

Increasing Transparency in the Extractive Industries in Cambodia

Prepared for

Open Development Cambodia

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Foreword

This report was written for Open Development Cambodia (ODC) by students at the La Follette School of Public Affairs at the University of Wisconsin–Madison. The learning objective of the La Follette School is to provide graduate students the opportunity to improve their policy analysis skills while providing the client an analysis of a policy problem on which a decision or set of decisions needs to be made.

The La Follette School offers a two-year graduate program leading to a Master in Public Affairs (MPA) or a Master in International Public Affairs (MIPA) degree. Students study policy analysis and public management, and they spend the first year and a half of the program taking courses in which they develop the expertise needed to analyze public policies, including skills in statistics, economics, and policy analysis. The authors of this report all are in the final semester of their degree program and are enrolled in the Workshop in Public Affairs course. Although acquiring a set of policy analysis skills is important, there is no substitute for doing policy analysis as a means of experiential learning. The Workshop in Public Affairs gives graduate students that capstone opportunity as they produce a report for a real-world client about a question of importance to the organization.

I am grateful to Open Development Cambodia for partnering with the La Follette School on this project. Open Development Cambodia staff members have been generous with their time to support the students' work. The students have collectively contributed hundreds of hours to the project, and in the process developed critical insights about government transparency. The La Follette School is grateful for this collaborative effort and hopes the report proves valuable.

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The views, opinions, and recommendations in this report represent those of the authors alone and do not reflect findings, recommendations, or policies of the University of Wisconsin–Madison, the La Follette School, or Open Development Cambodia.

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Abbreviations

CDC	Cambodian Development Council
EIGF	Extractive Industries Governance Forum
EITI	Extractive Industry Transparency Initiative
FDI	foreign direct investment
GDP	gross domestic product
IMF	International Monetary Fund
MEF	Ministry of Economy and Finance
MIME	Ministry of Industry, Mines, and Energy
MIPA	Master in International Public Affairs
MME	Ministry of Mines and Energy
MoE	Ministry of Environment
NCSD	National Committee for Sustainable Development
NGO	Non-governmental Organization
ODC	Open Development Cambodia
RGC	Royal Government of Cambodia
SPIDER	The Swedish Program for ICT in Developing Regions
USGS	United States Geological Survey

Executive Summary

The extractive industries are poised to play an increasingly important role in Cambodia's economy and development. However, there is still significant uncertainty about how much these industries are expected to contribute to government revenues. In support of the extractive concessions information initiative by Open Development Cambodia (ODC), this report analyzes four key research questions: 1) What revenue requirements apply to extractive concession grantees in Cambodia?; 2) Based on current regulations, what amount of government revenues should be generated from these concessions?; 3) Does estimated revenue correspond to reported revenue?; and 4) What policy options should be considered to improve transparency and accountability regarding Cambodia's extractive industries? After analyzing these four questions, we recommend three key policies to be pursued separately or, ideally, as a combined package: 1) improvements to the website of the Ministry of Mines and Energy (MME), 2) greater clarification of various aspects of the extractive concessions process, and 3) eventual movement toward Cambodian entrance to and compliance with the Extractive Industries Transparency Initiative (EITI).

Each recommendation addresses a different area of governance practices and can be implemented separately or (ideally) holistically. The first recommendation promotes transparency through administrative governance. It also calls for making key improvements to the MME website to make relevant extractive industries documentation more widely available to the public. Because we consistently experienced a need to turn to non-governmental sources for documentation, we hope that this recommendation will help align the MME with Cambodia's Digital Government Policy of 2022–2035. Improving transparency through administrative governance is also a crucial mechanism for informing the public about the environmental and social impacts of extractive industries and what the government is doing to address these issues. The second recommendation promotes transparency through legislative governance practices and calls for clarifying the extractive concessions framework in Cambodia. We made this recommendation because much of the data necessary to confidently estimate revenues from extractive industries in Cambodia is either not available or incomplete, and while this information is likely held by the government, it is not available to the public. The third recommendation promotes transparency by engaging in international governance. It suggests that Cambodia join EITI and become compliant with the EITI standard. As the Cambodian government is not our client, we offer these as actions that non-governmental organizations (NGOs) like ODC can advocate for to push towards tangible changes to governance practices that promote openness and transparency in the extractive industries and more broadly.

We arrive at these recommendations after first detailing the role of the extractive industries both globally and in Cambodia, tracing the development of both the oil and gas industries and mineral industries in the country. We then briefly discuss the role of transparency in the extractive industries internationally, with particular emphasis on the Extractive Industries Transparency Initiative. After this, we highlight some of the key regulations surrounding the mineral industries and oil and gas industries in Cambodia, before transitioning into our data analysis. During this analysis, we identify prominent revenue streams from extractive industries and outline a potential revenue estimation process, gather information that would be necessary to estimate non-tax revenues from these industries, and then attempt to estimate non-tax revenue streams for the mining industry such as surface rental rates, licenses fees, and royalty payments, though in many cases we are limited by data availability or quality issues.

Broadly, we find that while reported non-tax revenues in 2021 represent a potentially plausible level — given the current state of data we were able to locate related to the Cambodian mineral industries — it is difficult to precisely verify reported revenues. Thus, the large range of our approximations is reflective of data transparency progress that will be necessary to confidently assess whether the Cambodian government is collecting the amount of revenue that they report. The figure below provides an illustrative example of this issue, as evaluating the expected royalties for just one major industry, sand production, is

complicated by contradictions between available data sources that make it difficult to precisely estimate what royalties the government should be collecting.

Table 1: Sand Royalty Estimates — Government and Non-Government Figures

Year	Production Revenues Haffner	Production Revenues USGS	Minimum Revenues Non-Governmental Estimates	Maximum Revenues Non-Governmental Estimates
2017	\$800,000	\$2,000,000	\$3,375,000	\$6,125,000
2018	\$1,600,000	\$2,875,000	\$4,250,000	\$7,875,000
2019	\$1,800,000	\$4,625,000	\$4,375,000	\$8,125,000

Source: Hackney et al 2021, Haffner 2020, Moon 2022, and Sokhorn 2016 2016 royalty rate of \$0.2/m³ applied for all years.

Finally, we detail our arguments for the policy package discussed above. It is not only a result of the data-based findings of our research but also a culmination of the challenges we faced in the process of creating this report more broadly. These challenges reflect the difficult situation that the extensive NGO network in Cambodia faces in gathering data on their country’s development. Throughout the creation of this report, our team consistently encountered a lack of available data regarding the revenues of extractive concessions in Cambodia. The lack of accessible information highlights the importance of our recommendations to solve this issue.

Improving transparency in Cambodia's extractive industries is critical for sustainable and equitable development. While there are challenges to overcome, there are also opportunities to build a more transparent and accountable mining sector that benefits all stakeholders. In fact, Cambodia has shown its willingness to adopt more transparent policies and engage with civil society, whether it be via conferences like the Extractive Industry Governance Forum or through the Digital Government Policy. By implementing the recommendations outlined in this report, Cambodia can move toward a more transparent and responsible framework of resource extraction that engages with both the public and private sectors and builds stronger accountability mechanisms within civil society via open data dissemination.

Introduction

The Client: Open Development Cambodia

The purpose of this report is to provide analysis for Open Development Cambodia (ODC) in support of the launch of their extractive concessions information initiative, funded by [SPIDER](#). ODC is a non-governmental organization (NGO) based in Phnom Penh, Cambodia that serves to increase government and corporate transparency by collecting data regarding Cambodia's development and making it accessible to the public. The primary mechanism for sharing this information is through the [ODC website](#), which has a collection of news, maps, and statistics for the country's economic, environmental, and health sectors, as well as many other fields (Open Development Cambodia 2023). ODC's current project on extractive concessions seeks to provide information regarding companies that are currently operating in Cambodia's mining industries, particularly focusing on how much revenue is being collected from these companies by the Cambodian government.

The role of our research team is to provide policy analysis for regulations in extractive industries in Cambodia. Based on this analysis, we will determine the types of payments that should be made by companies operating in Cambodia to the Cambodian government. Then, using known data, we will provide a projection for determining how much of this revenue should be collected in a given year. The final step in this analysis is to compare the projected concession revenue with the total revenue reported by the Cambodian government. This comparison will aid ODC in providing more transparent information about revenues received from extractive industries in Cambodia. The findings from the regulatory and data analyses will serve as the basis for policy recommendations. The recommendations will suggest ways to increase transparency and accountability within the Cambodian government and among corporations regarding extractive concessions. Furthermore, this report will discuss ways to address gaps in revenue collection as Cambodia continues to develop.

Understanding Expectations and Realities around Extractive Industries in Cambodia

Small-scale, local, and artisanal mining has long since been part of Cambodian culture. However, in the last several decades, some large-scale mining projects from domestic and international corporations have taken hold in the country (Open Development Cambodia 2018a). Still, the industry is relatively small; mining revenue accounts for only about .013 percent of Cambodia's GDP as of 2021 (Trading Economics 2023), while oil rents account for about .158 percent of Cambodia's GDP (CEIC 2023).

The Kingdom of Cambodia has developed a regulatory framework for extractive industries but has maintained some level of opacity around important aspects such as production levels and revenue collections. It is quite difficult for NGOs and current or potential investors, let alone average citizens, to gauge how the sector is developing with the current practices. Increased government transparency has been shown to have many benefits, including higher economic efficiency and growth, less corruption, and the heightened ability for citizens to hold officials accountable. All of those aspects are linked to more development and higher living standards (Bastida and Benito 2007). The issue of transparency in extractive concessions in the mining sector has significant implications for Cambodia and its development, which is why we believe this report has the potential to aid in overall efforts to improve transparency.

Research Questions

Research Question 1: What revenue requirements apply to extractive concession grantees in Cambodia?

Approach: Conduct a review of documentation from the Cambodian government and other sources to assess the rates and fees that are associated with extractive concessions, as well as how transparent this information is.

Research Question 2: Based on current regulations, what is the amount of public revenues that should be generated by extractive concessions in Cambodia?

Approach: Utilize reviewed documentation to generate approximate estimates of public revenues through comparative and empirical analysis of government data, firm reports, etc.

Research Question 3: Does the tax owed correspond to the actual, reported revenue or is there a gap?

Approach: Detail government-reported revenues and compare these to our generated estimates. In addition, consider potential explanations for discrepancies or uncertainties between estimates and government numbers. As examples, these might include differences in market price rates for high-value commodities and other production quotas or levels. Firm reports or other data sources may be useful to see if the production yields match the given revenue and market price.

Research Question 4: What policy options should be considered for improving transparency and accountability in the Cambodian extractive industries system?

Approach: Building on lessons and key takeaways from our analysis, consider and recommend various policy options for increasing transparency. As developing nations suffer from asymmetric information problems between domestic governments and firms, it is paramount to ensure the efficiency of given state procedures.

Background

Understanding the Role of Extractive Industries Globally

Extractive industries — including the mining industry, the oil industry, and the natural gas industry — are a significant global economic sector. Between 2013 and 2023, the market size of the oil and gas industries ranged between \$2–\$5 trillion, and they are estimated to have a market size of approximately \$4.3 trillion in 2023 (IBISWorld 2022), around four to five percent of the world economy. For mining, revenue for just the top forty companies in the world was an estimated \$925 billion in 2021 (Garside 2022).

The importance of these industries is also reflected via non-monetary indicators. Over three billion metric tons of metals were mined in 2019 (Bhutada 2021), approximately 4.2 billion metric tons of oil were produced in 2021 (Aizarani 2023), and approximately 140 trillion cubic feet of natural gas were produced in 2020 (U.S. Energy Information Agency 2021). Spatially, Maus et al. (2022) estimate that, as of 2019, artisanal, small-scale, and large-scale mining — all of which takes place in Cambodia — globally utilized almost 102,000 square kilometers of land. Given the realized success of the industries globally, it is understandable why countries such as Cambodia would look toward extractive industries as an avenue of development.

Importantly, international organizations also place emphasis on the sector. The United Nations Environment Programme acknowledges the potential economic benefits of extractive industries while emphasizing the climatic, ecological, and social costs that may stem from them (UN Environment Programme n.d.) The World Bank shares this view, noting the role that extractive industries play in the economies of many countries while also implementing programs like the Climate-Smart Mining Initiative and Extractives Global Programmatic Support to improve governance and limit the potential negative effects of the extractive industries on the environment and people (The World Bank 2021). The International Monetary Fund also plays a role in promoting extractive industries governance, placing emphasis on transparency in revenue — for instance working with the Extractive Industries Transparency Initiative (International Monetary Fund 2014) — and developing tools for better understanding revenues such as the Fiscal Analysis of Resource Industries framework (International Monetary Fund n.d.).

The development of extractive industries in Cambodia must be understood within this broader international context. However, it is also necessary to detail the Cambodian case, as it differs in a number of ways from the more developed state of extractive industries in other countries.

Understanding the Role of Extractive Industries in Cambodia

Extractive industries have considerable potential to drive economic growth, especially for Cambodia, which has undergone significant development over the two past decades. As such, the economic growth rate in Cambodia was, on average, 7.7 percent annually from 1998 to 2019, one of the fastest rates in the world over that period (The World Bank 2022). The World Bank even reclassified Cambodia as a lower-middle income country in 2015, and the country was on pace to reach high-middle income status by 2030 prior to the Covid-19 pandemic. The rapid growth can be attributed to the roaring success of garment exports and the tourism industry, which have bounced back since the pandemic but have not returned to pre-pandemic rates (The World Bank 2022). However, despite this transition, the southeast Asian nation remains one of the poorest amongst its neighbors. The potential that extractives hold may be the boost that Cambodia needs to continue on this path of steady development that could see it achieve a high-middle income classification by 2030. Importantly, the industry allows for diversification of foreign direct investment, more trading potential, and ways to address poverty and grow the quality of public services in the country.

The Oil and Gas Industry in Cambodia

Outside of long-running efforts to develop mining in Cambodia, companies have seen Cambodia as a potential source of oil. Activity in the oil sector picked up in 1991, with several companies signing

exploration agreements and conducting exploration activities (Lyday 1995). A review of United States Geological Survey (USGS) reports in the 1990s and 2000s reflects a steady stream of such activities, but production has been plagued with difficulties. Most recently, KrisEnergy announced that it would begin oil production in offshore Block A in 2019. This was the same location where Chevron struck oil in 2004 and attempted to begin production; however, the agreement between Chevron and the Cambodian government fell apart (Keeton-Olsen 2019). Unfortunately, after a brief effort to restart oil production efforts in Cambodia, by 2021 the venture with KrisEnergy had collapsed (Reuters 2020). KrisEnergy, due to cost issues and underproduction, entered liquidation shortly after beginning production (Thul and Aravindan 2021). Given the Cambodian government had estimated the project would bring in over \$500 million in government revenues, this was a significant loss, and it remains to be seen how oil exploration will develop moving forward.

