
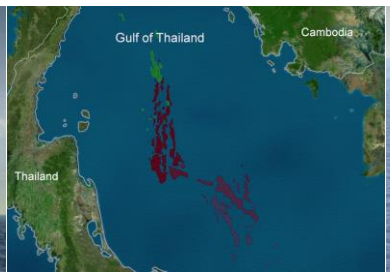

Oil Revenue Prospects for Cambodia

An Economic Analysis of Block A Offshore

December 2015

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ACKNOWLEDGEMENTS

This study was prepared for Cambodians for Resource Revenue Transparency (CRRT) under a contract with Oxfam America.

We wish to thank Isabel Munilla of Oxfam America for first proposing an analysis of the contract terms for Block A offshore and for her valuable guidance and unfailing enthusiasm throughout the project. We thank Ms. Kim Natacha, Executive Director of CRRT, and Mr. Lay Khim, Oxfam East Asia Extractive Industry Regional Program Coordinator, for their active participation in the design and implementation of the project, and for their support during the three missions to Phnom Penh.

We thank the Ministry of Mines and Energy for providing the opportunity to present preliminary findings of this study. We appreciate Kelvin Tang, President of KrisEnergy Cambodia taking the time to meet with us and share KrisEnergy perspectives on Block A offshore.

More generally, we would like to acknowledge the valuable input received from participants at the various training sessions held in Phnom Penh including representatives of CRRT and the wider civil society community, economic analysts and journalists.

This report is an independent product of Resources for Development, and any acknowledgement of those consulted does not necessarily imply their endorsement of the publication or its findings.

About Resources for Development Consulting

Resources for Development Consulting is a policy research firm that seeks to assist resource-rich developing countries in securing a fair share of extractive sector wealth by analyzing contracts and broader fiscal regimes, and conducting integrated economic analyses in order to assess plausible government revenues.

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ACRONYMS

ACDA	Apsara Core Development Area
bbl	Barrels of oil
bopd	Barrels of oil per day
CNPA	Cambodian National Petroleum Authority
CRRT	Cambodians for Resource Revenue Transparency
FID	Final investment decision
FSO	Floating Storage and Offloading
IMF	International Monetary Fund
IPO	Initial public offering
MIME	Ministry of Industry, Mines and Energy
NOCs	National oil companies
OCA	Overlapping Claims Area
PPA	Petroleum Permit Application
UNDP	United Nations Development Program

EXECUTIVE SUMMARY

This report seeks to provide an estimate of potential government revenue from KrisEnergy's proposed Block A offshore oil project.

Cambodians have been expecting economic benefits from offshore oil since Chevron first announced its discovery in 2004. The International Monetary Fund and the United Nations Development Program heightened expectations in the years that followed, publishing optimistic projections of government revenue amounting to billions of dollars per year. At the same time, however, Chevron was completing its evaluation of the drilling results and concluded that the field was not even guaranteed to be profitable.

KrisEnergy was brought into the consortium due to their experience in working on so-called "marginal" fields. A Petroleum Permit Application (PPA) was submitted in 2010, outlining the plan for the field's development, but the Government refused to grant approval without changes to the fiscal provisions.

In August of 2014, KrisEnergy bought out Chevron's stake in the project and began negotiations with the Government to finalize the fiscal terms. Reports suggest that these negotiations have been completed and that the Government will soon approve the PPA. KrisEnergy could then consider making a final investment decision on the project and moving forward with development of the field.

Recognizing that much of the publicly available analysis on the Block A project was outdated, Oxfam and Cambodians for Resource Revenue Transparency (CRRT) commissioned this report. They hope that on the basis of a thorough review of the publicly available information, an integrated economic analysis can provide a reality check on potentially unrealistic public expectations, greater clarity on the contract terms that govern the project, as well as a sense of potential scale and timing of revenues that could flow to the Government of Cambodia.

The analysis below is based exclusively on information in the public domain. The information is integrated into a spreadsheet model in order to assess potential government revenue under varying scenarios of production, price, costs and fiscal (tax) terms. The spreadsheet model will also be available in the public domain.

Four main inputs are required in order to generate a forecast of potential government revenue: production volumes, forecast oil price, field costs and fiscal (tax) terms. Details of our assumptions for each are provided in the report.

The timing and volume of production are the most important of these inputs. Although negotiations with the Government are reportedly complete at the time of printing, first oil production is still years away. KrisEnergy originally estimated that it would take 34 months from final investment decision to first production. This timeframe has subsequently been revised down to 24 months. Either way, production cannot be expected before 2018 at the earliest. Plummeting oil prices could easily result in further delays.

Early reports suggested that Block A reserves might contain as much as 700 million barrels of recoverable reserves. Large reserves would be expected to result in large government revenues. In contrast, KrisEnergy is proposing a capital risk-averse approach to field development. They plan to begin with a single platform with an expected gross recovery of only 8.6 million barrels. If this first phase is successful, a second phase is anticipated that could be expected to start in the early 2020s and result in production of up to 25.8 million barrels.

All indications suggest that the core fiscal elements of the original contract signed by Chevron in 2002 remain in place. Cambodia employs a production sharing system with three principal sources of government revenue: a 12.5% royalty, a share of after-costs oil production (42%-62%), and corporate income tax (25%-30%). The Government also holds a 5% carried equity stake in the project.

The results of any economic model are, of course, no better than the inputs assumptions on which they are based. Revenue projections therefore should be seen as an estimate of possible government revenue under specific scenarios.

The first phase of development as proposed by KrisEnergy is designed as a low-cost test to determine whether there are sufficient reserves to justify expansion. The project is not economically viable at this level of production. This phase would generate only very modest government revenue. For example, total government revenues over the six years of this first phase production could be expected to amount to less than $100 million with oil at $70/barrel and around $125 million at $90/barrel.

If the project moves to a second phase based on the success of first phase drilling, new platforms would come on stream in the early 2020s. At this stage, the project would become economically viable if oil prices are above $70/barrel. With the full development of the second phase, total government revenue over the lifespan of the project could be around $630 million at $70/barrel and around $1 billion at $90/barrel.

These conclusions are clearly much more modest than the billions of dollars in *annual* government revenue suggested in previous revenue projections. The difference is overwhelmingly due to the change in the estimated volume of recoverable oil.

Changes in fiscal terms between the original 2002 contract and the final terms agreed with KrisEnergy can be expected to make only very modest differences to the amount of government revenue. Under the varying fiscal terms, the share of divisible revenue allocated to the government (the so-called "government take") is more than 70% over the lifetime of the project.

Assessing whether this represents a "fair" share for the government requires comparing Cambodia in the early 2000s with other so-called "frontier" countries – non-producing countries where the exploration risk would be considered high. A thorough cross-country comparison has not been undertaken as part of this research. However, a government take of 65%-75% is within what would be considered the normal range for frontier countries.

Understanding the government revenue implication from Block A is not a one-time exercise. Cambodian citizens should have access to information related to the project on an ongoing basis. Best practice calls for all contracts and subsequent amendments to be publicly accessible. General project data should also be made available by the Government to ensure that Cambodian citizens have at least as much information as KrisEnergy investors. This has been the practice in other countries, and has led to healthy, informed and efficient public dialogues.

INTRODUCTION

When Chevron struck oil in Block A offshore in 2004, many expected that Cambodia was about to enter a new phase of economic development. Subsequent years were devoted to additional drilling and in 2010 a proposal was submitted for the development of the Apsara oil field in Block A. Since 2010 the process has been bogged down in negotiations over the fiscal terms that will govern the project.

Enthusiasm for the project was renewed in August 2014 when KrisEnergy acquired Chevon's stake in the project and took over the position of operator. Recent reports suggest that negotiations between the company and the government are nearing completion. It seems possible, therefore, that in the coming months the Government will approve the proposed development plan, KrisEnergy and its joint venture partners will make the "final investment decision" to proceed with the project, and the practical work will begin to move Cambodia towards oil production.

There has been considerable speculation on the size of the oil finds in Block A and the potential for government revenue from the development of those fields. Earlier assessments of the potential economic prospects for oil production in Cambodia, prepared by the IMF and UNDP, were based on highly optimistic scenarios about the amount of recoverable oil and timelines to first production. It has been clear for some time that these scenarios were overly optimistic, but they have not been replaced by more up-to-date analyses and therefore continue to be quoted in the media and to inform public debate.

With the prospects for oil production once again on the horizon, the time is opportune to reassess the prospects for oil production from Block A, and potential implications for government revenue. Fortunately, important information has entered the public domain allowing for a careful economic analysis. Although the original contract with Chevron is still confidential, most of the important terms are now publicly available in a Prospectus issued by KrisEnergy as part of an Initial Public Offering on the Singapore Stock Exchange in 2013. The Prospectus also provides considerable detail on the approach that KrisEnergy plans to take in the development of Block A, as well as estimated costs.

Recognizing that much of the publicly available analysis on the Block A project was outdated, Oxfam and Cambodians for Resource Revenue Transparency (CRRT) commissioned this report. They hope that on the basis of a thorough review of the publicly available information, an integrated economic analysis can provide a reality check on potentially unrealistic public expectations, greater clarity on the contract terms that govern the project, as well as a sense of potential scale of revenues that could flow to the Government of Cambodia. Greater clarity is essential in order to ensure budget accuracy and fiscal discipline, and to support oversight and planning of public investment to meet Cambodia's significant development needs as well as informed and efficient public dialogue.

This report is based on publicly accessible information. Previously published analyses of the petroleum sector have been consulted, as have industry analyses and media reports.

The economic analysis contained in this report is generated from a simplified version of an industry-standard "annual cash flow" model. The model, constructed in a spreadsheet, incorporates the fiscal terms that apply to Block A, including competing options where differing possibilities are known. These fiscal terms are then applied to a hypothetical project that is based on KrisEnergy's public statements about how it plans to proceed. Production and cost profiles are drawn from KrisEnergy document and validated with publicly accessible data from analogous fields on the other side of the border in the Gulf of Thailand. The various scenarios are then tested against a range of oil prices.

