Board of Executive Directors
Short Procedure
Expires on 30 June 2016

PR-4403
23 June 2016
Original: English
Public
Simultaneous Disclosure

To: The Executive Directors

From: The Secretary

Subject: Colombia. Nonreimbursable investment financing for the "Investment Grant for the Risk Transfer Program in Geothermal Power"

Basic Information:

Operation type ..... Investment Grant Operations (IGR)

Executing agency..... *Banco de Comercio Exterior de Colombia S.A.* (Bancóldex)

Amount ..... up to US$9,530,000

Source ..... Clean Technology Fund

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Remarks: The attached operation is being submitted according to the new rules and procedures established pursuant to Resolution DE-103/14, approving the "Proposal to Modify the Procedures for Approval of Nonreimbursable Operations. Approved version" (document GN 2752-4).

The Directors are requested to inform the Secretary, in writing, no later than **30 June 2016**, if they wish to interrupt this procedure. If no such communication is received by that date, the attached resolution will be considered approved by the Board of Executive Directors, and a record to that effect will be made in the minutes of a forthcoming meeting.

Reference: AT-80-10(3/74), DR-398-17(1/15), CS-3953-2(5/16), GN-2469-2(3/08), DE-44/08, GN-2470-2(3/08), DE-45/08, GN-2752-4(8/14), DE-103/14, GN-2571(5/10), DE-51/10, OP-214-3(5/13)

DOCUMENT OF THE INTER-AMERICAN DEVELOPMENT BANK

COLOMBIA

INVESTMENT GRANT FOR THE RISK TRANSFER PROGRAM IN GEOTHERMAL POWER

(CO-G1007)

GRANT PROPOSAL

This document was prepared by the project team consisting of: Joan Prats, IFD/CMF, Team leader; Jose Ramón Gómez, ENE/CCO, Alternate Team Leader; Claudio Alatorre, INE/CCS; Enrique Rodríguez Flores, ENE/CPE; Jose Juan Gomes, Ramón Guzmán, Isabel Haro, Isabelle Braly-Cartillier, Sebastián Vargas, Gloria Lugo, Cecilia Bernedo, IFD/CMF; Alvaro Concha, CMF/CCO; Kevin McTigue, LEG/SGO; Colin McKee, VPS/ESG; Mónica Rojas, CAN/CCO; Miguel Angel Orellana, Claudia Cárdenas García and Gabriele del Monte, FMP/CCO.

CONTENT

ANNEXES	
Annex I	Development Effectiveness Matrix (DEM) - Summary
Annex II	Results Matrix
Annex III	Fiduciary Arrangements

ELECTRONIC LINKS

REQUIRED

1. Monitoring and Evaluation Arrangements
2. Environmental and Social Management Report (ESMR)
3. Procurement Plan - Component II only

OPTIONAL

1. Economic Analysis
2. Indicative Information on Eligibility Criteria
3. *Emprendimiento de la Energía Geotérmica en Colombia*
4. The Manageable Risks of Conventional Hydrothermal Geothermal Power Systems
5. 2014 Annual U.S. & Global Geothermal Power Production Report
6. Improvement of Perception of the Geothermal Energy as a Potential Source of Electrical Energy in Colombia, Country Update, April 2015
7. *Geotermia en Colombia*, May 2014
8. Success of Geothermal Wells: A global study
9. Geothermal Handbook: Planning and Financing Power Generation
10. The Role of Public Finance in Deploying Geothermal: Background Paper
11. Latin American geothermal: Ready to Erupt

ABBREVIATIONS	
Bancóldex	*Banco de Comercio Exterior de Colombia S.A.*
CCLIP	Conditional Credit Line for Investment Projects
CO_2	Carbon Dioxide
COP	Colombian Pesos
CPI	Climate Policy Initiative
CRG	Contingent Recovery Grant
CTF	Clean Technology Fund
DPSP	Dedicated Private Sector Program
EA	Executing Agency
EIA	Environmental Impact Assessment
ENE	Energy Division
ESMAP	Energy Sector Management Assistance Program
ESMS	Environmental and Social Management System
FI	Financial Intermediaries
GDP	Gross Domestic Product
GEA	Geothermal Energy Association
GGDP	Global Geothermal Development Plan
GHG	Greenhouse Gas
IDB	Inter-American Development Bank
IEA	International Energy Agency
IFC	International Finance Corporation
IGA	International Geothermal Association
kWh/MWh/GWh	Kilowatt-hour/Megawatt-hour/Gigawatt-hour
MDB	Multilateral Development Bank
Mt	Mega ton (millions of tons)
$MtCO_2e$	Mega ton of Carbon Dioxide Equivalent
MW/GW	Megawatt/Gigawatt
MWe/GWe	Megawatt equivalent/Gigawatt equivalent
NAFIN	*Nacional Financiera*
NCRE	Non-conventional Renewable Energy
NDP	National Development Plan
NPV	Net Present Value
OR	Operating Regulations
POD	Proposal for Operational Development
PPP	Public-Private Partnership
RE	Renewable Energy
tCO_2	Ton of Carbon Dioxide
tCO_2e	Ton of Carbon Dioxide Equivalent
UNEP	United Nations Environment Programme
UPME	*Unidad de Planeación Minero Energética*

PROJECT SUMMARY

COLOMBIA

INVESTMENT GRANT FOR THE RISK TRANSFER PROGRAM IN GEOTHERMAL POWER (CO-G1007)

<table>
<tr><th colspan="5">Financial Terms and Conditions</th></tr>
<tr><td colspan="3">Beneficiary and Executing Agency: Banco de Comercio Exterior de Colombia S.A. (Bancóldex).</td><td colspan="2">CTF
Non reimbursable Investment Financing</td></tr>
<tr><td>Source</td><td>Amount US$</td><td>%</td><td rowspan="2">Disbursement and execution periods:</td><td rowspan="2">10 years</td></tr>
<tr><td>IDB: Clean Technology Fund (CTF)[a]</td><td>9.53 million</td><td>100</td></tr>
<tr><td>Total:</td><td>9.53 million</td><td>100</td><td>Currency of Approval:</td><td>U.S. dollars</td></tr>
<tr><th colspan="5">Project at a Glance</th></tr>
<tr><td colspan="5">Project objective / description: The objective of the program is to scale up investment in geothermal power generation projects by making available a financial mechanism tailored to meet the specific needs of a project's earliest development stages, specifically at the exploration phase. To this end, the program intends to trigger power production from geothermal sources, thus contributing to the reduction of global Greenhouse Gas emissions and the diversification of Colombia's energy matrix.</td></tr>
<tr><td colspan="5">Special Contractual Condition prior to the first disbursement of the grant resources: Bancóldex should provide evidence, to the Bank's satisfaction that: (i) the program coordinator has been appointed in accordance with the terms of references previously agreed upon with the Bank; and (ii) the program's Operating Regulations has been approved and entered into effect, in accordance with the terms and conditions previously agreed upon with the Bank (¶3.5).</td></tr>
<tr><td colspan="5">Exceptions to Bank policies: None.</td></tr>
<tr><th colspan="5">Strategic Alignment</th></tr>
<tr><td>Challenges[b]:</td><td colspan="4">SI ☐ PI ☑ EI ☐</td></tr>
<tr><td>Cross-Cutting Themes[c]:</td><td colspan="4">GD ☐ CC ☑ IC ☐</td></tr>
</table>

[a] These resources will be provided by the CTF through its Contingent Recovery Grant (CRG) Fund and their availability would be subject to the approval of the resources by the Trust Fund Committee (TFC) of the CTF. CTF will recover any funds that, at the end of the execution period, have not been utilized. Resources of the CTF that have not been committed at the end of the execution of the program will be returned to the CTF. The possibility of grant financing is contemplated under CTF products, terms and procedures for public sector operations, when projects involve significant risks and use innovative financing instruments. This program is under the agreement between the Bank and the CTF; see GN-2571 "Proposal for the establishment of the Clean Technology Fund (CTF) in the Inter-American Development Bank.

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

[c] 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 Justification

1.1 Emerging economies all over the globe are facing the challenge of trying to meet increasing demands for energy in a sustainable and cost-efficient manner. International practice increasingly calls for policies and mechanisms that help energy systems around the world transition into low-carbon ones. International funding is readily available to support this process in less-developed economies, in which investments in power generation from clean sources play a large role. One of the least explored sources of Renewable Energies (RE) in the world is the geothermal energy that comes from reservoirs of steam and hot water beneath the earth's surface. Many developing countries are endowed with substantial geothermal resources that could be more actively put to use. Making use of this technology will help the transition process to cleaner energy systems.

1.2 In regions where the existence of geothermal resource is apparent, geothermal energy[1] is particularly relevant because of its ability to provide power in a reliable and flexible manner to meet both base load energy demand and respond to fluctuating supply from other technologies. Geothermal power production increases the reliability of the power system, by providing a continuous source of clean energy, which can substitute fossil fuels (coal and gas) as a baseload power source. Moreover, due to its high capacity factor,[2] geothermal facilities can provide more flexibility and balance to the energy system as they offer back-up capacity that can consistently respond to the electricity demand, covering the balancing cost (often overlooked) of other inherently intermittent RE such as wind and solar.

1.3 Geothermal energy indeed offers one of the most effective renewable and low carbon alternatives for power generation. It is a mature technology with competitive production costs and economic lifetime of plants typically around 20 to 30 years minimum,[3] which has proved to be viable in a number of places without the support of subsidies.[4] The aforementioned high capacity factor and the absence of fuel and other variable costs over the long life of geothermal projects give geothermal power one of the lowest levelized costs[5] among RE.[6]

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1 Energy stored in rock and in trapped vapors or liquids, such as water or brines (available as heat contained in or discharged from the earth's crust). International Energy Agency (IEA).

2 The United States Energy Information Administration lists geothermal power as having a capacity factor of 92%, higher than coal (85%), natural gas (87%), and biomass (83%), and significantly higher than other RE such as wind or solar, which range below 50%. There is a cost associated to intermittency, as the sun does not shine nor the wind blows 24 hours a day all year long. The capacity factor is the ratio of the actual output over a period of time to its potential output (if it were possible to operate at full capacity continuously over the same period of time).

