000 and a million tons of coal annually for an estimated twenty years. The mine will require an access road over 3.6km of public conservation land and the mine itself is located under conservation land on the eastern slopes of the Paparoa Range in the Grey Valley north east of Greymouth.

Coal seam fire burns hillside

On 5 January 2004 a fire burned 15 to 20ha of land on a hillside near Solid Energy's old No6 opencast mine, about 1km north of Ohai. The fire is thought to be the result of a coal seam that had been heating for some time. The fire was the third at the site after blazes in 1980 and 1999, caused by coal fines combusting. Fire Service investigator Stuart Ide said fissures had been located at several areas along the seam where oxygen could have got in and helped start the fire. Solid Energy commissioned a report from Mines Rescue, which said the fire was fanned by strong winds, with vegetation, particularly gorse, helping it spread. Solid Energy have now taken measures to clear vegetation away from any recognised danger zones.

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 industry is facing its biggest challenge in recent times. The Coal Association needs the support of Associate Members more than ever, if New Zealanders are to retain access to such a plentiful and economic fuel as coal. Your support could be vital, as the Association attempts to reduce the continuing threat of economic measures, designed to help meet New Zealand's Kyoto Protocol obligations. You can keep up to date with the efforts being made on your behalf, 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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