

## CTF PRIVATE SECTOR PROPOSAL

<b>Name of Program</b>	<b>ADB Private Sector Geothermal Energy Program</b>
<b>CTF amount requested</b>	<u>Investment</u> – up to US\$150 million equivalent in loans and guarantees <u>Implementation and supervision budget</u> - US\$750,000 (Annex A)
<b>Country targeted</b>	Indonesia
<b>Indicate if proposal is a Project or Program</b>	Program. The proposed program comprises a pipeline of geothermal power generation projects currently being developed by the private sector in Indonesia. The program will catalyze the demonstration, replication, and scale-up of the geothermal sector in Indonesia.
<p><i>In developing this proposal, ADB has already begun to engage with prospective clients for the proposed projects under the Program. To maintain credibility in the market, ADB can only engage further if there is confirmation that funds would be available to approve and disburse when required by the client. For this reason, per paragraph 33 of the CTF Financing Products, Terms and Review Procedures for Private Sector Operations, as revised on October 24, 2012, ADB is requesting the CTF Trust Fund Committee to approve and direct the Trustee to provide ADB with an unconditional letter of commitment for the entire amount required for the Program. Such approval would allow for the upfront transfer of up to the entire amount of the Program from the Trustee to the ADB, based on the confirmation of availability of US\$150 million by the Trustee as evidenced in Annex B. The transfer would be subject to (a) approval by the ADB Board of Directors of the investment sub-projects, and (b) submission of a transfer request to the Trustee including the anticipated closing date of the relevant sub-projects.</i></p>	

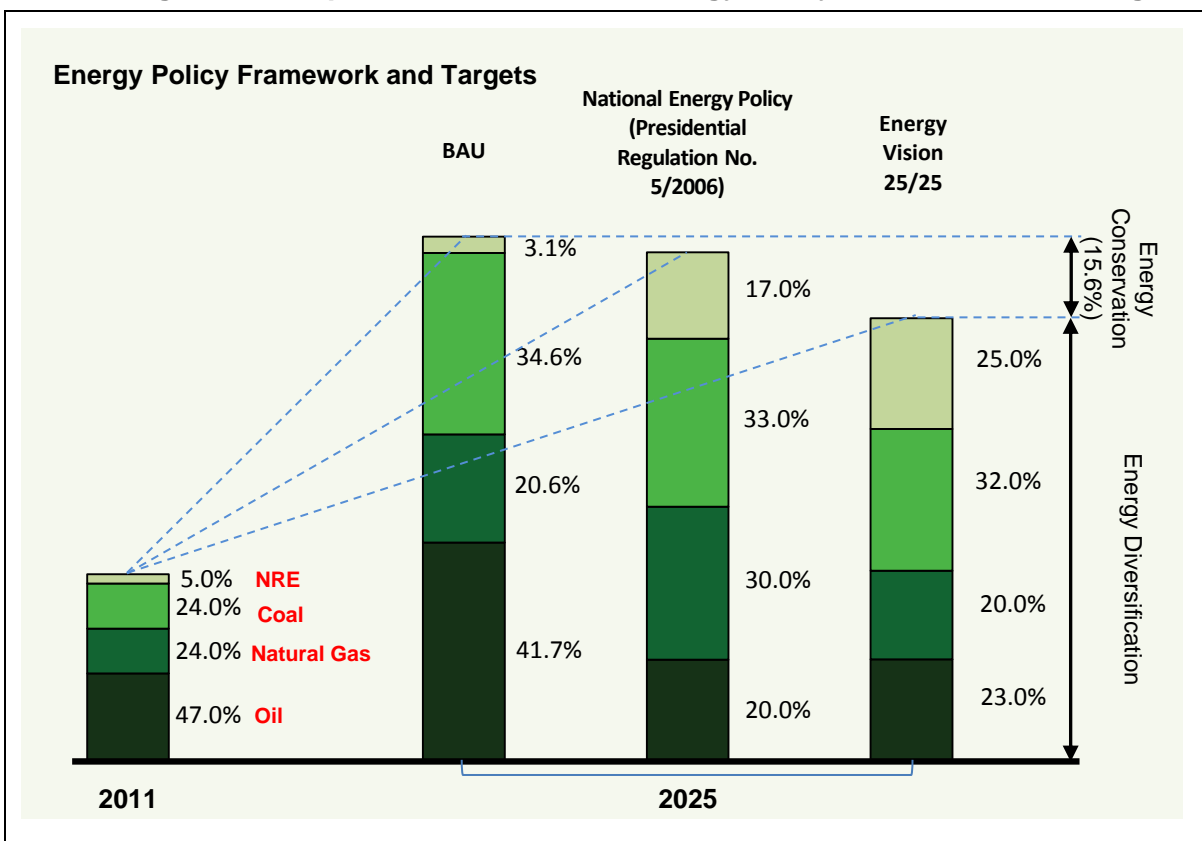
## DETAILED DESCRIPTION OF PROGRAM

### A. Country and Sector Context

1. As described in the Revised Country Investment Plan (IP) for Indonesia (April 2013)<sup>1</sup>, the Government of Indonesia (GoI) remains focused on diversifying the generation mix through increased production and use of indigenous renewable energy (RE) resources, institutionalization of energy sector reforms, and implementation of energy conservation initiatives. Released in 2011, Energy Vision 25/25 serves as an update to the policy framework which is consistent with the National Energy Policy (Presidential Regulation No. 5/2006) and the National Energy Implementation Program Blueprint (2005 – 2025). Energy Vision 25/25 calls for the increased penetration of clean energy into the generation mix, complemented by gains from conservation and efficiency initiatives. The policy increases the diversification and conservation targets set in the National Energy Policy, increasing the utilization of RE from 17% of the generation mix to 25% by 2025 and reducing energy demand by 15.6% relative to a projected business as usual scenario (see Figure 1).

<sup>1</sup> *Clean Technology Fund Revision of the Investment Plan for Indonesia*, 23 April 2013. Endorsed by the Trust Fund Committee on 26 April 2013. The document is available on the CIF website at: [https://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/Indonesia\\_CTF\\_IP\\_Revision\\_23\\_Apr\\_2013.pdf](https://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/Indonesia_CTF_IP_Revision_23_Apr_2013.pdf)

**Figure 1: Comparison of Indonesian Energy Policy Frameworks and Targets**



Sources: Ministry of Energy and Mineral Resources. NRE = new and renewable energy

Note: The breakdown for new and renewable energy (NRE) under the National Energy Policy (Presidential Regulation No. 5/2006) includes bio-fuels (5%), geothermal (5%), other RE resources (5%), and coal liquid (2%).

2. In order to meet the 25% RE target by 2025, a new target for adding 18,154 MW of RE capacity has been set, which represents about 17% of the total RE potential of the country. Increasing the penetration of clean energy into the generation mix in terms of enhanced utilization of RE resources and EE technologies is consistent with the energy security and low-carbon development objectives of the Government and CTF. Expanding the use of non-tradable domestic energy resources such as geothermal, biomass, solar, and wind will improve energy security by offsetting demand for imported oil and petroleum products.

3. At over 29,000 MW of potential geothermal power, Indonesia possesses one of, if not the, largest resources in the world and represents one of the best options for diversifying the country's primary energy mix. According to Bloomberg New Energy Finance, Indonesia also has the largest project pipeline of geothermal development at 3,200 MW, which represents 24% of the current global pipeline.<sup>2</sup> Currently, only about 4% of this potential has been exploited. Of the capacity online today, 1,114 MW was developed based on contracts signed between 1984 and 1999. Table 1 lists the operating geothermal power plants, inclusive of both public and private sector.

