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Preparing Bespoke Joint Operating Agreements for Shale Gas Projects

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The rapid recent growth in the scale of shale gas exploitation in the United States has been revolutionary, with the capacity to transform the country from a gas importer to a gas exporter. Other countries with shale gas deposits have recognised the potential and have been investigating their own opportunities for exploration and exploitation. **This is particularly so in the United Kingdom**, where recent government pronouncements have propelled shale gas to the forefront of the energy agenda (but not without some societal debate and disagreement about the wisdom of doing so). The risk and the cost of developing a shale gas project could compel project developers to band together to share the burden, and the prospect of investing into such projects could also be attractive to non-operational investors. Thus, a joint venture could be created between the various interested parties, and the terms of the **joint operating agreement (JOA)** will be critical.

The JOA must evolve from the offshore, conventional gas project world to which it typically relates in order to meet the requirements of an onshore shale gas project for two particular reasons:

(1) the essential operational characteristics of an onshore shale gas project will demand such an evolution if the JOA is intended to be properly suited to the needs of the project; and

(2) a participant in a joint venture that has experience of shale gas development from a particular jurisdiction will expect to work within the terms of a bespoke JOA. Recognising that some project participants might be new to the business of shale gas development means that some education as to how the shale gas JOA needs to be different could be essential.

Not every provision within the JOA will need to be modified to apply to an onshore gas sales project of course, but some evolution will be needed.

Understanding the operational premise

Before opening the pages of any project contract, such as a JOA, it is first necessary to understand the key operational characteristics of the underlying project. An onshore shale gas development project will differ from its conventional gas production project cousin in a number of ways.

A conventional offshore gas development project is commonly represented by the drilling of a single

exploration well (typically drilled vertically, albeit with the possibility of lateral (horizontal) deviations) that (if successful) is then appraised and is worked over to become a development lead, and then a production well. Once gas production is underway, inherent capillary pressure within the target gas reservoir will lead to the free flow of gas from the well bore, and gas flow rates from that well will ordinarily be characterised by a steady ramp-up and a smooth plateau production profile, before an eventual decline phase and the permanent cessation of gas production.

The wider gas production project within which the development well sits might be the subject of a phased programme of the tie-back of satellite development wells, in order to maximise gas production. Gas production could be shut-in for certain periods of time and later restored according to the commercial and operational needs of the parties.

In contrast, an onshore shale gas development project has a number of different operational aspects to note:

(1) *Gas liberation* – because of the nature of the fissile material within which the inherent shale gas deposits are located, those deposits ordinarily have insufficient matrix permeability to allow the free migration of the captive gas into an incoming well bore. The production of shale gas in commercial quantities requires significant manual manipulation in order to deliver the necessary permeability. That manipulation takes the form of the hydraulic fracturing of the fissile material within a target strata, and the injection of considerable volumes of water (under high pressure) and certain chemicals and proppants in order to liberate the captive gas. This is the famous 'hydro-fracking', of which much has popularly been said.

(2) *The drilling programme* – a key component of a shale gas development project will be the drilling of significant numbers of vertical wells within relatively condensed surface areas, and also the drilling of lengthy horizontal well bores in order to access the captive gas within a particular stratum. Conventional gas drilling is targeted to exploit reservoir high points near mature source rocks, whereas unconventional gas drilling needs to exploit much wider, basin-focused depocentres. Horizontal drilling maximises the ratio of borehole-to-shale surface area contact and allows greater quantities of shale gas to be exploited. Horizontal drilling might also entail deep level excursions into land areas owned by third parties. The selection of drilling sites and the management of the drilling programme will be essential to the project’s success. Gas will then be produced at relatively low pressures from the multiple well sites.

(3) *Environmental impacts* – an inevitable and very obvious consequence of the manner in which shale gas is liberated is the recovery of significant volumes of dirty waste water (sometimes called flowback) from the original water injection process, that is typically stored in artificially-made surface ponds to await restorative treatment. Not all of the injected water will be so recovered however. A proportion will remain in-ground, where it has at least the capacity to contaminate latent groundwater aquifers. Shale gas operations in the US have become controversial principally because of this perceived risk of contamination (although the probability is that poor well design and construction could have a greater role to play than any inherent problem with shale gas, which is a more controllable risk). Environmental issues are exacerbated where shale gas operations are proximate to population centres.

