

ENERGY AND MINING IN THE AMAZON

Corporate and Financing Landscape

Lisa Viscidi and Sarah Phillips

Foreword

I am pleased to present “Energy and Mining in the Amazon: Corporate and Financing Landscape,” a report by Lisa Viscidi and Sarah Phillips, respectively director and assistant of the Dialogue’s Energy, Climate Change & Extractive Industries Program.

The Amazon rainforest is one of the world’s most important ecosystems, home to several million species of native plants and animals, as well as Indigenous groups and other people, and a critical carbon sink. The Amazon region also holds substantial energy and mineral resources and is peppered with hydroelectric dams, oil and gas drilling sites, and mining projects producing gold, copper and other substances. A variety of companies own and operate these projects, while numerous banks and funds provide loans to back them.

This report analyzes the companies and financial institutions involved in energy and mining projects throughout the biogeographic Amazon. The analysis is based on findings from a new database developed by the Dialogue that provides a snapshot of the entities that own, operate, and finance hydroelectric, oil and gas, and mining projects in the Amazon region, including the countries where companies are headquartered, the types of companies present, the major lenders, and the deals made within the three sectors. The analysis was also informed by an expert workshop organized by the Dialogue in January 2021, as well as interviews with in-country experts. This research is intended to help governments, investors, and civil society groups identify the key corporate and financial actors that play an important role in the implementation of

environmental and social safeguards for energy and mining projects in the Amazon region.

We are grateful to the Gordon and Betty Moore Foundation for the support that made this report and database possible and to Kristina McNeff, program officer, for her extremely useful input. We are also grateful to Margaret Myers, director of the Dialogue’s Asia and Latin America Program, and Nate Graham, program associate for the Dialogue’s Energy, Climate Change & Extractive Industries Program, for their valuable assistance. We greatly appreciate the workshop participants and specifically Francisco Monaldi of Rice University, Guilherme Teixeira of SITAWI Finanças do Bem, Liliana Diaz of FTI Consulting, and Arturo Alarcón and Natascha Nunes da Cunha of the Inter-American Development Bank, for their insightful comments on this report. Finally, we thank Dialogue interns Omar Urdaneta, María José Rocha, José Daniel Madrigal and Jamie Dorner for their important research support.

This effort is a product of the Dialogue’s Energy, Climate Change & Extractive Industries Program, which informs and shapes policies that promote investment while encouraging the socially, economically, and environmentally responsible development of natural resources. The views expressed in this report are those of the authors and do not necessarily reflect the perspectives of the Inter-American Dialogue, or its board, partners, or sponsors.

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INTRODUCTION

The Amazon River basin holds the world's largest tropical rainforest, stretching across eight South American countries (Bolivia, Brazil, Colombia, Ecuador, Guyana, Peru, Suriname, and Venezuela) and one overseas territory (French Guiana). About 60 percent of the forest is contained within Brazil's borders, followed by 13 percent in Peru and 10 percent in Colombia.¹ The region is also home to roughly 30 million people, including numerous uncontacted tribes, but its impact reaches well beyond South America.

With global temperatures on the rise, the Amazon rainforest is increasingly critical as a carbon storehouse. Some recent estimates suggest that the rainforest extracts roughly 1-1.2 billion metric tons of carbon dioxide (CO₂) from the atmosphere annually²—more than twice the sum of Brazil's CO₂ emissions in 2019.³

The Amazon also plays an important role as a mediator of the global water cycle. The river basin recycles moisture from clouds as they move westward, generating nearly half of its own rainfall⁴ and providing crucial water resources for agriculture in other parts of South and Central America. Some studies have shown that the basin influences rainfall patterns as far north as the midwestern United States.⁵

One of the most biodiverse areas on Earth, the Amazon biome is home to several million species of native plants and animals⁶ that all play a role in regulating the biome's ecosystem. These species are also valuable to human populations which depend on the region's natural resources for food and medicine. The true extent of the forest's rich biodiversity remains unknown.⁷

The Amazon also holds substantial energy and mineral resources, extraction of which has taken place throughout the region for decades. Many of the countries that contain part of the forest have large hydropower, oil and gas, and mining sectors. Although most of this activity takes place outside of the Amazon region of these countries, economic dependence on the energy and extractives sectors leads them to encourage project development throughout their territories. These sectors also constitute a significant share of overall gross domestic product (GDP) in Amazon countries, though they are not always correlated with economic growth in local regions.

Large dams provide a significant share of electricity generation in Amazon countries. Large hydropower projects (those with installed capacity greater than 30 megawatts (MW)) made up an average of 55 percent

of total installed capacity in Brazil, Bolivia, Colombia, Ecuador, and Peru in 2019⁸ and 45 percent and 50 percent of installed capacity in Venezuela⁹ and French Guiana, respectively, in 2018.¹⁰ Hydropower provides an even larger share of generation in many countries since it is dispatched the majority of the time. For example, it provides roughly 65 percent of generation in Brazil.

Amazon countries also rely on oil and gas production as a source of domestic energy supply and export revenue. Five of these countries—Brazil, Colombia, Venezuela, Ecuador, and Peru—made up 87 percent of South and Central America's total oil production in 2019. In the same year, these countries held over 18 percent of the world's proven oil reserves.¹¹ Many South American countries, including Venezuela, Ecuador, Brazil, and Colombia, are net oil exporters for which oil revenues represent a significant proportion of total exports and GDP.¹²

The region also has immense metal and mineral resources. Together, Brazil and Peru hold roughly 9 percent of the world's gold reserves, for example.¹³ The mining sector is an important source of foreign investment and government revenue in the economies of Amazon countries. In Peru, one of the most important mineral producers in the region, the mining sector accounts for 11 percent of tax revenues.¹⁴

However, the hydroelectric, oil and gas, and mining sectors can have detrimental impacts on Amazon ecosystems. Mineral and hydrocarbon extraction and large hydroelectric projects can all lead to deforestation, greenhouse gas emissions, and environmental degradation. Thus, it is important to implement appropriate environmental and social standards if projects are built within the biome.

While various studies have mapped energy and extractives projects wholly or partly within the Amazon, a complete picture of the entities that own and finance these projects is lacking. Through collection and analysis of data related to hydroelectric, oil and gas, and mining projects in the Amazon, this report will provide stakeholders with a better understanding of the companies and banks involved in the projects. The report analyses the ownership profile of these projects, including the types of companies that own and operate them and where these companies are headquartered. Our research also analyzes deals made within the three sectors and sheds light on the region's financing landscape. Our hope is that this research will help governments, nongovernmental organizations, investors, and civil society identify the players that are active in energy and extractives projects in the Amazon and are thus important potential allies in designing and implementing robust environmental and social safeguards.

The projects in this data set lie within the biogeographic Amazon, an area broader than the Amazon River basin itself that holds dense tropical rainforest and diverse vegetation (see Figure 1).¹⁵ We collected data for the year each concession was originally awarded, for 2015, and for 2020 in order to understand corporate and financing trends over the life of each project as well as over a more recent period of time. Sources used to collect this data include project databases; bank websites and financial databases; company websites, technical reports, and press releases; securities filings; government agency websites; nongovernmental organizations; news sources; and interviews with experts. All graphs are based on data collection and calculations by the authors. For a complete list of sources, see Annex (page 36).

Our findings point to several noteworthy patterns in the corporate and financing landscape for energy and extractives projects in the Amazon.

State-owned enterprises (SOEs) are very prominent in the oil and power sectors in the Amazon region, mirroring their broader dominance in these sectors on the national level. Small and mid-sized foreign companies are also prevalent, particularly in the mining sector. Small local companies also have modest involvement in all three sectors. Major

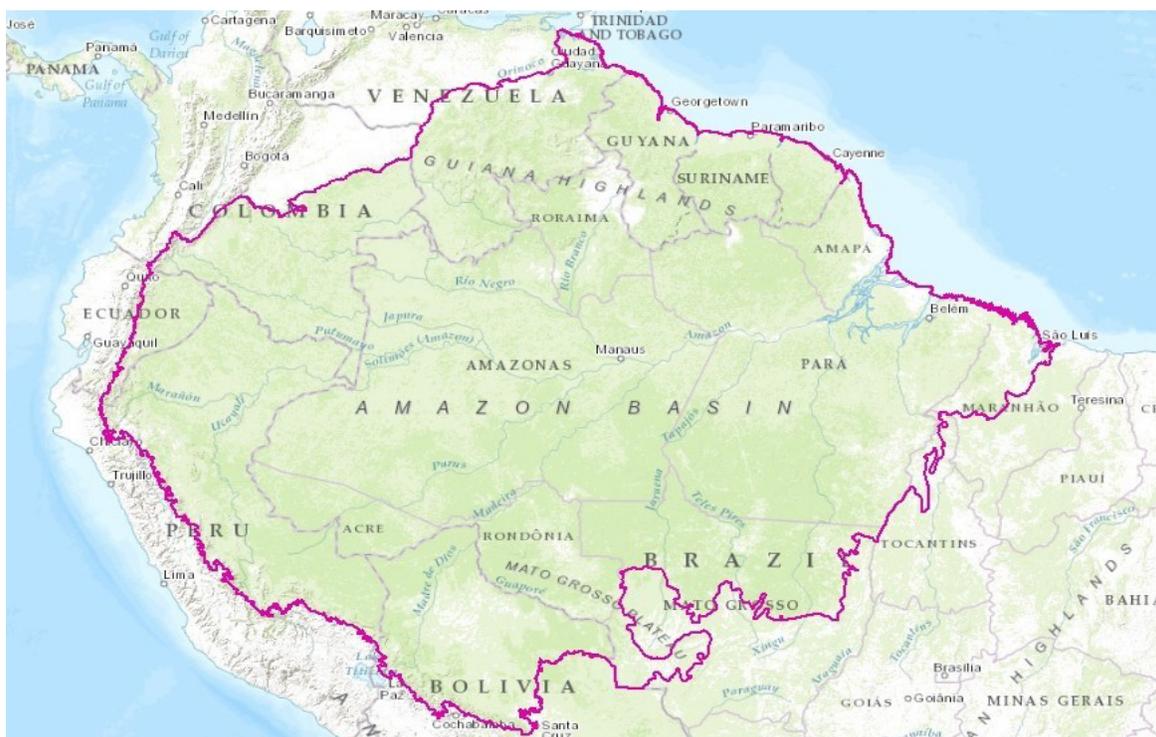
international companies have very limited presence in all three sectors in the Amazon region, perhaps because of the high potential environmental and social liabilities and reputational risks associated with them.

Foreign companies from a wide variety of countries do own and operate oil, mining, and hydropower projects in the Amazon region, but the majority of foreign firms are from a small number of countries, including Canada and some European countries. Chinese companies invest in projects across the energy and mining industries in South America but own less than 10 percent of total equity in projects in all three sectors in the Amazon. The level of engagement of Chinese companies in the Amazon is important because they are often perceived as having lower environmental and social standards than their Western counterparts—although their record varies depending on the host countries' own requirements—and deals involving these companies are more opaque. In addition, China is well-positioned to expand its footprint in energy and mining in the Amazon if investors from other countries shed assets.

The companies that own and operate energy and mining projects in the Amazon region have remained mostly consistent over the life of the projects. In all three sectors

FIGURE 1: THE BIOGEOGRAPHIC AMAZON

Source: Amazon Geo-Referenced Socio-Environmental Information Network (RAISG)



there were relatively few deals, such as mergers and acquisitions (M&As), full asset sales, or partial equity sales, despite major international shifts in commodity prices and interruptions to operations in recent years.

In the lion's share of projects, the company or consortium that owns a project is also its operator, so these conclusions apply to both owners and operators.

Multilateral and national development banks, particularly CAF – Development Bank of Latin America, the Inter-American Development Bank (IDB), and the Brazilian Development Bank (BNDES), have made loans to many hydropower projects but been almost entirely absent from the mining sector. Commercial and investment banks have also loaned to both the hydro and mining sectors while many private equity funds have also financed mining projects in the region.

Our analysis suggests that state-owned enterprises, followed by small and mid-sized international companies from a handful of countries, would have the greatest influence over the operations of energy and extractives projects in the Amazon rainforest and the implementation of environmental safeguards. Lenders, which mainly include multilateral and national development banks, commercial and investment banks, and private equity funds, could also have substantial influence over these companies' practices.

HYDROPOWER

Overview of the Sector in the Amazon Region

RESOURCES AND POTENTIAL

Many South American countries have chosen to develop hydropower capacity because they view it as a relatively cheap, clean, and reliable energy source. The Amazon basin has significant hydropower potential that many governments in the region have been eager to exploit.

Hydro is cheaper than other energy sources in many markets. According to the International Renewable Energy Agency, in 2019, 90 percent of the newly commissioned hydropower capacity globally cost less than the cheapest new fossil fuel-fired option.¹⁶

In addition, most hydropower projects in the world have a carbon intensity within the range of other renewable energy sources like solar and wind power,¹⁷ although the lifecycle greenhouse gas emissions of hydro projects can vary significantly depending on the size, life, and location of the project, and some projects, have significantly higher emissions. A 2016 study found that about 10 percent of hydro projects produce as much greenhouse gas per unit of energy as conventional fossil-fuel plants due mainly to their lower power densities, or the ratio of the reservoir size to installed capacity. Some of the carbon-intensive plants in the study are located within the Amazon rainforest.^{18,19}

Hydropower also provides firm power that complements intermittent renewables. Power stations can quickly go from zero to maximum output to meet rapidly fluctuating energy demand from the grid.²⁰ In some areas of the Amazon rainforest, abundant rainfall and large volumes of river water flow mean there is potential for electricity generation.²¹

In all Amazon countries except Guyana, hydropower is a significant source of electricity generation. The combined installed hydro capacity of all nine Amazon countries totaled 147.9 gigawatts (GW) in 2019, with almost two thirds of this located in Brazil, home to several mega dams. This is more than 10 times the total installed capacity of the world's second largest dam, located on the border between Brazil and Paraguay.²² As the economies of these countries continue to grow, so too will energy demand. Unless current growth trends are reversed, electricity demand for the broader region of Latin America and the Caribbean is estimated to increase by more than 91 percent through 2040, reaching over 2,970 terawatt-hours.²³

Although hydropower already represents a large share of generation in most Amazon countries, some undeveloped potential remains. In Brazil, untapped hydroelectric potential is estimated at 52 GW and, according to the country's National Energy Plan, 77 percent of this potential overlaps with protected areas.²⁴ In Peru, hydropower potential has been estimated at 70 GW,²⁵ but in 2019 installed capacity was only 5.2 GW.²⁶ Given that about 97 percent of the country's water resources are located in the Amazon River basin, some governments have identified the region as a significant potential source for hydropower development.²⁷ However, as explained in Section 2b, it is unclear that further hydropower resources in the Amazon will be developed.

INVESTMENT AND REGULATORY FRAMEWORK

In most Amazon countries, the power sectors are open to both public and private investment and regulated by an independent government regulator that enforces rules, organizes energy auctions, awards contracts, and sets tariffs. However, electricity markets in the region have differing levels of competition.

Beginning in 1992 with Peru, some Amazon countries adopted power sector reforms which fostered increased private sector participation.²⁸ Bolivia, Ecuador, and most notably Venezuela have since moved away from these reforms and have less competitive electricity markets.²⁹ The Guianas—French Guiana, Suriname, and Guyana—all have power sectors that are dominated by vertically integrated monopolies.³⁰ Brazil and Peru have more liberalized power sectors with competition at the wholesale level. In Colombia, competition exists at both the wholesale and retail level.³¹

Despite private sector participation in many markets, state-owned utilities such as Brazil's Centrais Elétricas Brasileiras (Eletrobras), Bolivia's Empresa Nacional de Electricidad (ENDE), and Ecuador's Corporación Eléctrica del Ecuador (CELEC) tend to be the dominant players in the power sector. Eletrobras is a mixed-capital company while ENDE and CELEC are wholly state-owned. In 2018, Eletrobras had the largest share of installed capacity in Brazil at 26.3 percent.³² Among the 10 largest energy generation companies in Brazil, four others are also state-owned: Itaipu, Petróleo Brasileiro (Petrobras), Companhia Energética de Minas Gerais, and Companhia Paranaense de Energia.³³ The latter two are provincial level utilities, while Petrobras is Brazil's national oil company and Itaipu, a binational company, is jointly owned by the Brazilian and Paraguayan governments.

The process through which private companies obtain authorizations or concessions for power generation varies by country. As is the case globally, private companies developing a hydroelectric project in Amazon countries apply through the relevant government agency and are required to acquire a series of permits and licenses prior to approval.³⁴ These may include pre-feasibility studies, proof of financing, an environmental license, and other requirements pertaining to the technical and financial abilities of the concessionaire.^{35,36,37}

The regulatory framework governing electricity generation contracts also varies by country. In Brazil and Peru, hydroelectric projects can supply consumers through direct contracting (free market) or competitive auctions

held to supply distributors (regulated market).^{38,39} In Bolivia and Ecuador, countries in which power generation and distribution are largely dominated by state companies, distributors and large unregulated consumers both contract energy directly from generators without auction mechanisms.^{40,41}

Many hydropower projects receive financing from external sources. Loans are generally disbursed on a project finance basis, meaning they are paid back with revenue from the project once it is in operation.