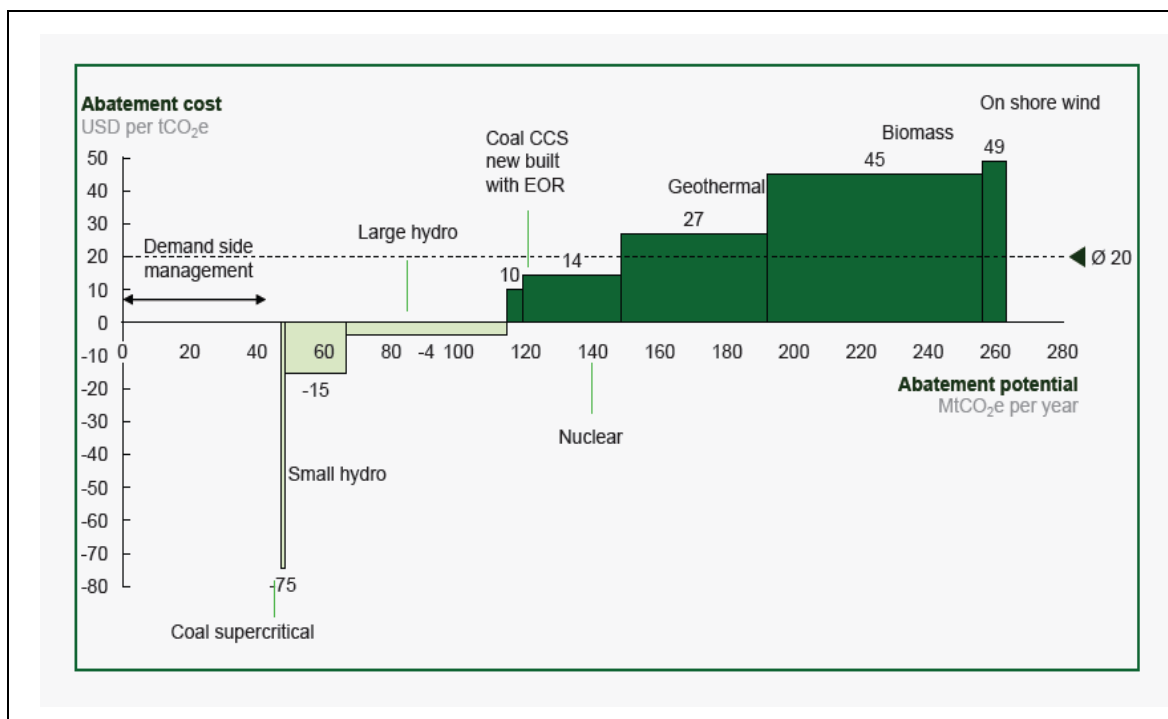
**Table 1: Geothermal Power Plants in Operation**

Power Plant	Region	Capacity (MW)
Kamojang	West Java	200
Lahendong	North Sulawesi	80
Sibayak	North Sumatra	12
Salak	West Java	377
Darajat	West Java	270
Wayang Windu	West Java	227
Dieng	Central Java	60
<b>Total</b>		<b>1,226</b>

Source: D. Sukarna, Ministry of Energy and Mineral Resources, Directorate General of New Renewable Energy and Energy Conservation. Presentation at Fukuoka Japan, 12 - 13 July 2012.

4. Figure 2 presents the GHG abatement cost curve for the electric power sector, which shows potential emissions reductions of 260 MtCO<sub>2</sub>e, of which demand-side management, small hydropower, geothermal, and biomass energy are consistent with CTF investment criteria and investment plan objectives. Based on the abatement cost curve, other analyses, and economic development imperatives of the GOI, the priority investments which could be supported by CTF include: (i) geothermal and biomass power generation, (ii) small hydropower, solar, and wind generation, (iii) Industrial energy efficiency improvements, including cogeneration, demand-side management, and facility/process upgrades for cleaner production (CP), and (iv) EE improvements for commercial and residential buildings. The IP proposed 2 major interventions to support these priority energy investments: a private sector geothermal program, and a private sector program for other RE and EE financing.

**Figure 2: GHG Abatement Cost Curve for the Electric Power Sector**



## B. Overview of the Proposed Program

5. Geothermal represents one of the best options for diversifying the country's primary energy mix, in particular for baseload electric power supply: existing geothermal power plants in Indonesia routinely operate more than 80% of the time, effectively producing "24/7" electricity; other renewables such as wind and solar typically produce electricity only 20-30% of the time. According to Bloomberg New Energy Finance, Indonesia also has the largest project pipeline of geothermal development at 3,200 MW, which represents 24% of the current global pipeline.<sup>3</sup> Currently, only about 4% of this potential has been exploited, all of which has been developed by Indonesian state utilities and independent power producers (IPPs). In order to accelerate development, increase market penetration, and facilitate evolution of the geothermal business, massive commercial investment is needed to open the playing field to new project developers.

6. There has been very little project development in the geothermal sector since the 1997-1998 financial crisis, which had a significant impact on Indonesian economy and perceptions of it as a foreign investment destination for past 15 years. Geothermal project development has remained concentrated in a handful of existing actors (both public and private), as the market has not yet demonstrated a viable business model to attract commercial investment. The private sector investors to date have included only those global companies with a strong presence in the oil & gas sectors. The Government has made strides in the regulatory and institutional framework for geothermal development as well as addressed some of the disconnects between upstream geothermal regulation (traditionally regulated as a mining activity) and downstream generation of electricity from RE sources. However, many of these recent policy changes target the next generation of geothermal projects which will be competitively tendered in a decentralized manner by local governments and benefit from higher feed-in tariff ceilings (distinguished by enthalpy levels of the resource and location within Indonesia). As geothermal projects often take 5-7 years to develop, these recent policy and tariff changes have had little to no impact on those private sector projects where surface exploration has been completed and geothermal exploitation licenses (the *Izin Usaha Pertambangan Panas Bumi* or the IUP) have been granted.

7. ADB's Private Sector Operations Department ("ADB-PSOD") proposes a \$150 million CTF program to facilitate commercial lending and the financial close of geothermal power projects undertaken by the private sector and state owned enterprises borrowing without the benefit of a government guarantee. A budget to support project implementation, monitoring and supervision is attached in Annex A. Most of these projects have been awarded IUPs for exploration and project development, and have signed a power purchase agreement (PPA) or are well advanced in such negotiations. ADB-PSOD is currently evaluating several prospective projects, mostly on Java and Sumatra, ranging from 30 MW to more than 300 MW per project, with aggregate capacity of 1,720 MW. The all-inclusive cost to bring these projects on-line is estimated at nearly \$7 billion.

8. The Program expects to support up to 5 projects over the next 3 years. Financing will be provided to private sector borrowers in association with an ADB investment, other development finance institutions, and/or commercial lenders for the underlying geothermal project. CTF funds will be structured to mitigate project development and resource risks (discussed further below). The proposed financing instruments include long-term project loans, medium-term loans for project development prior to financial close, guarantees, and risk participation or reinsurance.

