



COAL NEWS

NEW ZEALAND

Solid Energy says coal export prices could double this year

Solid Energy is expecting export prices for both coking and thermal coals to possibly double in price from July this year as world coal prices boom and supplies tighten.

Barry Bragg, chief operating officer for Solid Energy, said in an interview that he expects contract coking coal prices to as much as double from last year's US\$95 a tonne to about US\$190 a tonne.

He said contract thermal coal prices were likely to rise from US\$50 a tonne to about US\$100 a tonne.

Spot prices for both types of coal had increased about two and a half times since November 2007 after severe snowstorms and power shortages in China led Beijing to suspend coal exports for at least two months.

This was followed by severe floods in coal fields in Queensland - which produces about 50% of world's seaborne trade of coking coal. The floods filled to the brim some open pit mines trapping huge draglines. Some major coal exporting companies in the state have been forced to declare force majeure clauses because they are unable to deliver on their contracts.

South Africa was also forced to cut coal exports after severe electricity shortages.

Mr Bragg said there has also been a high world demand for coal for both steelmaking and the thermal power market.

How the high spot prices will translate into prices this year for contract coal - which is the way most of the world's traded coal is sold - was a matter of conjecture, he said.

Solid Energy should also benefit in the coming year from increased export volumes with production from the underground Spring Creek mine near Greymouth scheduled to reach 800,000 tonnes a year.

Solid Energy's exports consist of 60% hard coking coal, 30% semi-soft coking coal and 10% thermal, Mr Bragg said.

Solid Energy seeks extension to Huntly East mine

Solid Energy is seeking consent from a combined Waikato District Council and Environment Waikato consents hearing to make a northern extension to its Huntly East mine in the Waikato to access 6M tonnes of coal. The \$85M expansion is aimed to supply most of the coal to fire New Zealand Steel's Glenbrook steel plant.

The extension will add 10 to 15 years to its life and increase local employment from 146 to around 200 people.

Solid Energy said that about 90% of the coal mined at the Huntly East Mine and those from the company's nearby Rotowaro opencast mine are railed directly to the Glenbrook mill which was specially designed to produce steel from the North Island's west coast iron sands and Huntly coal. The major expenditure will be the construction of the shaft and the provision of mining equipment such as continuous miners, shuttle cars and conveyors.

What's news?

COAL NEWS 1

NEW ZEALAND 1

- Solid Energy says coal export prices could double this year 1*
- Solid Energy seeks extension to Huntly East mine 1*
- Solid Energy flares coal seam gas tests and looks at gasifying deep coal seams 2*
- Eastern wins coal contract for second Canterbury dairy plant 2*
- Newly available acreage from the Crown Minerals website 2*
- New minerals programme and regulations 2*
- Pike River Coal rights issue 'oversubscribed' 3*

INTERNATIONAL NEWS 3

- Queensland coal rail network body formed (Australia) 3*
- Price rise flags good returns on coal exports (Australia) 3*
- Cleaning up coal's dirty image (Australia) 3*
- Idemitsu to resume full coal output (Australia) 3*
- Baring strikes coal-bed methane deal (China) 3*
- Clean coal plant to be installed in Beijing (China) 4*
- Coal prices hold down power profit (China) 4*
- Cerrejon to boost coal output (Colombia) 4*
- WCL enters into coal supply agreement (India) 4*
- Possible joint venture on a coal-liquefaction project (India) 4*
- Coal India aims to sell in 2008-2009 (India) 4*
- Tie up to boost coal import (India) 5*
- Tokyo Electric to hasten building fossil fuel plants (Japan) 5*
- TNB to buy more coal (Malaysia) 5*
- CFE seeks detailed coal buying consultation (Mexico) 5*
- Eskom faces roads headache (South Africa) 5*
- Port terminal expansion South Africa) 5*
- Vinacomin sets coal target by 2015 (Vietnam) 6*

TECHNOLOGY & OTHER NEWS 6

- Ignition characteristics of pulverised coal under high oxygen concentrations 6*
- NZ should encourage clean coal technology 6*
- IPCC head says CO₂ capture is 'important solution' for climate 7*
- Garnaut says Australia must rely heavily on CCS 7*
- Clean coal test traps carbon 7*
- CO₂ storage project marks major milestone 7*
- Price rise may prompt CCS 8*
- EU moves to fast-track CCS proposals 8*
- Innovative coal-based product bumps petroleum out of equation 8*
- US DOE takes next steps with restructured FutureGen approach 8*
- International Conference on Clean Coal Technologies for our Future 9*
- In support of the G8 9*
- Clean coal technology RD&D 9*
- ECSC R&D achievements 9*

EVENTS 10

FEEDBACK 11

DISCLAIMER 11



Solid Energy flares coal seam gas tests and looks at gasifying deep coal seams

Solid Energy is flaring gas to test flow rates from appraisal wells at its Huntly coal seam gas project. The company also announced a project to investigate gasifying coal by controlled heating of coal in deep seams. Don Elder, chief executive of Solid Energy, told the annual power conference in March that it is developing some "very exciting opportunities" with coal gas.

