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ECUADOR

SUSTAINABLE MANAGEMENT OF UNDERGROUND RESOURCES AND ASSOCIATED INFRASTRUCTURE

(EC-L1257)

LOAN PROPOSAL

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REQUIRED LINKS	
1.	Multiyear execution plan / Annual work plan
2.	Monitoring and evaluation plan
3.	Environmental and social management report
4.	Procurement plan

OPTIONAL LINKS	
1.	Economic analysis of the project
2.	Environmental and social management Operating Regulations
3.	Program Operating Regulations
4.	Vertical logic
5.	Organizational chart of executing agencies
6.	Gender rationale
7.	Safeguard policy filter

ABBREVIATIONS

ARCOM	Agencia de Regulación y Control Minero [Mining Regulatory and Oversight Agency]
B/C	Benefit-cost ratio
BCE	Central Bank of Ecuador
CGE	Contraloría General del Estado [Office of the Comptroller General of the State]
CUT	Single Treasury Account
DDPLAC	Deep Decarbonization Pathways in Latin America and the Caribbean
ESMR	Environmental and Social Management Report
GDP	Gross domestic product
GHG	Greenhouse gas
ICB	International competitive bidding
IDB	Inter-American Development Bank
IIGE	Instituto de Investigación Geológico y Energético [Geological and Energy Research Institute]
IRR	Internal rate of return
LIBOR	London Interbank Offered Rate
MEF	Ministry of Economy and Finance
MERNNR	Ministry of Energy and Nonrenewable Natural Resources
MW	Megawatts
NDC	Nationally Determined Contribution
NPV	Net present value
PMU	Program management unit
SERNAGEOMIN	Servicio Nacional de Geología y Minería de Chile [National Geology and Mining Service of Chile]
SNCP	National Public Procurement System
SOTE	Sistema de Oleoducto Transecuatoriano [Trans-Ecuador Oil Pipeline System]
VAT	Value-added tax

PROJECT SUMMARY

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<table>
<tr><th colspan="5">Financial Terms and Conditions</th></tr>
<tr><td colspan="3">Borrower:</td><td colspan="2">Flexible Financing Facility[a]</td></tr>
<tr><td colspan="3">Republic of Ecuador</td><td>Amortization period:</td><td>25 years</td></tr>
<tr><td colspan="3">Executing agency:</td><td>Disbursement period:</td><td>5 years</td></tr>
<tr><td colspan="3" rowspan="2">Ministry of Energy and Nonrenewable Natural Resources (MERNNR) and the Geological and Energy Research Institute (IIGE)</td><td>Grace period:</td><td>6 years[b]</td></tr>
<tr><td>Interest rate:</td><td>LIBOR-based</td></tr>
<tr><td>Source</td><td>Amount (US$)</td><td>%</td><td>Credit fee:</td><td>[c]</td></tr>
<tr><td>IDB (Ordinary Capital)</td><td>78,400,000</td><td>100</td><td>Inspection and supervision fee:</td><td>[c]</td></tr>
<tr><td rowspan="2">Total</td><td rowspan="2">78,400,000</td><td rowspan="2">100</td><td>Weighted average life:</td><td>15.23 years</td></tr>
<tr><td>Approval currency:</td><td>United States dollars</td></tr>
<tr><th colspan="5">Project at a Glance</th></tr>
<tr><td colspan="5">Project objective/description: The general objective is to boost sustainable investment in the mining and energy sectors. The specific objectives are to: (i) strengthen strategic management of the sector; and (ii) promote sustainable investment in the energy sector.</td></tr>
<tr><td colspan="5">Special contractual conditions precedent to the first disbursement of the loan: (i) The borrower, either directly or through the executing agencies, has presented evidence that the program Operating Regulations and the environmental and social management Operating Regulations have been approved and taken effect under terms previously agreed with the Bank; and (ii) the borrower, either directly or through the executing agencies, has presented evidence that the program management units in each executing agency have been created and the minimum staff appointed, including a social specialist and an environmental specialist in the MERNNR who will be shared by both executing agencies (paragraph 3.8). See contractual conditions precedent to the first disbursement in Annex III (Fiduciary Agreement and Requirements) and in Annex B to the environmental and social management report (ESMR).

Special contractual conditions for execution of Components 1 and 3: (i) after the diagnostic assessments called for in Component 1 have been completed and before the training activities are executed, the executing agency will present to the Bank for its no objection the plan of activities, identifying the scope for each one; and (ii) prior to implementation of each preinvestment study under Component 3, the executing agency will present to the Bank, for its no objection, the plan of activities identifying the scope of the activities to be conducted (paragraph 3.9). See the special contractual conditions in Annex B of the ESMR.</td></tr>
<tr><td colspan="5">Exceptions to Bank policies: None.</td></tr>
<tr><th colspan="5">Strategic Alignment</th></tr>
<tr><td>Challenges:[d]</td><td colspan="4">SI ☑ PI ☑ EI ☐</td></tr>
<tr><td>Crosscutting themes:[e]</td><td colspan="4">GD ☑ CC ☑ IC ☑</td></tr>
</table>

[a] Under the terms of the Flexible Financing Facility (document FN-655-1), the borrower has the option of requesting changes to the amortization schedule, as well as currency, interest rate, and commodity conversions. The Bank will take operational and risk management considerations into account when reviewing such requests.

[b] Under the flexible repayment options of the Flexible Financing Facility, changes to the grace period are permitted provided the original weighted average life of the loan or the last payment date as documented in the loan contract are not exceeded.

[c] The credit fee and the inspection and supervision fee will be established periodically by the Board of Executive Directors as part of its review of the Bank's lending charges, in accordance with applicable policies.

[d] SI (Social Inclusion and Equality); PI (Productivity and Innovation); and EI (Economic Integration).

[e] GD (Gender Equality and Diversity); CC (Climate Change and Environmental Sustainability); and IC (Institutional Capacity and Rule of Law).

I. Description and Results Monitoring

A. Background, problem addressed, and rationale

1.1 **Macroeconomic context.** From 2010 to 2014 growth in Ecuador averaged 5.4% of gross domestic product (GDP). However, the growth rate dropped to 0.7% from 2015 to 2018, primarily due to falling oil prices. After 2014, the Government of Ecuador maintained a fiscal deficit above 5% of GDP and saw public debt increase to over 40% of GDP. For 2019, growth was expected to have dropped to approximately 0.5% of GDP.[1]

1.2 The government has launched its Prosperity Plan 2018-2021 as a vehicle for overcoming macroeconomic imbalances. The plan aims to foster productivity and employment, stimulate private investment and exports, and ensure fiscal sustainability. Increasing private investment is particularly critical at a time when there is little fiscal headroom for public spending to continue growing. With a dollarized economy, Ecuador also needs an inflow of foreign exchange.

1.3 The energy and mining sectors are key pillars for recovery, given their decisive economic, social, and environmental impact.[2] Managed strategically and responsibly, they have the capacity to promote macroeconomic equilibrium and contribute to sustainable development. The government is seeking to promote the mining industry on a large scale, to make the sector a pillar of the economy. At the same time, it aims to boost investment in energy projects that make the sector more efficient and reliable and help achieve the long-term low greenhouse gas (GHG) emission development strategies, in keeping with the relevant commitments ratified by Ecuador for implementing the Paris Agreement.[3]

1.4 The key challenges the government faces to increasing investment in the mining and energy sectors are: (i) the need to optimize long-term comprehensive administration and planning of the sectors as a whole[4] and, in particular, the need to reinforce incipient management, regulation, and control capacities in the mining sector;[5] (ii) insufficient knowledge of Ecuadorian geology;[6] and (iii) limited planning and promotion of investment in the energy sector that take into account the

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1 IDB Group country strategy with Ecuador (2018-2021), May 2018.

2 Article 313 of the 2008 Constitution of Ecuador.

3 The Paris Agreements seeks, among other objectives, to keep the average global temperature rise below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5°C. The Agreement urges the countries to formulate and communicate long-term strategies, taking into account their common but differentiated responsibilities and respective capabilities, in the light of different national circumstances. The Conference of the Parties (COP) invited the Parties to communicate their long-term strategies in 2020: https://unfccc.int/process/the-paris-agreement/long-term-strategies

4 Diagnostic assessment of the organizational, functional, and administrative structure of the MERNNR.

5 Diagnostic assessment, National Development Plan for the Mining Sector 2019.

6 Ibid.

country's commitments,[7] as well as possible scenarios for 2050, including ones that consider the risk of these becoming abandoned assets during the energy transition.[8]

1.5 **Mining sector.** Large-scale mining of metals in Ecuador is in its infancy, but the industry has great potential to contribute to economic development. Historically, there has been limited development of the sector in the country, representing 1.5% of annual average GDP from 2010 to 2018[9] with primarily small-scale and artisanal mining. In recent years, the government has begun promoting large-scale metal mining, and in 2018 the sector generated US$738 million in foreign investment—over half of investment in the country.[10] This is due, in particular, to the implementation of five projects considered to be "strategic,"[11] with cumulative investment from 2007 to 2018 of US$2.035 billion.[12]

Source: Vice Ministry of Mines.

Figure 1: Strategic mining projects, 2018

7 Ecuador published its Nationally Determined Contribution (NDC) in March 2019. However, NDCs, in general, are not consistent with the temperature objectives established in the Paris Agreement and according to the models analyzed could create abandoned assets (Vogt-Schlib et al., 2019). Accordingly, the countries need to update their NDCs and align them with long-term low GHG emission development strategies. The project "Deep Decarbonization Pathways in Latin America and the Caribbean" (DDPLAC), spearheaded by the IDB, puts forward approaches for developing and offering long-term pathways for zero net emissions by 2050 (IDB and DDPLAC 2019). Moreover, it is important to take into account estimates that suggest that the region has a power generation stock using fossil fuels (including natural gas) that may already be incompatible with the objectives of the Paris Agreement (González-Mahecha et al., 2019).