The Mineral Industry in Cambodia

In March of 2013, Chrea Vichett, Director of the Department of Mineral Resources in the Ministry of Industry Mines and Energy (MIME), the precursor to what is now the Ministry of Mines and Energy (MME), authored a report titled “Current Situation of the Mining Industry in Cambodia.” The report provides a snapshot of the state of the mining industry in the early 2010s from the perspective of the governing body primarily responsible for its regulation and utilization. Vichett explained how many mining resources had yet to be fully explored or exploited, and he emphasized five commodity groups of mineral resources in Cambodia. Those groups are listed in Table 2.

Table 2: Mineral Resources in Cambodia

Commodity Group	Examples
Metallic Minerals	gold, iron, tin
Non-Metallic/Industrial Minerals	silica sand, limestone
Gemstones and Ornamental Stone	sapphire, ruby, amethyst
Solid Fuel Minerals	coal, lignite
Construction Materials	granite, sandstone, gravel, clay, sand

Source: Vichett 2013

However, the report does not provide details on the specific level of development of the production of these minerals, and it is difficult to locate reliable data on the historical or current levels of production for most of these commodities. One source that does provide some insight into these questions is the yearly reports of the United States Geological Survey (USGS).

Among its other activities, USGS publishes yearbooks on the mineral industries of various countries, including Cambodia (United States Geological Survey n.d.). The benefit of these yearbooks is that they provide a longitudinal trace of the development of the extractive industries. For Cambodia, USGS has published yearbooks running from 1994 to 2019, containing estimated quantities of production, major producers, background information on topics such as major laws, and specific updates about activities in certain sectors.

Early reports by USGS convey a sense of potential, albeit one limited by a lack of effective utilization. USGS’s first report in 1994 notes that, while there were a few known mineral resources in the country, exploration and production were underdeveloped, and there were no legal exports of minerals (Lyday 1995). The 1995 report echoes this point, although it does report 40,000 metric tons of salt production each year from 1991 to 1995 (Kuo 1996). The 1998 report represents the first departure from

previous reports that acknowledged a lack of exploration and production, with disclosures of 100,00 metric tons of cement production in 1994, which had risen to 300,000 by 1998 (Kuo 1999).

By the early 2000s, USGS's assessments of the Cambodian mineral industry had not drastically changed, and production remained limited to under twenty companies focused on "quarrying construction aggregates, crushed stones, and sand and gravel, as well as mining small quantities of gemstones, gold, iron ore, phosphate rock, and zirconium" (Wu 2002, 1). In 2003, when USGS reported International Monetary Fund estimates on the size of the minerals sector, it only represented around 0.2 percent of GDP and employed around 4,000 people (Wu 2004). Toward the end of the decade, these numbers were still small, though the industry had grown to around 20,000 workers in 2006, making up around .4 percent of GDP (Wu 2009).

Over time, USGS reports have observed and highlighted changes in the Cambodian mineral industry. In 2001, for example, USGS updated production quantities to include gravel, laterite, phosphate, fertilizer, quartz sand, and stones, some of which continue to be reported with minor variations until the end of the 2010s (Wu 2002). Quantities in some of these areas grew as well, giving a reason for optimism in recent years, particularly concerning construction-related materials (Moon 2022). Appendix B contains a line graph showing changes in production from 2015–2019 from USGS data.

However, issues with data quality remain; even in its most recent 2019 report, USGS has been unable to report accurate production data on minerals such as gold and iron due to inadequate information about production levels (Moon 2022). While there is some data available in this regard,¹ in general, data quality issues make evaluating the state of mineral industries in Cambodia difficult. Comprehensive and accurate estimates of overall production levels are difficult to locate. At least historically, this may be partially attributable to the underdevelopment of legal mining activities in the country. Wu (2009) notes that commodities like gold and gemstones were produced by small-scale or illegal miners, making it difficult to identify accurate production levels. Regardless of the reason, production data like that produced by USGS appears to be unable to fully capture the development of the mineral industry over time.

Alternative Indicators of Growth in the Extractive Sector

There are other indicators that the Cambodian minerals industry has grown over time. First, USGS reports provide snapshots of the number of active exploration and mining licenses in Cambodia, which can serve as a proxy for the growth of the mineral industry by indicating the number of entities interested in either the exploration or extraction of mineral resources. In combination with other sources, it is possible to construct a general timeline of the number of licenses.

In USGS's 2003 report, the agency provides its first explicit tally of the number of active licenses, noting that there were eleven licenses issued during the 1990s (Wu 2004). By 2007, the Cambodian government had awarded nineteen exploration licenses and eleven mining licenses, with four to five more exploration licenses awarded in early 2007 (Wu 2009). These numbers grew quickly, however. Per MIME, by 2012 this number had reached a total of 139 exploration licenses, thirteen of which were allowed to move past exploration to exploitation (Fong-Sam 2015).

By mid-2016 the Ministry of Mines and Energy (MME) reported over 500 active licenses of various types, even after canceling 116 (Kotoski 2016a; 2016b). Approximately four-fifths of these licenses were related to construction material extraction (Kotoski 2016a). These 2016 numbers appear relatively close to the number of active licenses today, as an Australian Trade and Investment Commission (2022) webinar discussing the Cambodian Mining Industry listed a total of 435 construction mining licenses, seventeen industrial (exploitation) licenses, and thirty exploration licenses as of 2022. In the absence of more granular production data, this large-scale increase in the number of licenses between the early 2000s and today is suggestive of growth or maturation in the extractive industries, primarily centered around construction

¹ For example, in 2021 there was a reported 1,344 kilograms of gold (in six months of operation) and 19,000 metric tons of coal produced, alongside 10.5 million metric tons of limestone and 8.8 million metric tons of cement (Australian Trade and Investment Commission 2022).

materials. Appendix A Figure 2, tracks the number of active mineral exploration licenses and industrial mining licenses over time.²

Alternatively, another indicator of the growth of the mineral industry in Cambodia is the GDP contribution of the mining sector over time. Per Trading Economics (2023b), from the earliest estimate of 2013 until 2021, mining's contribution to GDP rose from 346.5 billion KHR (\$90 million) to 1,436.9 billion KHR (\$350 million). Appendix C contains a line graph in Figure 10 that displays the changes in GDP over time. This increase in GDP has been accompanied by significant investment. In 2022, investment levels in mining were \$1,252 million, including \$975 million for industrial mining activities, and total employment in the sector was approximately 8,500 people, with close to 60 percent working in industrial mining and 40 percent in pits and quarries mining (Australian Trade and Investment Commission 2022).

A Brief Case Study: Gold

The Cambodian experience with gold mining is worth highlighting as a case study because of its eventual success as well as the struggles of obtaining reliable production data. First, gold has been an important factor in Cambodia's experience with extractive industries for decades. USGS notes that the Cambodian government signed potentially its first gold-related contract in 1994, and there were also plans in that year for Herald Resources Ltd. to invest \$20 million toward exploration (Lyday 1995). Similarly, USGS reported that Sun Trading Co. Ltd. was expected to begin commercial gold mining in 1996 (Kuo 1997). It is apparent that interest in gold dates back several decades, at a minimum, and USGS reports from 1994 to 2019 consistently highlight gold-related mining or exploration deals. Despite this, the first commercial gold mine in Cambodia only began production in 2021 (Firn and Vanyuth 2021). In short, developing commercial gold production has been a long-term process for Cambodia, though one with potentially significant payoffs. As of December 2022, the Cambodian government had collected more than \$15 million from gold production since June 2021, with \$8 million in royalties from Renaissance Minerals Ltd., which has accounted for over 95 percent of production to date (Kunmakara 2023). Should other projects and commodities follow, there is significant potential for the extractive industry's revenues to benefit Cambodia.

However, gold also shows some of the pitfalls of extractive industries and the challenges of understanding their development in Cambodia. Returning to our previous discussion, the long-term unreliability regarding production data, at least partially fueled by the small scale and/or undocumented nature of gold mining in Cambodia's past, highlights that the historical trend is one of opaque rather than transparent data. Both data and environmental concerns are illustrated in Wu's 2005 USGS yearbook. There, he cites a 2004 NGO report by Corporate Social Responsibility in Asia that alleged between 5,000 to 6,000 workers had been exposed to toxic chemicals used in gold mining, which caused serious health issues and environmental damages. And yet, no official gold mining was reported in that year. While greater public discussion about gold production in recent years is a promising sign, the outflow of extraction industry information must be consistent, and the government must ensure that officially licensed developments do not come at the expense of environmental or individual health.

Transparency in Extractive Industries: A Global Perspective

The issue of transparency in extractive industries is not one that is unique to Cambodia or even to developing countries. In fact, there is a global initiative to address opacity in this sector. International organizations such as the World Bank and the International Monetary Fund (IMF) have included increased transparency as a condition for receiving loans, and transnational corporations often use this open information for investment opportunities. The Extractive Industry Transparency Initiative (EITI) is an organization dedicated to increasing transparency and accountability by setting global standards and providing independent oversight in the implementation of these standards. The EITI currently has fifty-

² In some cases, sources list the number of companies with a certain type of license and a total number of concessions. We utilize the total number of concessions or licenses rather than the number of companies.

seven countries that have committed to implementing the organization's standard for reporting data and other aspects of extractive sector management. Members are also given a classification that provides a snapshot of how well the country is doing to adopt the EITI standard.

Benefits of EITI Participation

First, EITI is a voluntary organization, which carries practical and symbolic implications. The practicality of EITI is that countries can join regardless of where they are in the development of their extractive industry. This allows countries to easily share knowledge and best practices to help develop extractive industries while also maintaining a set of guidelines to instill these best practices (EITI 2019). Having this resource can be especially helpful for countries that are just beginning to develop their extractive industry, as they can learn from what other countries have done. However, there is no delegation of sovereignty to a supranational organization, so full discretion still rests in the hands of individual governments. Though governments may not necessarily be giving up any real source of power, membership signals a dedication to high standards and quality governance. This symbolic aspect can indicate to several parties that a participating country takes issues of transparency and accountability seriously. These parties include domestic interests — citizens, corporations, and related industries — and international ones, such as multinational corporations or international organizations that can provide investment, trade, and growth opportunities.

Second, EITI provides means-tested oversight that is associated with better governance practices across the board, not just within the extractive industries. By having an independent oversight mechanism, inefficient or corrupt practices are brought to light, making it easier for the public to demand change. With information more widely available, the public is more likely to participate in civil society, which strengthens democratic tradition. Additionally, transparency and accountability are also associated with heightened economic development (Bastida and Benito 2007). Therefore, EITI participation is beneficial for building quality government practices and for economic development without requiring a country to give up any control over these areas.

A Brief Case Study: Indonesia

Indonesia joined EITI in November of 2010 and is currently classified as having made “meaningful progress” in increasing transparency in its extractive industries. A 2021 case study examined Indonesia's progress and evaluated the impacts of EITI membership. The study evaluated the three main aspects of governance quality that EITI seeks to address: transparency, civil society participation, and accountability. The study defined transparency as “the public's access to information” (Yanuardi, Vijge, and Biermann 2021) and states that transparency can help prevent corrupt practices and boost stakeholder trust, reducing the likelihood of violent conflict. However, the fairly limited scope of the EITI standard does very little to address social and environmental impacts of the extractive industry. This limited scope is an area that the organization has tried to improve over the years, but, according to this study, it has yet to translate to meaningful change. The term civil society participation is defined in the study as “increased opportunities for civil society to influence decision-making processes” and states that this issue can improve relations and balances of power between citizens, the government, and extractive industry business owners. According to this study, it is not uncommon for EITI-implementing countries to suppress civil society participation. This is an especially concerning trend for Indonesia, which is still democratizing decades after the fall of its authoritarian regime in 1998. The term accountability refers to the ability of civilians to punish or reward the government and extractive businesses for their actions. This accountability mechanism seeks to minimize negative impacts but also requires some level of willingness or ability for actions to change. In evaluating these key aspects of EITI, this case study highlights the ways that Indonesia has benefited from EITI membership.

The study found that EITI membership has most positively impacted civil society participation in Indonesia, while there is much room for improvement in transparency and accountability. As mentioned previously, the concern of EITI-implementing countries suppressing civil society participation is especially relevant to Indonesia. However, being part of EITI has allowed for many civil organizations to establish a

network for Publish What You Pay membership. Publish What You Pay is another global transparency mechanism where businesses that deal in natural resources publish the revenues they pay to the government. This has been a very positive step for increasing civil society participation, but there are still many struggles that organizations face in Indonesia. Additionally, several extractive industry stakeholders in Indonesia believe that EITI is not an effective enough tool for improving transparency and accountability. In particular, the study mentions how the EITI standard does little to address the negative social and environmental impacts of the extractive industry. In response to this shortcoming, the study encourages policymakers to consider EITI as a stepping-stone for broader governance improvements. Overall, this study concluded that membership in EITI has opened the door for greater reform in Indonesia, and though not without its flaws, is beneficial for strengthening the relationship between the government, the public, and the extractives business community.

Indonesia was chosen as a case study because it shares a similar history with Cambodia regarding geographic location, democratic transition, and an underdeveloped but improving public service infrastructure. Though Indonesia has a much larger economy than Cambodia, Cambodia offers similar opportunities for investment from international businesses that will look at EITI participation favorably.

Regulatory Analysis

Common Payments Associated with Extractive Industry Projects

One of the complexities of understanding revenues from extractive industries in Cambodia is that there are a large number of potential revenue streams. Global Witness (2018) summarizes the main types of payments that an extractive company might make to a government as follows:

1. Fees to gain access to land or resources.
2. Bonuses paid as certain events occur during a project. These could be standardized or vary from project to project.
3. Production royalties.
4. Taxes.
5. Production entitlements, where the government may take some amount of overall production, or an equivalent in cash, most often associated with oil or gas contracts.

Additionally, Global Witness outlines the information that might be required to analyze different types of payments to governments, alongside various tests that could be conducted with this information. While discussing these tests in-depth is outside of the scope of this report, the types of information are relevant. These include the fiscal terms of a contract, revenues, sources to verify payments, determinations of whether certain bonuses or taxes are relevant, royalty rates, price information, project cost estimates, and cash flows. The ability to access these types of data, alongside the ease of this access, would determine the feasibility of comparing reported government revenues versus expected revenues, as well as the level of confidence in these estimates.

Understanding the Regulatory Framework: Mineral Resources

Created out of the former Ministry of Industry, Mines, and Energy in 2013, the Ministry of Mines and Energy (MME) is currently the main entity responsible for overseeing mineral resources in Cambodia, though other bodies like the Ministry of Environment, the National Committee for Sustainable Development, and the Cambodian Development Council also play roles in overseeing these activities (Transparency International Cambodia 2021).