"The first is a coal seam gas project in the Waikato, extracting methane trapped in coal seams deep underground," Dr Elder said. "Four appraisal wells have been sunk, and we are flaring gas right now to test flow rates. We expect to make a decision later this year about the commercial viability of the project. Potentially we're sitting on a resource of up to 300 PJ, as big as the Kupe gas field," he said.

The coal seam gas appraisal wells sunk into the 400m deep Kupakupa and Renown sub-bituminous coal seams 10km west of Huntly are being carried out in a joint venture with Colorado-based Resource Development Technology.

Dr Elder said Solid Energy is also developing underground coal gasification (UCG) which involves controlled gasification of confined pockets of very deep underground coal. The 'syngas' that is produced is piped to the surface and can be converted into a wide variety of products such as electricity, fertiliser, liquid fuels, natural gas and hydrogen. The company has been working closely for three years with various international companies in "this exciting new energy technology that has the potential to revolutionise the fuel sector".

Solid Energy has access to the latest UCG technology and is making plans for an initial pilot development. UCG projects have been successfully undertaken in the former Soviet Union, Australia and South Africa.

Eastern wins coal contract for second Canterbury dairy plant

Eastern Corporation Ltd's Takitimu mine in the Ohai area of Southland won a contract to supply 20,000 tonnes of coal a year to the recently completed New Zealand Dairies plant at Studholme, South Canterbury.

Last year, the Eastern mine won a 130,000 tonne a year contract to supply coal to the large Fonterra-owned Clondeboy dairy manufacturing plant, also in South Canterbury.

Eastern said several other contracts are currently under negotiation, resulting in further changes being made to the design of the new processing plant for the Takitimu mine to allow for increased capacity.

In the Takitimu mine block 2, overburden removal is on schedule to expose the increased volumes of coal needed to begin the Fonterra contract in the final quarter of 2008.

Under Eastern's exploration permit at Whareatea West on the Buller coalfield, further exploration drilling and coal quality testing is to be carried out during 2008 to further determine the resource.

Newly available acreage from the Crown Minerals website

The Minerals Programme for Minerals (excluding petroleum) 2008 (on www.crownminerals.govt.nz) sets out policies and procedures for how permit applications and applications for extension of land are handled over recently available land known as Newly Available Acreage (NAA).

Information on current NAAs can be accessed via the GIS Viewer for Minerals and Coal. The viewer can be launched using the short cut listed under 'Jump to Online Services' on the Crown Minerals Home page.

New minerals programme and regulations

The Minerals Programme for Minerals (excluding Petroleum) 2008 and the Crown Minerals (Minerals and Coal) Regulations 2007 both came into force starting 1 February 2008.

These two important statutory instruments provide both the Crown and industry with up-to-date and robust regulatory policy and practices that should enhance New Zealand's reputation as an attractive exploration destination for investment.

The new minerals programme provides an allocation regime which promotes the responsible discovery and development of New Zealand's Crown-owned mineral and coal resources. It builds upon the knowledge and experience gained since the existing minerals programmes were issued in 1996 and provides increased certainty and transparency in administering the Crown Minerals Act 1991.



The new minerals programme is supported by the Crown Minerals (Minerals and Coal) Regulations 2007 which have been amended to improve the administrative and data collection requirements of the minerals permitting regime.

Pike River Coal rights issue 'oversubscribed'

Pike River Coal (PRC) says its \$60M rights issue has closed oversubscribed - a good outcome in an unsettled world financial climate. PRC, which hopes to mine coal from the West Coast's Pike River mine, north of Greymouth, said the renounceable rights issue of one share for every 3.56 held had been oversubscribed by 5%.

INTERNATIONAL NEWS

Queensland coal rail network body formed (Australia)

The Coal Connect alliance agreement was recently signed between Queensland Rail (QR), Leighton Contractors, GHD and KBR as a key part of the A\$3 billion expansion of central Queensland's export coal rail network.

The parties will undertake the civil works of the \$1 billion Goonyella to Abbot Point project, including the Northern Missing Link and the Buckley to Newlands Upgrade.

Under the network expansion, QR is lifting the capacity and performance of the central Queensland coal network including new and upgraded track, and new locomotives and wagons.

"By 2010/11, it will have increased tonnage capacity by almost 60% in Queensland, with the ability to haul 261M tonnes of coal across all networks.

The Goonyella to Abbot Point expansion project could potentially deliver 100M tonnes per year through Abbot Point at Bowen. This will translate to well over \$10 billion in revenue at today's prices for coal companies and the state's burgeoning coal industry.

Price rise flags good returns on coal exports (Australia)

Exports of Collie coal to India are set to bring high returns with an increase in the value of thermal coal on the export market. Spot prices for thermal coal are hovering around the A\$130 per tonne mark compared to contract prices, set a year ago, of just \$55.

Collie Coal Futures Group said that it is good news for Collie's thermal coal producers, in south-west Western Australia, who are sending trial shipments to India.

Cleaning up coal's dirty image (Australia)

White Energy has linked up with associates of coal miner White Industries to market an Australian "cleaner coal" process developed by the CSIRO. The process upgrades low-grade sub-bituminous coal by turning it into coal briquettes, allowing it to generate more energy with lower ash and sulphur emissions.