This report is developed in five main sections. The first section provides an overview of the history of Block A. The second section offers an analysis of the role of oil contracts as well as the wider legal context in which they are situated. The third section contains a detailed overview of the sources of government revenue that apply to the Block A project. The fourth section draws on publicly accessible data in order to generate plausible scenarios that are incorporated, along with the fiscal

terms, into the spreadsheet model. The fifth section contains the economic analysis including the timing and volume of potential government revenue; the relative importance of the various fiscal instruments applied to the Block A project; as well as the allocation of after-cost revenue between the company and the government. The report draws to a close with final conclusions and recommendations.

1 BACKGROUND ON BLOCK A

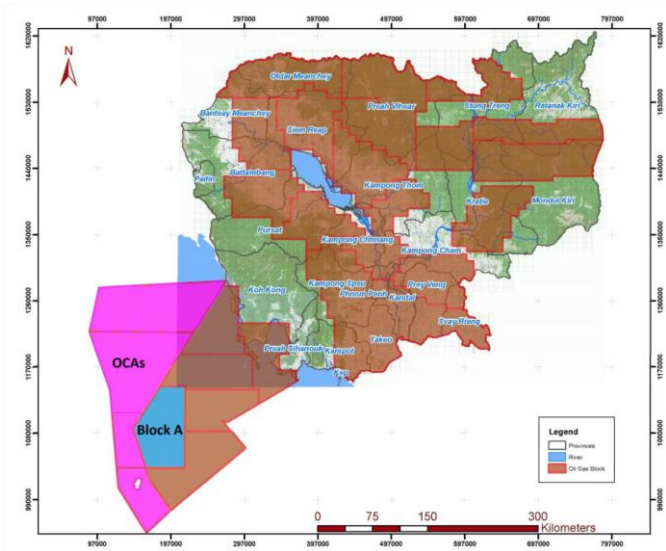
Although there have been decades of oil exploration, thus far Cambodia has no commercial production of oil nor any proven oil reserves.

Initial geological analysis undertaken by the Chinese in the 1950s was followed by decades of inactivity. In the early 1990s, four offshore blocks (I-IV) were allocated to exploration companies, but all were subsequently abandoned. A second allocation of offshore Blocks in 1998 (V and VI) met with the same fate.

In August 2002, the Cambodia National Petroleum Authority negotiated a Production Sharing Agreement for Block A offshore with Chevron-Texaco (See Map 1[1]). The Block covers a 6,278-km2 area in shallow water 120 km off the Cambodia coast in the Gulf of Thailand. The Block adjoined ChevronTexaco's producing field in block B8/32 on the Thai side of the border, and as well as exploration blocks in the Overlapping Claims Area (OCAs).

At the outset, Chevron Overseas Petroleum Cambodia Ltd. (then a subsidiary of Chevron Texaco Corp. of the United States) was the operator with a 70 percent stake in the project while Moeco Cambodia Co. Ltd. (a subsidiary of Mitsui Oil Exploration Co. Ltd. of Japan) held 30 percent. In March 2003, LG-Caltex, a private Korean oil company, bought a 15 percent stake from Chevron.

Map 1: Block A Offshore



Exploration drilling began with four wells drilled in late 2004. The companies publicly announced that they had been successful in the search for oil. They offered few details on the size of the find, however, claiming that they need to complete the drilling program and then carefully analyze the results.

1.1 Heightened Expectations

Even in the absence of the detailed drilling results, speculation on the size of the find and the timelines to oil production took off. In late 2004, the President of Cambodia's National Assembly told local reporters that not only were the oil finds commercially viable, but that production could be expected as early as 2007.

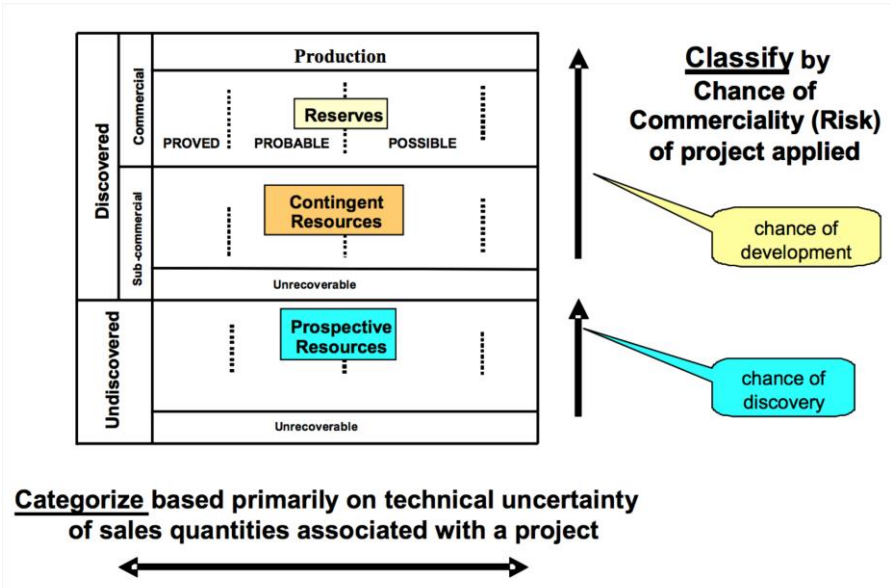
In fact, speculation on the volume of recoverable oil pre-dated the drilling campaign. After securing their 15% stake in the project in 2003, LG-Caltex publicly speculated that Block A might hold as much as 400 million barrels of oil and three trillion cubic feet of gas.[2] To give a sense of scale, a World Bank

[1] Map taken from Mr. Sebastian Abjorensen, Oil and Gas Revenue Management Options for Cambodia, Parliamentary Institute of Cambodia, 2014, p. 2.

[2] John C. Wu, The Mineral Industries of Cambodia and Laos, United States Geological Survey Minerals Yearbook, 2003, p. 1.

study of hypothetical oil fields considered 100 million barrels to be a medium size oil field and 600 million barrels to be a large field.[3]

Figure 1: Resources versus Reserves



Much confusion was generated by a lack of clarity on the differences between "resources" and "reserves." Prior to drilling, estimates are based on geological potential and are known as "prospective resources." Following drilling, it is possible to estimate "contingent resources." Oil exists but there may be technical or commercial barriers to production. When confirmed as commercially viable, reserves are defined according to confidence levels for commercial recovery (see Figure 1[4]).

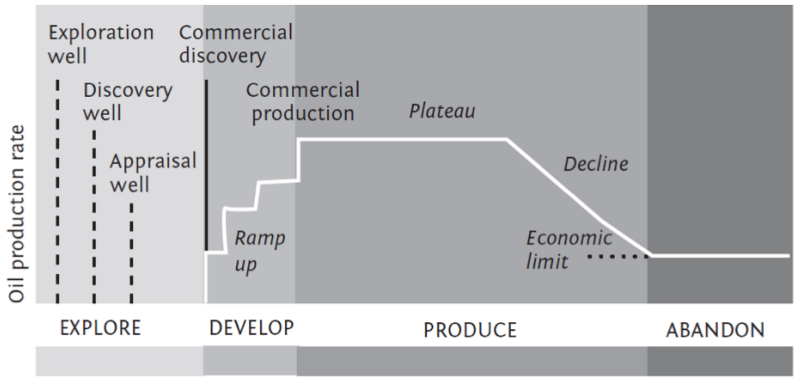
In subsequent years it was common for estimates of recoverable petroleum from Block A to be reported as ranging from 400-700 million barrels. And it was widely presumed that the project would get underway quickly with media reports suggesting that companies would move quickly towards a final investment decision and the beginning of the development phase.[5]

This initial enthusiasm resulted in two efforts to assess the scale of revenues that could potentially flow to the Cambodian Government from oil development: one by the United Nations Development Program (UNDP) and the other by the International Monetary Fund (IMF).

In 2005, the UNDP funded an economic analysis for the Cambodia National Petroleum Authority (CPNA) entitled a "Review of Development Prospects and Options for the Cambodian Oil and Gas Sector". They noted that exploratory drilling had led to initial reserve estimates of 400-500 million barrels, but pointed out that exploration was only just beginning and suggested that in the country as a whole "there may well be 2 billion barrels of recoverable oil and 10 trillion cubic feet of gas."[6] The analysis also suggested that spread over 20-25 years, the average annual total sales value could reach $6-7.5 billion, a sum significantly larger than Cambodia's GDP at that time. In terms of government revenue, the report estimated that the government would receive at least 53% of the gross sales (with a higher take being possible) resulting in potential revenue of $3 billion annually.

[3] Silvana Tordo, Fiscal Systems for Hydro Carbons, World Bank, 2007, p. 22.
[4] SPE Petroleum Resources Management System Guide for Non-Technical Users, Society of Petroleum Engineers, 2007, p. 2.
[5] See for example, Cambodia Oil Project Invest Decision Likely 1Q '08, Dow Jones Newswires, 18 December, 2007. Figure 2 is taken from "Oil Contracts – How to Read and Understand Them," OpenOil, 2012, p. 15.
[6] The conclusions were drawn from the "Review of Development Prospects and Options for the Cambodian Oil and Gas Sector" prepared by Brian Quinn in 2005 for United Nations Development Program and Cambodia National Petroleum Authority. See "A SWOT Analysis of the Cambodian Economy," UNDP Cambodia, 2006, p. 10.

Figure 2: Oil Project Timeline



Two years later the IMF prepared an analysis entitled "The Potential Macroeconomic Impact of Oil Production of Cambodia," noting that there were initial indications of oil reserves in Block A offshore of up to 700 million barrels.[7] The IMF was clear that "The scenario has been constructed to demonstrate the policy challenges of an oil sector, not as a forecast of the potential Cambodian oil sector." Nevertheless, the "realistic" scenario chosen seemed to fit speculation on Block A quite closely with recoverable reserves estimated at 500 million barrels and first field production beginning in 2011. The analysis concluded that under these assumptions, Cambodia could expect government revenues of $174 million in 2011, increasing to a maximum of 1.7 billion in 2021 before dropping off rapidly.[8]

The revenue projections from these two studies were, and continue to be, widely cited in the domestic and international media. However, the caveats provided in both of the studies are not normally mentioned, nor are the inherent limits of scenario forecasting.[9] It should be noted that the revenue projections were prepared during a period where international analysts were particularly concerned about the risks that large revenue inflows from oil and gas could lead to the "resource curse" where resource rich developing countries actually ended up poorer. Nevertheless, the revenue projections contributed to heightened public expectations that there were massive oil reserves offshore in the Gulf of Thailand; that oil production could be expected to begin by 2011; and that very large revenues were likely to flow into government coffers.[10]

1.2 Chevron Reassesses

Even as societal expectations of an oil and gas boom were growing, Chevron was quietly reassessing drilling results. Already by 2007, they had concluded that Block A was considerably less promising than they had first believed.[11] As is common in the Gulf of Thailand, oil is dispersed in smaller pockets rather than concentrated in main reservoirs. But Chevron drilling had revealed that the comparatively high concentrations of oil found on the Thai side of the border did not seem to be replicated on the Cambodian side. Based on this data, Chevron began to consider Block A as a "marginal field," questioning whether it was a commercially viable project. Recognizing that there was considerable national pride bound up in the country's first successful oil find, however, Chevron said little publicly about its changing perspectives on the viability of the project.