ENVIRONMENTAL AND SOCIAL IMPACTS

Hydropower produces various environmental impacts. Large dam construction can cause ecosystem disruption, resulting in deforestation and land-use change. Greenfield projects can also result in a loss of biodiversity. For example, dams can impact endemic freshwater species by altering the river's hydrology and water quality.⁴² As a result, it is difficult for companies to obtain environmental permits to build new hydropower dams, particularly in environmentally sensitive areas like the Amazon.

Climate change poses an increasing challenge to countries dependent on hydropower given the technology's vulnerability to climate variability. Changes in rainfall patterns and the increasing frequency of extreme weather events affect hydropower generation by changing the volume of water that flows through the river system (causing greater or smaller volumes of water than previously, depending on the location and span of time).⁴³ Temperature rises can also increase evaporation losses from reservoirs.⁴⁴ Erratic rainfall and droughts can result in blackouts. In this context, the long-term viability of some dams may be questionable.

Despite private sector participation in many markets, state-owned utilities tend to be the dominant players in the power sector.

There are also various social impacts associated with hydropower dams. Communities that live near rivers may be displaced to accommodate greenfield dam construction. In the case of Brazil's massive Belo Monte complex, for example, tens of thousands of people were displaced.⁴⁵ Damage to wildlife populations can impact the livelihood of surrounding communities that rely on fish as a source of food or income. In addition, large hydropower dams can reduce irrigation water availability, impacting local agricultural practices, and some agricultural lands may be flooded by the creation of a dam.⁴⁶ The short-term migrant labor associated with dam construction also strains local municipalities' provision of basic services. Insufficient consultation processes and lack of effective strategies have exacerbated social impacts associated with hydropower, and in some cases stopped the development of new hydropower projects in the Amazon.

Hydropower development in the Amazon, as in other areas of the world, generally requires an environmental license prior to construction. These licenses set technical conditions that must be met to reduce and mitigate potential environmental degradation. If conditions are not met, the license could be revoked, or the company could face fines. To meet environmental regulations in Brazil, for example, companies must secure three licenses at separate stages of project development—a preliminary license, an installation license, and an operation license.⁴⁷

Analysis of Corporate and Financing Trends

PROJECT DATABASE

Our data collection produced a comprehensive set of large (defined as having installed capacity greater than 30 MW) operational and planned hydroelectric projects in the biogeographic Amazon. Projects with multiple power stations or phases were combined and treated as a single project when the owners and operators were the same for all phases.

In total, our list contains 69 large hydroelectric dams (see Figure 2). Peru and Brazil hold the greatest number of projects in the region, while there are no large hydroelectric dams in the Amazon regions of French Guiana or Guyana. Most projects, with the exception of several in Brazil, are clustered around the edges of the biogeographic Amazon limits.

Our research initially yielded 175 projects for analysis. However, for 65 of them no evidence that they had moved past the very early planning stages was publicly available. Another 30 planned projects appear more likely to come online and are analyzed in this report but not

FIGURE 2: AMAZON HYDROPOWER PROJECTS, 2020 OPERATIONAL STATUS

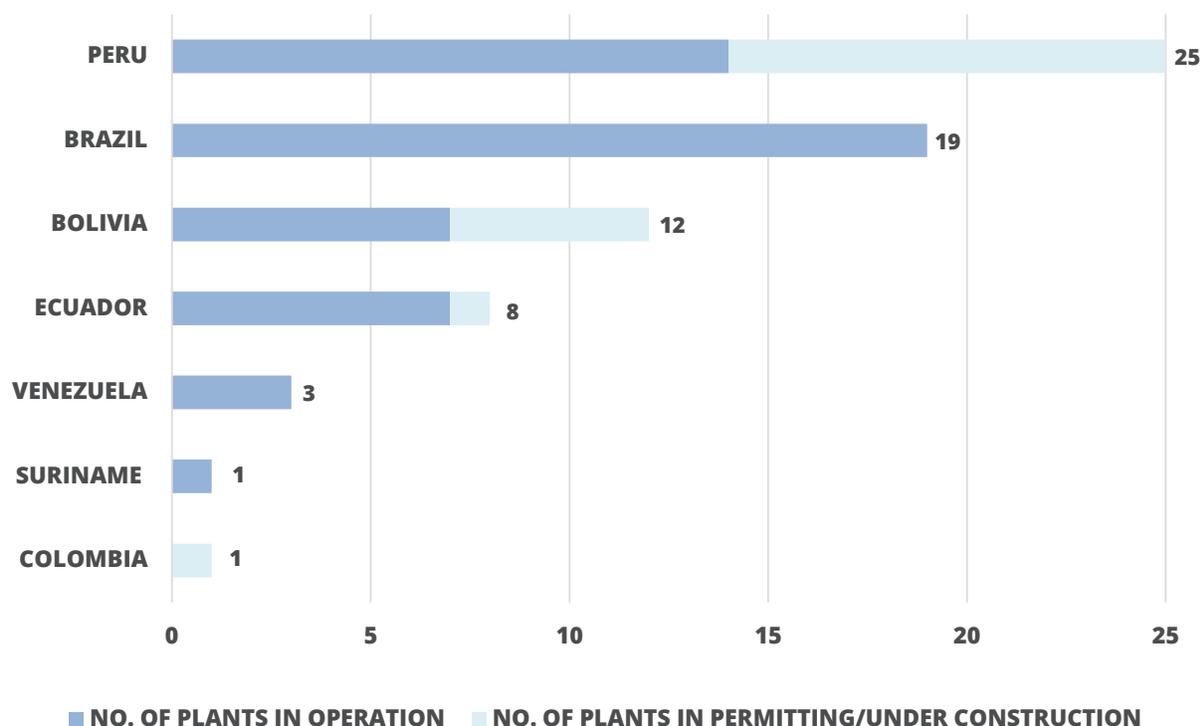
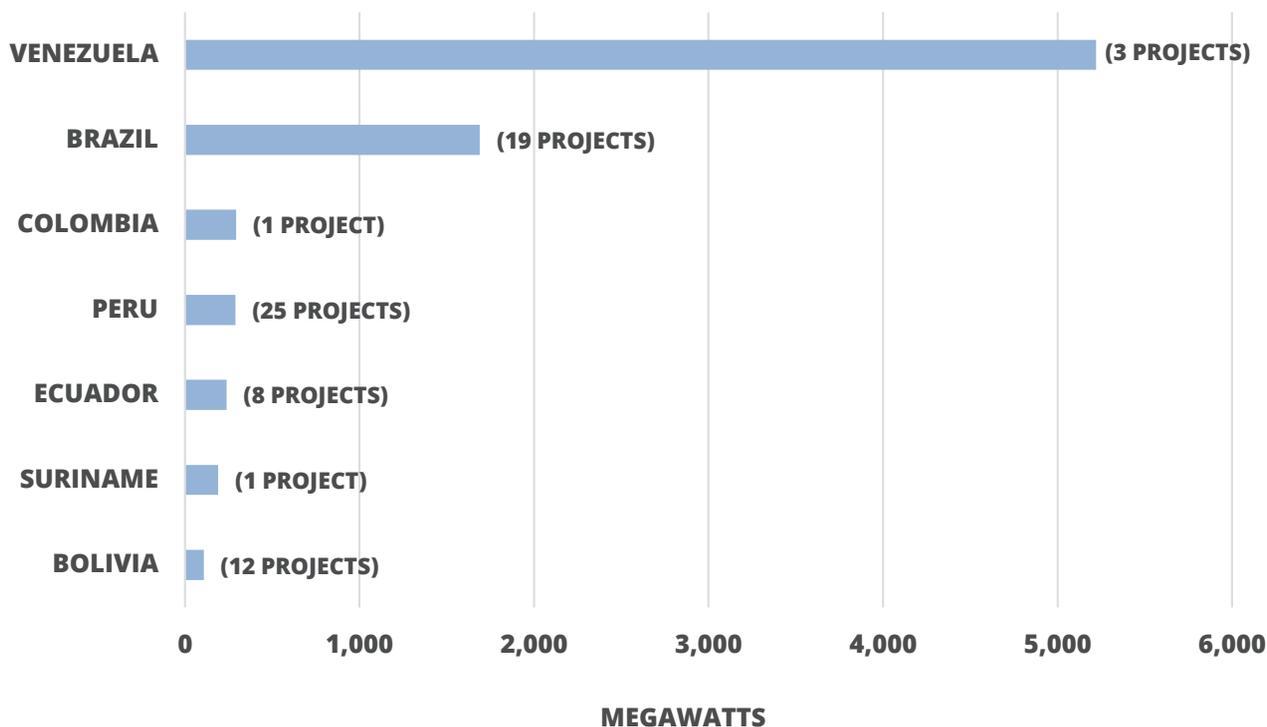


FIGURE 3: AMAZON HYDROPOWER PROJECTS, AVERAGE INSTALLED CAPACITY BY COUNTRY



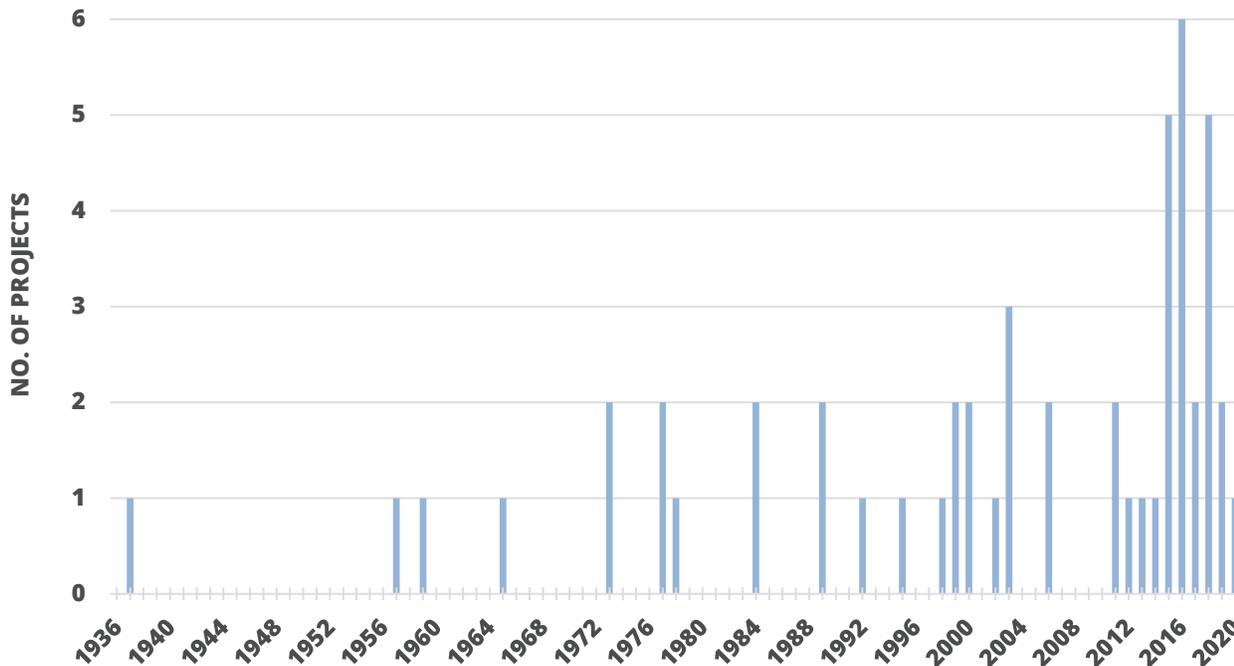
included in the data set. Some of these 30 plants are in the prefeasibility or feasibility stages, while others have received financing and have a scheduled date to come online but have yet to begin construction. Nearly half of these projects are in Peru. In addition, 11 projects that we identified were dormant or cancelled. Of our final list, most (52) projects are in operation. The greatest number of these are located in Brazil, followed by Peru. Colombia, Guyana, and French Guiana have no plants in operation in the Amazon. In these countries, the low population density (and thus minimal energy demand), coupled with the high costs of infrastructure development in remote areas, may explain the lack of hydroelectric plants in the Amazon region. Instead, diesel generators in isolated grid systems are the norm. While developers have announced plans to build projects in the Colombian Amazon⁴⁸ in recent years, none have moved past the permitting phase. Brazil and Peru, by contrast, have large populations within or close to the Amazon region.

In terms of size, projects in Venezuela have the greatest average installed capacity (see Figure 3). However, the country's three mega dams are only operating at around one third of their installed capacity due to technical failures resulting from the government's failure to maintain or repair facilities.⁴⁹ In the case of the Guri hydropower

plant, 12 out of 20 turbines are out of commission.⁵⁰ After Venezuela, Brazil has the greatest average installed capacity, at 1,690 MW, although this number is skewed by a few mega projects such as the Belo Monte dam, which has capacity of more than 11,000 MW. The average size of projects in other countries in the region is much smaller—between 100 and 300 MW. The smallest projects on average are located in Bolivia.

After Venezuela, Brazil has the greatest average installed capacity at 1,690 MW, although this number is skewed by a few mega projects.

FIGURE 4: AMAZON HYDROPOWER PROJECTS, NUMBER ONLINE PER YEAR



The projects in our data set came online with the highest frequency in 2016, followed by 2015 and 2018 (see Figure 4). Projects that are no longer in operation or are planned to come online after 2020 are not included in our analysis. The average hydropower plant has a life span of 30 to 80 years, so projects that came online before 1990 may have been decommissioned, explaining why most projects currently in operation came online in more recent decades.⁵¹

Even though the greatest number of currently operational projects have come online over the last ten years, the outlook for hydropower development in the Amazon region

is uncertain. For example, little additional hydro capacity is expected in the Brazilian Amazon for a variety of reasons including concerns about transparency, political instability, questions about economic returns, and potential social and environmental impacts. While Brazil’s 10-year energy policy lays out a plan to develop 55 GW of capacity, only 10 percent is expected to come from hydropower sources.⁵² In the 2020 energy plan, there are only three announced hydropower plants which could come online in the Brazilian Amazon between 2020 and 2029, none of which have been awarded generation contracts.⁵³ The last contract for capacity larger than 30 MW on offer in an auction in the biogeographic Amazon was in 2014.⁵⁴

In addition, the massive regional corruption scandal centered on Brazilian engineering and contracting company Odebrecht, which came to light in 2014, impacted construction of new projects in power and other sectors, particularly in Peru. This caused delays in awarding contracts because of new anti-corruption measures, although it is unclear that this directly affected project construction in the Amazon.

Rather than building new projects, governments and developers are currently more focused on modernizing existing hydropower assets. Digitalization has been a driving factor of Latin America’s hydropower business for the last ten years.⁵⁵ Some companies are investing in extending the life of these power plants, meaning they

Rather than building new projects, governments and developers are currently more focused on modernizing existing hydropower assets.

could be operating for the next 30 or 40 years. Modernized plants also tend to have lower environmental impacts—bringing additional capacity online in a brownfield project avoids the negative environmental externalities associated with building a new plant. In addition, technological advances and digitalization allow for increased climate resilience by permitting the integration of intermittent sources like wind and solar to complement hydro generation.⁵⁶

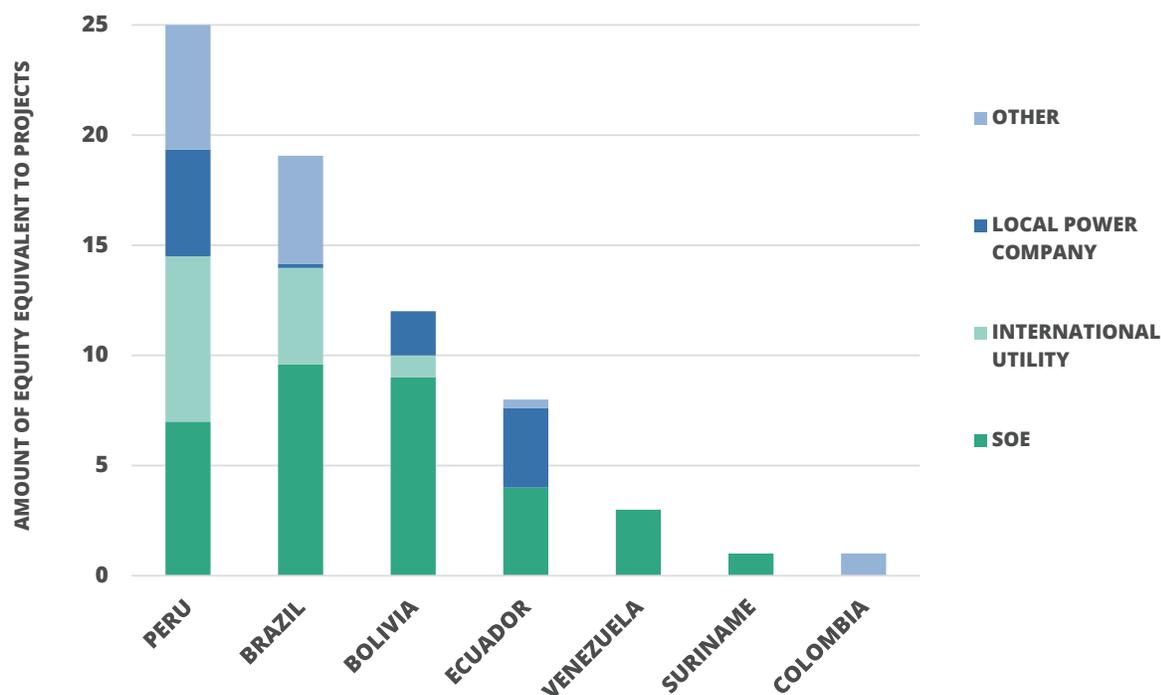
PROJECT OWNERS AND OPERATORS

In terms of project ownership, state-owned companies such as Eletrobras, ENDE, and CELEC dominate the landscape (see Figure 5). This mirrors a broader trend in Latin American countries, namely that state-owned utilities tend to receive the majority of generation contracts (although in recent years private sector generation has increased).⁵⁷ Hydroelectric generation is concentrated in the hands of SOEs in various markets, most notably in Central America (apart from Panama), Colombia,⁵⁸ Venezuela, Ecuador, and Brazil.⁵⁹ State-owned hydropower plants often serve government objectives such as boosting local economic development, maintaining low electricity

prices, and optimizing the use of water resources for irrigation and flood control purposes.⁶⁰ Moreover, government involvement is often key to successfully developing large hydro projects given the numerous environmental, social, and financial risks involved as well as the fact that these projects are capital-intensive and thus require long-term financing that only government entities can obtain. Within the Amazon region, state entities hold equity equivalent to about 49 percent of all projects. In Brazil and Ecuador, state-owned companies hold equity equivalent to 14 projects, or about half of the total number of projects. In Bolivia and Venezuela, this share is higher at 75 percent and 100 percent, respectively. State-owned entities hold equity stakes equal to about one third of projects in Peru. The ownership of Suriname's singular large hydropower dam, Afobaka, was recently transferred from US mining giant Alcoa to state-owned Staatsolie Power Company Suriname, a subsidiary of state oil company Staatsolie.⁶¹

International utilities—large, multinational power companies such as Energias de Portugal (EDP), Engie, Iberdrola, and Enel—and their subsidiaries own the second largest share of Amazon hydro projects: about 17 percent.

