UNDERGROUND COAL GASIFICATION AND COAL BED METHANE THE CHALLENGE OF RESOURCE AND TENEMENT COMPETITION

Neil Scott*

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INTRODUCTION

Underground coal gasification (**UCG**) is not a new technology – the first patents were granted before World War I and successful pilot plants were operating in the then-USSR almost 80 years ago. Nonetheless it is still regarded and treated around the world as a "frontier technology." Most resource industry participants – let alone governments – are still trying to work out just where and how UCG fits in.

In particular, UCG is emerging into a regulatory environment that has been developed and shaped to meet the needs of resources uses that have been much longer established than UCG – particularly, on the one hand, coal, and on the other oil and conventional gas.

The purpose of this paper is to consider the basis on which the UCG industry is regulated, and in particular its interaction with alternative, potentially competitive, resource uses. This is not intended to be a highly legalistic analysis. However, in order to advance, and meet its full potential, the UCG industry must find ways of getting the best possible outcomes from existing regulatory structures, and if necessary constructing the well-based arguments to ensure that the governments evaluate and treat UCG on its true merits.

In providing this review, the paper will refer particularly to legal developments in Queensland, Australia, if for no other reason than that the writer, as an Australian lawyer, has particular familiarity with the laws of Queensland. Much more compellingly, however, Queensland is a major player in the coal and gas game globally (it is the world's largest exporter of seaborne coal[1]). The Queensland state government has made serious efforts in recent years to develop legal regimes aimed at optimising the opportunities and outputs of all parts of the state's resources industry. Whether those efforts have been successful is, however, still open to question.

In most parts of the world where there is significant hydrocarbon exploitation, there are two major regulatory pillars:

1. Coal (and other minerals), is explored for, and produced, under Mining tenements, usually under a "Mining Act" (or equivalent); and

2. Oil and gas are explored for and produced under Petroleum tenements, usually under a "Petroleum Act" or similar.

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[1] 'Review of Overlapping Coal and Coal Seam Gas Tenure' (Consultation Paper, Queensland Department of Employment, Economic Development and Innovation, 2011) 1 <http://www.industry.qld.gov.au/documents/LNG_ConsultationPaper/Review-of-overlapping-coal-and-coal-seam-gas-tenure.pdf> ('*Consultation Paper'*).

* BA (Hons), LLB(Hons), Lawyer Australia and New Zealand, Director Neil Scott & Associates

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In some jurisdictions they are all dealt with under the one statute or law, but even then, almost invariably, that law will provide for the same two separate and distinct tenement regimes.

Obviously, two different parties cannot hold the same tenement type over the same ground – that is the whole point of a licensing system, to give the exclusivity for the term of the tenure. So, if Coal, Inc holds a mining exploration licence over a particular territory, no one else can explore for coal on that territory while the licence is on foot. If Coal, Inc is then granted a mining lease to produce coal from that territory, no one else can come in and extract coal from it.

Similarly, if Oil & Gas PLC holds a petroleum exploration licence over a territory, it has the exclusive right to explore for oil and gas within that territory, and if granted a petroleum lease, to produce oil and gas.

However, it is quite possible for two different parties to hold "overlapping" tenements over the same ground, albeit with a view to exploring for, and ultimately producing, different resources. So Coal, Inc's coal tenement could quite feasibly be overlapped by Oil & Gas PLC's petroleum tenement.

In fact, tenement overlaps, let alone conflicts, appear to have been rare between conventional coal on the one hand and oil and conventional gas on the other. Geology has seen to that.

The situation changed with the emergence and remarkable growth of the coal seam gas/coal bed methane (**CBM**) industry.

CBM, as a hydrocarbon, is regulated – and licensed – on the same basis as oil and conventional gas. However, by definition CBM is found where there is coal. Therefore, there is every likelihood that a petroleum licence/lease issued for the exploration for or production of CBM will overlap with a mining licence/lease issued for the exploration for or production of coal.

A number of jurisdictions, including Queensland, have amended their laws in an effort to address the potential conflicts that arise from these tenement overlaps, and this paper will give some attention to those efforts.