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<sup>3</sup> 27 June 2013. Bloomberg New Energy Finance. *Q2 2013 Geothermal Market Outlook*. New York. This includes projects which have been publicly announced, permitted, commenced drilling and/or under construction.

### C. Market Transformation

9. Indonesia is one of the only developing countries that has announced quantitative GHG reduction goals: in 2009, the President of Indonesia committed to reducing GHG emissions by 26% on a unilateral basis and 41% with international assistance. Translating this commitment into viable investment programs remains a challenge given the scale of investment required. Indonesia's potential RE resources (including large hydropower) are more than sufficient to supply all current electricity demand. However, the combined factors of the wholesale cost of energy production from a variety of resources, retail energy pricing, affordability, and consumer willingness to pay, preclude an immediate shift to a 100% RE future. As noted above, Energy Vision 25/25 has been formulated accordingly and should be considered quite aggressive considering that Indonesia's abundant coal resources offer the promise of low-cost electricity for the foreseeable future.

10. The geothermal resources offer tremendous promise to put Indonesia's energy sector onto a low-carbon trajectory, but translating this potential into reality remains elusive due in part to the complicated nature of proving and then managing the resource: geothermal energy is the most challenging form of RE due to the geological and technological risks associated with exploration, development, and long-term operations. Geothermal development in Indonesia has traditionally been classified in the regulatory framework as a mining activity, and in fact all of the risks encountered in conventional mining and oil and gas development are present on geothermal projects. A major difference is that for minerals and hydrocarbons there is a wealth of commercial experience and mature markets with reasonably well-defined risk-reward formulae; these success factors do not have a robust presence in Indonesia's geothermal sector and as a result exploitation has been restricted to a handful of corporate players with sufficient fiscal and technical resources to operate in what may be considered as a sub-optimal market.<sup>4</sup> Simply stated, abundant potential does not create a market spontaneously; otherwise, substantially more than 4% of the geothermal potential would already be online today.

11. Geothermal market evolution is further challenged by the upfront development cost: Indonesia's rule of thumb is \$4-4.5 million per MW installed (all inclusive) vs. \$1 million per MW for a coal fired power plant. The current pipeline of 3,200 MW requires more than \$12 billion investment, with another \$15 billion or more required to reach the longer-term goal of 10,000+ MW of installed capacity. The learning rates exhibited in solar and wind energy developments – which have seen dramatic cost reductions in the past several years -- cannot be expected in the geothermal subsector without quantum advances in exploration and drilling technologies which would reduce the upfront development cost and risks. Despite substantial investment in enhanced geothermal research globally, there is unlikely to be a breakthrough which would achieve cost reductions on the scale required to compete with coal – there are no “silver bullet” solutions in sight.<sup>5</sup> Further complicating this technological situation is that the Government has

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<sup>4</sup> Likewise, commercial investment in hydrocarbon exploration has not been sufficient to maintain the reserve base, which resulted in Indonesia becoming a net hydrocarbon importer in the last decade.

<sup>5</sup> Drilling expenses comprise one the largest costs of developing a geothermal prospect, and the cost of drilling is proportional to the depth of a well. There is no technological breakthrough on the horizon to dramatically reduce development and heat production costs (such as the integration of horizontal drilling and massive hydraulic fracturing which have helped commercialize unconventional natural gas and oil exploitation).

made a conscious policy decision to promote geothermal development on a fully commercial basis, with majority private sector investments.<sup>6</sup>

12. Geothermal's advantages are that it is less expensive than petroleum-based generation, it is ideally suited for baseload power (unlike solar and wind), and there are geothermal prospects throughout most of Indonesia (although the resources are concentrated to some extent on Java and Sumatra). The levelized cost of geothermal power is less than Indonesia's average cost of supply, which presents an opportunity to improve the long-term financial health of the national electricity utility (PLN) while improving energy security through reduced reliance on petroleum fuels. Accelerating development of geothermal requires these comparative advantages to be recognized and monetized, which points to the need for innovative financing arrangements to reduce overall development risk and reduce the cost of capital.

13. The Government has recognized the inherent geological risks and other risks which are constraining development, including limited investor appetite for project development risks. During the past 3 years, a geothermal financing facility has been established under the Ministry of Finance's Indonesia Investment Center (*pusat investasi pemerintah*, PIP)<sup>7</sup>, off-take tariffs have been adjusted upwards, improved regulatory provisions for PPAs have been introduced, and the President of Indonesia has directed the various Ministries with overlapping regulatory authority to facilitate permitting and licensing within the bounds of existing regulations.

14. Although the policy and regulatory environment has improved considerably in the last few years, commercial financing has not appeared in requisite quantities to accelerate development. The billions of investment and financing needed for market transformation will not materialize until some of the actual and perceived risks are reduced through financial closure of new private sector projects (i.e., success breeds success). Further policy support, e.g., a doubling of the FITs might attract some level of commercial bank interest in the sector, but it is unrealistic to expect any dramatic policy shifts in the immediate future until the current pipeline of projects at an advanced stage of development being financed.<sup>8</sup> In the current situation, judicious use of concessional cofinancing is proposed to facilitate financial close of landmark projects which will provide the demonstrative effect necessary to initiate market transformation. Alternatively stated, although the geothermal market in Indonesia is not in its infancy, it is immature and at present suffers from infectious inertia with several projects at reasonably advanced stages of development, but psychologically far from financial closure.

15. ADB has been mandated or in active discussions on several private sector geothermal projects, building on its local and regional knowledge of the geothermal sector and its broader regional expertise in clean energy project financing which totals more than \$2 billion per annum in the last 3 years. ADB provided a loan to PLN through the Government of Indonesia, which helped finance two phases (40 MW) of the Lahendong geothermal power project in North Sulawesi and a 5 MW geothermal project in Ulumbu, Flores.<sup>9</sup> ADB has provided sector and

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<sup>6</sup> As discussed in the updated IP (April 2013), multilateral bank support will be provided via private sector operations. No direct government budget support is anticipated.

<sup>7</sup> See Annex C for further details on this facility, which remains under detailed design.

<sup>8</sup> PLN continues to sell electricity at less than the cost of supply. Although the Government subsidizes these financial losses, commercial investors including those active in the mining and hydrocarbon sectors that may have a good understanding of the geological and technical risks of geothermal development are naturally hesitant to enter investments where the sole off-taker relies on government support to maintain its balance sheet.

<sup>9</sup> In 2002, ADB provided a \$161 million loan to PLN through the Government of Indonesia to finance the Renewable Energy Development Sector Project. The two phases (each 20 MW) of the Lahendong project were commissioned in 2007 and 2011, and the Ulumbu project is scheduled to be commissioned in the next 6-8 months.

technical assistance for RE development, including geothermal projects since the early 2000s, and more recently has been providing technical assistance to MEMR and PLN on renewable energy development, including geothermal resources, through its public sector operations.

#### **D. Summary of the Program and Use of CTF Funds**

16. The Program will include multiple private sector geothermal projects over the next 3 years which face common development and financing barriers as discussed above. A suite of products will be deployed depending on the specific circumstances as discussed with the project sponsors/investors and commercial lenders. The proposed financial products will be aligned to specific project risks, and are consistent with the general findings and recommendations of prior review and analysis of Indonesia's geothermal market risks.<sup>10</sup> Detailed financing plans will vary from project to project, and it is not possible at this time to fully elucidate these details for all projects. The agreements for specific projects comprising the Program will be subject to full due diligence per ADB's procedures for private sector operations and approval by ADB's Board of Directors, per the CTF private sector guidelines. The exact terms and conditions of the CTF financing will be determined during ADB-PSOD due diligence, and the principal of minimum concessionality will be applied. Per CTF guidelines, the concessionality of the CTF co-financing shall not exceed 40%.