8 Demand for fossil fuel products is increasingly affected by international climate commitments and the growing competitiveness of renewable energy and electromobility solutions (Solano-Rodriguez et al., 2019).

9 Diagnostic assessment, National Development Plan for the Mining Sector 2019.

10 Ibid.

11 Fruta del Norte, Mirador, Río Blanco, Loma Larga, and San Carlos Panantza.

12 Diagnostic assessment, National Development Plan for the Mining Sector 2019.

1.6 In 2021, with these projects beginning production, new "second-generation" operations,[13] and continuing growth in small-scale mining, the government predicts investment in the sector of around US$3.8 billion, exports of US$3.66 billion, and tax receipts of approximately US$800 million, thereby increasing the sector's contribution to 4% of GDP.[14]

1.7 **Sector management.** Although the sector has been growing rapidly, attracting investment from world-class companies, its continuation and consolidation as a pillar of the economy are not ensured. Because Ecuador does not have experience with large-scale mining, there are significant gaps in the government's capacity to plan, regulate, and oversee these major investments. This creates risks for the sector's growth, such as delays in the process of awarding licenses, which creates uncertainty for communities and investors, or weak oversight of the socioenvironmental standards imposed on the industry. Consolidation of the sector depends largely on the government's actions to ensure the current projects move forward and to produce new projects in a stable economic, legal, and socioenvironmental environment.

1.8 In this regard, the country's regulations need to be strengthened to reflect international good practices and provide clarity and legal certainty to the public and to investors. Today there are key formalities that are not specifically regulated and do not have specific requirements, deadlines, or procedures.[15] One such critical issue is the regulation governing the awarding of metal mining concessions, for which the approval procedures and rules for complying with investment and divestment procedures need to be clarified and optimized. At the same time, the technical expertise of government officials needs to be strengthened[16] and interagency coordination and management processes bolstered to implement mining policy and effectively oversee the sector's entire value chain.

1.9 **Technology and innovation.** The government does not have modern tools to effectively inspect mining projects. For example, digital technology today makes inspection of tailings dams more effective. These are dams where mining waste is deposited; the dam's stability is important, because it serves as a physical barrier that separates waste from the environment. Dam failure causes environmental problems, in some cases with very grave consequences. Sensors and software make it possible to monitor geotechnical stability in the dams using spatial data to determine changes over time. Adopting these in Ecuador would provide early warnings for environmental risks.

1.10 **Mining vision.** Promoting responsible development of the mining sector also involves incorporating the vision and needs of the areas where mining activity occurs. One of the main challenges the government has identified for developing the sector is lack of knowledge, locally and nationally, of what responsible mining entails.[17] Strengthening the dissemination of impartial information and social

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13 Cascabel, Llurimagua, Cangrejos, Ruta del Cobre, La Plata, and Curipamba.

14 Ministry of Economy and Finance: https://www.finanzas.gob.ec/usd-3-800-millones-de-inversion-minera-hasta-2021-daran-mas-prosperidad-al-ecuador/

15 Diagnostic assessment, National Development Plan for the Mining Sector 2019.

16 Diagnostic assessment of the organizational, functional, and administrative structure of the MERNNR.

17 Diagnostic assessment, National Development Plan for the Mining Sector 2019.

engagement in sector governance are critical to preventing conflicts that could interrupt sector growth and delay territorial development. One of the most valuable tools for achieving this is putting in place dialogue and awareness processes that build consensus on a comprehensive vision of what the sector means for the country's development. These processes need to pursue specific, long-term agreements among the stakeholders—local communities, civil society, governments, and the private sector—to ensure sustainable entry into the territories and transparent governance of the activity. The IDB has developed a process at the regional level in which a group of experts from the extractive sector—from government, civil society, and industry—agreed on a new vision for the sector, with priorities and recommendations to make it an effective engine of sustainable development in the region. Implementing that vision in national processes will put into practice the most pertinent recommendations for each country. Through such a process, Ecuador will be able to demonstrate that mining can improve the country's economic expansion and the quality of life of Ecuadorians.

1.11 **Gender perspective.** Similarly, to ensure that mining sector benefits translate into greater socioeconomic development, there needs to be a strategy that provides both men and women with the same opportunities and conditions for participation. Women tend to be disregarded in consultation processes and excluded from compensation and benefits and can experience increased gender-based violence due to the increased number of workers in the community.[18] Moreover, women who work in mines have worse working conditions (discrimination, lower pay for the same work, etc.).[19] In Ecuador, labor market participation for persons over 15 is 57% for women and 82% for men.[20] Of the women in the labor force, only 0.1% are in the mining sector.[21] Globally, around 10% of the labor force in the mining sector are women, and they account for only 4% of board members.[22] For the mining sector to be an inclusive engine of development, there must be equitable participation of women and men in territorial governance processes and the sector labor market.

1.12 **Geological knowledge.** Lastly, a critical challenge for developing the mining sector is the limited geological knowledge of the country, which is essential for the government to be able to improve policy-making and encourage private investment by reducing risks in the mining exploration stage.[23] The majority of geological maps of the country were created using different techniques and on different scales. As a result, the current geological knowledge of the territory at a scale of 1:100,000 is insufficient to lay the foundation for acceptable geological infrastructure on which applied and economic geological studies can be based.[24]

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18 Oxfam. (2002). Tunnel Vision: Women, Mining and Communities.

19 Ibid.

20 World Bank. (2019). The Little Data Book on Gender. Chapter on Ecuador.

21 International Labour Organisation. Men's participation in the sector is also low: 0.9% of the total.

22 Women in Mining and PwC. (2013), Mining for talent: A study of women on boards in the mining industry.

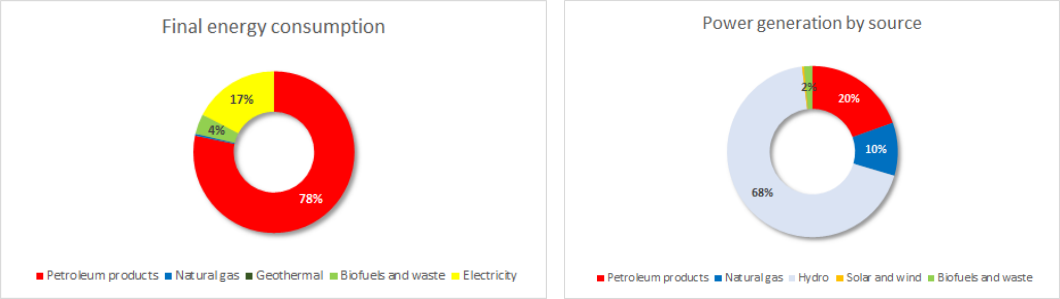
23 Häggquist et al., Luleå University of Technology, 2014. The economic value of geological information.

24 Diagnostic assessment, National Development Plan for the Mining Sector 2019.

1.13 At present, nationwide Ecuador only has 12% of the information related to identification and typology of mineral resources.[25] To encourage investment in the sector, national geological maps need to be updated or generated. Given their potential to have mineral deposits of economic interest, the mapping areas prioritized by the government are the Cordillera Occidental, Cordillera Real, and the Sub-Andean Zone. Since 2014, the government has been moving forward with analysis of the Cordillera Occidental, but existing and new data on the geology, geochemistry, and geophysics of the Cordillera Real and the Sub-Andean Zone still need to be processed.[26]

1.14 **Energy sector.** The energy sector, which includes hydrocarbons and electricity, is another essential pillar for boosting competitiveness and influencing socioeconomic welfare in the country. The government is facing the challenge of attracting investment in energy projects that lead to greater efficiency and reliability and are consistent with the long-term low GHG emission development strategies required by the Paris Agreement, such as decarbonization. To overcome this challenge, the government needs to build its planning and investment promotion capacity, to make more sustainable projects viable.[27]

1.15 In this regard, high domestic consumption of petroleum products[28] poses a challenge for the country, given the high economic and environmental cost. The petroleum sector is not only an essential engine of Ecuador's economy, but domestic consumption of petroleum products also represents 78% of the country's end energy consumption and 20% of power generation.[29] Accordingly, the government has pledged to reduce petroleum use in key sectors of the economy, including the energy sector.



Source: International Energy Agency.

Figure 2: Energy consumption and generation in Ecuador, 2017

1.16 In the last eight years, thanks to strong government investment in hydroelectric projects, the power generation fleet has shifted from being heavily dependent on imports and thermal generation with petroleum products to having a high share of renewable energy. In 2018, over 70% of installed electrical capacity was based on

25 Ibid.

26 Ibid.

27 Diagnostic assessment of the organizational, functional, and administrative structure of the MERNNR.

28 Gasoline, liquefied petroleum gas, diesel, and fuel oil.

29 International Energy Agency, 2017.

renewable sources, with approximately 90% based on hydroelectric sources. That same year, hydropower covered 81% of electricity demand in the National Interconnected System. However, most hydroelectric plants have small reservoirs that cannot store water between stations. So, during low-water periods, petroleum product-based thermal generation has to be used to meet demand. Moreover, nonconventional renewable resources, such as wind, solar or geothermal, represent less than 1% of the power generation matrix.[30]

1.17 **Investment promotion.** In Ecuador's exceptional context, replacing the generation of electricity using petroleum products during the dry season in a manner consistent with long-term, low GHG emission strategies, such as decarbonization, is particularly difficult.[31] Natural gas is an option that could give the electrical system the capacity it needs to deal with seasonal variability and replace the current petroleum product-based generation, reducing the environmental costs of using these fuels. To make the use of natural gas consistent with the Paris Agreement's temperature goal and the country's climate change-related objectives, it should complement the use of renewable energies, particularly during the dry season. This requires planning, together with a cost-benefit analysis of building infrastructure to import natural gas and expand or adapt the generation fleet.[32]

1.18 Diversifying the power matrix also requires attracting investment to further develop nonconventional renewable power generation projects. Ecuador has geothermal potential of at least 600 megawatts (MW),[33] which could replace part of its fossil fuel-based thermal generation. There are currently six geothermal projects in the country at different stages of readiness.