UCG presents a different set of issues. For the present, the prevalent view (as expressed both in the literature and anecdotally by industry participants) is that UCG is not directly competitive with conventional coal. UCG's opportunity is with coal that is not economically viable for conventional extraction, whether by reason of quality, depth, seam thickness and the like.

On the other hand, UCG is directly competitive with CBM. It is highly likely that coal seams amenable to UCG will also attract CBM activity.

The question, then, is whether the lessons learned from attempting to resolve conventional coal v CBM conflicts, and the methodologies adopted, will work in relation to UCG. If they do not work, is there an alternative model that will?

CONVENTIONAL COAL v. CBM

Queensland

The issues were well-expressed in a Consultation Paper released in early 2011 by the Queensland government, as part of a "Review of Overlapping Coal and Coal Seam Gas Tenure". The CSG-LNG (i.e. CBM) industry is looking for "greater long-term certainty of access to coal seam gas reserves, to give them the assurance they need to develop the industry"[2]. The coal industry proponents, however, are "concerned that coal resources could effectively be quarantined during the period of gas extraction and potentially even afterwards … [T]he possibility of lengthy delays to development or operational restrictions on future coal mining could risk investment in Queensland coal."[3]

Accordingly:

> "The goal of the review is to ensure the framework for petroleum and coal tenure adequately supports the establishment of a Queensland CSG–LNG industry and optimises the use of the state's CSG and coal resources.
>
> This goal will be reached by:
>
> 1. providing an appropriate level of tenure certainty to support investment in the CSG–LNG industry without encouraging land banking
>
> 2. ensuring that exploration for CSG resources and development of the CSG–LNG industry do not compromise the coal industry in a way that risks current and future investment
>
> 3. reducing as far as practicable the administrative burden and delays associated with dealing with overlapping tenure for coal and CSG
>
> 4. encouraging coal and CSG proponents to find commercial solutions to any conflicts arising over access to coal and CSG resources."[4]

That is a fine statement of aspiration; achieving it is a rather different matter.

In fact, Queensland's overlapping tenure "framework" is contained in amendments in 2004 to that state's *Mineral Resources Act*[5] and in the new *Petroleum and Gas (Production and Safety) Act*[6] introduced that year. Both Acts contemplate the possibility of tenement overlaps, and provide for a regime of consultation and negotiation, with a view to reaching "coordination agreements".

If an application is made for an exploration licence for either coal or gas over ground where there is an existing exploration licence for the other resource, the parties must exchange information and attempt to negotiate a coordination agreement. If they cannot reach such an

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[2] Ibid iii.
[3] Ibid.
[4] Ibid vii.
[5] *Mineral Resources Act 1989* (Qld) ('*Mineral Resources Act*').
[6] *Petroleum and Gas (Production and Safety) Act* (Qld).

agreement, either party may refer the matter to the Land Court, which in turn provides a recommendation to the relevant Minister, who makes a "preference decision". However, there is a strong expectation that at the exploration stage the parties would be able to make their own arrangements, if for no other reason than to avoid the expense and delay of the formal processes.

Where two parties hold overlapping exploration tenements (presumably having reached a coordination agreement) and one of them then seeks a production lease, they must again consult with a view to reaching an agreed basis for proceeding. If they cannot reach agreement, it once again becomes a matter for a Ministerial "preference decision", having regard to a Land Court recommendation.

If the situation is forced to a Ministerial preference decision, that decision will be based on the "public interest", having regard to factors such as safety, resource optimisation and ecological sustainability.[7]

Finally, if an area the subject of a production lease application for one resource overlaps with an existing production tenement for the other resource, the applicant must once again seek negotiations with the existing tenement holder to establish a coordination agreement. That coordination agreement must in turn be approved by the Minister, having regard to public interest factors.

The existing tenement holder must make reasonable attempts to reach a coordination agreement with the applicant, but only to the extent that the arrangement would be commercially and technically feasible for the existing holder. If the parties cannot reach a coordination agreement, or if the Minister does not approve an agreement, the application will fail and the existing production leaseholder will prevail.

