

**GREEN
CLIMATE
FUND**

Meeting of the Board
17 – 20 October 2018
Manama, Bahrain
Provisional agenda item 17

GCF/B.21/10/Add.02/Rev.01

27 September 2018

Consideration of funding proposals - Addendum II

Funding proposal package for FP083

Summary

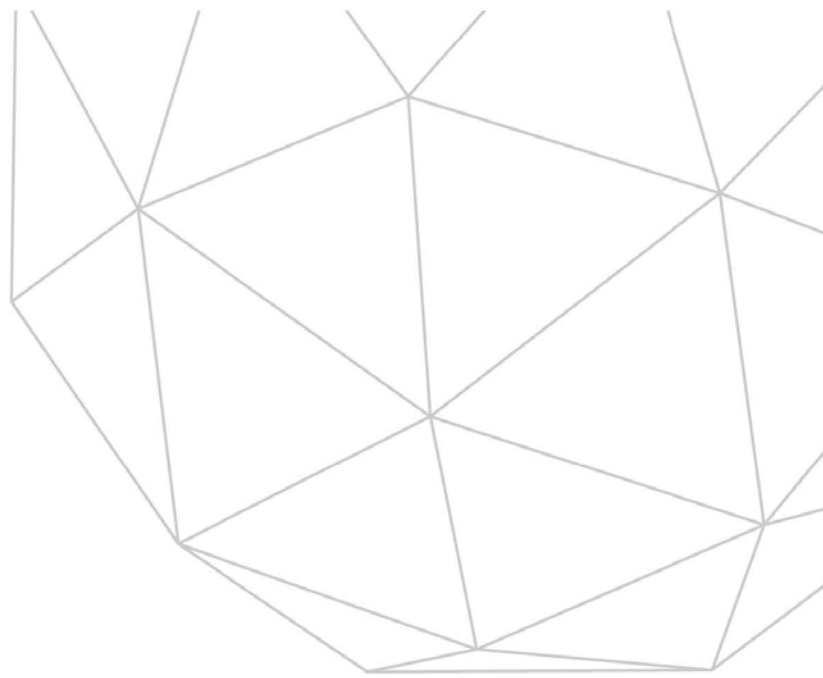
This addendum contains the following three parts:

- a) A funding proposal summary titled “Indonesia Geothermal Resource Risk Mitigation Project”;
- b) No-objection letter issued by the national designated authority(ies) or focal point(s); and
- c) Environmental and social report(s) disclosure;

The funding proposal package for FP083 is being submitted for the first time for the Board's consideration at its twenty-first meeting.



GREEN
CLIMATE
FUND



Funding Proposal

Version 1.1

The Green Climate Fund (GCF) is seeking high-quality funding proposals.

Accredited entities are expected to develop their funding proposals, in close consultation with the relevant national designated authority, with due consideration of the GCF's Investment Framework and Results Management Framework. The funding proposals should demonstrate how the proposed projects or programmes will perform against the investment criteria and achieve part or all of the strategic impact results.

Project/Programme Title: Indonesia Geothermal Resource Risk Mitigation Project

Country/Region: Indonesia/East Asia and the Pacific

Accredited Entity: The World Bank

Date of Submission: August 16, 2018

Contents

Section A	PROJECT / PROGRAMME SUMMARY
Section B	FINANCING / COST INFORMATION
Section C	DETAILED PROJECT / PROGRAMME DESCRIPTION
Section D	RATIONALE FOR GCF INVOLVEMENT
Section E	EXPECTED PERFORMANCE AGAINST INVESTMENT CRITERIA
Section F	APPRAISAL SUMMARY
Section G	RISK ASSESSMENT AND MANAGEMENT
Section H	RESULTS MONITORING AND REPORTING
Section I	ANNEXES

Note to accredited entities on the use of the funding proposal template

- Sections **A, B, D, E** and **H** of the funding proposal require detailed inputs from the accredited entity. For all other sections, including the Appraisal Summary in section F, accredited entities have discretion in how they wish to present the information. Accredited entities can either directly incorporate information into this proposal, or provide summary information in the proposal with cross-reference to other project documents such as project appraisal document.
- The total number of pages for the funding proposal (excluding annexes) is expected not to exceed 50.

Please submit the completed form to:

fundingproposal@gcfund.org

Please use the following name convention for the file name:

“[FP]-[Agency Short Name]-[Date]-[Serial Number]”

A.1. Brief Project / Programme Information		
A.1.1. Project / programme title	Indonesia Geothermal Resource Risk Mitigation Project	
A.1.2. Project or programme	Project	
A.1.3. Country (ies) / region	Indonesia / South East Asia	
A.1.4. National designated authority (ies)	Fiscal Policy Agency, Ministry of Finance	
A.1.5. Accredited entity	The World Bank	
A.1.5.a. Access modality	<input type="checkbox"/> Direct <input checked="" type="checkbox"/> International	
A.1.6. Executing entity / beneficiary	Executing Entity: PT Sarana Multi Infrastruktur (Persero) Beneficiary: Geothermal developers (public and private)	
A.1.7. Project size category (Total investment, million USD)	<input type="checkbox"/> Micro (≤ 10) <input type="checkbox"/> Small ($10 < x \leq 50$) <input type="checkbox"/> Medium ($50 < x \leq 250$) <input checked="" type="checkbox"/> Large (> 250)	
A.1.8. Mitigation / adaptation focus	<input checked="" type="checkbox"/> Mitigation <input type="checkbox"/> Adaptation <input type="checkbox"/> Cross-cutting	
A.1.9. Date of submission	August 16, 2018	
A.1.10. Project contact details	Contact person, position	Peter Johansen, Senior Energy Specialist
	Organization	The World Bank
	Email address	pjohansen@worldbank.org
	Telephone number	+1.202.458.5578
	Mailing address	1818 H Street NW, Washington DC 20433

A.1.11. Results areas (mark all that apply)	
Reduced emissions from:	
<input checked="" type="checkbox"/>	Energy access and power generation (E.g. on-grid, micro-grid or off-grid solar, wind, geothermal, etc.)
<input type="checkbox"/>	Low emission transport (E.g. high-speed rail, rapid bus system, etc.)
<input type="checkbox"/>	Buildings, cities and industries and appliances (E.g. new and retrofitted energy-efficient buildings, energy-efficient equipment for companies and supply chain management, etc.)
<input type="checkbox"/>	Forestry and land use (E.g. forest conservation and management, agroforestry, agricultural irrigation, water treatment and management, etc.)
Increased resilience of:	
<input type="checkbox"/>	Most vulnerable people and communities (E.g. mitigation of operational risk associated with climate change – diversification of supply sources and supply chain management, relocation of manufacturing facilities and warehouses, etc.)
<input type="checkbox"/>	Health and well-being, and food and water security (E.g. climate-resilient crops, efficient irrigation system, etc.)
<input type="checkbox"/>	Infrastructure and built environment (E.g. sea walls, resilient road networks, etc.)
<input type="checkbox"/>	Ecosystem and ecosystem services (E.g. ecosystem conservation and management, ecotourism, etc.)

A.2. Project / Programme Executive Summary (max 300 words)

Please provide a brief description of the proposed project/programme, including the objectives and primary measurable benefits (see [investment criteria in section E](#)). The detailed description can be elaborated in [section C](#).

The national grid in Indonesia has been dominated by fossil-fueled generation. Based on PLN's RUPTL 2018, the 2017 generation mix was 58.3 percent coal, 23.2 percent gas, 6 percent diesel, 12.5 percent renewables. At the 2015 COP21 in Paris, Indonesia committed to a **Nationally Determined Contribution (NDC)** at 29 percent reduction of GHG emissions by 2030. In support of the Indonesian Government's NDC and plan to increase the share of renewable energy in the power generation mix to 23 percent by 2026, the proposed Project aims to support a scale-up of investment in geothermal energy development. As a result, the Project is expected to contribute to: (i) displacing highly-polluting power supply alternatives and diversifying its generation portfolio; (ii) reducing reliance on fossil fuels and exposure to commodity price volatilities; and (iii) ultimately lowering the energy sector's emissions compared to the business-as-usual scenario.

The proposed Project supports the Gol in the establishment of a Geothermal Resource Risk Mitigation Facility, under which debt financing will support geothermal developers' resource confirmation drilling. The Project will be financed by IBRD (US\$325 million loan), and GCF (US\$25 million soft loan, US\$150 million reimbursable grant, and US\$10 million grant). Specifically, the GCF reimbursable grant will be used to finance the subscription of convertible bonds issued by private developers for the financing, together with the corresponding portion of the IBRD Loan, of their resource confirmation drilling. Ultimately, the Project is expected to enable reduction of 187 – 281 MtCO₂e over the generating assets' lifetime (to be cross-checked post drilling in a two-step approach to GHG accounting, see Section E6), an additional electric power generation capacity of 1 – 1.5 GW from geothermal resources and US\$4 – 5.5 billion of mostly private capital mobilized for investment in geothermal power generation. The Project will be implemented in tranches the impact of the first tranche (a total of US100 million from GCF) is expected to be around 60% of the impact from the total project.

A.3. Project/Programme Milestone

Expected approval from accredited entity's Board (if applicable)	15/12/2018
Expected financial close (if applicable)	N/A (The project intervention takes place prior to financial close of the power plant construction and operation phase)
Estimated implementation start and end date	Start: 28/02/2019 End: 28/02/2029
Project/programme lifespan	10 years

B.1. Description of Financial Elements of the Project / Programme

To achieve its objective, the proposed Project will provide financing instruments to mitigate resource risk, which is the key barrier to geothermal development in Indonesia. The Project includes a risk mitigation facility for geothermal resource confirmation (including exploration and delineation/test drilling) and technical assistance. GCF funds will be used to provide soft financing to public developers (GCF soft loan), and to subscribe to convertible bonds issued by private developers (GCF reimbursable grant). Mitigation of the drilling risk is possible because of the level of concessionality and the characteristics of the GCF reimbursable grant. A breakdown by components of the proposed Project's cost estimates is presented below.

The Project has initially been prepared on the basis of a GCF financing representing in the aggregate the sum of Tranche 1 and Tranche 2: for this reason, this Funding Proposal includes the figures for the overall Project. Then the Project has been sequenced and its GCF financing has been divided into Tranche 1 and Tranche 2. It is estimated that the tranching of the GCF financing remains a viable option for the Project: as a result, only Tranche 1 of the GCF proposed financing is submitted for approval by the GCF, and the numbers for Tranche 1 are separately reflected in this Funding Proposal. With respect to the funds which may be allocated at a later stage by GCF as Tranche 2, amounts allocated and dates for disbursements showed in Table 2 are purely tentative, since these funds are not part of this Funding Proposal and will not be approved by the GCF at this stage. A Funding Proposal to GCF for Tranche 2 of the financing of the Project will be prepared to seek approval by the GCF Board after 70% of the aggregate amount of GCF reimbursable funds and non-reimbursable funds extended under Tranche 1 previously disbursed by GCF to the Bank have been disbursed by the Bank or legally committed by SMI. It is understood that the funds which may be approved by the GCF Board for Tranche 2, could only become available for the Project after GCF Board approval and satisfaction of the conditions stated in the Board approval, if any.

Table 1: Breakdown of Cost Estimates

Component	Sub-component (if applicable)	Amount (for entire Project)	Currency	GCF funding amount	Tranche 1	Currency of disbursement to recipient
Component 1 – Geothermal Resource Risk Mitigation	1.1. Soft Loan provided through the Public Sector Window for resource confirmation (Senior loan)	125	million USD (\$)	25 (Public Sector Window)	7.5	USD
	1.2. Loan and bonds subscription through the Private Sector Window for resource confirmation	375		150 (Private Sector Window)	90	
Component 2 – Technical Assistance and Capacity Building	2.1. Governance and management support	2.5	million USD (\$)	10	0.5	USD
	2.2. Technical Assistance and Capacity Building to support MEMR, PLN and Geo Dipa	7.5			2.0	
Total project financing		510		185	100	

A breakdown of the main cost categories supported by GCF and tentative disbursement schedule of the GCF funds is provided.

Table 2: Budget Category Breakdown and Disbursement Schedule

Expenditure Type	Budget (US\$ million)	Disbursement Schedule (US\$ million)
Component 1 - Geothermal Resource Risk Mitigation		
<i>Reimbursable Grant for subscription of convertible bonds for Private Sector Resource Confirmation</i>	150	Year 1: 90 million (Tranche 1) Year 3: 60 million (Tranche 2)
<i>Soft Loan for Public Sector Resource Confirmation</i>	25	Year 1: 7.5 million (Tranche 1) Year 3: 17.5 million (Tranche 2)
Component 2 - Technical Assistance and Capacity Building		
<i>Governance and Management Support, Technical Assistance and Capacity Building Activities</i>	10	Year 1: 2.5 million (Tranche 1) Year 6: 7.5 million (Tranche 2)

B.2. Project Financing Information

	Financial Instrument	Amount	Currency	Tenor	Pricing
(a) Total project financing	(a) = (b) + (c)	510	<u>million USD (\$)</u>		
(b) GCF financing to recipient	(i) Senior Loans	25 (Tranche 1: 7.5)	<u>million USD (\$)</u>	20 years	Senior (1.25%)
	(ii) Subordinated Loans		<u>Options</u>		
	(iii) Equity		<u>Options</u>		
	(iv) Guarantees		<u>Options</u>		
	(v) Reimbursable grants*	150 (Tranche 1: 90)	<u>million USD (\$)</u>	10 years	
	(vi) Grants *	10 (Tranche 1: 2.5)	<u>million USD (\$)</u>		
<p>* Please provide economic and financial justification in section F.1 for the concessionality that GCF is expected to provide, particularly in the case of grants. Please specify difference in tenor and price between GCF financing and that of accredited entities. Please note that the level of concessionality should correspond to the level of the project/programme's expected performance against the investment criteria indicated in section E.</p>					

	Total requested (i+ii+iii+iv+v+vi)	185		million USD (\$)			
(c) Co-financing to recipient	Financial Instrument	Amount	Currency	Name of Institution	Tenor	Pricing	Seniority
	<u>Senior Loans</u> <u>Options</u>	325	<u>Options</u> million USD (\$)	IBRD	IBRD ¹ Terms	IBRD Terms	<u>senior</u>
	Lead financing institution: World Bank/IBRD (Co-financing) in the amount of US\$325 million. MOF/SMI will provide US\$150 million as parallel financing. The private sector will provide US\$100 million in leveraged equity financing.						
	* Please provide a confirmation letter or a letter of commitment in section I issued by the co-financing institution.						
(d) Financial terms between GCF and AE (if applicable)	Refer to Terms Sheet to be attached to this Proposal						

B.3. Financial Markets Overview (if applicable)

How market price or expected commercial rate return was (non-concessional) determined? Please provide an overview of the size of total banking assets, debt capital markets and equity capital markets which could be tapped to finance the proposed project/programme. Please provide an overview of market rates (i.e. 1-year T-Bill, 5-year government bond, 5-year corporate bond (specify credit rating) and 5-year syndicate loan. Provide examples or information on comparable transactions.

Indonesia's financial markets are considered very shallow, and capital markets smaller and less liquid, compared to the regional and emerging market peers. This is primarily due to low capital market utilization to finance investments and limited intermediation by non-bank financial institutions (NBFIs) with modest hedging and insurance facilities. Securities and equity markets are relatively underdeveloped and market capitalization of Indonesia's listed companies is lower than that of its regional peers. The country's banking penetration – both conventional and Islamic – remains at a relatively low level.

Despite relatively stable gross domestic product (GDP) over the past decade, the shallow financial market in Indonesia is characterized by limited-to-nascent development of various key financial instruments, such as corporate bonds, exchange-traded funds (ETFs), real estate investment trusts (REITs), options and futures for index and individual stocks and other money market instruments. For capital users, there is a limited number of equity and debt capital markets issuers at around 20, compared to 116 in Malaysia, due to lack of participation of large state-owned enterprises as major players in the economy. For capital providers, the Indonesian corporate sector is heavily reliant on bank funding, whereas the market is constrained by limited asset base of domestic institutions. While basic building blocks for market infrastructure are in place (such as the establishment of the Indonesian Stock Exchange in 2007, the availability of a resettlement mechanism of over-the-counter (OTC) derivatives for the foreign exchange (FX) market, and the improving coverage and quality of credit information), there remains a lack of clear guidelines on risky asset pricing, as well as a credible benchmark for corporate bond market. Currently, the 5- to 20-year government bond curve is well-established, however, there is no such curve in the less-than-5-year and greater-than-20-year windows. To improve financial deepening, the country is undergoing fundamental changes, including developing long-term domestic institutional investors in the market, expanding investor base for bond and equity

¹ Tenor of pricing of IBRD loan will be as per negotiation between EA and EE. Pricing information and conditions are available on the IBRD webpage

markets and developing collateralized money market products with non-bank participation, among others ([link to source](#)).

The broader financial market structure and infrastructure has presented limited financing instruments and options to address geothermal resource risk in Indonesia. Existing projects were financed by both the public and private sector. Public sector projects were financed by a mix of internal funding and concessional funding from the MDBs. Private sector projects (e.g., Wayang Windu, Star Energy) – once the resource was significantly proven – were financed by expensive, limited-long-term recourse project finance loans from international (offshore) commercial banks. These project finance loans were later refinanced by project bonds, which was only after the assets had been in operation for many years thereby demonstrating commercial viability. In the context of Basel 3 regulatory requirements on banks regarding risk-adjusted capital, long-term commercial bank lending along the lines of 2007 are no longer feasible. Participation of international finance institutions (IFIs) and export credit agencies (ECAs) is necessary to ensure long-term lending can be arranged for the construction phases.

Furthermore, 58% of corporate funding is provided by commercial banks, and not by the bond market as in other regional and more developed markets. In no event could investors in the corporate bond market consider financing the complex risks of a greenfield geothermal project (i.e., before development and construction phases). The ratings on such issuances would be extremely low and therefore cost prohibitively high. This is a worldwide phenomenon with capital markets in the financing of infrastructure.

It is expected that greenfield geothermal projects will be financed by bank lending, and not the capital market. Even in developed countries, the capital market does not take construction risks on greenfield projects. Capital market participation is only possible for refinancing operating assets. The risk sharing facility supported through this Project will help develop database of information on risks and losses, which is how banks will be able to make decisions on how to fund projects and how to price loans to compensate for expected losses.

Under the existing financial market constraints, this proposed Project aims to utilize a combination of financing sources with an innovative risk sharing mechanism to mitigate the uncertainties associated with geothermal resource risk and leverage the initial investment of US\$500 million (plus US\$100 million in leveraged equity financing from the private sector) to achieve some US\$4 – 5.5 billion in downstream investments.

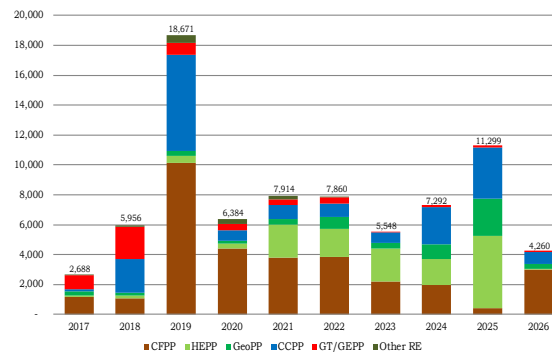
C.1. Strategic Context

Please describe relevant national, sub-national, regional, global, political, and/or economic factors that help to contextualize the proposal, including existing national and sector policies and strategies.

Indonesia is the world's fourth most populous nation with over 260 million people, the eighth largest economy globally and the largest economy in Southeast Asia with a GDP per capita in terms of purchasing power parity of US\$11,612, and a member of the G20. An emerging middle-income country, Indonesia has made enormous gains in poverty reduction, more than halving the poverty rate since 1999 to 10.9 percent in 2016. Indonesia has maintained a real GDP growth of five percent over the past three years, which is expected to maintain at 5.3 percent in 2018. Economic growth has thus far been supported by higher commodity prices, stronger global growth, rebounding international trade, and relatively accommodative monetary and financial conditions. Greater investment has been bolstered by lower financing costs, improved business environment, and stronger public capital investment.

The national grid in Indonesia has been dominated by fossil-fueled generation. The total installed power generation capacity is estimated at 55 gigawatts (GW) at the end of 2017 to meet an estimated demand of 30 GW. The primary energy mix is made up of 34.6 percent coal, 33.8 percent oil, 23.9 percent gas, and 7.7 percent renewable sources. The current 2017 electricity generation mix is coal 58.3 percent, gas 23.2 percent, diesel 6 percent, and RE 12.5 percent. According to the state-owned national utility, PT Perusahaan Listrik Negara (PLN) 2017-2026 Business Plan (RUPTL), Indonesia is expected to add about 78 GW capacity: 31.9 GW from coal, 24.4 GW from gas, 14.1 GW from hydro, 5.8 GW from geothermal, and 1.2 GW from other renewable sources. By 2027, the generation mix is expected to be as follows: 54.4% coal, 22.2% gas, 0.4% diesel, and 23% renewable energy (RE). The sub-project candidates (i.e. the developers) considered for support under the Project have been included in the latest RUPTL, which means that PLN would be the off-taker for the new generation. It should be noted that system redundancy is at acceptable level to ensure n-1 conditions and that dispatch gives priority to RE but due to the rapid expansion PLN is not at risk of signing more PPAs than the off-take potential. Due to the rapid demand expansion, PLN has no current plans to decommission existing plants.