By this stage, Chevron was pinning its hopes on linking its rights to Block A to potential development

[7] IMF, "The Potential Macroeconomic Impact of Oil Production of Cambodia," in Selected Issues and Statistical Appendix, IMF Country Report No. 07/291, August 2007, p. 4-13.
[8] IMF, "The Potential Macroeconomic Impact of Oil Production of Cambodia," p. 5.
[9] See for example, Managing Public Expectations: Cambodia's Emerging Oil and Gas Industry, Economic Institute of Cambodia, 2008.
[10] See for example, Technical Assistance Report, Asian Development Bank, Project Number: 40079 December 2006, Kingdom of Cambodia: Institutional Strengthening of the Cambodian National Petroleum Authority, (n.d.) p. 1.
[11] See: Chevron Downgrades Petroleum Estimates In Cambodian Waters, Looks To Overlapping Claims Area (C-Al7-02497), US Embassy, Phnom Penh, 1 February 2008.

in the much more promising "Overlapping Claims Area" (OCA).[12] Although control of the area was contested between the governments of Cambodia and Thailand, it was widely believed to be among the more promising unexplored areas in South East Asia. And there were positive indications that negotiations between the two countries might allow the area to be opened for exploration. In 2001, Cambodia and Thailand had signed a Memorandum of Understanding regarding the OCA as a foundation for joint development of these potential petroleum resources. However, the negotiations stagnated and the prospects of linking production in Block A to more promising OCA Blocks faded.[13]

By 2009, Chevron was left with the question about how to proceed with Block A as a stand-alone project. And the timeframe allocated in the contract for the exploration phase of the project was running out. Chevron's response was two-fold. First, they agreed to drill an additional three exploratory wells in exchange for an extension to the exploration phase through the third quarter of 2010. Second, they found a company with expertise in developing marginal fields in South East Asia to join the project and pay for the additional drilling. That company was KrisEnergy.

Although KrisEnergy was only formed in 2009, the principals of the company had previously owned Singapore-based Pearl Energy. That company had specialized in developing so-called "marginal" fields: concessions that did not attract the attention of major oil companies but which could potentially become profitable if capital costs were kept to a minimum.

The Jasmine field on the Thai-side of the Gulf of Thailand represents a good example of KrisEnergy's approach. Overlooked for decades, the field was developed in 2005. Production capacity was expanded only after successful early drilling demonstrated good prospects. Initial estimates of 8-9 million barrels of recoverable oil were quickly exceeded with production in the first three years of more than 17 million barrels. Total recoverable reserves are now estimated at more than 50 million barrels.

Pearl Energy was sold in 2008 and in 2009, some of the same individuals reformed around KrisEnergy. The company quickly acquired assets in the Gulf of Thailand, Indonesia and Vietnam.

In 2009, Chevron approached KrisEnergy and encouraged them to join the consortium of companies seeking to develop Block A. KrisEnergy acquired a 25% stake in the project "in exchange for the costs to drill and fulfill all the ongoing obligations during the Block A extension period."[14]

1.3 Petroleum Permit Application

The additional drilling had bought Chevron some additional time, with the exploration period set to expire at the end of September 2010. In August, Chevron formally declared that there were commercial quantities of oil in Block A and one month later they submitted a Production Permit Application (PPA) seeking CNPA approval to move forward with the project.

The PPA specified the fields designated for development and set out a phased field development plan. It was a cautious plan designed to increase capital spending only on the basis of proven results. As such, the first phase (1a) was to include only one production platform with 22 wells producing to a floating tank system designed to store the oil produced until it can be offloaded onto a tanker.[15]The approval process was initially expected to allow Chevron to move quickly to develop the fields and begin production by 2012.[16] However, disagreements between the company and the Government of Cambodia over the economic terms of the project resulted in extended delays.

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[12] See Chevron Downgrades Petroleum Estimates In Cambodian Waters, US Diplomatic Cable 08PHNOMPENH128.

[13] See, "Thai instability blamed for delays in oil talks," Phnom Penh Post, 25 May 2009.

[14] KrisEnergy Prospectus, 2013, p. K-61. KrisEnergy indicates that they paid more than $12 million in drilling costs during this phase.

[15] Known as an FSO (Floating, Storage & Offloading) Unit.

[16] See "Kingdom of Cambodia: Capacity Building for the Cambodian National Petroleum Authority," Asian Development Bank, December 2010, p.2.

The core of the disagreement is reported to have been differences in the tax terms contained in the Production Sharing Agreement signed by Chevron and the CNPA in 2002 and the 1997 Law on Taxation.[17]

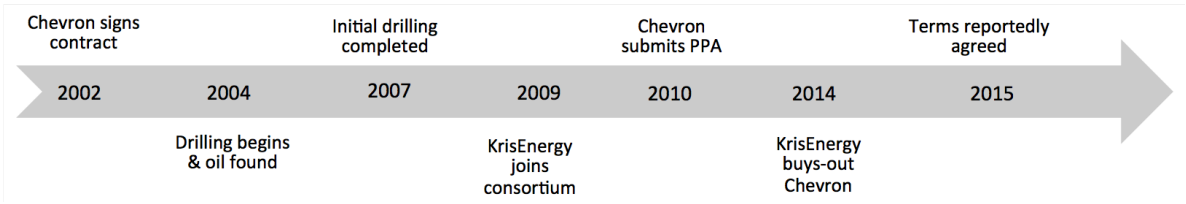
Specifically, the 2002 contract established a corporate income tax rate of 25% and provided complete exemptions from many other Cambodian taxes. The contract also contained an 'economic equilibrium" clause.[18] This provision committed the Government of Cambodia to ensure that any subsequent changes in Cambodia tax law, if applied to the project, would be offset by other changes in order not to have any negative effect on the economic position of the company.

In contrast, the 1997 Law on Taxation, amended in 2003, contained specific provisions relating to the taxation of petroleum. Most importantly, the tax rate was set at 30% rather than 25%. There were also other important differences including how capital assets were depreciated and the inclusion of withholding taxes on foreign income and interest.

It appears that Chevron had accepted that there would be some changes from the fiscal terms set out in the 2002 contract. Specifically, the KrisEnergy Prospectus implies that a 2009 contract amendment included a reference that taxes would be paid according to the Law on Taxation of 1997.[19] Nevertheless, it appears that significant differences remained between the company and the Cambodian Government. And growing pressure to accept revised fiscal terms did not seem to have much impact on Chevron. For example, in 2010 Deputy Prime Minister Sok An, Chairman of the Cambodia National Petroleum Authority, is reported to have "ordered Chevron to start production by 2012 or forfeit its license."[20]

Chevron submitted a revised PPA in 2012 but was again unable to secure government approval.[21]

Figure 3: Block A Timeline



1.4 Chevron Sells to KrisEnergy

In August 2014, KrisEnergy purchased Chevron's entire 30% stake in Block A for US$65 million, and took over the position of operator.[22] For Chevron the decision was likely motivated by a frustration with the ongoing negotiations combined with the option to invest in other more promising assets. For KrisEnergy, the purchase fit well with their corporate strategy of wanting not just to hold viable

[17] "Tax Talks Said to Stall Chevron Oil Deal," The Cambodian Daily, 11 January 2012.
[18] See Article 21.3 "If, at any time or from time to time, there should be changes in the Petroleum Regulations, or if there should be the introduction of any other legislation, regulations or orders, which materially increases the financial burden of Contractor, then CNPA shall agree to amend the terms of this Agreement in favour of Contractor so as to take account of such changes or introduction."
[19] The "contractor shall pay taxes to the Cambodia Government according to the Law on Taxation of 1997." KrisEnergy Prospectus, p. B4.
[20] "Firm date set for oil flow," Phnom Penh Post, 2 July 2010.
[21] "Tax Talks Said to Stall Chevron Oil Deal," The Cambodian Daily, 11 January 2012.
[22] See: KrisEnergy acquires Chevron Cambodia unit, 11 August 2014. "The other participants in Cambodia Block A are MOECO with a 28.5% working interest, GS Energy with 14.25% and CNPA with 5% once formal transfer is approved."

assets in South East Asia, but also to be able to drive the project forward from the position of the operator. The company currently holds 19 licenses in Bangladesh, Cambodia, Indonesia, Thailand and Vietnam and is the operator in 13 of them.

KrisEnergy has been in negotiation with the Government on the terms of the PPA since their buyout of Chevron was approved in October 2014. Public reports suggest that the negotiations have been completed and are now awaiting only final approval, but no timeframe for the conclusion of the agreement has been announced.[23] Once these negotiations are concluded, the company and its joint venture partners will consider making the final investment decision (FID) on the project. Low current oil prices could easily result in further delays.

[23] See, Approval on the way for KrisEnergy Block A plan, upstreamonline.com, 19 June 2015.

2 OIL CONTRACTS AND NATIONAL LEGISLATION

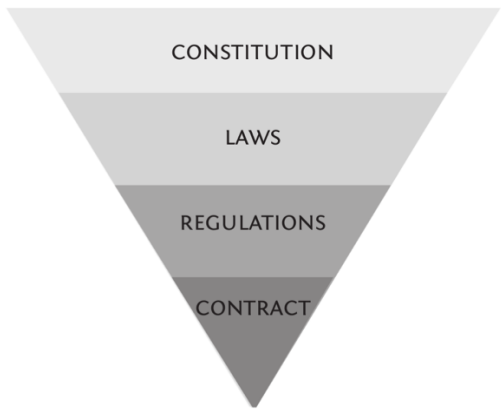
Oil contracts establish the terms under which private companies explore for oil. There are of course other ways in which a country can develop an oil industry. The largest oil companies in the world are not private; they are the national oil companies (NOCs) of Saudi Arabia, Russia and Iran. These are the exception however. Most countries lack the technical expertise to develop a domestic oil sector. Equally importantly, few countries want to risk their own financial resources in the high-risk venture of exploring for oil (industry averages suggest only 1 in 10 exploration wells find oil). The solution is to encourage private companies to explore and develop oil resources based on terms set out in a contract.