FIGURE 5: AMAZON HYDROPOWER PROJECTS, EQUITY OF OWNERS BY COMPANY TYPE (2020)



Note: The calculations shown reflect each company's respective share of project ownership. Projects with multiple equity partners are proportionally accounted for (i.e. a company with 50 percent of a project's equity is counted as 0.5 projects). In cases where the owner is a subsidiary, the data shown is representative of its parent company.

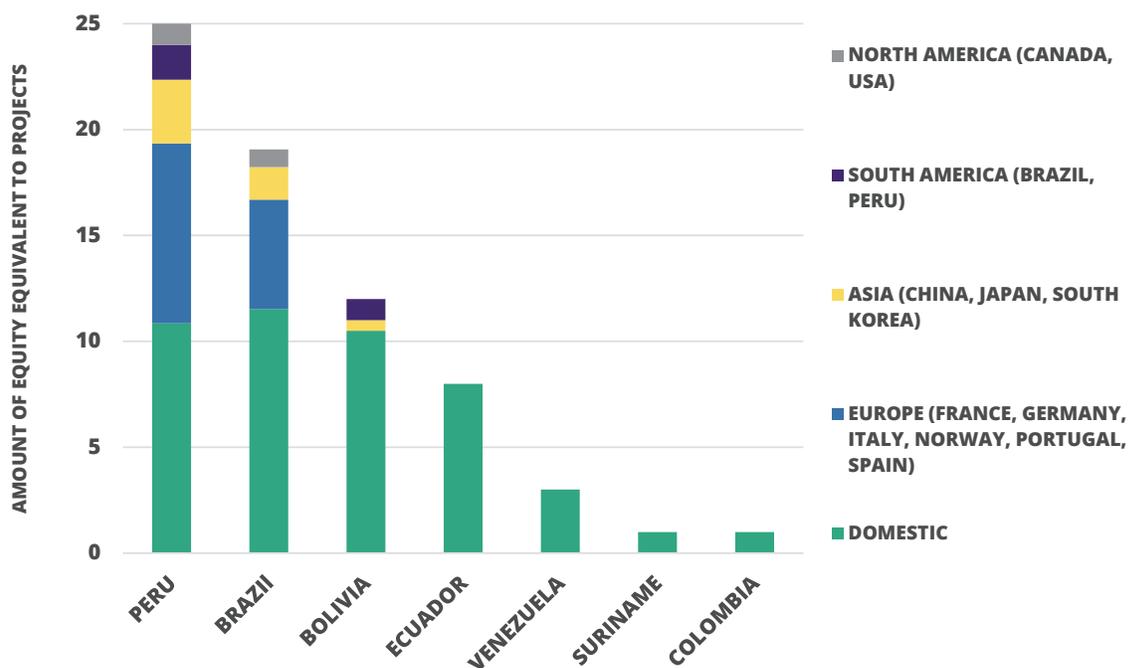
Most of the projects owned by international utilities are concentrated in Peru and Brazil. In recent years, however, few international utilities have invested in new hydropower projects in the Amazon. Only six projects that came online between 2015 and 2020 in the Amazon were fully or partially owned by international utilities, with most in Brazil. The projects owned by international utilities tend to be large, with an average capacity of 1,429 MW, likely due to the greater revenue streams from larger projects. International utilities may be averse to investing in projects in the Amazon given the potential environmental and social liabilities and reputational risks, according to experts and company representatives consulted for this study. Additionally, some international utilities are moving away from large hydropower investments altogether, shifting project development to focus on newer technologies with lower upfront capital costs. For example, hydropower generation made up just 1 percent of Enel's 2019 renewables pipeline, while 47 percent was wind and 52 percent solar.⁶²

Local power companies (domestic, private generation or transmission companies) hold the smallest share of projects. Unlike state and international utilities, small and medium-sized companies often build projects smaller

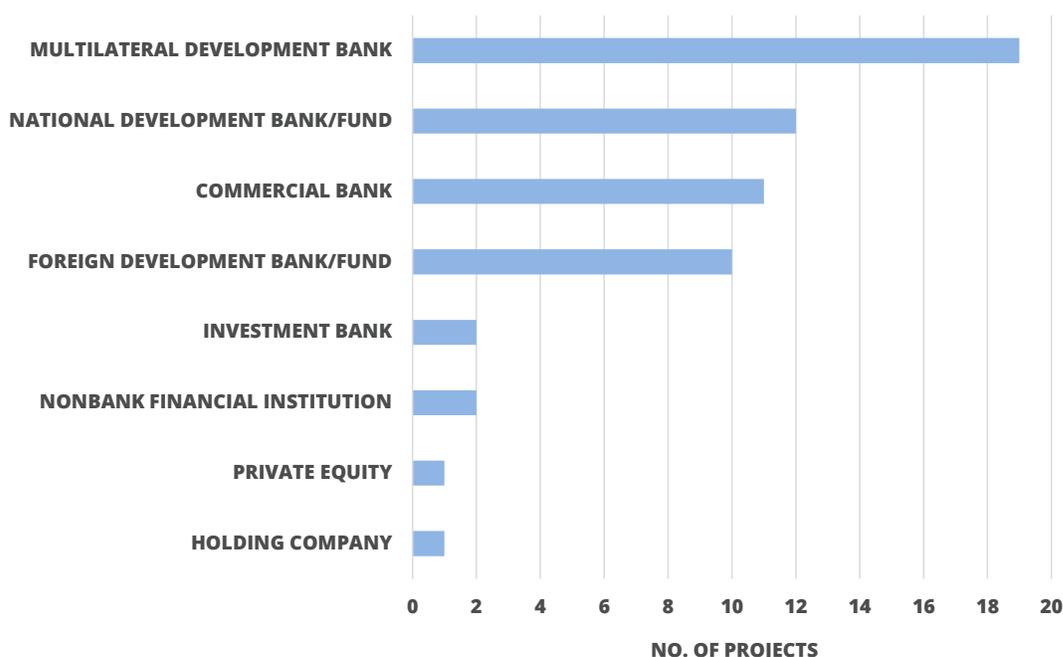
than 30 MW that would not be included in this analysis. Of the projects owned by local companies, two thirds have capacity of less than 90 MW. 'Other' companies—those whose main operations are not related to the generation and transmission of electricity, including mining, construction, investment, and holding companies—own about one sixth of projects.

Most companies operating hydro projects in the Amazon are not listed on stock exchanges. However, the companies that are publicly traded have large market caps, in some cases more than \$20 billion, and are well known companies with a wide variety of investors. Examples include European utility companies such as Enel, Iberdrola, EDP, and Engie. Of the non-listed companies, a plurality (45 percent) are SOEs, which is unsurprising given that most state-owned companies do not float stock. The one major exception is Eletrobras, Brazil's state-owned power utility, which is listed on Brazil's B3, the New York Stock Exchange, and the Madrid Stock Exchange.⁶³ Local power companies, 'other' companies, and Inkia Energy, a Peruvian multinational company that owns and operates power generation projects throughout Latin America,⁶⁴ make up the remainder of non-listed companies. Privately owned companies generally disclose less information

FIGURE 6: AMAZON HYDROPOWER PROJECTS, EQUITY OF OWNERS BY LOCATION OF HEADQUARTERS (2020)



Note: The calculations shown reflect each company's respective share of project ownership. Projects with multiple equity partners are proportionally accounted for (i.e. a company with 50 percent of a project's equity is counted as 0.5 projects). In cases where the owner is a subsidiary, the data shown is representative of its parent company.

FIGURE 7: AMAZON HYDROPOWER PROJECTS, SELECTED FINANCING BY NUMBER OF TRANSACTIONS

Note: In some cases, projects had multiple financial backers. Each financier is counted separately in the above figure.

about company financials and liabilities, meaning their prevalence in the Amazon hydroelectric space poses a challenge to transparency and oversight.

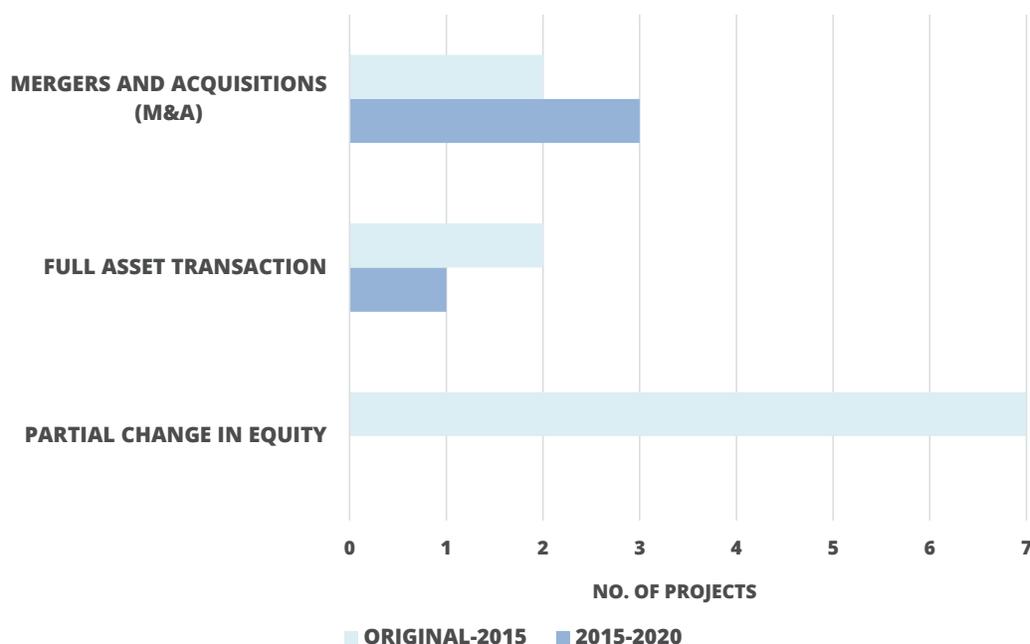
The majority of Amazon hydropower projects are owned and operated by companies from the country where the plant is located, in part because of the high levels of SOE participation. Almost 70 percent of project ownership is in the hands of Latin American companies. For the most part, South American companies with hydroelectric assets are based in the same country in which they operate, although there are a few examples of Peruvian companies owning projects in Bolivia and Brazilian companies operating in Peru, including two projects partially owned by Odebrecht.

Peru and Brazil have the greatest number of foreign-owned projects, possibly because these countries boast more favorable environments for foreign investment than Bolivia, Ecuador, and Venezuela, where most of the remaining hydro projects are located (see Figure 6). European companies (from Portugal, Spain, Italy, Norway, Germany, and France) are the top foreign developers, owning slightly less than one fifth of total project equity throughout the Amazon region. Europe's numerous large international power companies are important players in South American power markets broadly. North American (US and Canadian) participation in the Amazon hydro space is limited, accounting for less than 5 percent of total project equity.

China is the foreign country that accounts for the most companies with Amazon hydro assets (followed by European countries), although they own stakes worth just 8 percent of all projects. Chinese companies such as China Three Gorges and its subsidiaries have investments in six dams within the Amazon.⁶⁵ There is significant Chinese investment in engineering, procurement, and construction (EPC) contracts in Amazon-based hydro projects, though EPC contracts are outside the scope of this report.⁶⁶

Policy documents in China reflect a clearly articulated effort to move beyond EPC work and instead focus on acquiring equity stakes in projects. Indeed, China is trying to accomplish this through targeted acquisitions, many of which have taken place over the last several years, and this trend is expected to continue. For example, in 2019, state-owned power company China Three Gorges acquired Empresa de Generación Huallaga a former Odebrecht subsidiary, giving it control over one of Peru's largest hydroelectric power plants.⁶⁷ To date, Chinese companies have mostly acquired assets from companies with dams located outside of the Amazon, but given China's strong economic standing, it is well-positioned to acquire assets in the Amazon as well.

FIGURE 8: AMAZON HYDROPOWER PROJECTS, MOST RECENT TRANSACTION TYPE



Note: The figures above reflect the number of projects that had at least one transaction since the contract was awarded rather than the total number of project transactions. Projects with more than one transaction were included once and categorized by the type of the most recent transaction.

FINANCING AND TRANSACTIONS

The greatest number of Amazon hydro project loans that we could identify using publicly available information were issued by multilateral development banks such as CAF, the IDB, and the World Bank, with the single greatest number of loans (10) issued by CAF (see Figure 7). The IDB and its private-sector arm IDB Invest issued the second highest number of loans (7), while the World Bank provided two. However, in recent years, multilateral development banks have moved away from financing large hydro projects. Almost one third of multilateral loans were provided before 2000, including both loans from the World Bank, and only two loans were issued later than 2015. Multilateral loans were disbursed for projects in most countries in the study, the exception being Brazil, where there was no funding from multilaterals, likely due to competition from its own national development bank.

Multilateral development bank loans are generally needed to build large projects due to their high initial capital investment. This requires long-term financing of 20-30 years, which private lenders usually do not provide. Indeed, the average installed capacity of projects financed by multilaterals was 1,313 MW, although such banks also financed a number of smaller projects of around 100-200 MW. Organizations like CAF act as the initial financier of the project, conducting the risk assessment

and ensuring that the project incorporates international social and environmental standards, thus facilitating the entry of other banks in the project. Conversely, smaller hydropower projects (< 50 MW) usually have private sources of financing, such as private bank loans or private equity, or some sort of blended private financing with local development banks, according to some experts.

In Brazil, BNDES, the largest national development bank in Latin America, is the top financier of hydropower projects in the country and the only national development bank that has directly loaned to hydro projects in the Amazon region, according to our findings. BNDES provides loans in domestic currency, which is attractive for companies operating in Brazil because this mitigates risks associated with exchange rate volatility. In recent years, however, BNDES has pulled back from hydropower financing. In 2016, when BNDES approved new financing terms for the power sector, the bank reduced its participation in large hydroelectric project finance to a maximum of 50 percent (down from the previous 70 percent cap).⁶⁸ Furthermore, the bank appears unlikely to invest heavily in large hydropower in the coming years, according to its recent strategic plans.

Commercial banks represent the third largest group of financiers for hydroelectric projects in our data set. However, given that there is limited publicly available

information on commercial bank loans, our research likely does not offer a complete picture of the financing landscape. Of the commercial loans identified, roughly equal amounts came from domestic and foreign banks. Foreign entities were based in Spain, the United States, China, and Germany.

Chinese financial institutions also financed several hydroelectric projects in our data set. In Ecuador, six of the eight emblematic hydroelectric projects in support of former President Rafael Correa's plan for Ecuador to become an energy exporter were backed by Chinese loans, although not all of these are located within the Amazon.⁶⁹ In total, five hydro projects in our study were financed by Chinese lenders, with loans made in Peru, Ecuador, and Brazil. China was the largest foreign provider of loans on a country-by-country basis. One of the largest loans, \$1.7 billion from the Export-Import Bank of China,⁷⁰ backed the construction of the controversial Ecuadorian Coca Codo Sinclair dam. Chinese construction giant Sinohydro has faced backlash over allegations of the Amazon project's social and environmental impacts, as well as allegations of poor design and state corruption.