Figure 1: Generation Expansion Plan by 2026 (MW)



PLN, plans to achieve 99.7 percent national electrification rate by 2025 from a current rate of 93 percent. The expansion of transmission and distribution will include an additional 63,853 km of high voltage transmission, 278,351 km of medium voltage transmission/distribution, and 247,215 km of distribution. This plan ensures that the necessary power infrastructure will be constructed to allow the planned geothermal generation development.

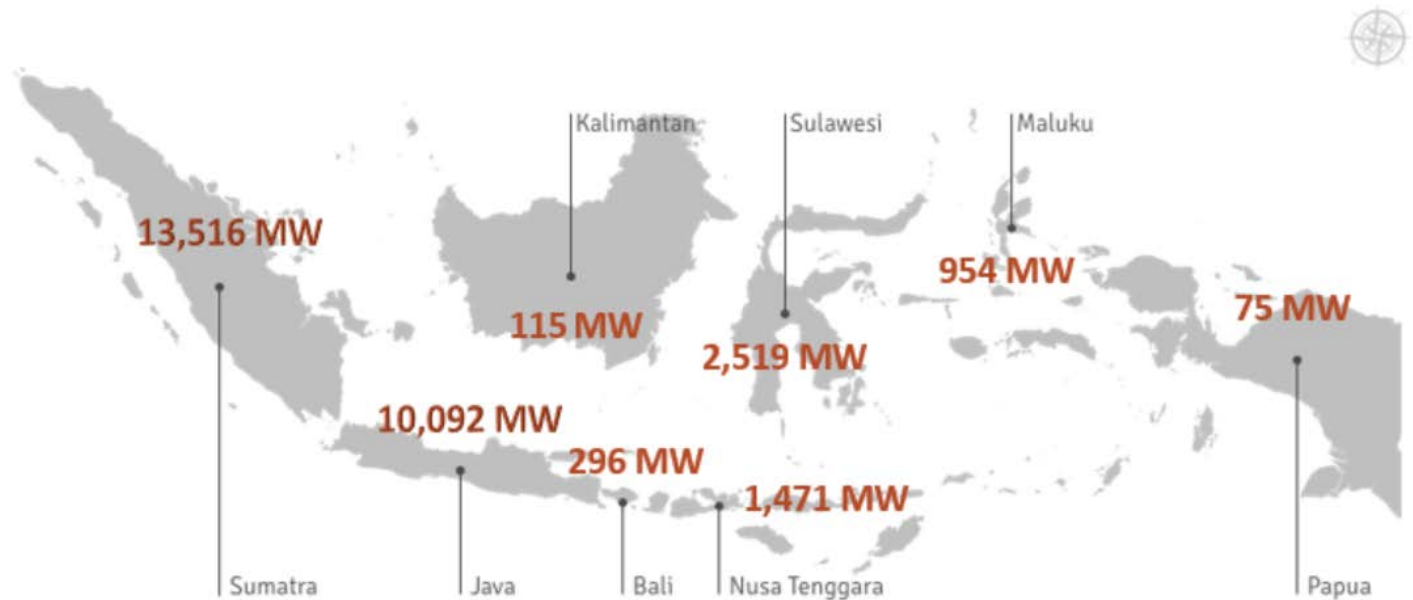
Constant pressure to keep electricity cost low favors more coal in the generation mix, where new coal plants are expected to lock in several million tons of greenhouse gas (GHG) emissions during their useful life. To maintain a stable economic growth rate and achieve the national access goal, Indonesia is expected to become increasingly dependent on energy imports of up to 25 percent of total demand by 2019.

President Joko Widodo committed Indonesia to a [Nationally Determined Contribution \(NDC\)](#) at 29 percent reduction of national greenhouse gas (GHG) emissions by 2030 at the 2015 COP21 in Paris. For the national energy planning, this is translated into an ambitious target to increase the share of renewable energy in the power generation mix to 23 percent by

2026. Geothermal energy is planned to contribute 7 percentage points of the 23 percent, which is equivalent to adding 5.8 GW to the present 1.8 GW geothermal generation capacity. This would require investments in the order of US\$ 25 billion (assuming an average cost \$4.3 million per MW as per Indonesian experience), most of which would have to come from the private sector.

Indonesia's geothermal power potential is estimated at around 29 GW, roughly 40 percent of the world's known reserves. Geothermal resources in Indonesia can be found on islands with large populations, such as Sumatra and Java-Bali, where electricity demand is high and growing, as well as in more remote regions such as Eastern Indonesia, offering an opportunity for poverty alleviation through rural electrification and substitution of expensive diesel-based generation. Despite this tremendous potential, only 1.8 GW, or about six percent, of geothermal resources in Indonesia has been developed to produce power due to the high resource risk coupled with high drilling costs.

Figure 2: Potential Geothermal Resources in Various Islands in Indonesia



Geothermal power is a baseload generation technology not subject to the same intermittency and variability associated with most renewable energy sources. Under the right conditions, it can be cost-competitive with coal or natural gas, which means that countries with such indigenous resources can depend less on imported fuels and increase their energy security. As a cleaner source of electricity, geothermal energy can play a significant role in decarbonizing the power sector and furthering the country's climate change agenda. It can also contribute to expanding access to electricity, economic growth, job creation, and boosting prosperity, particularly on the eastern islands where electrification rates are much lower and poverty rates higher than the national average.

Geothermal energy is developed through a multi-stage approach that begins with surface investigations followed by exploration drilling to confirm the availability of the geothermal resource, and by delineation drilling to confirm the extent of the resource. The key parameters of geothermal development – temperature, permeability, and resource size – can be estimated from geoscientific surveys, but can only be confirmed through an exploration drilling program, which in Indonesia is estimated between US\$20 – 40 million for a minimum of three wells in a greenfield project. Exploration drilling requires owner's equity or balance sheet finance, which is put at risk without a chance of recovery if the resource is not adequate. Therefore, even though initial costs for exploration drilling are modest compared to the total cost of developing all stages of a geothermal operation, finding this initial capital can be challenging for developers.

The geothermal tariff system in Indonesia, while underpinned by the need to keep electricity prices low, has not been conducive for geothermal development, particularly for the private developers. The first geothermal power plant in Indonesia was developed in 1983 by Pertamina, the state-owned oil and gas company. Throughout the end of the 1990s, PLN offered competitive tariffs for geothermal of around USc 7-10/kWh (about twice that if converted to 2018 US\$) and several projects were implemented through Joint Operation Contracts with private sector companies from the oil and gas industry who were

willing to take resource risk. The 1998 Asian Financial Crisis caused the Indonesian rupiah (IDR) to fall dramatically against the US dollar and compromised PLN's financial position. The Government of Indonesia (GoI) was forced to decrease the geothermal tariff to less than US\$ 5/kWh. Most geothermal projects subsequently became unviable at the new tariff level and all the original private geothermal developers have exited the Indonesian market since the lower tariffs no longer were seen to compensate for the high resource risk. Since then, the GoI has made several attempts to find an optimal geothermal tariff system. Recent regulation that related geothermal tariffs to the average cost of generation (BPP) provides for workable tariffs in eastern Indonesia, whereas workable prices only can be achieved through so-called Business-to-Business (B2B) negotiations with PLN in the country's main load centers where avoided costs are lower. Whereas the tariff framework needs further improvements, market sounding has demonstrated that an effective exploration risk mitigation scheme would facilitate investments under the existing conditions.

GoI has realized that reaching its ambitious target for scaling-up geothermal-powered generation will require: (i) judicious use of public funds while mobilizing private sector capital at a large scale; (ii) implementation of an effective upstream risk mitigation mechanism; and (iii) ensuring a conducive doing-business environment with transparent and competitive licensing and power purchase agreement (PPA) award procedures, effective cost-competition for drilling services, as well as management of bottlenecks related to drilling in forest areas. GoI sees the present Project as the main vehicle to achieve these goals – thanks to its risk mitigation facility and capacity building and technical assistance program.

Prior to 2017, tariffs were the element of competitiveness for the tendering of geothermal concessions/licenses. At that time, the winning bidder would be awarded the concession and could sign the PPA before conducting the exploration – there are still a number of such “grandfathered” licenses in Indonesia. Since 2017, tariffs are no longer included in the tender procedure and exploration drilling should be completed and resource confirmed before a PPA can be signed. The Ministry of Energy and Mineral Resources (MEMR) conducts the concession tender, issues the geothermal license, and supervises geothermal development at all stages. Only one entity can be awarded a geothermal license for one geothermal work area. However, it is possible that the entity which engages in the earlier phase of resource confirmation and steam-field development be different from the entity which develops the later phase of power plant development. PPAs are signed with PLN as the sole off-taker and the tariff is stated in US dollar; however, the actual payment to the developer will be in Indonesian rupiah using the exchange rate at the payment date, which does not introduce foreign exchange risk.

Effective facilitation of greater investments in the sector investments will also require close coordination among key stakeholders, namely the Ministry of Energy and Mineral Resources (MEMR), Ministry of Finance (MoF), Ministry of Environment and Forestry (MoEF), and the local governments.

C.2. Project / Programme Objective against Baseline

Describe the baseline scenario (i.e. emissions baseline, climate vulnerability baseline, key barriers, challenges and/or policies) and the outcomes and the impact that the project/programme will aim to achieve in improving the baseline scenario.

Based on Indonesia's First Biennial Update Report submitted to the United Nations Framework Convention on Climate Change (UNFCCC) in January 2016, national GHG emissions were 1.453 GtCO₂e in 2012. The main contributing sectors were land use change and forestry, including peat fires (47.8%) and energy (34.9%). For the energy sector, the baseline scenario for Indonesia is rapid fossil-fired generation expansion in Indonesia in the short and medium term.

The persistently low and declining commodity prices will continue to drive cheap coal-fired generation in the major grids of Java, Bali and Sumatra; and diesel-fired generation on the small grids of the poorer Eastern islands. The GoI's coal-based electricity generation expansion plan poses significant challenges. In addition to increasing Indonesia's dependence on fossil fuels for power generation for years to come, it will also exacerbate local and global environmental impacts. Over 80 percent of the current electricity generation in Indonesia is based on fossil fuels, and environmental conditions will further deteriorate when the planned additional 10 GW of coal-based capacity is fully commissioned (See Figure 1).

In more recent years, the GoI has begun to increase support for renewable energy with geothermal power making up 40 percent of the expected renewable energy generation target. This investment in renewable energy will reduce the carbon footprint of the power sector and lower local environmental impacts. Nevertheless, with the increasing power demand, the

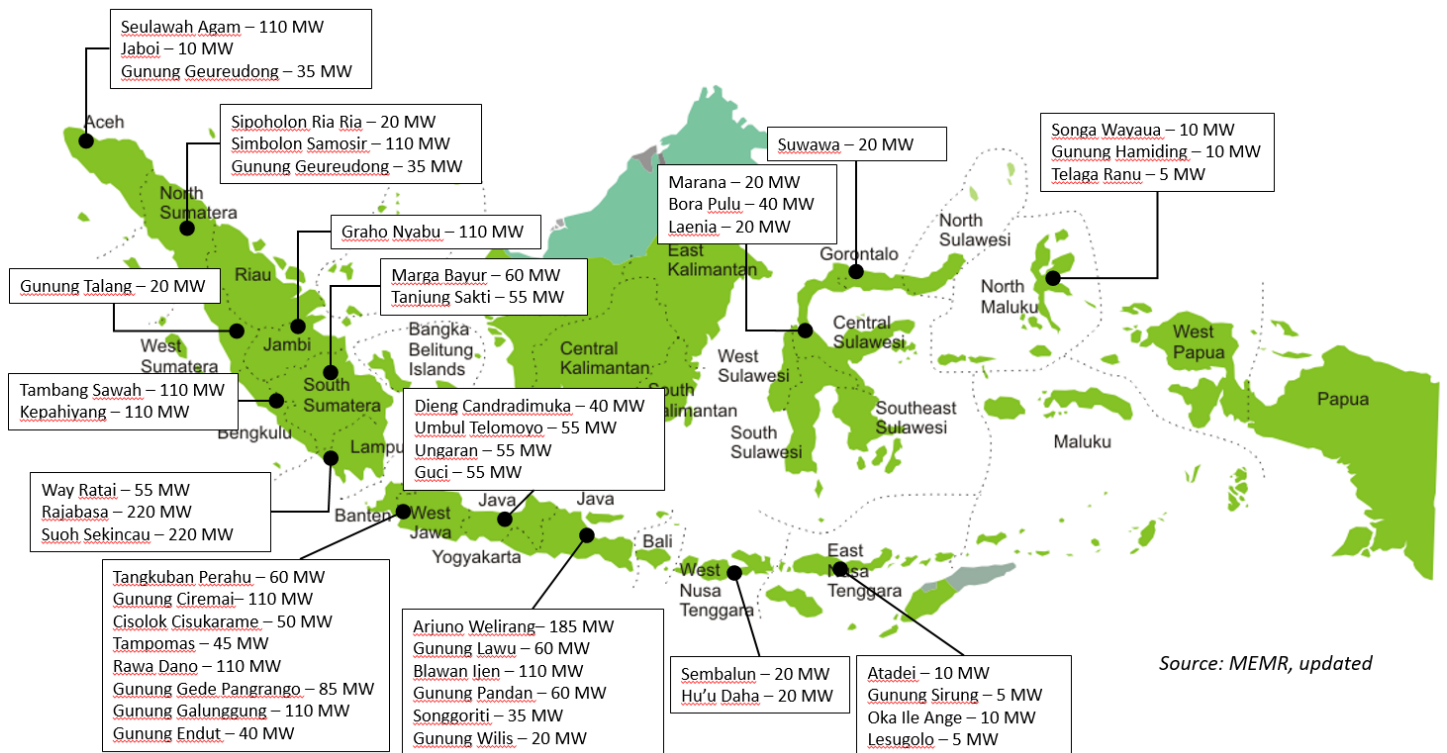
national mandate for universal electrification, and the projected supply gap, Indonesia is expected to resort to fossil fuel sources that will lock in millions of tons of GHG emissions for the long term.

Exploration drilling risk, also known as **resource risk**, is the biggest barrier to obtain financing as the uncertainties associated with the availability of productive and developable resources increase investors' requirements for return on equity. In the absence of major developers willing to take on resource risk at a large scale, the World Bank through its [Geothermal Energy Upstream Development Project](#) (GEUDP) has begun to support the Gol in addressing this issue. GEUDP provides financing for government-sponsored exploration drilling in unassigned geothermal work areas (Wilayah Kerja Panas Bumi, or WKPs). The Project is financed by US\$49 million contribution from the Gol through the Government's Infrastructure Fund for Geothermal Sector (also known as *Pembiayaan Infrastruktur Sektor Panas Bumi*, or PISP) matched by a US\$49 million contingent grant from the Clean Technology Fund (CTF), as well as a US\$6.25 million technical assistance grant from the Global Environment Facility (GEF); it is implemented by PT Sarana Multi Infrastruktur (SMI) (the same entity as the one who would manage the proposed Geothermal Resource Risk Mitigation Project under this Funding Proposal), a state-owned enterprise. The project started in July 2017 and drilling is expected to start in the second half of 2018.

The Gol has realized that even though GEUDP can make an important contribution, the capacity of SMI to carry out drilling on its own remains limited (at no more than two projects per year) and this *modus operandi* will not be sufficient to facilitate the planned scale-up of geothermal development. The Gol therefore wishes to expand the risk mitigation to exploration drilling that can be implemented by SOEs and private developers. This would complement the government-sponsored drilling and crowd in private sector financing.

MEMR has further designated 67 WKPs for development over the next seven years (see Figure 3), even though both the geothermal industry and MEMR assess that it is unrealistic that the pipeline will move without **an effective resource risk mitigation mechanism**. The proposed Project, including the scope and design of the Facility it supports, aims to address this issue (see Section C.3 below).

Figure 3: Designated Geothermal Work Areas by Ministry of Energy and Mineral Resources



Source: MEMR, updated

Against the baseline identified above, the project interventions are expected to enable reduction of 187 – 281 MtCO₂e over the lifetime of the generating assets, an additional electric power generation capacity of 1 – 1.5 GW from geothermal resources and US\$4 – 5.5 billion of mostly private capital mobilized for investment in geothermal power generation.

C.3. Project / Programme Description

Describe the main activities and the planned measures of the project/programme according to each of its components. Provide information on how the activities are linked to objectives, outputs and outcomes that the project/programme intends to achieve. The objectives, outputs and outcomes should be consistent with the information reported in the logic framework in section H.

The objective of the proposed Project is to scale up investment in geothermal energy development and support Indonesia in its efforts to reduce GHG emissions in the country. The Project will contribute to Indonesia's geothermal development goal of adding 5.8 GW by 2026, and in doing so, contribute to: (i) displacing highly-polluting power supply alternatives and further diversifying its generation portfolio; (ii) reducing reliance on fossil fuels and exposure to commodity price volatilities; and (iii) ultimately lowering emissions from the energy sector in comparison to the business-as-usual (BAU) scenario.

The full Project will have two components:

- Component 1, US\$500 million, for geothermal resource risk mitigation (with additional US\$150 million in parallel financing from SMI/PISP); and
- Component 2, US\$10 million, for technical assistance and capacity building.

Based on a request from GCF this proposal has been prepared with the understanding that if it is funded, the GCF funding may be divided into two tranches with tranche one being committed immediately and tranche two being subject to separate approval at a later stage. Throughout the proposal, reference has been made to the items where a tranching approach would have effect. This proposal therefore covers the total project as well as a specific focus on Tranche 1 (T1).

Under the proposed Project, a new Geothermal Resource Risk Mitigation Facility will be established. The existing government-sponsored exploration drilling program supported by the GEUDP will become the first window under the Facility, and two additional windows will be created: (i) a **Public-Sector Window** and (ii) a **Private-Sector Window**. The Facility will be managed by SMI as the financial intermediary.

Under Component 1 (Geothermal Resource Risk Mitigation; US\$500 million from IBRD and GCF (with US\$150 million parallel financing from Government of Indonesia)), SMI, through the Facility, will provide to geothermal developers debt financing for their resource confirmation drilling², through: (i) the extension of soft loans to public sector developers, and (ii) the extension of loans to private developers and the subscription of convertible bonds issued by private sector developers, to be used alongside the private developer's equity. As explained at the end of Section C.1, it is only after resource has been confirmed that new developers can enter into a PPA and achieve financial close for the development and operation of the corresponding power plant. The proposed Facility will propose support for the exploration and delineation/test drilling - these early phases are considered highest risk (See Figure 5), for which developers can only use corporate finance and no project finance would be possible. The financing support will cover exploration and delineation/test drilling depending on the size of the sub-project, to confirm whether there is sufficient productive steam resource for power generation. After the resource is confirmed, the developer can negotiate (i) a PPA (if the Developer has not benefited from pre-2017 regime grandfathering), and (ii) financing from commercial or other lenders under a project finance structure, for power plant development and exploitation drilling. As such, the support provided under the proposed project is a prerequisite which, if the resource is confirmed, would allow the subsequent phase (power plant development and exploitation drilling) to be financed by commercial and other financiers.

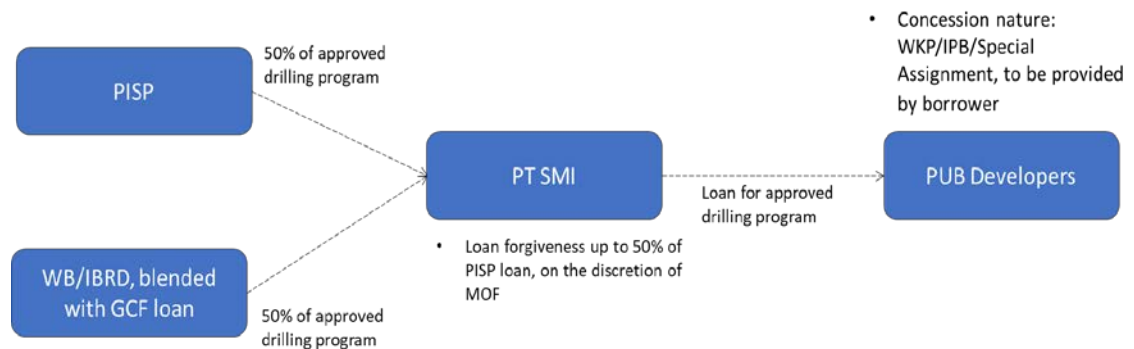
For each sub-project, it is envisaged that the Facility debt support will be capped at US\$30 million for both windows.

