Fit with CTF Investment Criteria

## Fit with Mexico’s Investment Plan and with the Dedicated Private Sector Programs

Mexico’s Investment Plan, revised in May 2013 and endorsed by the TFC of the CTF, includes USD34.3 M for a geothermal risk mitigation program.[[1]](#footnote-1) Additionally, USD20 M resources from the Dedicated Private Sector Programs, endorsed in October 2013, were allocated to Mexico for the development of further instruments to promote private geothermal development in the country. **This proposal combines the two sources in a comprehensive Facility that offers a range of financial and risk mitigation mechanisms tailored to meet the specific needs for each project’s stage of development,** namely: (i) exploration and test drilling, where risk and/or cost sharing instruments are combined with lending to reduce Value at Risk for developers, hence removing the main barrier to investment; (ii) field development, production and re-injection drilling, where risk mitigation instruments may be developed with the private sector (insurance) to deal with the still relatively high risk levels, and can be combined with lending; (iii) construction and operation phase (only once sufficiency and stability of the resource have been proven), which requires more standard financing tools (ordinary, subordinate or concessional debt, but also contingent finance and guarantees). CTF resources from DPSP (together with Government funds) are used to reduce risk and back the financing of the projects, a role that is deemed especially critical in the early exploration phase, while resources from the IP will contribute to financing projects at all stages, even after risk levels are reduced and projects are closer to commercial financing.

## Potential for GHG Emissions Savings

The Results Matrix (Annex I) outlines the indicators and the means to verify the accomplishment of the program’s targets. Using conservative estimates, the program is expected to finance 6 geothermal power plants producing electricity by 2024, with a capacity of 50 MW each. .The would lead to emissions savings of around **1.10 MtCO2** per year[[2]](#footnote-2). With these, the total resources invested (CTF IP + IDB +CTF DPSP) would deliver estimated emissions reductions of **33 MtCO2 in 30 years of operation of the plants.**

## Cost-effectiveness

Based on estimated reductions of CO2 emissions over the course of a 30 year lifetime of projects financed, and assuming US$54.3 million from the CTF, the investment per ton is USD1.64 per ton of CO2e, considering only the CTF resources; USD3.64/tCO2e considering the resources from the CTF, the IDB and the government, or USD 36.36/tCO2e, considering overall investment (USD 1,200M, including private sources).

An assessment of the Marginal Abatement Cost (MAC) for geothermal power in Mexico was carried out as part of the [Low Carbon Development Study for Mexico](http://bit.ly/MEDEC_eng) (2009)[[3]](#footnote-3). The result is a MAC of 11USD per tCO2e (positive).

## Demonstration Potential at Scale

Scope for avoided annual GHG emissions. A [recent study](http://bit.ly/SENER_Geotermia) commissioned by SENER conservatively estimates the potential capacity to be installed in the medium term at 2,200 MW[[4]](#footnote-4), although estimations vary widely. According to the same source, such geothermal development would allow capture 14% of the abatement potential in the energy sector CO2 emissions in 2020, decreasing **8.4 MtCO2** in that year.

Transformation Potential. This program combines CTF concessional resources (US$ 54.3 million) with IDB (US$ 54.3million) and resources from the Mexican Government (US$ 11.5 million), **leveraging an USD 1145.7 million from third party sources[[5]](#footnote-5) up to a total of US$1,200 million total resources** (including program and third party, public and private financing plus capital resources). The goal of the Program is to trigger investment in geothermal energy in Mexico, helping project developers overcome financial barriers, creating security for investors and advancing knowledge for financial institutions so that a track record for private intervention is established and the enormous potential of Mexico is unlocked. The Program includes a technical cooperation component that will ensure the building of capacity within NAFIN and SENER in order to guarantee the sustainability of the Program, as well as foster synergies with other related initiatives, such as the Geothermal Excellent Training center in El Salvador and the recently presented Geothermal Excellence center in Mexico. **The innovative approach of the Program**, using a multiple array of instruments and combining support from the Government, as well as incentives for private developers for the first time in Mexico, **will trigger an increase in the participation of geothermal energy in the energy matrix.**

The program also has **a multiplier effect,** as it is designed to optimize the use of funding available in terms of leverage and sustainability investing grant resources only where they are most efficient and where they leverage the most financing. Continuing these efforts should allow for the development of a sustainable framework in the long term, after demonstration of the benefits of investing in geothermal with the support of risk mitigation instruments 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 that could help facilitate the development of solutions for geothermal energy projects in the long term. Finally, the regulatory reform to which the program contributes should also multiply geothermal investment as it removes the last roadblocks for developers.

