

## Extract

*Quarry Vision: Coal, Climate Change and the End of the Resources Boom*

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### THE PROBLEM WITH “CLEAN COAL”

No matter what happens in 2009, Australians will still be conscripts on the wrong side of a “coal war” with climate change, a costly and disastrous proxy war on behalf of our coal industry. The industry may prevail, but we will lose, as will the planet – it is merely the extent of the loss that is uncertain. Some call for a “War Cabinet” to fight climate change, perhaps not noticing the several we already have. Successive state and federal Cabinets have fought on coal’s behalf in the war on climate change, believing coal burning has a bright future. They dare not consider the possibility that they have backed the wrong side. Rather than glance at that Medusa-like prospect for fear they might turn to political stone, they have turned to anthracite and lignite, oblivious of the consequences. Tim Winton might just as well have been describing the nation’s fight to protect coal when he recently wrote of his home state of Western Australia that the “economy and mindset are bound up in an endless war against nature.” Ultimately, however, the Australian people can only prevail if their country changes sides. The sooner we prepare for that, the better for the global environment, and the better for Australia.

There is more to our strong alliance with the coal industry than historical and psychological attachment to the quarry; there are more pragmatic reasons. Under the accounting provisions of the UN’s climate-change convention, the world has agreed that greenhouse emissions are attributed to the nations where they occur. To the extent that any “extended producer responsibility” is accepted for our coal exports, it ends once the ships leave our ports. Thus, Australia is responsible for less than one-quarter of the CO<sub>2</sub> emissions generated by its coal because around 80 per cent of it is exported. Coal is still a major source of domestic emissions, mainly because burning it generates most of our electricity, but by far the greater contribution of Australian coal to climate change accrues in other nations and is ignored relatively easily by us. As the world’s largest “coal mule,” this ought to present a moral challenge to a country that readily points the finger of climate-change culpability at the USA, China and India (the world’s largest coal users). Yet it is one that Australian political leaders continue to dodge.

Aside from accounting convenience, it’s politically attractive to keep coal exports off the table; we’re in so deep. Governments have a financial stake in coal mining, burning and exporting: they own

generators and rely on exploration-rights revenue and mining royalties; their railways, ports and other infrastructure depend on coal and its expansion. On both sides of politics, senior ministers, their predecessors and their mentors have made many of the decisions that dug Australia deeper into coal. As well as being personally invested, they have close friends and colleagues lobbying on behalf of coal companies or sitting on their boards. In the bureaucracy, there's a similar dynamic. A career spent making decisions that assume coal expansion in spite of climate change may not constitute a financial interest, but it confers a degree of ownership of the status quo and it fosters resistance to change.

For business leaders whose working lives were spent persuading cautious multinationals to bet on coal's expansion in Australia, and union leaders with thousands of members feeling under siege because of climate change, fighting the "coal war" seems the only conceivable option. It is unthinkable for such people to consider changing course, let alone changing sides – the humiliation and animosity are unimaginable. There are other unwelcome considerations. If Australia turned back now, there would surely be lawsuits from multinationals arguing that the government has no right to interfere after having sent such receptive signals to investors for so long. If Australian withdrawal from the coal trade pushed up coal prices, there would surely be diplomatic fallout, too – an outcry as coal export customers say we have no right to deprive them of essential energy resources. Various national governments that have invested in coal mining in Australia might retaliate. Critics would argue against singling coal out for special attention. After all, if we're not going to export coal until it's used cleanly, why should other countries send us oil, cars or plasma TVs until they're also used "cleanly" here? Why should there be a different rule for coal and LNG? The latter is cleaner, but it is still a fossil fuel.

The arguments are predictable, as if hundreds of millions of tonnes of coal were as innocuous an export as hundreds of millions of Kylie Minogue CDs. In the end, however, coal is a special case. There is still enough of it in the ground to meet projected global demand for hundreds of years, whereas the rising long-term price of oil is already starting to give rise to alternatives. As for the emissions generated by the use of most other energy-intensive products (plasma TVs, game consoles, fridges and so on), these can be cut to zero by switching to green power – an affordable option available to almost any user today. As for LNG, the emissions associated with our exports to 2030 are projected to be perhaps one-sixth of those caused by our coal exports – it is not in the same league. So coal *is* different. It is cheap, plentiful and inherently dirty. Coal is also different in that using it "cleanly" relies on a silver bullet: massive-scale carbon capture and storage infrastructure that must be virtually completed, not merely underway, ten to fifteen years from now, if there is to be any hope of avoiding catastrophic climate change. Given that the prospects of such infrastructure being in place are nil, as I'll discuss below, it's unthinkable *not* to single out coal. The urgent timetable for emission

cuts is such that we simply can't keep burning it. The best summary of the situation, by James Hansen, is worth quoting at length:

The only realistic way to sharply curtail CO<sub>2</sub> emissions is to phase out coal use except where CO<sub>2</sub> is captured and sequestered ... if the world continues on a business-as-usual path for even another decade without initiating phase-out of unconstrained coal use, prospects for avoiding a dangerously large, extended overshoot of the 350ppm [CO<sub>2</sub>] level will be dim ... Present policies, with continued construction of coal-fired power plants without CO<sub>2</sub> capture, suggest that decision-makers do not appreciate the gravity of the situation. We must begin to move now toward the era beyond fossil fuels. The most difficult task, phase-out over the next 20–25 years of coal use that does not capture CO<sub>2</sub>, is Herculean, yet feasible when compared with the efforts that went into World War II.

In a recent letter to Barack Obama, he went on to say:

This is the sine qua non for solving the climate problem ... Coal is responsible for as much atmospheric carbon dioxide as the other fossil fuels combined, and its reserves make coal even more important for the long run. Oil, the second greatest contributor to atmospheric carbon dioxide, is already substantially depleted, and it is impractical to capture carbon dioxide emitted by vehicles. But if coal emissions are phased out promptly, a range of actions including improved agricultural and forestry practices could bring the level of atmospheric carbon dioxide back down, out of the dangerous range ... continued construction of coal-fired power plants will raise atmospheric carbon dioxide to a level at least approaching 500ppm (parts per million) ... a conservative estimate for the number of species that would be exterminated (committed to extinction) is one million. The proportionate contribution of a single power plant operating 50 years ... would be about 400 species! Coal plants are factories of death. It is no wonder that young people (and some not so young) are beginning to block new construction.

Coal could hardly loom larger in Australia's emissions equation. In total, the coal we burn at home and export generates close to a billion tonnes of carbon dioxide annually – more than 1 in every 30 tonnes generated globally from fossil-fuel burning. For a country with 1 in every 313 of the world's people, this is polluting well above our weight. Ships laden with a single load of Australian coal can each carry the annual emissions equivalent of 25,000 cars. Our exports alone generate almost 700 million tonnes of CO<sub>2</sub> annually, which is almost 15 per cent more than Australia's entire annual greenhouse-gas emissions. Yet currently our coal exports are projected to nearly double from 231 million tonnes per annum in 2004–05 to 438 million in 2029–30. As a share of the global total, our *domestic* emissions are falling slowly, but our overall contribution to climate change is increasing. Even if we cut emissions in Australia to zero tomorrow, the projected

increase in coal exports erases the environmental saving – by the mid-2030s our carbon footprint would still be roughly what it is now.

Thus, no credible Australian response can ignore coal exports and there are only two ways to change the equation: either CCS saves the coal industry, or we phase out our role in coal mining and coal burning. The former is simply impossible, the latter merely unthinkable. This is obscured at present because the coal industry has defined clean coal, and the definition of success, on its own terms. Between the coal companies and governments, hardly a month passes without the industry or its proxies announcing another “clean-coal milestone.” For each new phase in the few pilot plants demonstrating CCS, for each new round of funding, for each cheque written by a different level of government, ribbons need cutting and the cameras need another grip ‘n’ grin moment. It is all proof that Australia has “skin in the game,” as the prime minister says we must. Based on my rough calculations, a new pro-CCS media release is issued for about every 100 tonnes of CO<sub>2</sub> actually captured and stored. The spectacular growth industry is not clean coal, but clean-coal PR.

To reinforce the impression that progress is being made with CCS, the coal industry runs a massive PR campaign to keep the image of “clean coal” as clean as it can. In the USA, coal-industry-funded front groups spent tens of millions in the run-up to the recent presidential election. The campaign used the same coloured backdrop in almost all its advertising – “pie-in-the-sky blue,” one might call it. I’m told that the industry’s market research found that consumers subliminally associate the colour with clean technology. The advertising actually features blocks of coal with electric cords plugged straight in – as if the burning-and-emitting part can be magically bypassed! One ad features the slogan “I believe” seventeen times in sixty seconds, as if enough faith and repetition will miraculously make “clean coal” happen.

The Australian coal industry has recently launched a similar re-branding campaign. The appeal to nationalism is similar, faith in American ingenuity is replaced by Aussie know-how, and other changes have been made to make the message more locally relevant. Rather than appealing to our religious fervour by telling us to “believe,” the Australian coal industry deftly shares the load by urging people to do *their* bit: to “Flick the switch” and “Turn it down.” The industry is spending over two million dollars on a new website (the biggest of its kind in the world) and an ad campaign by the same people who came up with the Kevin07 campaign. The local advertising blitz and the new Australian Coal Association logo both feature the ubiquitous poll-driven sky blue. Inconveniently, however, Australian consumers are suspicious about the “clean-coal” brand. So, to combat punter wariness, a new market-research-driven term is now in play: “NewGenCoal” feigns concern about the planet’s future while treating a new generation of coal-fired power stations as a fait accompli. The Rudd government has done its bit for the re-branding campaign, too. The government now says that “there is no alternative” to a new generation of coal-fired power stations, it has changed the name of what was the National Clean

Coal Fund to the National Low Emissions Coal Initiative, and half a dozen or more government employees from CSIRO and Geoscience Australia feature on the coal industry's NewGenCoal website.