3 Sustainably managed reservoirs can maintain energy production for decades, even over 50 years.

4 However, government support has been key in the initial stages of geothermal power development due to the risks discussed below.

5 The levelized cost of energy represents the per-kilowatt hour cost (in real dollars) of building and operating a power plant over an assumed financial life and duty cycle. For medium sized plants (around 50 MW), levelized costs of generation are typically between US$0.04 and US$0.10 per kWh (Energy Sector Management Assistance Program (ESMAP), 2013). Operation and management costs are a small

Furthermore, its development entails significant economic and social benefits, such as high quality employment creation and the potential to reduce the need to import gas. Studies comparing jobs created in energy sectors state that geothermal energy supports and generates a significant number of jobs when compared to other energy technologies.[7] From an energy and environmental perspective, the expansion of geothermal energy in countries with the potential of having the necessary resource is fully justified, since CO_2 (Carbon Dioxide) emissions from geothermal power generation, while not exactly zero, are far lower than those produced by power generation based on burning fossil fuels.[8]

1.4 In Colombia, currently 67% of electricity production is based on hydroelectric power, 27% comes from natural gas and coal, and less than 1% from other renewable sources. The national electric system as a whole has not shown any significant growth since 2010. Even when the current contribution of Colombia to global Greenhouse Gas (GHG) emissions may not appear significant (0.4% of total global emissions), the energy system dependence on water resources may pose a significant vulnerability, particularly under changing weather conditions, due to uncertainties in the costs associated to managing backup supplies of energy. The system is especially vulnerable to extreme hydrologic conditions (such as the ones occurred in 1991-1992 and 1997-1998) and particularly to *El Niño*, which might be affected by climate change.[9] At the same time, growth of the hydroelectric generation is limited due to high environmental and social risks. If hydroelectric contributions to the system continue to have a declining trend, the use of fossil fuels to cover for these deficits will continue to increase, impacting the level of GHG emissions in the long term. Thus, due to the mentioned limitations to increase hydroelectric power generation in Colombia, geothermal energy appears a technology that provides the advantage of: (i) being cleaner than the thermal generation alternatives; (ii) having a competitive levelized cost, especially in comparison with the other non-conventional sources of energy; and (iii) providing base load power to the energy system since the geothermal resource is not subject to the interruptions inherent to other RE.

1.5 After the energy crisis of 1992, the country implemented institutional and regulatory changes that have rendered a more efficient, robust and diversified energy system able to cope with extreme weather conditions. However, the National Development Plan (NDP) 2014-2018 acknowledges that the increase in

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percentage of total costs because geothermal requires no fuel, which significantly increases economic viability.

6 In comparison with other energy sources, levelized costs of geothermal energy in Colombian Pesos (COP) are 30 COP/kWh, lower than wind (50 COP/kWh), higher than big hydro (19 COP/kWh), but smaller than small hydro (38 COP/kWh). Levelized costs of geothermal are also higher than other conventional alternatives such as coal and gas thermal energy (around 20 COP/kWh and 22 COP/kWh respectively), but present important environmental benefits. See *Análisis Coste Beneficio de energías renovables no convencionales en Colombia.* Fedesarrollo, 2013.

7 Promoting Geothermal Energy: Air Emissions Comparison and Externality Analysis (Geothermal Energy Association (GEA), 2013); Green Jobs through Geothermal Energy (GEA, 2010); A Handbook on the Externalities, Employment, and Economics of Geothermal Energy (GEA 2006).

8 Geothermal emissions are around 91 grams of CO_2 per Kilowatt-hour, far lower than for natural gas (599), oil (893) or coal (955). See Energy Sector Management Assistance Program. Gothermal Handbook. 2014.

9 The Bank is currently preparing a Technical Cooperation on Climate Change Vulnerability and Adaptation Measures for Hydroelectric Systems in Andean Countries, including Colombia (RG-T2673).

residential and industrial energy demand produces a deficit in the balance between demand and supply in adverse hydrologic conditions, which requires high levels of thermoelectric generation. At the same time, the NDP 2014-2018 also recognizes the need to introduce new generation plants with lower operating costs and less intensive use of liquid fuels, in order to reduce prices in the spot and forward markets.[10] For this reason, the National Government of the Republic of Colombia is interested in maximizing the use of its natural resources (both renewable and not renewable), while complying with the highest environmental and social standards, in order to prevent an ever increasing need for thermal energy generation, especially in adverse weather conditions.[11] The NDP 2014-2018 prioritizes the creation of incentives and use of the existing opportunities to leverage international funding in order to promote investment in non-conventional energy sources

1.6 The Republic of Colombia is located in one of the regions with the highest geothermal energy source potential in the world.[12] Part of its territory is situated within the so-called Ring of Fire, in the basin of the Pacific Ocean, where subsurface temperatures are abnormally high and important volcanic activity occurs. There is evidence of geothermal energy resources with potential for electricity production in various areas near volcanoes within the region.[13] The intrinsic characteristics of the resources make such region very attractive in order to achieve the above-mentioned energy objectives stated in the NDP 2014-2018. However, despite several efforts, Colombia has yet to attain an effective way to tackle the potential offered by geothermal resources as an efficient, sustainable and clean technology.

1. Barriers to geothermal industry development in Colombia[14]

1.7 Geothermal power production is well below its estimated potential worldwide, and its development in regions with highest potential has been rather slow, almost negligible in comparison with other renewables. Latin America is home to four of the world's 15 biggest geothermal producers, and practically every country in the Pacific basin is suitable for high-efficiency geothermal projects. However, the Andean Region is lagging behind, with no geothermal production so far despite its great potential. In countries such as Mexico, El Salvador and Costa Rica,[15] the

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10 A simulation performed by the *Unidad de Planeación Minero Energética* (UPME) shows that the introduction of 2,000 MW of non-conventional energy sources in Colombia's energy matrix could have a significant impact in the long run marginal cost of the system, estimated in some US$9 per MW/h. (2015). Generation and Transmission Expansion Plan 2014-2018.

11 Electricity demand is estimated to increase 1.8% annually over the next ten years (Dewhurst Group, 2014). As of December 2014, installed capacity was 13,886 MW and projections for 2020 are to increase capacity to 14,971 MW (UPME). In the case of Geothermal energy, an in-depth analysis of the technical and economic benefit of geothermal energy production in Colombia is provided in the program's Economic Analysis.

12 Total potential is estimated to be in the range of 1,340 to 2,210 MW (Bank's Energy Division (ENE), 2014).

13 Sector Nevado del Ruiz (Nevado del Ruiz, Cerro Bravo, Santa Rosa de Cabal), Sector Nariño (Tufiño Chiles-Cerro Negro, Cumbal, Azufral, Galeras), Sector Paipa Iza, and Sector Nevado del Tolima (Dewhurst Group, 2014).

14 RE Essentials: Geothermal, IEA; ESMAP, 2013; GEA; Latin American Geothermal, Electric Power Intelligence Series, BNamericas, 2012.

15 Geothermal energy installed capacity in México is 958 MW (2.7% of total energy production), 204MW in El Salvador (25.5%), and 166MW in Costa Rica (11.9%).

industry has been traditionally led by public sector companies. However, the private sector is majorly leading prospects for development in areas that have emerged as “geothermal hotspots”, including Chile, Peru, Argentina, Nicaragua and Guatemala (Kurmanaev; Electric Power Intelligence Series, BNamericas, 2012). A considerable pipeline of projects is already in some stage of development in the region. Chile is expected to become South America’s first geothermal producer. However, not a single commercial plant is under operation so far.

1.8 With currently no geothermal capacity installed, there is still very limited experience in Colombia, and the volcanic regions where the resource is located usually lack infrastructure for accessing them, making it more difficult for developers to structure the projects. In addition, due to the incipient nature of the industry, local norms and regulation related to the use of the resource have yet to evolve, so as to facilitate the development of this technology. Even when technical engineering capacity in most developing countries can be outsourced fairly easily, geothermal energy development can provide many jobs in different important areas (such as in network connection, roads, and facilities construction, procurement of goods and services). Besides, there are important learning externalities from outsourced technology development that can improve local human capital. In the particular case of Colombia, certain similarities between the capacities and the equipment needed for oil and geothermal exploration, introduce important complementarities that may facilitate the adjustment costs of developing a new technology.

1.9 **Geothermal-specific regulation.** The current energy regulatory framework in Colombia lacks a specific regulation for the exploitation of geothermal resources. This increases the perception of risk by investors and imposes an additional barrier to investment. The Government of Colombia is making progress in the establishment of clearer and specific standard rules for the evaluation of geothermal projects for licensing (including environmental and social aspects), which addresses some other risks that are considered important inputs for investment decision making. Also, Colombia has begun to promote the use of non-conventional energy sources in general. In May 2014, Colombia passed the Law 1715, which fosters the development and use of non-conventional energy sources in the national energy system, by integrating them to the electricity market through investment incentives (tax and value-added tax exclusions, income and accelerated amortization profile). However, specific regulation such as defined concession areas for geothermal –which would avert the risk of free riders exploiting the same area– do not exist, and proper policy and institutional changes still need to be made in order to attract international and local investors at a larger scale and achieve full potential for geothermal in Colombia.[16] Despite its incipient stage, relevant local players in the energy sector have demonstrated their willingness to invest in this technology, therefore contributing to the development of a competitive geothermal market in Colombia and benefiting from the gains of becoming first comers in this emerging and profitable business.

[16] Although not absolutely necessary, offering geothermal concessions for private development can reduce regulatory risk significantly, provided that government institutions in charge of granting them are capable and credible. Countries in the region that have established these concessional regimes include Chile, Peru and, most recently, Mexico.