**Table 2: Program Financing Plan**

CTF Program	\$150 million
MDB co-financing	\$350 million
Public sector co-financing	\$400 million
Commercial co-financing (debt and equity)	\$1,100 million
Bilateral co-financing	\$600 million
Aggregate Amount of Investments:	\$2,600 million

## **FIT WITH INVESTMENT CRITERIA**

### **1. Potential GHG Emissions Savings:**

17. High, with high potential for replication and scale up: The proposed investments will facilitate 750 MW of geothermal capacity, with output of 5,913 GWh/y. GHG reductions are 4.4 million tCO<sub>2</sub>e/year assuming a grid emissions factor of 0.75 tons CO<sub>2</sub>e / MWh. These estimates do not include (i) consideration of black carbon, which may be significant given the amount of oil-based electricity generation capacity, or (ii) future reductions in emissions factor due to increased penetration of RE<sup>11</sup>:

<sup>10</sup> Geothermex, Inc. *An Assessment of Geothermal Resource Risks in Indonesia*. Prepared for the World Bank in Support of the Government of Indonesia and Ministry of Energy and Mineral Resources. Richmond, California, USA. June 2010.

<sup>11</sup> A more detailed discussion of emissions factors are presented in Appendix 4 of the revised CTF IP which was endorsed in April 2013.

Total GHG reductions directly supported by CTF <sup>a</sup>		Total GHG Reductions with potential replication and scale up <sup>a</sup>	
750 MW geothermal at 90% output	4.4 million tons / year CO <sub>2</sub> e	3,200 MW geothermal at 90% output	18.9 million tons / year CO <sub>2</sub> e

<sup>a</sup> GHG reductions assume that geothermal supplies power in the Sumatra and Java-Madura-Bali grids with an average emissions factor of 0.75 tons CO<sub>2</sub>e/MWh. Replication and scale up potential is taken as the current pipeline of projects reported by Bloomberg New Energy Finance (footnote 3); until this backlog of projects is completed the longer term objective of 10,000+ MW will not likely occur.

## 2. Cost Effectiveness

Cost Effectiveness based on total GHG reductions directly supported by CTF <sup>a</sup>	Cost effectiveness based on Total GHG Reductions with potential replication and scale up <sup>a</sup>
CTF \$1.70 per ton CO <sub>2</sub> e	~ CTF \$0.40 per ton CO <sub>2</sub> e

<sup>a</sup> Assumes a conservative 20-year operational period.

## 3. Demonstration Potential At Scale

18. Including the 750 MW of projects targeted in this Program, Indonesia has an announced project pipeline of 3,200 MW according to independent sources (footnote 3). In addition, the Government has identified a potential of nearly 10,000 MW of geothermal resources that is economically justified, and an estimated aggregate total of 29,000 MW that is technically viable, which could double the existing installed power generation capacity for the entire country. The replication and scale-up potential is more than the minimum of 4:1 and estimated at 17:1. The Program will help demonstrate a viable business model for geothermal power by the private sector, and build the next generation of experience and precedents for the private sector in Indonesia to leverage commercial debt and investment into the sector. As more projects commence exploratory programs and commercial operations, it will build the experience database in terms of success rates, and comparisons of actual results (e.g., heat resources, well capacities, other gases) as against estimates made using probabilistic models. This will reduce the uncertainties of future drilling programs (of success rates as well as costs), benefitting the geothermal sector.

19. It will demonstrate the viability of new power purchase agreements for geothermal projects with the state electricity offtaker (PLN), which may have a multiplier effect with respect to other types of RE projects (e.g., biomass cogeneration) that face similar issues. More importantly, the program will facilitate financial closure of landmark projects that improve bankability across the sector and remove barriers (establish new milestones) for accelerated development, *inter alia*:

- Previous geothermal PPAs (e.g., Wayang Windu, Darajat etc) did not include deemed commissioning and deemed dispatch provisions for Government force majeure events;
- Previous geothermal PPAs did not include any termination and buy-out provisions. The revised geothermal PPAs have buyout formulas based around traditional thermal power projects;
- Rather than requiring completion of the capacity under the PPA (like a traditional thermal project), the sponsors only have an obligation to commission the first unit which



preserves the PPA in the event plant operations need time to stabilize. This has been carried across to other multi-unit geothermal projects under the new PPA model;

- d. The tariff structure includes a monthly “take or pay” and availability guarantee, but with annual reconciliation (i.e., to smooth out any deficiencies in operation over the year). Other PPAs typically will penalize the developer on a monthly basis, and not give the developer a right to catch up. This annual reconciliation approach has been carried through to the new model geothermal PPAs.
- e. Indonesian PPAs have historically included a availability factor of 80% or less, thereby requiring a higher levelized tariff to be paid by PLN (assuming an 80% dispatch level). One project has been negotiated with a 90% availability factor, thereby reducing the levelized tariff.

#### **4. Development Impact**

20. Development impact accrues mainly from displacement of future coal-fired power generation capacity and offset or displacement of diesel and gasoline (petrol) fired generator sets with substantial ecological and public health co-benefits:

- Improved energy security (access to energy) co-benefits: 750 MW of equivalent at 90% output provides 5,913,000 MWh/year; assuming 1 MWh / year per person, and 5 people per household, 750 MW of new capacity will support more than 1 million households.
- Environmental and health co-benefits: This will include benefits to local air pollution that otherwise would have been generated from coal or diesel-fired generation. Benefits include reduced carbon dioxide, nitrous oxides (NOx), sulfur oxides (SOx), and total suspended particulates each per year (including black carbon).
- Employment co-benefits: Jobs directly and indirectly created by these investments, disaggregate by gender and skilled/unskilled. One project under consideration is expected to employ at least 2,000 persons during construction (1,300 skilled) and 100 skilled workers for long-term operation of the power plant and the steamfield. According to the Geothermal Energy Association<sup>12</sup>, approximately 4.0 jobs are created per MW installed during construction, and 1.7 jobs per MW installed created for operations and maintenance. Based on projects targeted under this Program, this would equate to 4,275 jobs created. Details will be reported on a project by project basis in line with program guidelines.

Performance indicators consistent with the CTF Results Framework are discussed below (at subheading 11). Other performance targets and indicators quantifying developmental impacts will be included in the formulation of a project design and monitoring framework for each individual project to be supported under this Program.

#### **5. Implementation Potential**

21. The Program will support 750 MW of projects with credible sponsors that are at a reasonably advanced stage of development, i.e., all with IUPs and in some cases with signed PPAs. All licensing and permitting (including environmental and forest licenses) is largely completed and does not pose a critical-path risk to financial closure and implementation.

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<sup>12</sup> October 2010. *Green Energy Jobs through Geothermal*. Geothermal Energy Association. Washington, D.C. These figures are endorsed by the U.S. Department of Energy.

Clearing this backlog of projects is critical to establishing investor confidence and scale up commercial financing for the next generation of greenfield projects.

