

## THE VARIOUS STRUCTURES FOR GRANTING PETROLEUM LICENCES AROUND THE WORLD\*

Darryl Egbert and Brian Livingston

### SUMMARY

This paper summarizes the various structures used throughout the world to grant petroleum licences to industry players wishing to develop an oil and gas resource. It describes the various structures that are used, such as concessions, production-sharing agreements and joint ventures, among others. The paper goes on to describe the various economic obligations that governments impose on industry in return for granting rights under their petroleum licensing systems. Finally, it describes the various processes used by governments to grant these rights, such as public auctions of generic rights, public requests for proposal and negotiation, restricted invitations and negotiations.

As a general theme, the paper concludes that no one petroleum licensing system or process for granting rights can be used in all cases. Rather, it suggests that these concepts should be tailored to the type of oil and gas resource to be developed.

The paper's Schedule I also describes the petroleum licensing systems and award processes used by several countries.

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## LES DIVERSES STRUCTURES D'OCTROI DE PERMIS D'EXPLOITATION PÉTROLIÈRE DANS LE MONDE\*

Darryl Egbert et Brian Livingston

### RÉSUMÉ

Cet article résume les différentes structures employées dans le monde pour octroyer les permis d'exploitation pétrolières aux acteurs de l'industrie qui souhaitent développer des ressources pétrolières et gazières. On y décrit les diverses structures utilisées, telles que les concessions, les contrats de partage de production et la coentreprise, entre autres. On y décrit ensuite les obligations économiques que les gouvernements imposent à l'industrie en échange de l'octroi de droits dans le cadre de leur système de permis d'exploitation. Enfin, on y présente les différents processus utilisés par les gouvernements pour octroyer ces droits, tels que les enchères publiques, les demandes publiques de propositions et les appels d'offres restreints.

Dans les grandes lignes, le document conclut qu'aucun système d'octroi de permis pétroliers ou de droits ne s'applique à toutes les situations. Il suggère plutôt que ces concepts soient adaptés au type de ressource pétrolière et gazière.

L'annexe I du document décrit, pour de nombreux pays, les systèmes d'octroi de permis pétroliers et les divers processus d'attribution.

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## **I. INTRODUCTION**

The exploration, development and production of oil and gas are worldwide activities. The usual situation is that a country is the landowner that owns the oil and gas rights and the resource base. Governments typically do not have the capital, the expertise or the labour to conduct the activities necessary to find, develop and produce the resource. On the other hand, private companies in the industry have the expertise, the capital and the labour to carry out these activities, but they need access to the resource base to determine if it is economic to explore for, develop and produce the resource. Given this division of capabilities, both parties will be driven to enter into an arrangement that enables the development of the resource. Like most contractual arrangements, it will only work if both parties benefit. This paper examines the process for allocating these oil and gas rights using a variety of mechanisms and practices.

## **II. BACKGROUND**

Before examining any specific mechanisms or practices, it is useful to step back and see the larger picture of oil and gas development. A summary of the various stages is contained in Schedule II.

A senior executive in the oil and gas business once summarized oil and gas development with the simple phrase “We’re all sharecroppers.” What he meant was that governments controlled the resource, and industry the expertise and capital needed to develop such resource. Companies want to make deals with governments in the same way that a landowner would have agreed with a sharecropper to jointly share in helping to grow crops on vacant land. All arrangements between the two parties feature a sharing of risk, return and control regarding the exploration for, development of and production of the resource. The petroleum licensing system can be viewed as one aspect of a series of negotiations between government and industry.

## **III. DIFFERING VIEWPOINTS OF GOVERNMENTS AND INDUSTRY**

As with most negotiations, each party has different viewpoints and different interests. A summary of the differing desires and concerns is shown below.

First, the desires and concerns of the government of the country holding the oil and gas rights.

### **GOVERNMENT DESIRES AND CONCERNS**

- An economic return for the development of publicly owned natural resources.
- Timely and effective evaluation to determine the presence and extent of any potential oil and gas resources. Timely and effective development and production of any commercial oil and gas resources found.
- Environmental and safety regulations to mitigate risks during all phases of a project’s life.

- Increased economic activity in the country and the creation of jobs.
- Access to outside technology.

Next, the desires and concerns of the resource company hoping to acquire these oil and gas rights.

### **INDUSTRY DESIRES AND CONCERNS**

- A reasonable opportunity to earn an equitable return on the effort, technology and equipment invested.
- Adequate time to evaluate the resource.
- Appropriate and equitable fiscal terms consistent with exploration risks and technical/commercial challenges. Assurances that the company will be able to develop and produce any commercial resource that it discovers.
- The ability to carry out exploration, development and production activities in a timely manner.
- A stable and sustainable business environment with respect to:
  - The rule of law;
  - Fiscal and other contract terms;
  - The legal framework.
- The development of local infrastructure to permit exploration, development and production.
- The ability to book oil and gas reserves on the company's financial filings for investors (e.g., proved reserves filed in Form 10-K with the U.S. Securities and Exchange Commission).

## **IV. STAGES OF RESOURCE DEVELOPMENT**

Regardless of the type of petroleum licensing system, resource companies will go through a multi-step process as they decide whether to participate in any particular resource play. These stages are:

1. High-level geological evaluation:
  - Are there prospects for oil and gas in the region?
2. Petroleum licensing system and terms:
  - Does the system give sufficient rights to permit the investing company to move through all phases of the project (exploration, development and production).
  - Does the arrangement make economic sense given the overall risk profile of the opportunity?
  - Is the bidding process acceptable?

3. Exploration:

- Is the time period granted for exploration sufficient to conduct an adequate exploration program to determine the presence, extent and quality of the resource?
- Does the system acknowledge the operating conditions present in terms of geographic limitations (e.g., terrain) and competing uses of the land (e.g., other industrial activities, surface rights and environmental conservation requirements)?

4. Development:

- If there is a discovery of a resource, will the investing company have assurance that it will have exclusive rights to monetize the resource?
- Is the time period granted for development-assessment sufficient for the resource company to carry out all activities associated with the evaluation and execution of the development phase of the project?
- Does the time period for development acknowledge commercial and market risks that may delay development?

5. Production:

- If a production facility is constructed, will the operating terms be acceptable?
- Will the time period granted for production be sufficient to recover the production volumes needed to make the overall project economics attractive?
- Are there restrictions that limit the flexibility to adjust production to acknowledge technical, commercial and market risks that may affect the commercial value of production?

At each stage, resource companies will do an assessment to determine whether the potential resource development provides attractive economics that warrant proceeding to the next stage, or if the economics do not justify any further activity. Companies will want to know the commercial terms for all stages before they start at stage 1, on the basis that there is no point getting to later stages only to find out that the structure and terms may not be acceptable.

## **V. COMMON FEATURES OF AWARD SYSTEMS OF ANY PETROLEUM LICENSING SYSTEM**

The basic elements of any petroleum licensing system are:

1. The granting of some rights to the resource company to permit exploration for, and the development and production of any resources discovered.
2. The obligations of both the investing company and the host government in terms of work activities and any processes that are needed to carry out the activities through all phases of the project life, including such elements as permitting, approvals and environmental requirements.
3. The duration of the various phases of the petroleum licence.
4. The fiscal and other commercial terms under which the petroleum licence activities will be carried out.
5. A possible requirement that industry permit the host government to participate as a joint-venture partner in the resource play.