Between 2014 and 2018, the MME sought to expand institutional capacity and community and environmental protections and development, increase revenues, and build up relevant mining-related infrastructure (Transparency International Cambodia 2021). Building on this work, Cambodia advanced the National Policy on Mineral Resources 2018–2028, aiming to incorporate stakeholder views and international experiences to better develop its own industries while also accounting for the environmental and social implications of development in the extractive sector. Similar to the MME’s work from 2014–2018, this policy focuses heavily on institutional capacity building, community and resource development, and achieving these goals sustainably (Transparency International Cambodia 2021).

Within this context, Cambodia has created forums such as the Extractive Industries Governance Forum to facilitate engagement between stakeholders and the government (Transparency International Cambodia 2021). While these venues do help generate legitimate discourse, this has not resolved all issues in the sector. There are still concerns, for example, about policies that allow the government to circumvent legal and regulatory requirements, about the actual level of engagement with stakeholders despite the government’s legal obligation to do so, etc. (Transparency International Cambodia 2021).

Regarding the legal and regulatory framework for the mining industry, sources such as Kim (2017), Transparency International Cambodia (2021), and Open Development Cambodia (2022) identify several key laws and policies related to the sector. They include the Law on Mineral Resource Management and Exploitation (Royal Government of Cambodia 2001), which is the primary law governing mining operations in the country, and Sub-Decree No. 72 on Management of Exploration and Industrial Mining

License (Royal Government of the Kingdom of Cambodia 2016), which provides updates and details on various aspects of the operation and management of the eponymous licenses, alongside clarifying policies related to environmental protection and sustainability. Open Development Cambodia (2022) additionally note that per the Law on Mineral Resource Management and Exploitation, raw materials are generally not allowed to be exported, which necessitates processing materials in Cambodia. Moreover, as the state owns all natural resources, acquiring a license is a pre-requisite for mining activities (Open Development Cambodia 2018b).

In Cambodia, the main sources of government revenue for a mining project include production royalties, taxes (such as income and export taxes, among others), and surface rental payments or payments into required social funds (INRES RESEARCHER 2015a; 2015b). For mineral exploration licenses and industry licenses (exploitation licenses), an Australian Trade and Investment Commission (2022) presentation specifically highlights a few costs for companies. For exploration licenses, these include a \$5,000 fee to acquire or renew a license, a yearly fee for every square kilometer that the company is renting that increases as the age of the license increases, alongside other taxes and fees. For exploitation licenses, the license fee is higher, at \$12,500, as are the surface rental fees. Moreover, there is a profit-based tax of 30 percent, production royalties, and required social fund payments.

Understanding the Regulatory Framework: Oil and Natural Gas

Cambodia's emerging economy has significant potential for oil and gas exploration and production. There are requirements that apply to grantees of gas and oil extractive concessions. This report will provide an overview of the tax and other fiscal requirements that apply to gas and oil extractive concession grantees in Cambodia, including the legal framework, taxation regime, and other fiscal requirements.

Legal Framework

The legal framework for oil and gas exploration and production in Cambodia was set by the Petroleum Law of 1991 which is now preceded by the 2019 passage of the Law on Management of Petroleum and Petroleum Products (Open Development Cambodia 2019). These laws provide for the granting of oil and gas exploration and production concessions, as well as the regulation of these activities.

Taxation Structure

The taxation structure for gas and oil extractive concession grantees in Cambodia is primarily governed by the Law on Taxation of 1997 (World Trade Organization 1997). The law sets out the tax rates and other fiscal requirements that apply to petroleum operations. These include:

1. **Royalty:** Under the Law on Taxation of Petroleum Operations, grantees of gas and oil extractive concessions are required to pay a royalty on the gross value of petroleum produced and sold. The royalty rate varies depending on the type of petroleum produced and the production level, but it ranges from 5 percent to 12.5 percent (CMS Law-Now 2015). The royalty rate is determined based on the sale price of the petroleum and calculated as a percentage of that price. The exact rate is set out in the concession agreement between the government and the concessionaire.
2. **Income Tax:** Grantees of gas and oil extractive concessions are also subject to income tax on their profits from petroleum operations. The income tax rate is currently set at 30 percent, and it is based on the net profit of the concessionaire under the Law on Taxation of Petroleum Operations Section 4 Article 20. The net profit is calculated as the gross revenue from petroleum operations minus the allowable deductions, which include the costs of exploration, development, and production. Other expenses such as depreciation and miscellaneous costs are also included (CMS Law-Now 2015).

Fiscal Requirements

In addition to royalty and income tax, grantees of gas and oil extractive concessions in Cambodia are also subject to other fiscal requirements, such as:

1. **Surface Rental Fees:** Grantees of gas and oil extractive concessions are required to pay annual rental fees for the use of land on which their operations are based. The rental fee is set at a rate of \$500 per square kilometer per year. This fee is payable in advance, and failure to pay can result in penalties and other legal consequences (Ministry of Mines and Energy and Ministry of Economy and Finance 2015).
2. **Signature Bonus:** When a concession is granted, the concessionaire is required to pay a signature bonus to the Cambodian government. The amount of the bonus varies depending on the size and location of the concession, and it is negotiated between the government and the concessionaire. The signature bonus is payable in installments over the course of the concession period (Open Development Cambodia 2019).
3. **Development Bonus:** In addition to the signature bonus, grantees of gas and oil extractive concessions may be required to pay a development bonus to the Cambodian government. The development bonus is payable when the concessionaire reaches certain milestones in the development of the concession, such as when commercial production begins. The amount of the bonus is negotiated between the government and the concessionaire (Open Development Cambodia 2019).
4. **Production Sharing:** In certain circumstances, the Cambodian government may require grantees of gas and oil extractive concessions to share a portion of their production with the government. The percentage of production that must be shared varies depending on the production level and other factors. The production sharing agreement is negotiated between the government and the concessionaire and is included in the concession agreement (Open Development Cambodia 2019).

In conclusion, grantees of gas and oil extractive concessions in Cambodia are subject to a range of tax and other fiscal requirements. This includes royalty, income tax, surface rental fees, and production sharing. Some values are transparent while others are subject to negotiation per Open Development Cambodia (2019), such as the signature and production bonus. The legal framework governing petroleum operations in Cambodia is primarily governed by the Petroleum Law of 1991 (amended in 2019) and the Sub-Decree on Petroleum Operations of 1995, while the taxation apparatus is governed by the Law on Taxation of Petroleum Operations of 2007 (amended in 2019).

Data Analysis

Licenses: Types and Amounts Available

Kim (2017) provides a breakdown of the different types of licenses and permits available in Cambodia. These include:

1. Artisanal mining licenses, which allow up to seven Cambodians to perform mining activities using simple tools and equipment.
2. Pits and quarries (or construction) mining licenses, which allow the license holder to search for and mine construction and industrial minerals in pits and quarries.
3. Gem mining licenses, which allow the license holder to search for and mine precious, semi-precious, and ornamental stones.
4. Mineral transforming licenses, which allow the license holder to process precious, semi-precious, or ornamental stones.
5. Mineral exploration licenses, which allow the license holder to search for mineral resources.
6. Industrial mining licenses, which allow the holder of an exploration license who locates mineral deposits to begin mining them.

Appendix A Figure 1 lists the number of active licenses by type across all the years we have been able to identify. Missing data for a type of license in a given year indicates that we are unable to locate information about the number of active licenses of that type. Compared to the late 1990s and early 2000s, the last decade has seen significantly more activity, with construction (pits and quarries) licenses numerically dominant. While exploration and industrial mining activities remain higher than in previous decades, they do appear to have slowed and stabilized since 2016.

Revenue Projections

Below, drawing on previous discussions about revenue streams, we first outline a general process to estimate the revenues collected by the Cambodian government for two specific types of licenses: mineral exploration licenses and industrial mining (or exploitation) licenses. Then, we estimate the non-tax revenues that the Cambodian government may have collected from mineral exploration, industrial mining, and construction (or pits and quarries) licenses. We also estimate production royalties for 2021 and for sand in several prior years. Finally, we detail actual reported non-tax revenues and compare our 2021 estimate to the official report in 2021 to illustrate the limitations current data sources place on the verification of government revenues.

Mineral Exploration Licenses

Calculating revenues from mineral exploration licenses is less complicated than industrial mining licenses as there are fewer project-specific variables. The potential revenue sources from a mineral exploration license include a licensing fee at the time of application or application renewal of \$5,000 USD, a surface rental fee dependent on the size and age of the mining concession, and potentially other taxes and fees (Australian Trade and Investment Commission 2022). Outside of these taxes and fees, government revenues from mineral exploration licenses are dependent on the size and age of all mineral exploration licenses each year. The process of determining the revenue collected from any one mineral exploration license would be as follows, which could be repeated for each license to determine non-tax revenues:

1. Determine if, each year, a license fee or renewal fee was paid.
2. Determine the size and age of the concession.
3. Based on the age of a concession and its size, apply the appropriate surface rental fee per square kilometer to determine the surface rental rate.

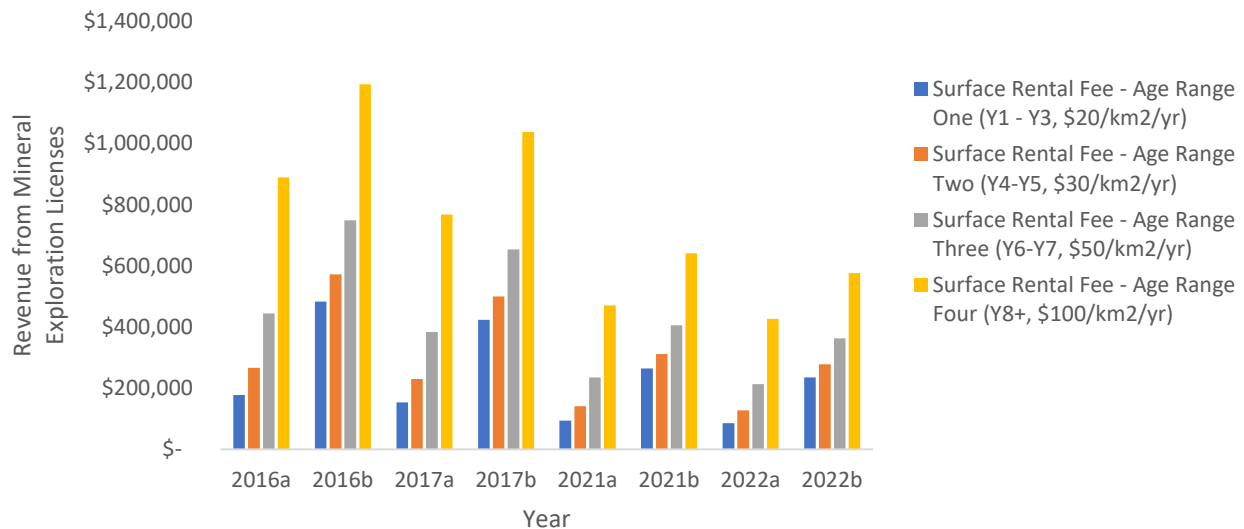
However, we are not aware of any database that collates all active mining concessions. This is consistent with research, as Webb et al. (2017) note that Cambodia is not legally required to release mining concession data and disclosure is done on an ad-hoc basis by the government. There are, however, lists and databases actively curated by civil society organizations, the largest of which has been developed by Open Development Cambodia. Open Development Cambodia's (n.d.) database contains information for 234 licenses and 302 concession areas dating back to the 1990s. However, entries for only fifty-five of these concessions are built off complete government data, and the rest rely on either partial government data or secondary sources. As such, many entries for licenses do not include some or all the necessary characteristics to estimate revenues, such as the size of the concession, the date in which a license was issued, the status of the license, or the type of license. Because of this, utilizing this database for revenue estimation is complicated and highlights the need for more quality information on this sector.

Instead, we turn to other data detailing the active number of licenses and the size of the area they cover. We have identified six years (2012, 2013, 2016, 2017, 2021, 2022) with at least some data available about the number of active licenses. We focus on 2016, 2017, 2021, and 2022. While we also have license numbers for 2012 and 2013, we choose not to estimate these years given the changes made to the policy framework surrounding extractive concessions in 2016 with the passage of Sub-Decree No. 72, among other policies. This leaves us with the four other years for which we have located data. Kim (2017) notes that as of December 31, 2016, there were sixty-one active mineral exploration licenses covering a combined area of 8,889 square kilometers. By the end of 2017, there were fifty-four active licenses (Ministry of Mines and Energy n.d.). As of September 2021, there were thirty-four active concession areas for exploration licenses covering 4,712 square kilometers (Vireak 2021). And, as of June 2022, there were thirty active exploration licenses (Australian Trade and Investment Commission 2022).³ The results of our estimates for revenue generated by license and surface rental fees are displayed below, with different scenarios assuming a single rental rate given the lack of age data on concessions.⁴

³ To account for the missing 2017 and 2022 areas, we calculate the average concession size in the 2016 and 2021 periods, then use this average multiplied by the number of active licenses in 2017 or 2022 to estimate the total area covered by the active licenses.

⁴ A few caveats to this analysis are: 1) sources such as Kim (2017) note that, at least nominally, exploration licenses cannot be extended more than seven years, so the eight plus year rate may be unlikely, although its existence suggests some licenses are extended past seven years; 2) we ignore potential application fees (listed as \$125 by Kim (2017) and other potential taxes/fees.

Figure 3: Potential Revenues from Mineral Exploration Licenses (2016, 2017, 2021, and 2022)



Source: Kim 2017, Vireak 2021, Australian Trade and Investment Commission 2022, and Ministry of Mines and Energy n.d.b.

Version B of a year includes the maximum license fees the government may have collected assuming all license holders paid the fee in addition to surface rental payments based on the assumed rate. In 2016, revenues range from as little as \$180,000 (if all licenses were one-to-three years old and no license fees were paid) to almost \$1.2 million (if all licenses were eight or more years old and license fees were paid). By 2022, this range had fallen to between \$85,000 and \$575,000. Non-tax revenues from these licenses likely fall somewhere within these ranges, but further analysis is precluded by a lack of information about the age and size of individual concessions.