As yet the Queensland provisions are largely untested, at least in terms of the formal procedures of application to the Land Court and Ministerial preference decision. However, it is clear that there may be expected to be a significant "first mover advantage".

In the case of overlapping exploration tenements the party that is first in a position to apply for production tenure will in all likelihood be best placed to demonstrate the public interest factors in its favour *at that time*. It may be that at some future time, the other party, having completed a comprehensive exploration program and a bankable feasibility study, would be able to demonstrate the public interest in favour of its development project. However, the Minister's decision will be made at or relatively soon after the first production application is lodged – not when both parties have completed exploration.

Likewise, a holder of a production tenement for one resource is always in a position to prevail over a subsequent applicant for a production lease for the other resource.

Powder River Basin, Wyoming

The Federal Bureau of Land Management (**BLM)** in its administration of the Powder River Basin also has a policy "to encourage oil and gas and coal companies to resolve conflicts

[7] Dominic McGann, 'Coordination Agreements for Coal Seam Gas' [2005] *AMPLA Yearbook* 380.

between themselves, and when requested, the BLM will assist in facilitating agreements between the companies."

However, the BLM also appears to take a more proactive approach:

- it establishes a Conflict Administration Zone (**CAZ**) around each active coal mine or Lease-By-Application area where there is potential for conflict with CBM development;

- CBM operators will be encouraged to develop and extract the gas as rapidly as possible in advance of the coal mining operations, in order to "maximise recovery of federal natural gas prior to the removal of coal";

- The BLM will offer incentives such as royalty reductions in order "to expedite [CBM] production in a manner that will maximise the recovery of the resource before required abandonment …"[8]

China

In China, it appears that the conflict has not necessarily occurred between coal production and CBM as such, but between coal miners and petroleum companies over the right to exploit and extract CBM. Lin Yanmei, of the Vermont Law School provides a fascinating case study on disputes over CBM rights in Shanxi province between provincial government-owned coal mining companies and central government owned petroleum producers.[9]

Legally, under the Mineral Resources Law, CBM is subject to the licensing and control of the central government's Ministry of Land Resources, which has issued CBM licences overwhelmingly to central government-owned entities.

However, the provincially licensed coal companies have taken the view that the CBM associated with their mining operations is also theirs to exploit. This has resulted in substantial extraction of CBM by the coal mining companies, mainly for local use.

Various dispute mechanisms have been established, but these assume "mutual communication for a win-win situation". However, in Ms Lin's words, "this remains a fine wish … and the conflict became increasingly intense"[10].

If negotiations fail, the Ministry of Land Resources will "support coal enterprises comprehensively explore and mine CBM resources", but "the Ministry cannot deprive the owners of the CBM exploration right [i.e. the CBM licensees], who obtained the right by legal means."[11]

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[8] US Bureau of Land Management, 'Policy and Guidance on Conflicts between Coalbed Natural Gas and Surface Coal Mine Development in the Powder River Basin' (11 May 2006) <http://www.blm.gov/wo/st/en/info/regulations/Instruction_Memos_and_Bulletins/national_instruction/2006/im_2006-153_.html>.

[9] Lin Yanmei, 'China's Evolving Energy Governance' (December 2011) <http://www.vermontlaw.edu/Documents/Yanmei%20Lin_China's%20Evolving%20Energy%20Governance.pdf>.

[10] Ibid 12.

[11] Ibid.

So, the provincial government entities have happily continued their exploitation of the resource, in substantial disregard of the formal law, ample demonstration of the Chines proverb invoked by Ms Lin: "the river dragon can't beat the local snake"[12]

All of us associated with the resources industry would do well to bear that axiom in mind.

UCG v CBM

UCG is generally regarded as a coal mining process, so wherever it occurs it is governed by the relevant Mining Act (or equivalent). Accordingly, it is as susceptible as conventional coal to tenement overlaps and conflicts with CBM. Whilst the various methodologies we have looked at for resolving conventional coal v CBM conflicts are still to prove themselves, they all assume that some resolution is possible – most logically on the basis of the order and timing of the respective developments.