1.19 There is also significant potential to make the sector more efficient by improving its operational processes, particularly in two areas. The first is replacing the use of fossil fuels with electricity as the main source of energy in the industry's operational processes. The Trans-Ecuador Oil Pipeline System (SOTE), for example, requires a large amount of energy that today comes from crude oil extracted in eastern Ecuador that is inefficient and polluting to transport to the Balao Maritime Terminal for export and delivery to domestic refineries. Electrifying the SOTE would increase operating efficiency and reduce GHG emissions in the near term. Second, oil production and refining in Ecuador also generates associated natural gas production that could be used as an energy source in various production processes instead of being flared (or vented), which would increase operating efficiency and reduce GHG emissions.

1.20 **Institutional context.** The institutional framework of the mining, hydrocarbon, and electricity sectors is governed by: the Ministry of Energy and Nonrenewable Natural Resources (MERNNR) and its entities: (i) the sector regulatory and

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30 Ibid.

31 Technologies, such as batteries, are increasingly competitive and make it possible to deal with the variability of wind or solar technologies, for example, and make headway on strategies like decarbonization. However, to address seasonal variability with low-emission solutions, solutions are needed that are not yet ready for implementation: https://www.iea.org/topics/sir/.

32 The 2018-2027 plan to expand generation includes 1,187 MW of new generation with gas.

33 Corporación Eléctrica del Ecuador SA (CELEC EP), 2014.

oversight agencies;[34] (ii) the Geological and Energy Research Institute (IIGE); and (iii) State-owned mining, electricity, and hydrocarbon companies.[35, 36]

1.21 The MERNNR was established in May 2018 through Executive Decree 399, merging the ministries of hydrocarbons, electricity, and mining into a single Ministry and also merging the National Institute for Geological, Mining, and Metallurgical Research and the National Institute of Energy Efficiency and Renewable Energy into the IIGE. As the steering and planning agency for the mining and energy sectors, the MERNNR is responsible for preparing and implementing policies, guidelines, and plans in the corresponding areas for development of the sectors. The Ministry is composed of the Vice Ministries of Mines, Hydrocarbons, and Electricity.

1.22 The sector regulatory and oversight agencies are technical-administrative bodies responsible for surveillance, auditing, intervention, and oversight of the phases of mining/energy activities. The mission of the IIGE is to generate and promote knowledge on geology and energy, through scientific research, technical assistance, and specialized services.

1.23 The creation of the MERNNR against a backdrop of economic austerity poses short-term challenges but also the opportunity to optimize comprehensive strategic management and planning in the medium and long terms, which then have a positive impact on the level of investment in the mining and energy sectors. For example, the MERNNR is currently processing valuable statistical data for independent decision-making at the national level separately for each sector. There is no unified system that can consolidate data from different sources and make it transparent, which prevents efficient integration of the sectors. Moreover, the MERNNR does not have a comprehensive plan for developing the sectors as a whole, with a sustainable, long-term vision. Those two dimensions need to be taken into account to strengthen the management of institutional processes.

1.24 Lastly, to strengthen the sector, the capacity of the human talent at the MERNNR needs to be reinforced, particularly in the Vice Ministry of Mines, since the government's objective is to promote responsible investment in the sector. A 2018 technical, behavioral, and performance evaluation of all MERNNR staff found that only 57% of the 547 civil servants assessed had obtained the minimum score required for their position or higher. In the Vice Ministry of Mines, 53% of the 148 civil servants had a satisfactory score.

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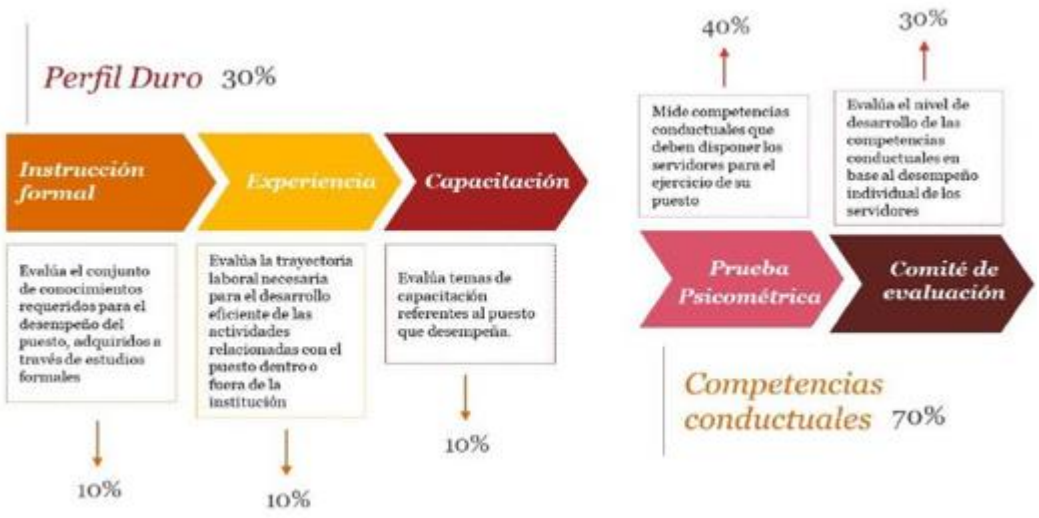
[34] Mining Regulatory and Oversight Agency (ARCOM), Hydrocarbon Regulatory and Oversight Agency, and Electricity Regulatory and Oversight Agency.

[35] National Mining Company, Petroamazonas and Petroecuador, Electricity Corporation of Ecuador, National Electricity Corporation, and 10 power distribution companies.

[36] See the organizational charts in optional link 5.



Source: PwC, Diagnostic assessment of the organizational, functional, and administrative structure of the MERNNR.

Figure 3: Hard skills and behavioral competencies to be evaluated, 2018

1.25 **The proposed intervention.** The program borrower is the Republic of Ecuador; its executing agencies are the MERNNR and the IIGE, and its objective is to boost sustainable investment in the mining and energy sectors. To tackle the challenge of optimizing management of the sectors as a whole and strengthen the fledgling capacity in the mining sector, the program will build the government's capacity to plan, regulate, and oversee the technical, social, and environmental aspects of these sectors, with an emphasis on mining. To counteract the insufficient geological knowledge of Ecuadorian territory, the program will develop geological maps in areas of mining interest. Lastly, to overcome the challenge of limited planning and promotion of sustainable investment in the energy sector, the program will conduct preinvestment studies to analyze the advisability and viability of investment projects that increase the sector's efficiency and/or reliability while remaining consistent with the country's commitments under the Paris Agreement. The activities will be guided by the IDB's Sustainable Infrastructure Framework,[37] which stipulates that all investments should comply with four pillars: social, economic and financial, environmental, and institutional sustainability.

1.26 **Effectiveness of the proposed intervention.** A review of the empirical literature in the mining and energy sectors shows significant economic gains associated with strengthening public management of the sector. In the mining sector, McMahon (2010) shows that interventions focused on strengthening sector management have increased investment in the sector in several countries in Latin America and Africa.[38] In Argentina, for example, 13 years after mining sector reform began,[39]

[37] Technical Note IDB-TN-01388.

[38] McMahon, G. (2010). The World Bank's Evolutionary Approach to Mining Sector Reform. Oil, Gas, and Mining Unit Working Paper. Extractive Industries for Development Series. The World Bank.

[39] The objectives were to: (i) upgrade the legal and regulatory frameworks; (ii) support institutional capacity-building; (iii) develop a modern cadastre; and (iv) establish an environmental protection system in the sector.

investment had risen from US$56 million in 1995 to US$2.4 billion in 2008. Similar interventions in African countries also bore positive results. On average, the impact attributable to institutional strengthening in those countries was equivalent to a 5% increase in mining investment.

1.27 A review of the literature also shows significant economic benefits for countries associated with the generation of geological information.[40] The potential value of that information can come from: (i) savings due to better physical planning, and (ii) more efficient mineral exploration stemming from increased investment in exploration. Scott et al. (2002) found that, in Australia, high-quality geological information led to an annual benefit of Aus$4.3 million for mineral exploration.[41]

1.28 Lastly, the literature shows ample evidence of the economic and environmental benefits of optimizing the use of fossil fuels in the energy sector. For example,[42] in the case of reducing oil production-related gas flaring and venting, the estimated benefits for Ecuador are substantial, with net savings of US$785 million and a reduction in gas flaring equivalent to 24.33 billion cubic meters of gas.[43] Preinvestment studies for infrastructure projects encourage investment by reducing costs and investment risk.

1.29 **IDB experience in Ecuador.** Recently, the mining and hydrocarbon sectors have benefited from three IDB investment loans (loans 4670/OC-EC, 4670/OC-EC-1, 4670/OC-EC-2; 4928/OC-EC; and 4845/OC-EC) with resources to: (i) strengthen institutional mechanisms that support regulatory quality and transparency in the business environment; (ii) support the merger of State-owned companies in the hydrocarbon sector; and (iii) increase the share of private resources in public investment. Since 2010, the electricity sector has received support through 10 investment loans and one policy-based loan. Among other objectives, the financing focused on improving efficiency and quality in delivering electricity service. One of the flagship investment projects, approved in 2010, was the modernization of Petroecuador's Esmeraldas-Quito pumping stations (loan 2472/OC-EC), which also supported remediation of oil-related environmental liabilities. Through nonreimbursable technical cooperation operations, the Bank has supported: (i) design of the optimal structure for the MERNNR; (ii) design of the new Mining Public Policy updated in May 2019; (iii) updating of the mining cadastre; (iv) building of geothermal capacity; (v) diversification of financing sources for the electricity sector; (vi) strengthening of sector companies and institutions; and (vii) preparing the country's path for decarbonization.