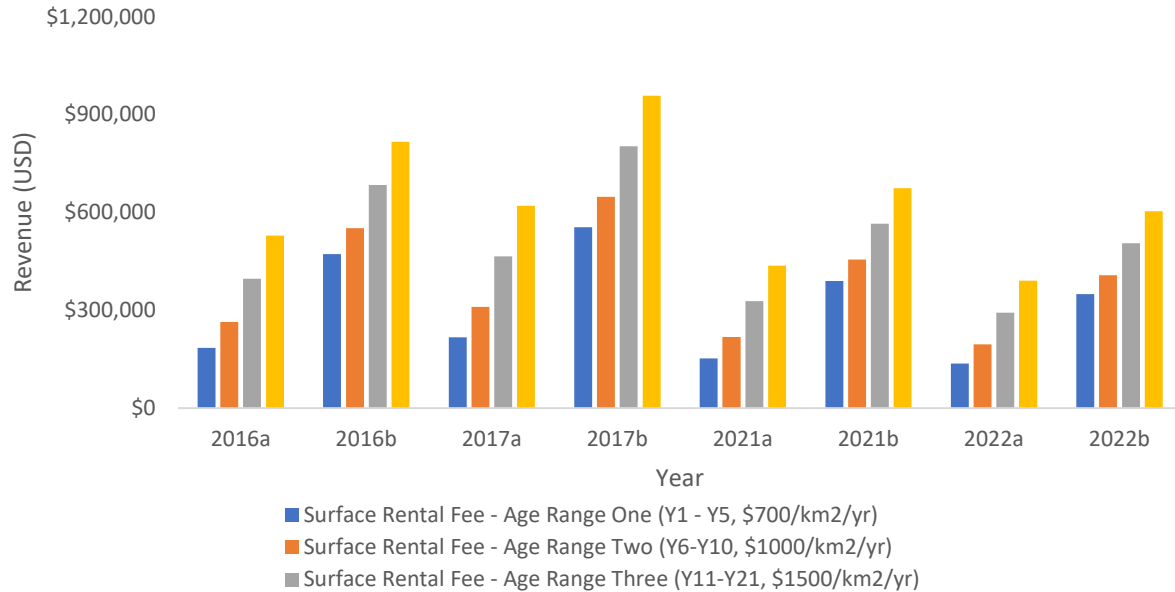
Industrial Mining Licenses

Estimating the revenues from industrial mining licenses poses a larger challenge. Part of this process would mirror that of mineral exploration licenses, making similar estimates for surface rental and license fees. But, building off the previous discussion of revenue streams, there are additional steps to consider for mineral exploitation that would need to be employed, including:

1. Determining the production quantity and appropriate royalty rate to determine royalty payments.
2. Determining if produced goods were exported and, if so, calculating the value of the export duty on these goods.
3. Determining the size of any potential social fund payments made to the government.
4. Determining the tax burden levied on the company operating the facility, which would likely include a determination about the applicability of various taxes and whether a company received tax incentives in its agreement with the government.

Given the difficulty of locating much of this information for individual projects, below we restrict our estimates to the aggregate surface rental and licensing fees the government might have collected from industrial mining licenses for 2016, 2017, 2021, and 2022.

Figure 4: Potential License and Surface Rental Fees from Industrial Exploitation (2016, 2017, 2021, and 2022)



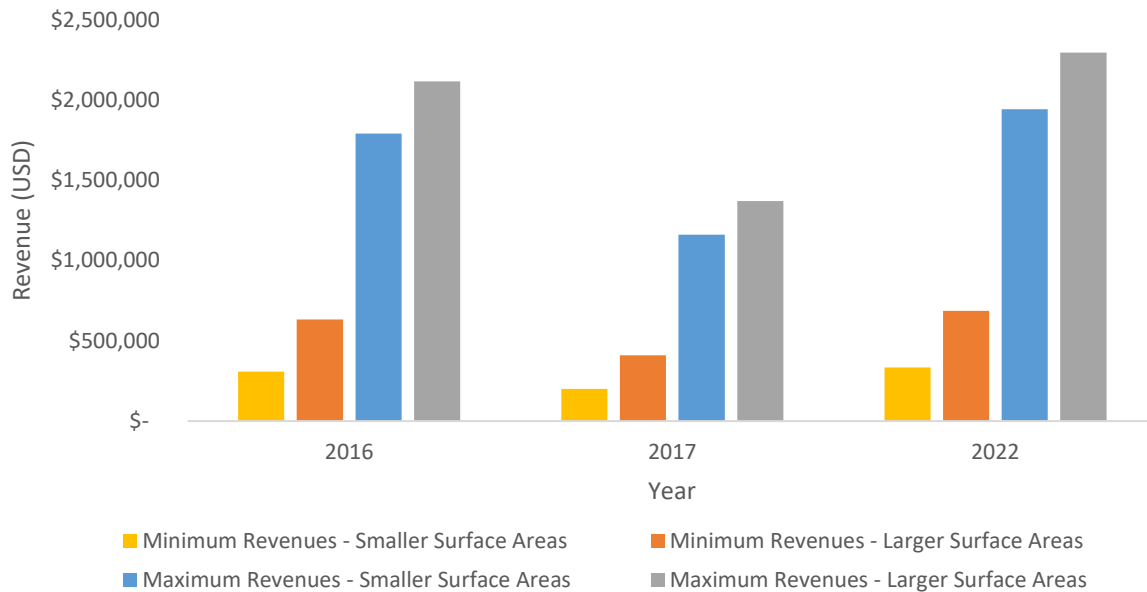
Source: Kim 2016, Ministry of Mines and Energy n.d.b, Vireak 2021, Australian Trade Commission 2022, and Kunmakara 2021

Versions A and Versions B of the concessions follow the same methodology as the exploration licenses, but with a license fee of \$12,500. Kunmakara (2021a) notes that Renaissance Mineral’s industrial mining license for gold covered a total of 11.5 square kilometers. Given a lack of further information on the size of industrial mining concessions, we use this as the baseline size of an industrial mining area and calculate license fees for twenty-three licenses in 2016, twenty-seven for 2017, nineteen for 2021, and seventeen for 2022. Industrial license fees within this period likely fall somewhere within the ranges presented, with the 2016 minimum at \$0.19 million and the maximum of \$0.82 million, falling to between \$0.14 million and \$0.60 million in 2022. However, the general accuracy of these ranges is highly dependent on the appropriateness of the assumptions made about how much area is covered given the high surface rental rates.

Construction Mining Licenses

Finally, we also estimate surface rental and license fee revenues from construction mining licenses in 2016, 2017, and 2022, dropping 2021 due to a lack of data. We follow a similar process as the previous two sections with some divergences based on differences in the surface rental fee structure. The full details of these calculations can be found in Appendix E, and due to uncertainties about the area each license covers, we present calculations with both a lower- and higher-assumed average surface area based on different data sources. Revenue estimates range between \$0.3–\$2.1 million in 2016, \$0.2–\$1.4 million in 2017, and \$0.3–\$2.3 million in 2022.

Figure 5: Potential License and Surface Rental Fees from Construction Mining (2016, 2017, and 2022)



Source: Kim 2017, Kimsay 2017, Ministry of Mines and Energy n.d.b, Australian Trade and Investment Commission 2022, Ministry of Economy and Finance & Ministry of Mines and Energy 2016, and Ministry of Mines and Energy & Ministry of Economy and Finance 2015

Royalties

Another aspect of revenues is royalty payments. These are potentially quite significant. Royalty payments from one gold mine totaled over \$8 million between June 2021 and December 2022, making up more than half of the \$15 million that the Cambodian government collected from gold production in that timeframe (Kunmakara 2023). Cambodia also collected \$7.7 million in non-tax revenue from sand and construction material-related projects between January and October 2016, approximately 80 percent (\$6.2 million) of which came from royalties (Kotoski 2016b). With sector-level production data, royalty rates could be applied to estimate payments by all companies reporting data to the government without identifying individual companies. However, individual firm data would be needed to conclusively determine if aggregate payments are correct (Kotoski 2016b).

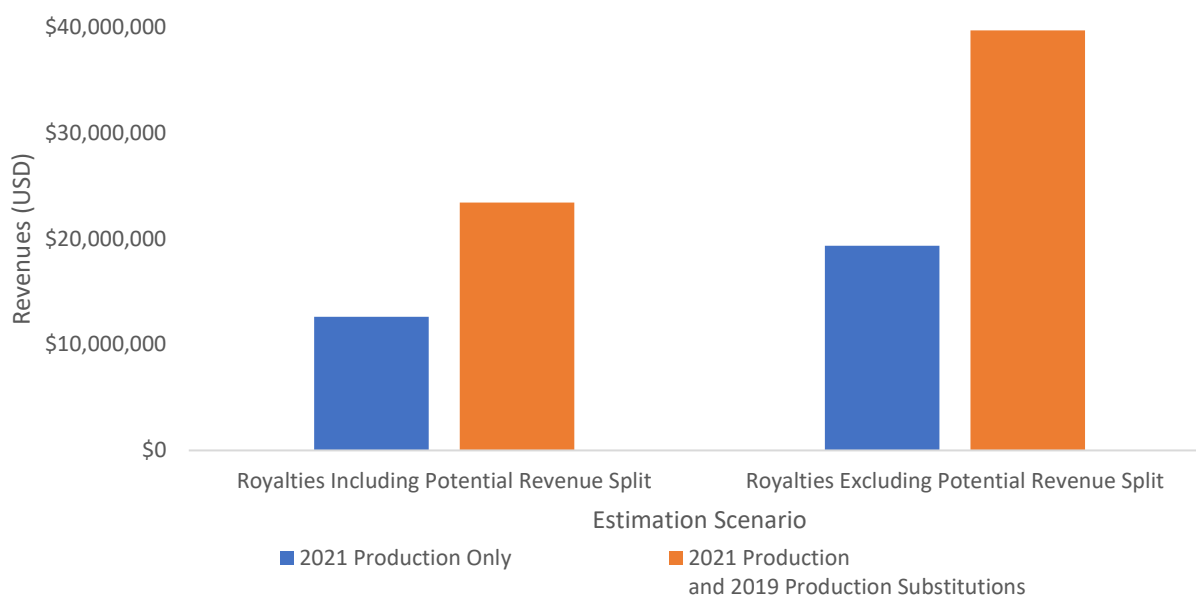
We focus primarily on 2021, the most recent year for which we have located production numbers,⁵ including data on gold, coal, limestone, cement, and a precious metals royalty rate (Australian Trade and Investment Commission 2022). We also located data on production levels and an accompanying royalty rate for sand: \$2 per cubic meter for exported sand, a \$1.60 export duty per cubic meter, and \$0.70 per cubic meter of sand kept domestically (Flynn and Srey 2022). We identify additional royalty rates from Inter-Ministerial Prakas No. 760 on Royalty Rates on Mineral Products and Royalties Payment Procedures, which set rates as of late 2020 (Ministry of Economy and Finance and Ministry of Mines and Energy 2020).⁶

⁵ Some sources do not clearly indicate whether tons refer to metric or imperial tons. In our calculations, we assume these rates refer to metric tons.

⁶ Per Inter-Ministerial Prakas No. 760 limestone royalties vary by end use (agricultural and industry versus metallurgy) and market price (Ministry of Economy and Finance and Ministry of Mines and Energy 2020). Given

At least per this document, there is no listed cement royalty, so we exclude this production from our analysis.⁷ Given the large role that construction-related products play in Cambodia’s extractive industries and gold’s growing importance, these goods are a useful focus. Figure 6 below presents total royalty estimates in 2021 under several different scenarios.

Figure 6: Estimated Royalty Payments Collected by Cambodian Government, 2021



Source: Australian Trade and Investment Commission 2022, Flynn and Srey 2022, UN Comtrade data n.d., Ministry of Economy and Finance & Ministry of Mines and Energy 2020, Emerald Resource NL 2022, US EIA 2022, Moon 2022, and Caterpillar Inc. n.d.

In 2021, Cambodia produced 11.5 million cubic meters of sand (Flynn and Srey 2022). If this was used domestically, royalty payments would have been approximately \$8 million. To attempt to account for exports, UN Comtrade data notes that, in 2021, Cambodia exported 797,218,000 kilograms of HS Code 2505 “Sands of all kinds; natural, whether or not coloured, other than metal-bearing sands of chapter 26” (United Nations n.d.). After converting this to cubic meters, a rough estimate is that Cambodia exported the equivalent of 500,000 cubic meters of sand in 2021, so the Cambodian government should have collected approximately \$9,540,000 from sand production in 2021 after accounting for export-based royalties and duties. In the same year, Cambodia also produced 10.5 million metric tons of limestone (Australian Trade and Investment Commission 2022). At a royalty rate of \$0.7/metric ton, these 10.5 million metric tons of limestone should have provided \$7,350,000 in royalty revenues to the Cambodian government.

There was also 1,344 kilograms of gold production (Australian Trade and Investment Commission 2022). Kunmakara (2023) notes that the Cambodian government collected more than \$8 million in royalties

the importance of construction materials in Cambodia, we utilize the former rates for our calculations, taking the average of the two potential rates (\$0.60/ton and \$0.80/ton), using \$0.7/ton for our calculations. For coal, the royalty rate is a percentage of sales price that varies based on market prices, and we utilize the 7 percent rate.

⁷ It is possible that cement production has associated royalties, as McLeod (2009) notes that the Cambodian government collected \$0.2/ton of produced Portland Cement. However, in that same year the royalty on limestone was assessed at a rate of \$0.2/ton of produced cement (Ministry of Economy and Finance and the Ministry of Industry, Mines, and Energy 2009), and absent a cement rate in Prakas No. 760, we are unable to determine if there should be a separate royalty for cement and do not include it in our analysis for 2021.

from 5.3 metric tons of gold doré, implying a royalty rate of \$1,509 per kilogram, so the Cambodian government should have collected approximately \$2,000,000 in 2021. The concentration of gold production in Emerald Resources' mine during 2021 allows for verification of this, as their 2022 annual report lists 47,118 ounces of gold produced in 2021 and sold at an average price of \$1,707 per ounce (Emerald Resources NL 2022). The total revenue at the average price would have been \$80,430,426, and at a 3 percent royalty rate (Australian Trade and Investment Commission 2022), the Cambodian government should have collected approximately \$2.4 million in royalties, which we use in our later calculations.

Finally, there were 19,000 metric tons of coal produced in 2021. The US Energy Information Administration (2022) notes that the average sales price of coal per ton varies by end use, but coal used for electric power generation (around 92 percent of US production) is worth \$37.32/imperial ton. Absent better information about the type of coal produced in Cambodia or its end use, we assume a price of \$37.32/ton for royalty calculations. Converting \$37.32/ton to \$33.96/metric ton, Cambodia produced approximately \$645,000 of coal, for a royalty of around \$45,000 at a 7 percent royalty rate.

In total between these products, the Cambodian government likely collected approximately \$19.3 million dollars in 2021, dependent on our assumptions about royalty rates for limestone and coal. However, in addition to these goods, Inter-Ministerial Prakas No. 760 also contains royalty rates for split stone, gravel, and silica sand (Ministry of Economy and Finance and Ministry of Mines and Energy 2020), and we have 2019 production data for these from USGS (Moon 2022).⁸ To provide an approximation of the additional revenue from these goods for 2021, we calculate the value of 2019 production levels at the 2020 royalty rates, increasing our 2021 royalties estimate by approximately \$20.4 million dollars, raising the total estimate to \$39.7 million. Appendix I Table 4 contains the details of these calculations.