If successful, the comprehensive intervention will be used as a model for additional projects in the Region and in other parts of the world. The IDB is currently preparing two Geothermal Development Programs with CTF resources in Colombia and Chile, and the synergies will be sought and knowledge transfer will be guaranteed. In addition, the IDB is participating in the Geothermal Development Facility in Latin America (GDFLA), coordinated by KfW, which aims at supporting early exploration drilling in the Region. The Programs in Mexico[[6]](#footnote-6) will be an integral part of the facility and the experience will be transferred to the pipeline of projects under development.

## Development Impact

## Geothermal energy offers one of the most effective renewable and low carbon alternatives for power generation. Furthermore, it is a power source that entails significant economic and social benefits, such as high quality employment creation and the potential to reduce the need to import gas. A recent study comparing jobs created in energy sectors states that geothermal energy supports and generates a significant number of jobs when compared to other energy technologies. The construction of the plants is more labor intensive than comparable energy sources (See Green Jobs through Geothermal Energy (GEA, 2010[[7]](#footnote-7)) (resulting in benefits for local population. From an energy and environmental perspective, the expansion of geothermal in Mexico is fully justified.

Developing additional 300 MW have positive impacts on economic and social terms[[8]](#footnote-8):

* 1. It would impact the GDP an equivalent to 0.10% of the 2011 GDP.
  2. Generate more than 5.400 jobs.
  3. It would increment the security of supply by reducing a 2% of the imports of natural gas in 2020.

## Implementation Potential

In the last decade, Mexico has successfully promoted Renewable Energy (RE) in power generation through tenders for projects of Independent Power Production (IPP) and favorable regulations for self-supply and cogeneration projects[[9]](#footnote-9) .

The Energy Reform (whose general guidelines were approved in December 2013) will further improve the framework for renewable energy generation, as it has among its objectives the expansion of clean technologies, the development of new infrastructure and the strengthening of the regulation to create security for investors[[10]](#footnote-10), as well as the creation of new market mechanisms.

Currently, it is the water resource regulations which govern access to geothermal resources. However, defined **concession areas for geothermal –which would avert the risk of free riders exploiting the same area– do not yet exist.** In order to address this problem, the Mexican Congress announced in the Energy reform the **development of a concessional regime** to be mandated by Law within the month of April 2014[[11]](#footnote-11) according to the calendar envisaged, giving greater certainty to both investors and financiers[[12]](#footnote-12).

**SENER has strongly supported the design and preparation of the project and has taken geothermal development as a priority in the new administration**, as shown in the Geothermal Energy Forum organized in October in Mexico City, together with the IDB, the World Bank and other organizations.

The government has made progress in the promotion of technology development and has announced the creation of a Center of Excellence on Geothermal, endowed with an estimated budget of USD77 million[[13]](#footnote-13).

The borrower and executing agency for the program, Nacional Financiera, S.N.C. (NAFIN), is a national credit institution established to promote savings and investment and to channel financial and technical support for Mexico’s industrial and economic development. NAFIN’s corporate goals and mandate include supporting projects related to the use of clean and efficient energy. In this sense, NAFIN has been working on: i) the development of a portfolio of eligible projects, ii) improving their technical, financial and environmental capabilities, in both the energy and infrastructure sectors and with IDB support , and iii) strengthening their network of intermediaries with capacity to channel funding to high risk projects.

**NAFIN is a solvent institution with exemplary risk management practices and the full backing of the Mexican government. NAFIN also has an excellent record of cooperation with the IDB, contributing actively to the country program of the IDB with Mexico.** So far, NAFIN has cofinanced approximately USD400 million and managed more than USD3,000 million in total financing of renewable energy projects, proving to be an executor with extensive experience in the management of resources to support private sector projects focused on energy efficiency, energy generation from renewable sources and, in general, to promote sustainable development.

Regarding the evaluation of the technical proposals, the Program includes support to NAFIN to (i) define the technical documentation required to conduct due diligence ; (ii) perform technical due diligence of evaluating the quality geothermal projects geothermal-consistency model and the technical feasibility of the proposed project and (iii) analyze the drilling program indicating whether (1) the procedures for drilling and safety systems are implemented to achieve the correct safety requirements and environmental protection, (2) the specific objectives, the minimum expectations and expected outcomes geothermal are consistent with the proposed preliminary geothermal model.

The Energy Regulatory Commission (CRE) plays a relevant role and has a 12 year experience in the development of regulations for Renewable Energy in Mexico. As a promoter of electricity generation by private developers, it has issued permits for renewable energy generation and will play a very relevant role in the expansion of geothermal energy in Mexico.