That kind of resolution is not as obviously available to the conflict between UCG and CBM. UCG is directly in competition with CBM. Indeed, the prevalent view is that "These technologies are fundamentally incompatible activities."[13] That opinion is almost universally expressed in the literature, and by industry participants in private conversation.

Peter Bond, from Linc Energy, is on record as saying that "Assertions of incompatibility between CSG UCG are not accurate. As is the case between CSG and underground coal mining, the question is not one of incompatibility, but one of best use of resource."[14] However, with respect to Mr Bond, the two cases are not the same. The underlying assumption in the case of coal v. CBM overlaps is that both resources can be developed and exploited, it is simply a matter of timing. In the case of UCG v. CBM that is not the case – whichever goes first is likely, in the process of exploiting its own resource, to render exploitation of the other resource practically impossible.

If the CBM is extracted first, even though the non-methane gases may still be available, the coal seam will be de-watered, and with it the positive hydrostatic pressure essential to a successful UCG operation is lost. According to industry experts, it can take 30-40 years for a seam to be naturally repressurised.[15]

On the other hand, if the UCG process were to take place prior to the extraction of CBM, the methane will be entirely removed – nothing left for the CBM operator.

Therefore, deciding "the best use of the resource" in a particular situation necessarily means choosing either UCG or CBM, and discarding the other.

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[12] Ibid 10.
[13] Reported in *The Australian*, 7 August 2008.
[14] Linc Energy, 'Response to inaccuracies in *The Australian* newspaper article of 7 August 2008' (Media Release, 7 August 2008) 1 <http://www.asx.com.au/asxpdf/20080807/pdf/31blg8bv80jxsq.pdf>.
[15] Interview with senior industry figure (Telephone Interview, 23 March 2012).

Queensland Position

Queensland is the only jurisdiction of which the writer is aware that explicitly acknowledges UCG in its resources legislation. Since 2008 the definition of "mineral" in the Mineral Resources Act includes "Mineral (f)", i.e.:

> "a product that may be extracted or produced by an underground gasification process for coal or oil shale (mineral (f)) and another product that may result from the carrying out of the process (also mineral (f));
> *Example of underground gasification processes–*
> *combustion, consumption, heating, leaching and reaction*
> *Example of another product–*
> *gas desorbed as a result of an underground gasification process.*"[16]

Therefore, UCG is clearly regulated by the Mineral Resources Act and the formal legal procedures discussed above in relation to the resolution of conventional coal v. CBM overlaps are equally applicable to UCG. In light of the fundamental incompatibility between UCG and CBM, the "first mover advantage" becomes particularly significant.

As this audience will be aware, in 2009 the Queensland government announced that three UCG "pilot projects" would be "allowed to continue or proceed" pursuant to mineral development licences granted under the Mineral Resources Act. The intention was "to provide the … pilot projects with the opportunity to demonstrate the technical, environmental and commercial viability of the technology".[17]

These pilot projects were granted exclusivity over underground resource rights, so that even if there was an overlapping petroleum tenure, the UCG pilot project would take precedence.

At the same time state Government established an Industry Consultative Committee made up of representatives of the UCG and CBM industries, under an independent chairman, "responsible for considering and presenting options to the Government for resolution of resource and technology conflicts". The Policy Paper acknowledged that a regime for granting of future tenures for CBM and UCG would be "based around the principle that the two industries may not be compatible and that no future overlaps will be contemplated"[18].

Perhaps ominously for the UCG industry:

> "In relation to **overlapping tenure between CSG tenements and MRA tenements held by parties which intend to later pursue UCG activities** at the date of this Government policy, and if it is in the public interest, apart from the UCG pilot projects outlined above:
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> 1. the Minister for Natural Resources, Mines and Energy if asked to determine a coordination or preference decision between the developer of a CSG resource and the developer of a UCG resource, the decision will be made in favour of

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[16] *Mineral Resources Act* s 6.
[17] Queensland Department of Employment, Economic Development and Innovation, *Underground Coal Gasification Policy* (18 February 2009) 3 <http://mines.industry.qld.gov.au/assets/mines/ucg_policy_february_2009.pdf>.
[18] Ibid 4.