While we discuss total estimated revenues in more depth later, this revised royalty estimation alone significantly eclipses 2021 non-tax revenues. One potential explanation for this, discussed in Appendix I, is that not all royalty income, particularly for construction minerals, may go towards national revenues (Ministry of Economy and Finance and Ministry of Mines and Energy 2020). Applying the potential proportions to just 2021 production, estimated royalties fall to approximately \$12.6 million from \$19.3 million, and when incorporating 2019 production levels for other goods, estimates fall to \$23.4 million from \$39.7 million. However, we are unsure whether such a revenue split is reflected in the reported government non-tax revenues from mining. Figure 6 graphically presents both royalty estimates. The blue bars represent only 2021 data, and the orange bars represent 2021 data with available production data for 2019. Additionally, we included a second calculation to determine what these estimates would be if the potential revenue split is factored in.

Concerning earlier years, USGS production data from Moon (2022) for mineral commodities is likely the most comprehensive longitudinal source, but we encounter issues with conflicting data sources that pose concerns over the accuracy of some available data. While some production from USGS, like cement, seems to line up with other sources, other commodities do not. We want to draw particular attention to non-silica sand as we have reports for 2017–2019 production that differ from USGS data.⁹

Looking at sand, Haffner (2020) reports that in 2017 companies were licensed to produce 4,000,000 cubic meters, which increased to 8,000,000 cubic meters in 2018 and 9,000,000 cubic meters in 2019. These numbers are largely consistent with recent years reported by Flynn and Srey (2022). However, Moon's

⁸ Stone production in the USGS data is listed as “crushed stone” whereas this product is translated as “split stone” in Inter-Ministerial Prakas No. 760, but in our analysis, we interpret these terms as referring to the same commodity. For silica sand, the listing in USGS data is “sand and gravel, industrial, silica,” potentially including gravel. Additionally, production of this commodity is listed as estimated via UN Comtrade data but, per our analysis, does not appear to match up with the net weight exports of sand for HS Code 2505 in the UN Comtrade database (United Nations n.d.). Despite these issues, we take these numbers at face value to provide a rough estimate.

⁹ Additionally, while we do not discuss them in-depth in this report, Appendix I contains tentative estimated royalty values using theoretical pre-2020 rates for some other commodities from Moon (2022).

(2022) data on sand used for construction places production at 16,000,000 tons (10,000,000 cubic meters)¹⁰ in 2017, 23,000,000 tons (14,375,000 cubic meters) in 2018, and 37,000,000 tons (23,125,000 cubic meters) in 2019 — all of which are notably higher than listed elsewhere.¹¹

Figure 7: Minimum and Maximum Royalty Payments from Sand, 2017–2019



Source: Moon 2022, Haffner 2020, Flynn and Srey 2022, and Sokhorng 2016

Due to these issues, we calculate royalty payments under both sets of potential sand production levels for 2017, 2018, and 2019, using a rate of \$0.2 per cubic meter as of 2016 (Sokhorng 2016). To simplify these calculations as much as possible, we ignore the potential for exports. Revenue estimates range from \$0.8–\$2.0 million in 2017, \$1.6–\$2.9 million in 2018, and \$1.8–\$4.6 million in 2019, depending on whether Haffner or Moon’s production data are used. These production differences therefore have revenue implications on the scale of millions of dollars. Appendix G contains the full list of estimates, detailed in Figure 11, including estimates using the 2020 sand royalty rate.

Finally, we raise one additional complication — that production levels in both these sources are underrepresented. Hackney et al (2021) utilizes satellite imagery to track the activity of sand barges in the Lower Mekong River in Cambodia to estimate yearly sand extraction. Based on their calculations, the authors estimate a significantly higher rate of production than in official reports. For example, the authors note that Haffner (2020) reported an official extraction level of 9,000,000 cubic meters in 2019, or 14.4 million tons, but the authors estimate that extraction in 2019 was approximately 50 million tons. Appendix D contains point estimates as well as upper and lower bounds as provided by Hackney et al (2021) compared to USGS data via Moon (2022) and other values reported by Haffner (2020). Of note, even in spite of the much larger size of the USGS values, only in 2019 does the USGS value come close to Hackney’s minimum estimates, and there are still very large gaps between the point estimates and all officially reported data.

¹⁰ This conversion comes from Hackney et al (2021), who notes that Haffner’s (2020) reported 9,000,000 cubic meters in 2019 was equivalent to 14.4 million tons of sand, for a ratio of 625,000 cubic meters per million ton.

¹¹ The listed production levels from Moon (2022) are categorized as “Unspecified,” but the report does specifically list stone and gravel production for construction, leaving out only sand, which is suggestive that this category may represent sand production. Moreover, the 9,000,000 metric tons of “Unspecified” production in Moon’s report for 2015 is the exact value as is listed for “Sand, construction material” production in prior USGS reports for 2014 (Fong-Sam 2017) and 2015 (Fong-Sam 2018). We are unable to distinguish whether a labeling swap was made due to concerns that sand production formerly listed in the USGS reports was not accurate (hence the swap to “Unspecified”), or if government-reported data from news articles and USGS data are actually contradictory or somehow capturing different concepts, forcing us to consider royalty implications for both sets of data sources.

These differences have potentially significant revenue implications. As previously discussed, ignoring any potential exports, the Cambodian government should have collected \$0.8–\$2.0 million for 2017, \$1.6–\$2.9 million in 2018, and \$1.8–\$4.6 million in 2019 using a royalty rate of \$0.2 per cubic meter. Minimum and maximum estimates for potential royalty revenues utilizing Hackney et al’s (2021) production are significantly higher than these.

Table 1: Sand Royalty Estimates – Government and Non-Government Figures

Year	Production Revenues Haffner	Production Revenues USGS	Minimum Revenues Non-Governmental Estimates	Maximum Revenues Non-Governmental Estimates
2017	\$800,000	\$2,000,000	\$3,375,000	\$6,125,000
2018	\$1,600,000	\$2,875,000	\$4,250,000	\$7,875,000
2019	\$1,800,000	\$4,625,000	\$4,375,000	\$8,125,000

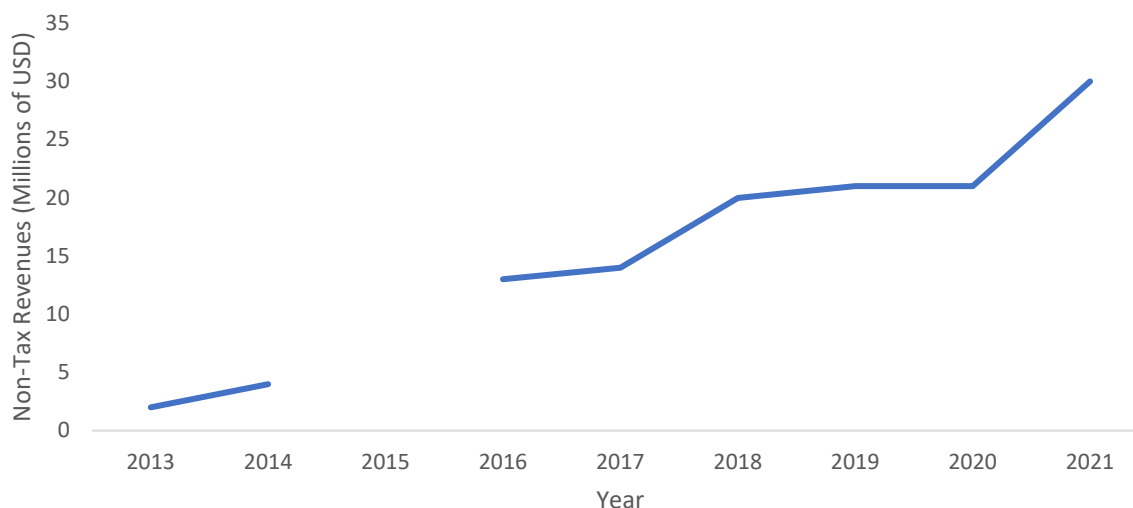
Source: Hackney et al 2021, Haffner 2020, Moon 2022, and Sokhorng 2016 2016 royalty rate of \$0.2/m³ applied for all years.

The table above lists revenues from the differing production numbers with 2016 royalty rates to illustrate that the potential lost revenues are in the millions, even assuming the highest potential revenues possible based on other sources. Appendix G contains the revenue implications of Hackney et al’s (2021) minimum, point, and max estimates for 2017–2020. While we cannot say with certainty that Hackney’s estimates are correct, in both 2017 and 2018 there is a clear revenue gap between all other reports and Hackney et al’s estimates, and even in 2019, USGS data only barely reaches Hackney’s minimum estimate, with a significant gap to max or point estimates. These gaps between estimates demand consideration of the veracity of official production numbers and potential explanations about why these potential gaps exist and where, if anywhere, this theoretical revenue may be going.

Revenues Reported

There is a clear upward trend in non-tax revenues from mining in Cambodia. Non-tax revenues from mining were \$2 million in 2013, \$4 million in 2014, \$13 million in 2016, and \$14 million in 2017 (Ministry of Mines and Energy n.d.). The 2018 amount, per Pisei (2020) was \$20 million, and Open Development Cambodia (2022), citing Pisei (2021) and Pisei (2020), note that non-tax mining revenues were around \$21 million in 2019 and 2020, with 2020 being larger by an unspecified small amount. Given this, we treat revenues for both years as \$21 million. Finally, through the first nine months of 2021, non-tax revenues were \$24.21 million, with the government estimating end-year revenues would be 20–25 percent higher than the initial target of 102.4 billion riel (Pisei 2021), or somewhere between \$30–\$31.6 million. We conservatively borrow the low-end estimate of \$30 million.

Figure 8: Non-Tax revenue from Mining in Cambodia, 2013–2021



Source: Open Development Cambodia 2022, Pisei 2021, Pisei 2020, and Ministry of Mines and Energy n.d.b

We combine our 2021 estimates across all categories and compare these against official reports. Only incorporating goods and licenses with 2021 data, our estimates for total non-tax revenues range from \$12.9 million to \$20.7 million. Our minimum estimate incorporates both the potential royalty revenue split and minimum revenues from exploration and industrial mining licenses, while the maximum estimate ignores the potential revenue split and takes the maximum license revenue.

Compared to government estimates of approximately \$30 million by the end of 2021, our initial estimates account for only 43–69 percent of reported non-tax revenue. This is not necessarily surprising. We do not have 2021 data on construction licenses or artisanal licenses, nor do we have 2021 production data on a number of other goods that potentially contribute to royalty income. To attempt to roughly account for these issues, we present two alternative specifications. First, we expand our total revenue calculations to include the \$20.4 million dollar estimate for 2019 production data and revenues based on 2022 construction mining license data, both of which we have discussed previously, as well as 2016 artisanal mining data (detailed in Appendix F), which might add somewhere between \$0.46–\$0.54 million. In total, these additions extend our estimated revenue range to \$24.4–\$43.9 million dollars, following the same general split between minimum and maximum revenues. Finally, we also attempt to account for the difference in sand production between Moon (2022) and other sources. Per Moon’s data, 2019-production-level sand royalties, even assuming no exports, would be approximately \$6.6 million dollars larger than our estimates in 2021, and incorporating this potential additional revenue extends the ranges further to \$27.1–\$50.5 million dollars.

Our original and alternative estimates are presented graphically in comparison to official government reports in Appendix H. Estimates based only on available 2021 data do not begin to approach official government reports in the same year, highlighting the potential serious limitation that incomplete data on production levels and licenses in a year poses for attempts to verify revenue levels. By contrast, our latter two specifications do include the \$30 million figure within their ranges, which suggests that reported revenues are at least a plausible figure for the government to have collected from mining activity. However, uncertainties and assumptions in our analysis make it difficult to assess these ranges with a high degree of confidence. These uncertainties and assumptions include how close 2019 production levels would be to 2021 levels, whether the potential revenue split is reflected in reports of official revenues, potential

discrepancies in sand production data, uncertainty over the end use of produced goods and how this affects royalty revenues, and uncertainty in license revenues, given the paucity of data on the age and size of licensed areas, among other issues. Outside of these, it is likely that available data sets do not fully capture mineral production, with Moon (2022) noting that production of other commodities may have occurred but cannot be reliably estimated due to data issues. Inter-Ministerial Prakas No. 760 similarly lists a number of goods that have assessed royalty rates but do not appear in identified production reports (Ministry of Economy and Finance and Ministry of Mines and Energy 2020).

Holistically, our data analysis provides a few major takeaways. First, data about active licenses is very difficult to locate. This requires us to take a range-based approach to revenues from these licenses that assumes information about the size and age of the concessions, introducing a high degree of uncertainty. Second, based on an analysis of 2021, royalty payments are a large revenue source for the Cambodian government, and potentially of growing importance since our estimates of other revenues from exploration and exploitation licenses appear to decline over time. However, the uncertainties discussed above present problems in accounting for potential royalty revenues. Due to such problems, it is our evaluation that it currently remains a significant challenge for civil society actors to confidently verify official reports of government revenues from the extractive industries, and our analysis offers insight into the types of information that will ultimately be necessary for the public to assess whether the government is truthfully representing these revenues.

Policy Options

Goals and Impact Categories

As discussed in the introduction, transparency is one of the main goals for extractive revenue information from mining in Cambodia. ODC along with other organizations such as Transparency International Cambodia, see transparency as an essential part of the growth of mining. By making data readily available to the public, companies can take accountability to ensure that every step the organization takes is in the best interest of all. The disclosure of relevant information combats corruption in keeping companies accountable as well as furthers trust with the citizens of Cambodia. Transparency is an ongoing process and better transparency brings greater levels of public engagement and support.

The availability of data is also an important goal. Easily accessible data enables governments and companies to build a data-informed culture where data leads to better decisions and action. An increase in accessible data would encourage insights from others to improve the mining operations and costs. This correlates with the idea of transparency being needed in order for others to understand what is happening on their land. As the current mining sector in Cambodia is mostly undeveloped, accessible data would give insight into the resources needed for investigating and monitoring mining operations.

A third impact category would be the accountability of the mining agencies to report their data openly and in a timely manner. Governments, companies, and communities can stop corruption by working together to create a fairer process. Accountability in the mining industry would keep negative impacts on the environment and people low and ensure that positive impacts are maximized. With accountability, adverse environmental and social impacts are mitigated and managed.

Recommendations

We have three distinct recommendations for increasing transparency in the extractive industries in Cambodia. ODC and other NGOs are not direct lawmakers in Cambodia but have relationships with both the government and the public, which puts them in a position to advocate for these recommendations. The three-recommendation package is:

1. MME website improvements
2. Simplification and clarification of the concessions collection process
3. EITI membership and compliance

Perhaps unsurprisingly, it has not been easy to find necessary information regarding the extractive industries that should be widely available. This fact is the basis for these recommendations, which seek to improve transparency and accountability in three aspects: administrative, legislative, and international governance practices. Ideally, each of these recommendations would be adopted. However, we recognize that the political will may not yet exist within the Cambodian government. Still, steady and substantive progress to increase transparency and provide accountability mechanisms has been made, which encourages us to build on existing initiatives to bring these changes to the extractive concessions process in Cambodia. This is where we believe our client and civil society more broadly can be extremely useful in lobbying the government to adopt these policies. Below, each recommendation is discussed.