It is a process particularly relevant for countries with large reserves of low-grade coal, including the US, Indonesia and China. It will not just substantially upgrade sub-bituminous coal; it will also be more environmentally friendly, reducing the serious dust problems created by transporting low-grade coal.

Idemitsu to resume full coal output (Australia)

Idemitsu Kosan Co. expects to resume full operations at its Ensham deposit in Queensland in early 2009, after heavy rain and floods disrupted production.

Three of the seven mining areas have been operating normally and Idemitsu declared force majeure on Jan. 18 after the heavy rains, telling buyers it can't deliver coal from the mine. Idemitsu said it doesn't know when deliveries will resume from Ensham, which supplies about a third of Japan's thermal coal needs. The mines produced about 8M tonnes of power-station coal in 2007.

Baring strikes coal-bed methane deal (China)

Baring Private Equity Asia has struck a deal to invest US \$88M in a Chinese producer of coal-bed methane.

Coal-bed methane, or coal seam methane, is natural gas extracted from coal deposits. The technology removes gas with the potential to cause explosions in coal mines.

The agreement allows Baring to be the largest shareholder in China CBM Investment Holdings Ltd.



Clean coal plant to be installed in Beijing (China)

Australia and China signed a formal agreement for research and testing of clean coal technology in Beijing. The agreement, between CSIRO-Australia and TPRI-China will see TPRI install, commission, and operate a post-combustion capture (PCC) pilot plant at the Huaneng Beijing Co-Generation Power Plant as part of CSIRO's research programme.

PCC is a process that uses a liquid to capture the CO₂ from power station flue gases. The technology can potentially reduce CO₂ emissions from existing and future coal-fired power stations by more than 85%. The pilot plant is designed to capture 3,000 tonnes of carbon dioxide a year from the power station and begins the process of adapting this technology to evaluate its effectiveness in Chinese conditions.

The TPRI is aiming for the Beijing pilot plant to be up and running before August.

The installation of the PCC pilot plant in Beijing forms part of the Asia Pacific Partnership on Clean Development and Climate initiative. This programme also includes a pilot plant installation at Delta Electricity's Munmorah power station on the New South Wales Central Coast, with an additional Australian site currently under negotiation.

Coal prices hold down power profit (China)

Huaneng Power International posted a 1.5% rise in profit in 2007 as price curbs prevented the company from passing the rise in coal costs to consumers.

Despite the strong demand for electricity that has driven the bottom line of power companies, challenges remain as coal prices rose to a record high and competition gets tougher.

The central government ordered a freeze on energy prices in January as part of moves to tackle inflation.

Although the domestic market will still be the main focus, the company is setting its sights abroad to diversify operations and increase shareholders' returns.

Gerrejon to boost coal output (Colombia)

Gerrejon LLC of Colombia is projected to produce 31M tonnes of coal for export in 2008.

The open-pit mine located in the Guajira province in the northern tip of Colombia earned US\$1.5 billion from the sale of coal in 2007. The company plans to invest \$600M to boost production to 42M tonnes a year by 2011.

Coal is Colombia's second-largest legal export behind oil and processed products. Coal sales abroad brought in \$3.5 billion in 2007, up from \$2.9 billion in the previous year.

WCL enters into coal supply agreement (India)

Western Coalfields Limited (WCL) has entered into a coal supply agreement on negotiated price basis with its major consumer Maharashtra Electricity Generation Company Ltd for another opencast project 'Junad' (0.6M tonnes annually) in north Wani area.

WCL already has a coal supply agreement on negotiated price basis in respect to five coal projects, Adasa (9.2Mt), Kolgaon OC (0.4Mt), Bhatadi OC (0.6Mt), Durgapur (2.0Mt) and Waghoda UG (0.4Mt).

Apart from Waghoda, WCL was supplying coal from all of these mines. Consumers will benefit by this agreement as it ensures uninterrupted supply of assured quantity and quality from the producing company.

Possible joint venture on a coal-liquefaction project (India)

Reliance Industries Ltd (RIL) has begun talks with Coal India Ltd (CIL) to explore the possibility of striking a joint venture for a coal-liquefaction project.

CIL is keen on such a forward-integration project as it could get ammonium nitrate, an explosive it uses for its mining purposes and whose shortage is an area of concern. The project would entail investments for setting up the plant and the two companies would form a joint working group to evaluate a detailed feasibility report.

Coal India aims to sell in 2008-2009 (India)

Coal India is planning to sell 15M tonnes of its targeted 405M tonnes of coal production in 2008-09 through the introduction of forward electronic auction.



The scheme is aimed at meeting the long term fuel requirements for cement and steel firms on a quarter to quarter basis. The new system follows the introduction of spot electronic auction of coal through which the firm proposes to sell 25M tonnes of its production in 2008-09. Coal India, which supplies 90% of its output at a fixed price to power firms in India, will finalise fuel supply agreements with existing users this month.

The firm has earmarked 140M tonnes of coal for new units and 8M tonnes of coal through state-run firms to meet demand from small industries.

Tie up to boost coal import (India)

Power Finance Corp Ltd (PFC) has tied up with RITES Ltd, to facilitate import of coal from African countries for Indian power projects. The two firms will provide advisory services to help Indian firms acquire mining rights abroad.