Petroleum licensing systems have two basic concepts:

1. The type of rights granted. The types of rights granted can be further subdivided into:
  - The structure of the rights granted.
  - The commercial terms under which the rights are granted.
2. The method of granting those rights.

This paper will examine those two concepts.

## **VI. TYPES AND STRUCTURE OF RIGHTS GRANTED**

### **A. STRUCTURE OF RIGHTS**

1. Description of Rights Granted

The rights granted under a petroleum licensing system vary in several important areas.

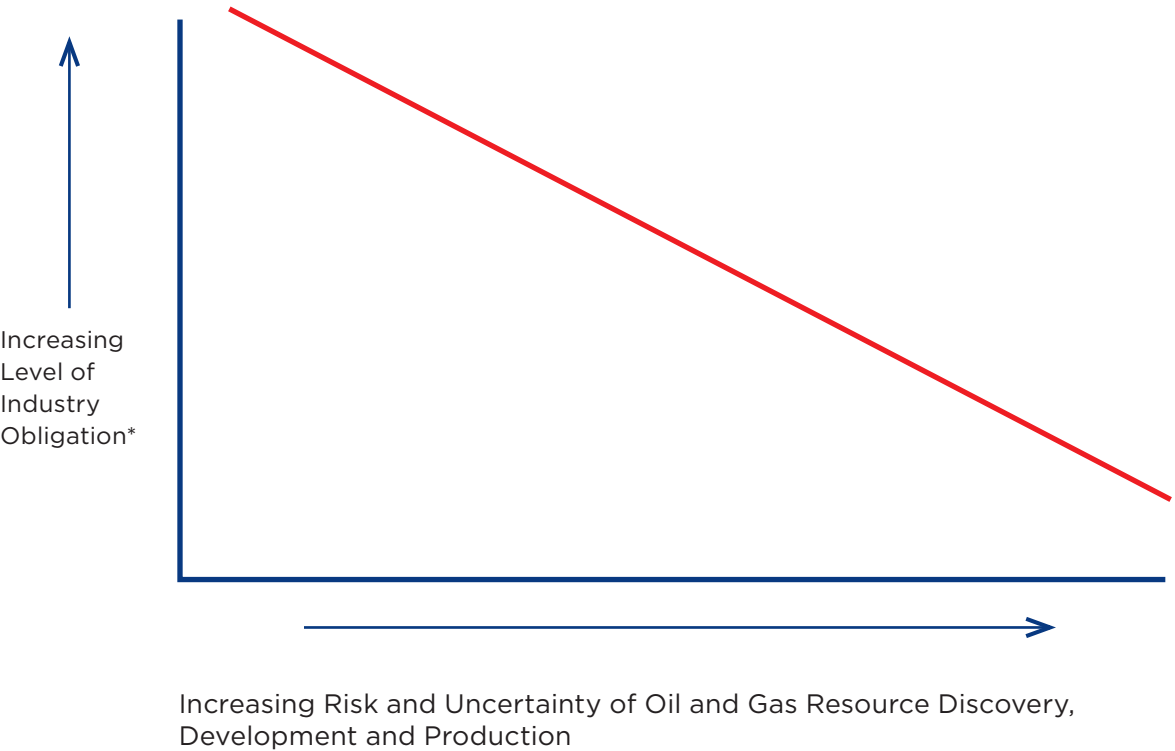
1. The geographical extent of rights granted, both horizontal and vertical. Most grants encompass a horizontal area on a map, varying from a few acres to many thousands of square kilometres. In addition, rights may be segmented by vertical division, much like floors in a condominium building. In such a case, the industry recipient only has rights to a certain strata of the potential underground resource.
2. Specific provisions regarding length of term, work requirements, bonus-payment requirements and other features.

The specific allocation of these rights and obligations form the essential terms of any petroleum licensing arrangement. The table below shows the range of these allocations, which can run from restricted to extensive.

	Restricted	Extensive
Extent of Rights	Small area	Large area
Restricted levels	All levels	
Term	Short	Long or unlimited
Bonus and Rent-Payment Obligations	Little or none	Extensive
Work Obligations	Little or none	Extensive

As will be seen from a list of various regimes around the world, the allocation of these rights and obligations appears to vary depending on the risk and uncertainty associated with the potential oil and gas resource.

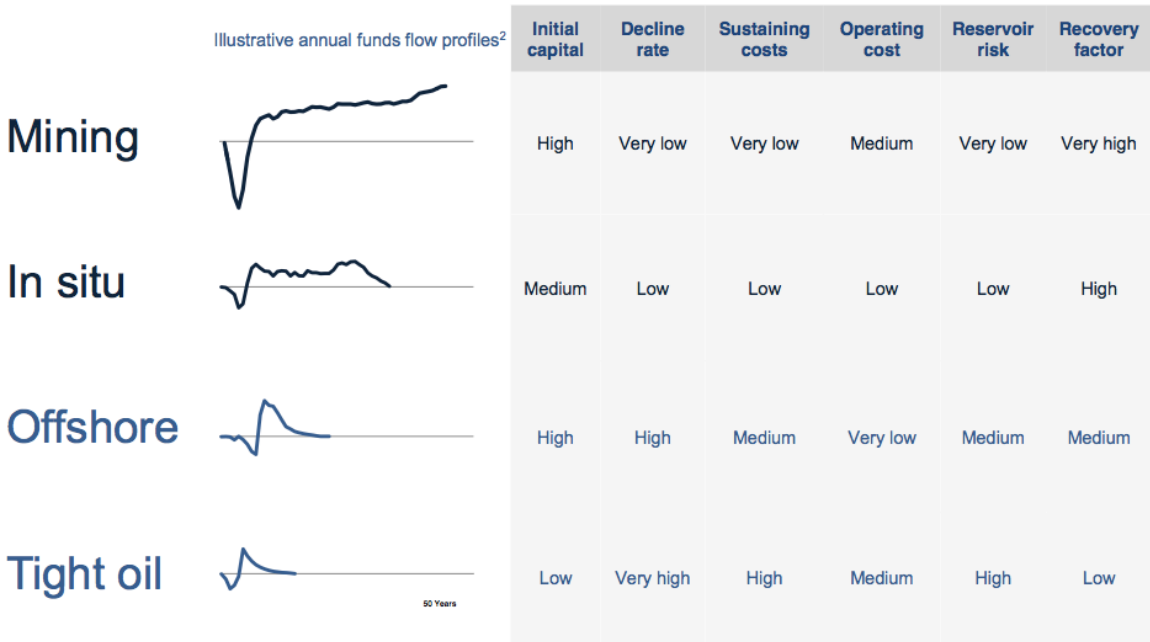
The simple chart below shows that as the risk and uncertainty of the oil and gas resource increases, the level of industry obligation will likely decrease.



\* “Industry obligation” refers to the company’s obligations during the term of the project to pay bonus payments or annual lease payments, carry out work obligations and make payments under the terms of the fiscal arrangements with the host government.

The following chart from the Canadian oil and gas company Suncor sets out the costs of several types of oil and gas deposits and, by implication, the level of risk associated with each type of deposit.

## Typical attributes<sup>1</sup> of North American oil plays



1, 2 See Slide Notes and Advisories.