- For the public-sector window, support will be provided to public entities, such as state-owned enterprises (SOEs), SOE subsidiaries, or public service agencies. It is expected that SMI will provide a soft loan (using funds from IBRD

² A resource confirmation program consists of an initial phase of exploration drilling, the successful conclusion of which will be followed by a phase of delineation/test drilling.

and the GCF soft loan to do so), which would be matched (50/50) by funds from PISP. At the discretion of MoF, the PISP part of the loan could include a contingent feature to allow SMI to forgive and write off up to 50 percent of the loan in case the SOE relinquishes the license for the WKP in question (i.e., the exploration is deemed unsuccessful³). PISP funds with loan forgiveness cannot be used for the private sector window due to the risk of potential inequitable or non-transparent subsidies being delivered. It is expected that SMI will make available to public sector developers 20-year loans with financial terms derived from the financial engineering of the GCF's soft loan terms, IBRD loan terms and PISP loan terms, plus SMI's reasonable mark-up and costs. It is expected that one public sector sub-project will be supported under Tranche 1 with additionally up to three public sector sub-projects financed under Tranche 2 with the last project financed in the 2020-2021 timeframe.

Flow of Funds under the Public Sector Window



- For the private sector window, it is assumed that a project owner (Sponsor) has created a special purpose vehicle (SPV – referred to as the “Developer”⁴) to develop a geothermal site and has secured a license to explore (which also will confer the right to exploit the geothermal reservoir to the same SPV). Developers will be required to commit Sponsor Funds equivalent to at least 25 percent of the total cost of the exploration drilling program with the remaining funds coming from SMI (maximum US\$30 million). For exploration this support can be funded in equal portions from an SMI Loan financed by IBRD funds and a convertible bond (CB) package financed from the GCF Reimbursable Grant. The Reimbursable Grant would have a tenor of 10 years, with the last sub-project financed by year 4 to accommodate a maturity of the CB of six years which is the maximum time resource confirmation is expected to take up to six years. The SMI Loan will initially be for four years and for exploration only but can be extended through an additional loan for delineation. As the CB will have a maturity of 6 years, new issuances/purchases will stop after Year 4 of project implementation to ensure that all reflows can be captured before the closing date. For the delineation drilling an additional SMI Loan financed from IBRD would be offered without matching funds from GCF – this loan could be of a size up to US\$30 million. It is expected that the resulting IBRD financing over a portfolio of deals would be in a proportion of 2:1 with the GCF funds (GCF Reimbursable Grant: US\$150 million leveraging a total of US\$300 million IBRD funds).

³ A successful sub-project is one that has confirmed the geothermal resource and where this resource is adequate for a financially viable operation.

⁴ The main eligibility criteria to be fulfilled by Developers include: The company has been operating for a minimum of three years, or in the case of a new company, at least one of the founding companies/parent companies/JV partners (Sponsors) have been operating for a minimum of three years; (ii) The company has at least three years of audited financial statement or in the case of a new company, at least one of the Sponsors has three years of historical financial statements, with minimum two years audited financial statements; (iii) The company has a valid Geothermal WKP license; (iv) The company, or in the case of a new company, at least one of its Sponsors, has geothermal exploration expertise (as indicated in project references) and/or engaged consultants (as indicated in the key personnel curriculum vitae) which have such experience; (v) The company, or in the case of a new company, its Sponsors, has/have never been involved in any activities related to money laundering and/or financing of terrorism (assessment of anti-money laundering and prevention of financing of terrorism in application of SMI's internal financing procedure), and is not under sanction in application of the WB sanction regime with respect to fraud and corruption.; and (vi) The company provides a proper environmental and social impact documentation and policy.

- The CB is an innovative instrument to mitigate the resource risk of geothermal exploration. GCF funds are used to provide the co-financing (alongside the IBRD Loan), which allow SMI to extend a debt for the financing of the geothermal exploration. In addition, and unlike the funds provided through the IBRD Loan, the proposed instrument allows GCF to participate both in the Sponsor's possible downside and possible upside resulting from the exploration (as the case may be). GCF's revenues from sharing of the upside (through monetizing part of the value created through successful exploration) are intended to balance the losses incurred from sharing in the downside (i.e. losses from potentially unsuccessful exploration ventures) at the overall Facility level. The guiding principle is that when a sub-project is successful SMI should be able to flow back to GCF not only the reimbursement of the grant amount used to finance the CB but also a share of the additional value created.
- The mechanics of the CB is that SMI will provide debt through a bond facility under which the amount to be repaid will be calculated at the time of repayment based on the value of the geothermal Developer. The general idea is that the Sponsor can choose to buy back the CB as long as it is willing to pay a premium of 30-50% (the original value of the CB plus the premium is referred to as the Notional Bond Value – NBV) depending on how long time SMI has held the CB. However, if the Sponsor believes the value of the Developer is limited due to inconclusive or unsuccessful exploration and wants to pay less than the NBV, then the Sponsor can have the Developer valued and will be allowed to pay only a share commensurate with its financial participation level (Share of Participation)⁵ of the estimated value. This creates a market based price setting of the CB.
- There is a clear strategy for exit of GCF participation to ensure that GCF always gets at least the Share of Participation of any residual value of a partially successful or unsuccessful sub-project based on fair market value at the time of exit from the sub-project. Sub-project exit will happen either due to (i) Sponsor buy-back of the CB, (ii) SMI exercising its conversion option or (iii) project abandonment and handing-back of drilling license.
 - (i) In case the Sponsor *buys back* the CB the result is payment either of the NBV or the Share of Participation of the estimated market value of the Developer. The other two cases are briefly described below
 - (ii) In some events SMI would have to monetize its *conversion option* because the Sponsor disagrees to buy back the CB for whatever reason. In this case, SMI would first try to sell or auction off the CB (including the conversion option) to a third-party developer. In such case, the exit will be the sale of the conversion option for the best price received through the auction process. In case the CB cannot be sold SMI may consider converting the CB into shares as a way of monetization, whether through a sale of the shares of the Developer or a liquidation of its assets⁶. However, if SMI is unable to sell the CB into shares of the Developer, it is an indication from the market that the CB lacks value. If, after two unsuccessful attempts, the CB cannot be sold then SMI can either ask permission from IBRD to write off (see point (iii) below) or choose to convert into shares and try to sell those⁷. Any funds raised will be returned to GCF.
 - (iii) SMI will only have the right to *write off* the CB (i.e. no longer actively seek to monetize a CB for the purpose of returning funds to GCF) provided (i) the Developer hands back his exploration license following proof that exploration drilling was unsuccessful (as per feasibility study and drilling logs verified by independent technical experts which confirms to IBRD that no useful resource is found), **and** (ii) SMI has demonstrated in a manner acceptable to IBRD (following guidelines specified in the Operations Manual) that the expected value of the residual assets of the Developer is not worth an auctioning. An additional event that can trigger a write-off (depending on IBRD consent) is that there have been no takers in spite of two consecutive attempts to auction off the CB (see point (ii) above). In this context it is worth to note that with the license handed back, the Developer is no longer allowed to carry out geothermal development on the site and will therefore have no residual value related to steam resources on the site. As an antigaming measure, neither the Sponsor nor any associated person or company may take ownership of the right to explore or exploit the same site for geothermal activity for a period of 10 years.

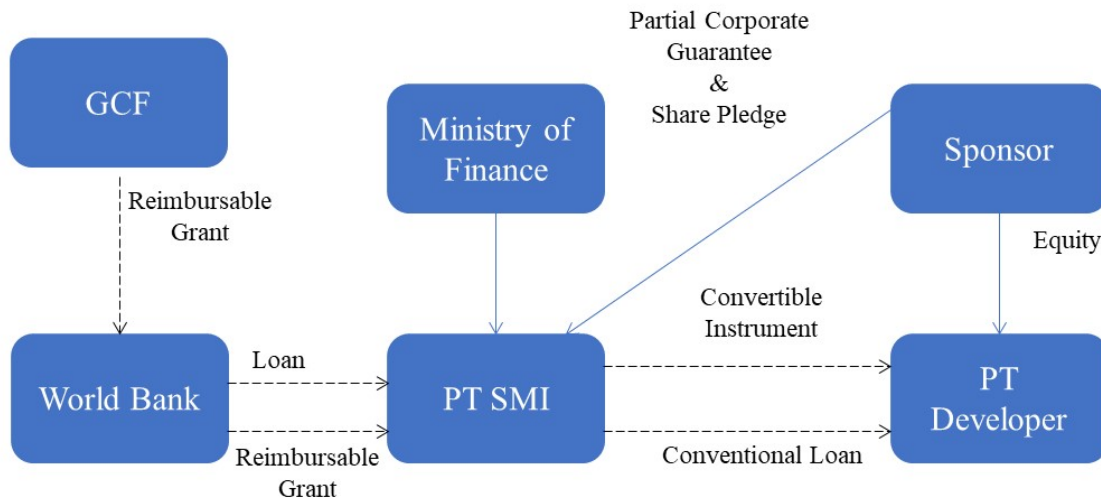
⁵ This share will be equivalent to the share of the total exploration costs financed from the CB (maximum 37.5%).

⁶ The AE confirms that according to legal due diligence by Indonesian legal expertise SMI will be able to convert the CB into shares and to auction such shares to the public.

⁷ In the case the shares are sold, then due to the nature of the situation, it can be assumed that value of the Developer is lower than the NBV and that a buyer would therefore be able to take control of the Developer. If there is any residual value in the Developer it can therefore be monetized through this sale. If a sale is not feasible it is indication that the value of the Developer is close to zero.

- This mechanism will ensure that GCF will take resource risk without taking regulatory risk. If, in spite of successful exploration, a project does not move to financial close before year 6, for instance due to protracted off-take price discussions, the CB can still be monetized through auction to third party or through independent valuation.
- If the entire operation is so successful that the reflows received by SMI are in excess of the principal amount disbursed to it by IBRD under the Reimbursable Grant Agreement, such excess funds shall be considered “Surplus Amounts” which are not subject to repayment to GCF. The legal agreement between IBRD and SMI shall provide that the SMI shall only use Surplus Amounts to support the objective of the Project, i.e. to mitigate resource risk for geothermal exploration. The Surplus Amount will be reduced by tax payments by SMI. There will only be taxation of the difference between Facility revenue (reflows) and loss (when CB is not paid back in full) meaning that taxation will never reduce the amount to be reflowed to GCF.
- In conclusion, the CB mechanism will achieve (i) full repayment of the original value of the CB plus an upside to be passed on by SMI to GCF if a Developer’s exploration is successful, and (ii) partial or no repayment of the CB (due to reduced payment received by SMI under the CB) in the cases where the exploration is only partially successful or unsuccessful. The full details of the conversion mechanism are spelled in the Operations Manual. A model of fund flows and reflows using realistic assumptions of the drilling risks has been prepared to estimate facility-level profits/losses under different scenarios. The model has been included with this Funding Proposal package and its key findings are further elaborated in Section E.6.3.

Flow of Funds Under the Private Sector Window



As necessary, technical assistance will be provided under Component 2 of the Project to support SMI. SMI will need to implement World Bank-compliant financial management system, which will ensure proper use of funds and rigorous due diligence process to ensure that loans are based on benchmarked cost estimates and that the funds are used to finance the intended activities. WB will monitor compliance and, as per the IBRD Loan Agreements, in case non-compliance is not addressed in a timely manner the WB will have the right to exercise its remedies (i.e. principally suspension of disbursements or early repayment of amounts used for ineligible expenditures). For the 10 years of the Facility life, the World Bank will receive and send on to GCF periodic reports on the loan performance and repayments.

In terms of **facility uptake**, several public and private developers have already expressed interest in the financing support to be made available through the Facility during the earlier rounds of market sounding. The market sounding was conducted with all the state-owned developers and the largest and most active private developers. Among the private developers, established developers such as Medco Power, Supreme Energy, and Energy Development Corporation (EDC) as well as a considerable number of emerging players have expressed interest to step in when risk mitigation facility is in place. Of these, four projects with existing PPA arrangements are the most likely to seek financing from the Facility. Of the public sector developers, Geo Dipa Energi, a geothermal developer mostly owned by MoF, holds licenses for three WKPs and

has expressed strong interest. Pertamina Geothermal Energy (PGE) has indicated interest for one project, while PLN has indicated that they would be interested in support that could help attract private funding and expertise to implement their large portfolio of recently granted licenses (seven licenses assigned in 2017 with another seven expected to be assigned in near future) as part of its expansion of electricity supply in eastern Indonesia. The market indicated interest in the Facility and confirmed the attractiveness of the proposed financial instruments.

The list of WKPs as indicated by MEMR presents a potential **project pipeline** (refer to Annex 1) consisting of projects that have already been licensed to private developers or assigned to public developers. There is also a list of unassigned areas where market forces are expected to push developers to move first to sites with highest development potential and bring these into the Facility in a second wave of projects. The potential resources were estimated based on earlier surface investigations and surveys. Based on the sizes of the projects, the Facility is expected to enable drilling of up to 20 projects on a first come-first served basis (subject to due diligence) (this assumes a commitment period of 6 years so that the funds can be paid back to SMI before the initial 10-year project lifespan).

The project pipeline consists of domestic and international developers, many of which have extensive experience in geothermal development and all are well aware of the tight regulatory environment. Nevertheless, one-on-one market sounding have confirmed the interest of several private developers in accessing financing provided through the facility, and in some case, readiness to submit a funding application. Tariff negotiations are in any case expected where the average cost of generations is low and while regulation can be improved (with the support of the technical assistance envisioned under the proposed project), there is consensus among developers that exploration drilling is where support is most needed. Funding support using concessional finance is critical to reducing to overall cost of electricity generation, thereby reducing the tariff requirements to make projects developed by independent power producers (IPPs) viable.

Based on the project sizes and the proposed support to the developers, the funding allocation for each window is expected to be as follows.

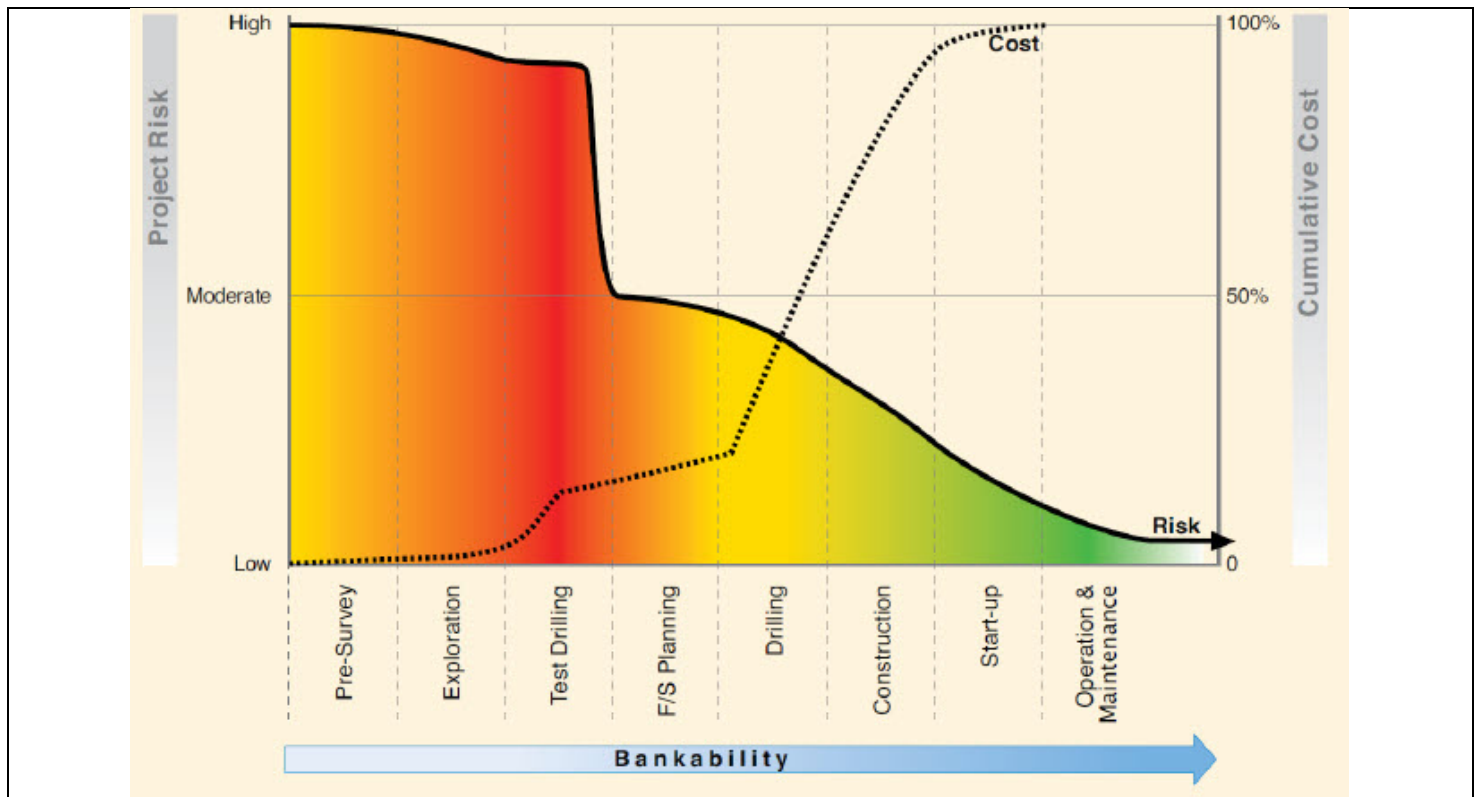
Table 2: Funding Allocation by Windows (US\$)

	SMI / PISP (parallel financing)	World Bank / IBRD	Green Climate Fund	Total
Public Sector Window	150	25	25 (T1: 7.5)	200
Private Sector Window	0	300	150 (T1: 90)	450
Facility	150	325	175 (T1: 97.5)	650

After exploration drilling, delineation drilling could be financed by SMI using IBRD funds or any other funds from development partners and banks who have an interest in doing so and can offer similar terms such as possibly the International Finance Corporation (IFC), Kreditanstalt für Wiederaufbau (KfW), Agence Française de Développement (Afd), Asian Development Bank (ADB), and Japan Bank for International Cooperation (JBIC). KfW and AFD in particular have expressed interest in cooperating with SMI and the World Bank on support to geothermal development via parallel financing towards the proposed resource risk mitigation facility. Discussions are ongoing with KfW and Afd on aligning the eligibility criteria and financing terms that would allow a concerted approach to risk mitigation envisaged under the Facility. There is also an option that a soft loan from the Canadian government can be mobilized as parallel financing of the resource confirmation loans in parallel with the IBRD funds, which could serve to further bring down the financing costs.

The **outputs for Component 1** will be blended soft loans for exploration and delineation well drilling and auxiliary infrastructure built by public and private developers. The outcomes will be resource risk removed on geothermal greenfield areas through drilling, and therefore financial close achieved for steam-field development and power plant construction. Depending on the project size, this would leverage an additional US\$4 – 5.5 billion investments by 2030, an additional geothermal power capacity of 1 – 1.5 GW, and 6.2 – 9.3 MtCO_{2e}/year. The outcome and result indicators are described in more details in Section H.1. The estimated development impact from the first tranche of GCF allocation is expected to be around 60% of the impact from the total project.

Figure 4: Stage-wise Risk Profiles and Capital Requirements for Geothermal Development



Component 2 (Technical Assistance and Capacity Building; US\$10 million from the Green Climate Fund) will finance a multi-year support program to cover for incremental operating costs and enhance SMI's capacity in managing the Facility, to build capacity within the key sector stakeholders and to provide technical assistance support towards improving the overall sector governance and investment climate for geothermal development in Indonesia. Tranche 1 allocates US\$2.5 million to support Component 2.

Support will include broad assistance in governance of the Facility and management of the GREM portfolio. This support is expected to cover the implementation/management fees for the duration of the proposed Project. It is expected that a Project Management Unit will be established within SMI to run the Facility. The PMU will be led by the Head of PMU, supported by a Project Manager with two Deputies for Operational and Planning/Administration. The PMU will include a team of specialists responsible for technical, procurement, financial management, and environmental and social safeguards. GCF grants will be used to support around half of the project management and incremental operating costs related to facility management by SMI.

An Exploration Supervision Team (EST) in SMI will be responsible for the Facility's technical, financial and legal aspects. Support under Component 2 may include further development of eligibility criteria, vetting developers' proposals, validating complex geoscientific data, and evaluating the quality of environmental and social safeguards due diligence and developers' financial capability. Furthermore, the EST is expected to review the outcome of the drilling carried out by developers and supervise drilling activities as dictated by the sub-project's business needs. The EST will leverage in-house knowledge of SMI's developed under GEUDP on key drilling strategies, critical cost benchmarks, project management timelines and management of project and portfolio risks. Specifically, the support could also cover the following areas:

- Technical Advisory would support SMI in procuring the service of a firm with specialized geothermal expertise in reviewing the geology, geochemistry and geophysics surveys (3G surveys) and topographic mapping for project proposals. Technical assistance will be delivered through strong on-site support and on-the-job training from technical consultants that are world-class experts in the geothermal field.
- Financial Advisory would support SMI to carry out financial due diligence of borrowers, which includes but are not limited to integrity due diligence such as anti-money laundering/combating the financing of terrorism (AML/CFT), blacklists and reputational risk searches.