The two firms will also form a special purpose vehicle to acquire coal mining rights abroad (along with a local company), outsource the mining and import the coal to India.

RITES, a technical arm of the Indian Railways, and PFC will also work with concerned agencies to augment port capacity and road and rail connectivity in India to meet the rising demand for coal imports.

Tokyo Electric to hasten building fossil fuel plants (Japan)

Tokyo Electric Power Co., forced to shut the world's biggest nuclear station after an earthquake, will speed up construction of coal- and gas-fired plants to avoid a supply shortfall as safety concerns delay new atomic reactors.

The company will complete the 1,000MW Hitachinaka No. 2 and 600MW Hirono No. 6 coal-fired plants in fiscal 2013, one year ahead of schedule.

The earlier start of the thermal plants is meant to offset lost output caused by the one-year delay in the completion of Tokyo Electric's three new nuclear reactors.

TNB to buy more coal (Malaysia)

Tenaga Nasional Bhd (TNB) agreed to buy more than its coal requirements for this fiscal year. It had secured 111% of coal needs for the year ending August (FY08).

According to Bloomberg, TNB hasn't locked in coal purchases for 2009 and 2010. Rising coal prices have raised concern that TNB's profit may be eroded by higher fuel costs. TNB is also looking for new sources for coal

CFE seeks detailed coal buying consultation (Mexico)

Mexico's Federal Electricity Commission (CFE) sent out a letter to coal suppliers asking for detailed, month-long consultations aimed at improving the efficiency of its coal-buying process.

CFE tendered for just under 5M tonnes of coal for March-December supply to its Petacalco plant on Mexico's Pacific Coast. The tender was awarded to local supplier Ailia, at prices of US\$50 a tonne lower than other offers.

Ailia has not begun deliveries to CFE yet thus forcing Petacalco to burn fuel oil at more than double the cost of coal.

Eskom faces roads headache (South Africa)

Eskom, struggling to fix a severe power crisis, faces another headache in trucking urgently needed coal to power stations on crumbling and heavily used roads. Eskom said it will take 900 trucks to get the 45M tonnes of extra coal the utility needs over the next two years to feed its power stations in coal-rich Mpumalanga province, which has some of the country's worst roads.

The quality of the coal and getting it to Eskom's coal-fed power stations, which are concentrated in Mpumalanga in north east South Africa, are among Eskom's biggest worries in the power crisis. South African roads are riddled with potholes, rutted and slippery surfaces and suffer a lack of roadside maintenance,

Port terminal expansion South Africa)

Mining Weekly has reported that Eskom's coal crunch would not affect or delay a potential phase six expansion of the world's biggest single coal terminal to more than 100M tonnes a year.

Richards Bay Coal Terminal had completed a study late last year which showed that there was a business case for expansion beyond the 91M tonnes a year by 2009.



RBCT said that they do not foresee any impact of Eskom's coal shortage on the possible expansion. They explained that export coal and the fuel that the power utility burned in its power stations were of different grades. However, RBCT said what could impact on the phase six expansions will be Transnet Freight Rail's, ability to boost its coal carrying capacity to the port.

Transnet Freight Rail said that it would support industry expansion, but only if it had assurances that the coal miners would have enough coal to take up any expanded rail capacity.

Vinacomin sets coal target by 2015 (Vietnam)

Viet Nam National Coal Mineral Industries (Vinacomin) Group expects to produce 60M tonnes of coal per year by 2015, 150% more than at present.

To reach its goal, Vinacomin plans to open 7 to 10 new coal mines, adding 1.5 to 2M tonnes to capacity each year between 2008-15, even though exploratory costs are high.

With its existing facilities and technology, Vinacomin can exploit mines up to 100m underground, much less than the several hundred metres in the rest of the world.

Exploratory results show Viet Nam has great reserves of coal, including 10 billion tonnes at 300m in the northern province of Quang Ninh and hundreds of billions of tonnes at a depth of 1,000m in the Red River Delta region.

Vinacomin has established two subsidiaries in preparation for exploiting coal in Quang Ninh's Cam Pha and Uong Bi districts. It is also negotiating with partners to import coal in order to meet domestic demand estimated at 70 to 80M tonnes in 2015, mostly for use in thermo electric plants.

Vinacomin at present capacity is about 40M tonnes a year, enough to serve domestic demand as well as exports.

TECHNOLOGY & OTHER NEWS

Ignition characteristics of pulverised coal under high oxygen concentrations

This recent paper in Energy & Fuels Journal demonstrates that oxygen enrichment of combustion air can be very effective in electric power plant boilers especially when overall fuel consumption is reduced or when a "valuable" fuel is partially substituted with a poor one. Combustion characteristics of three Chinese pulverised coals (bituminous, anthracite and lignite) and three different particle sizes (under high oxygen concentrations) were investigated using thermogravimetric/differential scanning calorimetry analysis and a drop-tube furnace.

Results showed that ignitability, the combustion property, and the burnout were largely improved when added oxygen was used, especially for small particles. The influence of oxygen on the bituminous coal was greater than the lignite and the anthracite, and the suitable O₂ concentration of the ignition of pulverised coal flow should be controlled below 40%.