An example of a low-risk resource is the in situ resource in northern Alberta, located more than 200 feet below the surface. Delineation wells are very cheap to drill and can delineate the resource in place to a high degree of certainty. As a result, the term of the lease granted is limited in time, and requires the company to provide upfront bonus payments and annual rental payments.

An example of a high-risk resource is exploration in the deep water offshore Canada’s East Coast. Exploiting any potential resource there is a very risky prospect. Exploratory drilling often has a very low chance of success, in that there is no industry history of resource discovery in the area. The costs of drilling a well can be in the order of hundreds of millions of U.S. dollars. Even if a discovery is made, it would require a very large discovery (referred to in the industry as an “elephant”) and the appropriate market conditions to justify the billions of dollars it would take to build the required production infrastructure, such as a production platform. As a result, the term of offshore petroleum licensing is longer (nine years) to permit the drilling of a well and evaluation of any discovery. There are no upfront bonus payments or annual lease payments. The only obligations on industry are work obligations, to spend a certain sum of money specified in the bid made by the winning bidder.



## **B. VARIOUS PETROLEUM LICENSING SYSTEMS**

The various structures of petroleum licensing for resource development are described below. The attached Schedule I gives examples of various countries using the various petroleum licensing systems.

### **1. Concessions**

The following text gives an excellent summary of an oil and gas concession.

Concessions are the oldest form of a petroleum contract, having first been developed during the oil boom in the United States in the 1800s. When they were introduced around the world, concessions were one-sided contracts favoring companies, according to Revenue Watch, when many of the resource-rich nations of today were dependencies, colonies, or protectorates of other states or empires.

*Concessions are based on the American system of land ownership, in which a land owner owns all resources in the ground under the land he owns and theoretically all resources in the air above it. Concessions grant an area of land, sub-soil resources included, to a company so that if a company discovers oil on a piece of land, it owns that oil. In concession contracts the contractor also has exclusive rights to explore and prospect for oil in that pre-defined area. While the benefit to companies comes directly in the form of ownership over any oil and gas found, governments granting concessions benefit in the form of taxes and royalties on oil and gas produced. Companies compete by offering bids, often coupled with signing bonuses, for the licence to these rights. This type of agreement is quite common throughout the world and is used in Kuwait, Sudan, Angola, and Ecuador, among other countries.*

#### **Advantages and Disadvantages**

*For governments, concession contracts have the advantage of being more straightforward than other kinds of agreements, and the degree of professional support and expertise required is often less complex than that needed to negotiate joint ventures or production sharing agreements (PSAs). Also, the host government keeps the fees paid by the contractor regardless of whether oil is found and commercial production takes place. All financial risks of development, including the costs of exploration, are absorbed by the contractor. The main disadvantage, for governments, of concession contracts is that companies bidding for the contract tend to be more cautious in their bids. If oil and gas reserves are not proven then there is no guarantee that a company's costs will be covered, so the host government may not maximize its potential return.*

Source: Open Oil, "Types of Oil Contracts," [http://wiki.openoil.net/Types\\_of\\_Oil\\_Contracts](http://wiki.openoil.net/Types_of_Oil_Contracts).

In a concession, as the name implies, the government concedes rights to a company to develop its resource. The most important terms are the time limit of the concession, the upfront bonus payments and annual rental payment, any work obligations and any other fiscal arrangements defined in the licence agreement (e.g. royalties, and petroleum taxes). Governments negotiating such terms will want to ensure that the time limit is such that industry is motivated to explore for the oil and gas resource and, if successful, develop the resource in a timely way.

In some cases, the initial licence issued will be an exploration licence, granting industry only the right to explore a specified licence area for a specified period of time. However, linked to these exploration licences will be exclusive rights for the investing company to obtain development and production licences in order to monetize any commercial discoveries that it has made. Furthermore, after the term of the exploration licence has expired, the investing companies may be required to forfeit any rights in the licence area, except for areas where a commercial discovery has been made.

Concessionary licences generally work within the framework of the existing tax laws for the country. The standard corporate income tax rate that applies to all industries also applies to the petroleum industry. Layered on top of this income tax are various forms of resource rents to compensate the resource owner for the resources that will be depleted during the production operations. The most common form of primary resource-rent instrument used in concessionary contracts is the royalty. For this reason, concessionary contracts are often referred to as “tax-royalty” contracts. The royalties can be applied on a gross basis (gross value of production) or on a net basis (value of production after costs are deducted) and can take the form of in-kind payments, for instance, barrels of oil. Generally, the investing companies will be able to book the resources they find and produce with the exception of royalty volumes, as the rights to those volumes are usually maintained by the resource owner. However, there are rare instances in which the resource owner does not maintain rights to production in-kind, and the investing companies can book 100 per cent of the resource (U.S. SEC guidelines dictate this). In addition to the royalties, other common forms of fiscal instruments used in concessions include signature bonuses, lease rentals and profit taxes.

## **2. Production Sharing Agreements (PSAs)**

The following text gives an excellent summary of production sharing agreements.

*Production sharing agreements (PSAs), sometimes called production sharing contracts (PSCs), does not vest a contractor with ownership over the oil in the ground; ownership of the resource lies with the state. In this situation the PSA is drafted so that a contractor can extract the government's oil on behalf of the government. The PSA was first used in Indonesia in 1966, when the government decided to maintain ownership of the oil in the ground, so that the international company had the right to explore for oil but gained the right to own it and sell it (or a portion of it) once it had been extracted. In Indonesia, according to Revenue Watch, the concession licensing method had been discredited as a legacy of imperialistic and colonial periods and the PSA system was developed in the context of a broader movement of “resource nationalism” among oil-producing*

*countries worldwide. Since that time PSAs have spread globally and are now a common form of doing business, especially in Central Asia and the Caucasus.*

*Oil companies are entitled to cost recovery for operating expenses and capital investment, and receive money from annual earnings—“cost oil”—“to this effect. Once the companies have used annual earnings to repay themselves, the rest—““profit oil”—“is shared according to the agreed percentage division with the host government.*

### **Advantages and Disadvantages**

*All financial and operational risk rests with the international oil companies in the PSA arrangement, and a host government has the added advantage that it shares any potential profits without having to make an investment, unless it agreed to do so.*

*A disadvantage of the PSA for host governments is that it puts a premium on highly professional negotiations, and the government must have access to technical, environmental, financial, commercial, and legal expertise. This is more feasible for some oil-rich countries than others.*

Source: Open Oil, “Types of Oil Contracts,” [http://wiki.openoil.net/Types\\_of\\_Oil\\_Contracts](http://wiki.openoil.net/Types_of_Oil_Contracts).

PSAs generally allow the government to exercise more control over the exploration, development and production of the resources and the terms of the arrangement are usually separated into distinct and sequential exploration, development and production periods. Similar to concessionary licences, the initial licence issued may be an exploration licence, with linkages to the investing company having exclusive rights to obtain development and production licences in the case of any commercial discoveries. The company is usually required to relinquish some portion of the initial licence area at various stages of the exploration period and eventually to relinquish any of the licence area that is not part of a commercial discovery at the end of the exploration period.