MME Website Improvements (Administrative Governance Practices)

Throughout this project, we have relied on information from the Ministry of Mines and Energy, which is the branch of government that oversees the extractive industry in Cambodia. However, one of the major hurdles we faced was actually finding the information as it was often inaccessible on the MME website. Instead, we have had to look elsewhere for this information, relying on the NGO network in Cambodia to fill the gap in accessibility. In contrast, other Ministries in Cambodia have websites that are robust in their

public accessibility. For example, the website for the Ministry of Economy and Finance (MEF) is quite easy to navigate, information is regularly updated, and documents on important regulations are widely available. We believe that this site can serve as a model for the MME website.

Making MME website improvements is a policy recommendation that fits nicely with the Royal Government of Cambodia's own Digital Government Policy 2022–2035 (Ministry of Post and Telecommunications 2022), which has the stated mission of “establishing digital government to improve the people’s quality of life and build trust among the people through better public service provision.” The framework promotes several strategies that aim at improving the digital infrastructure in Cambodia, with Strategy 6: Digitally Transform the Government and Public Services being particularly relevant to this policy recommendation. The overarching goals of this strategy aim at improving government efficiency through digitization and emphasize the importance of making government information more accessible. The policy promotes sound governance practices — first, by increasing “the effectiveness, equity, quality, and transparency of delivering public services to the citizens” and second, by “aiming to reduce costs, promote participation, promote transparency, facilitate usage, and increase the effectiveness of public services to the private sector” (Ministry of Post and Telecommunications 2022). Given these provisions stated by the Cambodian government, we have identified the major areas of the MME website in need of improvement to achieve both the goals proposed by the government itself and by ODC regarding extractive industry transparency.

The first suggested improvement is updating the “Laws and Regulations” section under the website’s archive. As previously mentioned, the MEF website is a solid model for how MME could reshape its site. In particular, the MEF makes all current relevant legislation information available to view or download, providing easy access to the public. Though the MME website currently has the infrastructure to accommodate a database for relevant laws and regulations, when one attempts to view these documents, they are often redirected to a 403 error. A 403 error means that the server understands the user’s request, but refuses to authorize it. This issue indicates that these documents are in fact within the website’s existing mainframe, but the Ministry is not currently making them available. The MME website, like other ministry sites, does have a Khmer version and an English version, with the Khmer version having more relevant documents listed. Still, the 403 error is a common issue regardless of the language used. This technical issue should be resolved in both language mainframes, in Khmer for the use of Cambodian citizens, and in English for potential international investors or researchers interested in learning more about the development of the extractive industries in Cambodia.

The second suggested improvement is updating the Press Release section of the MME website. Another important way to increase administrative transparency is by regularly updating the public about mining activity in Cambodia via the MME website. In an interview with Transparency International Cambodia Business Integrity Programme Manager Tong Soprach (2023) on March 17, 2023, he emphasized the importance of transparency and the role of government in the mining companies active in Cambodia. He states that one major issue is that communities are left without a lot of information regarding mining. There may suddenly be mining companies in these communities without the members knowing why or what mining is being done. For Soprach, the balance between mining and its impact on communities is the main aspect of why this issue is important. An expert in the field of extractive industry transparency, Soprach provides valuable insight that shaped aspects of our second recommendation.

However, the implications for this policy recommendation is that there is a clear lack of administrative transparency that would be mitigated by the government consistently updating the public regarding ongoing mining activity, as the industry can seriously impact the daily lives of Cambodian citizens due to potential environmental and social harm. For example, sand dredging has become a contentious issue as global reliance on sand material has greatly increased in the last several decades (Flynn and Srey 2022). As mining along the Mekong has grown in Cambodia and has contributed to its rapid urbanization, it has also led to erosion of the nearby land, which is harmful to those who live along the river. The government has maintained the stance that sand dredging is not the cause of this erosion, but that has been dubbed a myth by scientists who are studying this issue closely. Academics in the United Kingdom

have cited that “the rate of extraction on the Mekong was exceeding the rate of natural replenishment by almost five times in 2018” and “by a factor of 16 in 2020” (Flynn and Srey 2022).

Given the reliance on the Mekong to fuel the extractive industries in Cambodia, it is vital for the government to maintain consistent updates on these mining projects. The MME also has a fund that was created to offset some of the environmental impacts of sand dredging by using government revenue collected from sand production, but it requires the community to request funds from the ministry for specific projects (Flynn and Srey 2022). However, researchers have found that “few know about the fund and only 33 of the 69 projects the fund has supported since 2016 have been completed” (Flynn and Srey 2022). This initiative would clearly benefit from more consistent promotion via the Press Release tab on the MME website, as the current lack of awareness limits the project’s effectiveness.

Clarity of Extractive Concessions Process (Legislative Governance Practices)

This policy recommendation seeks to address the gap in extractive concessions revenue that we have determined in this report. As shown in Figure 13, the total revenue collected by the Cambodian government can only be estimated to a range due to data accessibility and quality issues. It is therefore unclear exactly how much revenue the government is collecting on a yearly basis and, moreover, what these revenues are being used for. This leads to uncertainty among the public and the private sector. By not providing clear data about how different types of payments in the extractive industry are estimated and collected, it is very difficult for the public to properly evaluate the development of this growing industry. One of the ways that the government can and should address this issue is by not only providing documentation for laws and regulations on an administrative level, but also by clarifying the legal framework for contract formation and revenue collections through new legislation.

From our few short months of experience with this project, we have developed the perception that due to incomplete public information, a lot of estimation is required among stakeholders to understand the full picture of the Cambodian extractive industry. Returning to the interview with the Transparency International Cambodia representative, a few suggestions about ways the government can make more progress in achieving higher levels of transparency included measures such as budget clarity, the selection of reputable mining companies for contracts, and making all aspects of revenue collection data available (Soprach 2023). We believe that all of these suggestions boil down to clarifying the extractive concessions process to relieve the burden on the NGO network in Cambodia to increase transparency. In other words, the Cambodian government should make legislative changes that clarify all aspects of the extractive concessions process. This recommendation is closely related to the idea of administrative transparency, but it requires budgetary and contract transparency that has not previously existed in Cambodia. Soprach’s experience with Transparency International Cambodia leads him to believe that the lack of transparency in the extractive industries in Cambodia is a conscious choice, meaning the government has all the necessary information surrounding the industry, but has decided not to make this information public, forcing organizations like ODC to fill in the gaps as best they can. This choice is concerning, as it leads to speculation as to why the government chooses to keep this information private. Therefore, we have identified key ways the Cambodian government can address a lack of transparency and address some of the suggestions presented by Transparency International Cambodia.

We have identified a list of information not related to law and regulation documents that the Cambodian government should make available. This list includes data on the number of active licenses, the size of each concession with the applied royalty rate, and any other fees associated with a given contract. See Appendix J for a case study of Renaissance Minerals, which provides this information and has therefore been widely reported on in Cambodia. Having accurate, updated databases containing this key information allows for organizations to keep their independent databases updated to best estimate the amount of revenue the government should be collecting. Making this information available not only increases transparency, but it also serves as a multifaceted accountability mechanism. It holds both the government and mining companies accountable. When the public is made aware of the important details of concessions contracts, they can ensure that companies are paying the royalty and other non-tax revenue amounts they should be

and the government is actually collecting the proper amount and attributing that revenue to the proper budgetary initiatives, which relates to Soprach’s concern about budget clarity.

EITI Membership and Compliance (International Governance Practices)

As addressed in the background section, there are several benefits to Extractive Industry Transparency Initiative (EITI) membership, including increasing transparency, civil engagement and accountability mechanisms, and the potential for greater economic growth via investment (Yanuardi, Vijge, and Biermann 2021). We are recommending, as a long-term progression, Cambodia becomes an EITI member and works within the international organizational framework toward compliance. The other two recommendations would already be considerable steps in this process, but having oversight from EITI is an international signal that the Cambodian government is taking serious steps toward transparency in its extractive industries. Additionally, the voluntary nature of this institution means that Cambodia can also work at its own pace, which may be appealing to the government. The recommendation would likely require serious pressure from civil society. We believe our client is in a particularly strong position to garner support from Cambodian citizens to continue to lobby the government to join EITI.

At present, the Cambodian government does not have the political will to adopt EITI, but it does have a domestic version via the Extractive Industries Governance Forum (EIGF), which held its ninth conference last September (DPA Cambodia 2022). The EIGF is a panel of stakeholders, including representatives from MME, the private sector, and civil society who come together to promote good governance in the mining sector. Goals of the forum include “promoting knowledge creation, integrity and shared value in business and industry practices of the extractive sector” (DPA Cambodia 2022). The forum focuses on networking and having multiple stakeholders participate in discussions around policy formation and implementation surrounding the extractives sector. However, it is not an organization, and all policy decisions are ultimately reserved by the Cambodian government. Although EITI would also ultimately have no binding policy implementation power, joining the organization taps into the extensive knowledge sharing that happens among international stakeholders. Through EITI membership, Cambodia is only expanding its network and learning more about best practices for good governance.

Conclusions

Through the research of this report, our team has found that, due to issues with the data that is publicly available on extractive industries licenses and production in Cambodia, revenue estimates are subject to significant uncertainty. While in certain specifications, reports of non-tax revenues in 2021 fall within our estimates for revenues, at least somewhat positively suggesting that reported revenues are plausible. However, given the concerns mentioned throughout this analysis related to available data and the resulting assumptions that these issues force us to make, we are unable to confidently state that estimated revenues match closely with government reports. As the mining industry in Cambodia grows, matures, and increasingly contributes to the wider Cambodian economy, ongoing public confidence in this sector will require that the government make the information necessary to estimate its revenues more broadly available. In this vein, we recommend changes to how the Ministry of Mines and Energy provides information through its website, a broader shift toward making revenue-related information accessible, and the pursuit of Cambodian entry into and compliance with EITI.

Implementing our recommendations would keep the government and corporations accountable. The suggested changes to the MME website would allow up-to-date information about the regulatory framework and activities around extractive industries to be more easily accessible to both the Cambodian public and international observers. Clarifying Cambodia's extractive concessions framework would provide a greater understanding of the performance of the extractive industries in Cambodia and into the practices of mining companies and the government, ensuring that the public can better evaluate whether these actors are truthfully reporting information and acting in good-faith with regulatory requirements. The final suggestion of joining EITI would promote better governance practices and accountability. These recommendations support the initiatives of ODC and are ways to further encourage transparency in Cambodia's mining sector.

Appendices

Appendix A: Active Mining Licenses and Types Over Time

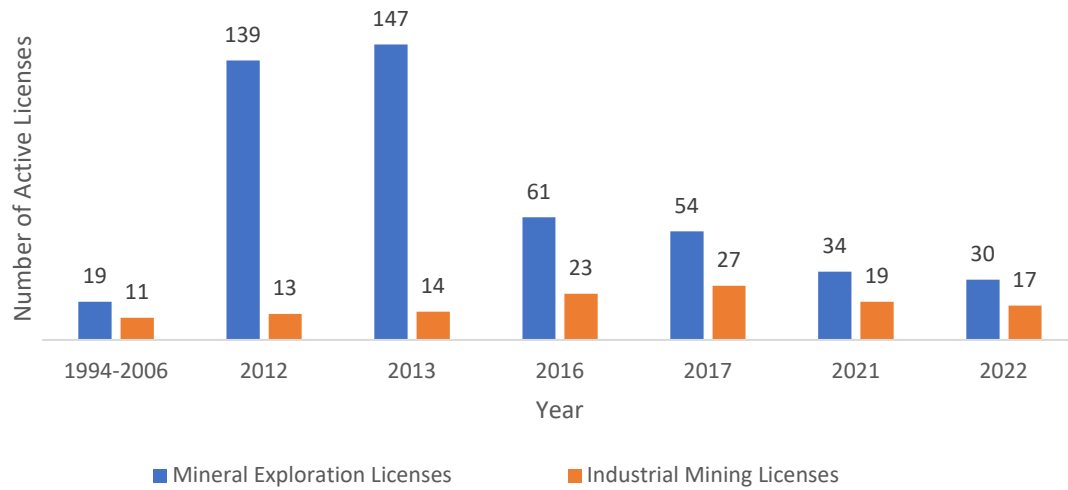
Figure 1 details active mining concessions in Cambodia over time, including available data for mineral exploration licenses, industrial mining licenses, construction mining licenses, and artisanal mining licenses. The number of active licenses for a given type of license is only presented in years where we were able to locate such data. Figure 2 provides just the number of active exploration and industrial mining licenses.

Figure 1: Active Mining Licenses in Cambodia by Type



Source: Wu 2009, Fong-Sam 2015, Kim 2017, Kimsay 2017, Vireak 2021, Open Development Cambodia 2022, Australian Trade and Investment Commission 2022, Ministry of Mines and Energy n.d.a, and Ministry of Mines and Energy n.d.b

Figure 2: Active Mineral Exploration and Industrial Mining Licenses Over Time

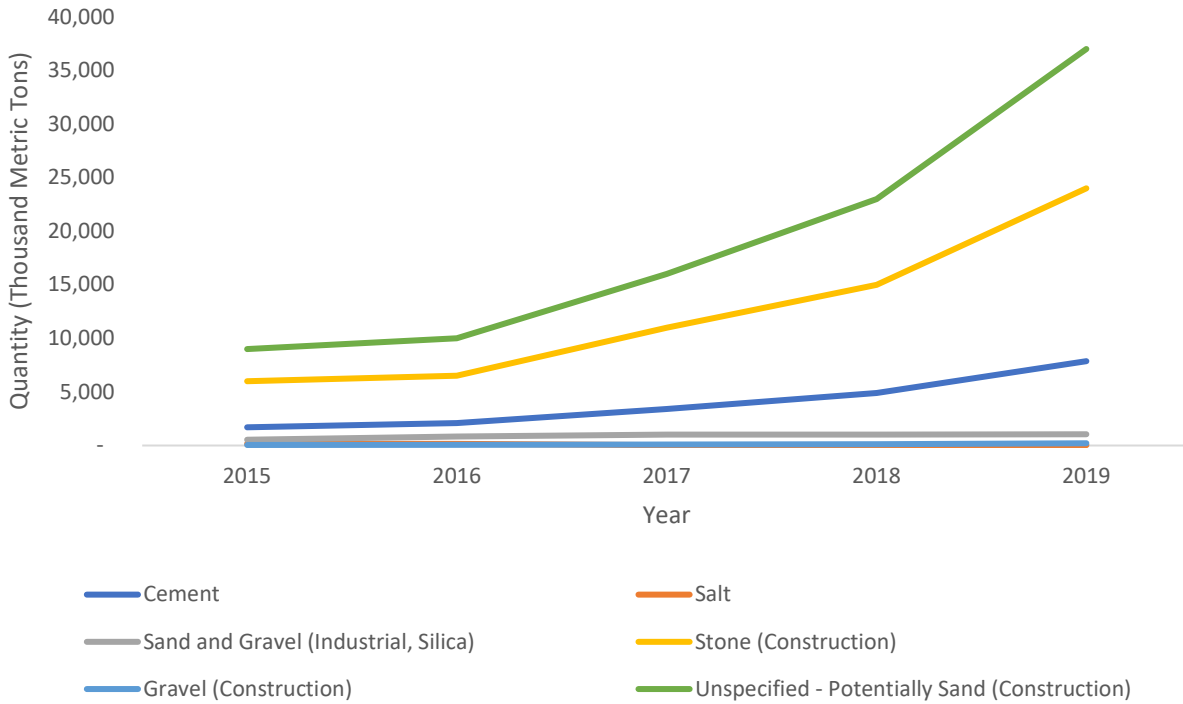


Source: Wu 2009, Fong-Sam 2015, Kim 2017, Kimsay 2017, Vireak 2021, Open Development Cambodia 2022, Australian Trade and Investment Commission 2022. Ministry of Mines and Energy n.d.a, and Ministry of Mines and Energy n.d.b

Appendix B: Mineral Production Data from 2015–2019

The below figure graphically represents changes in production data as provided by Moon (2022) of USGS. Some of the data utilized to make this graphic is reported as estimated, and all values are reported in thousands of metric tons. As discussed in more depth in footnote eight, there is some reason to believe that the “Unspecified” production in the data is sand; however, this does not line up with alternative reports of sand production, so interpreting this data as sand should be done somewhat cautiously.