(4) *Gas production profiles* – in comparison with a conventional gas project development, a shale gas project typically offers much more uncertainty as to how it will perform over time. Recovery rates are lower and depletion rates are faster than is the case for unconventional gas deposits. Gas flow rates will be variable, as individual well bores deplete and new well bores are drilled, appraised and

brought on-stream, and will present a relatively up and down gas production profile across an entire programme, compared to the relatively steady production profile that typifies a conventional gas project. Neither can gas production be readily shut-in (for example, during times when gas market prices are depressed), because of the relatively greater difficulty of restoring gas production from multiple low pressure wells.

(5) *The overall project profile* – the most significant difference between a shale gas production project and a conventional gas production project is represented by a combination of several factors. In a shale gas project exploration activities could be ongoing (such that exploration costs increase), and gas production levels could drop off (such that project revenues diminish) throughout the lifetime of the project. At times expense will outweigh income. The accounting procedure that is appended to the JOA will need to account for simultaneous revenue inflows and outflows. The overall project development plan will be in continuous evolution within a cycle of exploration, appraisal, development, production and decommissioning. The emergence of new technologies could also intervene to redirect the manner in which the project is operated. In essence, the development profile of an onshore shale gas project is constantly changing.

The role of the concession

In contrast to onshore petroleum production operations in, for example, the US, where mineral wealth rights are generally owned and leased by a private landowner, in a jurisdiction such as the UK the mineral wealth rights are vested in the sovereign authority, the Crown. It is then typically necessary for that authority to grant some form of concession to a private-sector participant in order to allow exploitation of the concession rights.

Under the terms of a conventional petroleum project concession there will be relatively short initial exploration phase and then (if a commercial discovery is made) a relatively lengthy production period. For an unconventional petroleum project the concession might be modified to reflect the reality that there will frequently be an overlap between the activities of exploration and production, and the exploration activity will be something of an iterative activity over the lifetime of the project. What constitutes a ‘commercial discovery’ will also necessarily differ by definition between the conventional and the unconventional worlds, because of the quite different profile for incurring expenditure and realising income that an unconventional gas project development cycle presents.

Of course, the JOA is the servant of the concession and not vice versa. The prospective participants in the shale gas project might have a view as to how the terms of the concession should be shaped in order to reflect the operational characteristics of their project but they will rarely have the luxury of being able to design the concession to suit their purposes. Rather, the JOA will have to fit with the terms of the concession.

The concession will also define a concession area, to which it applies and in which the concession-holder will possess the rights to exploit petroleum. This concession area will typically be bounded by areal coordinates, but could also define a certain stratigraphic depth. The discovery of petroleum (whether shale gas or other forms of conventional or unconventional petroleum) at different stratigraphic depths within the same areal coordinates could lead to discussions regarding the feasibility of sharing of joint property and joint development opportunities (see below).

The definition of petroleum

Even the very definition of petroleum, for the purposes of the JOA and the concession, will require

some different thinking in the context of an unconventional gas project development.

In a conventional context the term petroleum will reference crude oil, natural gas or associated liquids but in an unconventional JOA a different world becomes apparent. Petroleum could be defined by reference to the nature of the hydrocarbon to which the concession relates (whether shale gas, coal bed methane or tight gas), although the concession might not be so specific in its ambit. The form of licence that is granted in the UK for onshore exploration and production, for example, applies the same definition of petroleum as is applied to offshore projects and does not seek to differentiate the nature of the particular commodity.

Alternatively, the JOA could define petroleum not by reference to the nature of the commodity to be produced but simply by reference simply to the very manner of its exploitation. Thus, in some unconventional JOAs petroleum is defined simply as petroleum that cannot be recovered from a wellbore by conventional methods of petroleum recovery (whatever they are), or that cannot be recovered without interventions and stimulations such as hydraulic fracturing.

It is likely therefore that the concession will relate generically to the exploitation of petroleum (according to its widest definition) within the defined concession area and not specifically to shale gas. This will be of particular relevance to issues connected with sharing joint property and joint development opportunities (see below).