In order to ensure the government is receiving some revenue before all of the costs have been recovered, it is common for PSAs to cap the share of production that is available for cost recovery. The share of each party’s profit oil may be as simple as the allotment of a fixed percentage for each party in all years, but in many cases the contracts have been constructed to add an element of progressivity to the production-sharing terms. This progressivity is usually implemented in the form of an increasing share of the profit oil for the government when certain triggers have been achieved. Because the government retains ownership of the resource in the ground, the only oil volumes that the investing company will be able to book are the volumes it receives in the form of cost recovery plus the volumes that it receives as its share of the profit oil. In other words, all volumes the government keeps in the form of royalties or its share of the profit oil are volumes that the investing company will not be allowed to book. Although the sharing of production is the primary fiscal mechanism for value sharing in these types of contracts, other common forms of fiscal instruments used in PSAs include royalties, profit taxes and bonuses.

### 3. Risk Service Contracts

The primary driver behind the use of risk service contracts is extreme nationalism. This occurs in cases where resources are seen as belonging to the people of the country and they will not accept any perception that those resources have been given to a foreign investor or a private entity. To navigate this environment, the structure of a risk service contract is such that the investing company assumes the role of nothing more than a contractor providing services for the government. Similar to the case with production sharing contracts, investing companies are expected to provide the capital investment and execute all activities involved in the exploration, development and production of the resource. The investing company is then reimbursed for the costs it has incurred and is awarded a profit element in the form of a remuneration fee. The most common bases for the remuneration fees are a percentage of the capital investment and a dollar-amount per barrel of production. Note that neither of these links the investing company's compensation to the actual profitability of the opportunity. The reimbursement of costs and remuneration fees are paid in cash (not production volumes). This type of remuneration structure does not allow the investing company to report or book any reserves or production volumes. This lack of ability to report reserves and production and the inability of the investing company to participate in any upside in profitability, have resulted in most major oil companies eschewing these types of contracts.

There are only a few countries remaining that exclusively use risk service agreements: Kuwait, Iran, Iraq and Saudi Arabia. Mexico did so until its recently enacted energy reforms. Recognizing the importance of reserves reporting to major oil companies, Iraq started issuing technical service contracts in 2010 for its southern region, which allowed remuneration fees to be paid in the form of production volumes. This allowed investing companies to report reserves and production volumes, but the financial aspects of the compensation structure is otherwise no different than other versions of service agreements.

### 4. Joint Ventures

The following text gives an excellent summary of an oil and gas joint venture (JV).

*Another arrangement, sometimes considered to be a fourth type of contractual arrangement, is the joint venture (JV), which involves the state, through a national oil company, entering into a partnership with an oil company or a group of companies. The JV itself is in this case awarded the rights to explore, develop, produce and sell petroleum. Because there is no commonly-accepted form or structure for JVs, they are less commonly used as the basic agreement between an oil company and a host government. JVs require host governments and companies to do things jointly, so if the parties fail to work together the negotiations can be painstaking and disagreement common.*

#### **Advantages and Disadvantages**

*For the government, the only advantage of a JV is that it is not alone in decision-making on oil and gas matters and can count on the expertise and shared stake of a major international company. One of the main disadvantages of JVs is that they*

*require more extended negotiations and require much more legal advice because their format is so ambiguous. Additionally, costs must also be shared between the parties, meaning that the host government is a direct and responsible participant in the natural resource extraction, and responsibility also brings with it liability, including for environmental damage.*

Source: Open Oil, "Types of Oil Contracts," [http://wiki.openoil.net/Types\\_of\\_Oil\\_Contracts](http://wiki.openoil.net/Types_of_Oil_Contracts).

As mentioned above, a joint venture makes for a more complex situation than is the case with alternative types of oil contracts. It often occurs when the host government wants to keep some control over the resource development or encourage the transfer of expertise and technology from industry to the host government. Although the joint venture may be the structure under which the petroleum licence is issued, the fiscal terms that define the sharing of value will be a subset of the fiscal instruments defined in the three primary licence systems defined above.

## 5. Freehold

A freehold interest is a type of petroleum licence that was more common many years ago, but is rare today. It occurred when governments did not think of the value of retaining subsurface rights when they granted land to private owners. It reflected the property law concept referred to as *ad caelum et ad infernos* (Latin for from heaven to hell). This meant that the landowner also owned all the subsurface rights to any oil and gas resource in place.

Examples of these freehold interests include some privately owned land in the Permian Basin in Texas as well as some properties in Western Canada.

## 6. Comparison of Various Petroleum Licensing Systems

	Concession	Exploration Licence/ Joint Ventures/PSAs	Service Contracts
Extent of Rights	Unlimited	Some	None
Control of Government	None	Some	Most
Term	Limited	Limited	Limited
Bonus and Rent-Payment Obligations	Yes	Some	No
Work Obligations	None	Some	None
Protection of Commercial Discoveries	Yes	Yes	None
Ability to Book Reserves	Yes	Yes	No

## C. CRITERIA FOR BIDDING AND AWARDING PETROLEUM LICENCES

The criteria on which a contract is awarded have the potential to significantly impact the successful execution of activities as well as the ultimate economic value that will be realized from these activities. Therefore, it is important to consider how the award criteria will impact the investing company incentives for realizing the highest possible value for the resource being offered.

The award criteria can be divided into two high-level categories: Objective criteria and subjective criteria.

### Objective Criteria

Objective criteria share the characteristic of being mathematically quantifiable and transparent. In other words, once the bids for an exploration and production project are tabulated, there is no longer any judgment needed to determine who submitted the winning bid. It is possible to use a single criterion as the sole basis for awarding the contract or to incorporate more than one into a formula that will transparently calculate a single numerical result that defines the best bid (a point system). Although any fiscal instrument can be used as an objective award criterion, the most commonly used criteria in greenfield exploration opportunities are as follows:

1. Bonus payments;
2. Work programs;
3. Primary resource rent instrument (royalty, production/profit share, resource profits tax), or highest economic value to the government;
4. Cost-recovery limit;
5. Local content.

“Brownfield” opportunities, such as discovered but undeveloped resources or mature or enhanced oil recoveries might also include different or additional award criteria, such as targeted production rates and/or levels of capital investment. These will not be addressed in this paper.

### Bonus Payments

The most common form of bonus that is used as an award criterion is a signature bonus. A signature bonus is an upfront payment to the government in exchange for the rights to execute a contract agreement. The signature bonus is usually paid in full at the time the contract is signed, but there have been occasions when the payments have come in the form of instalments. Production bonuses are also commonly used as fiscal instruments, but are rarely included as a material element of the award criteria. Production bonuses are paid when certain production thresholds have been achieved (e.g., annual production rates or cumulative production levels).

When bonuses are used as the sole award criterion, they act as an incremental government take that is over and above the base fiscal terms to which the contract area is subjected. The level of bonus that a specific contract area will attract is usually

directly related to the perception of the quality of the opportunities within that contract area (e.g., geologic risk, resource size, expected costs, etc.) as well as the market outlook (costs and prices) of the bidding companies at the time the contract is executed. The maximum bonus that any company is willing to bid will likely be capped at a level that will still result in an acceptable economic outcome for the company based on its outlook for the opportunity and the underlying base fiscal terms in the contract. However, the actual bids may be less than this maximum level if an assessment of the competition leads the company to believe that a lower bid level might still be high enough to win. It is also common for governments to put minimum bid levels on contract areas to ensure that the government's view of minimum fair value is realized.