There are common interests between the private company and the government – both obviously hope that exploration results in the discovery of large, commercially viable, oil fields. The two parties to the contract however also have conflicting objectives – both want a substantial share of the profits. The challenge for the government then is to offer contract terms that maximize government revenue but also attract private companies to take the exploration risk. Tough terms might look good on paper, but they are of no value if credible companies are not willing to sign up to them. At the same time, highly generous terms may attract companies, but can leave the government with only a small portion of the economic benefits. The challenge in negotiating contracts, and in designing the broader fiscal regime, is to get the balance right.

2.1 The Hierarchy of Laws and Contracts

Oil contracts cannot be understood in isolation.[24] They are only one component of the broader framework that determines the government's share of potential oil revenue (Figure 4). In most countries, the Constitution provides the foundation on which the rest of the legal framework is based. Article 58 of the Cambodian Constitution states that all mineral resources are the property of the State, and that the management of such resources shall be set out by law.

Figure 4: Sources of Fiscal Terms



Normally, the next step in the legal hierarchy is a foundational Petroleum law. Cambodia however does not have a general petroleum law. Since at least 2008 there have been reports that a draft law was being prepared. After a period of inactivity, there appears to be a renewed effort to develop and pass a sector wide law, but it appears that this will not be completed until after negotiations with KrisEnergy on Block A are finalized.[25] Until such a law is passed, the basis for the existing legal framework is the Petroleum Regulations of 1991, as amended in 1998 and 1999.

The broader legal framework that governs petroleum exploration and development in Cambodia also includes the Law on Investment of 1994 and amended in 2003, and the Law on Taxation from 1997 and amended in 2003.

Under the 1991 Regulations, the Ministry of Industry, Mines and Energy (MIME) was the administrative authority responsible for the management of petroleum resources. In 1998 this authority was transferred to the Cambodian National Petroleum Authority (CNPA). The CNPA was

[24] For a non-technical guide to oil contracts, see Oil Contracts and How to Understand Them, OpenOil, 2012.
[25] "Oil deal before petroleum law," Phnom Penh Post, 6 April 1015.

responsible for evaluating bids and making recommendations to the government on Petroleum Agreements to be granted to specific companies. It was during this period that the Production Sharing Contract with Chevron was agreed. In 2013 the CNPA was absorbed back into the Ministry of Mines and Energy.

2.2 Production Sharing Agreements

Most of the specific detail on company rights and responsibilities, and the financial terms that govern company operations, are contained in a contract. Oil operations are complex and typically require dozens of individual "contracts." The main contract (sometimes called the "host country agreement") is the foundational agreement between the government and the company. In Cambodia, these contracts are called "production sharing agreements" or PSAs. The PSA governs the full lifecycle of the oil project. It gives the company the right to explore for oil within a specific area, and, if exploration efforts are successful, it also sets the terms for 30 years of production.

Although the specific terms are negotiated for each contract, the negotiators do not start from square one each time. Rather a model contract is prepared that defines the vast majority of the parameters, leaving only a few terms open to negotiation. Cambodia released a "model" production-sharing contract in 2004.[26]

Traditional analyses of petroleum fiscal regimes draw a sharp distinction between three different types: royalty and tax, production sharing and service agreements.[27] Table 1 shows the regional distribution of these three main systems.

The specific model chosen, however, is less important than is often thought. Governments can ensure that they secure a fair share of the overall revenues whichever model is chosen. It is the specific terms within the system, rather than the system itself, which determine whether the government has negotiated a good deal. Furthermore, over time the distinctions between these models have blurred and so-called hybrid models (adding royalties and income tax to a production-sharing system) are now very common.

Table 1: Overview of Fiscal Systems

AREA	ROYALTY/TAX	PRODUCTION SHARING	SERVICE
AFRICA	Nigeria (Shelf),Chad, Congo, Ghana, Madagascar, Morocco, Namibia, Niger, Senegal, Somalia, Sierra Leone, S. Africa, Tunisia (old)	Nigeria (Deepwater), Algeria, Angola, Benin, Cameroon, Congo, Cote D'Ivoire, Egypt, EG, Ethiopia, Gabon, Gambia, Kenya, Liberia, Libya, Madagascar, Mozambique, Sudan, Tanzania, Togo, Tunisia (new), Uganda, Zambia	Nigeria (JV)
EUROPE	Italy, France, Ireland, UK, Faroes, Spain, Ireland, Netherlands, Norway, Poland, Portugal, Romania, Spain, Denmark	Poland, Turkey, Malta, Albania	
ASIA	Australia, Brunei, S. Korea, Nepal, New Zealand, Thailand, Timor	Bangladesh, Cambodia, China, Georgia, India, Indonesia, Laos, Malaysia, Mongolia, Pakistan , Vietnam	Philippines
FSU	Russia	Azerbaijan, Georgia, Kazakhstan, Russia, Turkmenistan, Uzbekistan	
LATIN AMERICA	Argentina, Bolivia, Brazil, Columbia, Paraguay, Trinidad	Belize, Cuba, Guatemala, Nicaragua, Panama, Trinidad (off), Venezuela	Chile, Ecuador, Panama, Peru, Honduras, Mexico
MID EAST	Abu Dhabi, Dubai, Turkey	Bahrain, Iraq, Jordan, Oman, Libya, Qatar, Syria, Yemen	Iran, Kuwait, Saudi Arabia
N. AMERCIA	US, Canada		

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2.3 Contract Terms

The specific terms for Block A were set out in a "Production Sharing Contract" signed by Chevron in 2002 and subsequently amended in 2004 and 2009. The contract itself remains confidential, though it is available for those willing to pay the subscription fee through the Barrows commercial

[26] See Cambodia model contract.
[27] See Fiscal Systems for Hydrocarbons, 2006.

database.[28] The original 2002 contract, but not the subsequent amendments, has been reviewed as part of the analysis for this report.

There is a second public source that sets out the main contractual terms for oil exploration, development and production in Block A. In July 2013, KrisEnergy published a "Prospectus" as part of their initial public offering (IPO) registered with the Singapore Stock Exchange.[29] The document contains detailed analyses of KrisEnergy's full portfolio of 14 individual contract areas, including Cambodia Block A.

The Prospectus is clear that the terms that will govern the project are not yet fully settled. As KrisEnergy states, "it is uncertain whether the terms provided in the petroleum agreement and the PPA, including the fiscal terms, are the terms that will be in place once Block A reaches development or production."[30] The main terms listed in the Prospectus correspond to the terms as agreed in the original contract with two important exceptions: the corporate income tax rate and the participation of the Cambodian state as a commercial partner in the project (See Textbox 1[31]).

Textbox 1: KrisEnergy - Prospectus Summary of Fiscal Terms for Cambodia Block A

	Block A	
Royalty	12.5 per cent. of production	
Cost recovery petroleum	90.0 per cent. of production	
Allocation of remaining oil (to contractor) (average annual production)	1-10,000 bopd	58.0 per cent.
	in excess of 10,000-25,000 bopd	53.0 per cent.
	in excess of 25,000-50,000 bopd	48.0 per cent.
	Over 50,000 bopd	38.0 per cent.
Allocation of remaining gas (to contractor)	65.0 per cent.	
Income Tax (not payable on the royalty petroleum or cost recovery petroleum)	25.0 per cent. for five years from first profit and then 30.0 per cent. thereafter.	
Production bonus payment	None.	
Annual surface rental fee	US$500 per sq. km of unrelinquished production area and up to US$40 per sq. km of unrelinquished exploration area.	
CNPA option	5.0 per cent. exercised on November 15, 2011 and currently under negotiation.	
Concession expiry date	The Petroleum Agreement shall remain in full force and effect pending the Cambodian Government's approval of the PPA for the block. Upon approval of the PPA, the production permit will be for 30 years from the date of first commercial production.	

A third "government" source provides additional insights into fiscal terms governing petroleum operations in Cambodia. In 2010 a representative of the Department of Large Taxpayers in the Cambodian Department of Taxation presented to the Asian Tax Forum on the fiscal system for petroleum in Cambodia.[32] The presentation highlights the differences between the terms of the 1997 Law on Taxation, the Production Sharing Agreements (including the one signed by Chevron), and the draft "Petroleum Tax Law." It confirms the general terms that are set out in the Chevron 2002 PSA and the KrisEnergy Prospectus.

[28] See: Chevron Petroleum Agreement, 15 August 2002, Between The Cambodian National Petroleum Authority Chevron Overseas Petroleum (Cambodia) Ltd.; MOECO Cambodia Co. Ltd. and Woodside South East Asia Pty Ltd.

[29] KrisEnergy Ltd. Prospectus, 12 July 2013.

[30] KrisEnergy Prospectus, p. 42-43.

[31] KrisEnergy Prospectus, p. 167.

[32] Mr. Eng Ratana, Deputy Director, Department of Large Taxpayers, "Fiscal Systems for Petroleum and Minerals in Cambodia," General Department of Taxation, 22 October 2010.