The Federal Electricity Commission (CFE) is the fourth producer of geothermal energy in the world and has 40 years of experience in developing geothermal fields in the country. This program seeks to build on this expertise by fostering PPP business models, taking advantage of the impressive body of knowledge that the institution has gathered.

Even though the geothermal development industry is practically at a nascent stage in Mexico, there are already several firms that are investing resources in exploratory studies and exploration drilling. These firms have vast experience internationally and are backed by solid technology providers[[14]](#footnote-14)[[15]](#footnote-15).

## Additional Costs and Risk Premium

The Program aims to develop a pipeline of geothermal projects in Mexico and tackle the financial barriers encountered by private developers to access to financing sources. Lack of knowledge and absence of a performance record negatively affects investors and financiers. **As long as financial institutions do not understand the economics of geothermal technologies and develop methodologies to evaluate the feasibility of the projects, risk will be perceived as unbearable even after discovery**, financing will be unavailable and developments will have to rely exclusively on scarce and expensive capital resources, slowing down or precluding investment in the sector.

CTF resources will be able to provide financing **currently not available in the market**. Through the generation of a track record and knowledge for investors, financial institutions, institutions and developers, the perceived risks will be lower and additional finance will be available to further develop the sector in Mexico. The option of a public sector company was extremely successful in Mexico for at least 40 years. However, die to the scarcity of public resources and the stringent requirements for their use, **CFE has lately underinvested in geothermal vis-a-vis fossil fuel plants with shorter lead times and higher returns**. Hence, consensus on the need for financial support to develop geothermal power generation has been reached.

Consistent with its principles and objectives, **CTF funding will take risks that commercial lenders are not able to bear,** crowding in the private sector by catalyzing investment that would not have happened otherwise. Resources from the Utility-Scale Renewable Energy Program (DPSP) will be concentrated on riskier phases of exploration, following its objective to prioritize available concessional funds towards exploratory drilling and geothermal resource validation.

While IDB/NAFIN?CTF concessional loans will be made available for early exploration, these are not expected to significantly alter the risk/reward ratio of the exploration, and lending needs to be combined with risk sharing instruments. The IDB considers this a most effective structure to mobilize financing for the early phase of development of geothermal projects, where specific incremental risks (i.e. resource risks) are high. The involvement of NAFIN and the private banking and insurance sectors should maximize leverage from public and private sources, accelerate and scale-up finance to a larger number of private projects, enable the conditions for a sustainable development of the geothermal sector and reduce the need for subsidies in the future.

Specifically, the resources will be used as follows:

**CTF IP** resources in the form of a harder concessional loan are requested to be blended with IDB/NAFIN resources for financing at all stages of the development of the projects.

**CTF DPSP** resources will be requested in the form of a contingent recovery grant[[16]](#footnote-16) to support the deployment of risk mitigation instruments, specifically designed to maximize leverage of CTF resources and to back the financing of the projects, making them bankable and diminishing the need of capital, namely:

*Loans convertible to grants.* IDB/NAFIN/CTF IP exploration loans will be made available through NAFIN to developers for early drilling (first slim holes or wells). CTF DPSP funding will cushion the risks by operating as a guarantee, fully or partially guaranteeing these loans. DPSP resources will only cover resource risks. The sponsor would have recourse to an agreement with the grant fund (managed by NAFIN) and present a request for it to cover the debt service in the event that any of the specific technical triggers occur.

CTF DPSP funding will cushion the risks by operating as a guarantee, fully or partially guaranteeing these loans. The sponsor/lender would have an recourse to an agreement with the grant fund (managed by NAFIN) and present a request for it to fully or partially cover the debt service in the event of (once technical triggers is ascertained).

*Grants to partially cover insurance and insured loan premiums and/or rates.* Because insurance policies are still in the process of development[[17]](#footnote-17), the costs for a project to assume the associated premiums are fairly high and a subsidy is needed to make insured exploration financially viable. CTF DPSP grant funding will off-set these upfront costs, sharing with developers the cost of the insurance premium for a policy to cover IDB/NAFIN/CTF IP or commercial exploration loans[[18]](#footnote-18).

**CTF contingent recovery grant** resources to support projects shall be administered through a special account. This account will receive any income from the investment of its funds as well as the reimbursements from sub projects and the fees charged for their use. Any remaining grant funds after 10 years shall be returned by NAFIN to the CTF[[19]](#footnote-19). These funds will be available to support as man projects as are technically and financially viable over the execution period, the revolving nature will however be limited by the success/failure rate of projects. Any remaining funds after the execution period shall be used in support of geothermal projects consistent with the objectives of the program until resources are fully utilized, under the supervision of NAFIN and SENER. In all cases, a thorough due-diligence of projects by an independent expert/ insurance company is expected to reduce the risk of moral hazard.