In terms of transactions, few Amazon hydro projects changed hands between the original contract award and 2020. Eleven projects changed equity stakeholders between the original contract year and 2015 (see Figure 8). In our review of the most recent transaction for each project, we found that deals involved a mix of M&As, full asset sales, and sales of partial equity stakes, with the latter being the most common transaction type. About 65 percent of projects involved in these deals were transferred to international companies, most of which were large international utilities, while fewer projects went to domestic companies. Three of the transactions were related to China Three Gorge's establishment of a strategic partnership with EDP, a Portuguese utility, through the purchase of a 50-percent stake in EDP Renováveis Brasil in 2013. This allowed the Chinese firm to acquire 50 percent of both the Caldeirão and Jari hydroelectric plants, as well as 33.3 percent of São Manuel.⁷¹ Two years prior to that deal, in 2011, China Three Gorges purchased a 21-percent stake in EDP itself. The massive Chinese firm has since attempted a takeover bid to further increase its stake, but the offer was blocked by shareholders in 2019.⁷² Between 2015 and 2020 there were only four hydro projects that changed hands, most of which did so via M&As. Two of these projects went to Chinese companies, both in Peru. In Suriname, the Afobaka dam was sold to the state oil company as described above.

Hydropower projects are normally owned and operated by the same company over the life of the asset, which

explains why few transactions have taken place in our data set. Although there are significant financial risks associated with the construction phase, once built, hydro plants generate a steady source of revenue throughout the project's duration. Risks that may put these investments in jeopardy—even once the project is operational—include a change in the region's hydrology and the natural ageing of the asset itself. Hydropower concessions also have very long generation contracts, of 20 years or more, and it is uncommon for operators to transfer the concession to another entity. However, an acceleration of transactions is likely in the coming years, given that many of the concessions awarded in the early 2000s will expire and be put up for auction.

OIL AND GAS

Overview of the Sector in the Amazon Region

RESOURCES AND POTENTIAL

Latin America is one of the world's major oil-producing regions. It is home to 19 percent of the world's oil reserves and 8.5 percent of its oil production, as well as 4.1 percent of natural gas reserves and 5.3 percent of global gas production.⁷³ Within Latin America, Amazon countries are among the largest oil and gas producers. The oil and gas sector makes up a large share of the economies of many of these countries including Brazil, Colombia, Peru, Bolivia, Ecuador, Venezuela, and more recently, Guyana.

An acceleration of [hydropower] transactions is likely in the coming years, given that many concessions awarded in the early 2000s will expire and be put up for auction.

The Amazon region contains significant untapped oil and gas reserves. In Brazil, one of the largest natural gas producers in South America, 59 percent of the country's onshore natural gas reserves are located in the state of Amazonas.⁷⁴ In Ecuador, a large share of oil reserves lie within the Amazon. The Ishpingo-Tambococha-Tiputini fields, known as the ITT fields, are located inside the Amazon's Yasuní National Park. These three fields contain more than 1.6 billion barrels of oil,⁷⁵ making the ITT the largest project in the history of Ecuador's oil exploitation.⁷⁶ The Peruvian Amazon is home to one of South America's largest natural gas projects, Camisea, where gas is produced for domestic consumption and for export.

INVESTMENT AND REGULATORY FRAMEWORK

In many Amazon countries, the oil and gas sector is regulated by independent authorities that are responsible for overseeing the industry, including by organizing licensing procedures, awarding contracts, and enforcing certain regulations. In the more state-centered oil industries of countries like Venezuela, the state oil company and the energy ministry both establish policy and oversee the sector. Countries in the Amazon allocate exploration and production (E&P) contracts via direct negotiation or through calls for licensing rounds. The licensing rounds vary on a country-by-country basis, but the bid is generally awarded to the company with the highest offer that meets the set requirements. The types of blocks that are up for auction also vary based on the bid round. Governments may choose to auction mature areas previously explored by other companies or new acreage. Drilling rights are usually offered under either production-sharing contracts, whereby the state maintains a share of production, or concession contracts, in which the

exploration company is given an exclusive right to explore, exploit, and market the petroleum or gas.⁷⁷

State-owned oil companies are central to their respective industries in most Amazon countries, producing the majority of national oil output. For example, Brazil's Petrobras produced 2.17 million barrels per day (b/d) of crude, or about 81 percent of Brazil's total output, in 2019.⁷⁸ In Colombia, Ecopetrol produced roughly 70 percent of the country's crude in 2018,⁷⁹ while Petroamazonas accounted for 80 percent of Ecuador's total oil production in the same year.⁸⁰

National oil companies (NOCs) have varying ownership and management structures—some are 100 percent state-owned while others are majority state-controlled but partially privatized. Brazil's Petrobras and its Colombian counterpart Ecopetrol are both listed on local and international stock exchanges and have private shareholders.⁸¹ In Venezuela, Bolivia, Ecuador, Peru, and Suriname, the state is the sole owner of the national oil company. In the case of Guyana, a nascent producer, an oil boon has attracted foreign investment but the country does not have a state oil company. For both state-owned and private oil companies, upstream projects are generally financed off the corporate balance sheet, meaning there is no external, project-based funding.

ENVIRONMENTAL AND SOCIAL IMPACTS

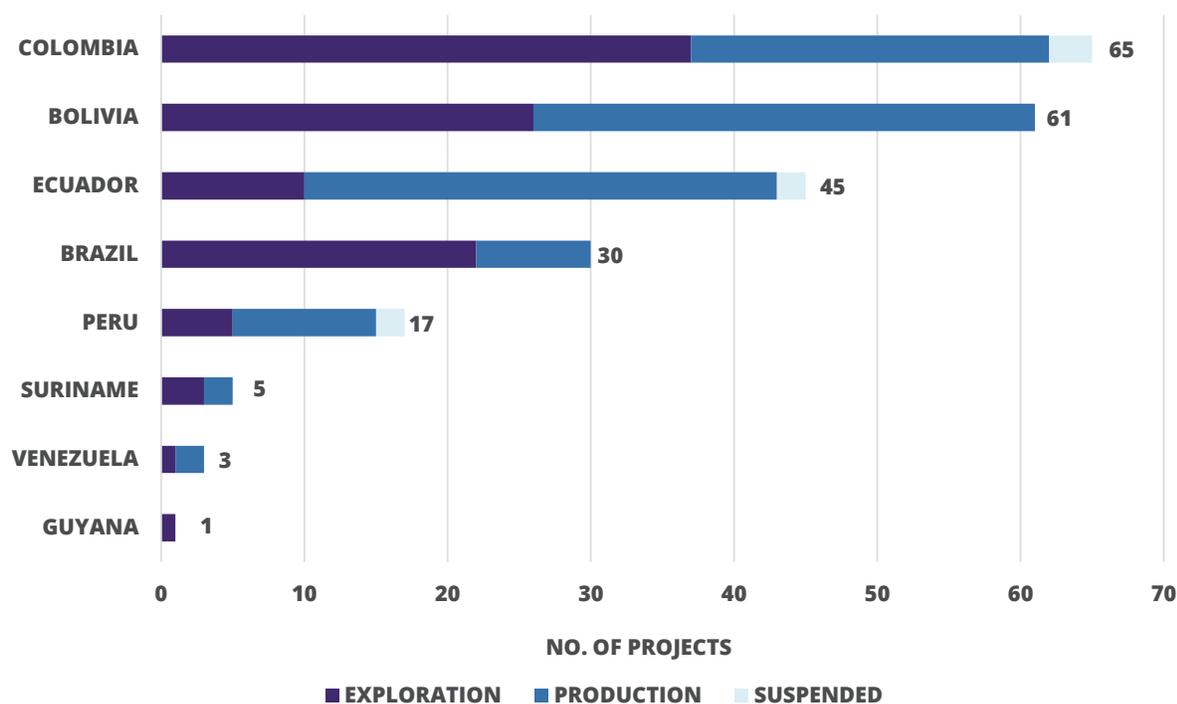
Oil and gas projects impact the environment in a variety of ways. Although fossil fuel combustion by consumers is the greatest source of emissions related to the oil sector,⁸² E&P emissions can also be significant.⁸³ Upstream operations produce Scope 1, or direct, greenhouse gas emissions through processes like natural gas flaring and venting.⁸⁴ In addition to the operations themselves, building infrastructure for the oil and gas industry such as access roads, onshore drilling platforms, and pipelines has an environmental impact. Associated infrastructure can result in increased rates of deforestation, further augmenting the release of harmful greenhouse gases.⁸⁵

Beyond their environmental impacts, oil and gas projects have negative social externalities as well. Improper infrastructure management and operational failures can result in oil spills with the potential to contaminate local water resources, impact food supply chains, and contribute to soil degradation.⁸⁶ In addition, air pollution may have adverse health effects on local communities that live close to the drilling site.⁸⁷

In parts of the Amazon, oil and gas reserves overlap with Indigenous territories. Most governments in the region

State-owned oil companies are central to their respective industries in most Amazon countries, producing the majority of national oil output.

FIGURE 9: AMAZON OIL AND GAS PROJECTS, 2020 OPERATIONAL STATUS



have established the right of Indigenous peoples to free, prior, and informed consultation or consent for oil and gas development. However, in practice this process is not always properly implemented, nor does it give communities veto power over projects.⁸⁸ Indigenous peoples have occasionally won lawsuits against governments over a lack of consultation prior to opening their territory to oil development. Such was the case in Ecuador in 2019 when the Waorani won a legal battle preventing their ancestral lands from being included in an oil auction.⁸⁹

Environmental regulation varies on a country-by-country basis in the Amazon. In all countries, concessionaires must perform environmental impact assessments which are subject to approval by the environmental authority.

Analysis of Corporate and Financing Trends

PROJECT DATABASE

Our oil and gas data set constitutes a comprehensive list of upstream projects within the biogeographic Amazon. Only concessions that have been awarded or are already

operational are included, although there are a few temporarily suspended blocks.

Colombia has the greatest number of oil and gas blocks in the Amazon (65), followed by Bolivia (61). Together, Colombia and Bolivia contain almost two thirds of the Amazon's active upstream blocks. While in Brazil and Peru several blocks are located in the interior of the rainforest, the majority of projects overall are concentrated around the edges of the biogeographic Amazon limits. Most blocks are either in the exploration or the production stage (see Figure 9). The number of projects in each stage is roughly equal, with 107 in exploration and 115 in production. In Colombia and Brazil, most blocks (59 percent and 73 percent, respectively) are still in exploration. In Ecuador and Bolivia, most blocks (76 percent and 57 percent, respectively) are in the production stage. In general, blocks in the exploration phase have been awarded more recently than those in production.

There are also a number of suspended blocks located in Colombia, Ecuador, and Peru, some of which have been suspended due to conflicts with local communities. In Ecuador, two blocks owned by Chinese company Andes Petroleum were suspended due to opposition from Indigenous communities.

The large share of blocks fully owned by one company may reflect relatively low costs and risks associated with assets under development.

The median size of Amazon oil and gas blocks varies between countries. Peru has the greatest median block size followed by Guyana and Brazil. While there is only one block located in Guyana, it is quite large at 3,295 square kilometers. Bolivia has the smallest median block size of the group, although it has the second greatest number of blocks. As described below, the output of fields also varies by country, with Ecuador and Peru having much higher-output fields in the Amazon than the other countries.

51 percent of the total Amazon oil and gas contracts still active today were awarded between 2005 and 2012. Contracts were awarded with the highest frequency in

2007 (see Figure 10). Of these, the majority (38 out of 43) were in Bolivia with most contracts awarded to state company Yacimientos Petrolíferos Fiscales Bolivianos (YPFB) or its subsidiaries. This could be related to the country’s nationalization of its oil sector the year prior. Shortly after taking office in 2006, then-President Evo Morales decreed that foreign oil companies operating in Bolivia must hand majority control of their projects to YPFB within 180 days.

A total of 106 companies and their subsidiaries control oil and gas projects in the Amazon. Of more than 225 projects under development, almost nine tenths are 100 percent owned by the company operating the project, while 11 percent of blocks had an operator that was one of multiple equity stakeholders. Oil companies typically bring in equity partners to help finance capital-intensive or high-exploration-risk projects, meaning the large share of blocks fully owned by one company may reflect relatively low costs and risks associated with assets under development in the Amazon region.

PROJECT OWNERS AND OPERATORS

NOCs hold the largest share of upstream projects in the Amazon (see Figure 11). This mirrors trends on the national level in most South American countries, namely that NOCs control a majority—or at least a large share—

FIGURE 10: AMAZON OIL AND GAS PROJECTS, NUMBER OF CONTRACTS AWARDED PER YEAR

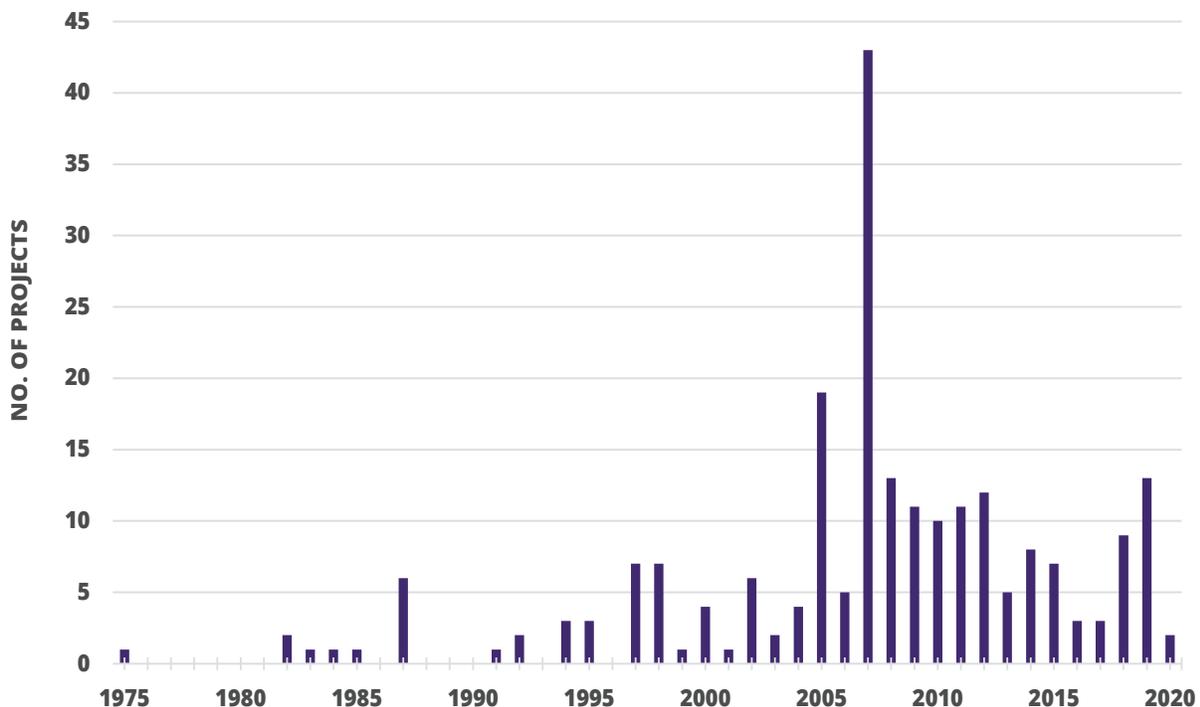
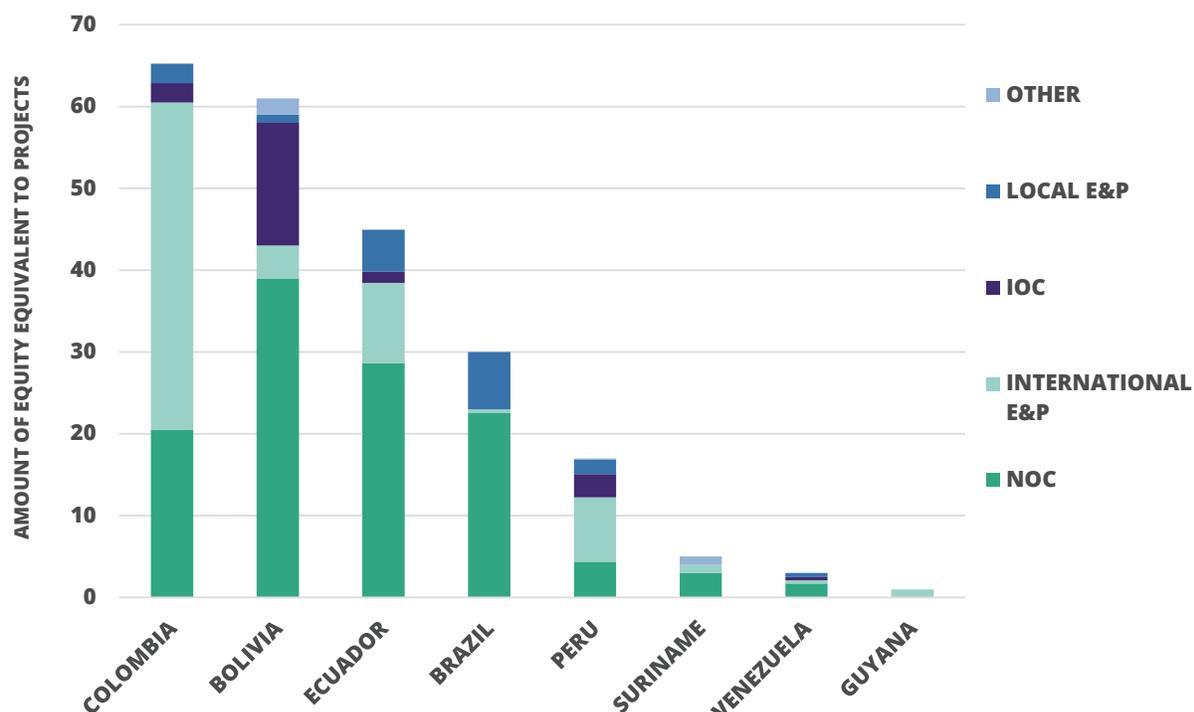


FIGURE 11: AMAZON OIL AND GAS PROJECTS, EQUITY OF OWNERS BY COMPANY TYPE (2020)



Note: The calculations shown reflect each company's respective share of project ownership. Projects with multiple equity partners are proportionally accounted for (i.e. a company with 50 percent of a project's equity is counted as 0.5 projects). In cases where the owner is a subsidiary, the data shown is representative of its parent company.