Most demonstration projects focus on one part of CCS: either post-combustion carbon capture, or CO<sub>2</sub> transport, or geosequestration. They do not combine all the elements, let alone prove commercial viability. Almost all are heavily subsidised by government, and even then some of the biggest projects have been shelved. Just a year after it was announced with great fanfare, the Rio Tinto/BP coal-to-hydrogen project, touted as "Australia's biggest contribution to developing clean-coal technology," was abandoned. The Shell/Anglo Monash Energy coal-to-liquids project, which has hypnotised politicians since 2006, was also shelved recently. Collectively, if all goes well, the remaining carbon capture and storage projects expected to be up and running in Australia over the next few years might save 100,000 tonnes of CO<sub>2</sub> annually. It sounds impressive, until you realise that this is the same as a week's emissions from just one large coal-fired power station, or the equivalent of taking all the cars off the road in, say ... Tamworth.

As evidence of the global momentum towards cleaning up coal, one carbon-lobby-funded research centre lists sixty-one operational or planned demonstration projects around the world. This too sounds impressive until you realise that forty-eight of these projects are in the USA, Australia and Canada. None whatsoever is listed from India, Indonesia, Russia or South America. Of the two projects listed from China, only one relates to coal and it concluded in 2004. However, there is another Chinese CCS project of note that is not on the centre's list and it is enthusiastically funded by the Australian government, in part so that prime ministers can visit it with a great fanfare when in Beijing. If all goes well, that particular "milestone" project will capture 3000 tonnes of CO<sub>2</sub> a year – the equivalent of taking all the cars off the road in Nimbin. There simply is no grand push for CCS in the countries where the fastest growth in coal-fired power is occurring.

International estimates suggest no commercial-scale deployment of CCS plants before 2020 in developed countries, and in developing countries not until at least 2025. The International Energy Agency reckons that it might take a carbon price of A\$100 a tonne before CCS becomes viable (much higher than for renewable options such as wind and solar-thermal power). Perhaps not surprisingly, the IPCC doesn't expect carbon capture to contribute much until well into the second half of this century – too late for the climate. Modelling by the Australian Treasury suggests that CCS won't be deployed here until 2026, and not until 2033 under the 5 per cent target scenario now adopted by the government. Even our coal-fired electricity generators say they doubt that CCS will be viable on anything like the scale required in time. The head of the National Generators Forum, John Boshier, told the ABC's *7.30 Report*:

I think we all felt a few years ago that clean coal was doable and was a great option for Australia. We've got a lot of coal in

Australia. We're now worried about how long it will take and how much it's going to cost on the scale that we're talking about. We shouldn't kid ourselves it's going to be available in the near term. We think that 2020 is the earliest it can really be commercialised.

In the meantime, based on current projections, well over 1000 conventional coal-fired power stations will be added in the developing world. That would add around 8 billion more tonnes of CO<sub>2</sub> annually from coal burning alone (more than a quarter of the current global total produced by fossil-fuel consumption). Under such circumstances, there is simply no way that global emissions can peak by 2015, or even 2030, let alone fall rapidly.

When "commercial-scale" power stations are finally built with CCS, they're likely to cost twice as much, use a third more coal in order to power the carbon-capture process, and produce electricity that is twice as expensive. In the meantime, proponents argue that new conventional coal-fired power stations should be permitted so long as they're "CCS ready." Such facilities would be "CCS ready" much as I am "winning-lottery-ticket ready" – that is, it's a nice thought but there is little chance of it actually happening. Installing new CCS technology in old stations is likely to be very expensive, which is why some generators have publicly admitted that they expect it to make more sense to build a new power station than to retrofit an existing one. Pointing to the "enormous energy and cost penalty" involved, a power-company executive from Stanwell Corporation told a recent Australian parliamentary inquiry that "unless there is an enormous breakthrough in science, the post-combustion capture technologies would probably send you down the route of thinking, 'I might build something brand-new instead.'"

