TERMS OF REFERENCE

Indonesia Geothermal Resource Risk Mitigation (GREM) Project
PT Sarana Multi Infrastruktur (Persero)

Technical Assistance to Ministry of Energy & Mineral Resources (MEMR)
Supported by Clean Technology Fund (CTF)

Consultancy Service - Reducing the Cost of Geothermal Development

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1. Background and Objectives

1.1 Context

The World Bank is supporting the Government of Indonesia in establishing a Geothermal Resource Risk Mitigation (GREM) Facility to support exploration drilling by state-owned and private sector developers. The main objective is to scale up investment in geothermal energy development in Indonesia. This will be achieved through providing about US$ 375 million for upstream resource development (i.e., exploration and delineation drilling) – the riskiest phase of geothermal development. Under the proposed Project, two new windows will be created: (i) a Public Sector Window and (ii) a Private Sector Window. The Facility will be managed by PT Sarana Multi Infrastruktur (SMI) as the financial intermediary.

Ministry of Energy and Mineral Resources (MEMR), Ministry of Finance (MoF), PT. Perusahaan Listrik Negara (PLN), and geothermal SOEs PT. Pertamina Geothermal Energy (PGE) and PT. Geo Dipa Energi (GDE) have all expressed interest in various geothermal related capacity building which are associated to the GREM Project. The capacity building shall include but not limited to geothermal tariff, tendering process and geothermal drilling management and project development capacity, with the goal to improve sector governance and investment climate. The GoI are also revisiting the incentive framework for private and public developers – and has sought WB's just-in-time advisory support – with changes believed to include viability gap funding (VGF) to allow geothermal Power Purchase Agreement (PPAs) to go above the average power generation cost in a given regional grid as long as it is still lower than the economic benefits of green power. The continued WB support to key stakeholders will solidify the WB's position as a trusted development partner and will open up multiple opportunities to develop follow-on investments for downstream geothermal investments, i.e., steam-field development and power plant construction on sites where PLN, PGE and GDE have geothermal licenses. Such operations will include Public-Private Partnerships to include private sector developers in downstream development and will be planned in close coordination with International Finance Corporation (IFC).

The scope of consultancy services is mainly to develop strategies that will be recommended to MEMR in reducing the cost of geothermal power development in Indonesia, as described in the scope of work section.

2. Consultancy Services

The Energy and Extractives Global Practice of the World Bank (WB), with funding support from the Clean Technology Fund (CTF), is seeking to hire a firm consultant with expertise in geothermal development projects in Indonesia and internationally (Consultant) to provide advice and develop recommended

strategies for MEMR to reduce the cost of geothermal power development in Indonesia. The advice should be based on national best practice and international best practice adapted to the Indonesia context.

2.1 Scope of Work

The scope of work under this assignment has the following tasks:

- Task 1: Comparison of Global Data on Geothermal Development Cost

- The consultant shall collect and review data on international experiences for the overall geothermal development cost, including exploration surveys, infrastructure development, exploration drilling, production wells drilling, power plant development, financing cost, and all related costs for a full geothermal development. The data should be analyzed based on project classification such as resource quality (high or medium enthalpy), and geothermal technology (single flash, double or triple flash, or binary system).
- Based on the international experiences, the consultant should carry out the similar review and analysis for geothermal projects in Indonesia. Comparing with the international experience, the consultant should identify potential strategies to lower the geothermal development cost in Indonesia.

- Task 2: Impact of Geothermal Resource Risk Mitigation to the Development Cost

- The consultant shall review the impact of Indonesia's current approach of geothermal resource risks strategies to the overall geothermal development cost. The resource risk mitigation strategies include: a) government sponsored drilling (implemented through WB's Geothermal Energy Upstream Development Project, GEUDP); b) exploration drilling facility to SOEs and private developers (implemented through WB's Geothermal Resource Risk Mitigation, GREM Project); and c) exploration drilling to be carried out by government without any cost replacement by the developers. The consultant should compare those analysis with the baseline conditions in which no resource risk mitigation is available and the concession tender would be carried out without subsurface data.
- The consultant shall review the existing resource risk mitigation applied in other countries (US, the Philippines, Turkey, New Zealand, Japan, Iceland, Kenya) and find the best practice which are potentially could be implemented in Indonesia to improve the existing risk mitigation approaches.