### **Considerations for a Signature Bonus as an Award Criterion**

One of the primary benefits of using a signature bonus is that it provides the government with an upfront payment for the resources that is independent of exploration success (the government gets value even if there is no resource found). However, this also means the signature bonus that is paid has taken into consideration this risk, so the government will likely receive less value in the success case than they would if they had used other fiscal instruments that are based on the actual value that is realized from monetizing the resource (e.g. royalties, production sharing, or petroleum taxes).

Another potential downside of a signature bonus is that the price environment will have a significant impact on the level of bonuses that the companies will offer. If the contracts are offered during a high-price environment, the bonus levels are likely to be much greater than they would be in a low-price environment. So the share of value that the government realizes from the signature bonuses will be determined by the perception of value at the time of the contract offering rather than the actual value that is realized from the monetization of the resource. This may be beneficial for the government if the contract areas are offered during a period when price expectations are higher than actually realized, but detrimental if the contracts are offered during a period when price expectations are lower than actually realized. There are several countries that have used the signature bonus as the sole criterion for awarding the contract, including offshore drilling licences in the U.S., Brazil and Angola.

### **Work Programs**

Work programs refer to commitments that are made by the investing companies to carry out a certain level of activities, usually in the first phase of the contract. For undiscovered resources, this would be the exploration phase. For discovered resources, this might be an evaluation phase looking at commercialization options for an undeveloped resource, or expansion opportunities for a resource that is producing below its potential. These can either be in the form of a financial commitment, or they may be commitments to carry out a specified level of activities such as a seismic program (kilometres) and/or drilling a certain number of exploration/appraisal wells. The use of a work program as part of the award criteria is based on the premise that a larger work program generally has a higher probability of finding/commercializing more resources. When the work program is activity-based (rather than expenditure-based), and both seismic and drilling



are included in the work program, it will be necessary for the arrangement to predefine the value to be assigned to each of these activities (e.g., a point system) in order to determine the highest bidder. If this is not done, transparency will be lost and the process will no longer be completely objective. Even if a work program is not used as part of the award criteria, the contract should include some minimum level of work program to ensure that whoever wins the contract actually carries out some material degree of exploration/evaluation activity.

### **Considerations for a Work Program as an Award Criterion**

The use of a work program as part of the bid/award criteria is based on the premise that a larger work program generally has a higher probability of finding/commercializing resources. However, it can also encourage companies to bid with a higher work program than is appropriate for the contract area, and in circumstances where the cost of carrying out the work program is high (e.g., deep water) this may result in an inefficient allocation of capital. For example, if seismic results available before the contract is offered indicate that there is only one potentially viable opportunity within the contract area, a bid committing to more than one exploration well might be counterproductive, as the second well would be a waste of money (the cost of these wells can be in the hundreds of millions of dollars). Even though the bidding company might recognize this in advance, it might still offer to build a second well if it felt that increased its chances of winning. The smaller the contract area, the more likely it is that this issue might arise.

This problem can also be amplified further when there is already a minimum work program specified—and the bid parameter is an incremental work program over and above the minimum—as this would leave less room for the bid portion of the work program up to a level that is appropriate. For that reason, using the work program as an award criterion may not be effective when the contract areas are small. These unnecessary exploration costs are usually recoverable or deductible, so both the government and the investor would share the burden of these wasted expenditures. To mitigate this potential issue, some governments have actually specified a maximum work program that will be accepted. The general practice is to use a work program in conjunction with one or more of the other award criteria.

### **Primary Resource Rent Instrument or Highest Economic Value to the Government**

Another common award criterion is to bid the terms associated with the primary fiscal instrument used to collect resource rents. The three most common fiscal instruments for collecting the primary resource rents are: royalties, production sharing and petroleum profit taxes.

Royalties can be defined by a share of the production measured before any costs downstream of the wellhead have been deducted (gross royalty) or can be calculated on the value after all or most of the upstream costs have been deducted (net royalty). Production share refers to the share of the profit oil (defined earlier in this paper under the description of a PSA) that government retains. Since the profit oil is what remains after the cost oil has been deducted, the production share applies to the profits of the petroleum operations after any royalties have been deducted (revenues less royalties



less costs). The petroleum profits tax is nothing more than an additional tax that applies specifically to the upstream petroleum industry. It is applied to the profits of the petroleum operations after royalties have been deducted (revenues less royalties less costs).

In the case of royalties, the contract would be awarded to the investing company that is willing to pay the highest royalty rates to the government. In the case of production/profit sharing, the contract would be awarded to the investing company that is willing to allow the government to retain the largest share of production. In the case of a petroleum profits tax, the contract would be awarded to the investing company that is willing to pay the highest petroleum profit tax rate to the government.

It is not uncommon for governments to have designed progressive fiscal systems with more than one rate for any of the three fiscal instruments described above. Different rates would apply depending on some parameter achieving a specific threshold value. The most common parameters that are currently being used for setting the rates are:

1. Cumulative production;
2. Annual production rate;
3. Cumulative project return;
4. R-factor (cumulative revenue/cumulative cost);
5. Price of oil (or gas);
6. Some combination of two of the parameters above.

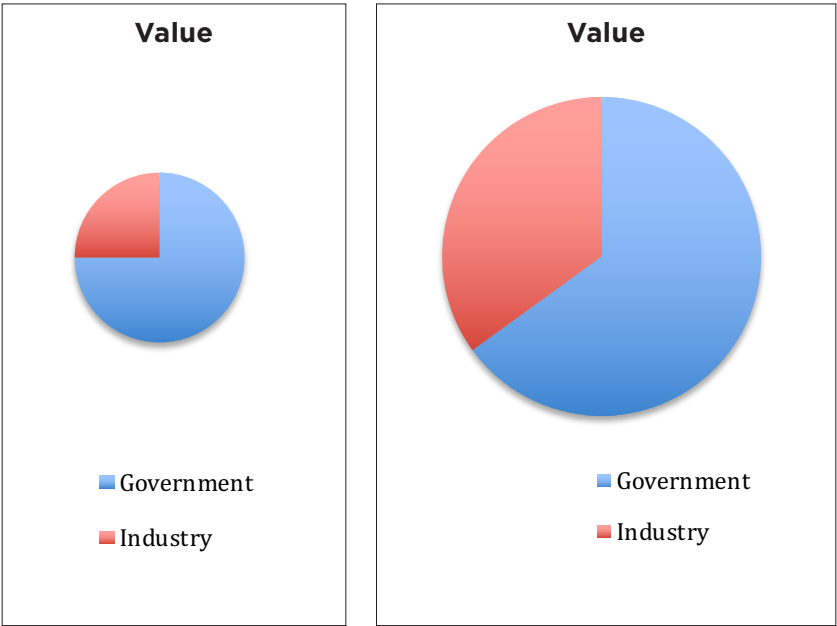
For those situations where there are multiple rates, the award criteria may be limited to bidding on only one rate, with the government defining all of the other rates as a function of that single bid rate. In these cases, the bid rate alone can clearly (and transparently) define the winning bidder. However, if the government chooses to allow for the bidding of the entire suite of rates and/or the values of the parameters that trigger the rates, or if more than one economic-value bid criterion is being used to determine the winning bid (e.g., bonus and primary resource rent), it may not be clear which bid is actually offering the highest value for the government. The most common solution is to build a model and use a standard set of assumptions (production, costs and prices) and then calculate which bid yields the highest value to the government under that set of assumptions. The standard methodology for calculating the highest value is discounted-cash-flow analysis, but the government would still need to choose the parameter that defines value for the purposes of awarding the bid (e.g., undiscounted government revenues, discounted government revenues, or government share as a percentage). One of the problems with this methodology is that there will always be considerable uncertainty regarding all of the input parameters, and the assumptions used will likely have an impact in determining who the winning bidder is. So, it would be in the best interests of the government to run this model for a range of different input assumptions to see how the bid values vary under each set of assumptions. If there are different winning bidders for each of the various assumption scenarios, the government will need to decide on a process to determine how the winner is chosen. It could choose to make a subjective decision at this point (losing transparency), or it can define (before the tender process is initiated) how the values associated with each of the different assumption sets can be combined to determine a single aggregate value that will define the winning bid.