In particular, specific areas in the current regulatory and policy framework that need to be addressed in order to promote investment in geothermal energy are: (i) geothermal licensing terms of reference following international best practice; (ii) a geothermal master plan identifying future demand of the geothermal resource and associated economic, infrastructure and social demands in order to manage the geothermal resource in medium and long term; and (iii) a complete review to update the geothermal regulatory framework in Colombia. See ¶2.5 for more information regarding the actions related to regulatory support in the technical assistance component of this operation.

1.10 **Financing geothermal investments.** From a financial perspective, a successfully deployed geothermal power plant can have significant long-term benefits. However, for an investor or developer –public or private–, geothermal power generation is a high risk-high return venture, of a much more complex financial nature than the one associated to other RE. These projects entail substantial risk related to finding and developing the geothermal resource, mainly at the initial stages of a project, implying extremely high value at risk. Any greenfield geothermal power project requires:

a. **Relatively long lead time to discover, confirm, and develop the resource.** Geothermal resources require exploration activities, but unlike oil and gas, once it is discovered, it cannot generate a return on investment until a suitable power plant is constructed. The duration of the entire process is approximately five to seven years before any revenue can be realized (two to five years to discover the reservoir, develop the field and carry out the drilling program and an estimated of two additional years to build the plant and begin operations).

b. **High upfront capital for the drilling and exploration phases, where most of the risk is undertaken.** Significant financial commitment needs to be made before the characteristics of the resource can be fully known. Although vast information about subsurface conditions can improve significantly the odds of success in initial exploratory wells at a relatively low cost (via a combination of geological, geochemical and geophysical surface surveys), yet approximately 35% to 40% of the total capital costs of an average geothermal power project needs to be invested in well field exploration (actual drilling) until deep wells penetrate the geothermal reservoir and resource uncertainty and risk is overcome.[17]

1.11 The risks described have an adverse impact on the willingness to finance these projects. In a great part, the financial constraint explains why this technology remains largely underdeveloped. Even when project bankability increases after resource risk is dissipated, debt financing is typically unavailable during the early

[17] Furthermore, costs for each development vary significantly, as they depend on specific characteristics of the resource, location, drilling markets, size of the project, and type of plant (dry steam, flash, binary), imposing added uncertainty on ex ante cost estimations. A single well may cost between US$1 million and US$7 million (International Finance Corporation (IFC), 2013) depending on the geographic location and local geology. In Colombia, geophysical conditions can lead to exploration costs higher than in other parts of the world, thus increasing financial risk aversion and making the resource risk even more critical to tackle through public policy intervention.

stages of the project (in general, industry experts estimate that around 50% of investment has to be made prior to accessing typical debt funding), increasing the need to rely on more costly options such as equity capital (Geothermal Energy Association (GEA), 2014). Private sector developers would either self-finance or enter into a partnership to share the drilling risk among multiple parties. But even well-capitalized, geothermal-focused developers may struggle to internally justify greenfield projects, and only those capable of diversifying risk and absorbing the losses can carry out these projects from such an early stage. On the other hand, equity partnerships or joint ventures require alternative structures if debt finance is to be used (i.e. project finance), which makes projects riskier from a financier's perspective.

1.12 Global trends in RE investment show a positive, although relatively slow, evolution of new investment in geothermal, growing 8% over the last decade (wind and solar grew 21% and 28% in that same period, respectively). Despite its growth, levels remain small and significantly below all other RE technologies, except for marine RE. There are virtually no financing vehicles available for funding geothermal. Solar energy still dominates project bond issuance worldwide, and institutional investors face barriers in –or simply lack appetite for– the RE market as a whole, due mainly to policy context, financial regulation and limited knowledge of the clean energy sector (United Nations Environment Programme (UNEP), 2014).

2. Problem addressed and intervention proposed

1.13 The diagnosis described above identifies the broad aspects affecting the pace of development of geothermal power production in Colombia (see ¶1.7-1.12). The lack of regulation and relatively low technical capacity at a local level pose important issues and uncertainties that slow down geothermal progress. The consolidation of local expertise will only be attained in the long term, once there is reasonable scale in the market so that it makes sense to invest in proper domestic training and research centers. In the meantime, outsourcing this expertise remains a much more viable and efficient alternative, as has been the case in other countries developing this technology with relative success. In terms of regulation, substantial efforts are still needed to improve general issues and enforce the development of rules particular to this technology. The Bank has already been providing support to Colombia in this sector. Resources have been provided for institutional strengthening and development of technical capacity at the local level.[18] However, even if these ongoing efforts were to overcome every technical and legal issue, the absence of financial mechanisms for geothermal projects will continue to deter investment. With this in mind, the proposed program will focus on overcoming the financial problems that affect the development of these projects.

1.14 The characteristics described in ¶1.10 result in the inexistence of financing options for developers, especially in the early stages. Moreover, lack of

[18] This includes equipment for exploration, communication and dissemination activities, trainings, workshops, participation in seminars and international conferences, etc. See *Emprendimiento de la energía geotérmica en Colombia, Marzolf, Natacha C.,* Inter-American Development Bank (IDB). See also operation CO-X1009 (ATN/FM-12805-CO and ATN/FM-12825-CO) described in ¶1.22.

knowledge and the absence of a performance record negatively affect investors and financiers in more subtle and permanent ways. Financing is of course dependent on a "bankable" geothermal reservoir, but financial institutions lack the expertise and knowledge to understand the financial economics of geothermal technologies. This affects negatively the banking system capacity to evaluate the feasibility of geothermal projects. Taking into consideration also the lack of available technical capacity to explore and assess geothermal resources, risk is often perceived as unbearable even after discovery of resource. Hence, financing is unavailable and developments rely exclusively on scarce and expensive capital resources, slowing down or precluding investment in the sector until the construction and operation phase is imminent. Logically, all these effects are stronger in countries, such as Colombia, with potential but without any geothermal field developed.

1.15 These are the reasons why geothermal power has been developed worldwide with public sector backing of one type or another.[19] The Geothermal Exploration Best Practices (International Geothermal Association (IGA), 2013) report presents a number of alternatives for its development. The option of a public sector company is among the most popular (Indonesia, Philippines, among the largest producers) and was extremely successful in the past in countries such as Mexico. However, due mainly to fiscal restrictions, it is likely that governments with the capacity to develop this technology end up underinvesting in geothermal, vis-a-vis fossil fuel plants with shorter lead times and higher returns, leaving its potential widely untapped.

1.16 There is consensus on the need for financial support to develop geothermal power generation. The International Energy Agency (IEA) suggests the development of financial instruments to promote geothermal exploration (by governments, development banks and commercial banks) among their recommendations for market facilitation and transformation of the sector (Technology Roadmap for Geothermal Heat and Power, 2011). The lack of risk mitigation and financing mechanisms is often credited for holding back projects in emerging economies (Global Geothermal Development Plan (GGDP) Roundtable 2013, Climate Policy Initiative (CPI) Geothermal Dialogue 2014 and 2015). Development banks have increasingly become an important source of clean energy investments over the last decade (Frankfurt School - UNEP, 2014), and virtually all geothermal projects recently developed or underway in developing countries have benefitted from the involvement of development banks. Private finance for both debt and equity, if available, is particularly prevalent only in developed markets such as the United States of America and New Zealand (CPI, 2014).

1.17 If properly devised, a risk mitigation instrument with clear and specific rules that govern its functionality should encourage investment flows into the Colombian market, contributing to an increase in the quality and supply of clean energy and to improve operating efficiency of the national electric system.

[19] According to CPI, 76% to 90% of geothermal project investments utilize some public debt or equity support. See also *Experiencia internacional en la mitigación del riesgo y desarrollo de la energía geotérmica*. GeothermEx for the World Bank, June 2010.

1.18 **Proposed intervention.** The risk levels inherent to each phase of a geothermal development decrease over time as the project advances. Consistently, risks at the early resource identification and exploratory drilling phases are seen as the biggest barriers to obtaining financing. But much of the current public support remains confined to either the pre-development phase (i.e. preliminary surveys and surface exploration) or the operational phase of the project (CPI, 2014), leaving an important gap in the riskier portion of project development.

1.19 Under the scheme proposed, the program will provide a risk sharing instrument that will support the financing of early drilling stages of geothermal projects,[20] in order to increase debt and equity financing for geothermal developers. As part of a set of proposed activities, the program will also aim to provide technical assistance in order to improve project execution enhancing the technical capacities of the executing agency and accompany government actions to promote the acceleration of regulatory reforms that will enable a more attractive environment for these investments (e.g. the provision of inputs for the preparation of draft rules and procedures associated to overcoming some of the development risks).

1.20 **Magnitude of resources needed.** Worldwide, geothermal investment costs are in the range of US$2 million and US$4 million per MW for a condensing flash plant and between US$2.4 million and US$5.9 million per MW for a binary plant (IEA).[21] Smaller plants can be more costly because of the lack of economies of scale in drilling. A long term analysis carried out by the *Unidad de Planeación Minero Energética* (UPME) includes projections of different scenarios for expansion of Colombia's energy system. Taking into consideration the recently approved law for incentives to non-conventional RE (see ¶1.9), scenarios of expansion, considering all Non-Conventional Renewable Energy (NCRE), include between 275MW and 375MW of new geothermal capacity added to the system by 2030. Based on these projections, the total investment in geothermal needed for this expansion would reach up to US$1,500 million over the medium to long term.[22] Program resources will be used to maximize leverage of additional private and public funds. Expected investments to be mobilized by the program

[20] The Geothermal Handbook (ESMAP, 2013) provides a good recount on evidence of exemplary models of support for geothermal development. In Iceland, a government funded insurance scheme for geothermal drilling proved to be critical to the development of geothermal in the country (currently representing 25% of its total electricity production). France and Germany have also established risk insurance funds (providing one-off guarantees or combining them with project financing via credit); despite their lack of resources, they are currently the countries with the 5th and 6th largest geothermal capacity in Europe (GEOELEC, 2013). In the 80s, the US Federal Government agreed to guarantee the value of loans taken by private geothermal companies (up to 80%) for well/field development and plant construction, effectively increasing their ability to raise money via credit at lower costs. The government also promoted an insurance scheme, which did not take off commercially, presumably due to high cost of premiums (GeothermEx, 2010). This proposal takes on all these experiences in the design and operation of geothermal funds in Europe and the United States, as well as some recently implemented programs in Central Asia and Africa, and uses their valuable lessons to better structure the financial mechanisms proposed.