- Legal Advisory would allow SMI to retain legal services to handle ad-hoc issues related to loan and contract management.

Regulatory support would be targeted at MEMR, with a view to improving the investment climate and doing business environment in the sector and addressing the key sectoral bottlenecks to scaling up geothermal development. This would cover, but not be limited to, support to MEMR in understanding the economics and impacts of the existing (including geothermal) tariff system. MEMR would also benefit from support on geothermal upstream development, with a focus on improving the tender process for unassigned WKPs.

Capacity building could support SMI, PLN and Geo Dipa as key stakeholders of an inclusive geothermal development program in Indonesia. The support could include assistance with: transmission and distribution planning for geothermal development, geothermal geoscientific and resource data management, drilling management expertise, procurement and contract management expertise, preparation and implementation of project-level gender action plan (GAP), and twinning arrangements for better on-the-job learning and sharing of best practice in geothermal sector in Indonesia. Finally, technical assistance could include research on the feasibility of other geothermal financing instruments, possibly involving the capital markets.

The **outputs for Component 2** will be: (i) a well-staffed and competent Project Management Unit to support SMI in managing the Facility; (ii) technical, financial and legal advice and upstream development and regulatory support to MEMR to improve the sector investment climate; (iii) capacity building and training activities provided to key sector stakeholders; and (iv) research on future possible instruments to finance geothermal activities. The outcomes will be improved capacity of SMI in managing a complex geothermal funding facility, better human resources with knowledge of cutting edge geothermal knowledge and drilling management capacity for state-owned entities, and more appropriate tariff-setting mechanisms and transparent license allocation process by policy-makers such as MEMR. The support envisioned would also assist with enhancing SMI's capability to manage and ensure compliance with the Project's environmental and social safeguards standards, complementing the support on safeguards management provided under GEUDP. The outcome and result indicators are described in more details in Section H.1.

C.4. Background Information on Project / Programme Sponsor (Executing Entity)

Describe the quality of the management team, overall strategy and financial profile of the Sponsor (Executing Entity) and how it will support the project/programme in terms of equity investment, management, operations, production and marketing.

SMI – **an accredited entity with GCF** – will be the Executing Entity for this Project and owner of the Facility in a financial intermediary function. This would include vetting process for the pipeline and setting eligibility criteria for developers accessing the Facility's funds, among others. The Project Management Unit (PMU), which has been established within SMI to manage GEUDP, will also manage the expanded Facility and handle the interfacing with developers. The PMU will be sized up as appropriate and be aided by a world-class specialized geothermal consultant with deep geotechnical and geothermal market expertise to help SMI manage the developers and prepare relevant recommendations to key stakeholders.

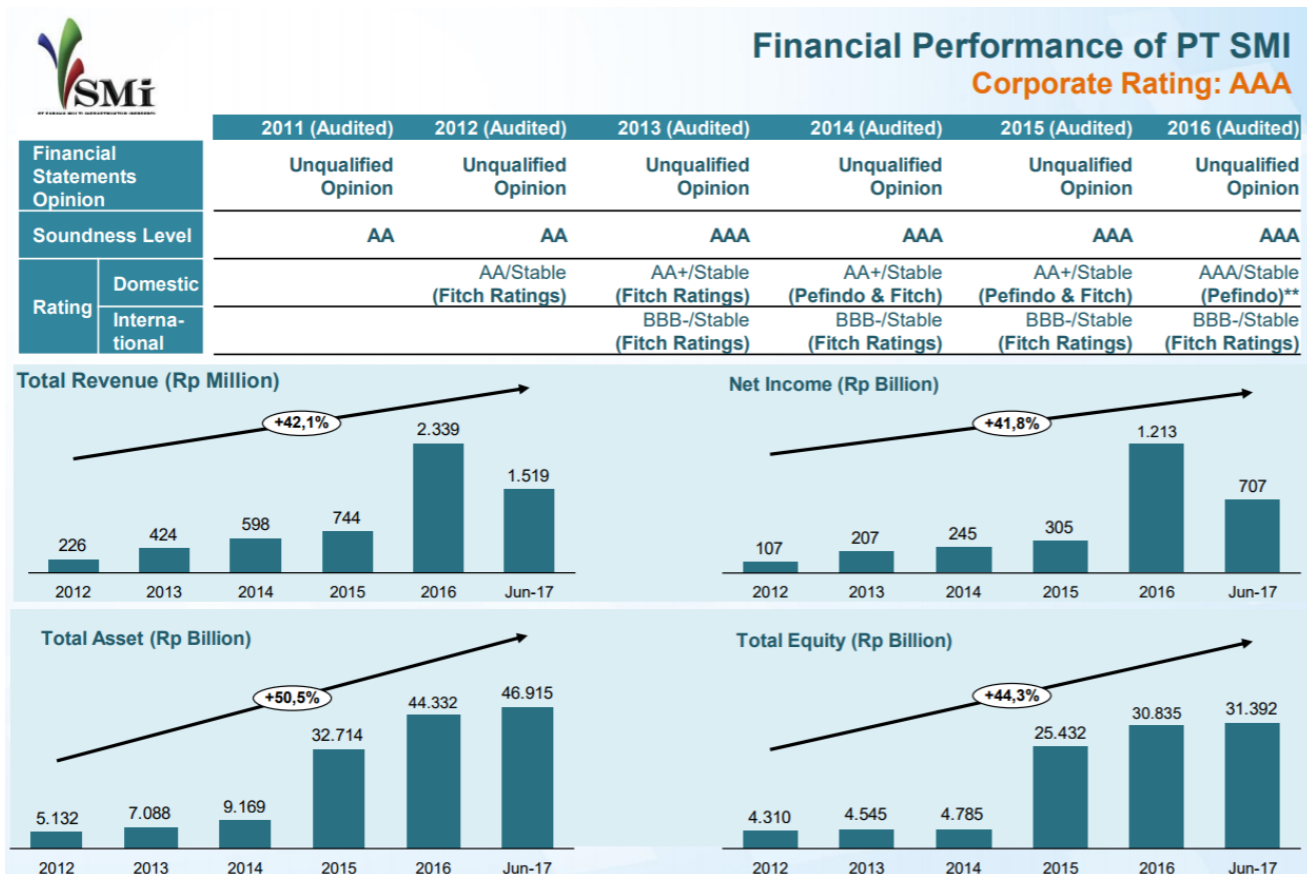
With 100 percent ownership by the Indonesian Ministry of Finance, SMI is a non-bank financial institution with a mandate to facilitate the implementation of the Gol's infrastructure development agenda through partnerships with private and multilateral financial institutions. SMI is expected to transform into Indonesia's national development bank and is seen as the Gol's key effort in creating a more open and transparent investment regime and better institutions for infrastructure finance. Under a set of enabling regulatory mandates, SMI has plans to strengthen corporate governance, partnership schemes and investor base to become the facilitator and financier for infrastructure crucial for Indonesia's continued growth.

Most recently, MoF assigned SMI to be the **Fund Manager for the PISP**. In August 2017, MoF issued the ministerial regulation (PMK No. 62-08/2017) to provide the legal basis and framework for the use of the PISP funds by SMI. PISP is capitalized with about IDR 3.1 trillion, or US\$229 million, to support geothermal exploration drilling through steam-field development and power plant construction. With US\$49 million already committed under GEUDP for government-sponsored exploration drilling, it is expected that US\$150 million will be provided by Gol towards supporting exploration and delineation drilling by public and private developers under the Facility.

SMI has three primary business areas: investment and financing, advisory, and project development. It has developed or is cultivating strategic partnerships with AFD (renewable energy), United Nations Development Program (wind power), Asian Development Bank and Korea Development Bank (public-private partnerships transaction advisory), World Bank (regional infrastructure development fund and geothermal exploration drilling), ADB and KfW (municipal financing and development of environmental and social management system (ESMS)), and Gesellschaft für Internationale Zusammenarbeit (GIZ) (renewable energy, energy-efficient street lighting, and sustainable urban transport/bus rapid transit). In the medium term, SMI is expected to focus on: (i) structuring financing for electricity, transportation and dam as national strategic priority projects, (ii) supporting local governments and regional development efforts, and (iii) developing cooperation with donors and development partners in renewable energy and energy efficiency projects. This Project fits within SMI's corporate priorities and national development mandates.

SMI's continued growth is backed by its prudent financial management. In 2017, it received a **AA+(idn) Rating with a Stable outlook by Fitch** and **IdAAA/Stable** by PT Pemeringkat Efek Indonesia (PEFINDO), the oldest and most trusted credit rating agency in Indonesia. SMI has maintained this high credit rating since 2014 ([link to source](#)). SMI raised IDR 5 trillion (US\$ 370 million) and an IDR7 trillion (US\$500 million) through bond issues for the First Sustainability Bond Phase 1 and 2, respectively. Phase 1 was oversubscribed by 20 percent and Phase 2 by 30 percent thanks to SMI's high credit rating, investor's confidence and high interest in infrastructure bond. A summary of SMI's financial performance during the period of 2011 – 2016 is presented below.

Figure 5: SMI's Financial Performance in Recent Years



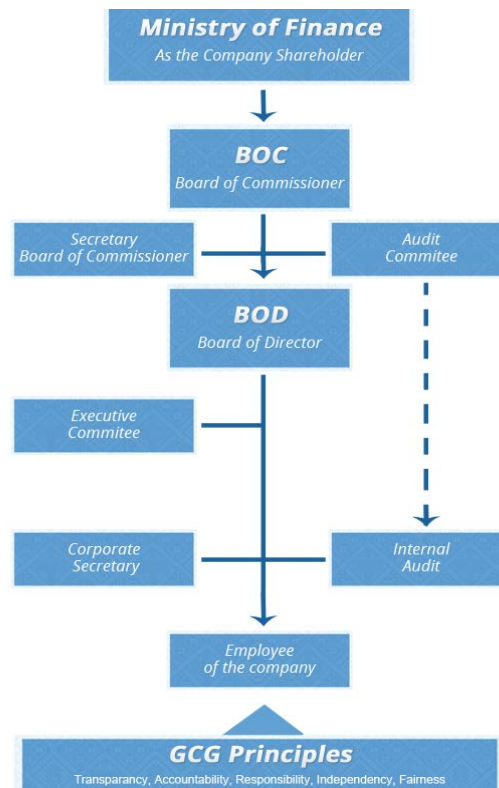
In implementation of the Facility, it is expected that SMI will be overseen by a similar (if not the same) Joint Committee (JC) established under GEUDP. The existing JC is made up of key stakeholders, namely MoF and MEMR. MoF and MEMR provide strategic guidance to SMI related to the decision to drill and decision to tender a de-risked geothermal work area, and in doing so, play an important coordination role. MoF is responsible for allocating funds to support sector development through dedicated program (such as PISP), ministerial budgetary allocations, or fiscal incentives for geothermal

development. MEMR is responsible for tendering and managing the tendered geothermal work areas and regulating geothermal off-take price. Badan Geologi (BG), the Geological Agency of MEMR, supports project implementation through supplying geological data on the candidate projects and providing SMI with technical inputs as relevant for screening developers' proposals.

Early assessment on environmental and social safeguards, procurement and financial management capacity finds that SMI has the system in place to manage a large-scale lending facility (more in Section F). While GEUDP has supported SMI in building its capacity for managing complex drilling operations, this Project will strengthen SMI's system and capability for managing a large fund for renewable energy investments. It will further expand SMI's risk appetite and improve its capacity in managing those risks, as stated as one of the objectives of Component 2.

SMI aims to implement Good Corporate Governance ("GCG") to achieve the company's business objectives as well as protect the interests of all stakeholders. The implementation of GCG is based on Ministry of State Owned Enterprises (SOE) Decree No. PER-01/MBU/2011 dated August 1, 2011 on the Implementation of Good Corporate Governance in State Owned Enterprises. A schematic of the Corporate Governance Structure of SMI is presented below.

Figure 6: Corporate Governance Structure of SMI



C.5. Market Overview (if applicable)

Describe the market for the product(s) or services including the historical data and forecasts. Describe the competitive environment including the list of competitors with market shares and customer base and key differentiating factors (if applicable). Provide pricing structures, price controls, subsidies available and government involvement (if any).

Indonesia is currently the third largest geothermal market in the world with 1,809 MW of installed capacity, after the United States (3,591 MW) and the Philippines (1,868 MW), as of January 2018. With its strategic location in the Pacific Ring of Fire, Indonesia is blessed with high temperature productive resources for the indirect use of electricity generation. Nevertheless, many of the large geothermal fields lie in conservation and protected forest areas. Besides resource risk, land use, particularly in the conservation forest areas, remains a significant bottleneck for geothermal development. While recent regulatory changes have been made to accommodate geothermal development in certain parts of conservation

forest areas as per Geothermal Law 2014 and Ministry of Environment and Forestry Regulation (MoEF) No. 46/2016, steps will need to be taken to translate the new regulation into clear implementation guidelines agreed by MEMR and MoEF.

The MoEF Regulation No. 46/2016 concerning the Utilization of Environmental Services for Geothermal in the National Park, Grand Forest Park and Natural Recreation Park provides a legal basis to enable geothermal power development in the utilization zones (zona pemanfaatan) of National Parks (Taman Nasional) and the utilization blocks of Grand Forest Parks (Taman Hutan Raya) and Nature Recreational Parks (Taman Wisata Alam) through the Environmental Service Permit (IPJLPB). The laws and implementing regulations prohibit geothermal power development in Nature and Wildlife Reserves (Cagar Alam dan Suaka Margasatwa). Core zones and core blocks of these conservation areas remain legally off-limits for such developments. The Facility will be in compliance with the government regulation and World Bank Policies OP 4.04 for Natural Habitats. Development of geothermal power projects in high-risk conservation areas such as the core zones of national parks will not be financed.

Under Presidential Decree No. 22/1981, Pertamina (the state-owned oil and gas company) was provided the mandate to explore and operate the geothermal fields, sell steam to PLN (the state utility company), and enter into joint ventures with local and international partners. The Joint Operation Contract (JOC) arrangement was introduced under the 1990s mining regulations, when Pertamina was the only entity with the mandate to develop geothermal projects in Indonesia. Under JOC signed between the partner and Pertamina. Pertamina holds the license and manages the geothermal work area, while the private partner (which could be a contractor and/or an investor) operates the area for steam production and power generation. JOCs have been operated under a Build-Own-Operate (BOO) or Build-Own-Transfer (BOT) arrangement ([link to source](#)). Through the JOC the partner put in early funding to explore and develop the project on WKPs under Pertamina, where Pertamina would later build and operate the geothermal power plant known as the total project. The subsequent issuance of Geothermal Law No. 27/2003 and Oil & Gas Law No. 22/2001 mandated that Pertamina be required to meet its future contractual obligations to continue to draw investor's interest in developing geothermal business with Pertamina and later, its subsidiary, Pertamina Geothermal Energy ([link to source](#)).

The first geothermal power plant in Indonesia was developed in 1983. Many projects were explored and developed under the Joint Operation Contract (JOC) modality. The private partners involved in the JOCs included Chevron, Unocal, Amoseas, Magma Nusantara, Bali Energy, Karaha Bodas, and Star Energy. All but Star Energy have now exited the Indonesian market. These JOCs have facilitated the exploitation of some of the biggest geothermal fields: Darajat, West Java (270 MW); Katheraha & Talaga Bodas, West Java (30 MW); Salak, West Java (377 MW); Kamojang, West Java (235 MW); Sarulla, North Sumatra (220 MW); and Wayang Windu, West Java (227 MW). For Wayang Windu, A 110 MW extension is being planned, which will bring the total capacity up to 330 MW. The remaining fields in operation include: Waypanas Ulubelu, Lampung (220 MW); Lahendong, North Sulawesi (120 MW); Dieng, Central Java (60 MW); Patuha, West Java (55 MW); Sibayak, North Sumatra (12 MW); Ulumbu, East Nusa Tenggara (10 MW); and Mataloko, East Nusa Tenggara (2.5 MW).

There are several public developers in the market. *First*, PT Geo Dipa was created in 2002 as a subsidiary of PT Pertamina and PT PLN to develop two geothermal working areas of Dieng, Central Java (total potential of 400 MW), and Patuha, West Java (also expected to be 400 MW). In 2011, Geo Dipa was transformed into a state-owned enterprise majority-owned by MoF, and assigned two additional fields Umbul Telomoyo, Central Java and Arjuno Welirang, East Java. *Second*, Pertamina Geothermal Energy (PGE) was created in 2006 as a wholly owned subsidiary of Pertamina, which has now inherited Pertamina's geothermal licenses. *Third*, PLN, the state power utility, has a unit dedicated to geothermal development. State-owned enterprises are considered catalytic to the Gol's infrastructure delivery. Many of the key infrastructure projects and programs have been implemented by SOEs. The challenge lies in developing a risk-sharing model where SOEs can use government-backed lower borrowing costs to deliver public infrastructure cost-effectively without exposing the national budget to undue fiscal burden, while creating a more conducive environment for private sector participation to help close the infrastructure gap.

Through a competitive tender process and licensing procedure for geothermal licenses, MEMR has attracted to the sector a wide range of developers. Medco Power (Indonesia), Supreme Energy (Indonesia), ENEL (Italy), Energy Development Corporation (the Philippines) are all major energy developers and independent power producers. Others include Hitay Energy (Turkey), Sabang Geothermal Energy, Jabar Rekin Geothermal, Vijaya Karya, Sintesa Banten, Giri Indah Aejahtera, and Spring Energy Sentosa (Indonesia). These companies either are looking to expand their geothermal operations in Indonesia or have obtained WKPs to develop geothermal power. The expected sizes of the projects can be found in Annex 1.

The market has also observed active participation by Jacobs (New Zealand), GeothermEx (USA), Schlumberger (USA), Halliburton (USA), and Pertamina Drilling Service, Inc (Indonesia) in providing specialized technical advisory in geotechnical investigations and surface manifestations and development of drilling program, and/or drilling services.

C.6. Regulation, Taxation and Insurance (if applicable)

Provide details of government licenses or permits required for implementing and operating the project/programme, the issuing authority, and the date of issue or expected date of issue. Describe applicable taxes and foreign exchange regulations. Provide details on insurance policies related to project/programme.

The GoI issued Regulation No. 79/2014 on National Energy Policy (KEN), setting a target for renewable energy of 23 percent by 2026, even though the national energy supply is, and remains in the medium term, largely dominated by fossil-fuelled sources. Recent regulatory changes related to tariff setting and PPAs reflect the GoI's efforts to facilitate geothermal investment while keeping electricity costs affordable for consumers.

MEMR has issued several regulations to guide the development of the geothermal sector. The most pertinent to this Project include:

- (i) Regulation No. 17/2014 which mandates PLN to purchase geothermal steam and electricity produced by geothermal power plants;
- (ii) Regulation No. 44/2016 concerning the form and procedure of placement and withdrawal of exploration commitment;
- (iii) Regulation No. 36/2017 which lays out the procedures for assignment of conducting preliminary survey (PSP), and for assignment of conducting preliminary survey and exploration drilling (PSPE);
- (iv) Regulation No. 37/2017 which lists the 67 WLPs for Indirect Use;
- (v) Regulation No. 49/2017 (previously No.10/2017 concerning the principles in power sale and purchase agreement) which set the maximum period for Power Purchase Agreement (PPA) to be the same as the concession validity period;
- (vi) Regulation No. 50/2017 (previous No. 12/2017), which sets the reasonable level of investment returns, or ceiling tariff, at average electricity supply costs (biaya penyediaan pokok, or BPP) defined as PLN's avoided costs in the local power systems, as well as allowance for a business-to-business (B2B) scheme between PLN and the developer for tariff negotiation.

Most recently, MOF Regulation (PMK No. 62-08/2017) provides the legal and regulatory framework for financing the operationalization of the PISP to support geothermal investment to be managed by SMI. PISP was transformed from the previous Geothermal Fund Facility (GFF). The original design of the GFF was to provide loans to address the high costs and risks incurred during the exploration phase. But this scheme was not successful, since the GFF loans required sufficient collateral from project developers and were to be paid back in full even in the case of unsuccessful drilling. The design of the PISP, which is expected to support exploration drilling (among others), hinges on a more balanced approach to risk allocation in the overall geothermal development process.

In addition, MoF also offers fiscal incentives such as tax holidays and allowances and an income tax facility for the geothermal sector, as well as value-added tax (VAT) and import duty exemption for capital goods. Regulation No. 18/2015 provisioned a 30 percent reduction of corporate net income for 6 years for geothermal developers. At this stage there are no tax incentives for the Geothermal Risk Mitigation Facility and this will be explored further with the legal team during Appraisal.

Sub-borrowers will be responsible for obtaining the required licenses and permits, which may be particular to the site proposed for exploration and will need to indicate the nature of the needed permits when seeking to access the Facility. Sub-projects will be accepted only when meeting eligibility criteria specified in the Operations Manual – including ensuring that environmental and social risks can be adequately mitigated.