Once the path of any subjectivity is introduced after the bids are submitted, objectivity and transparency will have been compromised. Because including two economic-value criteria (bonus and primary resource rent) or allowing for multiple rates introduces this additional complexity, it is recommended that the bidding be limited to one economic-value criterion (bonus or primary resource rent) and a single rate for the resource rent, with all other rates then defined as a function of that single rate.

**Considerations for Primary Resource Rent as an Award Criterion**

Using primary resource rent as the sole basis for awarding a contract will likely result in the government getting the highest share of value that is actually realized. However, the amount/value of the petroleum ultimately produced and sold (and therefore available to be shared) will likely be a function of which company is awarded the contract and how effectively and efficiently it executes the monetization of the resource (exploration, development and production activities). Also, if the winning bid has terms that are too onerous, the company may defer investments by prioritizing and allocating its capital to other opportunities that produce higher value. And finally, since the fiscal terms will be a major driver in the commerciality of marginal opportunities, the terms associated with the winning bid may be such that marginal production goes undeveloped. Therefore, awarding the contract to the bidder with the highest share of value to the government (regardless of instrument) is not a guarantee that the government will realize the highest absolute value from the resource in the contract area.

The following diagrams illustrate this concept.



The government share in the left chart is a higher percentage (75 per cent) than the government share in the right chart (65 per cent). However, the overall value to government (represented by the blue area in both pie charts) is lower in the left chart than in the right chart.

## **Cost-Recovery Limit**

Another award criterion that is sometimes used in production/profit-sharing agreements is to have the investing companies bid the cost-recovery limit. The cost-recovery limit is the percentage of revenue in any given period that is made available for the investing company to recover its investments/cost. A lower cost-recovery limit delays the recovery of investment for the investing company and therefore results in higher revenues to the government in the early years of the project life. In this sense, a cost-recovery limit has the same effect as a royalty and assures that some portion of the revenues are going to the government in all years of production.

## **Considerations for Cost-Recovery Limit as an Award Criterion**

Governments who are interested in early revenues may want to use this award criterion to allow the investing companies to specify how much of these early revenues they are willing to give up. Since this criterion only impacts the timing of revenues to the government, it is not of sufficient value to be used as the sole criterion for awarding the contract and is almost always used in conjunction with one or more of the other award criteria.

## **Local Content**

Local content generally refers to the percentage of investment capital that will be spent with local contractors and/or the percentage of the workforce that will be sourced locally. Governments are interested in using local resources to capture the additional potential value associated with the expenditures needed to develop and produce those resources. Keeping the revenue from these expenditures in the local economy will benefit the country in the form of employment, direct revenues for the local businesses and the multiplier effect that these expenditures will have on the local economy.

Investing companies would prefer to have the flexibility to source the contractors and labour from global markets to have better control over costs, quality, schedules and technical capabilities. To the extent that local-content providers are lacking in capabilities and/or capacity, local-content requirements have the potential to come at a higher cost and/or result in delays in execution than if sourcing were allowed to occur in a global competitive-bid environment. These additional costs will result in a lower direct value to be shared by the government and the investing company. The government may still be a net winner due to the value that is realized from the local content, but the investing company could be a net loser. Since local content brings additional value into the equation (expenditures that would have been outsourced are kept in the value equation), it offers an opportunity to increase the overall value of the pie to be shared between the government and the investing company. A win-win can be created if the local content can be combined with a lower level of government take, such that both parties benefit from the local content. If the local capabilities/capacity is severely lacking, it is possible that costs associated with using the local content may actually destroy more value than the benefits that the government realizes, and the size of the pie to be shared actually becomes smaller.

## Considerations for Local Content as an Award Criterion

While the direct economic benefits to the government of higher local content are clear and can probably be quantified, the negative impact on the project can be much more difficult to assess. As long as an argument can be made that the total value of having local content is a net positive (benefits exceed the negative impacts on the project costs and execution), local-content requirements have the potential to add value to the existing project. It is then a matter of how that added value is shared. The magnitude of the value associated with local content is generally going to be very small relative to the magnitude of the resource monetization. Therefore, it is not of sufficient value to be used as the sole criterion for awarding the contract and is almost always used in conjunction with one or more of the other award criteria.

## Subjective Criteria

It is important to distinguish between subjectivity used in the determination of the bidding parameters and award process and other forms of subjectivity that are outside of that process. As mentioned above, when more than one objective criterion is used, it is possible to build a point system. The construction of this point system—which is essentially weighting the value of the various bid criteria—invariably has subjective elements. However, by defining how the point system is to be applied to various bid criteria in advance, the subjectivity incorporated into the bidding process remains transparent.

Subjective criteria are those that may be difficult to numerically quantify, but are still deemed important to the government in the selection of an investing company. Some of the criteria that might fall into this category are:

1. Technical capabilities/experience of the bidding companies (e.g., expertise in deep water or LNG);
2. Health, environmental and safety history of the bidding companies;
3. Historical working relationships;
4. Political/regional diversity;
5. Financial capabilities/balance sheet;
6. Other.

If these subjective criteria were used to pre-qualify investing companies regarding their eligibility to participate in the bidding process, the total process can still be considered transparent. However, if these subjective criteria were to be incorporated into the decision of which company is awarded the licence after the bids are submitted, transparency will have been compromised.

## **VII. METHOD FOR GRANTING AND ALLOCATING RIGHTS**

### **A. COMMON FEATURE OF AWARD METHODS**

The section on petroleum licensing rights dealt with substantive rights. As noted in Part VI, all petroleum licensing systems feature a mix of term, bonus payments, annual payments, work commitments, royalty, profit share, production share, local sourcing and technology transfer. This section of the paper deals with procedural rights in that it describes the various methods a government can use to grant the substantive petroleum licensing rights.

All the methods require governments to evaluate the different economic criteria contained in bids from industry. Governments will have to use different scoring systems to perform such an evaluation. Governments will also have to decide how they want to communicate with industry as they put out a request for bids. They will have to decide if they want to communicate in an open, public and transparent manner, or if they want to communicate in a closed, private and non-transparent manner.

As mentioned in the discussion of subjective criteria, another feature that is commonly used in the bidding process is for the government to go through the process of pre-qualifying the investing companies regarding their eligibility to participate in the bidding process. This is usually done when the opportunity being offered has unique technical requirements, such as with deep water, liquefied natural gas (LNG) or sour gas projects, but it can also be used when the capital requirements of the project are very large. The parameters that are most commonly used in the pre-qualifying process relate to the investing company's technical and financial capabilities as well as its experience in projects of a similar type.