[21] Total costs per MW include: Preliminary surveys and exploration (2.5% of total costs); test drillings and feasibility studies (12.5%); drillings (35.5%); plant construction (38.5%); steam gathering system and substation (8.5%); start up and commissioning (2.5%). Source: ESMAP, 2014.

are around US$200 million, which would represent a contribution of some 13% to total country geothermal investment needs by 2030.

1.21 **Strategic alignment.** The program is consistent with the Update to the Institutional Strategy (UIS) 2010-2020 (AB-3008) and is aligned with the development challenge of: (i) productivity and innovation, directly, by promoting and supporting the use of modern, efficient, and sustainable technologies for energy generation. The program is also aligned with the cross-cutting theme of climate change and environmental sustainability, directly**,** given that it results in investments in sustainable energy and other sustainable practices that mitigate climate change. It is also aligned to the regional context indicators of Greenhouse gas emissions (reducing CO_2 emissions per US$1 Gross Domestic Product (GDP)), and to the country development result indicator of reduction of emissions with support of IDBG financing (annual millions tons CO2 e), and the output of installed power generation from renewable energy sources. The program is also consistent with the IDB Country Strategy with Colombia 2015-2018 (GN-2832) on its strategic areas of: (i) climate change and its objective of strengthen the resilience of infrastructure to climate change; and (ii) increase economic productivity, specifically with its objective of spur innovation and development in business and agriculture and its expected result of expand private sector access to credit. The program is also aligned with the IDB strategic priorities stated in the IDB Infrastructure Strategy (GN-2710-5) and the Support to SMEs and Financial Access / Supervision Sector Framework Document (GN-2768-3) by developing risk-management instruments, and by facilitating finance of long-term projects.

1.22 **Lessons learned.** The Bank's previous experience in the development of financing solutions for clean energy projects via public development banks has proven viable and effective with a number of operations, not only in Colombia but also in Mexico and Uruguay.[23] All of these had objectives related to the support of private sector investment in clean power generation and energy efficiency, with strong focus on maximizing the leverage of public and donor resources used. Lessons learned from these operations applied in this program are: (i) the importance of providing technical support to the executing agency for improving subproject evaluation; and (ii) the allocation of funds and efforts to guarantee projects compliance with environmental and social international standards. In the geothermal area, the program capitalizes on IDB's particular experience in Mexico (see 3178/OC-ME and 3179/TT-ME, and GRT/TC-14423-ME and GRT/TC-14424-ME), as well as on the work initiated in 2011 in Colombia in terms of RE regulation, geothermal resource identification and exploration and development strategies (CO-X1009 (ATN/FM-12805-CO and ATN/FM-12825-CO). The latter work contributed significantly to building capacity in important geothermal developers in the country. Important lessons derived from all these projects are applied in the operating rules of the program, regarding the technical, financial and legal requirement of the projects.

[23] See the execution of the CCLIP ME-X1010 with *Nacional Financiera* in Mexico. In Uruguay see operation 3396/OC-UR.

B. Objectives, Components and Cost

1.23 The objective of the program is to scale up investment in geothermal power generation projects by making available a financial mechanism tailored to meet the specific needs of a project's earliest development stages, specifically at the exploration phase. To this end, the program intends to trigger power production from geothermal sources, thus contributing to the reduction of global GHG emissions and the diversification of Colombia's energy matrix.

1.24 The program will channel resources through the *Banco de Comercio Exterior de Colombia S.A.* (Bancóldex). Bancóldex will act as the fiduciary manager of a Contingent Recovery Grant (CRG) facility created to insure geothermal developers against resource risk. The program will be implemented through two components:

1.25 **Component I - CRG Facility for Risk Mitigation (US$9.33 million).** Under this component, the program's resources will be used to support the establishment of a contingent recovery grant scheme to be managed by Bancóldex in order to mitigate the risks associated with the initial stages (i.e. drilling) of exploitation of geothermal energy projects[24]. In the case of an unsuccessful drilling, the grant will be transferred to the private developer itself or to a financial intermediary institutions (including Bancóldex) that provided the financing for the drilling phase. This grant will be provided exclusively for the resource risk prevailing in the early stages of the projects, where the aforementioned risks are higher and inhibit investment. Support for initial surface exploration phases (geothermal resource studies, field surveys and detailed geothermal exploration surveys) is not included in this component, as these can generally be financed by the eligible beneficiaries (i.e. developers). The operating mechanism of the CRG facility shall be as follows: (i) in case of unsuccessful drilling at the initial stage (i.e. existence of geothermal resource is not confirmed in pre-defined levels of quality and quantity), program's resources will be used to partially reimburse the developers for the incurred costs in the drilling phase or the amount of the credit component of the funding incurred by the developer for drilling; and (ii) in case of successful drilling, the committed resources will be released so that they can be used to benefit new exploration projects. By mitigating the financial risks in the early drilling stages, this component aims to contribute to overcoming initial geothermal reservoir risks and enabling projects to advance towards subsequent phases of development.[25] If successful, it is expected that private developers will continue to invest in the geothermal energy facility construction and set up phases in order to fully exploit the resource. At this stage the project is more bankable and financial intermediaries will be more prone to provide the financing required for this investment since the major risk (resource risk) is out of the table, the project is well advanced (around 30% of total investment is already undertaken), and tangible revenues are expected in two or three years. It is in this sense that the project, setting up an instrument to manage the resource risk,

[24] Early stage refers to first exploration wells drilled, after significant knowledge of the geothermal resource has been attained through geological surveys. Developer must present due diligence of surface studies and have them certified by an independent consultant in order to be eligible.

[25] Even when a first well is not successful, the information gathered from this process provides a basis for understanding the reason for failure, thus improving the probability of success on subsequent wells.

seeks to mobilize the resources needed to finance at least one geothermal plan of 50 MW with an estimated cost of US$200 million. If needed, grants may be used to partially cover insurance and insured loans premiums and rates.[26] The specific procedures, amounts to be covered, conditions and requirements for the operations (including technical, regulatory and financial criteria for accessing the CRG facility), the eligibility criteria for the participating Financial Intermediaries (FI), and criteria for eligible projects are described in the Operating Regulations (OR) of the program. These criteria will establish the legal, financial, environmental and technical requisites of each individual subproject. Such criteria and conditions will be consistent with Bank policies and procedures, (including environmental and social standards and the ESMS). Following these criteria, the Bank will have to provide a previous non-objection for any disbursement undertaken by the executing agency (Bancóldex) to the program beneficiaries. In order to grant the non-objection the Bank will take into consideration the expert opinion regarding environmental and social standards and other important technical and legal aspects (see ¶1.27 and ¶ 3.3).

1.26 **Component II. Implementation and technical assistance activities. (US$0.2 million).** Program execution will benefit from the technical assistance directed to key activities of the program. This component will be executed by the Bank and funded with US$200,000 and will provide technical support to manage the major project risks further described in ¶2.3 and ¶2.5. This component entails two subcomponents: Subcomponent II.1 will focus in improving subproject evaluation and surveillance. The activities under this subcomponent will provide a credible mechanism for proper technical implementation. In this regard, resources will be used to: (i) finance an independent third party to provide expert advice to Bancóldex in order to evaluate the technical requirements of each project, as well as to provide independent verification services of the success and failure on the drillings and arbitrage services if needed; and (ii) analyze the environmental and social impact of the projects in order to attend potential gaps between the projects assessment and required international standards. Subcomponent II.2 will provide the national authorities with technical support to update the required regulation, including legal comparative studies, drafting regulatory proposals, and training agencies personnel on geothermal project evaluation. These resources will help guarantee a sound and efficient program, while also ensuring local capacity building regarding geothermal power projects financial assessment (see ¶1.27 and ¶3.3). For more information see Procurement Plan.

1.27 **Beneficiaries.** The intended beneficiaries of the program will be developers of geothermal projects. Public or private firms, as well as Public-Private Partnerships (PPP) will be eligible as beneficiaries. The program will seek to build a model that assures competitive practices and maximizes return on the public sector accumulated assets (i.e. know how, studies, land permits). Due to the high technical requirements of geothermal generation and the lack of

[26] Since there is little information available for actuarial calculations at the initial exploration drilling stage, recently developed risk insurance schemes for geothermal wells are being implemented only for later drilling stages, after the resource has been discovered and confirmed. In order to bring the insurance market to earlier stages of geothermal exploration, the program will study the possibility to cover part of the insurance premium.

previous experience in Colombia, it is expected that the initial beneficiaries and developers of geothermal energy in the country will be big private or public firms. Based on the amount of resources available, a very limited number of projects may benefit from the program, though its design will seek to maximize its impact in terms of number of ventures.[27] Projects eligibility will be determined by Bancóldex and the Bank, based on technical reports, according to a pre-established set of criteria and conditions to be specified in the program's OR (see ¶3.3). In addition, Colombian population will indirectly benefit from positive externalities associated with the environmental and economic impacts of the program.

C. Key Results Indicators

1.28 At the output level, the indicators that will be measured are: (i) number of geothermal power projects covered by the program; and (ii) number of studies carried out by independent consultants. The outcome indicators of the projects are: (i) geothermal power generation by projects covered by the program; (ii) quantity of GHG emissions avoided through the use of geothermal energy of projects covered by the program; and (iii) level of additional financing raised by the projects covered by the program.[28] At the impact level, indicators are: (i) GHG emissions in Colombia's energy sector; and (ii) contribution of geothermal power to non-conventional energy sources. These indicators include the Clean Technology Fund (CTF) core indicators regarding GHC emissions avoidance and additional financing (see more details in Annex II).