It will be made clear to EE (SMI) and sub-borrowers that no additional financing will be provided to cover applicable taxes.

C.7. Institutional / Implementation Arrangements

Please describe in detail the governance structure of the project/programme, including but not limited to the organization structure, roles and responsibilities of the project/programme management unit, steering committee, executing entities and so on, as well as the flow of funds structure. Also describe which of these structures are already in place and which are still pending. For the pending ones, please specify the requirements to establish them. Describe construction and supervision methodology with key contractual agreements. Describe operational arrangements with key contractual agreements following the completion of construction. If applicable, provide the credit analysis of key counterparties of key contractual agreements and/or structural mitigants to cover the counterparty risks.

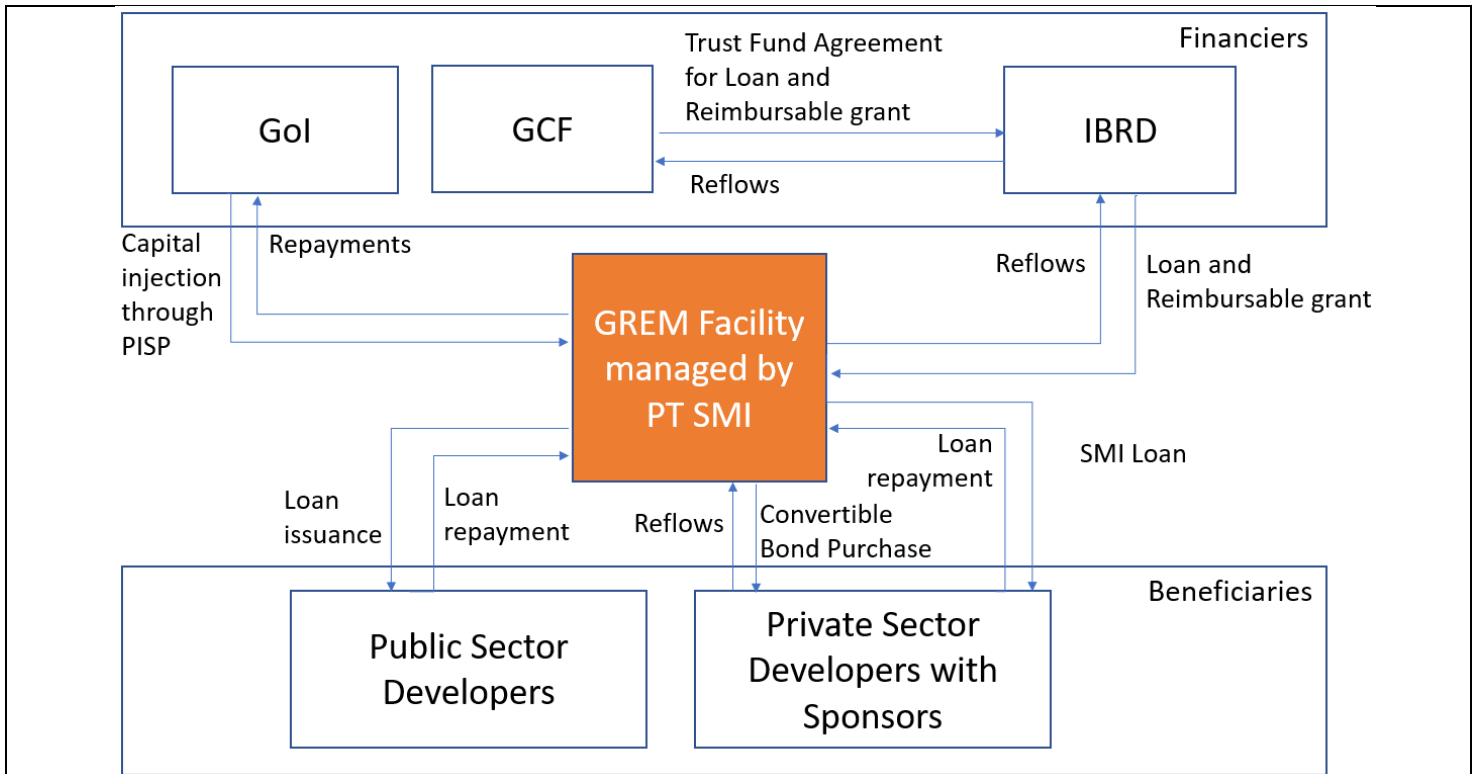
SMI will be as the Executing Entity for this Project assuming a financial intermediary role. This would entail managing the vetting process for the project pipeline, setting eligibility criteria for developers accessing the Facility's funds, and managing the loan portfolio. A PMU will be established to help SMI manage the daily operations of the expanded Facility. The PMU will be aided by a world-class specialized geothermal consultant with deep geotechnical and geothermal market expertise to help SMI manage the developers and prepare relevant recommendations to key stakeholders.

More specifically, SMI and its PMU will be responsible for:

- Administering the Facility and managing accounts.
- Appraising and approving or rejecting project proposals based on a technical, economic and financial review of applications from developers.
- Monitoring and evaluating progress and results at the Facility level and preparing periodic progress and supervision reports as requested by the World Bank (and, through the World Bank, by the Green Climate Fund). This may include developing a system for gathering and maintaining data needed from the developers to track the individual sub-projects and identifying mitigation measures for risks that may affect individual projects and the Facility.
- Financial management of the Project and accounting and financial reporting; arranging for the submission of audited financial reports.
- Preparing Terms of Reference for consulting services funded with WB/GCF resources to be approved by the WB.
- Facilitating external evaluations and ensuring that recommendations are implemented.

SMI will coordinate closely with a Joint Committee which will constitute the key stakeholders in the geothermal sector, namely MoF and MEMR. MoF is responsible for allocating funds to support sector development through dedicated program (such as PISP), budgetary allocations, and fiscal incentives for geothermal development. MEMR is responsible for tendering and overseeing the broad development progress of the tendered geothermal work areas, assessing the market environment and regulating geothermal off-take prices, and deciding if and to what extent the financing support from GREM Facility can be considered in future tendering considerations. BG supports project implementation through providing any necessary inputs related to geotechnical data to support SMI's technical due diligence in evaluation of the proposed drilling program and validation of the drilling reports submitted by the developers.

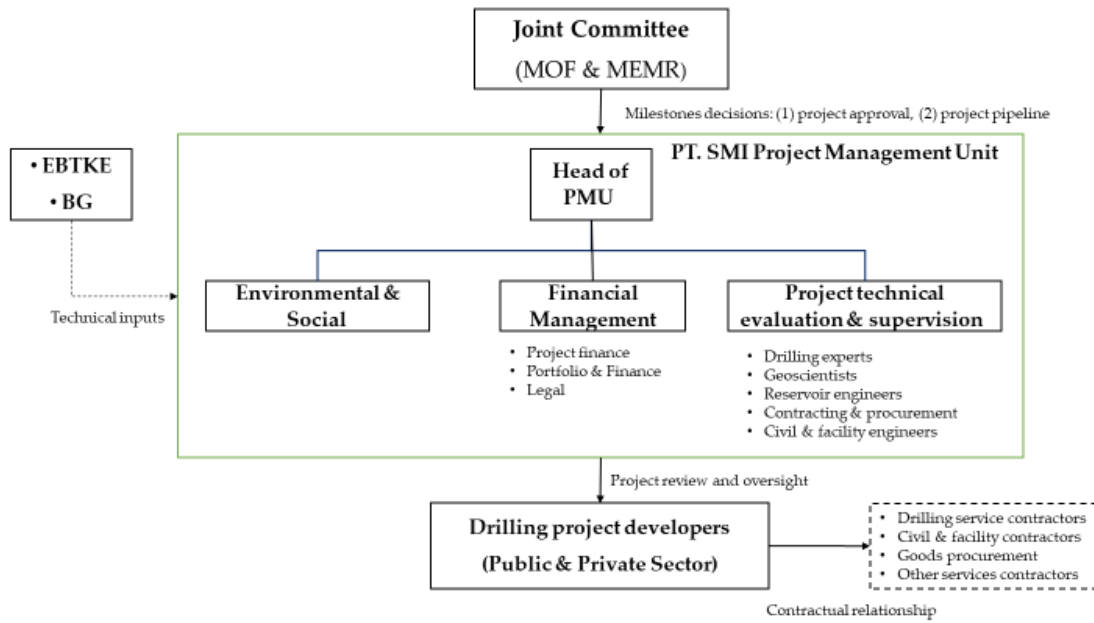
Figure 7: Governance Arrangement and Flow of Funds



As the Accredited Entity, the World Bank will provide support to the Executing Entity (EE) in its implementation of the Project. This includes working with the EE in defining the key features of the Facility and supervising compliance with WB requirements and standards, such as the decision-making process and eligibility criteria, fiduciary requirements and safeguards standards, stakeholder management, sub-loan, CB and contractual arrangement, and providing independent advisory support on reviewing drilling results and capacity building for drilling management. As the co-financier for the Facility, GCF will receive periodic reports on overall progress and SMI's management of the portfolio of sub-projects supported by the Facility, from WB's bi-annual project supervision missions and as per the reporting arrangement defined in the agreed Project Term Sheet and respective Legal Agreements. Throughout implementation, GCF representatives may be invited to join the World Bank supervision missions. As a standard procedure, the WB will prepare an Implementation Completion Report (ICR) at the end of project implementation to take stock of project achievement and impacts.

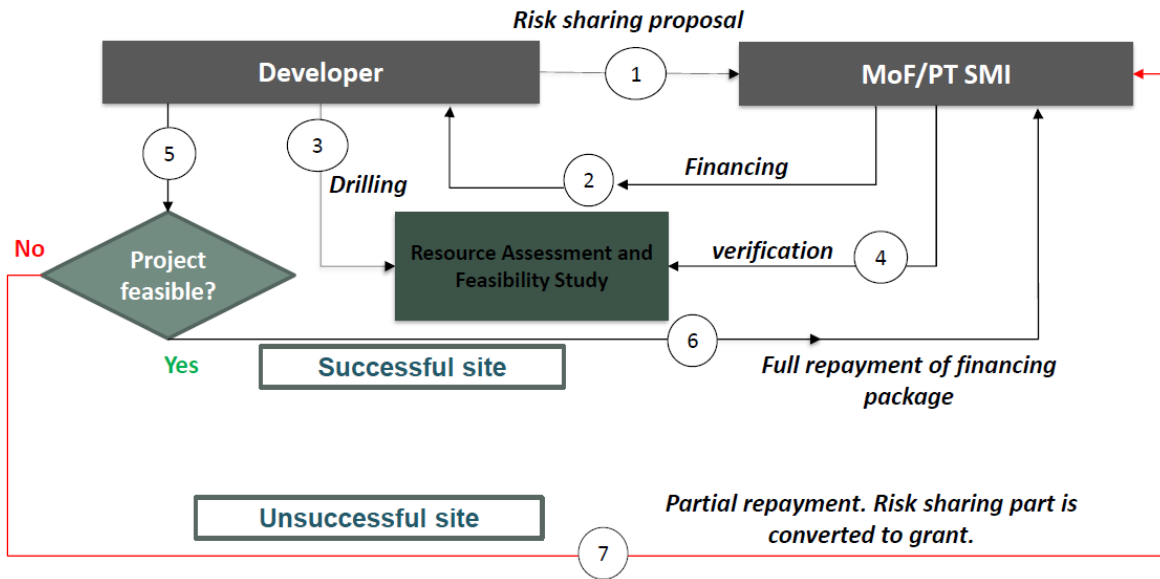
In terms of legal agreements, the Bank will enter into a Funded Activity Agreement with GCF for the financing provided by GCF. In addition, it will enter into (a) a Loan Agreement in the amount of US\$7.5 million, (b) a Reimbursable Grant Agreement in the amount of US\$90 million, and (c) a Grant Agreement in the amount of US\$2.5 million with the Executing Entity for the implementation of the portion of the Project funded by GCF. The Bank will also enter into a Sovereign Guarantee agreement with the Government of Indonesia, pursuant to which the Government of Indonesia will guarantee the Executing Entity's obligation to repay the GCF Loan to the Bank under the Loan Agreement, up to the amount of US\$7.5 million.

Figure 8: Key Stakeholders in Project Implementation



In addition to the key stakeholders and their roles, a schematic of the sequencing of key actions for an individual loan or debt package is presented below.

Figure 9: Life Cycle of an Individual Loan



C.8. Timetable of Project/Programme Implementation

Please provide a project/programme implementation timetable in [section I \(Annexes\)](#). The table below is for illustrative purposes. If the table format below is used, please refer to the activities as numbered in Section H. In the case of outputs, please mark when all the required activities will be completed.

COMPONENTS/OUTPUTS	2019				2020				2021				2022				2023				2024				2025				2026				2027				2028			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Component 1 - Establishment and implementation of the Geothermal Resource Risk Mitigation Facility																																								
Output 1 - Funding for exploration drilling extended to explore new prospective sites																																								
Activity 1.1 - Funding for resource confirmation drilling	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x																				
Activity 1.2- Supervision of drilling loans and convertible bonds					x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x				
Component 2 - Technical Assistance and Capacity Building																																								
Output 2 - Appraisal and drilling result evaluation reports prepared by the PMU																																								
Activity 2.1 - Appraisal and drilling result evaluation	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x																				
Output 3 - Project-level GAP prepared and implemented																																								
Activity 3.1 - Preparation of project-level GAPs and supervision	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x																				
Output 4 - PLN's geothermal PPA including T&D arrangement																																								
Activity 4.1 - Transmission and distribution planning for geothermal development	x	x	x	x	x	x	x	x																																
Output 5 - Proposed tariff report delivered to MEMR																																								
Activity 5.1 - Preparation of revised Geothermal Tariff	x	x	x	x	x	x	x	x																																
Output 6 - Improved resource data management capacity by Geo Dipa																																								
Activity 6.1 - Data management software with training	x	x	x	x	x	x	x	x																																
Output 7 - Geothermal development capacity of Geo Dipa and PLN increased																																								
Activity 7.1 - Exploration and exploitation management focused trainings	x	x	x	x	x	x	x	x																																
Project Monitoring																																								
Inception report		Inception Report																																						
Annual Project Report (APR)					APR				APR				APR				APR				APR				APR				APR											
Interim Independent Evaluation Report																																								
Project Completion Report (last APR)																																								
Final Independent Evaluation Report																																						Final Evaluation		

*Note: All outputs are expected to be completed by the project closing date.

D.1. Value Added for GCF Involvement

Please specify why the GCF involvement is critical for the project/programme, in consideration of other alternatives.

GCF funds are an integral element of the project design for two main reasons: (i) the risk profile of GCF's instrument and their catalytic effect in attracting public and private finance towards geothermal development; and therefore (ii) its contribution in helping Indonesia achieve its NDC and fight climate change as one of the Energy Transition countries (besides Brazil, China, India, Mexico and South Africa).

First, GCF instruments have the risk capital profile to match the risk associated with early-stage geothermal exploration drilling supported by this Project. In Indonesia, exploration drilling comes at a hefty price tag of up to US\$8 million plus supporting infrastructure, which needs to be put at risk and therefore could be prohibitive for developers to significantly expand their geothermal operations. This is a similar position to the CTF contingent grant contribution of US\$49 million under GEUDP. GCF sources will be a crucial element of a blended financing arrangement for public developers and a convertible bond for private developers. Experiences in the past decade have shown that without support for de-risking in the exploration phase, investments -particularly private- have been lacklustre at best. The use of the GCF funding and soft loan as part of the whole project is demonstrated in the attached Integrated Financial Model.

Second, GCF funds plays a critical role in enabling innovative climate solutions to facilitate a low-carbon future for Indonesia through scaling up geothermal investments as a clean source of energy and electricity. The alternatives, as discussed in Section C.2, will be a rapid ramp-up of coal in place of a cleaner solution in the short and medium terms, and therefore the lock-in of millions of tons of GHG emissions for the long term. This Project – underpinned by much needed climate finance from GCF – will help the Gol in reaching its NDC of 29 percent reduction of GHG emissions by 2030 with an annual avoidance rate of 6.2 – 9.3 MtCO₂e compared to a business-as-usual scenario with heavy ramp-up of fossil-fuelled electricity generation. The Project has already been highlighted at the 2017 One Planet Summit in Paris by SMI President Director as one of Gol's priority efforts in reaching the NDC ([link to source](#)), as well as the World Bank Group President as one of the flagship Projects that will have a transformational effect in reducing carbon emissions by one of the biggest coal-producing countries in the world ([link to source](#)). This showcases the strong commitment from the Gol and the WB for this initiative, and GCF stands to become a pivotal part of that effort.

D.2. Exit Strategy

Please explain how the project/programme sustainability will be ensured in the long run, after the project/programme is implemented with support from the GCF and other sources, taking into consideration the long-term financial viability demonstrated in [E.6.3](#). This should include a description of strategies for longer term maintenance of physical assets (if applicable).

As mentioned above and in Section C.3, the Facility will support public and private developers. The attached Integrated Financial Model provides details on the use of each funding source and the respective reflow schedules. The model has been used to describe some exit scenarios testing sensitivity of key assumptions in terms of GCF non-recovery rate. The results are presented in the table below and show that the non-recovery rate (GCF net loss) would be less than 0% in a base case version and not higher than 7.1% in a 65% development success rate scenario (see model attached to FP). This indicates that the concept is sustainable and that there is a solid exit strategy for GCF.

Base case	Alternative Scenario 1	Alternative Scenario 2	Alternative Scenario 3	Alternative Scenario 4	Alternative Scenario 5	Alternative Scenario 6
(13 projects, ~75% success, 6.5% CB premium, mixed realized potential)	(13 projects, ~75% success, 6.5% CB premium, 100% realized potential)	(13 projects, ~75% success, 6.5% CB premium, 80% realized potential)	(13 projects, ~85% success, 6.5% CB premium, mixed realized potential)	(13 projects, ~85% success, 6.5% CB premium, 100% realized potential)	(13 projects, ~65% success, 6.5% CB premium, mixed realized potential)	(13 projects, ~65% success, 6.5% CB premium, 100% realized potential)
-1.2%	-12.8%	-5.4%	-9.9%	-21.5%	7.1%	-4.6%

It is expected that the funds mobilized will have leveraged an additional US\$4 – 5.5 billion investments and catalyze an additional geothermal power capacity of 1 – 1.5 GW – possibly making Indonesia the world's biggest geothermal market. The estimated development impact from the first tranche of GCF allocation is expected to be around 60% of the impact from the total project.

In this section, the accredited entity is expected to provide a brief description of the expected performance of the proposed project/programme against each of the Fund's six investment criteria. Activity-specific sub-criteria and indicative assessment factors, which can be found in the Fund's [Investment Framework](#), should be addressed where relevant and applicable. This section should tie into any request for concessionality made in [section B.2](#).

E.1. Impact Potential

Potential of the project/programme to contribute to the achievement of the Fund's objectives and result areas

E.1.1. Mitigation / adaptation impact potential

Specify the mitigation and/or adaptation impact, taking into account the relevant and applicable sub-criteria and assessment factors in the Fund's [investment framework](#). When applicable, specify the degree to which the project/programme avoids lock-in of long-lived, high emission or climate-vulnerable infrastructure.

In Indonesia, constant pressure to keep electricity cost low favors more coal in the generation mix, where new coal plants are expected to lock in several million tons of GHG emissions during their useful life. The Gol has plans to add 10,000 MW of electricity generation from coal and 6,500 MW from gas by 2019 (See Section C.1). Once successfully implemented, this Project is expected to enable an additional 187-281 MtCO₂e over the lifetime of the generating assets, which represents a 18.7-28.1 percent of GCF's 1,000 MtCO₂e avoided from its existing 53 projects to date ([link to source](#)). The estimated development impact from the first tranche of GCF allocation is expected to be around 60% of the impact from the total project.

E.1.2. Key impact potential indicator

GCF core indicators	<i>Expected tonnes of carbon dioxide equivalent (t CO₂ eq) to be reduced or avoided (Mitigation only)</i>	<i>Annual</i>	6.2-9.3 MtCO ₂ e
		<i>Lifetime</i>	187-281 MtCO ₂ e
	<ul style="list-style-type: none"> <i>Expected total number of direct and indirect beneficiaries, disaggregated by gender (reduced vulnerability or increased resilience);</i> <i>Number of beneficiaries relative to total population, disaggregated by gender (adaptation only)</i> 	<i>Total</i>	Not applicable
		<i>Percentage (%)</i>	Not applicable
Other relevant indicators	<ul style="list-style-type: none"> <i>Additional electric power generation capacity enabled (1,000-1,500 megawatt (MW))</i> <i>Private capital mobilized for investment in geothermal Exploration (US\$0.5 billion)</i> <i>Private capital expected to be mobilized for investment in geothermal development over time (US\$ 3.5 billion)</i> 		

Methodology for calculating the project indicators:

- Expected tonnes of carbon dioxide equivalent (tCO₂ eq) to be reduced or avoided:* The CO₂ emissions reduction potential is estimated by subtracting projected lifetime emissions from a given sub-project (Sub-Project scenario) from the projected lifetime emissions in the BAU scenario (Baseline).
- Additional electric power generation capacity enabled (1,000 megawatt (MW)):* The generation capacity enabled is estimated by identifying the number of projects that can be supported by such a facility and the sizes of the pipeline projects that would be available to obtain financing support.
- Private capital mobilized for investment in geothermal power generation:* The investment required is estimated based on the cost data of the sub-projects being considered for inclusion under the Facility.