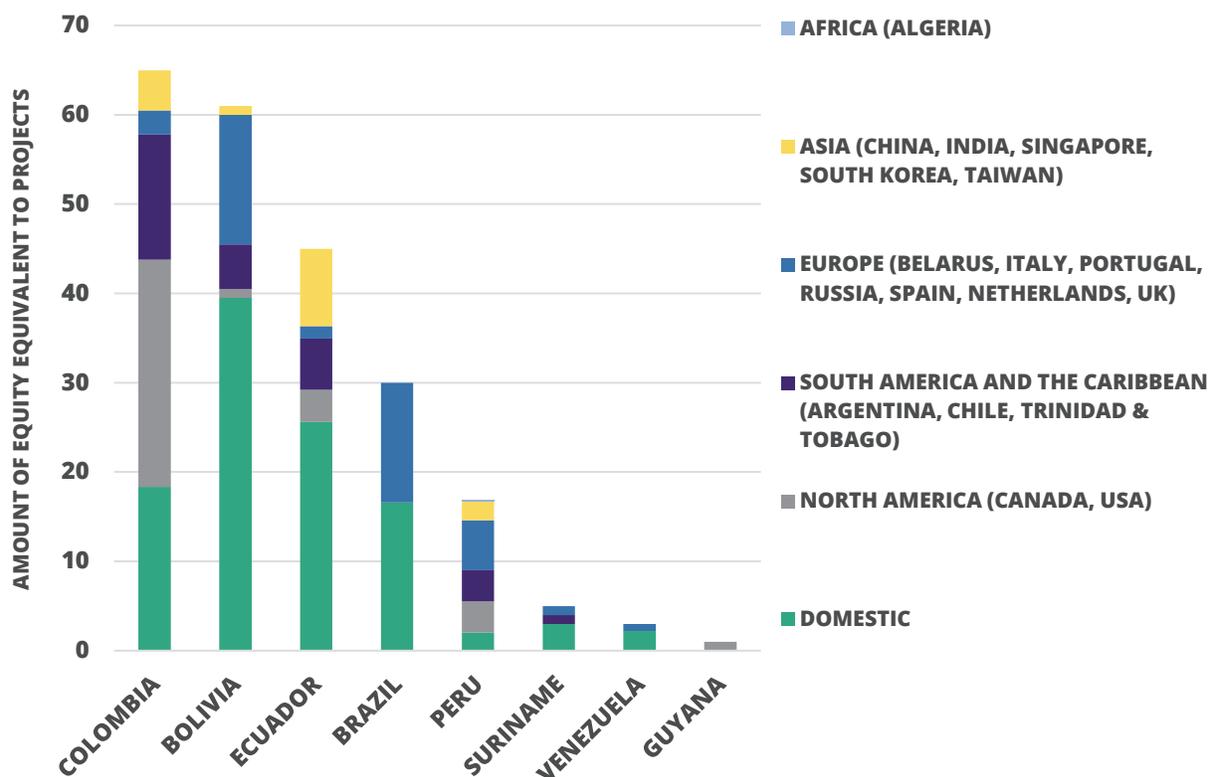
of acreage for a variety of reasons. In many countries, NOCs historically held monopolies over oil and gas production and retained a large share of acreage when the industry was privatized. They have advantages in terms of knowledge of national geology and of the social and regulatory landscape. They also usually control most or all of the refining and fuel networks and have influence over fuel prices (which are sometimes controlled for political reasons), making it difficult for private companies to enter the market. That said, NOCs are more dominant in certain countries than others. In Bolivia and Ecuador, NOCs own the majority of equity in Amazon blocks and operate most of those projects. On the other hand, in Colombia and Brazil, the state oil companies own the equivalent of roughly one third of projects. Peruvian NOC Petroperú owns few oil projects in the Amazon region as it focuses mainly on downstream operations. The majority of NOC-controlled acreage is already in the production stage in Bolivia, Ecuador, and Brazil, while Colombia's Ecopetrol has more blocks in exploration.

International E&P companies—independent, non-vertically integrated multinational oil and gas companies that only have upstream operations—have the second greatest

total equity in blocks following the NOCs. The greatest number of equity-equivalent blocks (30) lie in the hands of Canadian companies, followed by companies from Spain, Chile, and Russia (see Figure 12). Of the Canadian projects, the majority (24) were in the Colombian Amazon and most were owned by Gran Tierra. The Canadian market is particularly well suited for developing small and medium-sized firms in oil as well as mining because of their commodities-focused stock exchange. Forty-seven

NOCs hold the largest share of projects in the Amazon. This mirrors trends on the national level.

FIGURE 12: AMAZON OIL AND GAS PROJECTS, EQUITY OF OWNERS BY LOCATION OF HEADQUARTERS (2020)



Note: The calculations shown reflect each company's respective share of project ownership. Projects with multiple equity partners are proportionally accounted for (i.e. a company with 50 percent of a project's equity is counted as 0.5 projects). In cases where the owner is a subsidiary, the data shown is representative of its parent company.

percent of the world's public mining companies are listed on the Toronto stock exchange and venture exchange (the country's public venture capital marketplace where many juniors and other emerging companies are listed).⁹⁰

International oil companies (IOCs), or large multinational companies, have virtually no exposure to the Amazon.

International oil companies generally pursue large-scale projects with high production potential.

Expectations for flattening or even declining oil demand in the long term amid a global transition toward cleaner energy sources is leading IOCs to practice increased capital discipline.⁹¹ Temporary declines in oil prices and depressed demand because of the Covid-19 pandemic have also led companies to cut spending in the shorter term.⁹² In addition, oil companies, particularly the majors, face increasing stakeholder pressure to improve environmental, social, and governance (ESG) performance. Companies are under pressure to diversify away from emissions-intensive fossil fuels, leading investors to worry about the risk of stranded assets.⁹³ Investors and civil society are looking at social metrics as well. When all of this is considered, drilling in environmentally and socially sensitive areas like the Amazon is not worth the reputational risk for many IOCs.

Furthermore, IOCs generally pursue large-scale projects with high production potential, such as the deepwater fields offshore Brazil and Guyana, while fields in the Amazon have low average output. In the countries where most Amazon oil projects are concentrated (Colombia,

Bolivia, and Brazil), these projects average only around 1,000 to 5,000 barrels of oil equivalent per day (boe/d). In Ecuador and Peru, average production is somewhat higher thanks to a number of large fields but still reaches only about 20,000 and 40,000 boe/d, respectively. Large offshore oil fields, by contrast, can have a peak output of over 100,000 b/d. Moreover, the Putumayo, Oriente, and Marañón basins, which mostly span across the Colombian, Ecuadorian, and Peruvian rainforest,⁹⁴ largely contain heavy oil fields,⁹⁵ which are also less attractive for IOCs because they are more carbon-intensive.⁹⁶ Repsol is the only IOC to have received an Amazon oil and gas concession since 2015 and virtually the only IOC currently developing blocks in the Amazon. The Spanish major has several natural gas projects in Bolivia and holds a stake of almost 50 percent in YPF Andina, a joint venture with state-owned YPFB.⁹⁷

Smaller foreign and local E&P companies play a modest role in the Amazon, accounting for only 7 percent of total ownership. Local E&P companies are most active in Brazil thanks to its robust private sector and opportunities to develop natural gas from the Amazon to provide power for the region's cities. For example, Eneva, Brazil's largest private natural gas operator,⁹⁸ has purchased numerous natural gas fields in the Amazon region that were previously part of Petrobras' portfolio. The company owns 100 percent of the undeveloped Azulão field in the Amazonas basin, as well as the mature Juruá field in the Solimões basin and several other natural gas fields in the Parnaíba basin.⁹⁹ As of February 2021, Petrobras was in negotiations with Eneva to sell the Polo Urucu natural gas field. The field is linked to Manaus, the capital city of the state of Amazonas, through the Urucu-Coari-Manaus pipeline.¹⁰⁰ The gas produced by the complex powers about 760 MW of electricity generation in Manaus.¹⁰¹

Foreign companies make up a minority of equity stakeholders in Amazon oil and gas projects in Bolivia, Ecuador, Brazil, Suriname, and Venezuela due to the strong presence of NOCs. By contrast, in Colombia and Peru, the majority of project owners are foreign companies and the field of players is much more diversified. In Peru, Block 88, part of the massive Camisea natural gas project, is operated by a consortium of foreign firms, including Argentina's Pluspetrol and Tecpetrol, South Korea's SK Innovation, Spain's Repsol, Algerian NOC Sonatrach, and US company Hunt Oil. Canadian companies hold the largest share of foreign ownership in Amazon oil and gas projects and are particularly active in Colombia, as noted above. A significant share of companies are also based in Europe. Of these firms, Spanish companies own the largest share of projects, mostly due to Repsol's acreage in Bolivia through its joint venture with YPFB (mentioned above).

Since their initial contract awards, oil and gas projects in the Amazon have witnessed few transactions to 2020.

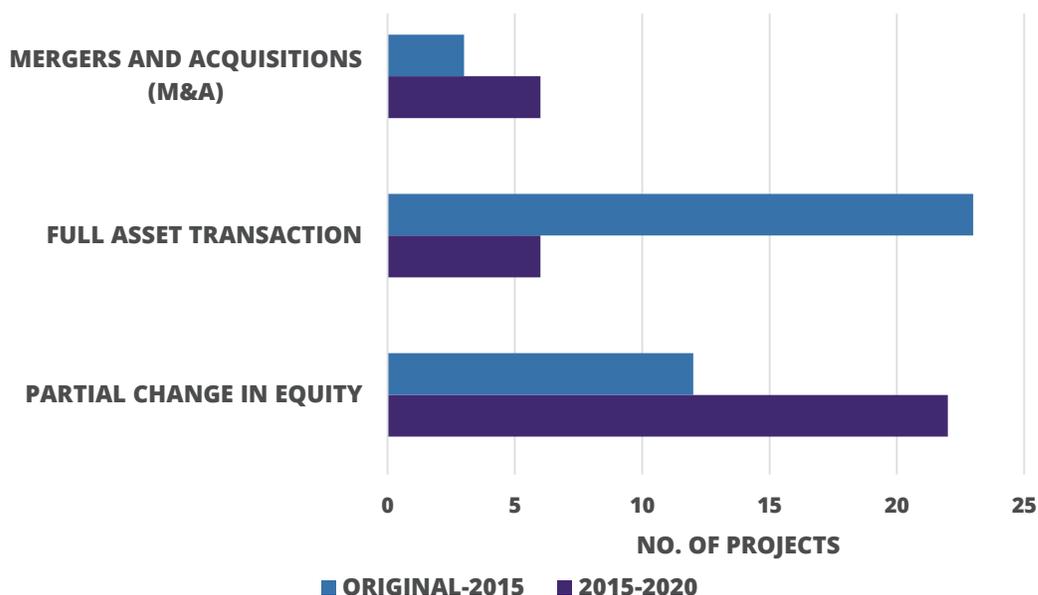
Russian NOC Rosneft is responsible for the second largest share of European-owned projects. All of its blocks are located in Brazil's state of Amazonas.

Chinese participation in the oil and gas sector in the Amazon is limited. Out of 227 projects we analyzed, Chinese companies and their subsidiaries were involved in only 16, mostly in Ecuador, Colombia, and Peru. Instead, Chinese investment in the South American oil industry is concentrated in fields outside of the Amazon region, such as those in Venezuela's Orinoco oil belt and Brazil's offshore pre-salt zone, in which China became involved through oil-backed lending agreements between the China Development Bank, Latin American governments, and Chinese and Latin American NOCs. Despite China's limited exposure to the Amazon overall, however, the country is a major player in the Ecuadorian Amazon. Beijing-based Sinopec was contracted by Petroamazonas to help develop the ITT fields in Ecuador, which are among the fields with the largest oil reserves in the Amazon region. Andes Petroleum, a consortium of Sinopec and CNPC (China National Petroleum Corporation), operates the producing Tarapoa block in Ecuador's Oriente basin, and its subsidiary, PetroOriental, operates two additional blocks. The joint venture has faced resistance from Indigenous communities and environmental NGOs. Chinese oil companies may further increase their investments in the Andean country if a \$2.4-billion loan from the China Development Bank and the Industrial and Commercial Bank of China materializes in 2021.¹⁰²

FINANCING AND TRANSACTIONS

Since their initial contract awards, oil and gas projects in the Amazon have witnessed few transactions to 2020.

FIGURE 13: AMAZON OIL AND GAS PROJECTS, MOST RECENT TRANSACTION TYPE



Note: The figures above reflect the number of projects that had at least one transaction since the contract was awarded rather than the total number of project transactions. Projects with more than one transaction were included once and categorized by the type of the most recent transaction.

Roughly 16 percent of blocks changed hands to 2015, and 15 percent between 2015 and 2020. Blocks that are owned by a subsidiary and then later owned by a parent company or vice versa are not included in this calculation. Among blocks that did change hands, a full asset transaction was the most common transaction type during the first period (see Figure 13). Sixteen blocks in Brazil’s Solimões basin were acquired by Russian NOC Rosneft from PetroRio, a Brazilian independent company, in 2015.¹⁰³ The area acquired covers roughly 41,500 square kilometers and contains mostly natural gas reserves.¹⁰⁴ These blocks, since reduced to 13 licenses, have yet to be developed, as Rosneft excluded its Amazon acreage from 2020 investment plans.¹⁰⁵ A partial change in equity stake was the most common transaction type between 2015 and 2020 as several companies farmed into existing blocks.

The low number of asset transactions could be related to the prevalence of NOCs in the Amazon oil and gas sector. NOCs often retain assets in the interest of maintaining a substantial share of the acreage in their countries. The prominent exception is Petrobras, which has begun divesting non-core assets, including those within the Amazon, in order to reduce debt and focus on more profitable offshore pre-salt blocks.

MINING

Overview of the Sector in the Amazon Region

RESOURCES AND POTENTIAL

South America, and the Amazon region in particular, has immense mineral and metal resources. Thirty-seven percent of the world’s copper reserves and 8 percent of the world’s gold are located in South American countries, according to a 2017 estimate.¹⁰⁶ The Amazon region itself contains considerable mineral reserves, most notably of gold and copper. The Brazilian Amazon is also home to the largest iron ore project in the world. Recent estimates suggest that industrial mining concessions cover approximately 1.28 million square kilometers of the Amazon (more than 18 percent).¹⁰⁷

The average share of GDP from mining in Amazon countries is lower than that from oil and gas, but still considerable. Peru and Bolivia had the highest average share of GDP from mining in 2018 with 0.9 percent each.¹⁰⁸ Moreover, mining as a percentage of GDP has increased in several Amazon countries over the last few years, underscoring the sector’s role in the economy.¹⁰⁹

The Covid-19 pandemic has impacted commodity markets around the world, and South America's mining sector is no exception. Health-related lockdowns in the region, particularly in Peru, slowed down production or halted it altogether, causing a reduction in output. Restrictions put in place to slow the spread of the virus also crippled supply chains and created staffing problems for companies.¹¹⁰ Furthermore, the economic strain wrought by the virus forced companies to re-think investment plans in the face of reduced revenue and increased uncertainty.¹¹¹

Due partly to lower production, most mineral prices rose in 2020,¹¹² helping companies offset pandemic-related revenue losses. The price of gold has risen sharply over the last two years, peaking in August 2020 at \$2,000 per ounce due to low interest rates which led investors to shift capital away from bonds in search of higher returns.¹¹³ Prices have since softened but remain high compared to recent years. Copper prices have also spiked since early 2020 amid supply constraints and expectations for a green global economic recovery that will drive demand for clean energy technologies. Prices of iron ore are also expected to remain high in the second quarter of 2021 thanks to higher steel output and reduced inventories.¹¹⁴ Commodity prices appear likely to be sustained in the near term by a confluence of factors. If lockdowns continue, mineral output could be stymied, impacting global supply and causing prices to surge. Prices could also be buoyed by the roll-out of vaccines and the re-opening of economies that will stimulate trade and travel.¹¹⁵ Rising commodity prices could also be driven by loose US monetary policy which could weaken the US dollar, making minerals more affordable in developing markets.¹¹⁶ In the longer term, climate policy is expected to boost demand for certain minerals as the use of clean technologies rises. For example, manufacturing more solar panels, wind turbines, and batteries will increase demand for metals such as copper and lithium. This trend will likely lead to an increase in investment in mineral-rich Amazon countries.