Figure 9: Mineral Production in Cambodia, 2015–2019

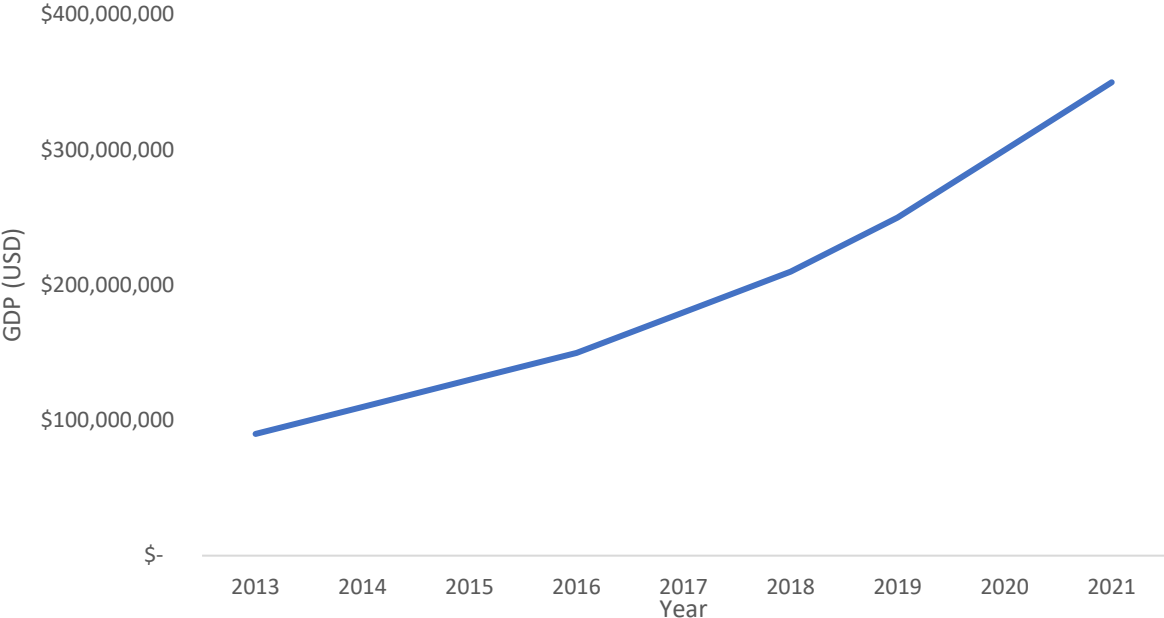


Source: Moon 2022

Appendix C: Cambodian GDP from Mining, 2013–2021

Figure 10 displays changes in Cambodian GDP from mining between 2013 and 2021. Yearly data comes from Trading Economics (2023b) and is converted from Cambodian Riel to USD.

Figure 10: Cambodian GDP from Mining (in USD), 2013–2021



Source: Trading Economics 2023b

Appendix D: Production Data from Hackney et al (2021) versus Other Sources

Table 3 details minimum, point, and maximum sand extraction estimates from Hackney et al (2021). Values for 2017 and 2018 are not directly listed by the authors, and we therefore estimate them visually from figures in the paper. Additionally, we convert the metric ton-based production numbers reported by Moon (2022) for 2017–2019 and the cubic meter-based production numbers provided by Haffner (2020) into megatons, presenting estimates from all sources in relation to one another.

Table 3: Production Amounts — Government and Non-Government Data

Year	Production Amounts Haffner (MT)	Production Amounts USGS (MT)	Hackney Minimum Estimate (MT)	Hackney Point Estimates (MT)	Hackney Max Estimates (MT)
2017	6.4	16	27	37	49
2018	12.8	23	34	48	63
2019	14.4	37	35	50	65

Source: Hackney et al 2021, Haffner 2020, and Moon 2022

Appendix E: Assumptions Behind Surface Rental Fee and License Fee Calculations for Construction Mining Licenses

For data on construction mining licenses, we rely on the reported number of construction licenses in 2016 (Kim 2017; Kimsay 2017), 2017 (Ministry of Mines and Energy n.d.), and 2022 (Australian Trade and Investment Commission 2022). Given a lack of information about the size of these concessions, we present two alternative estimations based on data about the size of the overall area a type of concession covers. First, we use the average size of areas covered by sand mining licenses in 2022 (Flynn and Srey 2022). Per Flynn and Srey (2022), forty-nine sand licenses covered 2,320 hectares in 2022, which provides an average area of forty-seven hectares, and we apply this average to all construction mining projects. Multiplying the number of licenses by forty-seven hectares for 2016, 2017, and 2022, we estimate the total size of the area covered by construction mining licenses in each year. Second, the Ministry of Mines and Energy (n.d.) notes that 260 construction mining licenses covered approximately 6,000 hectares, which we interpret as being reported for 2017. While this license number seems somewhat low compared to reports for 2016 and 2022, taking it at face value, the average size of a construction mining license area is approximately twenty-three hectares. We repeat the same process as with the sand-based estimates to calculate a smaller surface area estimate.

Rental fees come from rates provided in Inter-Ministerial Prakas no. 664 (Ministry of Economy and Finance and Ministry of Mines and Energy 2016), where we take the average rental fee from the three sub-types of construction licenses (\$33/hectare). We use this rate in combination with the number of licenses of each type and the average surface area they cover to calculate the total surface fee paid for all three years, under both surface area scenarios. For the license fees, we pull rates from an appendix to Inter-Ministerial Prakas No. 1451 (Ministry of Mines and Energy and Ministry of Economy and Finance 2015) setting the rate at 15,000,000 KHR or \$3,699 for construction licenses (the average between the two different sub-types of licenses). Multiplying these values gives us a range of potential license fees for each year. Finally, we sum these with the estimated rental fees for the year to create minimum and maximum estimated non-tax revenues for license fees and surface rental fees, as presented in Figure 5.

Appendix F: Assumptions about Additional Non-Tax Revenues, 2021

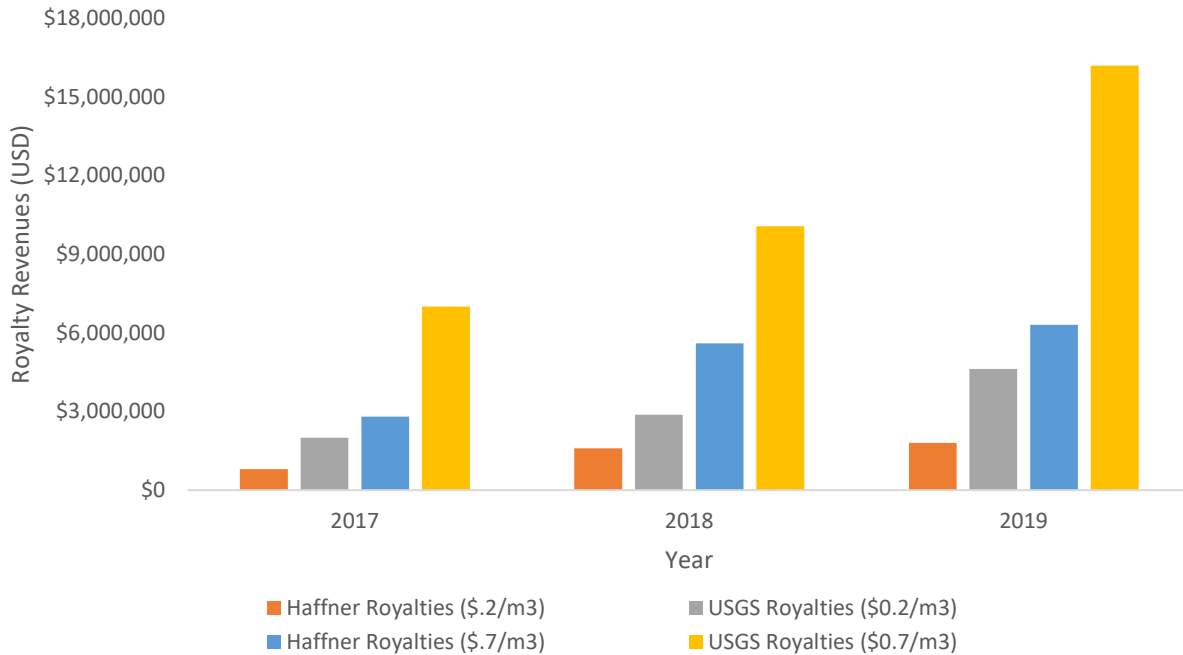
For artisanal mining licenses, we rely on the reported number of artisanal licenses in 2016 (Kimsay 2017), and the average size of areas covered by sand mining licenses in 2022 (Flynn and Srey 2022) as we do not possess any information about the size of the area covered by artisanal mining licenses. Per Kimsay, there were 326 artisanal mining licenses in 2016, and as a rough estimate, we substitute these for 2021 given the lack of actual data for that year. Per Flynn and Srey, forty-nine sand licenses covered 2,320 hectares in 2022, which provides an average area of forty-seven hectares, and we apply this average to all artisanal mining projects.

Rental fees come from rates provided in Inter-Ministerial Prakas No. 664 (Ministry of Economy and Finance and Ministry of Mines and Energy 2016), where we take the average rental fee from the four sub-types of artisanal mining licenses (\$30/hectare). We use this in combination with the number of licenses and the average surface area that they cover to calculate the total surface fee paid, which we estimate at approximately \$0.46 million for artisanal licenses. For the license fees, we pull rates from an appendix to Inter-Ministerial Prakas No. 1451 (Ministry of Mines and Energy and Ministry of Economy and Finance 2015) setting the rate at 1,000,000 KHR or \$247 for artisanal licenses. Multiplying these values gives us a range of potential license fees for each type, ranging from \$0–\$80,000 for artisanal mining licenses. Finally, we sum these with the estimated rental fees for the year to create minimum and maximum non-tax revenues for license fees and surface rental fees, totaling between \$0.46–\$0.54 million.

Appendix G: Cambodian Sand Royalty Revenue Ranges, 2017–2019, and Theoretical Revenues Based on Hackney et al’s (2021) Estimates

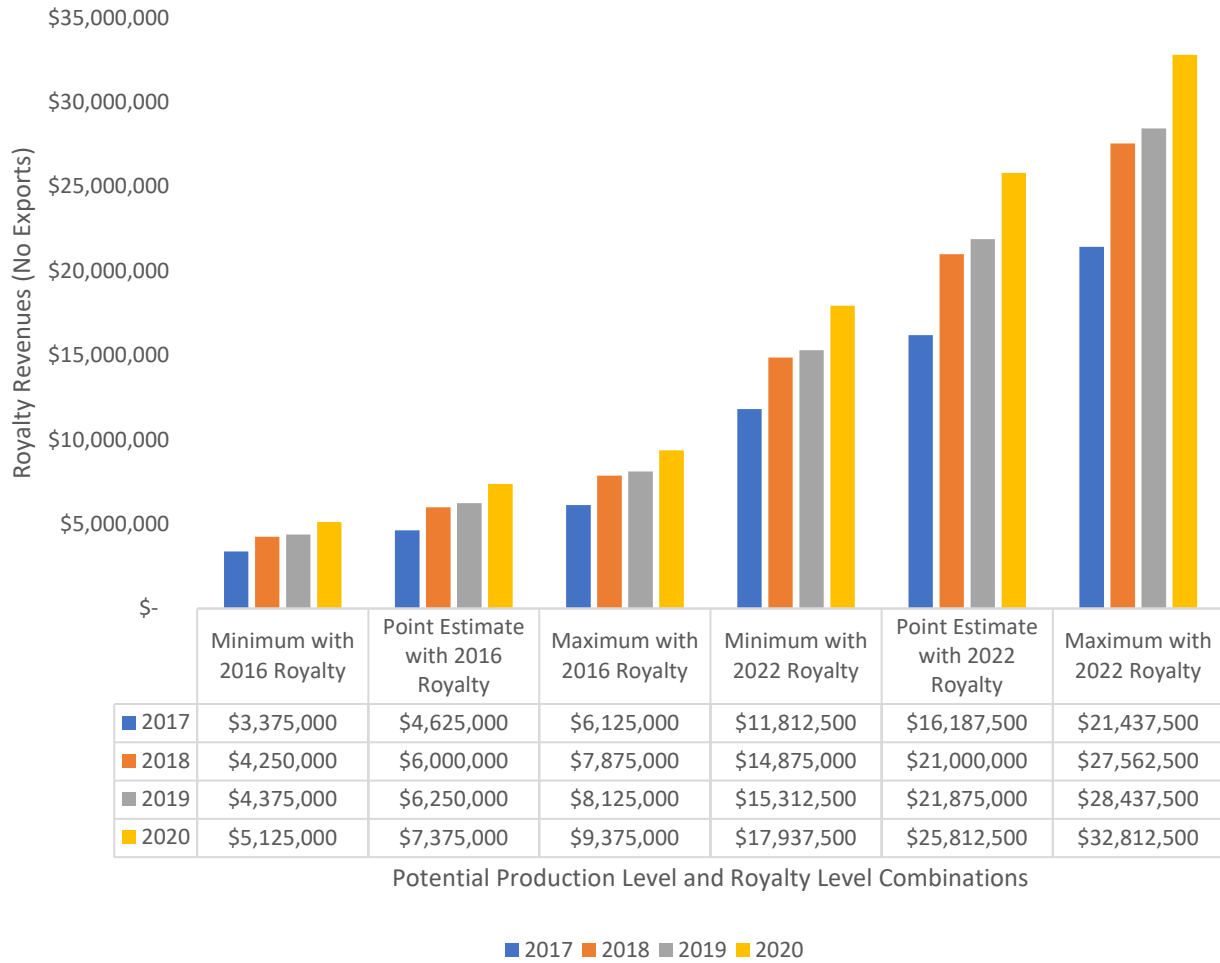
Below, Figure 11 details estimated sand royalties from 2017–2019 for sand production values as presented by Haffner (2020) and Moon (2022), the latter of which we first convert into cubic meters. We present estimates at both the 2016 royalty rate (Sokhorng 2016) and the 2022 royalty rate (Flynn and Srey 2022).