The role of the JOA

The role of the JOA in a conventional petroleum project is well understood. At the outset it is vitally important not to lose sight of the essential purposes of the JOA here – to ensure the proper performance of the terms of the concession allowing for shale gas exploration and production that the joint venture parties have signed up to (assuming of course that there is a concession), to reflect the inherent operational mechanics of the search for shale gas and then the fullest possible levels of production from the shale gas deposit, to reflect the commercial terms of the joint venture between the project participants and to allow for the appointment of an operator in order to manage the project.

The defined scope of the JOA should be careful to address the essential elements associated with the promotion of an onshore shale gas project. These elements should be self-evident, although additional consideration should be given to the making available to third parties of project infrastructure in order to allow collaborative developments (see below).

The reality in contracting for unconventional petroleum developments is that all too often inadequate attention is paid to making the JOA truly appropriate to the necessary purpose, thus resulting in a JOA that simply does not reflect the essential elements of what is really necessary for the development of a shale gas deposit. This will lead to uncertainty, and could result in disputes between the parties to the JOA. Established, conventional project JOA positions will in some cases be quite redundant, and in other cases will require significant re-working. In the context of onshore shale gas developments in the United Kingdom, the likely JOA candidates are the 2012 AIPN model form JOA and the 2008 Oil & Gas UK model form JOA. Neither is readily fit for purpose for immediate application to an onshore shale gas project. The AIPN is currently working to prepare a bespoke form of JOA for unconventional petroleum project developments.

Overall, a JOA that is to be applied to the management of an onshore shale gas production project will require modification in a number of ways, that are discussed below.

The role of the operator

The experience and the ability of the person appointed to act as the operator under the JOA in managing an onshore shale gas development project will be critical. There are several issues to consider in connection with the appointment and the conduct of such an operator.

The operator must of course be skilled in managing vertical and horizontal drilling programmes, in undertaking hydraulic fracturing with minimal associated impact and in managing the project's overall environmental performance.

The quality of the drilling programme that the operator undertakes, together with the manner of the manipulation of the shale gas deposit, will be key to the production of shale gas and the mitigation of costs in order to sustain a commercially viable project that is sufficient to deliver the required returns to the participants.

Where a horizontal drilling programme requires deep level drilling through land owned by third parties the scope of the JOA should extend also to the operator's right (and obligation) to negotiate way leaves with third-party landowners, so as to avoid later claims for deep trespass. This will be a particular issue where shale gas exploration and production takes place within land areas of relatively dense occupancy.

The operator could also require greater latitude in the manner of the performance of its activities under the JOA than is the norm for conventional gas projects. This is discussed further below.

In further definition of the operator's customary obligation to act prudently, because of the essential differences that exist between developing conventional and unconventional projects, a reference in the JOA to a test for 'good and prudent gas field practice' (or similar) that draws from analogous projects in the same jurisdiction will have little real meaning where that jurisdiction is witnessing the undertaking of unconventional projects work for the first time. Thus, such a test should draw instead from analogues from other, unrelated jurisdictions (such as the US) where there is a much greater track record of developing unconventional projects.

The responsibility of the operator for losses and liabilities arising in connection with the conduct of the requisite joint operations is considered further below.

Finally, the issue of fiduciary duties owed by the operator to the non-operating parties in the JOA will require some careful consideration. This is typically deliberately left as an opaque area in the context of offshore, conventional JOAs. The operator of a particular concession could be the operator of a number of adjacent concessions and could have its own views as the best method of developing those concession areas as part of a much wider estate of interests. The operator's preference here could be at odds however with the views of the non-operating parties in respect of a particular concession who are not also the owners of that wider estate. This issue could also be related to the possibility of a wider joint development (see below).

Defining joint property

In a conventional JOA joint property will be represented as that property owned by all of the parties jointly. This would relate, for example, to the ownership of an offshore production platform. If a party transfers its interests under a concession and a JOA to a third party then a corresponding proportional interest of the joint property will transfer also to the third party.

In an onshore shale gas project the key property interest of the parties will be the ownership of, or at least a right of access to, the surface area land interests from which the drilling operations will be conducted and upon which the storage of the flowback will take place. These land interests could be held severally between each of the parties (according to their respective participating percentage interests in the project) but this fractional entitlement, with its multiple and distinct sets of interests, could be particularly difficult to effect in the context of land ownership.