E.2. Paradigm Shift Potential

Degree to which the proposed activity can catalyze impact beyond a one-off project/programme investment

E.2.1. Potential for scaling up and replication (Provide a numerical multiple and supporting rationale)

Describe how the proposed project/programme's expected contributions to global low-carbon and/or climate-resilient development pathways could be scaled-up and replicated including a description of the steps necessary to accomplish it.

The proposed project expects to contribute to the global low-carbon development pathways by implementing an innovative risk mitigation approach that have the potential to be replicated in other geothermal-rich countries and regions. They may include but are not limited to Chile, Dominica, Mexico, Nicaragua, El Salvador, Costa Rica and Saint Lucia in Latin America; Ethiopia, Tanzania, Kenya and Djibouti in East Africa; Turkey and Armenia in Eastern Europe and the Balkans; and the Philippines and Fiji in the Pacific. The risk mitigation model developed under this Project could be adapted to country contexts to potentially facilitate a rapid world-wide scale-up of geothermal development through demonstration effects.

The approach is underpinned by three key elements:

- (i) The Project's approach to geothermal resource risk mitigation by providing financing support to the whole exploration drilling program as a package has been its most innovative feature. Instead of a well-based guarantee program like in Turkey or in Latin America, this Project will finance the whole exploration drilling program, including site infrastructure for eligible developers. This would allow for the developers' management of the drilling risks on a portfolio basis, spreading the risk cross projects. It will also be expected to reduce the administrative burden and time cost of well-based guarantee programs with long well testing time between wells drilling.
- (ii) The proposed Project is expected to enable the establishment of a facility that would provide support to de-risk a large number of geothermal projects. The facility is expected to attract new players with lower costs of funds and present a more equal playing field, while enabling participation of the existing, but lately dormant, private players with a view to take advantage of their drilling expertise and valuable in-house knowledge.
- (iii) The Project's implementation arrangement through a financial intermediary has been adapted to work within the currently underdeveloped financial markets and regulatory constraints in Indonesia. This would allow the Facility to reach a greater number of developers and inducing greater competition, thereby facilitating an expansion and deepening of the geothermal sector in Indonesia.

E.2.2. Potential for knowledge and learning

Describe how the project/programme contributes to the creation or strengthening of knowledge, collective learning processes, or institutions.

First, the Project will improve knowledge and capacity of key stakeholders in geothermal sector in Indonesia, contributing to achievement of the development objectives of the Project and the wider sector. The Project creates an avenue for key sector stakeholders, such as MEMR, MoF, PLN, and SMI to dialogue and solve challenges collectively – through provision of legal mandates, development of streamlined and more transparent licensing procedures to attract private developers and serving on joint committee to provide strategic guidance to improve the investment climate in the sector. Through the Project, the key stakeholders will also benefit from just-in-time technical assistance to take advantage of the state-of-the-art knowledge on drilling technology, legal advisory on contract management, international roadshow for tendering of geothermal prospects to attract the most technically qualified and financially solid investors and developers.

Second, the Project will contribute to the world's state of collective knowledge and experience on how to undertake a geothermal resource risk mitigation operation. The successful implementation of the facility for geothermal exploration drilling will showcase the benefits and impacts of such a facility to expand the geothermal market, while revealing how institutional, technical and operational challenges can be addressed. These lessons can be readily applied or adapted for other countries looking to develop a similar process and institution.

Third, the Project is expected to strengthen the link between educational institutions, such as the renowned Bandung Institute of Technology, to develop a cadre of market-ready engineers, scientists and researchers and the geothermal industry, as well as between the professional training institute in Yogyakarta and the government's technical staff and decision makers to improve the general state of knowledge around the geothermal sector, its most pertinent technical, economic and operational challenges and potential solutions. The link could be fostered through support to internship programs, vocational training and on-the-job learning.

E.2.3. Contribution to the creation of an enabling environment

Describe how proposed measures will create conditions that are conducive to effective and sustained participation of private and public sector actors in low-carbon and/or resilient development that go beyond the program. Describe how the proposal contributes to innovation, market development and transformation. Examples include:

- *Introducing and demonstrating a new market or a new technology in a country or a region*
- *Using innovative funding scheme such as initial public offerings and/or bond markets for projects/programme*

The proposed measures are expected to create conditions that are conducive to effective and sustained participation of private and public actors in low-carbon development through improvement of the overall investment climate and provision of tailored financing support for developers in the geothermal sector in Indonesia that could be applied to any other countries rich in geothermal resources. First, the technical assistance and capacity building support made available through Component 2 of the Project is expected to create enabling environment and transform the geothermal sector in Indonesia. Second, given the risk profile of the geothermal sector, the Facility is expected to improve the risk appetite for geothermal development through provision of low-cost financing and risk capital. Financing support will support the project viability, therefore incentivizing the developers to direct more capital towards geothermal development. The Facility's design also enables management of drilling risk on a portfolio basis, which has not been adopted at a national level anywhere else in the world. The innovative features of Project design have been clearly laid out in Section C.3 and E.2.

E.2.4. Contribution to regulatory framework and policies

Describe how the project/programme strengthens the national / local regulatory or legal frameworks to systematically drive investment in low-emission technologies or activities, promote development of additional low-emission policies, and/or improve climate-responsive planning and development.

In the past two decades, Indonesia has strengthened the body of national and local regulatory and legal frameworks, underpinned by the first Geothermal Law 2003, to systematically drive investment in the geothermal sector as one of its strategically important low-emission technologies. In supporting the Gol in establishing the resource risk mitigation facility and interacting directly with the private and public developers, it is observed that some of the recent regulatory changes – including a tariff ceiling for geothermal and other renewable sectors – have made geothermal projects not financially viable, hindering sector development at large.

Component 2 of the Project has identified specific interventions to strengthen the legal framework and regulatory environment for the geothermal in the long run. Regulatory support would be targeted at MEMR, with a view to improve the investment climate and doing business environment in the sector and addressing the key sectoral bottlenecks to scaling up geothermal development. This would cover, but is not limited to, support to MEMR in improving the tender process for unassigned WKPs and understanding of the economics and impacts of the existing RE (including geothermal) tariff system.

E.3. Sustainable Development Potential

Wider benefits and priorities

E.3.1. Environmental, social and economic co-benefits, including gender-sensitive development impact

Environmental co-benefits:

A significant scale-up of geothermal energy investment through the proposed Project is expected to deliver tremendous environmental benefits to Indonesia, mainly through the magnitude of avoidance of greenhouse gas emissions in Indonesia and beyond.

- *First*, it can be extracted without burning a fossil fuel such as coal, gas or oil and there is no combustion in the geothermal development process. Geothermal fields produce only about one-sixth of the carbon dioxide that a relatively clean natural gas-fueled power plant produces. Binary plants release essentially no emissions. While direct emissions do exist and are linked to the geology of the underground reservoir and fluids, these are dwarfed by the emissions of thermal power plants. At the local pollution level, geothermal power has negligible emissions of sulfur dioxide (SO₂), nitrogen oxide (NO_x), and total suspended particulates (TSP). In a closed loop geothermal system, there are no CO₂ emissions. With the most advanced technology and drilling techniques, the environmental impact of chemical release from the drilling process can be greatly minimized. Unlike other geothermal markets, GHG emissions from geothermal in Indonesia are negligible based on ongoing testing and measurement from existing and active fields.
- *Second*, geothermal operations have minimal freshwater requirements. For example, a geothermal plant uses on average five gallons of freshwater per megawatt-hour (MWh), while binary air-cooled plants use no fresh water. Coal- and gas-fired facilities in contrast use hundreds of gallons of freshwater.
- *Third*, geothermal drilling has a smaller footprint than conventional energy extraction operations, as a relatively small area of land is needed for reinjection and production wells thanks to minimal equipment. Horizontal drilling techniques and programs will also allow for avoidance of critical conservation or protection forest areas and minimize habitat disturbance issues. The presence of major drilling management firms such as Halliburton and Schlumberger also mean that the most advanced and efficient technologies will be employed to ensure the most sustainable drilling techniques.

Social and economic co-benefits:

The socio-economic benefits brought by this Facility are mainly related to energy security and job creation for both men and women.

- *First*, the proposed Project will enable drilling activities, thereby contributing to direct job creation for skilled and manual workers engaged in drilling, civil works, infrastructure construction and auxiliary services in up to 20 locations throughout Indonesia. According to the Geothermal Energy Association, a typical 50 MW geothermal project could generate employment for approximately 860 people with diverse skills over its full development cycle. Furthermore, as discussed in descriptions of Component 2 in Section C.2, the Project will support efforts in working closely with developers at corporate level and academic institutions in creating and improving the opportunities for female engineers and project managers in the geothermal sector, and to the extent possible, enhance the participation and employment of women in geothermal developers.
- *Second*, geothermal power can have great implications for greening and diversifying the energy mix and increasing energy security of Indonesia and other geothermal-rich countries. Geothermal energy is not affected by price fluctuations and delivery of fuels, as is the case of higher-polluting alternatives. The replenishment of heat from natural processes and modern reservoir management techniques enable sustainable use of geothermal resources – the same cannot be said about fossil fuels. With appropriate resource management, the tapped heat from an active reservoir is continuously restored by natural heat production, conduction and convection from surrounding

hotter regions, and the extracted geothermal fluids are replenished by natural recharge and by injection of the depleted (cooled) fluids.

E.4. Needs of the Recipient

Vulnerability and financing needs of the beneficiary country and population

E.4.1. Vulnerability of country and beneficiary groups (Adaptation only)

Describe the scale and intensity of vulnerability of the country and beneficiary groups, and elaborate how the project/programme addresses the issue (e.g. the level of exposure to climate risks for beneficiary country and groups, overall income level, etc).

Not applicable

E.4.2. Financial, economic, social and institutional needs

Describe how the project/programme addresses the following needs:

- *Economic and social development level of the country and the affected population*
- *Absence of alternative sources of financing (e.g. fiscal or balance of payment gap that prevents from addressing the needs of the country; and lack of depth and history in the local capital market)*
- *Need for strengthening institutions and implementation capacity.*

As discussed extensively in Sections B.3, C.1 and C.4, this proposed Project fill the gap of a shallow local capital market unable to provide adequate and attractive financing terms to geothermal developers. As a key development objective, it also aims to support the Gol in bringing on-line on a mass scale more reliable and cheaper power in the fossil fuel-dominated national grids. Following exploration drilling which will be cost-shared between the Facility and the developers under the proposed Project and where the resources are confirmed, the developers will be able to access project finance from the market. Component 2 sets out to provide the pre-identified technical assistance and capacity building for the implementing entity as well as the broader group of stakeholders in ensuring that the exploration drilling results will constitute an integral part of the geothermal data package that can be used to raise adequate financing for the exploitation of the resources and power plant development.

E.5. Country Ownership

Beneficiary country (ies) ownership of, and capacity to implement, a funded project or programme

E.5.1. Existence of a national climate strategy and coherence with existing plans and policies, including NAMAs, NAPAs and NAPs

Please describe how the project/programme contributes to country's identified priorities for low-emission and climate-resilient development, and the degree to which the activity is supported by a country's enabling policy and institutional framework, or includes policy or institutional changes.

The proposed Facility seeks to contribute to Indonesia's identified priorities for low-emission and climate resilient development as described in Section C.1; and is supported by the country's enabling policy and institutional framework as outlined in Sections C.6 and E.2.4.

E.5.2. Capacity of accredited entities and executing entities to deliver

Please describe experience and track record of the accredited entity and executing entities with respect to the activities that they are expected to undertake in the proposed project/programme.

SMI has extensive experience in managing the World Bank's and other donors' safeguards policies and complying with relevant fiduciary procedures and standards under the Indonesia Investment Guarantee Fund (IIGF), Indonesia Infrastructure Facility Fund (IIF) and the Regional Infrastructure Development Fund (RIDF). As the Executing Entity

for the Project, SMI has been screened for capacity under the proposed Project in three main areas: (i) technical and financial due diligence, (ii) environmental and social safeguards management, and (iii) fiduciary management, including procurement and financial management. The detailed assessments are as follows.

Technical and financial due diligence: Refer to Sections C.2, C.3 and G.2.

Environmental and social safeguards management:

SMI has developed a specific Operations Manual and Environmental and Social Management System (ESMS) for use on its programs supporting local government investments through various infrastructure funds. They have a safeguards team in the Environmental Social Safeguard and Business Continuity Management (ESS&BCM) Division under the Risk Management Directorate, with qualified and experienced staff members. This team will be responsible for overseeing the implementation of the Environmental and Social Management Framework (ESMF) to be developed for GREM.

On the geothermal sector, SMI has been engaging with the World Bank on the on-going GEUDP, the first window of the proposed Resource Risk Mitigation Facility, for which the ESMF was developed and duly implemented. This document details the environmental and social safeguard policies, principles, procedures, institutional arrangements, and workflows of SMI to guide the avoidance, minimization, or mitigation of any adverse environmental or social impacts of infrastructure projects supported by the GEUDP. Furthermore, SMI has brought on board one Environmental Specialist and one Social Specialist under the GEUDP's Project Management Unit (PMU), which is expected to be expanded to support GREM. SMI's corporate Project Advisory Division has access to a pool of on-call environmental and social expert consultants ready to support the Project.

Fiduciary management:

Financial Management (FM). This financial management of the several World Bank projects implemented by SMI has been rated satisfactory, reflecting SMI's capacity and their institutional arrangement in place to uphold high fiduciary standards by MDBs. A Financial Management Assessment (FMA) for the proposed Project will be prepared as part of ongoing World Bank's project preparation process and is expected to be completed by September 2018. Further detailed financial management arrangements will be fleshed out at the time of Appraisal, including on the use of international financing reporting and auditing standards.

Procurement. The proposed operation envisages on-lending by SMI to (i) public sector developers, including state-owned enterprises (SOEs), and joint ventures formed between SOEs and private partners; and (ii) private sector developers. For sub-loans to SOEs, the procurement of goods, works, non-consulting services, and consulting services shall follow the World Bank Procurement Guidelines for Investment Project Financing (IPF) Borrowers dated November 2017. For private developers, the Bank guidelines will not apply; and the procurement will be done on a commercial practice basis. Normally, projects implemented by a PPP that is majority-owned by the public partner, would be subject to World Bank procurement guidelines. However, if the PPP is set up in a way to ensure private sector control of all operational decisions it may be more correct to look at this as a private sector entity. This issue will be assessed based on a broader review of the proposed joint ventures structures, which is expected to be finalized in the coming months of project preparation.

E.5.3. Engagement with NDAs, civil society organizations and other relevant stakeholders

Please provide a full description of the steps taken to ensure country ownership, including the engagement with NDAs on the funding proposal and the no-objection letter. Please also specify the multi-stakeholder engagement plan and the consultations that were conducted when this proposal was developed.

The proposed Project has been prepared in close coordination with the Ministry of Finance as the NDA and SMI as the executing entity, as well as the broader stakeholders in the geothermal sector in Indonesia. Their inputs have been duly reflected in the project design and the requested capacity building activities as part of the project design. MoF's commitment of US\$150 million of parallel financing from the government fund for geothermal sector demonstrates strong support from Gol for the proposed project. A draft of this Funding Proposal has also been shared with the NDAs early on for feedback. At the sub-project level, community consultations, including with local governments, will be a requirement as part of the implementation of the Project's Environmental and Social Management Framework. SMI will review and oversee compliance with the safeguards requirements by the developers.

E.6. Efficiency and Effectiveness

Economic and, if appropriate, financial soundness of the project/programme

E.6.1. Cost-effectiveness and efficiency

Describe how the financial structure is adequate and reasonable in order to achieve the proposal's objectives, including addressing existing bottlenecks and/or barriers; providing the least concessionality; and without crowding out private and other public investment. Please describe the efficiency and effectiveness, taking into account the total project financing and the mitigation/ adaptation impact that the project/programme aims to achieve, and explain how this compares to an appropriate benchmark. For mitigation, please make a reference to [E.6.5 \(core indicator for the cost per tCO₂eq\)](#).

The proposed Project aims to address resource risk (also known as drilling/exploration risk), which constitutes the biggest barrier to obtaining commercial financing for resource exploitation. Concessional financing from GCF and WB combined with government funds will help developers finance highly risky exploration drilling (mainly due to resource uncertainties) and related infrastructure development. It will bridge the financing gap between equity investors and commercial lenders. In Indonesia, geothermal exploration drilling comes with a hefty price tag of up to US\$8 million per full-sized well plus supporting infrastructure, which can be prohibitive for developers not guaranteed downstream returns on their pre-production investments, if sufficient resource is not found or the exploration is deemed unsuccessful. Slim-holes can be used at the cost of about US\$2-3 million per well on average, but they would not be able to be converted into production wells if the resource is confirmed.

In the past few years, geothermal exploration activities in Indonesia have been lackluster at best, given the high resource risk, low off-take price environment, and shallow capital market development. Instead of relying on costly equities, the combination of concessional financing and risk capital mobilized through this Project to facilitate up to 5.8 GW of geothermal capacity by 2026 is merited. It is expected that an initial capital contribution of US\$500 million from GCF and WB for resource risk mitigation will enable development of about 1 GW of geothermal capacity, and in doing so, leveraging at least US\$4 billion of total financing for downstream investments – most of which will come from the private sector. The Project is expected to contribute to an annual GHG emission reductions of at least 6.3 MtCO₂. More in-depth financial viability and economic analysis of the Facility and sub-projects are provided in Section E.6.3.

E.6.2. Co-financing, leveraging and mobilized long-term investments (mitigation only)

Please provide the co-financing ratio (total amount of co-financing divided by the Fund's investment in the project/programme) and/or the potential to catalyze indirect/long-term low emission investment. Please make a reference to [E.6.5 \(core indicator for the expected volume of finance to be leveraged\)](#).

Co-Financing and Leverage Factor

The GCF funding contribution of US\$185 million would be co-financed by a US\$325 million IBRD loan. On top of the IBRD co-financing, US\$150 million of parallel financing would be provided by Gol/SMI as loans. With an added US\$100 million as equity contributions which would be injected by the private developers receiving support through private sector window, it is expected that at least US\$4 billion of total investments with more than US\$3 billion coming from

the private sector will be mobilized. This translates to the following leverage ratios: (i) WB to GCF co-financing: 1.8 to 1; (ii) private financing to GCF: 18 to 1; and (iii) total financing to GCF: 22 to 1.

Long-term Investments

The proposed Project is in line with the Government's intention of strategically putting in government funds in the early stages in order to unlock private sector financing for geothermal development. It is expected that the lion's share of the investments needed to develop the planned 5.8 GW of geothermal capacity as a low-emission source of electricity over the next eight years would need to come from commercial sources, and that these funds would be leveraged through public-private partnerships.

E.6.3. Financial viability

Please specify the expected economic and financial rate of return with and without the Fund's support, based on the analysis conducted in [F.1](#). Please describe financial viability in the long run beyond the Fund intervention. Please describe the GCF's financial exit strategy in case of private sector operations (e.g. IPOs, trade sales, etc.).

Financial Viability of Geothermal Development

The viability of geothermal development has been assessed by looking at a typical medium/large project (55 MW) expected to be situated in the major power markets of Sumatra and Java-Bali, and a typical small project (10 MW) in eastern Indonesia. *Without the Project*, neither the larger 55 MW nor the smaller 10 MW geothermal development will be financially viable due to high equity requirements for exploration phase in combination with an unmitigated resource risk. This fact has constrained geothermal development in Indonesia till now.

With the Project, calculations show that FIRR for a private investor will be adequate to meet or exceed his required return on investment for the 55 MW case - even for low enthalpy scenarios. For the 10 MW plant, high or medium enthalpy resources would, marginally, allow a private developer an adequate return whereas an SOE, due to their lower hurdle rate, would be able to develop the 10 MW plant in all enthalpy scenarios.

Long-Term Sustainability of Facility

The attached Integrated Financial Model provides details on the use of each funding source and demonstrates the long-term financial sustainability of the Facility based on a portfolio approach to geothermal development, where success mitigates the downside of failed drilling campaigns that may prevent a developer from retaining a license and furthering development. In terms of upside, a success fee has been modelled into the project design and must be paid by the developer to SMI (who will eventually return the funds to GCF), when the project reaches financial closure. The model allows to change the success fee on the "Facility Level Summary" tab, hence allowing real time scenario modeling of the facility outcomes. It is noted that after the project implementation period, the Bank would not be taking on fiduciary and safeguards responsibilities.

E.6.4. Application of best practices

Please explain how best available technologies and practices are considered and applied. If applicable, specify the innovations/modifications/adjustments that are made based on industry best practices.