22. As mentioned earlier, the regulatory environment promotes commercial implementation of geothermal projects once surface exploration has been completed. The overall regulatory framework supports the projects, however, some or most of the projects do not enjoy the most recently established off-take tariffs which have effectively created a “last mover” advantage. CTF financing, deployed with the principle of minimum concessionality, will provide the financial boost needed to clear the final hurdles to financial closure. If successful, the Program could be expanded and replicated to support other geothermal IUP holders bring projects to completion.

## **6. Additional Costs and Risk Premium**

23. Coal-fired electricity prices set a benchmark and highlight the persistent cost gap between geothermal developments (that are economically but not necessarily financially attractive) compared to electricity from coal-fired power. New feed-in-tariffs introduced for geothermal projects are needless to say helpful in generating interest. However, existing IUP holders (especially those that have already signed a PPA at lower rates) are likely ineligible for the revised feed-in-tariffs, and these are the projects which will come first to the commercial market for financing between 2013 and 2015. This has perversely translated into a “last mover” advantage for private sector developers. Additional costs and risks remain in project development, including exploration risks and geological risks. These costs and risks are not directly addressed by the feed-in tariff, which financial benefits do not accrue to the project developer (nor the certainty lenders require) until such time that full commercial operations of the plant is commissioned and costs then amortized over the long-term debt financing. The new tariffs cannot be readily monetized to cover the higher upfront costs of RE, underscoring the need for CTF financing for the projects.

24. As noted above (para. 11), capital costs are more than 4 times higher for geothermal power plants than for conventional fossil fuel plants. Exploration and resource risks (described below) are highly prevalent upfront in project development, where \$20-30 million (on average between \$5-8 million per well) must be spent before it is known whether the resource is commercially viable. Thereafter, a comprehensive production and injection well drilling program must commence to fully develop the reservoir. This can be upwards of 30% of the capital costs of a geothermal project. It is the equivalent of prepaying for a 20 year supply of fuel for a project. These are additional costs unique to geothermal power projects and not shared with other types of renewable energy (e.g., solar, wind, biomass) where upfront costs are a barrier.

## **7. Financial Sustainability**

25. Projects financed under the program will be subject to ADB’s normal due diligence and feasibility assessments, including financial, economic, environmental, social, and risk analyses. CTF funds will be utilized with minimum concessionality to ensure that individual projects meet ADB criteria for financial viability.

26. The Program will help a critical mass of utility-scale geothermal projects proceed to construction and commercial operations, which will contribute to financial sustainability of the geothermal subsector. This experience will set the benchmark for the same commercial banks which co-finance projects under the Program and help induce new commercial banks to finance the follow-on geothermal projects using the precedents set in terms of due diligence and financial structuring. Once banks further see how the geothermal steam resources are fully developed during construction, it will allow them to apply lessons learned for future projects.

This learning-by-doing approach – supporting several projects in quick succession -- is needed to demonstrate the case for geothermal as a viable commercial investment destination (not unlike the mining and oil and gas sectors).

## **8. Effective Use of Concessional Finance**

27. The Program will address the myriad risks associated with geothermal development (as discussed under other criteria) which require creative financing arrangements. The Government has articulated a policy of developing geothermal projects on a fully commercial basis, without the use of public funds (after surface exploration has been completed). ADB-PSOD has a clear role to play in structuring financial products to meet these challenges with select projects which will have a demonstration effect on the market. The principle of minimal concessionality will be applied on a case-by-case basis. If any other international financial institutions are co-financing the project, the approach shall be coordinated. It is important to recognize that the long-term development objective will require more than \$10 billion in commercial investments, and mobilizing this scale of financing may require concessional funding support well above the CTF allocations of \$190 million - \$200 million for private sector geothermal investments presented in the revised IP.<sup>13</sup>

28. The Government will continue to play a critical role in clarifying regulations and determining the correct balance of incentives and rewards promoting renewable energy development in Indonesia. The Government has committed \$250 million of its own capital to create a geothermal financing facility to initiate early stage development of new geothermal projects (including surface exploration and preparation of bidding documents for local governments). ADB engaged for several years with the Government on these sector plans, and while concessional financing was offered, the Government declined to borrow from ADB and the rest of the multilateral community for this Fund. Technical assistance continues to be provided by the development community from other sources. Therefore, the most effective use of concessional financing is to help the near term projects reach completion through the Program.

29. Some of the candidate projects under the Program have been proposed for CDM registration. However, any potential revenue from the sale of certified or verifiable emission reductions (CERs, VERs) will only be “on delivery” (i.e., after commissioning of the project) and will not be available as up-front cofinancing due to the collapse of the carbon market and the absence of third parties who previously offered such products. CTF has been designed in part to address the limitations of the carbon markets, and is an appropriate source of funding to support the proposed program. Once projects are approved and closed under this Program, ADB-PSOD will disclose necessary information to the TFC and Trustee with respect to the status of CDM registration of the individual projects.

## **9. Mitigation of Market Distortions**

30. The Program is designed to support select near-term private sector geothermal projects which have already been licensed (IUPs) by the Government and have finalized PPAs with PLN. These are projects which will seek commercial financing from the market within the next 3 years. Once there are projects under construction, production drilling programs underway (which will establish a wider experience base with project developers other than oil & gas companies) and private sector projects commissioned and selling electricity, the risk

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<sup>13</sup> Recognizing this aspect of the geothermal subsector, additional support for utility-scale renewable energy programs (e.g., geothermal) are proposed in the parallel CTF Dedicated Private Sector Program. Indonesia is included in “group 2” of the candidate countries. This will complement the scope of interventions proposed herein for the ADB-PSOD program.

perceptions of commercial lenders and investors will be more well-informed. This will substantiate geothermal power as a viable business sector in Indonesia, transitioning from a subsector with a handful of projects that are economically and environmentally attractive but unable to attract commercial financing. Thereafter, the need for concessional finance will be reduced for future projects, which will also benefit from new feed-in tariffs being introduced by the Government. As the Program will be limited to select projects and time bound (3 years), this will prevent any market distortions with the private sector.

## 10. Risks

31. **Policy and Regulatory Uncertainty:** Since the Geothermal law was passed in 2003 (Law No. 27 of 2003), the regulatory and pricing regime in Indonesia has evolved considerably (see Annex C for more details), and has gradually improved the attractiveness to private investors. In 2010, a flat feed-in tariff of US\$0.097 per kwh was established for all geothermal projects, but there was no obligation for PLN to purchase the power nor mandatory dispatch of electricity generated under the PPAs. New tariffs were published in 2012, which set new tariff floors and tariff ceilings for geothermal based on location. These tariffs are in the process of being revised again for location, size and enthalpy. As shown in Figure 1, Indonesia has broadly-defined RE targets but does not have a renewable portfolio standard (RPS) or purchase obligation. The lack of a RPS and certain interpretations between the laws and regulations (including whether older projects are eligible for more recent changes) continue to pose risks for project developers and investors, and ultimately delay the negotiations and signing of power purchase agreements with PLN.<sup>14</sup> While unofficially acknowledged by the Government, it may be a challenge for these issues to be resolved until after national elections are held (2014).