3 FISCAL INSTRUMENTS FOR BLOCK A

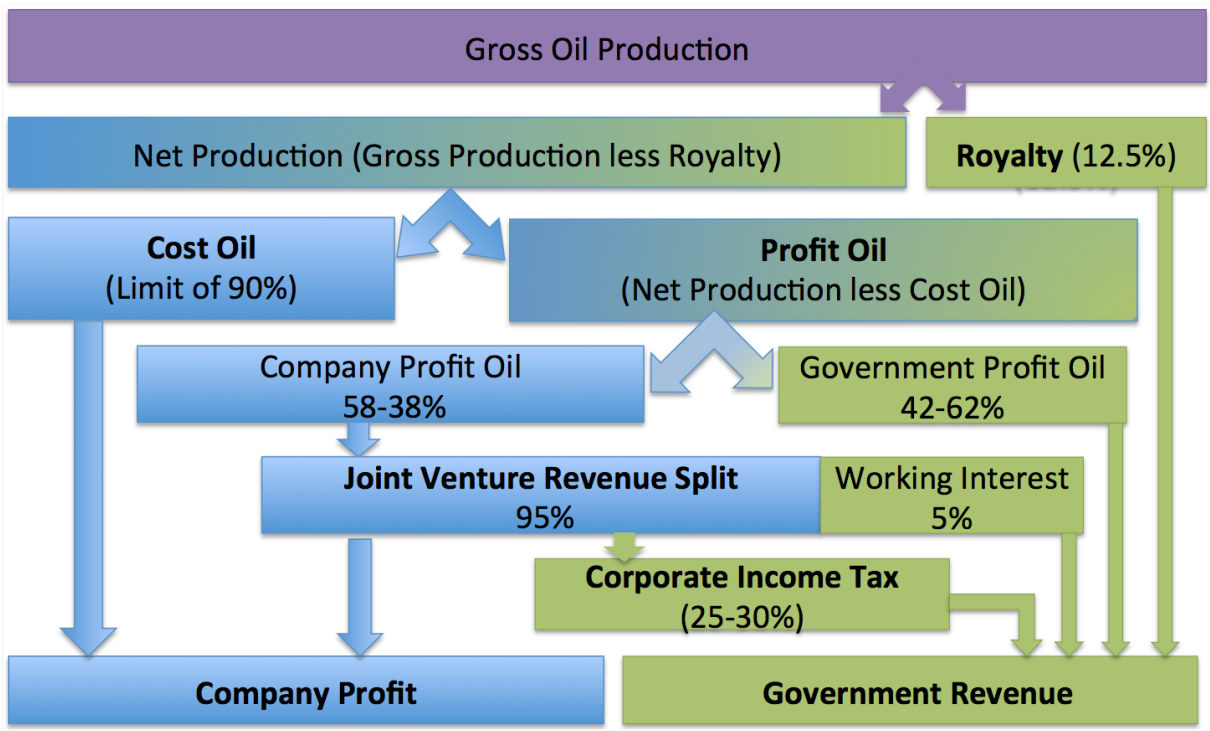
While areas of uncertainty remain, all indications suggest that the basic production sharing structure of the original agreement remains intact. As is common in many developing countries, Cambodia actually operates a hybrid production sharing system that includes a royalty and corporate income tax. The Government of Cambodia also holds an equity stake (often called "state participation" or a "working interest") in the project.

The core of the fiscal regime for Block A then is based on the four main fiscal instruments:

1. Royalty
2. Production Sharing
3. Corporate Income Tax
4. State Participation

Figure 4 illustrates the sequence in which the four main fiscal elements are engaged. It is important to note that the implications of the various fiscal instruments cannot be assessed in isolation. The benefits to the government of a stringent provision in one area can easily be offset by a more generous provision in another area. Fiscal instruments must be assessed comprehensively, in order to understand how they interact. Ultimately, fiscal instruments only become meaningful in the context of plausible scenarios on production volumes, oil price and expenses, as in Section V below.

Figure 5: Fiscal System for Block A Offshore



3 FISCAL INSTRUMENTS FOR BLOCK A

3.1 Royalty

For most fiscal regimes, the payment of a royalty is the first step in the calculation of government revenue. As a result, royalties are often called a payment "off the top." Royalties are commonly a payment to government calculated as a percentage of the overall value of the petroleum produced and are paid from the start of production, regardless of whether the company is making a profit.

Royalty payments have traditionally been viewed as compensation to the government for the depletion of a non-renewable resource. But royalties are now increasingly viewed as an important mechanism to guarantee government revenue in the early years of production, before profit-based taxes come on stream. There has been a general move away from high royalty rates, as they are not sensitive to the profitability of the project and can be a significant disincentive, particularly for marginal fields.

The royalty rate for oil in Block A is set in Article 11 of the 2002 contract at 12.5% of the sale value of the petroleum produced. This rate is confirmed in the KrisEnergy Prospectus.

3.2 Cost and Profit Oil

The second source of government revenue in the Block A fiscal system is a share of the oil produced. The production sharing system was developed by Indonesia in the 1960s and has since been widely adopted, particularly in the developing world. In this system, the oil company acts as a "contractor" to the government. There are two steps in the allocation of oil produced: first, the contractor recovers costs, and second, the remaining oil is divided between the contractor and the government.

Production sharing systems allow the contractor to recover their costs through an allocation of an initial amount of production termed "cost oil." Costs that can be recovered include those related to exploration for oil, the development of the facilities to produce oil and the operation of those facilities and their ultimate decommissioning.

In the first years of production, accumulated exploration and development costs normally exceed the value of total production. If all production in these early years were allocated to the recovery of costs, none would be left to split between the company and the government. In many (though not all) production sharing systems a limit is placed on the proportion of overall production each year that can be devoted to cost oil. With such a "cost recovery limit" in place, some proportion of production is always available to be split between the company and the government. It is important to note, however, that the cost recovery limit has an impact only on the timing of reimbursements to the company. Where limits are imposed, the costs that exceed those limits are carried-forward and claimed in subsequent years. According to one noted authority, cost recovery limits for production-sharing contracts around the world can be as low as 40-60%.[33] The limit for Cambodia Block A is set at 90% and is therefore quite generous for the company.

Once costs have been recovered, the remaining oil production, known as "profit oil", is split between the company and the government. In some countries, the division is based on a set percentage, but most PSAs use some kind of sliding scale. More specifically, many PSAs seek to provide the government with an increased percentage of production as the project becomes more successful.

The Cambodian fiscal system employs a traditional "production-based" allocation.[34] For production up to 10,000 barrels per day, the company receives 58% of profit oil while the government receives

[33] Daniel Johnston cited in Tordo, Fiscal Systems for Hydrocarbons, World Bank, 2006, p. 44.

[34] The traditional sliding scale is based on volume of production, normally thousands of barrels of oil per day (mbopd). While easy to administer, the approach has begun to fall out of favour, as there is no necessary relationship between production volumes and profitability. Small projects with low costs can generate high profits, while large projects with high costs may not generate much profit at all.

42%. For production exceeding 10,000 barrels per day up to 25,000, the split changes to 53% for the company and 47% for the government. The full set of tranches and percentages is set out in Table 2.

Table 2: Production Splits for Block A

(bopd)	Company	Government
0 - 10,000	58%	42%
>10,000 - 25,000	53%	47%
>25,000-50,000	48%	52%
>50,000	38%	62%

How do these percentages compare with other jurisdictions? Cross-country comparisons on the division of profit oil are difficult. According to the study by the UNDP, the percentage splits for Block A are quite similar to those that would apply in Vietnam, the Philippines and Myanmar.[35] This may well be the case, but no mention is made either of the volume of production required to move from one tranche to the next, or whether other fiscal instruments are applied such as corporate income tax. The full implications of the production sharing splits for government revenue can only be understood through an integrated analysis including all of the various production sharing terms as well as any additional fiscal instruments, as is done in Section 5 below.

3.3 Corporate Income Tax

It is increasingly common for countries with production sharing systems to also assess corporate income tax. Income tax is known as a "profits-based" tax as it is normally assessed on "net" or taxable income, calculated as gross income after eligible expenses have been deducted. Average tax rates globally are between 30% and 35% and it is not uncommon for the tax rate to be higher for petroleum operations than for the general private sector. Most expenses are claimed in the year in which they were incurred, though capital expenditures are commonly claimed back (depreciated) over multiple years.

As mentioned above, the rate of corporate income tax for Block A has been the source of controversy. Article 17 of the model PSA contract published by CPNA in 2004 indicates that the Contractor shall pay the government "income tax at a rate of 25% on Contractor's allocation of Net Petroleum." The original 2002 Chevron PSA uses exactly the same language indicating a 25% tax on company "profit oil" (Article 17). The contract is also clear on the "sanctity of the fundamental provisions." It indicates that if the government imposes new tax terms that result in a "material change in the financial burden," offsetting amendments will be made "in favor of the contractor." (Article 21.3).

The 1997 Law on Taxation is contradictory yet equally clear. Article 20 states that the tax rates on the annual profit are "30 percent for profit realised under an oil or natural gas production sharing contract." Article 15 of the Law on Taxation also sets out specific rules for capital depreciation in the context of the "depletion of natural resources" that are not mentioned in the 2002 contract.[36]

Although reports suggest that the negotiations on the PPA have been completed, at the time of publication, there has been no public indication of the results for corporate income tax. It appears likely that there will be some compromise between the two positions. In their 2013 Prospectus, KrisEnergy indicated that one potential compromise was to set the rate of income tax at "25.0 percent for 5 years from first profit and 30.0 percent thereafter."[37]

[35] See, Review of Development Prospects for the Cambodian Oil and Gas Sectors, UNDP, 2006, p.3.
[36] Specifically, depreciation is based on a units of production ("UOP") basis calculated by reference to total proved and probable developed and undeveloped reserves, incorporating the estimated future cost of developing those reserves.
[37] KrisEnergy Prospectus, p. 167.

For the purposes of this report, each of these three options identified in the public domain (the PSA 25%, the LOT 30% and the Prospectus 25-30%) will be assessed.

3.4 State Participation

Many countries with production sharing systems provide an option for the host government to "participate" in the project as a joint venture partner. This is also sometimes called state participation or "working interest."

The rationale for state participation is often not economic. In fact, there are no economic benefits provided by state participation that cannot be achieved through conventional taxes. In some cases, the rationale for state participation is driven by a sense of national pride: governments sometimes believe that it is essential that they have a direct role in the development of their national resources. Another justification for state participation, particularly when taking a very small stake, is the additional insight into the commercial dimensions of the operation gained from being on the inside.

Taking an equity interest in a project means that the State participates on essentially the same terms as other joint venture partners. There is however one important difference between the government and a normal commercial partner. It is unusual for the government to participate during the exploration phase. Rather, the private company takes all the risk associated with exploration and the government has the option to "back-in" to a percentage stake if exploration is successful. From this point it is not uncommon for the private companies to "carry" the costs of the state until production begins. Given the large up-front expenses required to develop an oil project, governments frequently require the company to finance project development with repayment being made from government revenues once oil production begins.