### **B. GENERIC PETROLEUM LICENSING SYSTEM—PUBLIC AUCTION OR “OPEN TENDER”**

Some countries have developed a standard generic petroleum licensing system for granting resource development rights. The specific terms of these rights regarding length of term, work requirements, fiscal terms and other features are described in public legislation and regulations. The theory of this generic regime is that the government has determined these terms and wishes to have them apply to any successful bid by a resource company. Given this structure, there is little or no negotiation of terms between government and industry. The only basis for the government to pick a specific resource company is to select the winner using a few specific and easily understood economic criteria, usually evaluated in monetary terms. Examples of this generic regime concept are the granting of rights in the Alberta oilsands and the granting of exploration rights in the offshore Atlantic region of Eastern Canada.

Governments will usually announce in advance that a public auction for various licence areas will take place on a specified date. Bids from industry will usually be made in a sealed envelope. Governments will usually announce the winning bidder and the terms of the winning bid, but will not reveal the names or bids of unsuccessful bidders.

## **C. PUBLIC REQUEST FOR PROPOSALS AND NEGOTIATION**

Governments may decide to issue a public request for proposals (RFP) for certain licence areas, with an invitation to one bidder to negotiate further. This type of process would involve a potential resource where the government is not sure enough of the economic criteria that would constitute the best bid. For example, it may not have a definite idea of the specific amounts of upfront bonus payments and lease payments versus an amount of work commitment.

The RFP would give flexibility to the government to examine various proposals from industry. The fact that the RFP is public means that a government will hear from the greatest number of bidders. The public nature of the RFP invitation also means that the RFP is competitive, which will force companies to make their best bid.

Companies might be concerned that they do not have certainty as to what they should bid in order to be the winner in the RFP. The fact that the negotiation with the winning bidder is private takes away from the transparency of the process.

Although governments may have some concerns about the possibility of losing some value in the form a lower bid than if it were conducted on a transparent and competitive basis, there may legitimate reasons that offset those concerns. Examples would be:

1. The government has previous positive experiences with a certain company (familiarity).
2. A company may have more experience (proven and successful previous endeavours) consistent with the unique challenges of the opportunity that is being offered.
3. The government could be concerned that a competitive bidding process could result in the winning bid being excessively high. An excessively high bid could result in realizing less total value due to a number of reasons that have been described earlier in this paper.

## **D. RESTRICTED INVITATION AND NEGOTIATION**

A government may choose to restrict the RFP invitation to a select group of industry bidders. This avoidance of a public RFP greatly decreases the transparency of the process. If an industry party discovers that it is not on the invitation list, it is very possible that it will allege favouritism and challenge the process. From the government's perspective, it may wonder if the restriction on invitation means that it may not receive the very best bid that could have been made by an excluded industry party.

### **1. Single Applicant**

If a government chooses to negotiate with only one applicant, the process is not transparent at all. Many other industry parties may cry favoritism and challenge the process. The reasons why a government would choose this process is because:

1. It believes that the single bidder has existing operations in the region or specific access to equipment or facilities in the region. The bidder is therefore likely to be the best one by far to be able to explore and develop the licence area, and therefore likely to make the best bid;

2. It believes that the terms of petroleum licensing and fiscal take are so complicated that it would be impractical to try to negotiate with more than one industry party; or
3. More ominously, it has picked a single bidder for political reasons, and does not wish to disclose this in public.

The procurement term for this process is called single-source negotiation. Most countries do not use single-source negotiation, since they believe that a public auction process will yield the best bid. Given this, it stands to reason that a government should think long and hard before it uses the single-applicant process for negotiating the petroleum licensing for a licence area.

## **2. Multiple Applicants**

The use of a process involving a negotiated RFP with multiple applicants is a middle ground between the two extremes of single-source negotiation and a public auction. It may make sense to a government and be perceived as fair by industry if there is realistically only a short list of viable bidders.

## **E. AWARD BY APPLICATION**

All of the above processes in effect involve an initial offer by the government to industry requesting that companies put together a potential bid for petroleum licensing rights in a specific licence area. It is possible for a situation to occur in which industry will make the first move by asking a government to put a specific licence area up for bid. Examples of countries where this process is used include Canada (for offshore rights), Angola, Guyana, Ghana, Suriname and Namibia. There is no requirement for the government to comply with the industry request.

## **VIII. COMPARING VARIOUS PETROLEUM LICENSING SYSTEMS AND BIDDING PROCESSES**

If maximizing exploration is the goal, the petroleum licensing system will likely be an exploration licence, with a work commitment as the economic feature. Industry will like this approach, since it maximizes the money that actually is used to find and develop the resource. A public auction process will likely be used, with the simple criterion that the highest work commitment wins the bid.

If the government believes that the resource is more certain, it may wish to obtain cash. It may propose a PSA that balances work commitment with upfront bonus payments and additional annual payments. Governments may be prepared to accept less upfront cash if a company commits to reinvesting any proceeds from production, or agrees to transfer technology to the government. The government may also propose a joint-venture structure if it wishes to exercise more control over the company performing the resource development. Governments would likely use a form of an RFP and negotiation to select the winning bidder. Governments may use a weighted scoring system to evaluate the various factors contained in different bids.

## IX. RECOMMENDATIONS

### A. ONE SIZE DOES NOT FIT ALL

#### 1. Overall Message

The overall message to be taken from the above discussion of various petroleum licensing systems and various processes for choosing a winning bidder is that there is no one-size-fits-all answer as to what choices should be made. Using the engineering concept that form follows function, the conclusion to be reached is that the first step is to assess the qualities of the potential resource to be developed and the possible bidders for the resource. Once these qualities have been assessed, the form of petroleum licensing and the process for choosing the winning bidder can be chosen that are most likely to develop the resource in the most optimal way.

As noted above, the most relevant qualities to be assessed are:

1. The risk profile of the resource, namely the probability that it actually exists;
2. The length of time it would take to develop the resource, assuming it exists;  
The cost for developing the resource; The technical knowledge, experience and financial strength needed to develop the resource; and
3. The realistic list of parties that possess the capabilities in point 4.

#### 2. Petroleum Licensing System

The following table provides some guidance as to how the quality of the resource affects the petroleum licensing system.

	High-Risk Resource	Low-Risk Resource
<b>Ascertainment Risk</b>		
Type of Petroleum Licensing	Exploration Licence	Concession/JV/PSA
Economic Obligations	Work Commitment	Upfront Payment
<b>Length and Cost of Development</b>		
Type of Petroleum Licensing	Exploration Licence	Concession/JV/PSA
Economic Obligations	Work Commitment	Upfront Payment

#### 3. Process to Select Winning Bidder

	High	Low
Degree of Certainty of Desired Economic Terms	Generic/ Public Auction	Public Request for Proposals and Negotiation
Level of Technical Expertise and Financial Strength	Restricted/Single Proposals and Negotiation	Public Request for Proposal and Negotiation



## **B. MIX AND MATCH**

A corollary of the idea that one size does not fit all is that governments may want to select features from various petroleum licensing systems and winning-bid selection processes. This is not surprising, since both aspects of petroleum licensing have evolved from simple property rights into more complex contractual rights. Since parties are free to contract on whatever terms they agree to, there is no limit to the permutations that may result.

## **C. BOTH SIDES NEED TO BENEFIT FROM THE ARRANGEMENT**

A third recommendation is that both government and industry remember that for an arrangement to work well, it needs to benefit both parties. Each party will no doubt state its desires, but each party should also understand the desires of the other side. These respective concerns are set out in Part III.