However, political instability and a lack of long-term government strategy for the sector may hinder the investment outlook in the Amazon, even in attractive and mature mining markets like those of Brazil and Peru. Brazil, under the previous government of Michel Temer, reformed its mining code to promote investment, but the secondary legislation has not been completed and the new law has not been fully implemented, which creates uncertainty for investors. The current president, Jair Bolsonaro, has vowed to open the Amazon to more mining projects, but he has developed no concrete plans to do so, and in any case, it is unclear that many mining companies are eager to expand in the Amazon region given the instability and

substantial environmental and social risks, described in greater detail below. Peru's mining sector has likewise confronted numerous social conflicts tied to community opposition that have halted projects. This, coupled with political instability—Peru had five ministers of energy and mines in only five months in 2020¹¹⁷ and is holding the second round of its presidential election on June 6, 2021—generates further uncertainty for the mining sector.

INVESTMENT AND REGULATORY FRAMEWORK

Each Amazon country has independent regulators that oversee mining activities within its borders. In most jurisdictions, companies obtain permission to explore and exploit minerals through an authorization and/or concession system in which a firm obtains a mining lease in accordance with the country's legal framework. The firm must meet certain financial and technical standards, as determined by the relevant regulatory agency, to win contracts.

In most cases, the authorization of mining activities is split into two different licenses: one for exploration and one for production. In Brazil, exploration licenses are authorized by the National Mining Agency. If the exploration phase is successful, the mining company must then apply for a production concession, which is granted by the Ministry of Mines and Energy. In Colombia, however, exploration and production licenses are treated as one.¹¹⁸

Some countries, such as Colombia and Ecuador, hold competitive auctions in which companies can bid on preselected license areas designated as strategic by the government.^{119,120} Venezuela's system for awarding contracts is unique given that private participation is limited and much of the industry is nationalized. Gold mining is reserved solely for the state, as is the production of other minerals and metals such as iron ore, diamond, copper, and silver.¹²¹

After securing a concession, investors begin mining on a large scale to confirm existing resources and decide whether to move forward with a prefeasibility study. The mine is then often sold to a major mining company. For the vast majority of mining titles, exploration projects do not ever become producing mines.

ENVIRONMENTAL AND SOCIAL IMPACTS

Corporate-scale mining operations produce a variety of environmental impacts. For example, large mines and the infrastructure associated with them, such as roads and railways for transporting the mined commodity, can result in high rates of deforestation.¹²² This environmental

ILLEGAL MINING IN THE AMAZON

Illegal and informal mining, particularly artisanal small-scale gold mining, has occurred in pockets throughout the Amazon region for decades, but in recent years it has exploded in parallel with high gold prices. In Ecuador and Colombia, roughly 80 percent of the gold produced in 2016 was estimated to come from illegal or informal mines, and in Venezuela this number is believed to be even higher.¹⁴⁵ In the Amazon region, much illegal and informal mining is concentrated in Peru, Bolivia, Brazil, and Venezuela.¹⁴⁶

While most forms of mineral extraction entail a degree of ecological destruction, the environmental impacts associated with unregulated illegal and informal mining are particularly acute. Elevated levels of mercury, which is commonly used to facilitate gold collection, have been found in fish and in sources of fresh drinking water near sites of illegal and informal gold mining.¹⁴⁷ Illegal and informal mining is also a leading driver of Amazon deforestation in some countries. In Peru, between 2013 and 2018, this activity led to the loss of 50,000 hectares of forest.¹⁴⁸

Illegal mining in the Amazon has resulted in social conflicts and in violence including sex trafficking and forced labor.¹⁴⁹ Roughly 45 percent of illegal mine workers are estimated to be underage in Venezuela and are coerced into working in deplorable conditions.¹⁵⁰ Historically, Indigenous communities that have attempted to fight back against the spread of illegal mining on their lands have been violently repressed or displaced.¹⁵¹

degradation leads to the loss of critical ecosystem benefits such as biodiversity and carbon sequestration. Improper waste management at gold and silver mines can pollute water resources by leading to sedimentation and acid drainage, among other impacts.¹²³ The production stage generally has a greater environmental impact than the exploration phase. The initial prospecting period, which involves surveying and mapping the area, causes limited environmental degradation. The subsequent drilling has a greater impact, as does mine construction itself.¹²⁴

Mining can also generate various negative externalities for local communities. Large-scale mining in the Amazon directly and indirectly impacts Indigenous lands and territories, with more than 10 percent of active mining concessions overlapping with such areas.¹²⁵ Failures of tailings dams (which are used to store waste byproducts), such as the infamous 2019 Brumadinho dam collapse in the Brazilian state of Minas Gerais, highlight the devastating social and environmental impacts of improper mine management. The Brumadinho disaster resulted in a release of toxic mudflow that claimed at least 259 lives and impacted local agriculture and infrastructure.

Most countries in the region adopted environmental regulations for the mining sector in the early 1990s.¹²⁶ These laws provide for the protection of forests and the environment. They require mining companies to minimize their environmental impacts, and in most cases, the government has the authority to impose fines or other restrictions on non-compliant companies. In Brazil, Colombia, Ecuador, Guyana, Bolivia, and Peru, environmental impact assessments (EIAs) are required for large-scale projects. These detailed reports are reviewed and approved by the relevant environmental authority. Most countries also have environmental restrictions on where mining can take place. In Colombia, for instance, the exploitation of mineral reserves is prohibited in national natural parks, regional parks, protected forest reserve areas, and wetlands.¹²⁷ Governments in the region cite enhancing environmental governance as a priority, but progress has been slow due in part to disagreement between mining authorities and environmental authorities.¹²⁸

Although our analysis does not cover illegal, informal, or artisanal mining projects that lack formal titles, it is

important to note that these forms of mining are major sources of grave environmental and social degradation in the Amazon region (see Box).

Analysis of Corporate and Financing Trends

PROJECT DATABASE

Our data set includes all the major mining projects in the Amazon region (it excludes thousands of titles for tiny projects, the vast majority of which will never lead to commercial-scale production). Only concessions that have been awarded, received financing, or are operational are included in the data set. Companies or consortiums that own mines are generally also the mine operators, the result being that the operator profile is almost identical to the owner profile.

Brazil has the greatest number of mining projects in the Amazon (52), followed by Peru (20) (see Figure 14). Bolivia and Colombia, the countries with the greatest number of oil and gas blocks in the Amazon, represent a much

smaller share of mining concessions. While mining is an important source of revenue in Bolivia and Colombia, much of the mining activity in these countries occurs outside of the Amazon region. For example, Bolivia's largest lithium deposit lies in the Potosí department, a dry, mountainous region bordering Chile's Atacama Desert. Similarly, the coal reserves of Colombia, South America's largest producer, are mostly located outside the Amazon region in the northern part of the country.^{129,130} The majority of projects are clustered around the edges of the biogeographic Amazon's limits, though in Brazil and the Guianas mines are located throughout the basin.

In Venezuela, no large-scale, legal mines are presently operational. A number of licit companies formerly operated mining projects in the Venezuelan Amazon but suspended their operations and initiated international arbitration proceedings after the Venezuelan government expropriated their assets. Those projects have since been taken over by criminal groups tied to the regime of Nicolás Maduro, which, as noted above, are responsible for some of the worst environmental degradation in the Amazon region.

The projects in our data set are in various phases of development. The largest share, some 44 percent of

FIGURE 14: AMAZON MINING PROJECTS BY COUNTRY

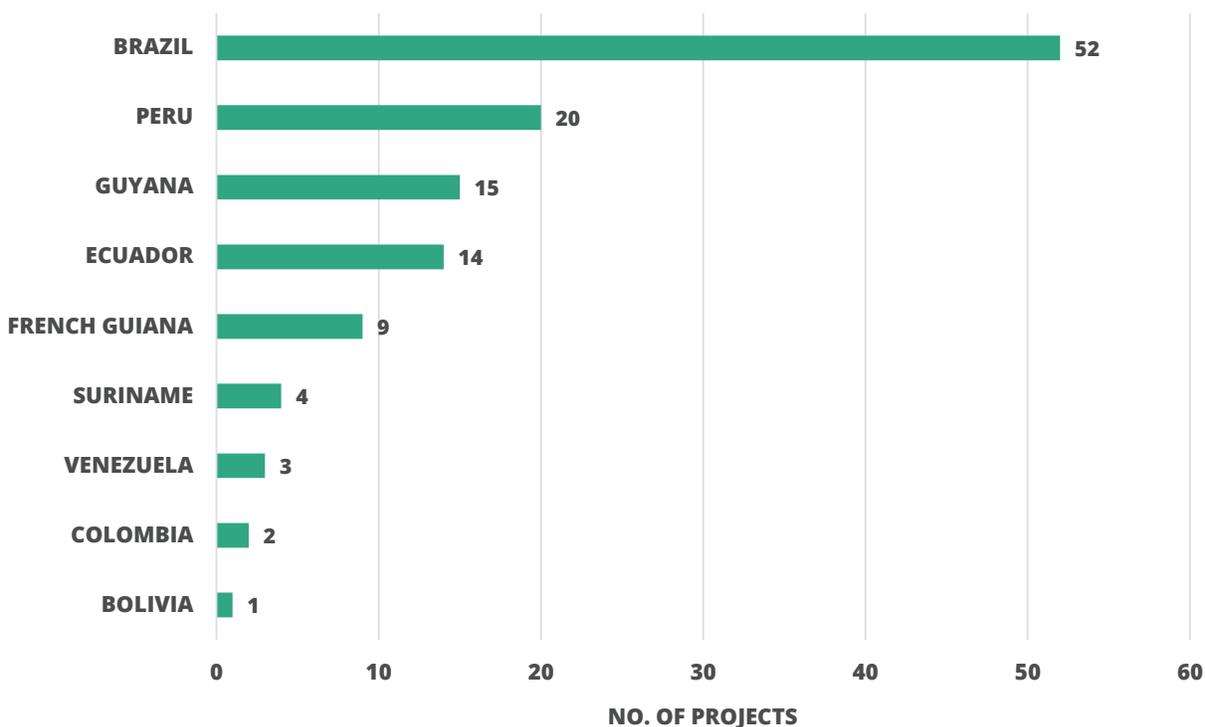
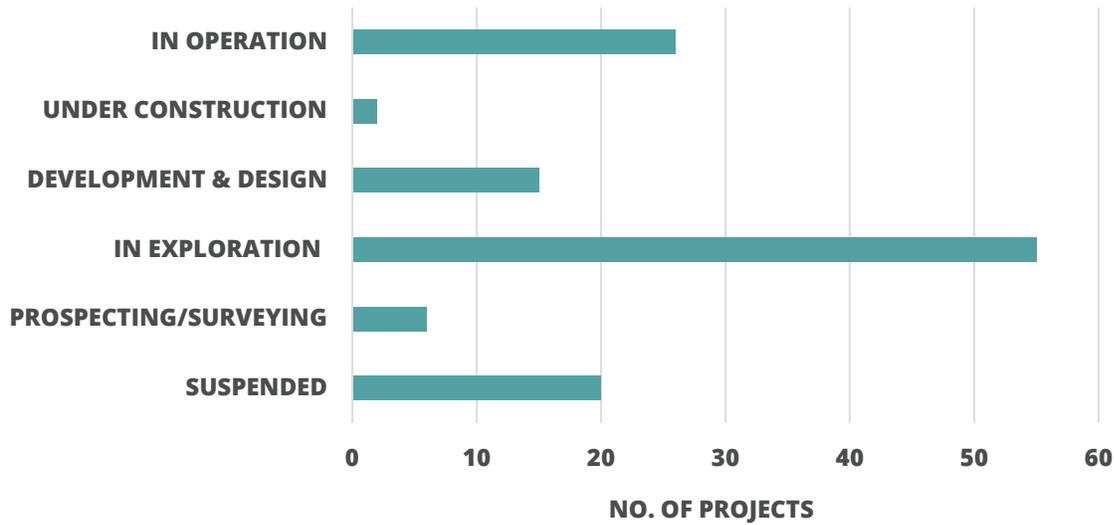


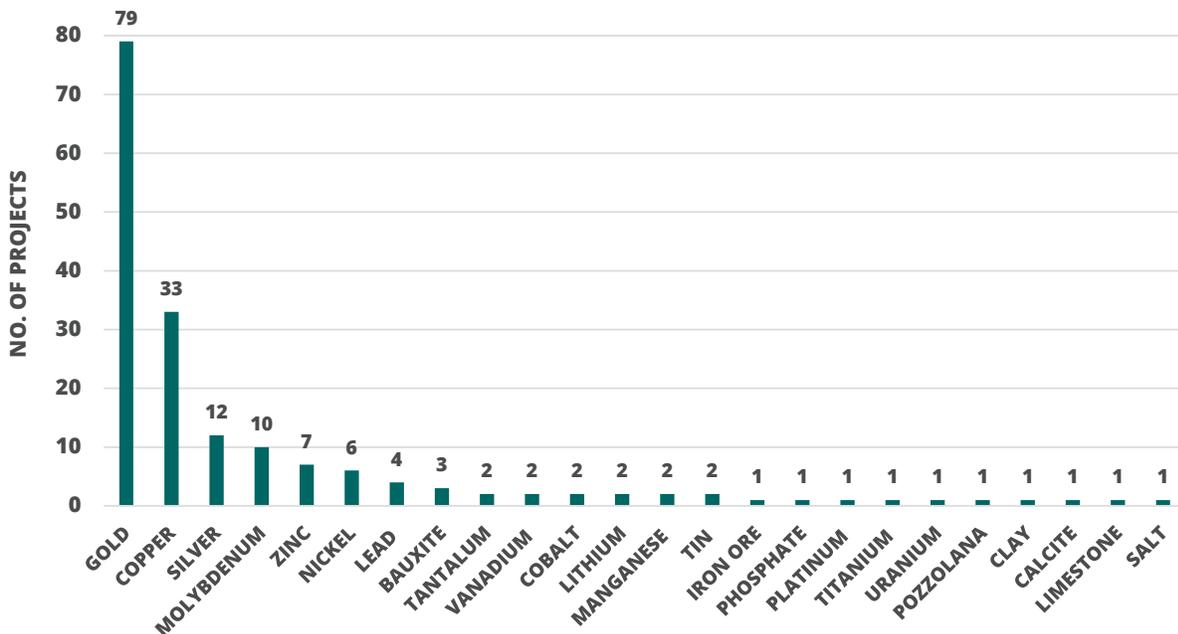
FIGURE 15: AMAZON MINING PROJECTS, 2020 OPERATIONAL STATUS



projects, are in the exploration stage (see Figure 15). This stage follows the initial prospecting and surveying process in which deposits are located. Several projects are also temporarily suspended due to community approval problems, licensing delays, and environmental issues. For some projects, no budget was allocated by the license holder in 2020 other than holding costs, meaning no work programs were undertaken at the property.

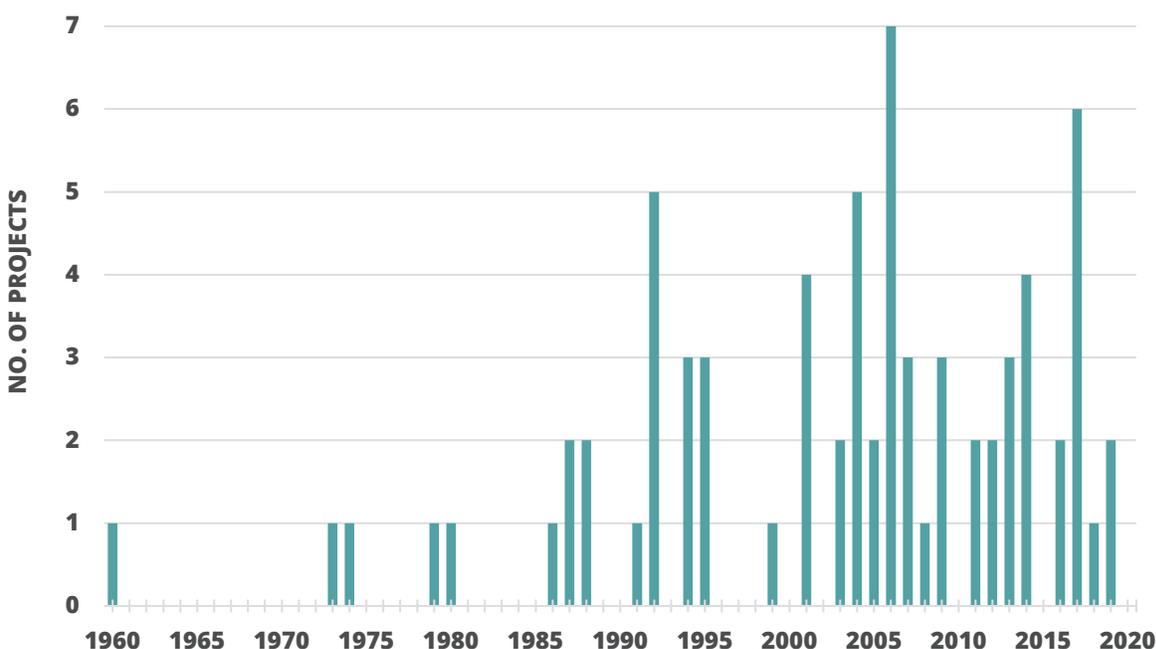
Although in total there are 24 different substances mined within our data set, the vast majority of projects relate to gold (79 projects), followed by copper (33 projects) (see Figure 16). The presence of gold in the Amazon is significant because it is one of the rarest minerals in the Earth’s crust, and much of the more accessible ore has already been mined.¹³¹ High commodity prices could result in increased interest in gold mining in the Amazon region,

FIGURE 16: AMAZON MINING PROJECTS, MINERAL OR METAL TYPE



Note: In some cases, projects mine multiple substances. Each substance is counted separately the above figure, meaning some projects are counted twice.