It could be preferable therefore to vest the shale gas project's land interests in a joint venture company, within which each of the project participants would hold shares. Such a structure would simplify the arrangements for future transfers by the parties of their interests in the project and its joint property, and would also allow the addition of further land interests by acquisition. This is particularly the case where land interests are unregistered, which leads to greater complexity in transferring title interests.

Any way leaves that are required for deep drilling through third-party lands (see above) could also be applied for and owned by that joint venture company.

Where petroleum deposits (of whatever nature – see above) exist at different stratigraphic depths with the boundary of a single set of areal coordinates then it could be attractive for joint property that exists in relation to a JOA (such as gas processing and gas gathering and gas transportation facilities at the surface) to be used collaboratively for the exploitation of other petroleum deposits within other concession areas, in order to generate further revenue for the parties to the JOA.

Ongoing project development

Because of the variable economic and operational profiles of a shale gas project (see above) the operator could require a significant degree of flexibility in order to respond to changing circumstances as the project unfolds. Critically, the operator could require the right to adjust the agreed overall project development plan (and individual work programmes), and also the associated budgets, without the need for formal approval by the non-operating parties through the operating committee (if the JOA is one that applies the concept of an operating committee).

The technologies needed to explore for shale gas are relatively untried in the UK. Estimates of untested shale gas deposits in the UK are obviously high (see above) but a realistic assessment of economic and technical viability will result only from extensive programmes of targeted exploration drilling, hydraulic fracturing and stimulation and then production testing. The JOA will need therefore to reserve to the operator the corresponding latitude to explore, give up and explore again in search of a viable depocentre, and to repeat that cycle as often as may be necessary.

Thus, in a shale gas JOA the operator could have discretion to adjust the operational parameters of the project and to overspend against budget in respect of a particular period of time, beyond the levels of flexibility customarily encountered in conventional JOAs. This could make the non-operating parties nervous however, and so some limits might, nevertheless, be applied to such greater discretion.

Exclusive operations

The exclusive operations provisions within a JOA (if they do in fact exist, since not all JOAs allow for exclusive operations, and certainly not always in the manner suggested below) are represented by two possible routes: a party can elect not participate in an operation that has been approved as a

joint operation by the operating committee (non-consent), or a party can propose to undertake a particular operation for its own account (sole risk). In either form of exclusive operation the essential point to note is that a particular operation will be undertaken by less than all of the parties, and will be accounted for separately to the true joint operations that are carried out under the JOA.

It is arguable that, because of the variable economic and productive profile of a shale gas project (see above), a non-consent right should simply not exist within a shale gas JOA. A party should be fully committed to the agreed joint operation that the agreed overall project development plan represents and should not have the right to absent itself from any part of that operation, through the exercise of a non-consent right, just because that party has taken a dim view of the overall profile of the shale gas project at a particular point in time. A similar philosophy applies to condition the right of a party to withdraw from a project (see below).

It is also arguable that a sole risk right is inappropriate in the context of a shale gas project development, because of the need for very careful management of the resource base in order to maximise the recovery of gas from a deposit that typically presents a very narrow range of realisable opportunity. Vertical and horizontal drilling programmes must be exercised with great care, in order to allow for the most effective exploitation of the target strata. Allowing a party to undertake sole risk activities could operate to the detriment of the wider interests of the project.

Thus, the shale gas JOA could simply do away with the exclusive operations provision (in whatever form it takes). This, however, will usually be an area ripe for debate.

Withdrawal

In simple terms, the withdrawal right in a JOA allows a party (subject to certain conditions and limitations) to elect to surrender its interests in the JOA and the corresponding concession to the other parties to the joint venture, as a precursor to leaving the project. This is of a particular value to a party that has made a commercial decision not to continue to participate in a petroleum project but where, for whatever reason, a transfer for value of that party's interests in the project to a third party as a means of exit is not a possibility.

In a conventional gas production project the ability to simply walk away from any continued involvement that the withdrawal right represents could be applied, for example, as soon as after the minimum work obligations required by the terms of the concession have been performed and a sequence of first exploration, appraisal and well-testing fails to offer the requisite levels of encouragement for the prospects of a commercial development. This would represent an early exit by a party that lacks the appetite to (as it sees it, at least) throw good money after bad.

