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Encouraging Geothermal Investment in Indonesia through a New Business Scheme

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ABSTRACT

The Indonesian government has committed to reducing greenhouse gas emissions by 29% in 2030. One of the efforts from energy sector is optimizing renewable energy utilization, including geothermal energy. The National Energy Policy targets the utilization of electricity from geothermal energy to reach 9300 MW by 2030. Due to national budget constraints, the government offers Geothermal License to business entities before exploration drilling. Preliminary Survey and Exploration Assignment (*Penugasan Survei Pendahuluan dan Eksplorasi/*PSPE) is one of the government's breakthroughs to accelerate geothermal energy development through assignments given by the Minister of Energy and Mineral Resources to business entities to carry out Preliminary Survey and Exploration activities aiming at one exploration well as the minimum output. The PSPE should be carried out within 3 years with the aim of finding geothermal reserves that can be developed economically. PSPE is carried out at the expense of the business entities without any reimbursement, but the executors will get the privilege or priority to obtain a Geothermal License after the PSPE is completed. Furthermore, they will be entitled to fiscal incentives for import duty on goods and the exemption of fixed dues. This new mechanism of geothermal development has received a positive response from investors. Offered in the second semester of 2017 until the end of 2018, the new mechanism has managed to get 8 (eight) business entities assigned by the Ministry of Energy and Mineral Resources. The PSPE holders are investors from the US, China, Turkey, Brazil, Philippines, and Indonesia, with an expected total investment amount of around US$135 million in the next three years. This paper lays out the guidance and process of PSPE in order to accelerate geothermal development in Indonesia.

1. INTRODUCTION

The government of Indonesia has agreed with one of the outcomes of the Conference of Parties (COP)-21 in 2015 to reduce Green House Gas (GHG) emissions by 29% independently or up to 41% with international assistance in 2030, as outlined in the Paris Agreement and ratified by Law No. 16 of 2016 concerning the Paris Agreement or the United Nations Framework Conference on Climate Change. The targeted contribution from the energy sector to national GHG emission reduction is 38% by 2030. Of this target, the contribution from specifically the new renewable energy sub-sector reached 54.3% in 2018.

Located between active fault lines, Indonesia has abundant geothermal resources. A geothermal resource investigation by Geological Agency (2018) found that Indonesia has geothermal potential of 25.4 GW spread over 349 locations along the ring of fire, passing through Sumatra, Java, Bali, Nusa Tenggara, Sulawesi, and Moluccas. As of the end of 2018, this potential had been successfully utilized for geothermal power plants with total installed capacity of 1.9 GW, which accounts for only 7% of total resource. The utilization achievement suggests that there is a lot of room for improvement.

Along with technological advancement, electricity has become humans' basic need. The government of Indonesia has carried out a series of efforts to meet domestic energy demand, including the establishment of the National Energy Policy in 2014. The policy provides a guideline in directing energy management in order to ensure energy independence and security to support the national development. Moreover, National Energy Policy has been set in line with the 7th goal of Indonesia's Sustainable Development Goals in the framework of ensuring affordable, reliable, sustainable, and modern energy access for the people. As part of the GHG emission reduction mitigation actions from the new renewable energy sub-sector, the development of geothermal power plants is deemed feasible to do to meet those targets.

To achieve national energy independence and security, the National Energy Policy mandates that energy resources should become not only exported commodities but also a national development capital. To this end, the government has set a number of targets, including the achievement of the optimal primary energy mix, one of which is by increasing the role of new energy and renewable energy, including geothermal energy by 23% in 2025 and 31% in 2050. Therefore, to implement the National Energy Policy and fulfil the commitment to COP-21, the utilization of geothermal energy for power plants is targeted to contribute 7.2 GW in 2025 and 9.3 GW in 2030.

Geothermal is an environmentally-friendly energy source and can be used sustainably even though the development of geothermal energy is not easy and entails high technology, high risks, and high costs. Referring to Law Number 21 of 2014 concerning Geothermal Energy, the government conducts geothermal exploration. However, in its implementation, the government has never conducted any exploration drilling on their own due to the high risks of exploration and budget constraints. Fortunately, the Law enables the government to assign other parties to carry out an exploration drilling.

In order to attract investment in the geothermal sector, the government prepares geothermal business schemes through the mechanism of Preliminary Survey and Exploration Assignment (PSPE) which is regulated in details in the Energy and Mineral Resources Ministerial Regulation No 36 of 2017. PSPE is an assignment given by the government to business entities to carry out geological, geochemical, and geophysical surveys, and integrated evaluation, as well as to drill exploration wells with the aim of obtaining information on sub-surface geological conditions in order to estimate geothermal reserves. In any geothermal development, the preliminary survey and exploration activities pose the greatest risk, as illustrated in Figure 1. The issuance of

PSPE business scheme is intended to attract investors who have technical and financial capabilities to support the acceleration of geothermal development in Indonesia.