32. **Electricity Off-take risks.** While the upstream activities on exploration and use of steam resources are managed and regulated by MEMR, the downstream activities (i.e., electricity production) fall under relevant electricity law and regulations. All electricity generated by the projects will be sold to PLN, the state owned electric utility, through a fixed tariff for the full term of the power purchase agreements. PLN owns and operates the majority of the country's power generating capacity and remains the main provider of transmission and distribution services in Indonesia. PLN benefits from a dominant integrated position in the Indonesian power sector and a strong track record of government support. However, PLN's average retail tariffs do not fully cover the cost of power purchases and other operating expenses, thereby creating certain financial risks for any project developer borrowing large amounts of debt and injecting equity to finance the capital expenditures required to construct a geothermal power project. This offtake risk is somewhat mitigated by the 20-year guarantee (through a business viability guarantee letter<sup>15</sup>) from the Ministry of Finance. This guarantee is a key feature improving the bankability of geothermal power projects in Indonesia.

33. **Financing Constraints:** Given the policy, regulatory, and off-take issues discussed above, commercial financing is generally not available until most of the geological and "fuel" risk on a specific project has been reduced. Commercial financing is limited mostly to export credit agencies, development finance institutions and a handful of international project finance (i.e.,

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<sup>14</sup> The review of geothermal risks by Geothermex in 2010 (footnote 10) included discussion of the perceived risks of Government policy, noting: "The memory of the 1997-1998 crisis remains fresh, despite the efforts of the Government to restore and enhance investor confidence." In the view of many commercial investors who remain reluctant to support geothermal projects, that statement remains true today.

<sup>15</sup> Minister of Finance Regulation No. 139/PMK.011/2011

non- or limited recourse) lenders<sup>16</sup>. Indonesian banks are not active project finance lenders and have shown very limited appetite for geothermal projects to date. This is expected to change once there are new successful financial closings on geothermal projects. In this context, ADB has held detailed discussions with those commercial banks which are still active in project finance in Asia and two key issues have been raised which CTF could help alleviate: loan tenor limitations and resource risks.

- a) Loan Tenor Limitations: Geothermal projects in Indonesia typically have a 25 year power purchase agreement which necessitate relatively long-tenored loans to match the revenue stream and amortize the relatively high capital costs. Due to the impact of Basel III regulatory norms and other facts, international commercial banks are unable to provide these long tenors that geothermal developers require. Under the program, long-term project loans with up to 20 year door-to-door tenor will be utilized to mitigate this risk.
- b) Resource Risk: Geothermal has inherent high risks associated with (i) upfront steam field exploration and confirmation drilling in the development stage, before the project is determined to be viable; and (ii) maintenance of the reservoirs and steam wells, steam gathering systems and turbines in the operational stage. Geological risks are not readily mitigated with the current regulatory and tariff regime. Geothermal has higher upfront costs, reflecting the fact that the upstream exploration and development provides the “fuel” for the operating lifetime of the associated power generation units. These additional upfront fuel costs and development risks are site-specific and not fully predictable.<sup>17, 18, 19</sup> As there are very few reference private sector projects anywhere in the world, commercial banks require higher debt service coverage ratios<sup>20</sup> (and/or higher risk premiums) to get comfortable with both exploration and resource risk (the full MW capacity of the steam reservoir and the variability of electricity production during operations).

34. As discussed above, some financing instruments tailored to these site-specific risks will be employed as necessary on a project-by-project basis. CTF funds deployed in a subordinated debt position to specifically cover contingent and upfront costs could facilitate credit approvals for the large amounts of senior debt required to bring these projects to financial close (without incurring further delays waiting for additional wells to be drilled and resource proven, which increases the cost of capital for a project.)

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<sup>16</sup> Prior to the global financial crisis in 2008, there were approximately 25 international project finance banks that were active lenders in Asia and the Pacific. In last few years, this number has declined to approximately 15 banks which are principally Japanese, Australian, Singaporean, and two regional banks. Noticeably absent are most of the European banks, who were active lenders until the last several years. By way of comparison, the Malaysian power market is largely financed by domestic banks and bonds due to its successful and established track record.

<sup>17</sup> The risks of the total drilling costs per well and “success” is not normally borne by the drilling contractor, rather these risks are borne by the project developer/owner. If a well needs to be drilled to a depth of 2,500 m rather than 2,000 m, the additional drilling cost is borne by the owner, and the drilling contractor protects his liability by negotiating unit rates (on per meter or per day basis).

<sup>18</sup> A major geophysical risk is the co-production of corrosive fluids and non-condensable gases, both of which are commercially unattractive features.

<sup>19</sup> A comprehensive discussion of geothermal exploration and development risks can be found in: 2012. *ESMAP Geothermal Handbook: Planning and Financing Power Generation*. Washington, D.C. Discussion of development risks specific to Indonesia can be found in the reference in footnote 10.

<sup>20</sup> The ratio of available cash flow from a project to meet the scheduled interest and principal payments due to the lender.

35. **Environmental Issues:** With 42% of geothermal power resources located in forest areas, environmental and social protection is a critical risk of project development and implementation. Despite best intentions and investor's commitment to sustainable development, these challenges can often lengthen development time and expense, putting further pressure on investor's commitments to shareholders. However, it is possible for geothermal development to be balanced with forest preservation, while also supporting the livelihoods of forest dependent communities. These impacts will be assessed and evaluated on a project specific basis in accordance with ADB's *Safeguard Policy Statement* 2009 which includes specific provisions to preserve and protect biodiversity and sensitive ecosystems. It is important to identify and preserve high-value conservation forests and avoid land acquisition in sensitive ecosystems. Meaningful consultations with all affected persons and stakeholders will be carried out and concerns addressed in a participatory fashion and with due respect to gender impacts. No projects located in conservation forests, as categorized by Ministry of Forestry, will be supported under the Program.

## **11. Performance Indicators**

36. The performance indicators outlined below are derived from the CTF Results Measurement Framework and Indonesia's CIP Update (April 2013). These indicators will be tracked at least annually.

Program Performance Indicator		Baseline	Anticipated Results by December 2018 (5 years)
GHG emissions avoided by the Program (including replication and scale up)		N/A	4.4 million tons of CO <sub>2</sub> equivalent per annum <sup>21</sup>
CTF financial leverage for the Program		N/A	17 to 1, inclusive of MDB co- financing (\$350 million), public co- financing (\$400 million), and commercial/private sector debt and equity (\$1,700 million) leveraged.
Increased supply of RE – geothermal power	Installed capacity (MW)	1,226 MW	Additional 750 MW
	Design Output (GWh/y)	N/A	Additional 5,913 GWh/y

NOTE: Other performance targets and indicators quantifying developmental impacts will be included in the formulation of a Project Design and Monitoring Framework for each individual project to be supported under this program.

<sup>21</sup> This assumes 750 MW of new geothermal capacity from the Program, operating at 90% availability, and an average emissions factor for the Sumatra and Java-Madura-Bali grids of 0.75 MtCO<sub>2</sub>e/MWh.

## Annex A

### Administrative Budget

ADB Indonesia Private Sector Geothermal Program	
Summary for 20 Years	
Program Implementation	150,000
Legal Services	400,000
Project Supervision	200,000
<b>Total</b>	<b>750,000</b>



## Annex B

### Email from CTF Trustee confirming cash availability for this program

----- Forwarded by Don Purka/RSDD/ADB on 09/09/2013 10:49 AM -----

From: cingvoldstad@worldbank.org  
To: zzhang2@worldbank.org,  
Cc: "Don Purka" <dpurka@adb.org>, "Jiwan Acharya" <jacharya@adb.org>, Lwilson2@worldbank.org, mbeppu@worldbank.org, rdelacruz1@worldbank.org, jfmachado@worldbank.org  
Date: 06/09/2013 10:37 PM  
Subject: Re: CTF Program Proposal - Indonesia Private Sector Geothermal

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Hi Zhihong,

We have sufficient funds for the request.