In a shale gas project however the withdrawal right might be further conditioned in its potential application. Because of the variable economic profile of an unconventional gas project (see above) and the need for the parties to stay the course, the shale gas JOA could declare that the right of a party to withdraw from the project is declared inapplicable for a defined period of time from the inception of the project, so as to allow the project to be fully developed between the parties according to a certain development timetable.

Alternatively, in order to ensure that the envisaged project is fully funded, the shale gas JOA could provide that the right of a party to withdraw requires the withdrawing party to commit to funding a certain share of future project development costs as a condition of that withdrawal.

Options for gas commercialisation

Under a conventional JOA the parties typically have a right and an obligation to take delivery of their respective participating interest shares of the resultant gas at the point of its production. In furtherance of this, the parties usually make their own individual arrangements to sell their particular interests in the produced gas, and also to transport that gas away from the point of production (through pipeline access, for example). Where the parties have several gas sales arrangements there could be gas balancing and attribution arrangements between the parties, so that they are able to lend and borrow gas between themselves so that they are better able to meet their respective delivery commitments.

In an unconventional project development these premises could need to be modified however.

The obligation of a project participant to take delivery of its share of overall gas production could be disapplied, as part of the wider disapplication of the commitment to several sales and transportation arrangements, in favour of a single joint sales and transportation arrangement that is entered into by all of the project participants (subject to any applicable competition law constraints on joint selling or joint commercialisation). This is attributable, at least in part, to the possibility that well sites for an onshore shale gas project could be located in a relatively remote area, far from gas consumption markets and gas transportation infrastructure.

The potentially variable profile for the production of gas from a shale gas deposit (see above) also means that the resultant gas sales and gas transportation arrangements will need to be sufficiently flexible to be able to accommodate that profile. The mechanics of contracting for the sale of unconventional gas is a further topic in its own right.

Environmental and HSE issues, and operator liabilities

There has generally been a greatly heightened awareness of health, safety and environment (HSE) issues in the oil and gas sector over the past several years. Whilst global drilling activities are a world away from onshore gas production in the north of England, the residual similarity between the two activities is the obsession of industry players with protecting corporate reputation from association with any sort of environmental disaster.

Any JOA will be careful to define the regime for the management of the HSE issues that are associated with the project to which the JOA relates. Typically in a JOA the operator will be solely responsible for the development and the implementation of a suitable HSE plan, and the non-operating parties could have little involvement (apart from a right to audit the operator’s performance against the HSE plan) in that activity.

The development of an onshore shale gas project has the scope for a more obvious and immediate impact on the local environment than is the case for the development of an offshore conventional gas project, where out of sight means out of mind for most people. Managing the environmental impact of a large-scale onshore shale gas development project, or at least the perception of the impact, can be challenging. There could be significant social objections to the introduction of such a project from what are popularly referred to as ‘affected local communities’.

Local concerns relating to the perceived adverse environmental impact associated with shale gas project developments are manifested initially in response to the threatened activity of exploring for shale gas, and yet paradoxically it is the production phase that has the greater environmental impact

and a poor exploration result could eliminate the prospects of production.

Even a relatively small environmental event could lead very visible and very public consequences, and to significant reputational damage for the project participants. Thus, for a shale gas project the JOA might say something different about how HSE matters are to be addressed.

In a shale gas project all of the parties could be involved in the initial development, and also in the ongoing implementation, of the HSE plan. Ultimately, this could even result in the right of a non-operating party to intervene in the conduct of the project in order to arrest a perceived environmental risk. This right of intervention is not something that the operator would typically be comfortable with.

A further, related, issue involves the operator's liability to the non-operating parties for loss or liability caused by the operator’s acts or omissions in the performance of the joint operations. In a conventional JOA the operator will be liable only for proven wilful misconduct or gross negligence (both as defined by the terms of the JOA, and usually set to a standard of proof that makes it very difficult for the operator ever to incur liability). Furthermore, even if the operator is found liable there is almost always an exclusion of the operator’s liability to the parties for consequential losses (also as defined by the JOA).