NZ should encourage clean coal technology

The New Zealand Business Council for Sustainable Development said focus should go onto encouraging clean coal research and development, not issuing orders to stop it. Business Council Chief Executive Peter Neilson said the Green Party's concern over the environment and climate change is understandable and shared by the Business Council.

However, if New Zealand wants an international agreement covering greenhouse gases post-2012, we need to recognise coal will still be part of the energy mix for the foreseeable future.

The Business Council commented on the Green's policy announcement advocating an end to new coal mines, a ban on thermal coal exports, instructing Solid Energy to "stop pouring money into lignite to liquid fuels", and to shut down Huntly gas and coal fired power stations over time. The Greens will also try amending the emissions trading bill to include coal seam methane in the climate change obligations of coal mining companies.

The Business Council said putting a price on coal emissions through the trading scheme will send a strong enough signal to coal users about lowering emissions, or paying for them. They don't think a ban on new thermal (gas and coal-fired) generation is needed when there is a new price on carbon. The emphasis should go onto delivering



commercially viable clean coal technology in the next 10 years. Solid Energy's \$100M 20-year investment in renewables and clean coal should be encouraged, not stopped.

IPCC head says CO₂ capture is 'important solution' for climate

CCS is an "important solution" to global warming, although "much more effort" is needed to get the technology widely adopted, according to Rajendra Pachauri, chairman of the Intergovernmental Panel on Climate Change, the UN panel of scientists who shared the Nobel Peace Prize with Al Gore. "I know some people think CCS is immoral and so on, but this is a very limited view," Dr Pachauri said. "We need to use everything at our disposal."

Similar comments were made by Yvo de Boer, head of the UN Framework Convention on Climate Change Secretariat: "To my mind, if declared safe and acceptable, it is going to be an imperative in terms of an effective solution. If I look at some of the really huge coal based economies around the world, like China, like India, like South Africa, like Australia, I don't really see how we can come to grips with climate change without using CCS."

Garnaut says Australia must rely heavily on CCS

Australia has no choice but to rely heavily on CCS to cut its greenhouse gas emissions in time to make a difference on climate change, delegates to the NSW Government's "clean coal" summit were told by Professor Ross Garnaut, the architect of Australia's climate change review. "Coal is set to play a big role in future Australian prosperity, so long as we can deal effectively with an inconvenient truth," Garnaut told the coal summit.

The NSW coal summit brought the shape of Australia's future power industry over the next four decades into sharper focus. Renewable energy will play an increasingly large role, but would remain secondary to coal well into the second half of the century, the summit heard.

Professor Garnaut said it was "erroneous" to say that CCS would not be available in a commercially effective form by 2020. Coal was too valuable to contemplate using or selling much less, Professor Garnaut said, adding that price rises meant an extra A\$25 billion in Australian export earnings this year, equivalent to 2½ times the value of the nation's total merchandise exports to the US.

Clean coal test traps carbon

Sargas of Norway said tests of a new technology for capturing greenhouse gases from coal-fired power plants have achieved 95% cuts in a step towards new ways to fight climate change.

Sargas said tests have been held since October of a prototype at the Vartan power plant in Stockholm. Tests by Sargas' five-metre high system of pressurised filters, absorbers and condensers at Vartan - processing 60 kilograms of exhaust gases an hour - are capturing 95% of carbon dioxide.

The system relies on existing technology adapted from the chemicals industry and would have to be 40m tall to work at full scale. Sargas said that the capture process costs just under US\$20 a tonne of carbon dioxide and companies would need government help for storage - perhaps by pumping the gas into offshore oilfields to raise pressure and extract more oil.

A limitation of Sargas' technology is that the system works under pressure and only a handful of coal-fired power plants so far use Pressurised Fluidised Bed Combustion technology - in Sweden, Japan and Germany. That means it can be used in new plants, including any burning natural gas, but cannot be easily retro-fitted at plants where exhaust gases come out at atmospheric pressure.

CO₂ storage project marks major milestone

Industry, environment groups, research organisations and governments have widely hailed the CO₂CRC Otway Project as a major step forward in Australia's implementation of low emission technologies. The Otway Project, which is trialling the long term geological storage of CO₂, was launched officially in April in south-western Victoria. The project has also received support from the environment and union sectors. The World Wide Fund for Nature (WWF) welcomed the Otway Project saying there was a need for similar ground-breaking initiatives. The president of Australia's largest and most influential mining union, the Construction, Forestry, Mining and Energy Union, Tony Maher, paid tribute to researchers and industry for their contribution to the development and deployment for the low emission technology being demonstrated through the Otway Project.

The NZ\$40M project will see 100,000 tonnes of CO₂ injected to a depth of 2km and then extensively monitored. It is designed to demonstrate that CCS (geosequestration) is technically and environmentally feasible and is ready for widespread commercial application.



CO2CRC Chief Executive, Dr Peter Cook, said the Otway Project will play an important role in demonstrating the safety of geosequestration technology to communities, industry and governments worldwide. In addition to demonstrating the deep geological storage of CO₂ through the Otway project, he stated that CO2CRC is also a leader in the research and demonstration of CO₂ capture technologies.