Regarding the potential reduction in costs of geothermal development, the industry in Mexico is currently well developed and established, so that in the short term no drastic price changes are expected to occur. However, with the increased support in the Region and worldwide due to the current initiatives under development is it expected that, in the medium to long term the overall cost will be reduced.

## Gender Issues

NAFIN will develop a Social and Environmental Management System (SGAS) as required by the IDB, where measures for the removal of any barriers to the equal participation of men and women in the benefit of the projects will be included. NAFIN will also comply with the requirements for consultation and compensation, and will actively promote the inclusion of women in the workplace.

In addition, SENER is currently developing a new framework for public consultation for private sector power generation projects, and seeks to consider women’s participation as an important element of such framework.

1. This amount has been modified by IDB from 34.4M, as an update of the Revision of the IP allocated 2.1 (instead of 2.0 M ) to the FIRA Green Line project. [↑](#footnote-ref-1)
2. Estimations made using the average emissions factor for electricity in Mexico (0.5 kgCO2/kWh) and a 84% load factor. [↑](#footnote-ref-2)
3. Bit.ly/medec\_eng [↑](#footnote-ref-3)
4. See [analysis of the sector in Mexico](http://www.energia.gob.mx/webSener/res/0/Geothermal_01.pdf) (SENER/PwC, 2012). [↑](#footnote-ref-4)
5. Additional estimations based on a 70:30 debt to equity ratio, investment costs of US$5 million per well and US$4 million per MW installed, and US$120.1 million financing from the program. Financing may come from NAFIN, and from other public or private banks. [↑](#footnote-ref-5)
6. And Chile and Colombia [↑](#footnote-ref-6)
7. <http://bit.ly/Geojobs> [↑](#footnote-ref-7)
8. Quantification of the macroeconomic impact has been carried out using the Input-Output methodology, based on the latest Input-Output matrix prepared by the INEGI (Instituto Nacional de Estadística y Geografía de México). (<http://bit.ly/IOModel>)

   [↑](#footnote-ref-8)
9. Private sector projects can be developed under four modalities: independent power producer (IPP, under a tender-based system), small producers (capacity under 30 MW), self-suppliers and cogenerators. IPPs and small producers sell all the electricity they generate to CFE. [↑](#footnote-ref-9)
10. The involvement of non-fossil fuels in the generation for public service was app. 18.3% of the energy generated in 2012 (SENER, 2013), so the Energy reform requires investments diversify energy sources and increase the installed generation capacity in Mexico. [↑](#footnote-ref-10)
11. The IDB has supported the Government with technical inputs for the Law. [↑](#footnote-ref-11)
12. Article 27 establishes the right of private actors to engage in generation and distribution of electric energy under the modality of contract with the Mexican State. Transitory disposition number 3 establishes the CFE, while the Reform is finalized, may enter into contracts for electricity transmission and distribution. Transitory Disposition number 11 establishes that the Mexican Congress shall provide by law the modalities for recruitment for individuals on behalf of the Nation, carried out, among others, financing, installation, maintenance, management, operation and expansion of the infrastructure to provide public service broadcasting and distribution of electricity. [↑](#footnote-ref-12)
13. <http://thinkgeoenergy.com/archives/17380> [↑](#footnote-ref-13)
14. <http://www.europapress.es/economia/noticia-economia-empresas-enel-firma-mexico-memorando-entendimiento-geotermia-redes-electricas-inteligentes-20140114093033.html>; [↑](#footnote-ref-14)
15. <http://www.energias-renovables.com/articulo/alstom-construira-en-mexico-una-central-geotermica-20131219> [↑](#footnote-ref-15)
16. According to the CTF Financing Products, Terms, and Review Procedures, grant financing can be considered on a case-by-case basis for project components with significant risks and innovative financing instruments. [↑](#footnote-ref-16)
17. The introduction of an insurance mechanism would bring an important component of financial innovation to the program, as experiences in LAC are fairly limited. [↑](#footnote-ref-17)
18. As part of its strategy for the development of geothermal energy, the Government of Mexico has allocated 150 million pesos, to be managed by NAFIN. CTF resources will top up this existing allocation. [↑](#footnote-ref-18)
19. A sustainability analysis of costs and optimal conditions on revolving mechanisms for these resources are under study. Specific criteria, including the size of the subsidy, will depend on each type of instrument and will also have an impact on the number of projects that the program is able to support. [↑](#footnote-ref-19)