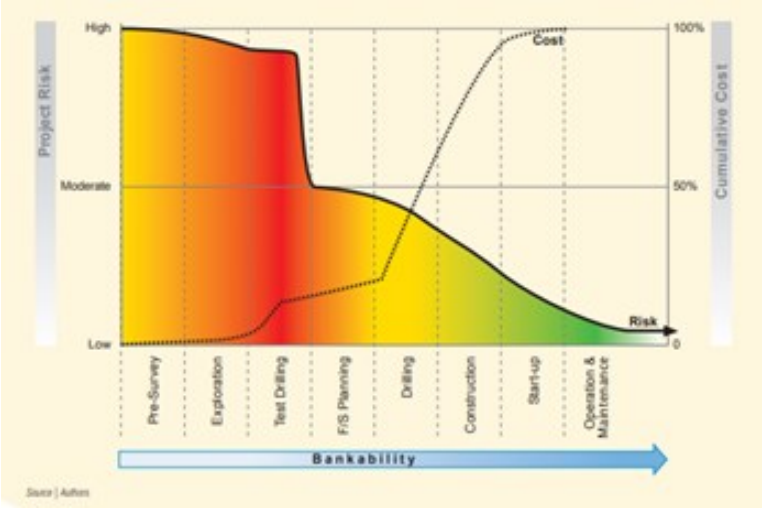


Figure 1: Project Cost and Risk Profile at Various Stages of Development (World Bank, 2012).

2. GEOTHERMAL BUSINESS SCHEME IN INDONESIA

2.1 Business Process of Geothermal Development

In accordance with Law Number 21 of 2014 concerning Geothermal Energy, which is derived from the Government's Regulation Number 7 of 2017 concerning Geothermal Energy for Indirect Use, a geothermal utilization process starts with the stage of preparing for the working areas. The data used for this preparation can originate from preliminary and exploration surveys which use the government's budget as well as those carried out by business entities.

The geothermal working areas will then be offered to business entities by either following a tender mechanism or assigning them to state-owned enterprises. Regarding who can conduct the preliminary and exploration surveys, the tender for a geothermal working area is divided into: (1) for a geothermal working area whose data are from the private sector, the tender will be conducted in a limited auction; and, (2) for the data obtained by the government, it will be conducted in an open auction.

Business entities which are selected as the auction winners and given assignments by the government will be granted Geothermal License stipulated by the Minister of Energy and Mineral Resources which is valid for 37 years, covering 5 years for exploration with an option to extend for 2 times, each in one year, and 30 years for exploitation and utilization (Figure 2).

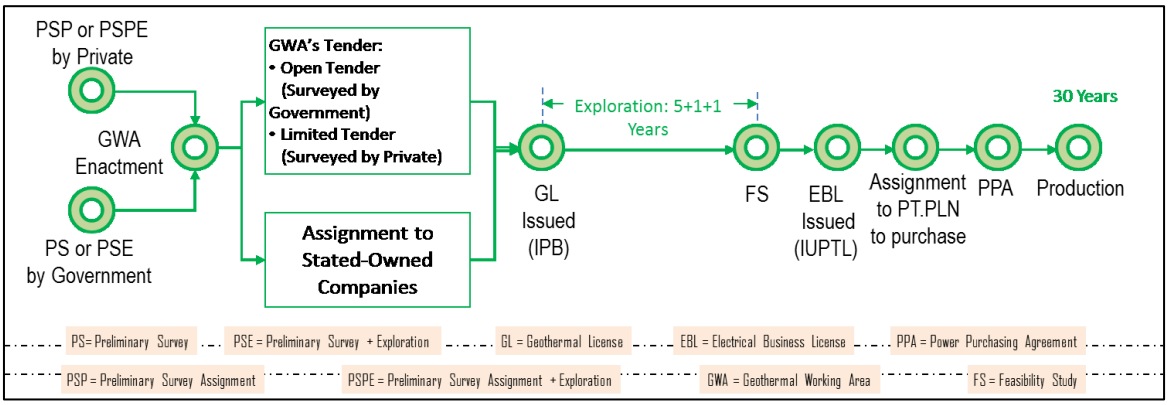


Figure 2: Geothermal Business Scheme.

2.2 Offering of Geothermal Business through Geothermal Working Areas and PSPE Areas

As PSPE holders are prioritized for obtaining Geothermal License through limited auctions, the following table illustrates the differences between Geothermal Working Area (GWA) tender and PSPE area offering.

Table 1: Comparison of GWA Tender and PSPE Area Offering Schemes.