> the CSG tenure holder under the P&G Act, so as to allow the CSG tenure to progress to production stage …"[19]

It appears that the consultative process has not proceeded completely smoothly. As will also be well-known, one of the pilot projects, operated by Cougar Energy, was suspended by the government for supposedly allowing benzene to contaminate groundwater. Cougar is now embarked on major litigation against the state government, and has apparently withdrawn from the consultative process.

In addition, according to conversations with industry insiders, the CBM representatives have largely ignored the Committee, in favour of pressing ahead with expansion of the CSG industry throughout the three major Queensland coal basins. According to the 2011 Consultation Paper, the coal and CBM tenure overlaps stood at:

- Galilee Basin – 30%
- Bowen Basin – 50%
- Surat/Clarence-Moreton Basin – 25%[20]

Hand in hand there has been a massive investment in CBM infrastructure – pipelines, LNG plants, ports and associated facilities. There are currently eight LNG projects proposed for Queensland, five of them "well advanced" in planning and development, and three in construction, with the first LNG cargoes expected in 2014.

These projects are expected to generate $45billion in capital expenditure and produce 28.8 Mtpa of LNG.[21]

UCG proponents know that in suitable conditions – low-grade coal, deep coal, thin coal, stranded coal – the energy recovery from UCG can be as much as 20 times greater than CBM would provide from the same ground. Quite apart from the economic and community benefit, the licensing government – whether Queensland or elsewhere – will reap many times greater royalties from UCG than from CBM.

Nonetheless, confronted with a situation such as now prevails in Queensland, any Minister required to make a "preference decision" could scarcely ignore the enormous capital investment already made by the CBM industry. This takes us back to the "first mover advantage" mentioned earlier – in Queensland it clearly lies with the CBM industry, and at this stage it is difficult to see UCG being anything other than a marginal player for many decades to come.

In an ideal world it would be, as Peter Bond optimistically suggested, a question of "best use of resource". Unfortunately, in the flawed world in which we find ourselves, decisions will inevitably be made for much shorter term, politically opportunistic reasons.

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[19] Ibid.
[20] *Consultation Paper*, above n 1, 2.
[21] Queensland Government Industry Development, *CSG-LNG Projects in Queensland* (15 February 2012) <http://www.industry.qld.gov.au/lng/projects-queensland.html>.

What Are the Lessons?

So, what lessons can the UCG industry takes from the Queensland experience?

Where UCG and CBM go “head to head” on a level playing field, UCG is demonstrably superior by many multiples, both in terms of the energy value produced and the royalties generated for the regulating government (let alone having regard to environmental values).

However, the playing fields are rarely level, and CBM has first mover advantage in a number of areas, including east coast Australia (especially Queensland) and Wyoming in the USA. This advantage may be impossible for UCG to overcome if it comes down to a regulator deciding on a “public interest” basis.

A pragmatic answer is simply to look elsewhere, in coal provinces where CBM has yet to establish itself. There are plenty of those in the world. Current concerns with CBM’s impact on groundwater resources – however well- or ill-founded – may increase UCG’s opportunity.

It is always tempting to look for changes in the law changes as a remedy. For instance, would UCG, as a gas producer, benefit from being regulated under petroleum rather than mining laws? In this writer’s view, the answer is “no”. UCG is still fundamentally a part of the coal industry, and should be regulated as such.

However the law is "fiddled”, the issue here is one of the physical reality of UCG and CBM production respectively. Changing the law of the land does not change the laws of physics. The difficult questions will still be resolved by the exercise of human judgment. What the UCG industry must do is ensure that UCG’s merits are fairly understood and evaluated when those judgments are made.

This means that UCG must establish itself with governments and communities as a legitimate and valuable part of the total energy and environmental mix, so that when regulators are making resource allocation decisions, UCG is top of mind. The industry knows we have a good story to tell – we must go out and tell it.

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