In early 2008, the US government abandoned its investment in FutureGen, the world's largest "clean-coal" project. Today, the Integrated Gasification Combined Cycle technology that would have been used by FutureGen is dismissed as the "Rolls-Royce" of carbon capture and storage. Alternatives, like CS Energy's Oxyfuel process being demonstrated at Callide in Queensland, are promoted as offering results much sooner. Yet even if we go with the Holden Barina rather than wait for the Rolls-Royce, there is no prospect of enough being done in time. By 2011–13, CS Energy plans to sequester up to 27,000 tonnes of CO<sub>2</sub> annually at Callide. The emissions saved are about 1/150th of the annual emissions coming from the company's new Kogan Creek coal-fired power station. If all goes well by 2011, Australia would then have to upscale what is proposed at Callide 7000 times just to deal with its coal-fired electricity emissions. To deal with current coal emissions globally, the world would have to buy the Holden Barina of carbon capture more than 400,000 times over, and perhaps a million times over to deal with the coal-fired emissions projected for 2030.

With coal-fired power use projected to double over the next few decades, there is simply no prospect of CCS keeping up. That is why senior

officials at the International Energy Agency say half of China's coal-fired power plants, at most, will be fitted with CCS in our lifetimes. It's as clear an admission as you're likely to see that CCS cannot clean up coal in time. Even this best-case scenario is pie in the sky. Not only would almost every new coal-fired power station need to be built with CCS, but thousands of existing power stations would need to be retrofitted at enormous expense. A web of pipelines linking power stations and storage sites would have to criss-cross some of the most densely populated parts of the planet. If trucks were used instead of pipelines to transport CO<sub>2</sub> to storage sites (as is happening in various projects), close to 2 million trucks would be added to the world's roads by 2030 (enough to stretch right round the globe end-to-end). The infrastructure required for CCS would be comparable to that of the global petroleum industry, only it would need to be built in a fraction of the time – and all to dispose of a waste that can be avoided in the first place with cheaper technology, much of which is already available. It would cost a fortune and arrive too late: the most expensive exercise in futility the world would ever have seen.

So when we speak today of whether CCS will work or not, how we define “work” is all important. In Australia and elsewhere, this has been reduced to the question of whether a particular technology might one day stack up commercially somewhere. The prime minister murmurs that the International Energy Agency reckons CCS will be economically feasible with a \$20–40 carbon price and rests his case. In reality, nothing is commercially feasible everywhere – it depends on the circumstances. I'll be very surprised if CCS is not viable in some Australian locations in the next twenty years. However, we should not confuse this with CCS “working.” When we ask whether CCS will “work,” what really matters is timing and scale. To work well enough to save the 20 per cent of Australian coal used domestically, CCS has to be retrofitted to most of our existing coal-fired power stations and used in any new ones.

Even if all emissions from coal were dealt with in Australia, CCS would not have begun to work well enough to save the four-fifths of production destined for export markets. It would need to be retrofitted at hundreds of locations around the world where Australian coal is burned or would be in future – in power stations and steel mills over which Australian governments (and coal exporters) have no jurisdiction whatsoever. If emissions are to peak globally by 2015 to avoid the worst impacts of climate change, this needs to happen very soon. To complete a global phase-down of coal emissions over the next twenty to twenty-five years, which scientists like James Hansen say is essential, the process has to start even sooner in countries such as Australia.

Yet for all Kevin Rudd's talk of having “skin in the game” and the coal industry's hype about making a “fair and reasonable” contribution to CCS, very little money is being spent in relative terms. The \$0.20 per tonne levied under the industry's Coal 21 Program is on average less than a thousandth of what each tonne of coal is expected to fetch in 2008–09.

The Australian government, meanwhile, has much more skin in expanding coal exports than in cleaning up their use. The National Low Emissions Coal Initiative is worth just \$90 million a year between now and 2012. More is being spent by the Rudd government in the Hunter Valley alone on expanding railway infrastructure to double coal export capacity. Up in Queensland, the federal environment minister, Peter Garrett, has approved the Wiggins Island Coal Terminal, which will double the coal exported from Gladstone. All up, the extra coal exports from these two regions will generate almost as much greenhouse pollution annually as Australia's national total. And for all the hype and taxpayer-funded help, the Australian coal industry's aim is to have the equivalent of just one large clean-coal power station installed by 2020. The same shortfall in investment is evident around the world (and made worse by the continuing growth in conventional coal use). The G8 has set a target of a mere twenty "industrial-scale" CCS projects by 2020. It is far from certain that this will be achieved, but, assuming a generous definition of "industrial scale" and assuming all goes well, it is less than one-hundredth of what's required to deal with emissions from existing coal-fired power stations. That leaves an inescapable conclusion.

#### **SUNSET ON COAL**

If four-fifths of our coal is exported and there's no prospect of it being used cleanly in time, what we have here is an industry whose products are still in demand but whose "social licence" must be withdrawn: a sunset industry by moral and environmental necessity. The choice facing Australia is what type of sunset that will be: a long one that fuels catastrophic climate change, or a short one that fights it. It is undoubtedly one of the biggest decisions this country will face.