Best,  
Chie

▼ Zhihong Zhang---09/06/2013 09:48:21 AM---Dear Don, Glad to hear about the progress with the Indonesia PS geothermal program. By copy of this

From: Zhihong Zhang/Person/World Bank  
To: "Don Purka" <dpurka@adb.org>  
Cc: Lesley Wilson/Person/World Bank@WorldBank, "Jiwan Acharya" <jacharya@adb.org>, Chie Ingvoldstad/Person/World Bank@WorldBank, Rowena Dela Cruz/Person/World Bank@WorldBank, Mayumi Beppu/Person/World Bank@WorldBank  
Date: 09/06/2013 09:48 AM  
Subject: Re: CTF Program Proposal - Indonesia Private Sector Geothermal

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Dear Don,

Glad to hear about the progress with the Indonesia PS geothermal program. By copy of this email, I ask the Trustee (Chie) to confirm availability of resources.

Thanks, Chie, in advance.

Best,

Zhihong

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**From:** dpurka

## **Annex C:**

### **Regulatory Framework for Private Sector Participation In the Indonesia Geothermal Sector**

1. The Government of Indonesia recognized the potential for geothermal energy to serve as a viable power generation source since the early 1990s. A presidential decree issued in 1991 earmarked 18 geothermal working areas or WKPs (*wilayah kerja pertambangan*), for allocation among public and private developers with the aim of adding 4,500 MW of power generation capacity. Geothermal development has historically been categorized as a mining activity in Indonesia, and was previously managed by Pertamina. Pertamina was given the authority to conduct preliminary survey, exploration and exploitation of geothermal resources under Decree 22/1981.<sup>22</sup> For some of these projects, Pertamina signed joint operation contracts (JOC) and allowed private investors to develop and operate geothermal power plants while steam field assets remained under government ownership. Pertamina also segregated its geothermal operation division and established a subsidiary, Pertamina Geothermal Energy (PGE), in 2006 to enhance its geothermal development.

2. Unfortunately, regulatory and economic challenges derailed this effort and very little new capacity was added to the grid in the 1990s. In an effort to revive the flagging geothermal sector, the government issued a geothermal law in 2003 that mandated transparent and competitive tendering of future geothermal fields not covered under the previous presidential decree. The law shifted regulatory authority from the state owned oil company, Pertamina, to the Ministry of Energy and Mineral Resources (MEMR), which subsequently created a dedicated directorate for geothermal development.

3. The Geothermal Law (Law No. 27 of 2003) governs the upstream side of geothermal development but leaves the downstream aspects of electricity supply to the more general electricity legislation (Law No. 30 of 2009). These laws are supplemented by a number of government and ministerial regulations dealing with geothermal development. The following is short summary of key regulations in this regard.

### **Processes for geothermal working area concession**

#### **Geothermal Law (No. 27/2003)**

4. In the 2003 Geothermal Law, there are two key changes from the traditional framework. First, it delegated the authority of geothermal resource development of new WKPs to local governments. Therefore, new WKPs are managed by regency or provincial governments, depending on the coverage of areas of the WKP. If a WKP covers an area over multiple regencies, the provincial government retains the authority. When a WKP area is spread over multiple provinces, the central government retains the authority for resource development. Second, by delegating authority to the local governments and by tendering out the concessions, the law promotes development by independent power producers (IPPs).

5. The winning bidder is granted the WKP area in which it may develop geothermal energy based on the geothermal mining license issued (the *Izin Usaha Pertambangan Panas Bumi* or the IUP). IUPs are granted for working areas under the 2003 Law No. 27. IUP holders are

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<sup>22</sup> The right to develop fourteen working areas, that were set before the enactment of the Geothermal Law (Law 27/2003) is still held by Pertamina to date.

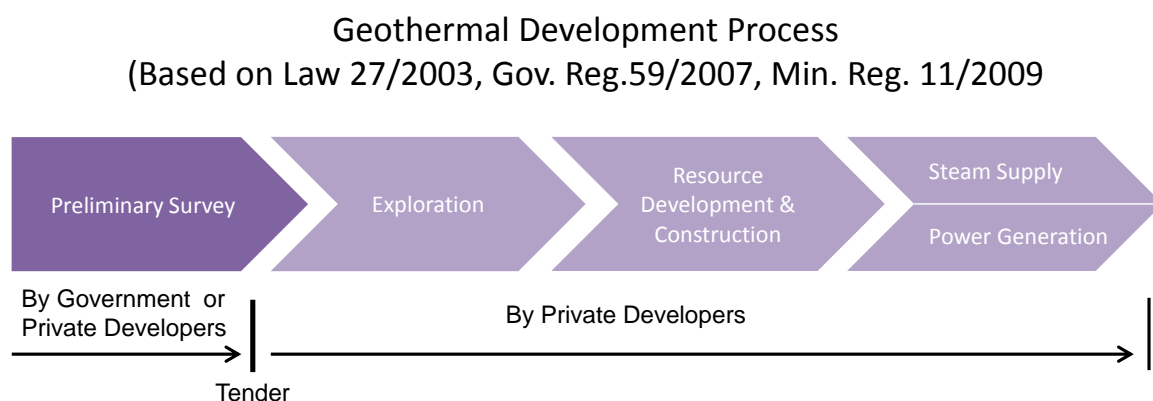
entitled to: (i) utilize government data and information related to their respective WKP, (ii) enjoy certain tax breaks such as import duty exemptions, (iii) use public infrastructure, (iv) utilize geothermal energy either directly or sell the steam produced and (v) obtain an extension period of the IUP. Under the 2003 law, the private sector developer bears the full cost (and risks) of exploration and drilling activities.

6. IUP holders, among others, have the obligation to: (i) periodically submit long-term exploration and exploitation plans as well as post-mining plans to the Minister, (ii) pay state revenues i.e. taxes and non-tax state revenues, and (iii) relinquish their work areas in whole or in part to the Minister, Governor or Regent/Mayor. Other than the above requirements, IUP holders must also comply with the regulations on environmental protection, health and safety in the work environment, community development and other prevailing laws and regulations which are relevant. IUP holders cannot assign their rights to a third party (without government consent) and may not securitize the IUP for raising debt.

### **Government Regulation (PP) 59/2007 on geothermal working area tender processes**

7. After the 2003 Geothermal Law was passed, there were no significant activities in geothermal development until the issuance of the Government Regulation on geothermal working area tender processes (PP 59/2007). This regulation set up the framework for working area tender processes by local or central governments. The key points in PP59/2007 are:

- power price is the most significant competition element in tender processes<sup>23</sup>,
- even though the timing of exploration in relation to tender processes is not specified, MEMR's policy so far has been to conduct the tender as soon as WKP is set only with surface survey data and without exploration drilling, and
- it allows private developers to conduct preliminary surveys on a first-come first-served basis, and these developers will be given a right to match in tender processes.<sup>24</sup> The basic structure of the process is as shown in the Figure below.



<sup>23</sup> PP 59/2007 specifies in Article 25 b. that the winner of an IUP tender shall be selected based on the lowest selling price of geothermal power, but it leaves room for other evaluation of financial and technical quality in proposals in ranking participants.