Solid Energy, is a major investor and founding member of the company set up to own and operate the Otway project. Chief Executive Officer, Dr Don Elder, said after the launch it was "a major milestone in global efforts to address climate change and a very significant day for Solid Energy as a key participant in this project since 2004. Carbon capture and storage is already proven technology used in a number of applications around the world and is expected to be commercially utilised in new coal-fired power stations over the next five to 10 years."

Price rise may prompt CCS

A major new study of the impact of likely future carbon pricing on electricity generation investment in Australia has been completed by the Cooperative Research Centre for Coal in Sustainable Development. The CCSD study predicted that a portfolio of new generation technologies, including renewables, gas, and ultra supercritical coal with CCS would be introduced should deep emission reduction targets be set. The study indicated that CO₂ emissions permits in the price range of A\$40 to \$70 a tonne may be sufficient to encourage the industry to commence CCS for coal based electricity by the "mid-part of the coming decade."

EU moves to fast-track CCS proposals

The European Union may boost CCS efforts by pushing forward proposals for a dozen demonstration projects.

The European Commission has proposed legislation to encourage CCS, notably by helping fund up to 12 demonstration plants and by providing a legal and regulatory framework to make geological storage of CO₂ possible.

However, UK Prime Minister Gordon Brown's environment adviser, has said the EU will not get its planned 12 CCS-fitted power plants because it is trying to do it on the cheap. Michael Jacobs said Britain was pushing ahead with its competition to get a CCS demonstration plant up and running by the end of 2014 and was willing to put "tens of millions of pounds of taxpayers money" in place to do so.

Innovative coal-based product bumps petroleum out of equation

Through a cooperative agreement with US Department of Energy's National Energy Technology Laboratory, a team headed by West Virginia University has successfully demonstrated a synthetic binder pitch that uses hydrocarbons from coal to supplement or replace petroleum feedstocks.

Binder pitch is an important ingredient in making graphite rods used in electric arc furnaces for the manufacture of steel from scrap. Conventional binder pitch usually blends petroleum pitch with standard coal-tar pitch. The new synthetic pitch could replace at least 19,000 tonnes of conventional pitch needed each year by graphite electrode manufacturers. WVU claims that the same pitch could be used by the aluminium industry; if so, demand for the new product would be equivalent to nearly one million barrels per year.

Producing the synthetic pitch employs a solvent-based continual coal-extraction process. Deriving binder pitch via this process uses much less coal than the standard method of distilling it from coke-oven tar. About 700kg of pitch can be produced from one tonne of coal using the new process, whereas only about 30kg is produced from every tonne of coal via the standard method.

US DOE takes next steps with restructured FutureGen approach

The US Department of Energy (DOE) recently released a draft Funding Opportunity Announcement to solicit public input on the demonstration of multiple commercial-scale Integrated Gasification Combined Cycle (IGCC) or other clean coal power plants with CCS technology under the restructured FutureGen approach. The draft solicitation for up to \$1.3 billion outlines the planned scope of the project, evaluation criteria, terms and conditions, and cost sharing requirements for public-private cooperation under FutureGen. Each plant will permanently store underground at least 1M tonnes of CO₂ a year, capturing at least 81% of the CO₂, with a goal of reaching 90%. Projects must also remove at least 90% of the mercury emissions, at least 99% of the sulphur dioxide emissions and reduce nitrogen oxide and particulate emissions to very low levels.

DOE announced a restructured approach to its FutureGen project in January to build on technological R&D advancements in CCS technology achieved over the past five years. The restructure purpose was also to account for changing market conditions for clean coal technology, as well as efforts to limit taxpayer exposure and maximise the federal government's investment in this technology. The restructured approach aims to accelerate the near-term deployment of advanced clean coal technology by equipping new IGCC or other clean coal commercial power plants



(at least 300MW) with CCS technology. With multiple projects funded, it is expected to at least double the amount of CO₂ sequestered compared to the concept announced in 2003.

International Conference on Clean Coal Technologies for our Future

The first three conferences in this series were held in Sardinia, Italy. The most recent, in May 2007 attracted more than 200 delegates from more than 32 countries. Papers from the Third Conference are available from IEA-Clean Coal centre website.

The fourth series of this conference will be held at the Maritim Hotel and International Congress Center, Dresden, Germany on 18-20 May 2009, in conjunction with the Third International Freiberg Conference on IGCC and CTL Technologies. The conference will be organised jointly between IEA CCC and Forschungszentrum Jülich.

In support of the G8

The IEA Clean Coal Centre was asked to help build global knowledge on coal use potential in the Plan of Action for Climate Change arising from the July 2005 G8 Meeting in Gleneagles, Scotland. The Communiqué invited the IEA 'to carry out a global study of recently constructed plants building on the work of its Clean Coal Centre, to assess which are the most cost effective and have the highest efficiencies and the lowest emissions, and to disseminate this information widely.

A series of case studies was conducted to show what is being achieved now in modern plants in different parts of the world. The report entitled "Fossil Fuel-Fired Power Generation, Case Studies of Recently Constructed Coal- and Gas-Fired Power Plants" is available through the IEA's website www.iea.org.