FIGURE 17: AMAZON MINING PROJECTS, NUMBER OF CONTRACTS AWARDED PER YEAR



which underscores the need to ensure that environmental safeguards are being upheld.

Iron ore, which is used for steelmaking, is another mineral produced in large quantities in the Amazon, with most of the output coming from a single mega project in Brazil. Vale's Serra Sul 120 expansion project will boost annual iron ore capacity at its S11D mine and plant by 20 million metric tons per year, bringing output to 120 million metric tons per year, once it comes online in 2024.¹³² The mine currently produces about 300,000 metric tons daily.¹³³ Brazil is one of the world's top iron ore exporters.¹³⁴

Projects in our data set date back several decades, with the majority of titles having been awarded over the last 20 years. In our sample, contracts were awarded with the highest frequency in 2006 and 2017 (see Figure 17). Older projects are less frequent either because the mines have closed or because there is no publicly available data.

PROJECT OWNERS AND OPERATORS

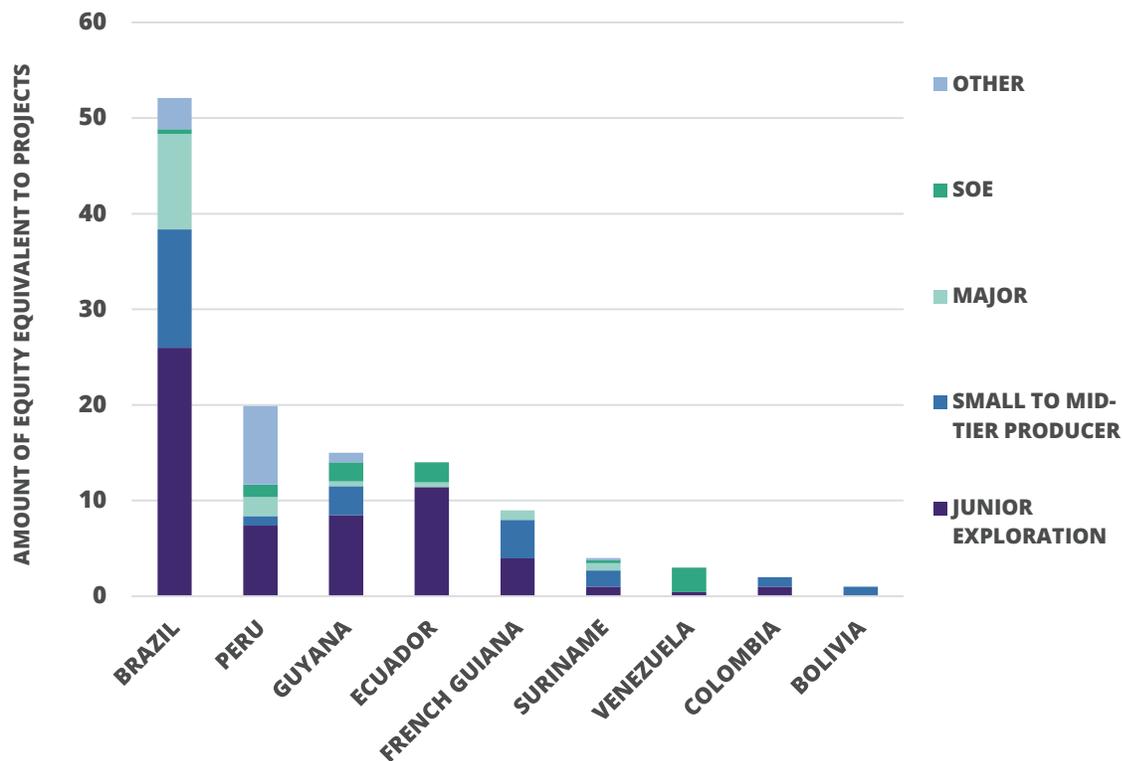
Mining projects in the Amazon are owned and operated by a mix of smaller and larger companies. Foreign junior exploration companies own the largest share of projects in our sample (see Figure 18). These companies have specialized knowledge of the exploration process and assess the value of assets by gathering geological

data. Rather than mining themselves, they often then sell their assets to bigger companies for a large profit. Joint ventures between junior companies and majors are common since they ease the financial burden of projects and spread out some of the project risk. Partnering with juniors saves larger companies money in the exploration phase.

By contrast, major mining companies such as Anglo American, Glencore, and BHP Group operate fewer projects in our sample than juniors. Majors tend to invest in later stages of project development once resources have already been discovered by junior exploration firms. Given their financial prowess, large corporations can complete the final stages of mine development, including feasibility, consultation, environmental licensing, and finally, construction. Within our sample, 70 percent of the projects owned by majors are in advanced exploration or already producing. Small to mid-tier producers also own and operate a number of projects, with almost half in exploration.

In addition to their focus on the production phase, larger mining companies may also have less of a presence in Amazon projects due to concerns about the reputational risk of investing in such environmentally and culturally sensitive areas, particularly in Brazil, where there is a growing international perception that the current

FIGURE 18: AMAZON MINING PROJECTS, EQUITY OF OWNERS BY COMPANY TYPE (2020)



Note: The calculations shown reflect each company's respective share of project ownership. Projects with multiple equity partners are proportionally accounted for (i.e. a company with 50 percent of a project's equity is counted as 0.5 projects). In cases where the owner is a subsidiary, the data shown is representative of its parent company.

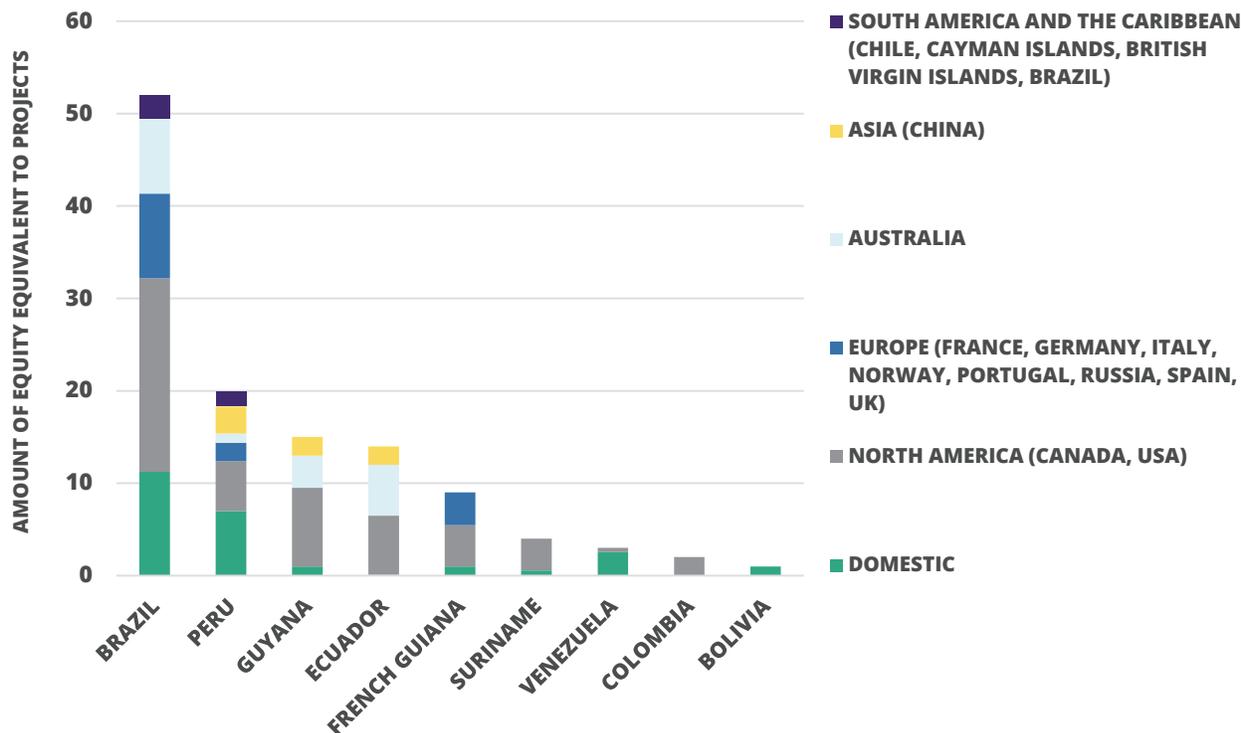
government has a poor environmental record.¹³⁵ Large, publicly traded mining companies also face investor pressure to demonstrate that they meet ESG standards. In February 2021, Brazilian mining firm Vale greenlighted the creation of an executive position to address sustainability issues amid growing pressure from investors and civil society.¹³⁶

Unlike in the other sectors in this study, state-owned companies are nearly absent from the mining sector in the Amazon. Corporación Venezolana de Minería (CVM) and Corporación Venezolana de Guayana (CVG) have stakes in two Venezuelan mines, Siembra Minera and Sosa Méndez. Suriname's NOC Staatsolie has a minor equity stake in the Saramacca project. Major Brazilian mining firm Vale was originally established as a state-owned company but was privatized in the 1990s, with the federal government having sold off its remaining direct shares in the company in 2021 (for which reason it is categorized in this study as a private company rather than an SOE). However, the federal government will maintain some influence over Vale through its 12 golden shares, which give the state veto rights over certain company decisions, and through indirect holdings.¹³⁷

Most mining projects in the Amazon are owned by foreign companies. Canadian mining companies have sizable mining operations abroad and South America is a particular area of interest. In 2019, there were 197 Canadian companies operating across the continent, or more than double the number active in Africa and triple those in Asia.¹³⁸ Canadian mining assets in Brazil alone

Unlike in other sectors, state-owned companies are nearly absent from the mining sector.

FIGURE 19: AMAZON MINING PROJECTS, EQUITY OF OWNERS BY LOCATION OF HEADQUARTERS (2020)



Note: The calculations shown reflect each company's respective share of project ownership. Projects with multiple equity partners are proportionally accounted for (i.e. a company with 50 percent of a project's equity is counted as 0.5 projects). In cases where the owner is a subsidiary, the data shown is representative of its parent company.

totaled over 10 billion Canadian dollars (roughly \$7.98 billion¹³⁹) in 2019. In our Amazon sample, Canadian entities controlled the largest share of projects in 2020 with equity equivalent to roughly 47 concessions, followed by Australia, Brazil, and the UK (see Figure 19). Australia, like Canada, is a major mining country and its companies have a robust overseas presence. Australian investment in the Amazon is mostly undertaken by junior exploration companies.

Chinese companies play only a modest role in the development of mining projects in the Amazon. Firms including Zijin Mining Group, China Railway Construction Corporation, Tongling Nonferrous, and China Minmetals, among others, have full or partial stakes in seven projects located in Ecuador, Peru, and Guyana. Many of these mines hold copper deposits, although mining giant Zijin recently strengthened its position in the gold industry thanks to its acquisition of Canadian firm Guyana Goldfields in 2020.¹⁴⁰ Copper in particular was in high demand as infrastructure development surged in China as part of the country's post-2008 economic stimulus. As in other sectors, Chinese activity in South America's mining sector has been driven primarily by the acquisition of existing projects (the

easiest way for them to enter the sector given a lack of experience on the ground). However, many of the mines that Chinese companies have acquired in South America are not located in the Amazon region.

Most of the foreign companies involved in the Amazon mining sector and included in our data set are publicly listed. The majority of listed mining companies in Latin America float shares on the Toronto Stock Exchange, which has the greatest number of oil and mining companies listed in the world. Canadian regulators have robust corporate and financial reporting requirements for listed companies. Some companies also list on the London Stock Exchange or local exchanges. The Lima Stock Exchange is a favored bourse for mining companies in the region and permits dual listings with other markets like Toronto.¹⁴¹ It also offers a risk capital segment specifically for junior mining companies to help them obtain financing.¹⁴² By listing its shares, a mining company can access global finance and capital from investors around the world.

Mining stocks belong to two distinct groups: majors and juniors. Junior stocks are riskier since these companies are smaller, have less capital, and are generally less well

known.¹⁴³ Listing on the stock exchange is important for junior companies in order to acquire equity financing to fund their exploration work. Major companies, on the other hand, have high market capitalizations, decades of history, and multinational operations. As such, major stocks are less volatile and more mature.

Given that many mining companies in the Amazon are publicly traded, investors could use their shareholder power to pressure these companies to implement and uphold higher environmental standards. Publicly listed companies also face reporting requirements that oblige them to uphold a certain degree of transparency.

FINANCING AND TRANSACTIONS

Financing for mining varies based on the metal or mineral, the size of the resource, the project’s ownership structure, and the mine location. Larger projects tend to receive external financing rather than financing projects off the corporate balance sheet, although acquiring financing remains a challenge as it can take decades for the project to yield a return on investment.

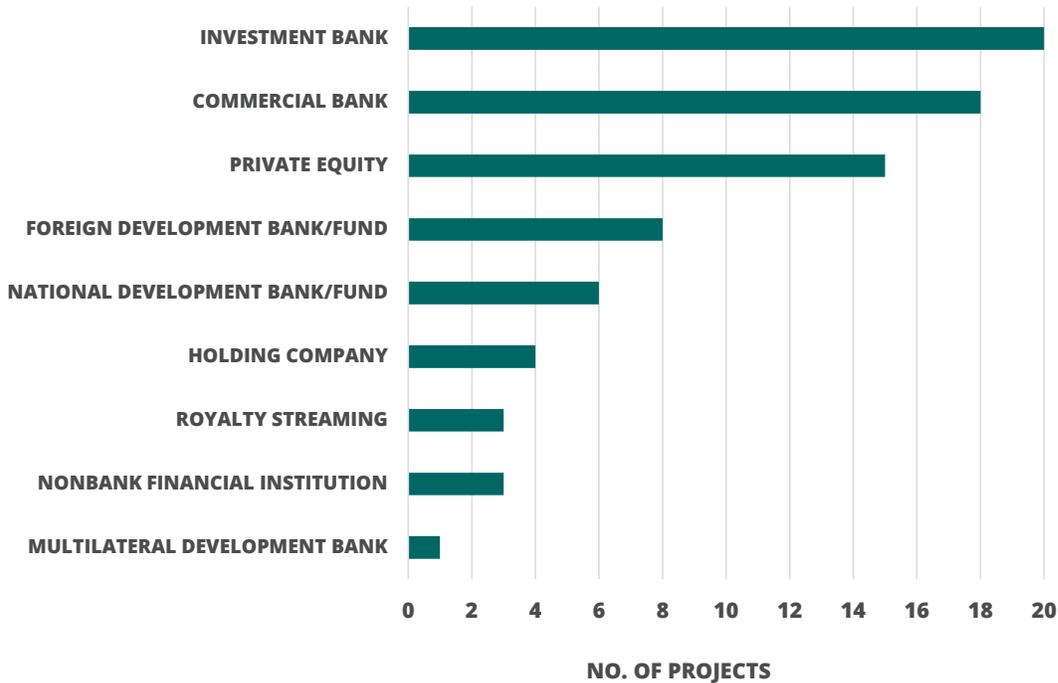
Within our data set, the most common lenders were investment banks, followed by commercial banks (see

Figure 20). Private equity firms also made about 19 percent of the total loans. In some cases, projects had multiple financial backers.