Applying these parameters to an onshore shale gas project, where there has been a significant environmental event that exposes all of the JOA parties to a claim made by a regulatory agency (or to claims made by affected third parties), could see the non-operating parties unable to pass that liability through to the party that was principally responsible for the offending event (that is, the operator). Thus, in a shale gas JOA the operator could be required to assume a much greater level of liability to the non-operating parties for any environmental loss or liability that has occurred as a consequence of the performance of the project.

In response to this, apart from reciting the customary operator antipathy towards any prospect of liability, the operator could argue that if it has afforded much greater rights of involvement to the non-operating parties in the development and implementation of the HSE plan (see above), then the operator should not then be made singularly responsible amongst all of the parties for any environmental loss or liability. In this respect, the non-operating parties cannot have the best of both worlds.

Where there is deep drilling through adjacent third-party lands (see above) the operator could expose the parties to the JOA to a claim for damages for deep trespass, if the operator has not negotiated an appropriate way leave with the third-party landowner. This, the non-operating parties might argue, is an area where the operator should assume a direct, or at least a greater level of, liability for its acts and omissions.

Unitisation and joint development opportunities

The supervening mineral law or the terms of the concession could reserve a right for the relevant government agency or for the grantor of the concession to implement a scheme of unitisation in respect of the concession area and other adjacent concession areas where there is a suggestion of contiguous petroleum deposits (assuming that the petroleum is of the same character and composition). Alternatively, the parties to the concession might come to a view themselves that some form of joint project development across a cross-concession area is a practical necessity in the interests of maximising gas recovery.

The process of unitisation (particularly with reference to the manner of estimation of gas volumes initially in place and the determination of tract participations) will necessarily be quite different for unconventional projects and the JOA should reflect that.

The relative paucity of gas recovery from a single concession area could be the inspiration for a wider collaborative joint venture, without recourse to a programme of unitisation. The JOA could also therefore recognise the possibility that there could be non-unitised joint development areas, as a means of maximising the overall recovery of shale gas from the overall resource area. The possibilities of a joint development might also be trailed within some form of area of mutual interest agreement (AMIA).

A joint development programme, with shared use of joint property (see above), could be of particular relevance where petroleum deposits (of whatever nature – see above) exist at different stratigraphic depths with the boundary of a single set of areal coordinates. This is not an absolute proposition however, since the drilling of a conventional gas well and also a well to be used for the liberation of shale gas within the footprint of single set of areal coordinates would require separate wellbores, given the very different natures of the ensuing methods of gas production.

Decommissioning

The principle of decommissioning, reflecting that at the end of the productive life of a petroleum deposit the production wells should be permanently plugged and abandoned and that any necessary production and transportation infrastructure should be safely and effectively removed, is the same between conventional and unconventional projects, but in an onshore shale gas project there are a number of operational differences to note.

Because of the production profile of a shale gas project (see above) it could be required that individual wells be plugged and abandoned during the lifetime of the project and whilst gas production is ongoing from other wells. Thus, there is not a distinct decommissioning ‘phase’ such as occurs at the end of the lifetime of the gas deposit.

The costs of decommissioning will also therefore need to be funded during the lifetime of the project, which has an immediate cash flow impact but which also reduces the size of the decommissioning costs at the end of the project’s life. This in turn should moderate the need to provide security for unfunded decommissioning costs. Onshore decommissioning works are also obviously much easier to inspect than offshore works, which removes a certain measure of costs contingency and reduces the required levels of the associated security.

Conclusion

One of the keys to making a success of a shale gas play will be the negotiation of project documentation that is truly fit for purpose, and key amongst that documentation will be the JOA where the shale gas project is developed as a co-venture. The JOA will need to protect the co-venturers and create a stable yet flexible platform to allow the project the greatest chance of operational success.

Anyone involved in the upstream petroleum business has at least some idea of what should go into a JOA, but this is experience grounded typically in the development of conventional petroleum projects. In the race to develop shale gas deposits, and to ensure that such deposits are developed with the greatest of economic and operational efficiencies and the minimum of risks, the temptation to cut

corners with the JOA through reliance on a barely-modified conventional gas project contract form must be resisted.

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