1.30 **Lessons learned.** The project draws on lessons learned from operations executed by the Bank in Ecuador, including: (i) the need to prioritize improvements in operational and energy efficiency to make better use of energy resources while fulfilling the country's international commitments (loans 4343/OC-EC and 4600/OC-EC); (ii) the need to approach sector improvements by designing

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40 Elisabeth Häggquist, Patrik Söderholm Luleå University of Technology, 2014. The economic value of geological information: Synthesis and directions for future research.

41 Scott, M., Dimitrakopoulos, R., Brown, R.P.C., 2002. Valuing regional geoscientific data acquisition programmes: addressing issues of quantification, uncertainty and risk. Natural Resource Forum 26, 55–68.

42 For a detailed list of the evidence, see the program's cost-benefit analysis.

43 Climate & Clean Air Coalition, 2018: https://ccacoalition.org/en/content/petroamazonas-ep

modernization policies and plans, as was done in the electricity sector and is beginning to happen in the mining sector (loan 4600/OC-EC); (iii) the importance of having a regulatory framework that promotes private participation arrangements (loan 4670/OC-EC, 4670/OC-EC-1, 4670/OC-EC-2); and (iv) the importance of having public companies in the electricity and hydrocarbon sector with better governance and operations, enabling them to be more effective technical counterparts in projects with private participation (loan 4845/OC-EC). Moreover, the Bank's experience supporting responsible development of the mining and energy sectors in the region, through the Canadian Facility for the Extractives Sector (RG-X1262) and the portfolio executed by the Mining, Geothermal, and Hydrocarbon Cluster demonstrated that in order for the program to have the desired impact—in this case, increased investment—the legal frameworks and sector management capacity need to be strengthened; however, it is also critical to lay the foundation for a shared vision in society of what the sector's long-term contribution should be. Without this, the sectors' sustainability will be weak. This program's design reflects the lessons learned from operations executed in Ecuador and the region, including notably: (i) prioritization of activities and projects that consider financial, socioenvironmental, and technical sustainability criteria; (ii) preparation in close collaboration with the executing agencies; and (iii) inclusion of activities for continuing strengthening of executing agencies.

1.31 The government is committed to the program actions, beyond completion of the operation. This is demonstrated by the priority it is placing on investments in information management systems, equipment and geological mapping, which provide transparency to the sectors and governance tools that transcend political cycles.

1.32 **IDB Group Country Strategy with Ecuador 2018-2021.** The program is aligned with the IDB Group Country Strategy with Ecuador 2018-2021 (document GN-2924) by contributing to the following objectives: (i) strengthening of public finances; and (ii) support for productivity and private sector development as drivers of growth. For the former, the program will support the country by promoting investment in strategic sectors, having a positive impact on the generation of exports and fiscal revenue. For the latter, the program seeks to specifically help the country promote investment in the mining and energy sectors. This operation is included in the Update to Annex III of the 2019 Operational Program Report (document GN-2948-2), as part of the 2020 indicative program.

1.33 **Strategic alignment.** The program is consistent with the Second Update to the Institutional Strategy (document AB-3190-2) and aligned with the challenges of: (i) Productivity and Innovation, by strengthening the mining sector as a pillar of economic growth and promoting responsible investment in the energy sector; and (ii) Social Inclusion and Equality, by building the government's capacity to implement dialogue and awareness-raising processes that consider the mining territories' socioeconomic needs on what development of the sector entails. It is also aligned with the crosscutting areas of: (i) Climate Change and Environmental Sustainability, through the studies on geothermal energy, reducing gas flaring and venting and conversion to electricity from the SOTE. Approximately 6.64% of the operation's resources are invested in climate change mitigation activities, according to the joint methodology of the multilateral development banks' for tracking climate change finance. These resources will contribute to the Bank's target of increasing financing

for climate-related projects to 30% of approvals by the end of 2020. (ii) Gender and Diversity, by promoting gender equality and women's participation in the mining sector; and (iii) Institutional Capacity and Rule of Law, by building the government's sector management capacity.

1.34 The program is consistent with the Energy Sector Framework (document GN-2830-2), by promoting the sustainability of the energy matrix through diversification; and with the Strategy for Sustainable Infrastructure for Competitiveness and Inclusive Growth (document GN-2710-5), through support for planning environmentally and socially sustainable infrastructure.

1.35 **Gender-related actions.** To promote gender equality in the mining sector, the program will: (i) develop the Gender Strategy and Action Plan for the sector, which will identify the appropriate activities based on the diagnostic assessment and include specific actions to promote gender equality; (ii) conduct mining professionalization and technical strengthening programs for civil servants with a gender perspective; and (iii) implement the Program for Emerging Women Leaders in the Public and Private Mining Sector.

B. Objectives, components, and cost

1.36 The general objective is to boost sustainable investment in the mining and energy sectors. The specific objectives are to: (i) strengthen strategic management of the sector; and (ii) promote sustainable investment in the energy sector.

1.37 **Component 1: Strengthening strategic management of the sector (US$27.92 million).** This component will finance the building of planning, regulatory and oversight, and implementation capacity for sector public policy. Sector planning instruments and policy and regulation tools will be developed that, based on the pillars of the Sustainable Infrastructure Framework, make the regulatory framework more efficient and create a business climate conducive to responsible investment. The activities to be financed include: (i) sustainable sector infrastructure plan, merging supply and demand scenarios in the mining, electricity, and hydrocarbon sectors and considering a risk analysis and fiscal and economic opportunities related to climate change, the global energy transition to reduce fossil energy consumption, and other sustainability criteria; (ii) development of the country's Mining Vision, through a multi-stakeholder dialogue process with equitable participation by women and men; (iii) strategic communication plan on responsible mining; (iv) development and modernization of regulatory frameworks for mining, natural gas, and geothermal energy; (v) plan for optimizing licensing procedures for mining projects; (vi) comprehensive information management model; (vii) mining professionalization program, based on the diagnostic assessment of labor gaps in the sector, with a gender perspective, in the context of activities (i) to (iv) of this component; (viii) specialized technical strengthening and sector management programs for civil servants, with a gender perspective;[44] and (ix) procurement of mining inspection equipment.[45]

[44] Includes the Program for Emerging Women Leaders in the Public Sector.

[45] For the Mining Regulatory and Oversight Agency (ARCOM). See the program Operating Regulations for execution details.

1.38 **Component 2. Generating information on the geological potential of Ecuadorian territory (US$26.32 million).** This component will finance the survey and compilation of the geological information needed to make decisions on underground resources, in order to identify opportunities for development of mining and metals resources, including: (i) surveying for geological mapping in areas of mining interest; and (ii) procurement of geological prospecting equipment. The specialized services that will be financed for preparing the geological maps include airborne geophysical services, geochemistry services, and field work to move forward in geological mapping of the entire Ecuadorian territory. Financing will also be provided for the procurement of equipment for field work and processing geological samples. Lastly, a pilot center for monitoring tailings dams will be financed, to monitor the structural safety of such dams in industrial mining projects through sensors and spatial data.

1.39 **Component III. Promoting sustainable investment in the energy sector (US$20.83 million).** This component will finance technical, environmental, legal, and economic studies for energy sector projects, taking into account the IDB's Sustainable Infrastructure Framework. These are expected to increase reliability and/or efficiency while making headway on the country's compliance with the Paris Agreement. To contend with the seasonal variability of the current electricity system and make it more reliable, preinvestment studies will be conducted for a natural gas regasification plant and generation facilities (taking into account the cost-benefit comparisons of lower GHG emission alternatives) and surface studies for developing geothermal potential. To improve sector efficiency and support the reduction in fuel consumption in the country, preinvestment studies will be conducted for conversion to electricity from the SOTE together with preinvestment studies for projects to reduce the associated gas flaring and venting. This component will not finance studies related to or aimed at the exploration and production of fossil fuels.

1.40 **Program administration (US$3.33 million).** In addition, administration expenses related to the two Project Management Units (PMUs) will be financed, together with program audits and evaluations.

C. Key results indicators

1.41 Attainment of program results will be measured by the indicators and targets in the Results Matrix. The expected impact is increased investment in the mining and energy sectors. This will be measured through the following outcome indicators: (i) percentage of pending licenses granted during program execution for first- and second-generation mining projects; (ii) percentage of civil servants and students who pass the exams—with a score of 80/100 or higher—administered after the training workshops; (iii) percentage of mining companies that considered access to and the quality of the current geological information to be a major deterrent to investment in the country's mining sector; and (iv) number of investment projects awarded in the energy sector.

1.42 **Beneficiary.** By generating new investment in the mining and energy sectors, the program will benefit the Ecuadorian population through the investments' impact on macroeconomic stability, productivity, and job creation. By financing preinvestment studies, the government can determine how these projects can provide the greatest possible benefit to the country in a sustainable manner. Preinvestment

covers the development of various economic, environmental, and legal studies that, once the feasibility of a project is established, encourage investment by reducing costs and risks and increasing the benefits of the investment. Given the importance of these sectors in generating revenue for the country, the MERNNR and the IIGE are key institutions for promoting investment in these sectors and, thus, for promoting economic sustainability in Ecuador.

1.43 **Economic evaluation.** A cost-benefit analysis (optional link 1) will be conducted that assesses the program's economic relevance. The net present value (NPV), internal rate of return (IRR) and benefit-cost ratio (B/C) indicators make it possible to determine the program's social interest up to 10 years after its completion. Based on the literature of existing empirical evidence, the expected increase in the gross production value of the mining and energy sectors from strengthening strategic management of the sector was quantified. The results for the intervention correspond to an NPV of US$76,097,615 and an IRR of 22.49%, which exceeds the 12% discount rate used. Moreover, the B/C was equal to 2.35, which shows that program benefits exceed costs in present value.