<sup>24</sup> The right to match or first refusal is granted to a developer that conducted a preliminary survey to match the offer price of another bidder with a lower tariff.

## **Ministerial Regulation (MEMR) 11/2009, as detailed regulation of PP 59/2007**

8. In 2009, MEMR Regulation 11/2009 was issued to clarify some issues of the tender processes stipulated in PP 59/2007. The main structure of tender process remains the same as PP 59/2007. This regulation requires bidders to prove that they have secured US\$10 million for exploration in the form of cash in an escrow account or loan/credit facility. It also stipulates that if exploration does not commence within six months of the issuance, the IUP will be revoked. IUPs may be granted for 35 years, which comprises an exploration period of 3 years (extendable twice by a period of one year each time), a feasibility study of valid for a maximum of two years and an exploitation period of up to 30 years.

## **Pricing and Tariffs**

9. The pricing for geothermal power projects has evolved considerably over the past several years.

## **Ministerial Regulation (MEMR) 14/2008**

10. In 2008, MEMR Regulation 14/2008 was issued to set geothermal power prices at 80% to 85% of the average generation cost of each regional grid. However, this would cause potential fluctuation of purchasing prices. When oil prices were record high in 2008, this method allowed competitive pricing in some regions, but as the oil price declined, these prices became no longer attractive for private sector developers, especially in regions where large resources are located such as Sumatra and Java.

## **Ministerial Regulation (MEMR) 32/2009**

11. The Geothermal Law (Law No. 27 of 2003) governs the upstream side of geothermal development but left the downstream aspects of electricity supply to the more general electricity legislation (Law No. 30 of 2009). In 2009, MEMR Regulation 32/2009 was issued and a ceiling price of 9.7 US cents/kwh was set. However, this regulation did not specifically mandate PLN to purchase geothermal power, therefore private sector developers could not be certain of PLN's intention to sign PPAs at the prices set in tenders. Therefore, MEMR Regulation 4/2011 was issued to make purchasing of geothermal power an obligation of PLN by the Government, if the winning price was equal to or lower than 9.7 U.S. cents/kwh. These regulations became the basis for a number of tenders for which IUPs have been awarded.

## **Ministerial Regulation (MEMR) 22/2012**

12. In 2012, however, there was a significant change in pricing policies. MEMR issued Regulation 22/2012, which set fixed prices for geothermal power, or feed-in tariffs (FIT). Prices were differentiated by region and voltage connection and ranged from US\$0.105 to 0.185/kwh (see Table A below). The rates are non-negotiable, with the provinces of Maluku and Papua receiving the maximum tariff (US\$0.17/kwh), and Sumatra the minimum (US\$0.10/kwh). The government also provides "business viability" guarantees that effectively cover the risk of PLN default on PPA payments. Should PLN fail to pay the agreed price at some point, the Government would cover the financial loss for private investors.

**Table A: Feed-in Tariffs of MEMR 22/2012**

Area	Geothermal Electricity Price (US\$/kWh)	
	High Voltage	Medium Voltage
Sumatra	0.10	0.115
Java, Madura and Bali	0.11	0.125
South Sulawesi, West Sulawesi, and South-East Sulawesi	0.12	0.135
North Sulawesi, Central Sulawesi, and Gorontalo	0.13	0.145
West Lesser Sundas, and East Lesser Sundas	0.15	0.165
Maluku and Papua	0.17	0.185

13. The new FiT policy has not accelerated project development and the Government (MEMR and MOF) is now looking into changing the tariff policy. While not yet official, MEMR has suggested it will raise the ceiling to US\$0.30/kwh and introduce a floor price of \$0.115/kwh (and distinguishing prices based on capacity and heat resource levels). The new scheme would allow more flexible negotiations between developers and PLN on the power purchase agreements and clear a path to reintroduce the competitive tendering process. There is an intention from MEMR to stipulate that the maximum price companies can receive for any given project will be dependent on the anticipated size of the plant and temperature of the resource.

## Forestry

### **Government Regulation No. 24 of 2010 on Utilization of Forest Area (“GR 24/2010”)**

14. Under GR 24/2010, power plants including geothermal power plants and other projects deemed strategically important can now take place in Protected Forests. However, no change has been made in respect of Conservation Forests; therefore, geothermal projects could not take place in Conservation Forests. Any projects located in a Protected Forest must obtain a Lend-Use License (or *Ijin Pinjam Pakai*) from the Ministry of Forestry, which provides a non-exclusive right to use the designated forest area for project development. Further, if the forest is deemed as State Land (*Tanah Negara*), the Ministry of Forestry will not release its control over the Protected Forest area meaning that the project site cannot be converted into any land title and cannot be secured with any type of security.

## Geothermal Risk Mitigation Fund

### Ministerial Regulation (MOF) 3/2012

15. Ministry of Finance issued MOF Regulation No. 3/2012 to establish a Geothermal Fund Facility (GFF) to provide risk mitigation measures to promote the participation of private developers. This regulation assigns the Government Investment Agency (PIP), an agency under MOF, as the manager of GFF. The GFF was initially capitalized in 2011 by the Government with approximately \$145 million of state resources and an additional \$105 million was authorized by MOF in 2012. There are three main schemes outlined by the regulation: one for local governments, a second for IUP licensees and a third for those parties granted pre-2003 WKPs.

16. For the local government scheme, GFF can finance the exploration costs, based on the request from the designed government authority (local or central government) before bids are invited. In this scheme, GFF will cover the expenses associated with exploration and then transfer the exploration drilling data and analysis for the government agency to make available to the bidders. The maximum amount per site is US\$ 30 million, which is expected to cover at minimum the cost of up to three exploration wells. If there is a successful tender process, the loan is to be repaid by the winner of the tender with a 5% margin to PIP. This payment by the winner is a necessary condition for the issuance of IUP, which needs to be committed by the tenderers before the decision to use GFF. However, in cases where the tender process is delayed or not successful, the liability of loan remains with the designated authority (local or central government). Further implementation details are being developed by PIP.

17. Another avenue of financing under the regulation is for existing winners of holders of IUPs under competitive basis, including the private sector. The GFF can provide refinancing of up to \$30 million equivalent in local currency per site to existing holders of IUP. The loan is available to refinance eligible expenditures incurred by the IUP holder (based on documented progress of exploration drilling) with interest rate at the benchmark Bank Indonesia rate. The loan must be repaid by borrowers no later than 4 years after exploration is completed or at financial close, whichever occurs first. However, there are challenges to this scheme as IUP holders must first finance the capital expenditures (a mix of both foreign and local currency) and initiate drilling activities before the GFF loan will consider refinancing the expenditures in Indonesian rupiah. In addition, GFF loans must be fully collateralized which is challenging for special purpose companies with no assets nor cash flow (until the project begins commercial operations). This would require guarantees or recourse by project sponsors, in addition to the outlay of shareholder funds to begin drilling. Therefore, there is no apparent risk bearing capacity by GFF in this scheme. The regulation does not further specify implementation details.

18. The third scheme under this particular regulation applies to existing holders of WKP development rights before the promulgation of the Geothermal Law in 2003. Essentially, this applies to PGE. While details have not yet been determined by the implementation agency, the loan needs to be repaid within five years after the commercial operation date (COD) of power plants.