Multilateral development banks are shying away from large mining projects with complex social and environmental issues. The Inter-American Development Bank does not lend to mining projects at all, and the World Bank’s International Finance Corporation (IFC) no longer does so. According to the IFC’s website, the Aurora project in Guyana is the only one the fund has loaned to in the Amazon region.¹⁴⁴

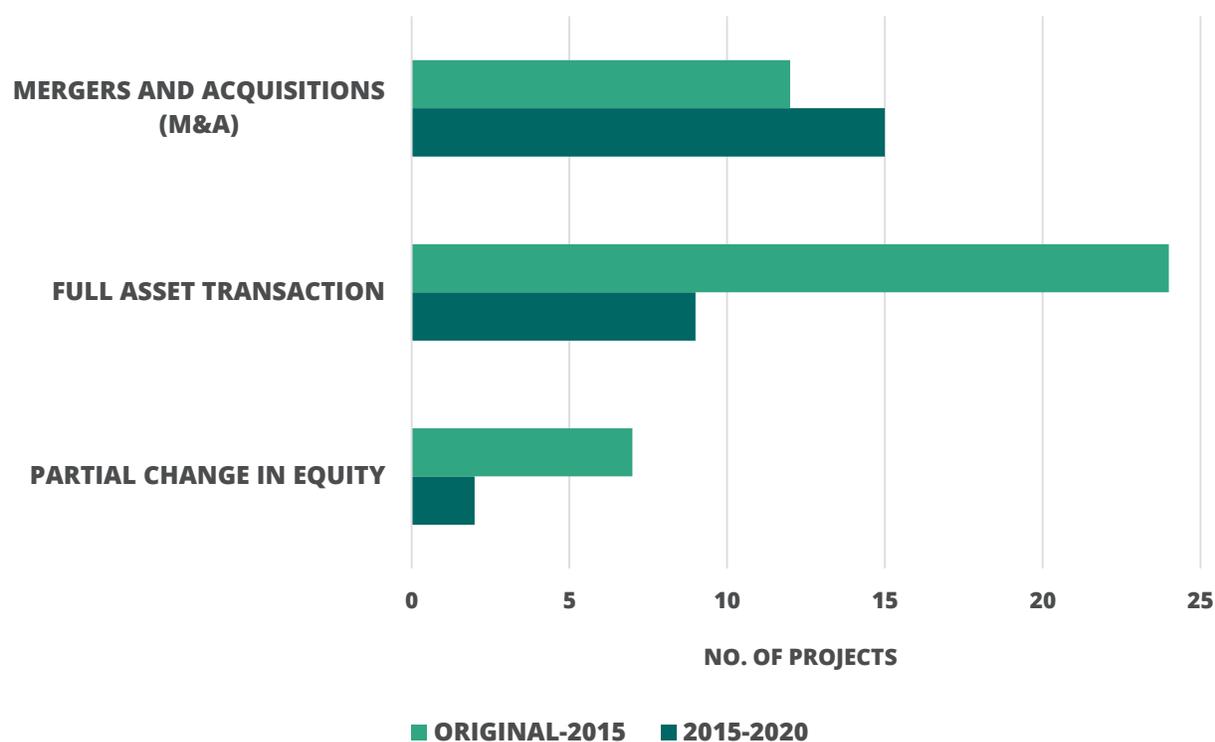
Chinese entities issued loans to a handful of mining projects in the Amazon region in Peru, Ecuador, Venezuela, and Guyana. As a percentage of total lending, mining accounts for a very small amount of financing from Chinese policy banks, though Chinese commercial bank loans to mining projects are more common. The Industrial and Commercial Bank of China (ICBC) financed three mines in the Amazon, all in Peru. Historically, Chinese banks have proven more willing to operate in countries considered too risky by traditional investors (Venezuela, Guyana, Ecuador). However, Chinese lenders in these countries have not always received payment and have made losses on many of their investments, suggesting that

FIGURE 20: AMAZON MINING PROJECTS, SELECTED FINANCING BY NUMBER OF TRANSACTIONS



Note: In some cases, projects had multiple financial backers. Each financier is counted separately in the above figure.

FIGURE 21: AMAZON MINING PROJECTS, MOST RECENT TRANSACTION TYPE



Note: The figures above reflect the number of projects that had at least one transaction since the contract was awarded rather than the total number of project transactions. Projects with more than one transaction were included once and categorized by the type of the most recent transaction.

China's appetite for risk in the region may be ill-calibrated. As such, experts believe that in the future Chinese banks may seek to spread out risk and invest in countries with greater institutional stability.

The mining sector witnessed a greater number of transactions than the other sectors covered in this report. Pre-2015, there were more than 40 project transactions (see Figure 21). During this period, the most common transaction type was an asset transaction in which 100 percent of the equity stake was transferred from one entity to another. This is typical of the mining sector, in which junior exploration companies often sell assets for larger companies to develop. Slightly less than half of the transactions occurred in Brazil, which also had the greatest number of mines overall. Most assets were still under development (pre-production) when the transaction occurred. In many cases, the asset was sold from an international company to another foreign entity, but few projects were transferred between local companies. Overall, the trend of transactions has been to concentrate projects in the hands of large firms.

Between 2015 and 2020 there were fewer transactions than pre-2015. The most common transactions were those related to M&A activity. M&As have become increasingly

common in the global mining space, with a stronger trend toward mergers more than acquisitions. In general, high commodity prices tend to correlate with M&A activity and companies are currently seeking to diversify their commodity portfolios in order to reduce risk and capitalize on price volatility.

Of the transactions that took place between 2015 and 2020, the majority did so in Brazil and a quarter were assets that originally belonged to Brazilian mining major Vale. The sales are likely part of the company's current strategy of divesting non-core assets and smaller projects. All of these assets were transferred from the Brazilian major to foreign entities and most were still under development when the transaction occurred.

CONCLUSIONS

Although corporate and investor profiles and financing patterns vary greatly between hydropower, oil and gas, and mining projects in the Amazon region, some noteworthy trends are evident across the three sectors.

1

State-owned enterprises are very prominent in the oil and power sectors in the Amazon region, with mixed implications for the maintenance of high social and environmental standards.

The prominence of SOEs mirrors national trends in Amazon countries, in which state-owned enterprises are dominant in oil and hydropower operations in other regions as well. In addition, state-owned enterprises are often able to take on projects with higher risks (such as large dams in sensitive areas), can access longer-term financing, and have decades of experience working with local communities, which sometimes view them more favorably than they do private companies. State-owned companies also may prioritize political decisions taken by governments over economic considerations, in contrast with their counterparts in the private sector. These factors facilitate the ability of state-owned enterprises to operate in the Amazon. In the oil sector, national oil companies often seek to acquire acreage even if it has low resource potential and they do not plan to develop it immediately, which also explains their large footprint in the Amazon and in other regions of their countries.

The environmental and social record of state-owned enterprises is mixed. For example, Ecuador's national oil company has a poor environmental record, stained by numerous oil spills, while other national oil companies in South America have made some important strides toward reducing greenhouse gas emissions. Public pressure for state-owned companies to improve their environmental practices seems to be growing in the wake of major environmental disasters such as the Brumadinho collapse at a Vale-owned project in Brazil. The mining sector is the exception—most Amazon countries have no state-owned mining company.

Despite modest involvement on the part of small local companies in all three sectors, Amazon countries largely lack domestic companies with extensive energy and mining assets, other than the state-controlled heavyweights.

2

Foreign companies from a wide variety of countries own and operate oil, mining, and hydropower projects in the Amazon region, but the majority of foreign firms are headquartered in a small group of countries.

While the majority of projects in all three sectors are owned by domestic companies due to the large presence of state-owned enterprises, smaller foreign companies from a wide variety of countries do own and operate oil, mining, and hydropower projects in the Amazon region.

Foreign firms are largely from countries or regions with many companies specialized in a particular industry. Canada and Australia have large mining industries and numerous international mining companies, many of which operate in the Amazon. Europe boasts a multitude of utilities with international portfolios, and European countries are the most prevalent of the foreign players in the Amazon hydroelectric sector. US companies, by contrast, have very little investment in any of the three sectors. Many foreign companies are publicly listed, particularly in the mining sector, meaning they face more stringent reporting and transparency requirements.

Chinese companies invest in projects across the South American energy and mining sectors and are the largest foreign investor in Amazon hydropower. Chinese involvement in Amazon

energy projects has largely been driven by energy security calculus and supported by oil-backed lending arrangements with Chinese policy banks. Chinese mining investment has also been historically tied to natural resource acquisition. Yet, Chinese companies own less than 10 percent of total project equity in the Amazon in each of this study's three sectors. Most of China's activity in these sectors is concentrated outside of the Amazon region. This may continue to be the case, especially if Chinese companies become increasingly reluctant to invest in areas with fragile ecosystems and deal with complex relations with local communities. It is possible that commitments by President Xi Jinping and other Chinese officials to protect biodiversity and address climate change, along with increasingly stringent foreign investment regulations, could limit the interest of Chinese companies in the Amazon. Ultimately much will depend not only on China's actual commitment to its environmental claims, but also on the investment landscape in Latin America post-Covid-19, and whether high-quality, strategic assets in the Amazon region are up for grabs.

3

Major international companies have very limited presence in all three sectors in the Amazon region, possibly due to the potential environmental and social liabilities and reputational risks, among other factors, while smaller foreign companies are more prevalent than large ones. Assuming the projects in the Amazon continue to operate, this may be a negative development since these large companies are believed to have higher environmental and social standards than smaller, less accountable companies.

Major global companies are under increasing pressure to adhere to ESG standards and risk facing a backlash against operating in environmentally and socially sensitive areas such as the Amazon. In addition, for some sectors, the Amazon's low resource potential makes it unattractive. Unless hydropower plants in the Amazon stop operating altogether, the absence of global players would appear to be a negative trend for environmental protection of the Amazon since these companies are generally believed to

have higher environmental and social standards than small companies (although this claim merits further research). Large international companies doubtless face greater public scrutiny in environmental practices than smaller players that can remain under the radar. On the other hand, fields that are not acquired by smaller companies may also remain undeveloped if developing those fields puts corporate sustainability targets in jeopardy.

4

External financing is critical to investment in hydropower and mining projects, although publicly available information on lending is scarce. However, it is clear that both multilateral development banks and private lenders face increasing pressure over financing projects in sensitive areas. The retreat of multilaterals from financing projects in the Amazon only limits their influence and monitoring capacity and could create an opening for lenders with lower standards.

Multilateral and national development banks, particularly CAF, the IDB, and BNDES, made loans to many hydropower projects in the Amazon region, though they were absent from the mining sector almost entirely. Commercial and investment banks also loaned to both the hydro and mining sectors, while many private equity funds also financed mining projects in the region. In contrast, oil exploration and production projects are mainly financed off corporate balance sheets and do not receive project-specific external financing, so lenders and external investors in these projects could not be tracked.

Multilateral development banks face extensive pressure to uphold high ESG standards as well as criticism for financing projects in environmentally and socially sensitive areas. Private lenders are starting to confront similar pressures but are less publicly visible and have lower disclosure requirements. This trend suggests that development banks and some private lenders have started to avoid financing Amazon-based projects or demand higher environmental standards.

5

The companies that own and operate energy and mining projects in the Amazon region have remained mostly consistent over the life of the projects. Given the long life of such projects, this means that the entities that initially acquire the rights to develop them will likely control them and their environmental impacts for many decades.

There were relatively few deals, such as mergers and acquisitions, full asset sales, or partial equity sales, in any of the three sectors. Hydropower saw a particularly small number of transactions and nearly all hydro projects have remained in the hands of the same companies for their full duration. The mining sector witnessed the greatest number of deals, particularly complete

asset sales pre-2015. There has not been a rise in transactions in recent years despite some major international industry shifts, such as the Odebrecht scandal in Brazil, which reverberated across the region, a spike in gold and copper prices, the collapse of global oil prices in 2020, and interruptions to many operations as a result of the Covid-19 pandemic.

6

State-owned enterprises and smaller international companies from a few countries, as well as private lenders, have the greatest influence over the implementation of environmental and social safeguards.

Our analysis suggests that state-owned enterprises, followed by small and mid-sized international companies from a handful of countries, would have the greatest influence over the implementation of environmental and social safeguards in energy and extractive industries in the Amazon rainforest. Unfortunately, these actors are generally viewed as being less transparent and accountable and having lower standards (particularly if they are not publicly listed), although confirming the merits of this view is beyond the scope of this report and warrants further examination.

Lenders, which mainly include multilateral and national development banks, commercial and

investment banks, and private equity funds, could also have substantial influence over the practices of companies developing projects. Current trends suggest that in the future, companies and banks will more closely scrutinize the viability of projects based on both economic and environmental criteria. As a result, fewer Amazon projects will be developed, but greenfield projects will be developed by a more limited group of state-owned companies and smaller foreign companies. As the world increasingly demands accountability in preserving biodiversity, protecting vulnerable communities, and mitigating global warming, companies and financial entities with assets in the Amazon region will be expected to play their part.

Annex: List of Data Sources

HYDROPOWER SECTOR:

- Government Sources
 - ENDE, Empresa Nacional de Electricidad (Bolivia)
 - ANEEL, Agência Nacional de Energia Elétrica (Brazil)
 - Ministerio de Electricidad y Energía Renovable (Ecuador)
 - Ministerio de Energía y Minas (Peru)
 - Organismo Supervisor de la Inversión en Energía y Minería (Peru)
- Company-related Sources
 - Securities filings (EDGAR and SEDAR)
 - Company websites, reports, and press releases
 - Bank websites (BNDES, World Bank, IDB, CAF)
- News Engine Searches
 - News sites (*Hydro Review*, *Reuters*, *Power Technology*, *Mongabay*, *Diálogo Chino*, *New York Times*)
- Databases
 - Project databases (RAISG, Global Reservoir and Dam Database, BNamericas, GlobalData, World Resources Institute Global Power Plant Database, Global Energy Observatory, International Rivers, The Nature Conservancy)
 - Financial databases (Bank Track, Boston University's Chinese Overseas Development Finance)
- Reports
 - Seifert, F., G. Pimentel, I. Coutinho, R. Besso. 2019. Infraestrutura na Bacia do Alto Paraguai. SITAWI Finanças do Bem. <https://bit.ly/31xyjF5>
 - Anderson, E. P., C. N. Jenkins, S. Heilpern, J. A. Maldonado-Ocampo, F. M. Carvajal-Vallejos, A. C. Encalada, J. F. Rivadeneira, M. Hidalgo, et al. 2018. Fragmentation of Andes-to-Amazon connectivity by hydropower dams. *Science Advances* 4: eaao1642. doi:10.1126/sciadv.aao1642.
 - Latrubesse, E. M., E. Y. Arima, T. Dunne, E. Park, V. R. Baker, F. M. d'Horta, C. Wight, F. Wittmann, et al. 2017. Damming the rivers of the Amazon basin. *Nature* 546: 363–369. doi:10.1038/nature22333.
- Interviews
 - Interviews with in-country experts and comments from expert workshop
- Miscellaneous
 - World Wildlife Fund

OIL AND GAS SECTOR:

- Government Sources
 - Ministerio de Hidrocarburos y Energías (Bolivia)
 - YPFB website (Bolivia)
 - National Agency of Petroleum, Natural Gas and Biofuels (Brazil)
 - Agencia Nacional de Hidrocarburos (Colombia)
 - Secretaría de Hidrocarburos (Ecuador)
 - Petroamazonas website (Ecuador)
 - Ministerio de Ambiente y Agua (Ecuador)
 - Perupetro (Peru)
 - Senace Peru (Peru)
 - Ministerio de Energía y Minas (Peru)
- Company-related Sources
 - Company websites, annual reports, original licensing contracts

- News Engine Searches
 - News sites (*MercoPress, Argus Media*)
- Databases
 - Project databases (RAISG, BNamericas, GlobalData)
- Interviews
 - Interviews with in-country experts and comments from expert workshop
- Miscellaneous
 - Rice University's Baker Institute for Public Policy
 - Wood Mackenzie
 - Instituto Boliviano de Comercio Exterior
 - Extractive Industries Transparency Initiative

MINING SECTOR:

- Government Sources
 - Ministerio de Minería y Metalurgia (Bolivia)
 - Autoridad Jurisdiccional Administrativa Minera (Bolivia)
 - Ministério de Minas e Energia (Brazil)
 - Agência Nacional de Mineração (ANM, Brazil)
 - Agencia Nacional de Minería (Colombia)
 - Ministerio de Minas y Energía (Colombia)
 - Ministerio de Minería (Ecuador)
 - Agencia de Regulación y Control Minero (Ecuador)
 - Ministry of Natural Resources (Guyana)
 - Guyana Geology and Mines Commission (Guyana)
 - Ministerio de Energía y Minas (Instituto Geológico Minero y Metalúrgico, Peru)
 - Ministerie Van Natuurlijke Hulpbronnen (Suriname)
- Company-related Sources
 - Securities filings (EDGAR and SEDAR)
 - Company websites, technical reports, and press releases
 - Bank websites (BNDES, IFC)
- News Engine Searches
 - News sites (*Business Insider, Junior Mining Network, Global News Wire, DiproMin, NS Energy, Yahoo Finance, The Economist, Mining Journal, Market Screener, Mining Technology, Financial Times*)
- Databases
 - Project databases (RAISG, Mining Data Online, BNamericas, GlobalData)
 - Financial databases (Bank Track)
- Interviews
 - Interviews with in-country experts and comments from expert workshop
- Miscellaneous
 - Extractive Industries Transparency Initiative
 - Resource Contracts website
 - Sociedad Nacional de Minería, Petróleo y Energía (Peru)
 - Verisk Maplecroft
 - SOS Orinoco

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