Geothermal is a mature technology that uses the earth's underground heat to produce electricity. The first attempt to produce electricity out of geothermal resources dates back to over 100 years ago. In 1904, the world's first geothermal power plant to test the production of electricity out of a dry steam-field was established in Larderello, Italy. After over a century of developments, geothermal technologies have constantly been improved to provide technical solutions to develop projects that were previously considered not feasible. This would include (i) drilling of deeper wells, (ii)

horizontal drilling to avoid forest or protected areas, (iii) production of fractures to improve resource flow or to create large and sustainable reservoirs, also known as Enhanced Geothermal Systems, and (iv) introduction of efficient binary cycle power plant with lower overall power production costs. For smaller subprojects in the project pipeline, it is expected that some would use slim-holes at the per-well cost of about US\$2-3 million, to reduce the cost of the exploration drilling program, though there is a need to consider the disadvantage that they cannot be converted into production wells if the resource is confirmed.

Furthermore, the design of the Facility has benefitted from a review of the similar programs such as the World Bank-supported Turkey Geothermal Development Project and Armenia Geothermal Exploratory Drilling Project, the African Rift Geothermal Development Program (ARGeo), and KfW's Geothermal Risk Mitigation Facility for East Africa and Geothermal Development Facility for Latin America. This project's design is informed by an understanding of the options related to business model, implementation arrangement and flow of funds in these programs and adapt to the Indonesian context.

E.6.5. Key efficiency and effectiveness indicators

Estimated cost per t CO₂ eq, defined as total investment cost / expected lifetime emission reductions (mitigation only)

(a) Total project financing	US\$ 4 billion
(b) Requested GCF amount	US\$ 185 million
(c) Expected lifetime emission reductions overtime	187 MtCO ₂ eq
(d) Estimated cost per tCO₂eq (d = a / c)	US\$ 21.4 / tCO₂eq
(e) Estimated GCF cost per tCO₂eq removed (e = b / c)	US\$ 1 / tCO₂eq

GHG accounting methodology. The project implementation period does not include the construction of power plants. The expected geothermal capacity will be counted at financial closure. Depending on whether SMI will be able to recycle funds beyond the 10-year project period the facility would be able to support more projects resulting in more MWs. Based on this, a two-phase analysis will be carried out: pre- and post-drilling. The assumptions behind the analysis are:

GCF
core
indicators

- **Pre-Drilling.** The CO₂ emissions reduction potential is estimated by subtracting projected lifetime emissions from a given sub-project (Sub-Project scenario) from the projected lifetime emissions in the BAU scenario (Baseline). In the Sub-Project scenario, CO₂ emissions are estimated using an average emission factor for geothermal energy facilities of 62.9 tCO₂e/GWh. In the Baseline scenario, CO₂ emissions are estimated based on the combined margin grid emission factor of 838 tCO₂e/GWh. The net emission factor is therefore calculated as 838 tCO₂e/GWh minus 62.9 tCO₂e/GWh, which gives 775 tCO₂e/GWh. The emission factors assumed are in line with the World Bank GHG guidelines.
- **Post-Drilling.** A specific requirement for final borrowers to submit evidence on GHG emissions as part of the Project's monitoring and evaluation framework will be included. This is in line with the industry practice and the World Bank will encourage geothermal developers benefitting from its financing to collect and share project data that may eventually help reconcile pre-drilling estimates with post-drilling findings.

Emissions from possible deforestation which were derived from emission factors expressed in terms of t/hectare, areas of lands needed for drilling (approximately 2~3 ha/one standard well pad), and expected number of wells to be drilled are calculated as 59,870 ton based on the pre-identified pipeline. This emissions from the deforestation is reflected in the project GHG accounting although it is negligible compared to the GHG emission reduction amount from the project. Emissions from the drilling phase is already considered in the emission factor (62.9 gCO₂e/kWh) used in the current calculation and the

	<p>number is country specific. The estimated development impact from the first tranche of GCF allocation is expected to be around 60% of the impact from the total project.</p>
	<p>Expected volume of finance to be leveraged by the proposed project/programme and as a result of the Fund's financing, disaggregated by public and private sources (mitigation only)</p>
	<p>The Facility's two new lending windows are expected to be financed with an initial capital of US\$500 million: (i) US\$175 (T1:US\$97,5) million from GCF; (ii) US\$325 million loan from IBRD to SMI⁸ (co-financing); and in addition (iii) US\$150 million from Gol to SMI (parallel financing) as well as leveraged equity contributions from the private sector are expected in the measure of US\$100 million. It is expected that MoF would be providing backstopping in terms of potential partial loan forgiveness for SOEs.</p>
<p>Other relevant indicators (e.g. estimated cost per co-benefit generated as a result of the project/programme)</p>	<p>The relevant indicators for the proposed operation have been considered.</p>

The information can be drawn from the project/programme appraisal document.

F.1. Economic and Financial Analysis

Economic Analysis

The proposed Project will contribute to Indonesia's geothermal development goal of adding 5.8 GW by 2026, and by doing so, will contribute to: (i) displacing highly-polluting alternatives; (ii) diversifying Indonesia's generation portfolio; and (iii) ultimately contributing to lowering emissions from the energy sector in comparison to a BAU scenario. An economic analysis was carried out to assess the economic viability of two sample sub-project candidates (the full development of a 55 MW and a 10 MW power plant), and the results are presented below.

Cost-benefit analysis

The economic cost estimates were derived based on known or inferred relationships between costs and technical characteristics of geothermal projects, excluding taxes and duties. Investment costs of geothermal development are determined by the following factors: (i) size of the development (MW) determined by both resources availability and demand; (ii) the enthalpy and depth of the resources; (iii) difficulty of access to the concession area; and (iv) cost and efficiency of project management.

In terms of composition, geothermal development comprises four types of costs: (i) drilling costs, a function of the number wells and the cost of each well; (ii) infrastructure costs for construction roads, well pads and other infrastructure facilities; (iii) equipment costs, including power plant and steam field above ground systems (SAGS); and (iv) project management costs.

Drilling cost is a function of the following factors: (i) well productivity; (ii) success rate of drilling; (iii) well depth, and (iv) prevailing services and material cost. Well productivity, in turn, depends largely on the enthalpy of the resources and well permeability (i.e. the ease with which fluids flow into the well).

Three enthalpy scenarios were assumed in the analysis: (i) low enthalpy, i.e., temperature between 180°C and 230°C; (ii) medium enthalpy with temperature above 230°C but relatively low pressure⁹; and (iii) high enthalpy with both high temperature and high pressure. The base case scenario assumes medium enthalpy for both fields. It was further assumed three wells will be drilled at the exploration phase.

⁸ Either direct loan or on-lent via MoF.

⁹ Defined as less than 10% excess enthalpy compared to reservoir temperature when measured in a discharging well with at least 5 barg WHP, a definition agreed with MEMR albeit minor inconsistencies with the international conventions.

Infrastructure Costs are driven primarily by the difficulty in site access. The analysis laid out three scenarios: (i) easy access with initial access road length ranging between 0 and 7.5 km from existing public access road; (ii) medium with initial access road between 7.5 km and 20 km; and (iii) difficult with initial access road longer than 20 km.

Power Plant Equipment Costs were assumed at US\$1,500 per kW for a standard single-unit 55 MW plant, and \$1,650 per kW for the 10 MW plant. For any other sizes, the plant costs were estimated using an experiential formula derived from actual plant cost data.¹⁰

Assuming medium enthalpy and easy access, the total cost of geothermal development under the base case scenario was thus estimated at US\$209.3 million for the 55 MW site, and US\$41.2 million for the 10 MW site.

Table 3 – Total Investment Cost

	Development 1 (US\$ million)	Development 2 (US\$ million)
Drilling	90.5	18
Infrastructure	7.1	3.3
Power plant and SAGS	101.8	18
Project management	10	2
Total	209.3	41.2

Benefits

The economic benefits of each development comprise two parts: (i) the economic value of the power supply from the plant; and (ii) the avoided cost in CO2 emissions vis-à-vis thermal powered generation.

Plant Factor. A plant factor of 92% was assumed based on experience from operations of existing geothermal power plants in Indonesia.

Power supply. The annual power output amounts to 443.3 GWh from the 55 MW plant, and 80.6 GWh from the 10 MW plant.

The economic value of the power supply from each geothermal development is estimated as the weighted average of the cost of diesel-based power supply it substitutes and the willingness-to-pay for the additional power supply it enabled to provide access to un-electrified households.

Table 4 – Economics Analysis, ENPV and EIRR Results

	Development 1 55 MW	Development 2 10 MW
ENPV @ 6% discount rate	US\$240.7 million	US\$166.3 million
EIRR	16.4%	32.4%

¹⁰ Single unit plant cost = 1.6051 * (MW)^{-0.316}

Financial Analysis.

The Financial Analysis (FA) was carried out from two different perspectives: (i) one from the developer's perspective, assessing the financial viability of the 55 MW and 10 MW developments on a with- and without-project bases; (ii) the other from the implementing agency's perspective, assessing its cash in- and out-flows related to the Facility.

From a Developer's Perspective

Financing mix. In Indonesia, the costs of geothermal exploration are typically born by the developer through full equity financing because debt financing is usually not available at this stage of the development due to the high levels of resource uncertainties. Once resources risks are greatly reduced, developers can access debt financing more easily. Thus, in the without-Project scenario the financing mix is assumed to vary from full equity financing at the exploration stage, to a 70/30 debt-to-equity thereafter.

Financing cost. Each stage of geothermal development is associated with a certain amount of risks and capital requirements. Although the capital requirements are higher in later stages, the resource risks at early exploration stages are often deemed insurmountable from a financial perspective, stalling the sector's development. Developers would demand a risk premium commensurate with the high resource uncertainty associated with the exploration stage of the geothermal development.

Cost of capital. A cost of debt at 8.0% and corporate tax at 25% have been assumed.

Outcome of the financial analysis from a developer's perspective:

- *Without the Project intervention*, the 55 MW and 10 MW geothermal developments are unlikely to be pursued due to high equity exploration costs coupled with real and perceived geothermal development-related risks. A coal baseline for the country's main load centers and a diesel baseline (with less electrification) for the smaller island grids of Eastern Indonesia would likely be the alternative scenarios; and
- *With the Project* calculations show that FIRR for a private investor will be adequate to meet or exceed his required return on investment for the 55 MW case - even for low enthalpy scenarios. For the 10 MW plant, high or medium enthalpy resources would, marginally, allow a private developer an adequate return whereas an SOE, due to their lower hurdle rate, would be able to develop the 10 MW plant in all enthalpy scenarios.

From the Implementing Agency's Perspective

Facility Capitalization. The proposed Facility would be capitalized with the following contributions: (i) US\$175 million through GCF; (ii) US\$325 million from IBRD; and (iii) as parallel financing, US\$150 million from SMI through PISP.

Investment Mix. The proposed Facility would be supporting public, private and public-private partnership (PPP) investments, based on a pipeline of WKPs designated by MEMR. The pipeline as well as the site specifications, such as ease of access and expected sizes, have been included in the financial model.

Development Success Rate. For purposes of the financial analysis, the development success rate (including resource risk and downstream development) is assumed to be 75%. This is in line with a development success rate range of 75%-80% for Indonesia. It is noted that with a single well success rate, the likelihood that the well can be used for steam production is around 55%-60%, and that a normal site success criteria is two-thirds of the exploration wells being productive.

Funding Considerations. Funding eligibility and mix for each Facility window are shown in the table below.

Table 5 - Funding Eligibility and Mix

Loan Eligibility	PUB		PRIV
	Exploration	Delineation/Refinancing of Exploration	Exploration and Delineation
Max facility share of total investment	100%	100%	75%

Outcome of the financial analysis from the implementing agency's perspective:

- It is expected that at least 1,000 MW of new geothermal capacity could be enabled, thus leveraging at least US\$4,000 million and reducing GHG emissions by 6.3 MtCO₂ annually.

With the first tranche of US\$97.5 million, the Project is still considered viable.

F.2. Technical Evaluation

Please provide an assessment from the technical perspective. If a particular technological solution has been chosen, describe why it is the most appropriate for this project/programme.

Geothermal technologies use hydrothermal resources that have both water (hydro) and heat (thermal). Depending on the site and resource characteristics observed from surface manifestations and various geoscientific studies, there are three main types of technologies for the exploration drilling phase: ground source heat pumps, direct use, and deep and enhanced geothermal systems (EGS). The developers are expected to submit, as part of the sub-project funding proposal, a drilling program that will include considerations for the optimal technology for a given site, which will ultimately be vetted by SMI and its technical expert consultants.

F.3. Environmental, Social Assessment, including Gender Considerations

Describe the main outcome of the environment and social impact assessment. Specify the Environmental and Social Management Plan, and how the project/programme will avoid or mitigate negative impacts at each stage (e.g. preparation, implementation and operation), in accordance with the Fund's Environmental and Social Safeguard (ESS) standard. Also describe how the gender aspect is considered in accordance with the Fund's Gender Policy and Action Plan.

The Project will target prospective geothermal work areas across the Indonesian archipelago. Although the project locations are not yet defined, screening of potential sites indicates that they are likely to be remote areas, potentially with agricultural land uses, forests, surface geothermal features and landscapes, and potentially other types of natural habitats within the project area of influence. Infrastructure such as roads and wharfs may be basic and require upgrading to allow rigs to get to site. Indigenous people may be present in the project area of influence. Geothermal developments may not be well understood by the host communities, and there is the potential that host communities are not connected to an electricity grid or have other basic infrastructure. Locations and scope of the environmental and social impacts of projects seeking financing from SMI will be determined during the screening and appraisal of the proposals.

The developer's proposals for financing will consist of the activities for geothermal upstream resource development (exploration and delineation drilling). These activities will result in adverse environmental and social impacts and each proposal could fall as Category A or B. The potential environmental and social impacts might be significant, diverse and irreversible.

Exploration involves construction of access roads, mobilization and operation of large, heavy drilling rigs, construction of work camps. Potential impacts include: (i) impacts on soils, vegetation, biodiversity and the surface water network due to the construction of access roads and drilling platforms during the exploration phase, and production drillings, steam pipelines, powerhouses, road networks, and transmission lines during the operational phase; (ii) potential damage to, or conversion of natural habitats, as a significant percentage of geothermal resources is located in or near terrain on which forest cover is to be maintained for watershed protection; (iii) temporary and permanent land acquisition, or damage to, or loss of assets or livelihoods; (iv) damage or disturbances to physical cultural resources; (v) damage or disturbances to geothermal features, water supplies, community infrastructure; and (vi) production, handling, storage and disposal of drilling mud and fluids during the exploration phase; (vii) production, storage and handling of brines, noise and visual impacts during the production phase.

As part of standard practice for geothermal industry and in Indonesia, developers are required to return the site to prior drilling state in the demobilization process. Compared to most other technologies, geothermal drilling has small and confined footprint. Nevertheless, 60 percent of the geothermal sites in Indonesia tend to be in forest areas. The World Bank will consult with the lawyers in considering a strategy for re-forestation of unsuccessful sites, including the possibility of making it contractually binding.

The ESMF has provided three stages of screening: (1) desk review of the long list of potential sites to exclude non-starters such as sites within biodiversity reserves; (2) document review/field reconnaissance to identify any fatal flaws in sites proposed for further consideration, such as no way to evacuate power except through a protected area; and (3) undertake screening to determine what level of environmental assessment should be prepared for a site where exploration is planned. The ESMF will include model terms of reference for ESIA and Environmental and Social Management Plans (ESMPs). In addition to assessment of exploration impacts, sub-project-level ESIA and ESMPs will identify the key potential impacts of site development and operation along with mitigation requirements and approximate costs, as this information will be relevant to the decision whether or not to explore. The World Bank will review and approve the TORs for TA activities. The ESMF will provide guidelines for assessing environmental and social consequences of proposed reforms, to be applied by the entities conducting the TA, and the team will review the results of such assessments prior to implementation of the reforms. The WBG EHS Guidelines will apply to the Project, both the general guidelines and those for geothermal power generation.

Along with the implementation of safeguard for environmental and social issues, careful attentions and considerations will be made for gender aspects in the design and implementation of the project. Gender assessments will be carried out along with the sub-project level ESIA and ESMPs to identify and resolve gender issues associated with the exploration activities such as female employment etc. This practice will follow the gender related recommendations to be made in the Operations Manual.

F.4. Financial Management and Procurement

Describe the project/programme's financial management and procurement, including financial accounting, disbursement methods and auditing.

Financial Management (FM). This financial management of the several World Bank projects implemented by SMI has been rated satisfactory, reflecting SMI's capacity and their institutional arrangement in place to uphold high fiduciary standards by MDBs. A Financial Management Assessment (FMA) for the proposed Project will be prepared as part of ongoing World Bank's project preparation process and is expected to be completed by early September 2018 prior to the GCF Board decision. SMI will follow World Bank procurement guidelines, including independent auditing arrangements, use of IFRS and quarterly financial reporting. Designated trust fund account will be established for GCF funds by the World Bank and SMI.

Procurement. The proposed operation envisages on-lending by SMI to (i) public sector developers, including state-owned enterprises (SOEs), and joint ventures formed between SOEs and private partners; and (ii) private sector developers (i.e., IPPs). For sub-loans to SOEs, the procurement of goods, works, non-consulting services, and

consulting services shall follow the World Bank Procurement Guidelines for Investment Project Financing (IPF) Borrowers dated November 2017.

G.1. Risk Assessment Summary

Please provide a summary of main risk factors. Detailed description of risk factors and mitigation measures can be elaborated in G.2.

The Risk factors are described in detail in Section G.2.

G.2. Risk Factors and Mitigation Measures

Please describe financial, technical and operational, social and environmental and other risks that might prevent the project/programme objectives from being achieved. Also describe the proposed risk mitigation measures.

Selected Risk Factor 1

Description	Risk category	Level of impact	Probability of risk occurring
The GoI has set clear strategies and policies to develop the geothermal sector. There have however been significant and frequent changes in the regulatory framework, which has introduced uncertainties in the sector and deterred investments. First, the most recent tariff policy requiring power price to be competitive with the average cost of generation in a region rather than the marginal economic costs of new supply appears to create an additional barrier to bringing on-line renewable energy more broadly and geothermal energy more specifically. This can become a disincentive for geothermal development in areas with low average costs, including large power markets with rich geothermal resources and large power demand, such as Java and Sumatra. Second, uncertainty related to post-exploration business-to-business negotiations of PPA sales price with PLN may prevent developers from investing in exploration. This uncertainty could be compounded by the new requirement for ministerial approval of PPA sales price, which may be perceived as excessive scrutiny and may further deter investors.	Technical and operational	Low (<5% of project value)	Medium

Mitigation Measure(s)

Please describe how the identified risk will be mitigated or managed. Do the mitigation measures lower the probability of risk occurring? If so, to what level?

Through the Technical Assistance Component, the project team will continue dialogue with key policy-makers and stakeholders on ameliorating the regulatory barriers to the sector.

Selected Risk Factor 2

Description	Risk category	Level of impact	Probability of risk occurring
The Project aims to establish a first-of-its-kind Facility to support exploration drilling by geothermal developers in Indonesia. The Project design is still being tested with key stakeholders and issues related to legal,	Technical and operational	Low (<5% of project value)	Medium

operational, financial, and commercial risks for different parties will be considered and addressed.			
Mitigation Measure(s)			
<p><i>Please describe how the identified risk will be mitigated or managed. Do the mitigation measures lower the probability of risk occurring? If so, to what level?</i></p> <p>The financing terms will need to reflect market conditions and developers' risk appetite. The team is undertaking extensive market sounding to ensure adequate uptake for the Facility, while working with key government stakeholders to ensure the enabling legal framework for such a Facility is in place.</p>			
Selected Risk Factor 3			
Description	Risk category	Level of impact	Probability of risk occurring
Piloting a new financing facility with a complex modus operandi has inherent risks related to the institutional capacity of the key entities and stakeholders involved in establishing, managing, and overseeing such an innovative mechanism.	Technical and operational	Low (<5% of project value)	Medium
Mitigation Measure(s)			
<p><i>Please describe how the identified risk will be mitigated or managed. Do the mitigation measures lower the probability of risk occurring? If so, to what level?</i></p> <p>There is high-level support and commitment toward this Project among the key stakeholders, which provide momentum to address the main institutional bottlenecks both at the ministries and at SMI. The Technical Assistance Component will be designed to address the capacity issues and will focus on specific policies / regulations / practices to unblock some of the existing constraints and facilitate investment into the geothermal sector. Furthermore, the Bank will build on its ongoing experience of working with SMI, MEMR, and PLN, as well as draw on international experience in supporting efforts to improve the geothermal investment through extensive dialogues and consultations with developers and private sector stakeholders.</p>			
Selected Risk Factor 4			
Description	Risk category	Level of impact	Probability of risk occurring
The major procurement risks currently envisaged are SMI's capacity for due diligence and oversight of implementation of complex drilling operations by SOEs. The procurement risks will be further assessed during project preparation and mitigation measures agreed. For each sub-project, the SOEs will also be required to develop Project Procurement Strategy for Development (PPSD) with support from the Bank and SMI.	Technical and operational	Medium (5.1-20% of project value)	Medium
Mitigation Measure(s)			
<p><i>Please describe how the identified risk will be mitigated or managed. Do the mitigation measures lower the probability of risk occurring? If so, to what level?</i></p> <p>PPSD will include inter alia a market analysis to design the appropriate approaches to the market and to facilitate preparation of the procurement plan. The need for hiring the consultants by SMI for carrying capacity assessment of</p>			

SOEs with market analysis and preparation of PPSD, and supporting SMI in overseeing the procurement and contract management by SMI will also be discussed during the early stages of project preparation.