## **D. EXAMPLES OF PETROLEUM LICENSING SYSTEMS**

The attached Schedule I contains examples of various petroleum licensing systems around the world. It shows how governments have used the different concepts described in this paper as building blocks to construct a petroleum licensing system that is appropriate for the quality of the potential resource they own. The building blocks include the type of rights granted, the economic obligations imposed on industry and the process used by governments to pick a winning bidder.

## SCHEDULE I SUMMARY OF PETROLEUM LICENSING SYSTEMS IN VARIOUS COUNTRIES

The following extract from a recent article in The Globe and Mail on Feb. 5, 2019, gives an indication of the scope of recent interest in worldwide potential oil and gas plays. In addition, it shows that more than just the industry majors are interested in plays around the world, and that private equity firms may participate as well.

Private equity firm Seacrest and technology provider iPulse, backed by a sovereign wealth fund and private equity, founded oil exploration venture Seapulse. The three entities combined employ only about 60 people.

Seapulse in December teamed up with Maersk Drilling in a contract worth several hundred million dollars to drill 12 wells. Such an all-in services contract, Maersk estimates, can shave at least 10 percent off the cost of drilling.

Seapulse says its portfolio targets 11 billion barrels of gross prospective resources, according to an external estimate, stretching across the North Sea, the Mediterranean, the Caribbean, Latin America, southern Africa and Latin America.

Source: Shadia Nasralla, "In squeezed oil industry, partnerships emerge in hunt for new barrels," The Globe and Mail, Feb. 5, 2019, <https://www.theglobeandmail.com/business/industry-news/energy-and-resources/article-in-squeezed-oil-industry-partnerships-emerge-in-hunt-for-new-barrels/>.

### EXCEL SPREADSHEET

The following information for each country will be in a table in an Excel spreadsheet <http://www.policyschool.ca/publication-category/research-data/>. It will focus on the countries that are in the current exploration news. Examples are Guyana, Brazil, Egypt, the U.S. (in the Permian Basin), Angola, Kenya and Mexico.

#### I. Quality of Potential Resource

- A. Type of Resource (Onshore/Offshore, Shallow Water/Deep Water, Conventional/Tight)
- B. Level of Technology Involved and Technical Expertise (High/Low)
- C. Financial Capability Required (High/Low)
- D. Other

#### II. Rights Granted by Governments

- A. Brief Description of Petroleum Licensing Systems: Concession, PSA, JV, Service Contract or Other?
- B. Term
- C. Retention of Commercial Discoveries
- D. Other Rights

#### III. Economic Obligation Imposed upon Industry

- A. Cash Payments Required (Bonus and Annual Rental)
- B. Work Obligations
- C. Local-Content Requirements
- D. Other Obligations

#### IV. Ability to Book Reserves in Financial Filings

## SCHEDULE II

### SUMMARY OF STEPS IN OIL AND GAS INDUSTRY

#### I. High-Level Geological Evaluation

- Is area prospective due to general overall geology and possible development if resource is found?

#### II. Evaluation of Petroleum Licensing System

- If exploration prospect looks favourable, company will then look at petroleum licensing system:

To determine if it allows sufficient time to do exploration (seismic, evaluation, drilling);

To understand the total costs for resource evaluation as contained in upfront payments, rental payments, work commitments and exploration costs;

To assess the size of a potential discovery and the probability of discovery, in order to determine the risk-assessed potential discovery (probability times size);

To evaluate if the exploration play is economic.

- Petroleum licensing system should be tailored to the type of resource.
  - Resource with higher discovery risk should have low upfront payments, low annual payments and higher work commitments.
  - Resource with lower discovery risk can have the opposite: higher upfront and rental payments, lower work commitments.
  - Any regime needs to give assurance to the finder of the resource that it will have exclusive rights to develop and produce a discovery and will be given adequate time to do so.
- If petroleum licensing system is acceptable, go on to Step III. If not, stop any further work.

#### III. Decision to Bid

- Exploration play is contained in licence area put up for auction by the country controlling the area.
  - Sometimes because a company asked for license area to be put up for bid.
  - Other times because a country decided to put up licence area for bid.
- Resource company decides whether or not to bid.
- If no bid, or if a company bids and loses, no further work.
- If a company wins the bid, go to Step IV.

#### IV. Exploration Stage

- Resource company may divest some of the exploration play to other companies to reduce risk.
- Drilling a well may take several years to plan and execute.
- Exploration drilling will have to comply with all safety and environmental rules.
- If exploration drilling produces a dry hole or a non-commercial discovery, no further work.
- If exploration drilling makes a potential commercial discovery, go to Step V for development-stage evaluation.

#### V. Development-Stage Evaluation

- If resource company believes it has a commercial discovery, it will do intensive study to evaluate economics of the entire project:
  - Development costs and schedule;
  - Production volumes and reserve life;
  - Production operating costs:
    - fiscal regime for royalties, income taxes and other taxes;
    - forecast for price of resource (oil, natural gas, etc.);
    - infrastructure available to move resource to markets (e.g., pipelines).
- Company will do sensitivity studies to determine effect of oil prices, development costs and fiscal regime on economics of project.
- If project economics are not satisfactory, no further work.
- If project economics are satisfactory, go to Step VI for development-stage execution.

#### VI. Development-Stage Execution

- Project development costs will be spent over several years and will likely be an order of magnitude larger than exploration costs.
- Most approved projects will be completed.
- (Carmen Creek oilsands project owned by Shell is, however, an example of a deferral of a project that had been previously approved, after
- concerns about future oil prices and the availability of pipelines.)
- If project completed, go to Step VII, the production stage.

#### VII. Production Stage

- Production stage will likely last for many years for most projects.

## About the Author

**Brian Livingston** is an executive fellow with The School of Public Policy at the University of Calgary. He has a bachelor of science degree in mechanical engineering from Queen's University and a Juris Doctor degree from the University of Toronto Faculty of Law. He spent 30 years of his working career in the oil and gas business in a variety of different capacities. He recently published papers for The School of Public Policy titled "The Alberta Electrical Grid: What to Expect in the Next Few Years" and "The North West Redwater Sturgeon Refinery: What Are the Numbers For Alberta's Investment?"

**Darryl Egbert** retired from ExxonMobil in 2017 and is currently a private consultant to the oil and gas industry and governments, specializing in petroleum economics and fiscal regimes. He has a bachelor of science degree in metallurgical engineering and a master of science degree in mineral economics, both from the Colorado School of Mines.

Darryl worked for ExxonMobil for 38 years in a variety of positions that involved economic modelling, competitor analyses and bidding strategies for offshore oil and gas development. This work helped him to develop a broad and deep understanding of fiscal regimes around the world. In 2007, he was named the senior consultant for global fiscal systems for ExxonMobil, where he provided industry perspectives and consultation on petroleum fiscal systems to many government officials as well as private consultants, academic institutions and international institutions, such as the IMF, the World Bank and the OECD,

Darryl was a member of a panel at the Extractive Resource Governance Program's (ERGP) Inaugural Symposium established by the University of Calgary's School of Public Policy in April 2013. He subsequently initiated a relationship with the ERGP on ExxonMobil's behalf, which has resulted in ExxonMobil now having a seat on the ERGP advisory committee.

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