1.29 The proposed program seeks a transformational intervention by building a track record of geothermal projects and providing the possibility to replicate successful outcomes in other countries in the region and the world. The program also has a multiplier effect, as it is designed to optimize the use of funding available in terms of leverage and sustainability. Continuing these efforts should allow for the development of a permanent support framework in the long term, after demonstration of the benefits of investing in geothermal has permeated the economy. Moreover, in the scenario where the insurance industry would evolve into building risk management instruments that make sense for geothermal technologies, the proposed program could contribute to improve data on historical loss patterns and technical information that could help facilitate the development of solutions for geothermal energy projects in the long term.

1.30 **Economic evaluation.** The proposed program is expected to rise financing for some 50MW of new geothermal capacity in the long term, which could lead to emissions savings of around 77,394 tCO_2 (ton of Carbon Dioxide) per year. Based on estimated reductions of CO_2 emissions over the course of a 30 year lifetime of projects financed, the cost of abatement is estimated at:

[27] The actual beneficiaries of grant resources shall not be pre-defined. Given its magnitude, it is expected that program resources would be sufficient to support at least two geothermal exploration projects, with the successful development of at least one geothermal plant in the country (based on the assumption of a conservative probability of resource success of 50% and the identified potential demand), as well as to develop the financial and technical capabilities to further encourage geothermal exploration and development in the country.

[28] In addition, the project will have the following milestone: Installed capacity of geothermal power of projects covered by the program.

(i) US$4.31 per tCO_2e considering CTF financing; and (ii) US$86.14 when all project investment costs (including all public and private funds leveraged) are considered[29] (see Economic Analysis). The cost benefit analysis of the program compares the net benefits of the geothermal project and compares it to the net benefits of a counterfactual scenario without project. The value of averted CO_2 emissions by the geothermal plant is contemplated as a benefit in the analysis. The Net Present Value (NPV) of the program is US$45.54 and is calculated using a 12% discount rate. A sensitivity analysis is further performed by stressing some important variables such as load factors, investment costs, construction times and price of electricity.

II. FINANCING STRUCTURE AND MAIN RISKS

A. Financing Instruments

2.1 The CTF provides scaled-up financing for public and private sector projects that contribute to the demonstration, deployment, and transfer of low-carbon technologies with significant potential for GHG emissions reduction. Investments for the promotion of RE, sustainable transport and energy efficiency are eligible under the CTF. In addition, CTF resources may be used for the financing of projects with very high additional costs or with significant risks. Resources from the CTF are transferred to the Bank, acting as implementing agency, under a Financial Procedures Agreement and are administered by the Bank in a trust fund created within its organizational structure (IDB-CTF Trust Fund). In October 2013, the Trust Fund Committee approved funding to be deployed for Dedicated Private Sector Programs (DPSP). Under the DPSP, a utility-scale RE program proposes to focus initially on geothermal energy and more specifically on addressing the geothermal resource risk through well drillings. Consistent with CTF practice, DPSP is intended to make use of a range of financing instruments taking risks that commercial lenders are not able to bear. An initial US$115 million were assigned to existing CTF countries, namely Chile, Colombia, Turkey, and Mexico.

2.2 The program will be financed with resources from the CTF on a nonreimbursable basis. Resources will finance Components I and II (see ¶1.25-¶1.26) for a total amount of US$9.53 million. Bancóldex will use these resources to mitigate the risk of the initial stages of geothermal projects under conditions and criteria established in the program's OR. In addition**,** the Multilateral Development Bank (MDB) fees on the CTF grant resources (administrated by the Bank) could be used to finance additional technical evaluation of projects as needed. MDB fees will be up to US$470,000.

[29] These abatement costs are well within the range of the CTF (US$200 per tCO_2e) and to that extent, are proof of the cost effectiveness of the program. The threshold of cost-effectiveness was established for projects/programs in the CTF investment criteria with a view to maximizing the impact of the limited resources.

B. Environmental and Social Safeguard Risks

2.3 **Environmental and social risks.** According to Directive B.13 of the Environment and Safeguards Compliance Policy (OP-703), this program does not require classification. However, some geothermal projects (including initial drilling) are considered high-risk and can have adverse environmental or social impacts that can be significant, and which need to be assessed and managed on a project by project basis. Per IDB Policy, Bancóldex will apply an Environmental and Social Management System to identify and manage potential risks. Consistent with other operations with high risk geothermal sub-projects, the operation will use the Environmental and Social Management System (ESMS)[30] that will be part of the OR and it will enable the identification of potential impacts and risks and ensure that the beneficiaries of the program will implement environmental and social assessment, prevention, mitigation and management measures consistent with Bank safeguard policies. Component II of this program also includes technical assistance funds to deal with potential gaps between the environmental and social impact studies of the projects and international best practices. IDB ESG will assist the consultants and Bancóldex in ensuring compliance with IDB Safeguards. Bancóldex shows a strong institutional capacity in the management of environmental and social risks, with a full-fledged environmental and social management system designed and implemented with the technical assistance of the Bank. Bancóldex is among the most advanced financial institutions in the region in the management of environmental and social risks for second-tier banking activities. The Bank holds regular meetings with Bancóldex officials that ensure knowledge sharing of best practices, particularly in mitigating ESG risk and implementing the technical cooperation action necessary to deal with development risks and to build a regulatory framework to sustain geothermal investment in the medium term.

C. Fiduciary Risk

2.4 Bancóldex has experience in the implementation of programs with resources financed by the Bank and has shown since 2008 capacity as Executing Agency through several programs –loan 2080/OC-CO for US$100 million and loan 2193/OC-CO for US$200 million– funded under the CCLIP CO-X1007 approved in 2008 for US$650 million. Bancóldex is currently executing loan 2949/OC-CO for US$200 million, loan 2983/TC-CO for US$10 million and loan 3003/TC-CO for US$40 million; and has sufficient capacity to perform activities of financial management and administration of the resources of this operation. The fiduciary risk is low (see more details in Annex III). In order to strengthen the capacity of Bancóldex to manage geothermal projects, an independent expert will be hired to assist Bancóldex in the task of evaluating geothermal projects and structuring the agreements between the CRG facility and the developers (see Component II of the program in ¶1.26).

[30] Following examples of previous experiences of similar projects - specifically, loan 3178/OC-ME currently in execution in Mexico by *Nacional Financiera* (NAFIN), a Mexican development bank.

D. Other Key Issues and Risks

2.5 **Development risks.** The program identifies a high risk in the lack of clear and specific regulatory framework for geothermal energy exploration licensing procedure. The lack of specific geothermal regulation and of licensing experience by the national authorities makes the concession of exploration and exploitation permits more time intensive and uncertain. This may result in important delays and, thus, will not be eligible for the resources granted under Component I. In order to mitigate this risk, the Bank's program team will ensure a strong policy dialogue with relevant authorities in order to detect any technical or regulatory bottlenecks as early as possible. At the same time, specific technical cooperation funds are comprehended in this proposal that will be used to assist authorities in building the technical capacity or the specific regulations needed to evaluate geothermal energy development proposals. The Bank also has important experience in the design and implementation of geothermal projects and, in particular, those related to social and environmental safeguards (see ¶1.22). There is also a high development risk of having limited or insufficient human capacity (specific geothermal technical expertise) to accompany the development of projects supported. Several aspects are considered for mitigating this risk, including overseeing with Bancóldex the proper implementation of quality standards by providing technical advisors to assist in each participating project, engaging the Bank's own Center for Geothermal Training in El Salvador, and using existing certified international knowledge and ensuring transfer from third party technical expertise to develop local competencies.

2.6 The capabilities developed by Bancóldex, as well as in other financial intermediaries involved in financing geothermal energy, will constitute an asset for future potential geothermal developments in Colombia. Bancóldex will develop: (i) technical capabilities related to geothermal program management and risk evaluation, mitigation and supervision; and (ii) managerial capabilities to coordinate the multiple actors involved in geothermal power generation (developers, financial institutions, regulators and technical advisors). These capabilities will constitute a solid basis that national authorities and international organizations could use in order to undertake new programs to develop non-conventional sources of energy in Colombia.

III. Implementation and Management Plan

A. Summary of Implementation Arrangements

3.1 The beneficiary of the investment grant and the Executing Agency (EA) of the program will be Bancóldex, a well reputed national credit institution with ample experience in finance structuring and fiduciary management. (See Institutional information of Bancóldex). The EA has available the necessary administrative, fiduciary and control mechanisms to provide and to maintain a transparent and effective administration of the program, including the financing of the guarantees (see Annex III). Bancóldex as an EA will allow: (i) enhancement of management and operational synergies between the CRG and the credit provided either by Bancóldex or the eligible financial intermediaries; (ii) use of financial techniques

in structuring the pricing of the CRG facility, as well as the insurance instrument, if applicable; and (iii) improvement of financial risk analysis of geothermal projects in Bancóldex and the eligible FI involved. Previous works with Bancóldex, along with technical assistance from the Bank to strengthen their institutional and financial capacity, makes them a suitable partner with strong will to continue working and evolving in the sector of clean energy. The program also builds upon a strong coordination with the energy authorities, especially the UPME and the Ministry of Energy.

3.2 Bancóldex will implement the program under its current organizational structure. The provisions governing program execution, FIs' participation, and eligibility of each project to be granted access to the use of funds from the program, will be established in the OR agreed between the Bank and Bancóldex, in accordance with their standards and policies, local laws, and Colombia's financial industry practice. Bancóldex will be responsible of supervising the adequate use of program financial resources and of the timely provision of human and technical resources necessary to implement the program. The program will apply the standard procedures established by the Bank for monitoring and evaluation of investment operations, but will also be consistent with reporting obligations to the CTF.