Neither the 2004 "model" contract nor the 2002 Chevron PSA makes any mention of state participation. However, according to Articles 46-48 of the 1991 Petroleum Regulations, the government has the right to own a stake in petroleum projects, though the specific terms are to be set out in the specific petroleum agreement. The Regulations indicate that if the government chooses to participate in petroleum operations, it will reimburse the contractor its share of costs without interest. According to the KrisEnergy IPO, in November 2011 the Cambodian Government announced its intention to take up a 5% stake in the Block A project. The exact terms for Cambodia's participation in Block A are part of the yet to be announced final negotiations. Indications in the Prospectus however suggest that the government will receive a "full carry" in that the company will recover the State share development costs once production begins.[38]

3.5 Secondary Fiscal Terms

The list above identifies the central fiscal instruments used in this analysis of potential government revenues from Block A. There are other measures that could be relevant but have been excluded from the economic analysis included in this report.

First, the 2002 contract provides explicit exemptions from a series of taxes. Specifically, Article 18.4 indicates that, with the exception of the 25% corporate income tax, the company "shall be exempt from income tax, withholding taxes on interest payments, and other taxes and tariffs and charges due to the government or local authorities." The Law on Taxation however includes a series of additional measures including a withholding tax on non-residents (14% on interest, rent, management or technical services and dividends) as well as a value added tax. Also, in 2010 the

[38] KrisEnergy Prospectus: We expect that each of the participants in Block A, aside from the CNPA, will be responsible for paying a portion their *pro rata* shares of the CNPA's costs in the block until first production. Such carried costs will be reimbursable to us out of the CNPA's share of petroleum if and when Block A reaches production." p. 147.

Government of Cambodia imposed a 10% export tax on crude petroleum.[39] The imposition of some or all of these taxes may well be part of the final fiscal terms agreed between the Government of Cambodia and KrisEnergy.

Second, there are indications that the government may be seeking to put in place a "windfall" or "excess profits" tax of some kind. It is increasingly common for fiscal systems to incorporate taxes designed to ensure that the government receives an increasing share as projects become highly profitable. This trend was accelerated by the staggering rise in international oil prices in the mid-2000s. Most fiscal systems had been previously been designed for an oil price of $20 to $30 per barrel. As a result, many countries sought to recalibrate their fiscal terms in the middle of the 2000s. The addition of an excess profits tax could improve the overall performance of the fiscal system. However, there are no details in the public domain on the specific terms that might govern such a windfall tax. Furthermore, preliminary analysis suggests that such a tax would have marginal impact, at least in the early phases of the Block A project, due to high costs and the relatively small volume of anticipated production.

Finally, as is common in production sharing agreements, the 2002 Chevron PSA includes what is known as a "domestic market obligation." Specifically, the "CNPA has the right to order Contractor to sell to the government, for domestic consumption, a portion of Contractor's share of Net Oil to meet the internal demand of Cambodia." The obligation is potentially important given the challenges that importing oil presents to the Cambodian economy as well as publicly declared plans to build a domestic oil refinery.[40] Additional terms of the 2002 contract however make clear that the government will pay market prices for any oil that companies are required to sell domestically. The obligation therefore would have little or no impact on either company profits or government revenues from upstream oil production.

[39] For a detailed analysis of these differences see Fiscal Systems for Petroleum and Minerals in Cambodia, 2010, p. 12.

[40] See "No end date in sight for oil plant completion," Phnom Penh Post, 3 April 2015.

4 MODEL INPUTS AND ASSUMPTIONS

The objective of this analysis is to provide a sense of the scale and timing of revenues that could accrue to the Government of Cambodia from KrisEnergy's Block A project.

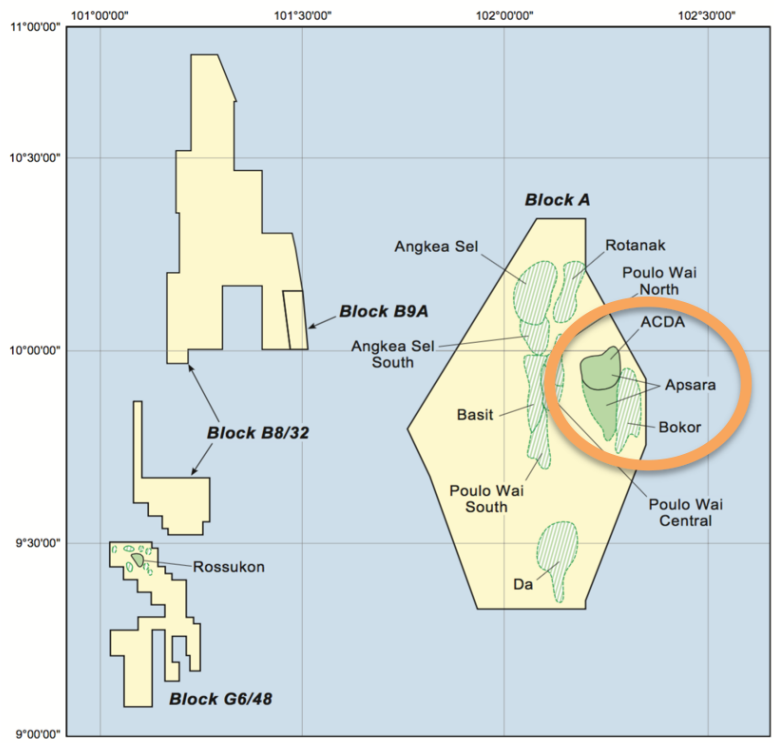
Assessments of potential government revenue from oil projects ultimately rest on four main components: the fiscal terms, the volume of oil produced, the price at which the oil is sold, and the costs incurred in production. The fiscal terms have been described in detail above. Details on input assumptions for production, price and costs are set out below.

A comprehensive understanding of project economics, and the relative benefits accruing to the company and the government, can only be completed after the project is finished and the books are closed. Nothing therefore can be said with any certainty about the future economics of the Block A project, or of the revenues that could accrue to the government. The best that can be done is to get a sense of what the project economics *might* look like under differing scenarios. These varying inputs are fed into a spreadsheet model in order to generate projections of potential government revenue.

4.1 Information sources

Three main sources have been used to develop the model inputs for production and costs. First, considerable details have been provided in the KrisEnergy Prospectus from 2013. The Prospectus was published following the submission of Chevron's second PPA in 2012 and therefore can be assumed to accurately characterize the development plan that existed at that time. Second, the Ministry of Mines and Energy provides a detailed technical overview of the proposed "first phase" of development for Block A.[41] Third, there is data from analogous petroleum operations by KrisEnergy and other international oil companies operating in similar conditions in the Gulf of Thailand on the Thai side of the border.[42] Finally, industry averages and "rules of thumb" have been used to fill in any remaining gaps.

Map 2: Block A – Apsara and ACDA Fields



[41] General Department of Petroleum - Offshore, Ministry of Mines and Energy n.d.

[42] "The development concept as detailed in the PPA is similar to other field developments in the Gulf of Thailand, including B8/32 and the Jasmine field in B5/27, which our Founders and certain individuals of our management team had developed prior to our incorporation." p. 146.

4.2 Production Timelines and Volumes

Overall production volumes and annual production profiles are normally based on estimates of recoverable oil reserves. For example, the UNDP and IMF revenue projections mentioned above based their analysis on hypothetical recoverable reserve estimates of 2.5 billion barrels and 500 million barrels respectively. In spite of the exploration drilling to date, there are no "proven reserves" in Block A. The independent economic analysis prepared for the KrisEnergy Prospectus provides estimates for only "contingent resources" (See Figure 1 above).

Both the Prospectus and the Ministry website provide details on the phased approach to the development of Block A that KrisEnergy has proposed. The development concept is similar to the approach that KrisEnergy has adopted in their Thai operations in the Gulf.

Given the information in the public domain, particularly from the KrisEnergy Prospectus, it is possible to be much more precise in estimating what the early phases of production from Block A might look like. The following excerpts from the IPO clarify the general approach of the development plan that Chevron had submitted to the Government of Cambodia.[43]

"Phase one of the development of Block A includes 24 development wells from a *single platform*, producing to a host floating storage and offloading vessel… Production is estimated to peak at 10,000 [barrels of oil per day …] and will result in a gross recovery of 8.60 [million barrels of oil] from the first platform."

"Two additional future development phases in the Apsara area on the discoveries made to date may involve the installation of up to 9 platforms, each with 24 wells. Further development across the entire license area could involve up to 44 production platforms in 7 separate producing areas."

"Production from this initial development phase is anticipated to start approximately 34 months after we and the other participants on Block A reach a final investment decision."

As noted above, KrisEnergy's approach to developing marginal fields is based on a phased methodology. The data provided in the IPO suggest the development of a series of platforms with a short lifespan and relatively high development costs. In order to minimize the capital expenditure risks, production capacity is expanded only as drilling success warrants.

Due to very short platform life, and to further minimize capital costs, it is assumed that the platforms will be installed as wellhead towers with minimal production facilities onboard. The oil will then be processed on a production barge with oil storage on a FSO (Floating Storage and Offloading). This approach minimizes the capital investment tied to the fixed platform maximizing the ability to transfer infrastructure for use on subsequent developments.

4.3 First Production

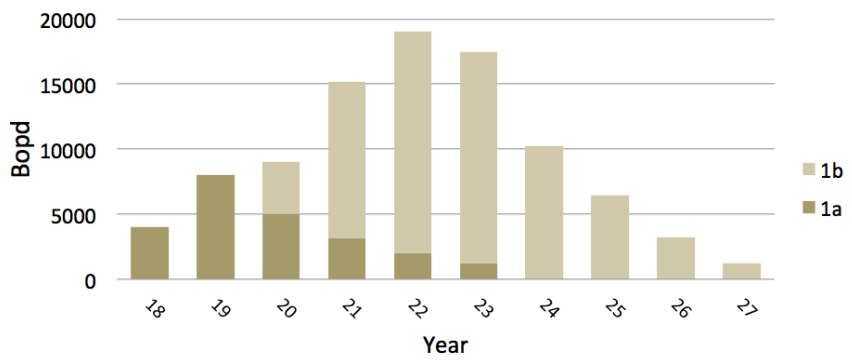
According to the Prospectus, production would start 34 months following the issuing of the PPA and the company's subsequent final investment decision (FID). More recent public statements from KrisEnergy suggest that the timelines for the development phase could be shortened to perhaps 24 months. KrisEnergy has reported that negotiations over the terms of the PPA are complete, though the documents still need to be finalized. It seems unlikely therefore than an FID could be expected before the end of 2015 at the earliest.[44] As a result, first production should not be expected before

[43] "Production from this initial development phase is anticipated to start approximately 34 months after we and the other participants on Block A reach a final investment decision, the date of which is difficult to determine. Production is estimated to peak at 10,000 bopd and, according to NSAI's 2C resources estimates, will result in a gross recovery of 8.60 mmbo from the first platform." Prospectus, p. 146. Map of Apsara Field from Prospectus p. D-315.