Clean coal technology RD&D

The European Commission has funded research on the production and use of coal, since the European Coal and Steel Community (ECSC) Treaty came into force in 1952. Financial support covered mining, coal preparation and conversion, and R&D in coal combustion and gasification. Since the end of the ECSC Treaty in 2002, R&D in the coal and steel area has been funded by the Research Fund for Coal and Steel (RFCS)

The programme is managed by DG Research according to similar principles to those applied to the ECSC Programme, but with new guidelines. The areas of emphasis in this review are coal combustion and gasification. In the 1970s and 1980s, there were major programmes to develop coal based alternatives to oil and gas, in response to the oil crises of the period. After the start of the 1990s, the main focus became the development of clean coal technologies for power generation.

ECSC R&D achievements

Most ECSC R&D was undertaken via collaborative projects. The major achievements and the topics emphasised are as follows:

1. Improving the performance of pulverised coal fired power plant
The work was undertaken to improve performance through: prediction and minimisation of the impact of coal blends on combustion, individual burner characterisation, and improving PC airflow distribution, measurement and control. The work was carried out through laboratory and large scale testing, the development of combustion models, plant optimisation studies, development of on-line monitoring techniques, and improved operational control strategies.
2. Reducing slagging and fouling for pulverised coal fired plant
This had three main themes: fundamental studies to improve overall understanding of the processes of ash deposition, probes and predictive tools to enable the measurement of deposition extent, and supporting studies to reduce ash deposition in large-scale PF boiler plant. The programme has generated a wealth of information and has considerably extended the understanding of the mechanisms and processes of ash deposition.
3. Improved environmental control for pulverised coal fired plant
This work showed that careful selection of combustion modification techniques could result in significant reductions in NO_x emissions. A range of measures have been established, including low NO_x burners, air staging, flue gas re-circulation, and re-burning. Overall, this has led to a number of techniques that have been applied by EU industry, both within the European Union and in external markets.
4. Co-combustion and fluidised bed applications
The programme supported key projects to address many important co-utilisation issues. These included practical laboratory and pilot scale tests of coal combustion with natural wood, agricultural waste, paper waste, agro-



industrial waste, waste edible oils, refuse derived fuel, plastic waste, meat and bone meal, and sewage sludge. Most of the work focused on Circulating Fluidised Bed Combustion applications as this technology is particularly suited to co-firing applications.

5. Valorisation of coal processing residues

The ECSC Programme supported various initiatives to minimise the impact of such coal residues, together with coal mining wastes, by characterising these materials and evaluating them for their potential applications. This included techniques to utilise the energy content of such residues, both to ensure comprehensive utilisation of resources and to achieve a significant environmental benefit.

6. Advanced power generation

In accordance with the ECSC terms of reference, the majority of the projects on advanced power generation focused on activities offering prospects of demonstration and replication of the technology under development. The results from these research activities contributed a significant part of the R&D achievements in the field of coal utilisation. As such, they enabled European industry, through co-operation at Community level, to make significant progress in the development and introduction of advanced power generation systems.

7. Control of CO₂ emissions

Some initial work was undertaken within the ECSC Programme, which considered both PF and IGCC processes. The emphasis was on separation membranes, and on coal reactivity studies. Since the end of the ECSC programme, it has been recognised that IGCC may be the technology of choice when CO₂ mitigation becomes a necessity. Consequently there has been an upturn in interest in methods for gas separation and this topic is of key importance in the ongoing RFCS programme and in the EC supported Framework R&D Programmes.

8. Exploitation of R&D results

The results arising from the ECSC coal utilisation R&D Programme have played a key role in the development of clean and efficient coal-based power generation. Work on PF combustion has contributed greatly to improving the performance of existing units within Europe, and has assisted in the deployment of newer designs of plant, with advanced steam cycles and state of the art environmental control systems.

Similarly, with CFBC, the ECSC work has greatly assisted in the full understanding of the process, leading to improved designs of plant capable of burning a wide range of coals and alternative feedstocks in an efficient and environmentally acceptable manner. For IGCC, the ECSC work led to the construction and operation of various pilot plants, from which two complete large-scale demonstration plants were installed in Europe. Subsequently, considerable support work was provided through ECSC, including component development and process measurement methods.

9. The way forward via the RFCS programme

The Treaty establishing the ECSC expired on the 23 July 2002. The ECSC funds were transferred to the European Community to create a common fund for research in the coal and steel area. This is being used to support the 'Research Programme of the Research Fund for Coal and Steel', which is managed by EC DG Research according to principles similar to those of ECSC RTD. The RFCS programme began in 2002, and the first projects are still underway, with the level of results yet in the public sector being very limited. Accordingly, a listing of the clean coal power generation R&D activities currently underway is included in Appendices B and C, which include the contact details of the research organisations and a brief description of the work, so that specific follow-up can be undertaken as required by interested organisations.

EVENTS

31 May-1 June 2008, Expert Meeting on Financing Carbon Capture and Storage (CCS) Projects, Rembrandt Hotel in London, UK, Organized by IEA Clean Coal Centre and IEA Greenhouse Gas R&D Programme, sponsored by Rio Tinto and the World Coal Institute.