3.3 The OR of the program will define the specific process, timing and requirements for the exploration projects to access resources under Component I. To be eligible, projects shall comply, among other requirements, with the following: (i) regulatory requirements, particularly exploration permits assigned by the responsible authority under the national applicable law for the use of the geothermal resource –in the case of Colombia, regulatory requirements include a complete Environmental Impact Assessment (EIA);[31] (ii) economic requirements, economic sustainability plan of the project, including estimated financing sources and costs; (iii) the environmental and safeguard requirement of the IDB, as well as the requirements of the ESMR; and (iv) technical requirements established by the CTF. This means to comply with all the technical pre-feasibility and feasibility studies on which the assumed exploitable potential of the reservoir is funded. The studies will include economic potential, infrastructure availability and geophysical, geochemical and geological studies. The aim of the technical requirements is to guarantee that there is real economic potential for a given project, as well as to reduce the risk of allocating funds to less viable projects, in order to maximize the use of resources under Component I. Financial requirements will be used as an element of competition and prioritization among different potential interested parties in the use of the CRG facility, as well as an upside benefit for the CTF fund. These rules will not alter the optimal financial decision from the project developer standpoint and their main purpose is to maximize the financial potential of the CRG facility. The financial elements may be centered in the asking price and/or the degree of equity and debt financing leveraged by the use of the grant facility. The price for the use of the CRG facility fund will be related to project risk. This is a clear potential upside for the CTF resources, maximizing their potential use for future geothermal projects, and aligning incentives between developers and the guarantee fund. At the same

[31] The Bank's Environmental Safeguards Unit will validate that the corresponding EIA meets IFC international standards.

time, eligibility will be limited to projects that provide technical information supporting that resource drilling risk is below 50%.

3.4 An agreement between Bancóldex and each eligible project beneficiary will provide the precise terms and conditions of the coverage in terms of geological parameters (temperature, flow rate, fluid chemistry and others), upon which the success or failure of the drilling activities are to be measured in a quantifiable manner, and upon which the amount of the grant resources will be determined. The agreement will only cover resource risk (not drilling, construction or other risks).[32] The Bank will provide support to Bancóldex in calling for expressions of interest and select a portfolio of eligible projects. There will be no targets for the proportion of resources that has to be disbursed under a specific financing alternative, which allows both Bancóldex and developers to opt for the alternative best suited to their financing needs. The deployment of this scheme is intended to distribute the risk associated with the use of resources between developers, donors, the government and the private sector (financiers, insurance companies, etc.) and across as much investments as possible, so as to maximize the impact of the use of concessional resources.

3.5 **Disbursements, execution and administration framework.** The execution period and the disbursement period will be ten years. This execution period will permit two important objectives: (i) monitor and evaluate the expected results and impacts of the program that, because of the inherent characteristics of geothermal exploration, require a long-term evaluation framework (see ¶1.28); and (ii) allow for the development of several projects in case the first covered drillings have been successful. Bancóldex will receive the resources in a special bank account (designated account) in US$ dollars. The Bank will disburse program resources in the form of advances of funds to the designated account, based on the liquidity needed by Bancóldex for program implementation. At the end of the disbursement period, any unused resources will be returned to the CTF. Given the nature and characteristics of the program, disbursements will be made subject to the signature and effectiveness of the corresponding CRG agreement to be entered into between Bancóldex and each of the corresponding beneficiaries of the program. Bancóldex may justify the payment to the IDB at the time the payment/reimbursement to the beneficiary under the CRG agreement is made. **It is a special contractual condition that prior to the first disbursement of the grant resources Bancóldex should provide evidence, to the Bank's satisfaction that: (i) the program coordinator has been appointed, in accordance with the terms of references previously agreed upon the Bank; and (ii) the program's OR has been approved and entered into effect, in accordance with the terms and conditions previously agreed upon with the Bank.**

3.6 **Financial statements.** The execution of resources and the eligibility of program expenditures will be audited annually by an independent auditing firm acceptable

[32] The CRG may be applied to a single well exploration or an agreed number of first exploration wells drilled by the private or public developer. In the latter case, the criterion for triggering the coverage would be the performance of the whole portfolio against a benchmark. This approach has the advantage that the CRG does not need to be called upon if dry wells are compensated for by highly productive wells and that the coverage cost per project is lower.

to the Bank, which will be contracted by Bancóldex. The auditing firm may be the same firm to audit the financial statements of Bancóldex.

3.7 **Procurement of goods and services.** Procurement actions will follow current Bank policies as set forth in the Policies for the Procurement of Works and Goods Financed by the IDB (document GN-2349-9) and the Policies for the Selection and Contracting of Consultants Financed by the IDB (document GN-2350-9). Since Component I of the program is mainly a financial intermediation activity, the program's Procurement Plan will only incorporate activities under Component II (see Annex III). The Bank will be responsible for the hiring of the specialists for the execution of the program activities under component II, upon request of the executing agency, and in accordance with the Bank's policies and procedures.

B. Summary of Arrangements for Monitoring Results

3.8 The program will apply the standard procedures established by the Bank for monitoring and evaluation of investment operations, but will also be consistent with reporting obligations to the CTF. The evolution of indicators should be periodically reported by Bancóldex to the Bank during program execution. Upon completion of the program, Bancóldex will prepare a final evaluation report

3.9 **Monitoring and reporting.** In accordance with legal obligations of record keeping, Bancóldex will compile, produce and maintain all information, indicators and parameters, including annual plans, midterm review and final evaluation, necessary for the preparation of the Project Completion Report (to be prepared 9 months before the last disbursement date) and any ex post assessment the Bank or the CTF may wish to conduct.

3.10 **Evaluation.** The evaluation plan considers a cost-benefit ex post methodology. Due to the scale and scope of the intervention, considered as one of many elements that will contribute to the long-term development of the geothermal sector in Colombia, the proposal is not able to present a thorough evaluation on the specific impact of the risk mitigation instrument proposed by the program on the structural indicators of the sector. This would require much more information which is not accessible –or non-existent–, as well as controlling for a series of variables that are out of the scope of the program (see Monitoring and Evaluation Arrangements).

Development Effectiveness Matrix			
Summary			
I. Strategic Alignment			
1. IDB Strategic Development Objectives	**Aligned**		
Development Challenges & Cross-cutting Themes	**-Productivity and Innovation -Climate Change and Environmental Sustainability**		
Regional Context Indicators	**-Greenhouse gas emissions (kg of CO2 e per $1 GDP (PPP))**		
Country Development Results Indicators	**-Reduction of emissions with support of IDBG financing (annual million tons CO2 e) -Installed power generation from renewable energy sources (%)**		
2. Country Strategy Development Objectives	**Aligned**		
Country Strategy Results Matrix	**GN-2832**	**i) Spur innovation and development in business and agriculture, and ii) Strengthen the resilience of infrastructure to climate change.**	
Country Program Results Matrix		**The intervention is not included in the 2016 Operational Program.**	
Relevance of this project to country development challenges (If not aligned to country strategy or country program)			
II. Development Outcomes - Evaluability	**Evaluable**	**Weight**	**Maximum Score**
	8.3		**10**
3. Evidence-based Assessment & Solution	**7.8**	**33.33%**	**10**
3.1 Program Diagnosis	**2.4**		
3.2 Proposed Interventions or Solutions	**2.4**		
3.3 Results Matrix Quality	**3.0**		
4. Ex ante Economic Analysis	**10.0**	**33.33%**	**10**
4.1 The program has an ERR/NPV, a Cost-Effectiveness Analysis or a General Economic Analysis	**4.0**		
4.2 Identified and Quantified Benefits	**1.5**		
4.3 Identified and Quantified Costs	**1.5**		
4.4 Reasonable Assumptions	**1.5**		
4.5 Sensitivity Analysis	**1.5**		
5. Monitoring and Evaluation	**7.1**	**33.33%**	**10**
5.1 Monitoring Mechanisms	**2.5**		
5.2 Evaluation Plan	**4.6**		
III. Risks & Mitigation Monitoring Matrix			
Overall risks rate = magnitude of risks*likelihood	**High**		
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:			
Gender Equality			
Labor			
Environment			
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	**Yes**	**CO-X1009 was aimed to reduce the regulatory and institutional barriers for geothermal development in Colombia.**	
The ex-post impact evaluation of the project will produce evidence to close knowledge gaps in the sector that were identified in the project document and/or in the evaluation plan			

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

The objective of the program is to scale up investment in geothermal power generation projects in Colombia by making available a financial mechanism tailored to meet the specific needs of a project's earliest development stages. The program intends to contribute in the reduction of global Greenhouse Gas (GHG) emissions and the diversification of Colombia's energy matrix. The program contributes to IDB's strategic development objectives and to Colombia's recently approved country strategy.

Although geothermal energy is clean and stable, operators do not invest in this technology due to the high risks during the exploration stage, and the lack of access to bank financing. The vertical logic of the project suggests that providing credit guarantees would allow operators to access credit, leverage funds, and ultimately complete Colombia's 1st geothermal plant. The program is ambitious; it is expected that a US$ 10MM grant will leverage US$190 MM.

The methodology for the ex ante economic analysis is technically solid. It is assumed that without the project, a representative plant would be built, which mimics Colombia's energy matrix (70% hydro and 30% gas and coal). The benefits from investing in geothermal energy arise from lower operating costs, a higher load factor than the representative plant, and the reduction in GHG emissions. The Net Present Value (NPV) of the project is US$45.54 MM (using a 12% discount rate). The sensitivity analysis stressed load factors, investment costs, construction times, and the price of electricity. The NPV turns negative if the investment costs increase over 33%, or if the construction time is delayed over 42%.

The Monitoring & Evaluation plan provides sufficient means for monitoring output and outcome indicators. Although project outcomes will take a long time to materialize; the project's execution phase is long enough that indicators should be measurable at least once (at the end of the execution phase). However, there are no milestone indicators that would allow identifying problems early on, limiting the usefulness of the midterm evaluation. The ex post evaluation will rely on an ex post economic analysis. Though this methodology is less robust than an impact evaluation, it is the most appropriate given the size and characteristics of the project. It is expected that data needed for the ex post economic analysis will be available from frequent publications by the Unidad de Planeación Minero Energética (UPME); however, such publications could turn out to be less frequent or less detailed than expected. Interviews with control firms and sector experts will be used to validate assumptions and to conduct the attribution analysis of outcomes based on case studies (going beyond a simple before-and-after comparison of indicators).