II. Financing Structure and Main Risks

A. Financing instruments

2.1 The program is structured as a specific investment loan for US$78.4 million, 100% of which will come from the Bank's Ordinary Capital, with that figure including the value-added tax (VAT).[46] Table 1 lays out the budget by component; the itemized budget is found in the Procurement Plan annex. The execution period shown in Table 2 was set at five years based on the excepted sequence of program activities, as well as the expectation of medium-term support from the Bank to ensure proper implementation. Those processes are broken down in the multiyear execution plan.

Table 1. Estimated program amounts (US$ millions)

Components	Total	%
Component 1. Strengthening strategic management of the sector	27.92	35.61%
Component 2. Generating information on the geological potential of Ecuadorian territory	26.32	33.57%
Component 3. Promoting sustainable investment in the energy sector	20.83	26.57%
Administration and monitoring	3.33	4.25%
Total	**78.40**	**100%**

[46] Pursuant to Article 1 of Ministerial Agreement MEF 001 of 2 January 2020, "…investment projects with resources from public debt and grant operations optimize and reprogram the costs of the various components, in order to ensure the VAT is paid from resources from that source…"

Table 1. Projected disbursements (US$ millions)

Source	2020	2021	2022	2023	2024	2025	Total
IDB	0.246	26.852	24.449	15.087	9.111	2.655	78.400

B. Environmental and social safeguard risks

2.2 The operation, classified as B.13, will finance the implementation of studies and activities that, from a socioenvironmental standpoint, entail (or are related to potential projects that would entail) impacts and risks that need to be appropriately managed and mitigated. Accordingly, the MERNNR and the IIGE will need to develop environmental and social management Operating Regulations establishing all the rules and standards to ensure that program studies and activities are carried out in line with the Bank's environmental and social safeguard policies, national regulations, and all applicable international standards. Likewise, the environmental and social management Operating Regulations will establish the rules and standards that must be included in program-financed studies related to future projects, so that those projects are also in line with the Bank's environmental and social safeguard policies, national regulations, and all applicable international standards. The environmental and social management Operating Regulations will include a list of eligibility criteria for studies and projects that cannot be presented to the Bank or financed by this operation (i.e. studies on critical natural habitats, negative impact on indigenous persons, impact on isolated indigenous persons, etc.). The most relevant technical sheets for the studies and subprojects will also be established. A medium risk identified was the lack of institutional capacity to implement the environmental and social management Operating Regulations. To mitigate this risk and ensure their proper implementation, the borrower will ensure that it has one social specialist and one environmental specialist in the MERNN, to be shared with the IIGE, focused on implementing these regulations.

C. Fiduciary risks

2.3 The risk workshop identified the following fiduciary risks: (i) medium-high risk: if it is not possible to open individual accounts at the Central Bank of Ecuador for each executing agency, it could be difficult to determine what funds are available for each of them, since the funds would go into the Single Treasury Account with a single suspense account per loan, without individual reporting by executing agency, which could delay or prevent project disbursements under a coexecution arrangement. To mitigate this risk, a contractual condition precedent to the first disbursement will be included related to the Ministry of Economy and Finance (MEF) guaranteeing to the Bank that there is a procedure for determining the transactions and funds available for each executing agency; and (ii) high risk: there are significant delays in the program time line because MERNNR and IIGE staff are not familiar with IDB policies, and taking into account the program's critical path for 2020 in accordance with the annual work plan and the 2020 procurement plan (under the purview of the IIGE: three international competitive bidding (ICB) processes and five specialized individual consulting assignments; under the purview of the MERNNR: 4 ICBs, 12 consulting assignments with consulting firms, and 8 specialized consulting assignments with individual consultants); to mitigate the risk the executing agencies need to determine the extent of the need for

technical and procurement specialists[47] with the profiles and experience to prepare the terms of reference and manage bidding processes in due time and manner to fulfill the planned contracts in the program's critical path.

D. Other key risks and issues

2.4 Other risks identified: (i) high risk: Given the participation of two coexecuting agencies, there could be a lack of coordination between them, which in turn could lead to unexpected execution delays. This risk will be mitigated by having a specialist in planning and monitoring and by including in the program Operating Regulations coordination activities between the two institutions (see paragraph 3.1); (ii) medium-high risk: because the procurement processes depend on backing from different government entities (the MEF, the Ministry of Telecommunications and the Information Society, and the Secretariat of Higher Education, Science, Technology, and Innovation, among others), there could be delays in managing the processes. This risk will be mitigated through regular meetings with their operational teams and with the involvement of the MEF by including supervision of program execution in the multiyear execution plan, the annual work plan, and each of the annual work plans in place during program execution; and (iii) medium-high risk: delays in program execution because of a lack of technical personnel with experience executing programs with multilaterals. This risk is partially mitigated by the presence of professionals with experience in executing projects in the MERNNR and by strengthening the program management units (PMUs).

III. Implementation and Management Plan

A. Summary of implementation arrangements

3.1 **Execution mechanism.** The borrower will be the Republic of Ecuador, and the executing agencies will be the MERNNR and the IIGE through their respective PMUs. The activities under Components 1 and 3 will be executed by the MERNNR's PMU. That unit will have a general coordinator, a financial specialist, two procurement specialists, four technical specialists (in mining, hydrocarbons, and environmental and social affairs) and a monitoring analyst, all working full time on program execution, paid for with loan proceeds. In addition, the program Operating Regulations will include coordination activities between the two institutions, including the development of a communication matrix describing the main flows of information exchanges between the parties, the frequency of and channels for delivering that information, the persons responsible for doing so, and other interagency agreements.

3.2 The activities under Component 2 will be executed by the IIGE's PMU, which will report directly to the Executive Director's Office and will have an internal staff coordinator (not financed with loan proceeds) and a procurement specialist working full time on program execution, paid for with loan proceeds. The IIGE will

[47] In the case of the MERNNR, it is recommended that at a minimum the PMU have two procurement specialists, given the number of bidding processes in the first two years of program execution. In addition, precontract processes are expected to begin before the first disbursement.

also be supported by the social, environmental, and monitoring specialists in the MERNNR's PMU.

3.3 The main functions of the PMUs will be to: (i) plan the execution of activities; (ii) prepare, implement, and update the project management tools: multiyear execution plan, procurement plan, annual work plan, and progress monitoring report; (iii) supervise execution and submit the status reports; (iv) prepare the terms of reference, bidding and procurement of goods, and selection and contracting of services; (v) present justifications and disbursement requests to the Bank; (vi) submit the audited financial statements; (vii) prepare the program evaluation; and (viii) coordinate the activities at the government level that are needed for program execution. The MERNNR will be responsible for commissioning the evaluation and audits for the entire program. The program Operating Regulations will describe: (i) the functions, procedures and standards for executing the components, outlining the functions of the PMUs; and (ii) the operational and contractual relationships between program participants.

3.4 The institutional assessment of both the MERNNR and the IIGE was performed using the Institutional Capacity Assessment Platform (ICAP). With respect to the MERNNR, it found strengths in project management, given the availability of professionals with experience executing investment projects with international financing. It also found weaknesses in: (i) technical quality management, given the lack of professionals with the technical expertise this project will require for execution; and (ii) human resources management, given the limited continuity and stability in staffing. Regarding procurement management, the assessment found limited delegation of approvals to the technical team, drawing out precontractual processes. In terms of financial management, there are opportunities for improvement, primarily in the early stage of project execution. Lastly, in environmental and social safeguard management, there is limited staff and few formal procedures for managing socioenvironmental impacts.

3.5 The main recommendations include: establishing a PMU within the MERNNR that reports to the Minister's Office and has administrative, financial, and legal autonomy and key specialized and support staff. That unit is to use existing MERNNR systems, and the MERNNR will adapt its processes to ensure the PMU's autonomy, with proper internal control and in full use of institutional systems.

3.6 With respect to the IIGE, the analysis found strengths in: (i) project management, since it has experience executing projects with funding from international donors; and (ii) technical quality management, since it has technical personnel trained for direct program execution. Regarding human resources management, there is a balance between strengths and opportunities for improvement, with stability in managerial and technical positions. With respect to procurement management and financial management, capacity needs to be built through training in the execution of loans adhering to the Bank's procurement policies, since the IIGE does not have experience in this area. Lastly, there is also limited personnel in environmental and social safeguard management and few formal procedures for managing socioenvironmental impacts.

3.7 The primary recommendation is to establish a PMU within the IIGE that reports to the Director. The PMU must have key specialists and use existing IIGE systems;

the IIGE will adapt its processes to ensure the PMU's autonomy with the proper internal control and in full use of institutional systems.

3.8 **Contractual conditions precedent to the first disbursement. The following will be conditions precedent: (i) The borrower, either directly or through the executing agencies, has presented evidence that the program Operating Regulations and the environmental and social management Operating Regulations have been approved and taken effect under terms previously agreed with the Bank; and (ii) the borrower, either directly or through the executing agencies, has presented evidence that the program management units in each executing agency have been created and the minimum staff appointed, including a social specialist and an environmental specialist in the MERNNR who will be shared by both executing agencies.** These conditions are necessary to establish the structure, guidelines, and procedures to be followed by the executing agencies for successful program execution.

3.9 **Special contractual conditions for execution of Components 1 and 3.** The following will be execution conditions: (i) after the diagnostic assessments called for in Component 1 have been completed and before the training activities are executed, the executing agency will present to the Bank for its no objection the plan of activities, identifying the scope for each one; and (ii) prior to implementation of each preinvestment study under Component 3, the executing agency will present to the Bank, for its no objection, the plan of activities identifying the scope of the activities to be conducted. These conditions are necessary to ensure alignment with program objectives and given the high amount of funding associated with these two activities.