Selected Risk Factor 5

Description	Risk category	Level of impact	Probability of risk occurring
There are potential direct and negative impacts during project implementation are associated with exploration infrastructure, such as access roads, drilling pads, extraction of geothermal water, and discharges of water and drilling muds. There are also potential long-term impacts from induced development and the benefits of renewable electricity generation.	Social and environmental	Medium (5.1-20% of project value)	Medium

Mitigation Measure(s)

Please describe how the identified risk will be mitigated or managed. Do the mitigation measures lower the probability of risk occurring? If so, to what level?

Some environmental impacts may be considered irreversible or unprecedented without adequate mitigation and management, which is outlined in detail in the accompanying ESMF. With regards to social issues, land acquisition is expected to be willing buyer-willing seller. In previous Bank-financed project implemented by PGE in Lahendong and Ulubelu, land acquisition was conducted through direct negotiation and there was no involuntary resettlement. The infrastructure, access route and drilling program can be adjusted in case land-owners object to releasing their land.

Other Potential Risks in the Horizon

Please describe other potential issues which will be monitored as “emerging risks” during the life of the projects (i.e., issues that have not yet raised to the level of “risk factor” but which will need monitoring). This could include issues related to external stakeholders such as project beneficiaries or the pool of potential contractors.

Not applicable

** Please expand this sub-section when needed to address all potential material and relevant risks.*

H.1. Logic Framework.

Please specify the logic framework in accordance with the GCF's [Performance Measurement Framework](#) under the [Results Management Framework](#).

H.1.1. Paradigm Shift Objectives and Impacts at the Fund level¹¹

Paradigm shift objectives

<i>Shift to low-emission sustainable development pathways</i>	The proposed Project expects to contribute to Indonesia's shift to low-emission sustainable development pathways by implementing an innovative risk mitigation approach that have the potential to be replicated in other geothermal-rich countries and regions. They may include but are not limited to Chile, Dominica, Mexico, Nicaragua, El Salvador, Costa Rica and Saint Lucia in Latin America; Ethiopia, Tanzania, Kenya and Djibouti in East Africa; Turkey and Armenia in Eastern Europe and the Balkans; and the Philippines and Fiji in the Pacific. The risk mitigation model developed under this Project could be adapted to country contexts to potentially facilitate a rapid world-wide scale-up of geothermal development through demonstration effects.					
---	---	--	--	--	--	--

Expected Result	Indicator	Means of Verification (MoV)	Baseline	Target		Assumptions
				Mid-term (if applicable)	Final	

Fund-level impacts

<i>M1.0 Reduced emissions through increased low-emission energy access and power generation</i>	Tonnes of carbon dioxide equivalent (t CO ₂ eq) reduced as a result of Fund funded projects/ programmes	SMI's M&E Function as Implement. Agency	0	93.5 MtCO ₂ eq	187 MtCO ₂ eq	Refer to Section E.6.5.
<i>M1.0 Reduced emissions through increased low-emission energy access and power generation</i>	Cost per t CO ₂ eq decreased for all Fund-funded mitigation projects/ programmes	SMI's M&E Function as Implement. Agency	0	US\$ 1.2 / tCO ₂ eq	US\$ 1.2 / tCO ₂ eq	Total financing of US\$4 billion divided by the GCF amount mobilized of US\$185 million.
<i>M1.0 Reduced emissions through increased low-emission energy access and power generation</i>	MWs of Low-emission energy capacity installed, generated and/or rehabilitated as a	SMI's M&E Function as Implement. Agency	0	500 MW	1,000 MW	Expected values

¹¹ Information on the Fund's expected results and indicators can be found in its Performance Measurement Frameworks available at the following link (Please note that some indicators are under refinement):

<http://www.greenclimate.fund/documents/20182/239759/5.3 - Performance Measurement Frameworks PMF .pdf/60941cef-7c87-475f-809e-4ebf1acbb3f4>

	result of the GCF support.					
<i>M1.0 Reduced emissions through increased low-emission energy access and power generation</i>	Volume of finance leveraged by Fund funding	SMI's M&E Function as Implement. Agency	0	US\$2 billion	US\$4 billion	Full geothermal development cost around US\$4 million per MW * 1,000 MW enabled
<i>M1.0 Reduced emissions through increased low-emission energy access and power generation</i>	Volume of finance leveraged by Fund funding – Sub-Element 1: Private capital mobilized for investment in geothermal Exploration	SMI's M&E Function as Implement. Agency	0	0	US\$0.5 million	Expected values
<i>M1.0 Reduced emissions through increased low-emission energy access and power generation</i>	Volume of finance leveraged by Fund funding – Sub-Element 2: Private capital expected to be mobilized for investment in geothermal development over time	SMI's M&E Function as Implement. Agency	0	0	US\$ 3.5 billion	Expected values

H.1.2. Outcomes, Outputs, Activities and Inputs at Project/Programme level

Expected Result	Indicator	Means of Verification (MoV)	Baseline	Target		Assumptions
				Mid-term (if applicable)	Final	
Project/programme outcomes	Outcomes that contribute to Fund-level impacts					
1. Geothermal projects explored	Number of projects explored	SMI's M&E Function as Implementing Agency	0	10	17 (T1: 10)	Each project will benefit from around US\$30 million loan from the facility
2. GREM Facility governance and management procedure under SMI adequate	PMU established, well-staffed and well-resourced	SMI's M&E Function as Implementing Agency	No	Yes	Yes (T1: Yes)	TA activity funded under Component 2

3. Geothermal investment climate improved	TA support extended to key players, including MEMR, PLN and Geo Dipa	SMI's M&E Function as Implementing Agency	No	Yes	Yes (T1: Yes)	TA activity funded under Component 2
Project/programme outputs	Outputs that contribute to outcomes					
1. Funding for exploration drilling extended to explore new prospective sites	Number of loans for resource confirmation drilling	SMI's M&E Function as Implementing Agency	0	10	17 (T1:10)	Investment support mobilized through TA support under Component 2
2. Appraisal and drilling result evaluation reports prepared by the PMU	Number of reports prepared by PMU	SMI's M&E Function as Implementing Agency	0	20	34 (T1:20)	TA activity funded under Component 2. It assumes two reports per project.
3. Project-level GAP prepared and implemented	Number of project-level GAPs prepared and supervision provided	SMI's M&E Function as Implementing Agency	0	10	17 (T1: 10)	TA activity funded under Component 2
4. PLN adopts bankable PPA reflective of transmission and distribution planning	Geothermal PPA including T&D arrangements	SMI's M&E Function as Implementing Agency	No	Yes	Yes (T1: Improved PPA template agreed)	TA activity funded under Component 2
5. Proposed tariff report for MEMR	Proposed tariff report delivered to MEMR	SMI's M&E Function as Implementing Agency	0	1	1 (T1: 1)	TA activity funded under Component 2
6. Improved resource data management capacity by Geo Dipa	Number of data management software with training (one) delivered to Geo Dipa	SMI's M&E Function as Implementing Agency	0	1	3 (T1: 1)	TA activity funded under Component 2
7. Geothermal development capacity of Geo Dipa and PLN increased	Number of geothermal exploration and exploitation management focused trainings	SMI's M&E Function as Implementing Agency	0	3	6 (T1: 2)	TA activity funded under Component 2

Activities	Description	Inputs	Description
Output 1 – Number of loans for resource confirmation drilling			
1.1 Funding for resource confirmation drilling	Funding packages provided to developers, and where relevant technical assistance	Investment support mobilized through TA support under Component 2	Preparation and specialized advisors on retainer basis to provide international expertise to SMI and its PMU
1.2 Supervision of drilling loans	Supervision of drilling loans	Investment support mobilized through TA support under Component 2	Preparation and specialized advisors on retainer basis to provide international expertise to SMI and its PMU
Output 2 – Number of appraisal and drilling result evaluation reports prepared by PMU			
2.1 Appraisal and drilling result evaluation	Technical reports will be prepared by expert consultants early on in project implementation and by SMI's in-house staff in later stage	TA support under Component 2	TA budget
Output 3 – Number of project-level GAPs prepared and supervision provided			
3.1 Preparation of project-level GAPs and supervision	GAPs will be prepared by developers and supported with supervision by PMU to contribute to the gender efforts under the Project	TA Component 2	GAPs will be in compliance with guidelines laid out in the OM
Output 4 – PLN's geothermal PPA including T&D arrangement			
4.1 Transmission and distribution planning for geothermal development	Delivery of report with recommendations on transmission and distribution planning for geothermal development	TA Component 2	TA budget
Output 5 – Proposed tariff report delivered to MEMR			
5.1 Preparation of revised geothermal tariff	Tariff report considering market conditions building on the previous regulatory TA efforts with a view to provide advice on key topics for greater investment, including private sector participation	TA Component 2	TA budget
Output 6 – Number of data management software with training (one) delivered to Geo Dipa			
6.1 Data management software with training	Delivery of data management software with training based on the private sector experience with data management tools	TA Component 2	TA budget
Output 7 – Number of geothermal exploration and exploitation management focused trainings for Geo Dipa and PLN			

<p>7.1 Geothermal exploration and exploitation management focused trainings</p>	<p>Delivery of geothermal exploration and exploitation management focused trainings. The focus of the training spans the entire geothermal development process, from development of a conceptual model for exploration to power plant operation and maintenance. The training could be provided by the Bandung Institute of Technology.</p>	<p>TA Component 2</p>	<p>TA budget</p>
---	---	-----------------------	------------------

H.2. Arrangements for Monitoring, Reporting and Evaluation

Besides the arrangements (e.g. semi-annual performance reports) laid out in AMA, please provide project/programme specific institutional setting and implementation arrangements for monitoring and reporting and evaluation. Please indicate how the interim/mid-term and final evaluations will be organized, including the timing. Please provide methodologies for monitoring and reporting of the key outcomes of the project/programme.

Project implementation involves: (i) monitoring of performance indicators in Section H; (ii) periodic progress reports; and (iii) a Mid-Term Review of implementation progress. This is in line with the monitoring and evaluation (M&E) framework of World Bank projects. In greater detail:

3. As part of the World Bank project implementation, SMI is expected as the implementing agency through a PMU, to administer the sub-loan portfolio and monitor the project implementation against the performance indicators of the Project results framework. In their M&E function, they will also be supported by experts sourced through the technical assistance component. Data and statistics on actual project outputs and outcomes will be gathered, analyzed, and included in the quarterly progress reports to be submitted to the Bank.
4. The Bank will review standard and ad-hoc progress reports as well as requests submitted by SMI, including no objections. Procurement and financial management controls will be put in place according to the Bank corporate standards. These will include detailed reviews of costing benchmarks from other geothermal development engagements in Indonesia - first and foremost, the ongoing Geothermal Energy Upstream Development Project (GEUDP) - to ensure reasonableness of costs incurred.
5. These efforts on monitoring progress towards the achievement of the project development objective will be complemented by the World Bank's Implementation Status and Results Reports (ISRs), which will be submitted at least biannually by the task team following on the ground implementation support missions. Halfway through project implementation, the World Bank will conduct a Mid-Term Review, the results of which will be captured in a dedicated ISR. At completion, an Implementation Completion and Results (ICR) report will be prepared with inputs from all stakeholders, including WB, the local agencies involved during implementation as well as the project beneficiaries. WB will report on its monitoring exercise to GCF, as required by the project needs.

I. SUPPORTING DOCUMENTS FOR FUNDING PROPOSAL

- NDA No-objection Letter
- Feasibility Study
- Integrated Financial Model that provides sensitivity analysis of critical elements (xls format, if applicable)
- Confirmation letter or letter of commitment for co-financing commitment (If applicable)
- Project/Programme Confirmation/Term Sheet (including cost/budget breakdown, disbursement schedule, etc.) – see the *Accreditation Master Agreement, Annex I*
- Environmental and Social Impact Assessment (ESIA) or Environmental and Social Management Plan (If applicable)
- Appraisal Report or Due Diligence Report with recommendations (*An Appraisal Report is currently being prepared and will be submitted at a later stage*)
- Evaluation Report of the baseline project (If applicable)
- Map indicating the location of the project/programme
- Timetable of project/programme implementation

** Please note that a funding proposal will be considered complete only upon receipt of all the applicable supporting documents.*

Annex 1: List of Potential Pipeline Projects

The following list consists of WKPs where geothermal development is being considered and where the developer either has not started exploration drilling or has only made very early exploration efforts. It also includes projects that have been designated for development, but not yet assigned to a developer. These KPs therefore constitute a potential pipeline of sub-projects for appraisal and investment purposes – not all sub-projects may end up being developed.

No	Working Area	Developer	Plan of Development (MW)	Remarks
Public Sector Projects				
1	Tangkuban Perahu	PLN	60	West Java, a slim hole exploration program has been started but it failed on technical drilling issue, showing interest to get the facility
2	Atadei	PLN	10	Lembata Island – East Nusa Tenggara, two shallow wells were drilled early 2000s by MEMR, showing interest to get the facility
3	Songa Wayaua	PLN	10	Bacan Island – North Maluku, no wells drilled yet, showing interest to get the facility
4	Sembalun	PLN	20	Lombok Island – West Nusa Tenggara, no wells drilled yet, showing interest to get the facility
5	Ungaran	PLN	55	Central Java, no wells drilled yet, showing interest to get the facility
6	Kepahiang	PLN	110	Bengkulu – South Sumatera, no wells drilled yet, showing interest to get the facility
7	Gunung Sirung	PLN	5	Pantar Island – East Nusa Tenggara, no wells drilled yet, showing interest to get the facility
8	Oka Ile Ange	PLN	10	Flores Island – East Nusa Tenggara, no wells drilled yet, showing interest to get the facility
9	Danau Ranau	PLN	55	Lampung – South Sumatera, no wells drilled yet, showing interest to get the facility

10	Dieng Candradimuka	Geo Dipa	40	Central Java, no wells drilled yet, showing interest to get the facility
11	Umbul Telomoyo	Geo Dipa	55	Central Java, no wells drilled yet, showing interest to get the facility
12	Arjuno Welirang	Geo Dipa	185	East Java, no wells drilled yet, showing interest to get the facility
13	Iyang Argopuro	PGE	55	East Java, no wells drilled yet, showing interest to get the facility
14	Seulawah Agam	PGE	110	Aceh – Sumatera, no wells drilled yet, showing interest to get the facility
Private Sector Projects				
1	Blawan Ijen	Medco	110	East Java, first exploration drilling program has been started, showing interest to get the facility
2	Gunung Talang – Bukit Kili	Hitay Energy	20	West Sumatera, no wells drilled yet, showing interest to get the facility
3	Way Ratai	ENEL JV	55	Lampung – Sumatera, no wells drilled yet, showing interest to get the facility
4	Rajabasa	Supreme	220	Lampung – Sumatera, no wells drilled yet, showing interest to get the facility
5	Jaboi	Sabang Geothermal Energy	10	Aceh – Sumatera, no wells drilled yet
6	Cisolok Cisukarame	Jabar Rekin Geothermal	50	West Java, no wells drilled yet
7	Tampomas	Wijaya Karya	45	West Java, no wells drilled yet
8	Rawa Dano	Sintesa Banten	110	Banten – West Java, no wells drilled yet
9	Guci	Spring Energy Sentosa	55	Central Java, no wells drilled yet

10	Pentadio	-	25	Gorontalo – North Sulawesi, in process for PSPE (exploration assignment) to an IPP
11	Hu'u Daha	-	20	West Nusa Tenggara, in process for PSPE (exploration assignment) to an IPP
12	Graho Nyabu	-	110	Jambi – Sumatera, in process for PSPE (exploration assignment) to an IPP
13	Suoh Sekincau	-	220	Lampung – Sumatera, in process for PSPE (exploration assignment) to an IPP
14	Gunung Hamiding	-	10	Halmahera Island - North Maluku, in process for PSPE (exploration assignment) to an IPP
15	Gunung Geuredong	-	35	Aceh – Sumatera, in process for PSPE (exploration assignment) to an IPP
Not Yet Assigned				
1	Sipoholon Ria Ria	-	20	North Sumatera
2	Simbolon Samosir	-	110	North Sumatera
3	Tanjung Sakti	-	55	South Sumatera
4	Gunung Gede Pangrango	-	85	West Java
5	Gunung Ciremai	-	110	West Java, no wells drilled yet, showing interest to get the facility
6	Marana	-	20	Central Sulawesi
7	Bora Pulu	-	40	Central Sulawesi
8	Gunung Galunggung	-	110	West Java
9	Lesugolo	-	5	Flores – East Nusa Tenggara
10	Gunung Endut	-	40	Banten – West Java
11	Gunung Pandan	-	60	East Java

12	Songgoriti	-	35	East Java
13	Laenia	-	20	Central Sulawesi
14	Suwawa	-	20	Gorontalo – Sulawesi
15	Telaga Ranu	-	5	North Maluku
16	Gunung Wilis	-	20	East Java



MINISTRY OF FINANCE OF THE REPUBLIC OF INDONESIA
FISCAL POLICY AGENCY

R.M. NOTOHAMIPRODJO BUILDING 2ND FLOOR JALAN DR. WAHIDIN RAYA NOMOR 1 JAKARTA 10710
TELEPHONE (+62 21) 3441484; FACSIMILE (+62 21) 3848049; WEBSITE www.fiskal.depkeu.go.id

Ref. : S-274/KF/2018

6 June 2018

Mr. Howard Bamsey
Executive Director
Secretariat of the Green Climate Fund
175, Art center-daero
Yeonsu-gu, Incheon 406-840
Republic of Korea

Subject: No Objection Letter for the Funding Proposal for the GCF by The World Bank regarding Geothermal Resource Risk Mitigation (GREM).

Dear Mr. Bamsey,

We refer to the programme Geothermal Resource Risk Mitigation (GREM) in Indonesia as included in the funding proposal submitted by The World Bank to us on 19 February 2018.

The undersigned is the Chairman of Fiscal Policy Agency, Ministry of Finance as the Head of the National Designated Authority of Indonesia.

Pursuant to GCF decision B.08/10, the content of which we acknowledge to have reviewed, we hereby communicate our no-objection to the programme as included in the funding proposal.

By communicating our no-objection, it is implied that:

- (a) The government of Indonesia has no-objection to the programme as included in the funding proposal;
- (b) The programme as included in the funding proposal is in conformity with Indonesia's national priorities, strategies and plans;
- (c) In accordance with the GCF's environmental and social safeguards, the programme as included in the funding proposal is in conformity with relevant national laws and regulations.

We also confirm that our national process for ascertaining no-objection to the programme as included in the funding proposal has been duly followed.

We also confirm that our no-objection applies to all projects or activities to be implemented within the scope of the programme.

We acknowledge that this letter will be made publicly available on the GCF website.

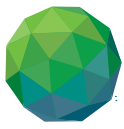
Yours faithfully,

Suahasil Nazara
Chairman

Environmental and social report(s) disclosure

Basic project/programme information	
Project/programme title	Indonesia Geothermal Resource Risk Mitigation Project
Accredited entity	The World Bank
Environmental and social safeguards (ESS) category	Intermediation 1 (I1)

Environmental and Social Impact Assessment (ESIA) (if applicable)	
Date of disclosure on accredited entity's website	Not applicable
Environmental and Social Impact Assessment (ESMP) (if applicable)	
Date of disclosure on accredited entity's website	Not applicable
Resettlement Action Plan (RAP) (if applicable)	
Date of disclosure on accredited entity's website	See below
Any other relevant ESS reports and/or disclosures (if applicable)	
Description of report/disclosure	Draft Environmental and Social Management Framework (ESMF) incorporating the Resettlement Policy Framework and Indigenous Peoples' Planning Framework
Date of disclosure on accredited entity's website	15 May 2018
Language(s) of disclosure	English
Link to disclosure	http://documents.worldbank.org/curated/en/683141519642635894/pdf/SFG4077-EA-REVISED-P166071-PUBLIC-Disclosed-5-15-2018.pdf The Draft ESMF contains an Environmental and Social Management System (ESMS) consistent with the requirements for a category I-1 programme.
Other link(s)	AE's web page: http://projects.worldbank.org/P166071?lang=en Intermediary's web page: English https://www.ptsmi.co.id/wp-content/uploads/2018/03/ESMF-Indonesia-GREM-Draft-ENG.pdf



	Bahasa Indonesia https://www.ptsmi.co.id/wp-content/uploads/2018/03/ESMF-Indonesia-GREM-Draft-INA.pdf
--	---

—