- Task 3: Impact of Geothermal Drilling to the Development Cost

- The consultant shall review the baseline of geothermal drilling cost in Indonesia, which have been implemented by SOE and private geothermal developers and compare it with international drilling cost. Since the data presentation and specific cost assumptions may vary from each developer, the consultant shall develop a standard costing items for geothermal exploration drilling, for example refer to the standard from oil/gas industry. The standard costing items will allow data comparison from various developers at the same assumption. From the baseline data, the consultant should recommend what are the best practices in reducing the drilling cost which have been applied by the existing national developers and lessons learned from international drilling practice. Different forms of drilling contracts should also be reviewed from the perspective of cost impact.
- Though the strategy of using standard hole drilling or slim hole drilling will depend on the project specific circumstances and the developers' risk appetite, the consultant shall review the impact of those exploration drilling strategy options to the overall geothermal power development cost, with example analysis to a small and large geothermal project size.

- The consultant shall review any related Indonesia's policies and regulation which might be hindering the open market for geothermal drilling industry in Indonesia, especially for international drilling company to enter the Indonesia market. The consultant should also review the existing market of geothermal drilling industry in Indonesia and suggest recommendation to increase the market competitiveness including the participation of international drilling companies.

- Task 4: Impact of Fiscal Incentives Provided by Government

- Major investment cost for geothermal project is for the development stage. While public developers may get benefit of soft loan, the availability of soft loan for private developers is limited. In the current drafting of Presidential Regulation for renewable energy, the government considers providing fiscal incentive in form of a concessional financing for development of renewable and/or replacement of geothermal exploration cost. Other than through government support, the developer may also access other potential source of soft loans for geothermal development.
- The consultant shall identify potential sources of soft loans which can be used by the government to support the developers. The consultant shall also identify any other sources of soft loans which can be tapped directly by private developers and the required support from the government to allow the private developers to access those soft loans. Based on the collected information, the consultant shall analysis the impact of financing from the soft loans to lowering the geothermal development cost.

- Task 5: Impact of Staged Development to the Project Financial Feasibility

- Depending on the resource size and demand condition, the geothermal development could be implemented directly in its full economic size or by staged development. Full size of development may require longer construction period and does not have an opportunity to generate revenue earlier. By staging development, a developer could develop some small size of generating units which will allow to generate revenue once each unit has been completed. These two scenarios may have different impacts to the project financial feasibility which the consultant should conduct the analyses.

- Task 6: Impact of Different Scenarios to the Geothermal Project's Financial Feasibility

- In conducting the works for Task 2, 3, 4, and 5, the consultant should use a financial model to analyze the impact of different scenarios to the required economics tariff for development, assuming a certain target of Financial Internal Rate of Return (FIRR) for public and private developers.
- The consultant should use the geothermal financial model which was developed by MEMR/New Zealand to conduct the above analysis (to be provided by MEMR).

- Task 7: Tender Mechanism and Tariff Setting for Geothermal Development

- The consultant should compare and analyze different options for concession tender strategy (competitive vs beauty contest) and geothermal tariff setting (competitive tariff with ceiling vs fixed tariff) and provide recommendation on the tender strategy and tariff setting which will result in a lower required tariff to develop a geothermal project. The consultant should also review the existing applicable regulation related to tender mechanism and tariff setting and provide recommended suggestion which potentially lead to a lower required tariff for geothermal development.

- MEMR (Directorate General of Electricity and Directorate Generate of New, Renewable Energy and Energy Conservation), MoF, and PLN are the main stakeholders which will be involved in the geothermal tariff setting. Currently, there is no a formal platform between those institutions to discuss and make decision on the geothermal tariff. The consultant should provide recommendation on the institutional setting for the discussion and decision-making process for the geothermal tariff.

- Task 8: Comparison of Geothermal Energy and Other Renewable Energy Options

- The consultant should compare and analyze the benefit of geothermal power (as a baseline generation) with other types of renewable energy.

2.2 Outputs and Milestones

The Consultant is expected to provide the following deliverables throughout the engagement:

a. An Inception Report which will outline the methodology to carry out the works by the consultant.
b. A Draft Final report
c. The Final Report

3. Qualification Requirements, Staffing and Work Arrangements

The Consultant is expected to have a proven track record of at least ten years in developing similar analysis and strategies for geothermal development projects in Indonesia and internationally. The firm should form a team which shall include combination of international and national experts which are familiar with the Indonesia geothermal industry and regulation.

4. Timeframe and Milestone Payment

The assignment is estimated to last about 4 months. Payment will be made refer to the deliverables as follow:

- 20% after the Inception Report being reviewed and approved by the Client.
- 50% after submission of the Draft Final Report.
- 30% after the Final Report being reviewed and approved by the Client.