1-4 Jun 2008, Coaltrans Asia 2008 conference, Bali, Indonesia, Coaltrans Conferences Ltd, Nestor House, Playhouse Yard, London EC4V 5EX, UK, Tel: +44 20 7779 8189, Fax: +44 20 7779 8946, Email: webmaster@coaltrans.com, Internet: www.coaltrans.com.

3-5 Jun 2008, Power-Gen Europe conference, Milan, Italy, Gil Burton, PennWell Corporation, PennWell Publishing (UK), Warlies Park House, Horseshoe Hill, Upshire, Essex, EN9 3SR, UK, Tel: +44 1992 656 617, Fax: +44 1992 656 700, Email: exhibitpge@pennwell.com, Internet: www.power-geneurope.com.

16-18 Jun 2008, Tonkin's Queensland Coal 2008 conference, Brisbane, Qld., Australia, Tel: +61 2 9224 6060, Fax: +61 2 9224 6066, Email: conferences@TonkinCorporation.com.



25-26 Jun 2008, Platts carbon capture & sequestration conference, Houston, TX, USA, Ron Berg, Platts, 24 Hartwell Ave., 3rd Floor, Lexington, MA 02421, USA, Tel: +1 781 430 2118, Fax: +1 781 860 6101, Email: ron_berg@platts.com, Internet: www.platts.com/Events/2008/pc819.

26-27 Jun 2008, International experts' workshop on mercury emission from coal, Newcastle, NSW, Australia, Prof. Terry Wall, Chemical Engineering, University of Newcastle, Newcastle, NSW 2308, Australia, Tel: +61 2 4921 6179, Fax: +61 2 4921 6920, Email: Terry.Wall@newcastle.edu.au.

1-3 Jul 2008, Coal-Gen Europe 2008 conference, Warsaw, Poland, Gil Burton, COAL-GEN Europe, PennWell Corporation, PennWell Publishing (UK), Warlies Park House, Horseshoe Hill, Upshire, Essex, EN9 3SR, UK, Tel: +44 1992 656 617, Fax: +44 1992 656 700, Email: exhibitcge@pennwell.com.

13-15 Aug 2008, Coal-Gen 2008 conference, Louisville, KY, USA, Sarah Syverson, PennWell, 1421 S. Sheridan Road, Tulsa, OK 74112, USA, Tel: +1 918 832 9343, Fax: +1 918 832 9305, Email: coal-genevent@pennwell.com, Internet: www.coal-gen.com.

29 Sep - 2 Oct 2008, 25th annual international Pittsburgh coal conference, Pittsburgh, PA, USA, International Pittsburgh Coal Conference Secretary, University of Pittsburgh, 1249 Benedum Hall, Pittsburgh, PA 15261, USA, Tel: +1 412 624 7440, Fax: +1 412 624 1480, Email: pcc@enr.pitt.edu, Internet: www.enr.pitt.edu/pcc.

6-8 Oct 2008, 2008 coal market strategies conference, Williamsburg, VA, USA, Teresa Coffey, American Coal Council, 1101 Pennsylvania Ave., NW, Ste. 600, Washington, DC 20004, USA, Tel: +1 202 756 4540, Fax: +1 732 231 6581, Email: tcoffey@americancoalcouncil.org, Internet: www.clean-coal.info/drupal/cms08.

9-10 Oct 2008, McCloskey's China coal markets conference 2008, Beijing, China, Georgina Lucey, The McCloskey Group, 2 Pages Court, St Peters Road, Petersfield GU32 3HX, UK, Tel: +44 1730 265095, Fax: +44 1730 260044, Email: georgina.lucey@mccloskeycoal.com, Internet: conf.mccloskeycoal.com.

19-23 Oct 2008, 12th Australian coal preparation conference: cleaning coal to secure our future, Darling Harbour, NSW, Australia, Australian Coal Preparation Society National & NSW, PO Box 2315, Dangar NSW 2309, Australia, Tel: +61 02 4926 4870, Fax: +61 02 4926 4902, Email: acpsnational@acps.com.au, Internet: www.acps.com.au.

21-23 Oct 2008, Power-Gen Asia 2008 conference, Kuala Lumpur, Malaysia, Samantha Malcolm, PennWell Corporation, PennWell Publishing (UK), Warlies Park House, Horseshoe Hill, Upshire, Essex EN9 3SR, UK, Tel: +44 1992 656 619, Fax: +44 1992 656 704, Email: attendingpga@pennwell.com, Internet: www.powergenasia.com.

16-20 Nov 2008, 9th international conference on greenhouse gas control technologies, Washington, DC, USA, John Gale, IEA Greenhouse Gas R&D Programme, Orchard Business Centre, Stoke Orchard, Cheltenham, GL52 7RZ, UK, Tel: +44 1242 680753, Fax: +44 1242 680758, Email: johng@ieaghg.org, Internet: mit.edu/ghgt9.

18-20 May 2009, 4th international conference on clean coal technologies, Dresden, Germany, IEA Clean Coal Centre, 10-18 Putney Hill, London SW15 6AA, UK, Tel: +44 20 8780 2111, Fax: +44 20 8780 1746, Email: mail@iea-coal.org.uk, Internet: www.iea-coal.org.uk.

FEEDBACK

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