[44] See KrisEnergy Press Release, 2nd Quarter Results, August 2015, p. 4.

sometime in 2018. Given plummeting oil prices, KrisEnergy may further delay FID until the oil price outlook is clearer, resulting in further delays.

Figure 6: Production Profiles – Phases 1a and 1b



For Block A specifically, the company envisages three potential phases for the Apsara field. Given the high levels of uncertainty surrounding actual oil reserves, only the first two phases are analyzed here.

Phase 1a involves the installation of a Platform A with 24 development wells. Assuming an FID in early 2016, Platform A could begin production in 2018. Based on data provided by KrisEnergy, the "best estimate of contingent reserves" would result in a gross recovery of 8.6 million barrels.[45] The production lifespan of the platform is assumed to be six years.

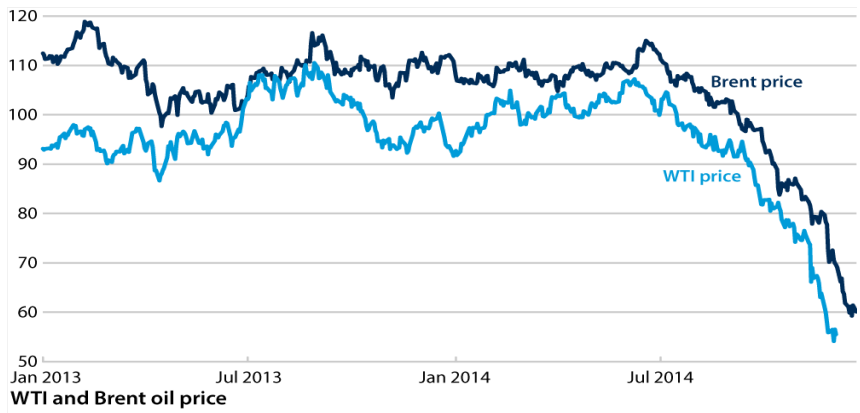
The proposed Phase 1b involves an additional three platforms in the Apsara Core Development Area (ACDA) with 72 wells for potential production of up to 25.8 million barrels. Assuming an FID of 2018 for Phase 1b, the additional platforms are assumed to be in place by 2020, 2021 and 2022 respectively. The production profile resulting from these start dates, with the aggressive drilling profile, peak within the assumed 20,000 bpd production barge processing capacity.

4.4 Oil Price

Annual production volumes are only one of two components necessary to calculate gross revenue; the other is the future sale price of oil. It is widely accepted that even the best oil price forecasts are little better than educated guesses. According to former BP CEO John Browne, the future oil price is "inherently unpredictable." The unexpected plummeting of oil prices through 2014 starkly illustrates this point. Whatever the uncertainty, companies use future price forecasts in making investment decisions.

Plausible estimates of future oil price are required for estimating future government revenue. The common technique is to select a base price and assuming modest price increases over time. This is not designed to be an accurate reflection of future prices but rather allows the fiscal system to be tested under a range of

Figure 7: International Oil Prices 2013-2014



[45] Year by year production totals over the five years are: 967, 2,880, 2,436, 1705, 612 million barrels. Prospectus p. D-347.

potential prices. Specific scenarios are based on oil prices of $70/bbl and $90/bbl. At the time of writing, oil prices are well below $50/bbl, and crude futures prices for the end of the decade are only around $65/bbl.[46] Our analysis shows that the Block A project is uneconomic below $70/bbl. We have therefore used that as our lower price estimate. Identifying an appropriate "high" oil price is more difficult. Given considerable skepticism that oil prices will return to levels of over $100/bbl, we have selected $90/bbl.

Forecast prices are for annual Brent crude – the world's most widely used benchmark price. The KrisEnergy Prospectus indicates that Block A crude is expected to sell at a 4% discount to Brent crude as a result of quality, transportation fees and regional price differentials.[47]

4.5 Field Costs

The third and final set of assumptions on which to construct plausible scenarios are costs associated with exploration, development, production and transportation. These costs are in some ways more "predictable" than production volumes or sale price. Data is drawn from the KrisEnergy Prospectus as well as other public domain sources.

Exploration Costs: The search for oil in Block A now extends back more than a decade. According to public statements from Chevron, 18 exploration wells have been drilled with total exploration costs of $160 million.[48] No specific data has been found on the distribution of these expenditures. The total therefore is simply divided over the four years when exploration wells were drilled – 2005-2007 and 2010.

Development Costs: Capital expenses for developing Platform A in the Aspara are provided for in the Prospectus. Total costs were estimated to be $215 million with three years allocated for the construction of the platform.[49] For this study the cost for the wellhead tower was based on data from fields in the Thai section of the Gulf of Thailand. The costs of pipelines and drilling were reviewed and, based on publicly accessible information, inflated to take into account current prices. Development costs for subsequent platforms are based on the same methodology.

Operating Costs: Estimated operating costs for Platform A are also provided in the Prospectus. Little additional information exists in public domain on rental rates for production barges and FSOs. Rental rate for the production barges and FSOs are assumed to be $100,000/day. Operating costs for wellhead towers are assumed to be $5 million per year. A notional $30million per year was included for non-rental operating costs. Operating costs for subsequent platforms are based on the same methodology – extending the production barge, FSO and non-lease operating costs accordingly over the years of operation and adding platform operating costs based on the number of additional platforms.

[46] See Brent Last Day Financial Futures Quotes, CME Group, December 2015.
[47] KrisEnergy Prospectus, D-314.
[48] "Chevron exits its investment in Block A after having spent more than $160 million on the venture and drilling at least 18 test wells." in "After $65M Deal, KrisEnergy in Familiar Position," Cambodia Daily, 13 August 2014.
[49] KrisEnergy Prospectus, D-344.

5 ECONOMIC ANALYSIS

The results from economic modeling are *not* a reliable projection of actual government revenues, particularly for projects not yet in the development stage. Rather, they provide insights into *potential* government revenue under specific sets of assumptions related to production volumes, oil price and field costs. The following section examines potential government revenues for the first and second phases of the project as identified in Figure 6.

Implementation of the first phase of Block A development depends on the finalization of the negotiations on the PPA and a final investment decision by KrisEnergy and its joint venture partners. Based on a final investment decision in late 2015 or early 2016, the earliest possible start of production would be 2018.

5.1 A First Phase (1a)

Phase 1a involves the deployment of a single platform producing 8.6 million barrels over a lifespan of 6 years. As is clear from the KrisEnergy development plan, Platform A is not expected to be economically viable on its own. This is no surprise for the development of a small volume of reserves 150 km offshore. Phase 1a is designed as a low-cost test to see whether there are sufficient oil reserves in the Apsara field for broader production to be profitable. This assumption is borne out in the economic analysis. The costs associated with Phase 1a are very high due to past exploration costs and relatively high development and operating costs combined with modest expected oil production over a short period of time. Irrespective of the oil price, the vast majority of production is allocated to cost oil (See Figure 5). Under the higher oil price scenario, a significant proportion of the value of the project to KrisEnergy is the recovery of historical exploration costs. Under the lower oil price scenario, a significant proportion of costs are not recovered.

If oil production in Block A does not proceed beyond Phase 1a, government revenue will be very modest. Under the assumptions adopted here, government revenues would begin with production in 2018. Revenues in the first years would be unlikely to exceed a few tens of millions. With an oil price of $70/bbl, total government revenues over the six years of the project would be less than $100 million. If oil prices were to be $90/bbl, total government revenues could potentially reach $125 million. As would be expected, the bulk of government revenue in this high cost / low revenue scenario would come from the 12.5% royalty.

5.2 A Second Phase (1a + 1b)

The implementation of Phase 1b depends on successful drilling during Phase 1a. There are no guarantees that the project will move to this second phase.

We have assumed that Phase 1b involves the deployment of an additional 3 platforms, coming on-stream between 2020 and 2022 allowing for total production of 25.8 million barrels over a lifespan of 10 years. This is seen as the most aggressive schedule possible as there is very little time allowed between Phase 1a production start up in 2018 and the final investment decision in 2018 for the first of these three platforms in Phase 1b to be able to come on line in 2020.

At this scale, the project becomes economically viable, though with high costs and modest projected production it would be unlikely to attract the interest of major oil companies like Chevron. The project however could become profitable for a company like KrisEnergy that seeks to exploit marginal fields if oil price rises to more than $70/bbl. While costs are still relatively high, the increased production volume generates more revenue.

5 ECONOMIC ANALYSIS

At $70/bbl, total government revenue from the combined 1a and 1b, over the lifespan of the project, would be around $630 million. Under the higher price assumption of $90/bbl, total revenues would be around $1.1 billion.

The bulk of early revenue from the project will be devoted to covering costs. With oil prices at $70/bbl, royalties account for a majority of government revenue. Revenues from production sharing only become prominent in 2023 when the volume of production allocated to cost oil declines. At $90/bbl, production sharing becomes a more prominent source of government revenue and accounts for more than 40% of government revenue over the lifespan of the project.

The “government take” is a common if crude metric for assessing how fair a deal the government negotiated. It assesses the percentage of divisible revenue (revenues after costs have been subtracted) that goes to the government as compared to the company over the entire life cycle of the project. Our analysis shows a government take of more than 70%.

The final fiscal instrument is state participation. Given that the equity stake in the project is only 5%, it is not surprising that it is a marginal contributor to overall government revenue. It does however increase government take by around 2% compared with no state participation.