The overall risk rating of the project is High. High risks include: environment and social sustainability risks (i.e. pollution, extraction of water, etc.); limited capacity in the geothermal sector; and lack of a clear regulatory framework. However, Bancoldex has a full-fledged Environmental and Social Management System designed and implemented with the technical assistance of the IDB.

RESULTS MATRIX

Project Objective:	The objective of the program is to scale up investment in geothermal power generation projects by making available a financial mechanism tailored to meet the specific needs of a project's earliest development stages. To this end, the program intends to trigger power production from geothermal sources, thus contributing to the reduction of global Greenhouse Gas (GHG) emissions and the diversification of the Colombia's energy matrix.

EXPECTED IMPACTS

Indicators	Unit	Baseline		Goals		Means of verification	Observations
		Value	Year	Value	Year		
EXPECTED IMPACT							
Greenhouse gases emissions in Colombia's electricity sector.	$MtCO_2$	11.57	2016	8.4	2026	Source: IDB/ Bancóldex with information coming from World Bank's development.	It is expected that the program will contribute to this development indicator by helping reduce the CO_2 emissions that are produced by electricity generation.
CO_2 emissions per dollar of GDP.	CO_2 emissions per dollar of GDP	0.13	2016	0.11	2026	Source: IDB/ Bancóldex with information coming from World Bank's development.	It is expected that the program will contribute to this development indicator by helping reduce the CO_2 emissions that are produced by electricity generation.

EXPECTED RESULTS

Expected Results	Unit	Baseline		Intermediate		Goals		Means of verification	Observations
		Value	Year	Value	Year	Value	Year		
EXPECTED RESULT									
Geothermal power generation by projects covered by the program.	GW/hr	0	2016			525.6	2026	Source: UPME.	This measures the annual generation of electricity by the expected 50 MW installed capacity. The calculation is based on a 95% capacity factor. **Milestone.** Additionally, the project will have the following milestone: Installed capacity of geothermal power of projects covered by the program. This will have a baseline value of 0 MW and a target value of 50 MW for 2026. UPME will provide data for monitoring.
Greenhouse gases emissions avoided through the use of geothermal energy of projects covered by the program.	Tons of CO_2 ($tCO_{2)}$	0	2016			232,183	2026	Source: UPME.	This indicator measures the cumulative tons of CO_2 avoided (the incremental value as compared to a business as usual scenario) through the use of geothermal energy. It is calculated by multiplying the emissions factor for the electricity sector

Expected Results	Unit	Baseline		Intermediate		Goals		Means of verification	Observations
		Value	Year	Value	Year	Value	Year		
									in Colombia by the actual power generation of the plant, adjusting for load capacity factor. This is measured for the last three years of the project, given that the plant is expected to begging its operations on the seventh year.
Additional financing raised by the projects covered by the program compared to non-beneficiaries projects.	US$ Million	0	2016			190	2026	Source: Bancóldex.	This indicator measures the difference between the additional funds raised by covered projects and the funds raised by non-covered projects.

PRODUCTS

Products	Estimated Cost (US$)	Unit	Baseline	Year 1	Year 2	Year 10	Final Goal	Means of verification
Component I: Risk mitigation grant facility								
Number of geothermal power projects guaranteed by the program.	9.33 million	Number	0	1	1	0	2	The project will provide guarantees for the development of two geothermal projects. Source: UPME.
Component II: Implementation and technical assistance activities								
Number of studies carried out by independent consultants (Subcomponent I).	0.15 million	Number	0	2	1	0	3	These studies will provide third party expertise for the technical validation of eligibility of projects, as well as verifying success and failures on drillings. Source: Bancóldex.
Number of studies carried out by independent consultants (Subcomponent II).	0.05 million	Number	0	1	0	0	1	These studies will provide third party expertise for the support to the development/reform of norms and regulation that will contribute to making the geothermal sector attractive for investment. Source: Bancóldex.

FIDUCIARY AGREEMENTS AND REQUIREMENTS

COUNTRY:	Colombia
PROYECT NUMBER:	CO-G1007
NAME:	Investment Grant for the Risk Transfer Program for Geothermal Power
EXECUTING AGENCY:	*Banco de Comercio Exterior de Colombi*a (Bancóldex)
PREPARED BY:	Mylenna Cárdenas García, Fiduciary Specialist in Financial Management Gabriele del Monte, Fiduciary Specialist in Procurement

I. EXECUTIVE SUMMARY

1.1 Bancóldex is a second-tier financial institution with separate legal status, administrative autonomy, and its own assets, subject to oversight by the Superintendency of Finance and associated with the Ministry of Trade, Industry, and Tourism (MCIT). Bancóldex has experience in implementing programs financed by the Bank and has demonstrated, since 2008, its capacity as an executing agency through two loan operations (2080/OC-CO for US$$100 million and 2193/OC-CO for US$200 million), financed through the Conditional Credit Line for Investment Projects (CCLIP) approved in 2008 for the total amount of US$650 million (CO-X1007). Currently, Bancóldex is implementing loan operation 2949/OC-CO for US$200 million, program 2983/TC-CO for US$10 million, and program 3003/TC-CO for US$40 million. Bancóldex has sufficient capacity to conduct activities related to the financial management and administration of the funds for the program. The fiduciary risk is low.

1.2 Since Bancóldex is not included in the national budget, it is not obliged to keep its accounts and budgetary controls within the Public Financial Management System (PFMS). Bancóldex uses a reliable, integrated system with online accounting, cash management, portfolio, and budgetary execution modules.

1.3 The amount financed by the Bank for this program is US$9.53 million, from which US$9.33 million will be dedicated to the provisioning of the Contingent Recovery Grant (CRG) facility and US$0.2 million will be under the Bank's administration. This amount is not significant compared with the total portfolio amounts executed by Bancóldex. The program does not include financing from other multilateral organizations, and the disbursement and execution period will be ten years.

II. FIDUCIARY CONTEXT OF THE EXECUTING AGENCY

2.1 Bancóldex uses a reliable, integrated AS-400 accounting system known as the Integrated Financial System (IFS), in which accounting, cash management, portfolio and budget execution modules are online. The system receives information from investment (Alfyn), T24, payment, Integrated Administrative Service System (IASS), cash management, balance transfer (and payroll applications. It is used to maintain, manage, and monitor independent accounts for recording program resources, thus facilitating their monitoring and identification.

2.2 Bancóldex has well defined policies, procedures, and processes, which were analyzed and confirmed during the institutional capacity assessment and supervision of loans in execution, and its quality management system has ISO-9001 certification. One of Bancóldex's strengths is its qualified personnel, functional information systems, and clear and defined procedures for each of the planned activities; it also has technical personnel who have built up experience and years of service in each of the institution's areas, enabling it to ensure quality in its fiduciary and administrative processes and responsibility and efficiency in the performance of its tasks.

III. FIDUCIARY RISK EVALUATION AND MITIGATION MEASURES

3.1 No fiduciary risks were identified.

IV. CONSIDERATIONS FOR THE SPECIAL PROVISIONS OF NON-REIMBURSABLE FINANCING CONTRACT

A. Financial Management

4.1 It is a special contractual condition that prior to the first disbursement of the grant resources Bancóldex should provide evidence, to the Bank's satisfaction that: (i) the program coordinator has been assigned; and (ii) the program's Operating Regulations (OR) has been approved and entered into effect, in accordance with the terms and conditions previously agreed upon with the Bank.

4.2 The validity of the CRG cannot exceed the deadline for the last disbursement of the loan operation (ten years, accounted from the signature date of the investment grant contract).

4.3 The exchange rate effective on the date of disbursement request submission will be applied in disbursement requests.

4.4 The project program implementation will be audited annually.

4.5 Once the deadline for disbursements has passed, unused funds shall be returned to the Bank (Clean Technology Fund [CTF]).

B. Procurement

4.6 The executing agency should prepare a procurement plan if procurements are to be made for the purpose of in-kind contribution to financing. The plan will be subject to approval by the Bank.

V. AGREEMENTS AND REQUIREMENTS FOR PROCUREMENT EXECUTION

5.1 The program does not foresee procurements, as its primary objective is to provide a CRG to cover financial risks of the program. The Bank will be responsible for the hiring of the specialists for the execution of the program activities under component II, upon request of the executing agency, and in accordance with the Bank's policies and procedures.

5.2 In the case that the Bank´s resources would be utilized to recruit of technical assistance (individual consultants and/or consulting companies) those shall be done:

a. In accordance with the "Policies for the Selection and Contracting of Consultants Financed by the Inter-American Development Bank" (GN-2350-9).
b. Consulting companies shall be selected and hired by using a harmonized SEP for Colombia and agreed upon with the Bank.

5.3 Retroactive financing is not applicable.

Table 1. Ex Post Case Threshold Amounts

Works*		Properties*		Consulting services	
International public tender	**National public tender**	**International public tender**	**National public tender**	**International advertising**	**Shortlist 100% national**
≥ US$10 million	US$ 350,000 - US$10 million	≥ US$1 million	US$ 50,000 - US$1 million	≥ US$200,000	≤US$500,000

* Acquisitions of simple works and common properties whose values are below the threshold amount for international public tender (IPT) can be done through price comparisons.

5.4 **Procurement supervision:** Program supervision shall be done through ex post review by the Bank or by third parties appointed by the Bank for review purposes (program auditing firm).

5.5 **Records and files:** The Executing Agency should have filing systems in which should contain the complete and organized documentation of potential procurement processes. The documentation should include information of all stages involved in the precontractual, contractual, and post-contractual processes.