3.10 **Procurement of works, goods, nonconsulting services, and consulting services.** Procurement processes financed fully or partially with Bank resources will be carried out in accordance with the Policies for the Procurement of Goods and Works Financed by the Inter-American Development Bank (document GN-2349-15) and the Policies for the Selection and Contracting of Consultants Financed by the Inter-American Development Bank (document GN-2350-15), both of May 2019 and approved by the Bank on 2 July 2019.

3.11 **Single-source selection of consulting services.** In Component 2, the IIGE anticipates using program resources for hiring, by single-source selection, the National Geology and Mining Service of Chile (SERNAGEOMIN), for the consulting assignment, "Specialized service regarding the Tailings Dam Monitoring Center management model." This will be done in accordance with the Policies for the Selection and Contracting of Consultants Financed by the IDB (document GN-2350-15), Section 3.11(d), since SERNAGEOMIN is an agency of the Government of Chile that is qualified and has experience of exceptional worth for delivering these services.[48]

3.12 **Financial management and audits.** Each executing agency will be responsible for managing its disbursements. Funds will be advanced to cover each executing agency's resource needs for up to 180 days. At the borrower's request, direct payments can also be made to suppliers, together with reimbursements of

[48] SERNAGEOMIN is the only entity that provides these specialized services in the region, and it has already done so successfully. Although it is a Chilean government entity, it can enter into contracts that establish the usual conditions in contracts with private sector providers. These characteristics are set forth in the procurement policies (document GN-2350-9), Single-source selection, paragraph 3.11(d).

expenditures made. Annual audited financial statement reports will be requested within 120 days following the close of each period or the deadline for the last disbursement upon completion of execution.

3.13 **Retroactive financing and recognition of expenditures.** The Bank can retroactively finance out of the loan proceeds procurements related to: (i) the geological mapping survey in areas of mining interest; (ii) procurement of geological prospecting equipment; and (iii) preinvestment studies for the natural gas regasification plant project and generation facilities, for up to US$15.68 million (20% of the proposed loan amount) in eligible expenditures made by the borrower, provided requirements substantially similar to those established in the loan contract were met. Those expenditures are to have been made on or after the profile approval date (15 October 2019) up until the date the loan was approved by the Bank's Board. In no case will expenditures made more than 18 months prior to the loan approval date be included.

B. Summary of arrangements for monitoring results

3.14 The monitoring arrangements include administration missions, semiannual status reports, and annual external audits. The executing agencies will perform overall program monitoring, based on the targets set forth in the Results Matrix and using the annual work plan, which is to be updated annually. The multiyear execution plan will lay out the progress of the activities done and will include the execution schedule for the remaining years in the loan disbursement period. The executing agencies will also be responsible for preparing semiannual reports and submitting them in March and September of each year, in addition to organizing meetings with the Bank to analyze program progress. The Bank, through the Sector Specialist, will supervise program execution. The details of the monitoring arrangements are presented in required link 2.

3.15 **Evaluation.** The executing agencies will submit to the Bank a midterm evaluation report 60 days from the date on which 50% of the loan proceeds have been disbursed; and a final evaluation report 60 days after the date on which 90% of the loan proceeds have been disbursed. The terms of reference for the consultants who will prepare those reports will require the prior no objection of the Bank. These reports will include: (i) progress made in achieving the targets in the Results Matrix; (ii) the degree of compliance with the obligations established in the loan contract; (iii) the effectiveness of the monitoring and evaluation system; and (iv) lessons learned. Upon completion of the program, a project completion report will be prepared to evaluate whether the program's objectives were met and to draw lessons that can be applied to future projects.

Development Effectiveness Matrix		
Summary	**EC-L1257**	
I. Corporate and Country Priorities		
1. IDB Development Objectives		
Development Challenges & Cross-cutting Themes	**-Social Inclusion and Equality -Productivity and Innovation -Gender Equality and Diversity -Climate Change and Environmental Sustainability -Institutional Capacity and the Rule of Law**	
Country Development Results Indicators	**-Students benefited by education projects (#)* -Women beneficiaries of economic empowerment initiatives (#)* -Government agencies benefited by projects that strengthen technological and managerial tools to improve public service delivery (#)* -Accountability institutions strengthened (#)* -Amount of FDI promoted (US$)***	
2. Country Development Objectives		
Country Strategy Results Matrix	**GN-2924**	**Mitigate the fiscal risk associated with oil price volatility; Increase the private share of investment through PPPs; Move forward on Ecuador's energy reform; Boost the contribution of private investment and productivity to economic growth; Foster access to export markets.**
Country Program Results Matrix	**GN-2948-2**	**The intervention is included in the 2019 Operational Program.**
Relevance of this project to country development challenges (If not aligned to country strategy or country program)		
II. Development Outcomes - Evaluability		**Evaluable**
3. Evidence-based Assessment & Solution		**9.0**
3.1 Program Diagnosis		**2.4**
3.2 Proposed Interventions or Solutions		**3.6**
3.3 Results Matrix Quality		**3.0**
4. Ex ante Economic Analysis		**7.0**
4.1 Program has an ERR/NPV, or key outcomes identified for CEA		**3.0**
4.2 Identified and Quantified Benefits and Costs		**0.0**
4.3 Reasonable Assumptions		**1.0**
4.4 Sensitivity Analysis		**2.0**
4.5 Consistency with results matrix		**1.0**
5. Monitoring and Evaluation		**7.9**
5.1 Monitoring Mechanisms		**1.1**
5.2 Evaluation Plan		**6.8**
III. Risks & Mitigation Monitoring Matrix		
Overall risks rate = magnitude of risks*likelihood		**Medium**
Identified risks have been rated for magnitude and likelihood		**Yes**
Mitigation measures have been identified for major risks		**Yes**
Mitigation measures have indicators for tracking their implementation		**Yes**
Environmental & social risk classification		**B.13**
IV. IDB´s Role - Additionality		
The project relies on the use of country systems		
Fiduciary (VPC/FMP Criteria)		
Non-Fiduciary		
The IDB's involvement promotes additional improvements of the intended beneficiaries and/or public sector entity in the following dimensions:		
Additional (to project preparation) technical assistance was provided to the public sector entity prior to approval to increase the likelihood of success of the project		

Note: (*) Indicates contribution to the corresponding CRF's Country Development Results Indicator.

Evaluability Assessment Note:

This is an investment loan of USD74.4 million to be executed by the Ministry of Energy and Nonrenewable Natural Resources (MERNNR) and the Institute of Geological and Energy Research (IIGE). The general objective of the operation is to increase sustainable investments in the mining and energy sectors. Its specific objectives are: i) to strengthen sectorial strategic management and ii) to promote sustainable investments in the energy sector. Ecuador's economy is highly dependent on oil. The fall in oil prices since 2014 has led to slow economic growth, high fiscal deficits and growing public debt. Oil represents 78% of the country's energy consumption. The Ecuadorian government is seeking to increase private investments in the mining and energy sectors to diversify Ecuador's economic base. These sectors, if developed in a sustainable manner, have the potential to help the country achieve macroeconomic stability, higher long-term growth and lower CO2 emissions. The operation aims to address three key challenges that prevents further private investments in the mining and energy sectors: i) weak planning, regulatory and institutional capacities; ii) insufficient geological information; and iii) limited planning and promotion of investments in the energy sector to face Ecuador's NDC commitments under the Paris Agreement. The surveyed literature supports the proposed interventions as it associates better institutional capacity and planning to higher investments in mining and energy. The literature also provides evidence of environmental and economic benefits from lower carbon emissions due to a reduction in fossil fuels consumption. The results matrix is adequately connected to stated specific objectives in a clear vertical logic. Results indicators aim to assess institutional development and the investment environment such as mining licenses approved, trained public servants, mining companies investment environment perception indicator and sustainable energy projects adjudicated to the private sector. Ex ante economic analysis is performed under reasonable assumptions resulting in a VPN of USD76,097,615 and an IRR of 22.49%. A sensitivity analysis using Monte Carlo simulations was adequately performed. The analysis does not include negative externalities that would result from higher investments in mining due to data and methodological limitations and had its score reduced accordingly. The Monitoring and Evaluation Plan proposes to perform an ex-post cost-benefit analysis using synthetic control methodology.

RESULTS MATRIX

Project objective:	The general objective is to boost sustainable investment in the mining and energy sectors. The specific objectives are to: (i) strengthen strategic management of the sector; and (ii) promote sustainable investment in the energy sector.

EXPECTED IMPACT

Indicator	Unit of measurement	Baseline		Target		Means of verification	Comments
		Value	Year	Value	Year		
IMPACT: Increased investment in the mining and energy sectors							
Level of investment in the mining and energy sectors	US$ millions	2,402	2018	2,242 (282)	2024	MERNNR	The variable is composed of investment in the mining sector (2018: US$738.5 million) and the hydrocarbon sector (2018: US$1.663 billion). To project the baseline in the mining sector, the results of the EConcept study (2019) were used; that study considered the main mining projects and assumed a normative scenario. For the baseline in the hydrocarbon sector, it considered the projection by the Vice Ministry of Hydrocarbons. The investment projections in the hydrocarbon sector exhibit a downward trend over time. This is due to the pace at which the main projects in the sector are expected to be executed. Lastly, to determine the expected impact, the impact attributable to strengthening of sector management equivalent to an increase of 5.07% in the mining sector was considered (McMahon, 2010) and of 3.5% in the hydrocarbon sector (Ballón and Molina, 2017); as an impact attributable to information generation, 4.0% was considered in the mining sector (United Nations Public Administration Network, 2003). See Annex 1 of the monitoring plan for more details.