6 CONCLUSIONS

Specific conclusions are offered on the timelines to production and expected production volumes in the early phases of the project; on the timing and potential scale of government revenues including the relative importance of the different fiscal instruments; and on the so-called "government take" and how it compares with "peer" countries. More general conclusions are offered on the importance of transparency of contracts and broader project data and on some lessons from this Block A analysis for the broader petroleum sector in Cambodia.

6.1 Timelines to Production

It has been more than a decade since oil was first discovered in Block A. KrisEnergy has brought renewed energy to the project and indications are positive that the negotiations on the Petroleum Permit Application are nearly finalized. Nevertheless, it will be at least 2018 before oil production could begin in Cambodia. First, KrisEnergy and its joint venture partners must make their "final investment decision." Then substantial capital infrastructure needs to be put in place. A 2018 estimate for first oil is a "best-case" scenario. A minimum amount of time is necessary to design and construct the wellhead platform and then drill the wells. But there is no maximum amount of time that can be taken, and further delays should not come as a surprise.

These timelines will seem very long to those in Cambodia who are relatively new to industry norms in the extractive sector. But it is important to recognize that it is not at all uncommon for it to take a decade or more from the first discovery of a resource until the start of commercial production. Furthermore, the current low oil price environment has resulted in companies being even more cautious in undertaking new development projects until the price outlook becomes clearer.

6.2 Production Volume

Early enthusiasm for oil in Block A was based only on geological possibilities. It is common for early estimates to be widely believed even in the absence of hard data from exploration drilling. For Block A, the idea that there might be 400-700 million barrels of recoverable oil was repeated many times over and became the conventional wisdom.

Since 2008, Chevron's few public statements suggested caution, noting that oil was more widely dispersed (less concentrated) on the Cambodia side of the border than on the Thai side. However, these statements were not widely reported or analyzed. An important signal on the scale of potential oil production was the participation of KrisEnergy. If Block A had been the massive oil find that some had speculated, Chevron would have had both the interest and capacity to develop the field itself. Bringing in KrisEnergy, a company that specializes in taking so-called "marginal" fields (those that may not be profitable) and making them economically viable was a sure indication that production, at least in the early phases, was going to be very modest.

With only 18 exploratory wells drilled to date, it is impossible to know how much oil is really available in Block A. Further drilling could yet demonstrate that Block A holds much more oil than many now think. Irrespective of the actual amount of oil, by adopting a risk-averse phased approach to production, KrisEnergy has provided a clear sense of what early production volumes might look like. Phase 1a will involve only a single platform designed to produce 8.6 million barrels of oil, with peak production of less than 10,000 barrels per day, over the course of five to six years. Only if drilling in Phase 1a is successful will the project move to Phase 1b, with three additional platforms being added over time. Total production across these two early phases is estimated to be less than 30 million barrels through to at least the mid-2020s.

6.3 Government Revenue

Oil revenues from Block A will not be a revenue "game changer" for Cambodia. The modest volume of anticipated production and the high cost of extracting the oil mean that government revenues

from the early phases of the project will also be very modest. As it is now understood, Block A holds the potential to bring in tens of millions of dollars of government revenue in peak production years. Under more optimistic scenarios, the total could peak at a few hundred million dollars per year.

As is normally the case, government revenues from Block A will be rear-loaded – that is they will arrive towards the middle and latter years of the project lifespan. This is because the bulk of early project revenue will be devoted to the recovery of costs incurred by the companies during exploration and development. The 90% cost recovery limit included in the 2002 contract is quite generous for the company. A lower cost recovery limit would generate a higher proportion of profit oil and therefore result in increases in government revenue in the early years of production. But the differences in overall government revenue generated by the project if the cost recovery limit were to be lowered would be small. The combination of relatively high costs (exploration and development) combined with very modest levels of anticipated production means that there is simply not that much revenue to split between the company and the government.

Under most scenarios the bulk of the government revenue comes from the 12.5% royalty. This is not surprising given both that the royalty rate itself is reasonably high and that royalty payments are assessed before costs are taken into account. Under higher price scenarios, costs are recovered more quickly and the government's share of production becomes a more prominent source of revenue. With profit oil split based on the volume of production (barrels of oil per day) production sharing would become an even greater source of government revenue if production increased significantly into the higher tranche levels above 25,000 and 50,000 barrels per day.

The corporate income tax rate has been a considerable source of controversy in the Block A project. Public reports suggest that the difference between the 25% rate in the 2002 PSA and the 30% in the Law on Taxation was the main point of contention in negotiations over the PPA underway since 2010. Obviously a higher tax rate will generate additional government revenue. And in percentage terms, the application of a 30% income tax results in an increase in the overall government take of about 2%. As total revenues for the project are modest, the impact of this percentage increase on overall government revenue is also modest. Looking at the combined Phase 1a and 1b, the total difference in government revenue between the two different income tax rates amounts to less than $100 million. In contrast, the difference in total government revenue between oil prices at $70/bbl and oil at $90/bbl is around $470 million.

6.4 Government Take

The most common measure for assessing whether the government negotiated a "good deal" in their oil contracts is the notion of the "government take" – that is the proportion of revenue after costs which is allocated to the government compared to the company over the life-cycle of the project. It is important to approach any government take statistic with caution, as it is difficult to know whether the figures were generated using similar assumptions on production, price and costs. Situations also change over time. For example, Indonesia is commonly thought to have a government take of around 85%, but by 2007 it had fallen by more than 10% and continues to decline as the mature producer seeks to encourage new exploration.[50]

Comparative research suggests that the government take varies widely among different countries with some securing only 40% while others take more than 95%. Based on an analysis of dozens of developing countries, the International Monetary Fund has concluded that the average government take ranges from 65% through 85%.[51] The economic analysis above suggests a government take for Block A, under varying scenarios, of more than 70%.

[50] Daniel Johnston, "Changing fiscal landscape," Journal of World Energy Law and Business, 2008.
[51] Philip Daniel, Generating Extractive Industry Revenues, International Monetary Fund, 2013, p. 7.

6 CONCLUSIONS

Previously analyses have suggested that Cambodia's fiscal terms are generous towards the company in comparison to other countries in the region.[52] But which countries should Cambodia be compared with? It is pointless to compare countries in fundamentally different situations. Any useful comparison of government take statistics must be done among peer countries.

For Cambodia, comparisons are best made with other so-called "frontier" countries – those with little or no existing production and with correspondingly high exploration risk at the time when contracts were signed. Cambodia was clearly a frontier country in 2002 when the original Chevron contract was signed. With only modest amounts of drilling having yet occurred outside of Block A, the country would still be considered to be high risk area for oil exploration. In these circumstances, countries invariably offer more generous terms in order to encourage companies to invest. The estimated government take based on the fiscal terms for Block A is certainly not unusually low.

Debates about the appropriate percentage of government take can be distracting. As the above analysis has demonstrated, the main determinants of the volume of government revenue from the Block A are not the fiscal terms that will be applied but rather the potential volume of oil that will be produced as well as the price at which that oil will be sold.

6.5 Transparency

This economic analysis of the revenue prospects from Block A would not have been possible without the data placed in the public domain by KrisEnergy in their Prospectus of 2013. Importantly, the Prospectus was the first public document setting out the fiscal terms from the 2002 Production Sharing Contract and from subsequent negotiations with the government. Cambodian citizens should have direct access to the contractual terms for all petroleum projects in the country, including offshore Block A.

It is now widely recognized that full contract disclosure is an essential element of good governance in the oil/gas and mining sectors. It is a recommended practice within the Extractive Industry Transparency Initiative and is being implemented by more than 20 countries worldwide.[53] It is also endorsed by the IMF and World Bank, and is required by the International Finance Corporation for oil gas and mining projects in which it invests.[54] Previous concerns that contracts contain commercially sensitive information have been widely discredited. Countries already implementing full contract disclosure have not seen any negative consequences. In fact, having contracts in the pubic domain increases trust between citizens, government and companies, thereby increasing the stability of agreed terms.

The Government of Cambodia is therefore encouraged to fully disclose existing petroleum production sharing agreements including any subsequent amendments. The documents should be easily accessible on a Government website.

The availability of the fiscal terms is an essential ingredient for developing an economic analysis of the project and for estimating potential government revenue. Equally important are details on estimated recoverable oil reserves, the proposed approach to field development and estimated costs. The Ministry of Mines and Energy currently provides some of this information for Block A on their website. This information should be updated and expanded following the finalization of the Petroleum Permit Application. Much of this data is already in the public domain. Cambodian citizens

[52] See Quinn, "Review of Development Prospects and Options for the Cambodian Oil and Gas Sector" 2005, p. 3.

[53] See "Contract Transparency: Creating Conditions To Improve Contract Quality" Natural Resource Governance Institute, 2015.

[54] See Guide on Resource Revenue Transparency, International Monetary Fund, 2007, p. 1; and Policy on Environmental and Social Sustainability, International Finance Corporation, 2012, p. 11-12.

should have no less right to information on the project than KrisEnergy's investors. This has been the practice in other countries, and has led to healthy, informed and efficient public dialogues.

The Wider Petroleum Sector

Block A is the flagship oil project for Cambodia. But it is not the only Block that holds promise, either offshore or onshore. Avoiding additional delays in the Block A project will facilitate the development of the broader petroleum sector. Enthusiasm for further exploration increases when earlier discoveries are converted into production. Progress on Block A will also help set the stage for a future licensing round to allocate additional Blocks.

Cambodia can also improve prospects for the further development of the petroleum sector by clarifying legal and fiscal frameworks. It is not uncommon for petroleum contract terms to be renegotiated, particularly in light of profound changes such as the massive rise in oil price between 2002 and 2008. At the same time, international oil companies expect a degree of certainty surrounding the economic terms governing their projects.

Best practice suggests moving away from project-by-project negotiations and embedding the majority of fiscal terms in sector-wide legislation. Adopting such a practice would ensure that there are no discrepancies between law and contracts in the future, as was the case with the Block A contract and the Law on Taxation. This can be achieved by passing a new Petroleum Law and publicly disclosing a corresponding "model" production sharing contract.

Specific recommendations on the fiscal provisions for a Petroleum Law and "model" contract are beyond the scope of this study. However, this analysis of Block A economics suggests that care should be taken to ensure that the overall package of fiscal instruments adopted provides an appropriate split of divisible revenue for projects with both low and high profitability. In a well-designed fiscal system, as profitability increases, so to should the proportion of divisible revenue allocated to the government.