Figure 11: Cambodian Sand Royalty Revenue Ranges, 2017–2019



Source: Moon 2022, Haffner 2020, Flynn and Srey 2022, and Sokhorng 2016

Figure 12: Potential Sand Royalties Based on Hackney et al (2021) Production Estimates



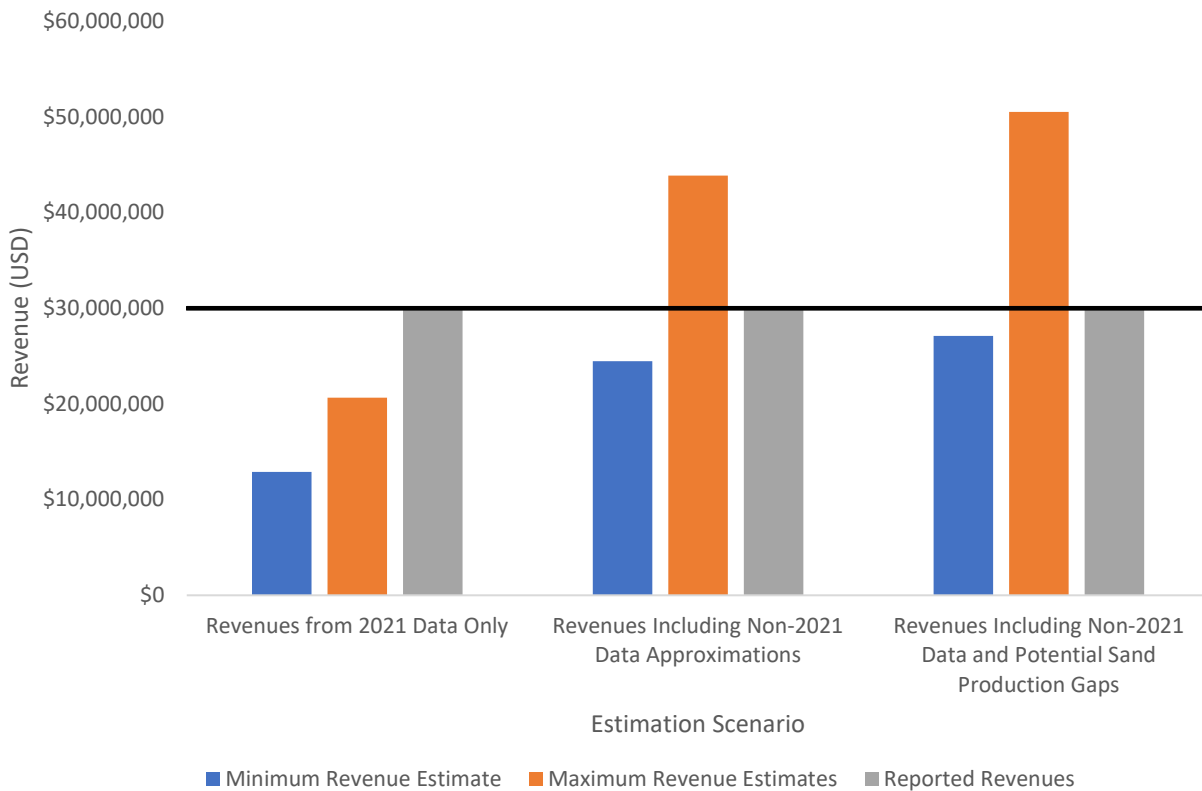
Source: Haffner 2020, Hackney et al 2021, Flynn and Srey 2022, and Sokhorng 2016

Figure 12 provides royalty estimates, assuming no exports, for sand production based on the production estimates provided by Hackney et al (2021) for both discussed sand royalty rates. At a minimum, the 2017 revenue with these new production numbers is over four times as large as the official minimum at \$3,375,000, and the maximum is over seven times as large compared to the official maximum. For 2018, the minimum is over two times as large, and the maximum almost five times as large. The 2019 minimum is also over two times larger with these estimates, and the maximum is over four times as large as the official maximum. Should sand production lean toward Hackney et al’s estimates rather than official production reports, this represents potentially millions of dollars of lost revenue.

Appendix H: 2021 Non-Tax Revenue Estimates

Figure 13 compares our original 2021 non-tax revenue minimum and maximum estimates to official non-tax revenues in 2021. Additionally, it contains two alternative scenarios. The first factors in non-2021 data to account for missing production and license data in 2021. The second incorporates discrepancies in sand production data between Moon (2022) and other sources by approximating the additional royalty revenue from sand production levels as listed by Moon in 2019 compared to our estimates of sand royalties based on 2021 production numbers, taking the difference between these values, and adding it to the minimum and maximum estimates from the first alternative scenario.

Figure 13: 2021 Non-Tax Revenue Estimates from Mining in Cambodia, 2021, Original and Alternative Specifications



Aggregated from prior revenue calculations for royalty payments, exploration licenses, industrial licenses, construction licenses, and artisanal licenses. Note: Minimum estimates incorporate a potential split of royalties between national revenues and other revenues, alongside minimum estimates for revenues from licenses. Maximum estimates do not incorporate split royalty payments and include maximum revenue estimates from licenses. The horizontal bar represents government revenues in 2021.

Appendix I: Other Implications of Inter-Ministerial Prakas No. 760

A Potential Split of Royalty Revenues

As discussed in the body of the report, after adding revenues for stone, gravel, and silica sand at 2019 production levels to the 2021 total, aggregate royalty revenues themselves are significantly higher than actually reported government revenues. One potential explanation for this is that Inter-Ministerial Prakas No. 760 notes that royalties for construction mineral products (sand, stone, and gravel, for our purposes) are split between national revenues (40 percent) sub-national revenues (50 percent), and deductible income (10 percent), whereas all other commodities (limestone, gold, coal, and silica sand, for our purposes) are split between national revenues (90 percent) and deductible income (10 percent) (Ministry of Economy and Finance and Ministry of Mines and Energy 2020). However, the sources we utilize for non-tax revenues do not mention such a split, and Inter-Ministerial Prakas No. 760 also suggests that either the Ministry of Mines and Energy or Provincial Department of Mines and Energy should be aware of the size of payments, so it is unclear whether this split is actually reflected in our data on non-tax revenue. To account for this possibility, we take calculated revenues for sand, limestone, gold, and coal from 2021 and crushed stone, gravel, and silica sand from 2019 using 2020 royalty rates, multiply these values by their respective national revenue take of 40 percent or 90 percent, and sum these together. This causes estimated royalty revenues to fall from approximately \$39.7 million to \$23.4 million when including 2019 production data as a proxy in 2021, and from \$19.3 million to \$12.6 million when only accounting for 2021 data.

Using 2019 Data to Approximate 2021 Royalty Revenues; Estimates for Selected Royalty Revenues 2017–2019

Relevant to production data from Moon (2022), Inter-Ministerial Prakas No. 760 provides royalty rates for split stones (\$1/cubic meter), which we interpret as the same commodity as crushed stones, gravel (\$0.85/cubic meter), and an updated rate for silica sand (\$5/ton domestically, \$10/ton for exports) (Ministry of Economy and Finance and Ministry of Mines and Energy 2020). As discussed in the body of the text, it also provides a royalty rate for limestone, from which we derive an approximate royalty of \$0.7/ton. Given that we do not have 2021 production data for any of these goods besides limestone, one way to generate a rough approximation of the additional royalty revenues that might have been collected in 2021 from these goods is to take 2019 production levels, apply the 2020 royalty rates, and then add these values to the 2021 royalty total. Table 14 below contains these calculations for 2019, as well as 2017 and 2018, and we take the total value for 2019 (of approximately \$20.4 million) and add it to our calculations of gold, limestone, sand, and coal (totaling approximately \$19.3 million) to generate the number discussed in the body of the report. One complication to this analysis is that stone and gravel royalties are in cubic meters, but USGS production data is provided in metric tons. We convert these values from tons to cubic meters, using rates of 1,600 kilograms per cubic meter for crushed stone and 1,510 kilograms per cubic meter for dry gravel, based on information from Caterpillar, Inc (n.d.). For example, in 2019 there was 24,000,000 tons of stone produced (Moon 2022), so converting this to cubic meters results in 15,000,000 cubic meters of stone, for a royalty payment of \$15,000,000. We additionally assume no exports of silica sand.

However, for years before Inter-Ministerial Prakas No. 760 was issued, it is not necessarily the case that these late-2020 royalty rates would have been those in use. For example, sand royalties increased from \$0.2/cubic meter to \$0.7/cubic meter between 2016–2020, disregarding exports (Flynn and Srey 2022; Sokhorng 2016). This represents a 250 percent increase between the two rates, and between 2008 and 2020 silica sand royalties increased from \$1.50/ton to \$5.00/ton for non-exports, which is an increase of 233 percent over a longer period. But some products, such as phosphate, have only increased from \$1.20/ton to \$1.50–\$2/ton, a much slower rate (Ministry of Economy and Finance and the Ministry of Industry, Mines, and Energy 2009; Ministry of Economy and Finance and Ministry of Mines and Energy 2020). We use the growth rate for sand to calculate base values for earlier years, where rates increased 250 percent from prior

values to their 2020 values, and we use the base as a royalty rate. We also calculate values if rates had increased at a slower rate of 125 percent up to the 2020 rates. However, given the lack of growth in phosphate royalties, we also provide calculations with the 2020 rates. Tables 4, 5, and 6 detail these calculations.

Table 4: Royalty Estimates for Stone, Gravel, and Silica Sand at 2020 Rates

Royalty Values with 2020 Royalty Rates	2017	2018	2019
Crushed Stone (\$1/m ³)	\$6,875,000	\$9,375,000	\$15,000,000
Gravel (\$0.85/m ³)	\$50,099	\$73,179	\$118,212
Silica Sand (\$5/metric ton)	\$5,150,000	\$5,100,000	\$5,250,000
Total	\$12,075,099	\$14,548,179	\$20,368,212

Source: Moon 2022, Ministry of Economy and Finance and Ministry of Mines and Energy 2020

Table 5: Royalty Estimates for Stone, Gravel, and Silica Sand at Lowest Theoretical Rates

Royalty Values for Assumed Pre-2020 Rates, Lowest	2017	2018	2019
Stone (\$0.29/m ³)	\$1,964,188	\$2,678,438	\$4,285,500
Gravel (\$0.24/m ³)	\$14,323	\$20,921	\$33,795
Silica Sand (\$1.43/metric ton)	\$1,472,900	\$1,458,600	\$1,501,500
Total	\$3,451,410	\$4,157,958	\$5,820,795

Source: Moon 2022, Ministry of Economy and Finance and Ministry of Mines and Energy 2020

Table 6: Royalty Estimates for Stone, Gravel, and Silica Sand at Moderate Theoretical Rates

Royalty Values for Assumed Pre-2020 Rates, Moderate	2017	2018	2019
Stone (\$0.44/m ³)	\$3,025,000	\$4,125,000	\$6,600,000
Gravel (\$0.38/m ³)	\$22,397	\$32,715	\$52,848
Silica Sand (\$2.2/metric ton)	\$2,266,000	\$2,244,000	\$2,310,000
Total	\$5,313,397	\$6,401,715	\$8,962,848

Source: Moon 2022, Ministry of Economy and Finance and Ministry of Mines and Energy 2020

Appendix J: Renaissance Minerals Cambodia Ltd. Case Study

Renaissance Minerals is one of the major mining companies currently operating in Cambodia. It is a subsidiary of the Australian-owned Emerald Resources NL and appears to be one of the most open about reporting its revenue. Because of the company's openness, we have been able to trace a clear history of Renaissance's Okvau Gold Project which began about five years ago. In July 2018, Renaissance was awarded Cambodia's first gold Industrial Mining License for 11.5 square kilometers in the Mondulhiri province in the eastern part of the country for a total of fifteen years with the opportunity to renew the contract for up to ten more (Kunmakara 2021b). Operations on the Okvau Gold Project began in June 2021 and, at the time, was estimated to generate over \$300 million in tax revenues and royalties in its first seven years (Kunmakara 2021a). Every year, the Kingdom of Cambodia expects the project to generate significant cash-flow for the local economy and \$40 million from royalties and taxes for the national budget (Kunmakara 2022a). Information about how much gold ore is being mined and shipped to Australia for refinement has been made available to the public over the course of the last several years, with the most recent update coming in January of 2023. This report states that the Cambodian government has collected more than \$15 million from the project, including \$8 million in royalties and \$6.5 million in taxes. At that time, 5,300 kilograms of gold had been mined by Renaissance (Khmer Times 2023), which is consistent with the company's full capacity of about 250 kilograms per month (Vanyuth 2022).

The Okvau Gold Project serves as an example of how openness provides opportunities for growth in Cambodia. There is clearly documented data on the location and size of the project concession, the length of production contract, original estimates of economic impact, and consistent reports on production levels and revenue collections, specifically royalties and taxes collected by the government. The original estimates for this project also included employment and income tax projections, another aspect of economic growth that can be challenging to measure if the other data provided for the project is not made available. Interestingly, the project has 462 workers, 437 of which are Cambodian (Khmer Times 2021), meaning that the company relies on the local workforce rather than foreign workers, further benefiting the local economy. Renaissance Minerals is the Australian government's biggest investment in Cambodia (Kunmakara 2022b) and has even expanded operations by being granted a three-year exploration license in the Tboung Khmum region that will last through January of 2024 (Vanyuth 2021). Having a mining company with good governance practices and a dedication to employing the local workforce provides more than simple economic wealth for the national government. It also promotes good working practices and provides more employment opportunities for local economies in Cambodia. Given that Cambodia's GDP per capita is still quite small compared to many of its neighbors in Southeast Asia, this partnership with the Australian government has the potential for greater development and higher living standards especially for those living in rural areas where these projects are occurring.

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