VI. FINANCIAL MANAGEMENT

A. Programming and Budget

6.1 Bancóldex is a national, mixed capital corporation and is not included in the national budget. Consequently, its expenses are not defrayed with resources from the public treasury. Instead, it meets its expenses from the resources generated by its operations as a credit establishment, and is therefore not subject to budgetary control within the PFMS. The institution's budget is structured according to the Strategic Action Plan, which is used to plan the course of action on the business fronts for the year, with subsequent definition of investments per line (loan disbursement requirements) and operating expenses. These are met from internally generated cash flows, deposits taken, and obligations acquired with financial institutions. It is worth noting that Bancóldex has clear policies for both budget preparation and monitoring, defined in the budgetary planning and management processes established within the Bancóldex value chain and approved by senior management. The Board of Directors approves the budget for each fiscal year. Tools such as Business forecasting (COGNOS PLANNING) and expenditure tracking tools (COGNOS FINANCE) are used to monitor budget management. These tools also allow monitoring of the various investment lines and business units (Data Warehouse - DWH). The President's Committees and its Board of Directors monitor the budgetary execution.

B. Accounting and Information Systems

6.2 Bancóldex will be responsible for program accounting, which will be on an annual basis, using a reliable, integrated system with online accounting and cash management modules. In recording its operations and preparing its financial statements, the institution follows the rules prescribed by Colombia's Superintendency of Finance, and for matters not addressed by those rules, Colombia's generally accepted accounting standards established by Decree 2649 of 1993. The audited financial statements for this program will be prepared on a cash basis using information generated by portfolio application, which identifies operations funded by non-reimbursable financing. In addition, Bancóldex has internal accounting policies, which are part of the Integrated Management System, and uses the financial sector's chart of accounts. Notwithstanding this, pursuant to Decree Number 2784 of December 2012—issued by the Ministry of Trade, Industry, and Tourism—and Resolution 743 of 2009—issued by the General Accounting Office of the Nation—Bancóldex is in the process of implementing international financial reporting standards (IFRS), which will enter fully into effect in 2015. Bancóldex belongs to a group of financial institutions with special schemes whose transition period starts on January 1, 2015. Bancóldex's first financial statements issued under the new regulatory framework shall have the closing date of December 31, 2016. Importantly, although the core of the system will initially follow Colombian GAPP, adjustments will be made gradually to the systems, so that they can enter full operation in 2015 with separate accounting based on IFRS.

C. Disbursements and Cash Flows

6.3 Bancóldex will open a bank account exclusively for managing the funds involved in the program cash flow (designated account), in US$ dollars, the currency in which the CRG agreements are denominated, in order to cover for contingent grants and avoid exchange rate risks. Using the direct payment modality in US$ dollars, the Bank shall disburse the funds that cover the CRG agreements or documents duly signed between Bancóldex and the beneficiary in question. The validity period of the CRG cannot exceed the deadline for the last disbursement of the loan program (ten years, accounted from the signature date of the investment grant contract), since funds unused by the deadline of the last disbursement shall be returned to the Bank (CTF). Costs associated with exchange rate loss that may arise from the repayment of unused funds will be covered by the developers.

D. Internal Control and Internal Audit

6.4 Bancóldex has an internal audit unit that reports to the Audit Committee of the Board of Directors, and administratively to Bancóldex's Office of the President. The institution has implemented the Standard Model of Internal Control (MECI 1000:2005) for State entities, based on the global COSO standard, which is aligned and coordinated with the internal control system established by the Superintendency of Finance in its Basic Legal Circular. Bancóldex has a code of good corporate governance, an Audit Committee made up of three members of the Board of Directors, a policy on controls, a set of audit regulations, an audit manual, and a quality and operations manual. It also applies the standards of the Institute of Internal Auditors (IIA) in the performance of its work, and is currently certified by "the Institute of Internal Auditors IIA". Subject to the oversight and control of the Superintendency of Finance, Bancóldex has the risk management methodologies and manuals required by law (on market, liquidity, and operations risk, money laundering and financing of terrorism, as well as information security). Bancóldex delivers an annual report on Evaluation Management of the Internal Control System to the Board of Directors and the General Meeting of Shareholders, in compliance with the legal requirement of the Superintendency of Finance's external circulars 14 and 38 of 2009, incorporated into Title 1, Chapter IX, Number 7 of the Basic Legal Circular.

6.5 Based on the principles of self-regulation, self-management, self-control, and continuous improvement, Bancóldex conducted an independent evaluation of its Internal Control System in 2014, which yielded satisfactory results. Two of the institution's strengths are its commitment to maintain and continuously improve this system and a culture of zero tolerance on fraud, which demonstrate Bancóldex's responsibility in relation to the plans and directives proposed by the national government with regard to internal control and quality management, supplemented by the institution's risk management systems. Bancóldex has "Instruction on Credit and Technical Assistance Programs with Multilateral Cooperation Institutions," which describes the general activities involved in credit and technical assistance programs that Bancóldex has entered into. The instruction is used as a strategy for funding and/or for financing in accordance

with the strategic framework of the institution, with different credit lines provided and client segments served.

E. External Control and Reports

6.6 The program's use of loans and eligibility of expenditures will be audited annually by a first tier, independent audit firm acceptable to the Bank, to be engaged by Bancóldex. The program auditor may be the same firm as the one that audits Bancóldex's financial statements and those of the other projects in execution, which would optimize cost and give the firm a comprehensive view on the control of the executing agency and program management. The auditor will carry out procedures necessary for verifying the use of funds in light of the program execution scheme. The auditing fees shall be financed with resources of Bancóldex. The audited financial statements for the program will be delivered to the Bank within hundred and twenty (120) days following the close of the program's fiscal year, during the original disbursement period or its extensions, with the last of these reports to be presented within hundred and twenty (120) days following the closure of fiscal exercise of the year of the last disbursement date, in accordance with the procedures and terms of reference previously agreed upon with the Bank.

6.7 The Bank will request the Bancóldex's audited financial statements and supplemental financial information related to them during the program disbursement period, until all program resources have been disbursed. They will be delivered to the Bank within 120 days following the close of the Bancóldex's fiscal year, beginning with the fiscal year in which the program commences execution. The of these reports shall be presented within hundred and twenty (120) days following the closure of fiscal exercise of the year of the last disbursement date.

F. Financial Supervision Plan

6.8 The financial specialist will conduct at least one onsite review per year, in addition to desk reviews of the auditing statements and disbursement requests. Visits for fiduciary supervision in financial management will include verification of the financial and accounting arrangements employed for program administration, tracking of disbursed funds in accordance with the execution mechanism, and implementation of any other recommendations issued by this program's independent auditor and others.

G. Execution Mechanism

6.9 Bancóldex will be responsible for the administration of CTF's resources. CTF resources will be used to finance a CRG facility scheme for the initial drilling stage. This grants shall be used exclusively to cover the investment in the initial stages of the project. The CRG shall cover the investment undertaken by a private developer or by the financing provided by a financial intermediary that has provided loans to the developer in order for him/her to invest in the drilling stage. The operating mechanism of the CRG will be the following: (i) if the exploration turns out to be unsuccessful in the initial stage (for example, if the geothermal resources fail to reach the predetermined level of quality and quantity), the CTF

resources will be used to reimburse the developer for the cost amount of the covered by the CRG; and (ii) if the exploration turns out to be successful, the resources assigned/committed for the corresponding grant, will be released and they can be used to cover other projects. The validity of the CRG cannot exceed the deadline perior for the last disbursement of the program's loan resources, since funds unused by the deadline of the last disbursement shall be returned to the Bank (CTF). To avoid exchange rate risk, resources in the same currency (in US$ dollars) as the guarantee must back the signed CRG agreements/contracts). Using the direct payment modality, the Bank shall disburse the funds that cover the CRG agreements or documents duly signed between Bancóldex and the beneficiary in question.

6.10 Bancóldex and the IDB will request expressions of interest and compile a list of eligible projects. Projects that meet technical, financial, and legal eligibility requirements specified in the program operating rules will be covered by the available program's resources. A CRG agreement will be signed by Bancóldex (acting as fiduciary of the CRG fund), and the developer, and it will specify the exact terms and conditions of the CRG of amount, payment and verification of activities and timelines, among others.

H. Other Financial Management Agreements and Requirements

6.11 There are no agreements in addition to those described above. However, the fiduciary agreements and requirements included in this annex may be altered as the program progresses, under the Bank's supervision.

INVESTMENT GRANT FOR THE RISK TRANSFER PROGRAM IN GEOTHERMAL POWER

CO-G1007

CERTIFICATION

I hereby certify that this operation was approved for financing under **Clean Technology Fund (CTF)** through a communication dated November 5, 2015 and signed by Goritza Ninova. Also, I certify that resources from said fund are available for up to **US$9,530,000** in order to finance the activities described and budgeted in this document. The commitment and disbursement of these resources shall be made only by the Bank in US dollars. The same currency shall be used to stipulate the remuneration and payments to consultants, except in the case of local consultants working in their own borrowing member country who shall have their remuneration defined and paid in the currency of such country. No resources of the Fund shall be made available to cover amounts greater than the amount certified herein above for the implementation of this operation. Amounts greater than the certified amount may arise from commitments on contracts denominated in a currency other than the Fund currency, resulting in currency exchange rate differences, i.e. represent a risk that will not be absorbed by the Fund.

(Original Signed) — 6/6/2016

Sonia M. Rivera
Chief
Grants and Co-Financing Management Unit
ORP/GCM

Date

DOCUMENT OF THE INTER-AMERICAN DEVELOPMENT BANK

PROPOSED RESOLUTION DE-___/16

Colombia. Nonreimbursable Investment Financing GRT/__-____-CO
Investment Grant for the Risk Transfer Program in Geothermal Power

The Board of Executive Directors

RESOLVES:

That the President of the Inter-American Development Bank ("Bank"), or such representative as he shall designate, is authorized in the name and on behalf of the Bank, as implementing entity of the Clean Technology Fund ("Fund"), to enter into such agreement or agreements as may be necessary with "Banco de Comercio Exterior de Colombia S.A. (Bancóldex)", for the purposes of granting it a nonreimbursable investment financing for a sum of up to US$9,530,000 chargeable to the resources of the Fund, and to adopt such other measures as may be pertinent for the execution of the project proposal contained in document PR-____.

(Adopted on ___ _____ 2016)

LEG/SGO/CAN/IDBDOCS#39941653
CO-G1007