EXPECTED OUTCOMES

Indicator	Unit of measurement	Baseline		Target		Means of verification	Comments
		Value	Year	Value	Year		
OUTCOME 1: Stronger strategic management of the sector							
% of pending licenses granted during program execution for first- and second-generation mining projects	%	0	2019	80%	2024	MERNNR	There are five phases of a mining project: (1) initial exploration, (2) advanced exploration, (3) economic assessment, (4) construction, and (5) production. Ecuador requires a mining and environmental license in all phases except for the economic assessment. To project the baseline, the results of the EConcept study (2019) were used, assuming the normative scenario. To determine the target, the study's best-case projection was used, in which strengthening the sector allowed for greater coordination for execution of the aforementioned projects and hence for moving ahead with 80% of the licenses needed for the next five years.
% of civil servants and students who pass the exams—with a score of 80/100 or higher—administered after the training workshops	%	0	2019	80%	2024	MERNNR	At the end of the training programs, participants will be assessed to measure what they learned during the program.
% of mining companies that consider the current access to and quality of geological information to be a strong deterrent to investment in the country's mining sector	%	13%	2018	6.50%	2024	Survey of Mining Companies, Fraser Institute	Fifteen factors related to mining investment are considered, and survey respondents are asked to select one of the following five responses that best describes their jurisdiction: (1) Encourages exploration investment, (2) Not a deterrent to exploration investment, (3) Is a mild deterrent to exploration investment, (4) Is a strong deterrent to exploration investment, (5) Would not pursue exploration investment in this region due to this factor. To build this indicator, only categories 4 and 5 were considered. This indicator was projected using its growth rate during the period 2011-2018.
OUTCOME 2: Enhanced promotion of sustainable investment in the energy sector							
# of investment projects awarded in the energy sector	# projects	0	2019	1	2025	MERNNR	1 of 5 sustainable projects from the group of projects promoted through the preinvestment studies.

OUTPUTS

Indicator	Unit of measurement	Baseline		Year 1	Year 2	Year 3	Year 4	Year 5	Final target	Means of verification	Comments
		Value	Year								
Comprehensive infrastructure plan developed for the mining and energy sectors	# documents	0	2019	0	0	1	0	0	1	MERNNR	Development of a plan bringing together the supply and demand scenarios in the mining, electricity, and hydrocarbon sectors and considering a risk analysis and fiscal and economic opportunities related to climate change.
Mining territorialization plan developed	# documents	0	2019	0	0	0	0	1	1	MERNNR	Development of a plan with a view to proposing key programs and strategies for bringing sector benefits to mining regions and reducing their social and environmental risks.
National and subnational dialogue process implemented	# reports	0	2019	0	0	1	0	0	1	MERNNR	The dialogue process will begin in year 2 with the adoption of a specific methodology and the establishment of roundtables at the national and subnational levels. A report will be presented with the main conclusions and recommendations.
Comprehensive territorial development plan at the project level developed	# documents	0	2019	0	0	0	0	1	1	MERNNR	The plan serves as input for the comprehensive territorial development plan.
Strategic communication plan implemented	# documents	0	2019	0	1	0	0	0	1	MERNNR	Implementation of a strategic communication plan, complementing the actions prioritized in the territorialization plan.
Regulatory frameworks for the natural gas, geothermal, and mining subsectors developed and updated	# documents	0	2019	0	3	0	0	0	3	MERNNR	Diagnostic assessment of current status and development of proposals for a new natural gas and geothermal energy framework, and mining improvement proposals.
Licensing optimization plan finalized for mining projects	# reports	0	2019	0	1	0	0	0	1	MERNNR	Diagnostic assessment of licensing projects and new improved plan.

Indicator	Unit of measurement	Baseline		Year 1	Year 2	Year 3	Year 4	Year 5	Final target	Means of verification	Comments
		Value	Year								
Persons trained under mining professionalization program	# professionals	0	2019	0	0	0	0	150	150	MERNNR	Implementation of a mining professionalization program under Component 1. There will be a training module on gender equality within this activity.
Specialized technical training and sector management programs for civil servants implemented in accountability institutions	# of civil servants	0	2019	0	0	0	0	200	200	MERNNR	Implementation of a technical training and sector management program for government institutions in the mining sector on regulatory, legal, technical, and environmental matters in the context of Component 1 activities. The institutions include the MERNNR, ARCOM, and the Ministry of the Environment. There will be a training module on gender equality in the programs.
Emerging Women Leaders in the Public Sector Program executed	# of women leaders who graduated from the program	0	2019	0	0	0	0	60	60	MERNNR	The six-month program seeks to strengthen and highlight the leadership skills of women with great potential in the sector and open up areas of collaboration between the public and private sectors to move forward on issues of gender equality.
Mineral occurrences and areas of geological mining interest in the Cordillera Real and Sub-Andean Zone mapped	# reports	0	2019	0	0	0	0	2	2	IIGE	Contracting specialized services to prepare the geological maps that include airborne geophysics, geochemistry, and field work to move forward with geological mapping of the entire territory of Ecuador. This will generate digital geological data that will be accompanied by a report.
Portfolio of preinvestment studies conducted for sustainable energy projects	# studies	0	2019	0	0	0	0	5	5	MERNNR	Considers five preinvestment studies for sustainable energy projects.

FIDUCIARY AGREEMENTS AND REQUIREMENTS

Country:	Ecuador
Project number:	EC-L1257
Name:	Sustainable Management of Underground Resources and Associated Infrastructure
Executing agency:	Ministry of Energy and Nonrenewable Natural Resources (MERNNR) and the Geological and Energy Research Institute (IIGE)
Fiduciary team:	Juan Carlos Dugand, Marcela Hidrovo, and Carolina Escudero (VPC/FMP)

I. SUMMARY

1.1 The program's fiduciary agreements on procurement and financial management consider: (i) the country's fiduciary context; (ii) an evaluation of fiduciary risks; (iii) the institutional capacity analysis of the MERNNR and IIGE; and (iv) inputs from meetings with teams and entities involved in project execution.

II. FIDUCIARY CONTEXT OF THE COUNTRY

2.1 **Country procurement system.** Based on document GN-2680-2 approved by the Bank's Board of Executive Directors on 13 May 2014, the Ministry of Economy and Finance (MEF), the Public Procurement Service (SERCOP), and the IDB signed the First Agreement for the Use of Ecuador's National Public Procurement System (SNCP) in IDB-financed Projects; paragraph 3.2 of the First Agreement calls for use of the SNCP in seven projects and gradually expanding from there. The First Agreement concluded on 31 December 2018; at present how well it functioned is being evaluated and, subsequently, a new agreement on use of the SNCP will be prepared and signed.

2.2 **Financial management system.** Central government entities use the Financial Management System (e-SIGEF), which integrates budget, accounting, and treasury processes. Government entities are subject to control and oversight by the Office of the Comptroller General of the State (CGE). In general, country financial management systems have an adequate level of development but need to be supplemented, for the purposes of executing IDB-financed projects, in the areas of financial reporting with off-book accounting records and external auditing with Bank-eligible auditing firms. The government is implementing a new system to replace the e-SIGEF that is expected to begin operating in 2020.

III. Fiduciary Context of the Executing Agency

3.1 The MERNNR and the IIGE are the program coexecuting agencies.

3.2 Each executing agency will manage the budget allocation for this program, as well as contracts and payments, through the Single Treasury Account (CUT). They will be responsible for preparing and reporting program financial information, managing disbursements with the IDB, and submitting the required audited and unaudited financial reports.

3.3 The executing agencies use the country procurement systems and are registered on the public procurement portal. For financial management, they use the country system (e-SIGEF), have internal control units, and are subject to external control by the CGE.

3.4 In addition, in 2015 an analysis of the Project Management Information System (SIGPRO) was conducted with satisfactory results; that system focuses on systematizing processes for prioritization, monitoring, control, and settlement of current MERNNR and IIGE projects and includes lessons learned during execution of loan 2608/OC-EC, which has already been completed.

IV. Fiduciary Risk Evaluation and Mitigation Actions

4.1 At the risk workshop, the following fiduciary risks were identified: (i) **medium risk:** if it is not possible to open individual accounts at the Central Bank of Ecuador for each executing agency, it could be difficult to determine what funds are available for each of them, since the funds would go into the Single Treasury Account with a single suspense account per loan, without there being individual reports by executing agency, which could delay or prevent project disbursements under a coexecution arrangement. To mitigate this risk, a contractual condition precedent to the first disbursement will be included related to the Ministry of Economy and Finance guaranteeing to the Bank that there is a procedure for determining the transactions and funds available for each executing agency; and (ii) **high risk:** of significant delays in the program time line because MERNNR and IIGE staff are not familiar with IDB policies and the program's critical path for 2020 in accordance with the annual work plan and the 2020 procurement plan (under the purview of the IIGE: three international competitive bidding (ICB) processes and five specialized individual consulting assignments; under the purview of the MERNNR: 4 ICBs, 12 consulting assignments with consulting firms, and 8 specialized consulting assignments with individual consultants); to mitigate the risk, the executing agencies need to determine the extent of the need for technical and procurement specialists with the profiles and experience to prepare terms of reference and manage the bidding processes in due time and manner.

V. Considerations for the Special Provisions of Contracts

5.1 **Special contractual condition precedent to the first disbursement.** The borrower has demonstrated that it has the capacity to produce detailed records of transactions and cash balances available for each executing agency, so they can present that information to the Bank as provided for in the loan contract. This

condition is critical, because it makes it possible to obtain individual reports on receipts, outlays, adjustments, and other transactions by each program executing agency that cannot currently be obtained from the Single Treasury Account, thus ensuring the traceability of the resources disbursed to each executing agency.

VI. AGREEMENTS AND REQUIREMENTS FOR PROCUREMENT EXECUTION

6.1 **Procurement execution.** Each executing agency will be responsible for updating, at least annually, the procurement plan for the component under its purview, through the Procurement Plan Execution System (SEPA). The main program procurements are listed in Table 2.

a. **Procurement of works, goods, and nonconsulting services.** These will be executed using the Bank's standard bidding documents, applying any methods described in the Policies (document GN-2349-15). Table 1 lists the procurement thresholds.

b. **Selection and contracting of consulting firms.** These will be executed using the Bank's standard Request for Proposals, applying any of the methods described in the Policies (document GN-2349-15). Table 1 lists the procurement thresholds.

c. **Single-source selection of consulting services.** This methodology will be used to hire the National Geology and Mining Service of Chile (SERNAGEOMIN) to prepare the Tailings Dam Monitoring Center management model for US$300,000. The rationale provided by the IIGE is that SERNAGEOMIN (i) is the only entity that provides this type of service in the region and has implemented a similar specialized product successfully, as it is qualified and has experience of exceptional worth for delivering this service; and (ii) although it is a Chilean government entity, it can enter into contracts that establish the usual conditions in contracts with private sector providers. The aforementioned arguments are provided for in the procurement policies (document GN-2350-9, Single-source selection, paragraph 3.10(d)).

d. **Selection of individual consultants.** Section V of the Policies for the Selection and Contracting of Consultants will apply.

Use of country procurement systems. Use of the SNCP will adhere to the provisions of paragraph 2.1.

e. **Retroactive financing and recognition of expenditures.** The Bank may use the loan proceeds to retroactively finance up to US$15.68 million (20% of the loan amount) in eligible expenditures made by the borrower, provided that requirements substantially similar to those set forth in the loan contract have been met. Those expenditures must have been made on or after the project profile approval date (15 October 2019) and up until the Bank's Board approves the loan. Expenditures made more than 18 months before the loan approval date will not be included.

f. **Domestic preference.** Bids for goods originating in the borrowing country will have a margin of preference on price equivalent to 15% in contracts subject to ICB.

Table VI-1. Threshold amounts (US$)

Works			Goods			Consultancies	
ICB	**National competitive bidding**	**Shopping**	**ICB**	**National Competitive Bidding**	**Shopping**	**International advertising consulting services**	**Shortlist 100% National**
≥3,000,000	<3,000,000 ≥250,000	< 250,000	≥250,000	< 250,000 ≥50,000	< 50,000	≥200,000	<200,000

Table VI-2. Main procurements

Activity	Selection method	Estimated date of invitation	Estimated amount (US$ thousand)
Consulting firms			
19 contracts for services from various consulting firms for amounts over US$200,000 from the MERNNR (see breakdown in procurement plan)	QCBS	Starting in Q4-2020	38,147
Specialized service for the Tailings Dam Monitoring Center management model	SSS	Q3-2020	336
External audit of program financial management	QCBS	Q3-2020	582
Midterm and final program evaluation (2 contracts) and financial audit (2 contracts)	QCBS	Q3-2021	224
Individual consultants			
Implementation of the roadmap for the business architecture of the mining/energy sector (6 contracts under the MERNNR)	IICQ/NICQ	Q3-2020	1,120
Implementation of information management technology platform (6 contracts under the MERNNR)	IICQ/NICQ	Q3-2022	560
Diagnostic assessment of Royalties Map, and parameterization and implementation of Royalties Map (2 contracts under the MERNNR)	IICQ/NICQ	Q3-2020	336
Specialized services in economic geology; X-ray diffractometry; mass and optical spectrometry; quality management systems in the chemistry lab; and data base administration (5 contracts under the IIGE)	IICQ/NICQ	Q4-2020	515
11 contracts for professionals to join the IIGE and MERNNR management teams (4 for the IIGE and 7 for the MERNNR)	NICQ	Q2-2020	2,496
Goods and nonconsulting services			
Procurement of software, hardware, and specialized equipment (6 contracts—2 IIGE and 4 MERNNR)	ICB	Q3-2020 Q2-2021 Q1-2022 Q2-2023	6,684
Advertising and strategic communication services for territorialization of the Mining Public Policy	ICB	Q4-2020	1,792
Quality control for outputs from the airborne geophysical survey	ICB	Q4-2020	3,360
Collection, processing, and interpretation of geophysical data through airborne radiometric and magnetometry records in the Cordillera Real and Sub-Andean Zone	ICB	Q4-2020	19,040
Sampling and laboratory analysis for dating and geochemistry	ICB	Q4-2020	940

Activity	Selection method	Estimated date of invitation	Estimated amount (US$ thousand)
Works			
Physical upgrades to the Monitoring Center and physical infrastructure for the National Geological Repository (2 contracts)	Shopping	Q3-2021	1,232

6.2 **Procurement supervision.** The procurement plan will set forth the method for supervision by the IDB. Ex post review will be performed annually as provided for in Appendix 1 of the policies and will include physical inspections, if the Bank deems these necessary.

Table VI-3. Ex post review threshold (US$)

Works	Goods	Consulting services	Individual consultant
< 3,000,000	<250,000	< 200,000	< 50,000

Note: Set based on the executing agency's execution fiduciary capacity and can be modified based on changes.

6.3 **Records and files.** The executing agency will maintain order and integrity in the files, organizing them separately by process and source of financing.

VII. FIDUCIARY MANAGEMENT AGREEMENTS AND REQUIREMENTS

7.1 **Programming and budget.** The Organic Code for Public Finance and Planning (COPYFP) establishes the regulations governing budget programming, formulation, approval, execution, control, evaluation, and settlement. These standards are applied to execution of Bank-financed programs in the country. The integrated e-SIGEF and the new system the government is developing implement and standardize application of these regulations throughout the national government apparatus. Each executing agency will manage the incorporation and/or updating of the investment program so as to have the respective budget allocations. The executing agencies will oversee and monitor budget execution in a comprehensive manner through the respective systems before the corresponding bodies.

7.2 **Accounting and information systems.** Project accounting will be through the e-SIGEF or the new system being developed by the government, once it is up and running, recording all program commitments and payments. However, off-book accounting records will be required for producing breakdowns by component and financial reports on the program, while verifying the reliability of the new system and its reports.

7.3 **Disbursements and cash flow.** In 2008, the Government of Ecuador instituted the Single Treasury Account mechanism, unifying treasury management for all central government entities. The executing agencies, since they are included in the General Budget of the State, will also make all their payments through the Single Treasury Account.

7.4 Implementation of this mechanism did not eliminate the special (or specific-purpose) accounts system managed in the Central Bank of Ecuador (BCE) to receive the proceeds of multilateral loans. The program will have an exclusive account in the BCE, into which the loan proceeds will be disbursed.

7.5 The Bank will make the loan disbursements through advances, separately for each executing agency, according to each executing agency's actual liquidity needs, in keeping with the itemized cash flow and financial plan for a period of up to 180 days. At the borrower's request, the Bank may also make direct payments to vendors or reimburse expenditures. In IDB systems, the components executed by each agency will be managed as a subloan, so that advances can be handled separately.

7.6 Accounts will be rendered for the advances in accordance with document OP-273-12; once 80% of the previous advances have been justified, a new disbursement for the component being executed can be disbursed.

7.7 With regard to expenditures not considered eligible by the Bank, the Bank and the executing agency will agree whether they should be repaid to the Bank, replaced by other eligible expenditures, or canceled.

7.8 Supporting documents for payments made will be reviewed after disbursement of the resources by the Bank and/or the external auditors.

7.9 **Internal control and internal audit.** The Constitution of Ecuador stipulates that the CGE is responsible for running the public sector control system. As part of that sector, the executing agency has its own internal audit area that reports directly to the CGE.

7.10 **External control and reports.** Although the CGE has the authority to audit public sector entities, the projects are not necessarily included in the annual audit plan. The project audit will be performed by an external firm of independent auditors acceptable to the Bank, in accordance with document OP-273-12. The firm will be hired by the MERNNR for the entire program, including the activities executed by each executing agency with IDB financing, based on terms of reference previously agreed with the Bank. The audit can be financed with program resources. The audit firm will be hired within 120 days after the end of the year to be audited. It is highly recommended that a single hiring process be carried out for the entire execution period through closing. During execution, the audited financial reports are submitted annually, within 120 days following the close of the fiscal year or, in the case of the final audit, from the date of the last disbursement. Each executing agency will prepare its own financial reports, and the audit firm can be asked for an individual opinion on those reports, as well as the compilation of reports to have aggregate information on the program. In addition, the IDB can request audited or unaudited financial reports related to the project, when it deems so necessary.

7.11 There is no national policy on public disclosure of audit reports; however, according to the current access to information policy, the project's audited reports should be published in Bank systems.

VIII. EXECUTION MECHANISM

8.1 **Execution mechanism.** For this program, each executing agency will have key support staff working exclusively on the project, to include at least a Coordinator, and Financial/Planning Specialist, and a Procurement Officer. They will report to senior management so as to be able to interact with the other involved areas of the institution. The contracts can be financed out of the IDB loan proceeds. The program Operating Regulations will establish the profiles of the persons to be hired or appointed for these functions.

DOCUMENT OF THE INTER-AMERICAN DEVELOPMENT BANK

PROPOSED RESOLUTION DE-__/20

Ecuador. Loan ____/OC-EC to the Republic of Ecuador
Sustainable Management of Underground Resources
and Associated Infrastructure

The Board of Executive Directors

RESOLVES:

That the President of the Bank, or such representative as he shall designate, is authorized, in the name and on behalf of the Bank, to enter into such contract or contracts as may be necessary with the Republic of Ecuador, as borrower, for the purpose of granting it a financing to cooperate in the execution of the project “Sustainable Management of Underground Resources and Associated Infrastructure”. Such financing will be for the amount of up to US$78,400,000 from the resources of the Bank’s Ordinary Capital, and will be subject to the Financial Terms and Conditions and the Special Contractual Conditions of the Project Summary of the Loan Proposal.

(Adopted on ___ _____ 2020)

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