No.	Issues	GWA Tender	PSPE Areas Offering
1.	Bidding mechanism	Tender	Contest
2.	Bidders	Business entity or consortium	Business entity
3.	Bid guarantee	a. IDR 2,000,000,000 for area with reserves of ≥ 100 MW b. IDR 1,000,000,000 for area with reserves of up to 100 MW	IDR 0
4.	Bidding stage	2 stages a. Stage1: determination of bidders who meet the qualifications based on an evaluation of documents on administrative, technical and financial requirements b. Stage 2: determining qualified bidders by referring to project proposal and exploration commitment	1 stage: evaluation of documents on administrative, technical and financial requirements
5.	Pre-Transaction Agreement with PT PLN (Persero)	Getting pre-transaction agreement when a bidder is decided as the winner	Pre-transaction agreement is provided after PSPE is finished and the contest winner follows a limited auction mechanism
6.	Form of exploration commitment	Escrow account at state-owned bank	Escrow account or standby letter of credit at state-owned bank
7.	Amount of exploration commitment	a. > US$10,000,000 for geothermal development of ≥ 5 MW b. > US$5,000,000 geothermal development of < 5 MW	> US$10,000,000
8.	Placement of exploration commitment	As much as the exploration commitment at state-owned bank	5% of exploration commitment at state-owned bank
9.	License type	Geothermal License holder	PSPE holder
10.	License period	37 years	5 years
11.	Activities	1. Preliminary survey 2. Exploration 3. Exploitation 4. Utilization	1. Preliminary survey 2. Exploration
12.	Exploration fee/ land rent	US$ 2 per Ha	US$ 0

3. PSPE MECHANISM

3.1 Procedures for Offering PSPE

SPE is an assignment given by the government to a business entity to carry out geological, geochemical, geophysical, and/or integrated evaluation activities, as well as the drilling of exploration wells and of temperature gradient, if necessary, with the aim of obtaining information on sub-surface geological conditions to estimate geothermal reserves in open areas or areas that have not yet been designated as Geothermal Working Areas. PSPE is granted for a maximum period of 3 (three) years and can be extended at most 2 (two) times each 1 (one) year. One PSPE area is given as an assignment to only 1 (one) business entity, and the cost of implementing PSPE issued by the business entity is not reimbursed.

Referring to the Ministry of Energy and Mineral Resources (MEMR) Minister's Regulation Number 36 of 2017, business entities can propose to the Minister of Energy and Mineral Resources through the Director General of New and Renewable Energy, and Energy Conservation (DG-NREEC) for an Open Area to be determined to be a PSPE Region. Business entities implementing PSPE are selected through the mechanism of contests, and the contest participants must be incorporated in Indonesia. PSPE area offerings are carried out within 1 month through print media, electronic media, other media and/or promotions in national or international forums.

In the event that the PSPE contest is joined by only 1 (one) business entity, the procedure for selecting PSPE implementers is based on the pre-determined stages by providing an opportunity to make improvements to fulfill the technical requirements and financial requirements. One PSPE area is given as an assignment to only 1 (one) business entity, and the cost of implementing PSPE issued by the business entity is not reimbursed either by the government or other business entities if the business entity implementing the PSPE does not proceed to the exploitation stage or become a Geothermal Permit (IPB) holder. The application for PSPE is submitted to the MEMR along with the documents required for the assignment request, namely:

1. Administrative documents (establishment deed, deed of business entity change, Taxpayer Identification Number, and business entity profile).

2. Technical documents (work program for the implementation of PSPE, the ability in technical operations, as shown from their experience in the geothermal field, and experts in the geothermal field). The work program for the implementation

of the PSPE consists of: 1) the procedure for implementing the PSPE; 2) the plan for financing the implementation of the PSPE; 3) the plan for exploration well design; 4) the plan for drilling exploration wells with at least 1 exploration well; 5) well test plan; and, 6) the plan for implementing good engineering practices and Health, Safety, and Environmental management.

3. Financial documents, which consist of the annual financial statement for the last 3 years from the business entity or its parent company and a statement letter on the provision of funding to implement the PSPE of at least US$10,000,000 (ten million United States dollars) as an Exploration Commitment.

The documents that are contested in the PSPE are technical and financial documents using a merit point system for each aspect according to the minimum passing grade based on the criteria set by the PSPE Selection Committee. Referring to the MEMR Minister's Regulation Number 33 of 2018 concerning the Management and Utilization of Geothermal Data and Information for Indirect Use, the business entity participating in the PSPE region is given access to raw data and processed data to design the PSPE work program.

Next, the top-ranking prospective PSPE executors are required to place a portion of exploration commitments (5% of exploration commitments) in accordance with the statement letter that has been submitted to the PSPE Selection Committee in the form of a standby letter of credit at an Indonesian state-owned bank based in Jakarta, including Bank Rakyat Indonesia (BRI), Bank Mandiri, Bank Negara Indonesia (BNI), and Bank Tabungan Negara (BTN). If the top-ranking candidates cannot place a portion of exploration commitments within the predetermined time limit, they will be declared null, and the candidate in the subsequent rank will be determined as the prospective PSPE executor and obliged to place a portion of exploration commitments. The MEMR will then proceed to the selection of the PSPE implementer after the prospective PSPE executor places a portion of the exploration commitments in question.

The executor of the PSPE is selected through the mechanism of contests, and the business entities participating in the contests must be incorporated in Indonesia. In the event that the PSPE contest is joined by only 1 (one) business entity, the procedure for selecting PSPE implementers is based on the pre-determined stages by providing an opportunity to make improvements to fulfill the technical requirements and financial requirements. The contested documents are technical and financial documents using a merit point system for each aspect according to the minimum passing grade based on the criteria set by the PSPE Selection Committee, which is 60 out of a total value of 100. The technical documents consist of a work program for the implementation of PSPE, the ability in technical operations, and experts in the geothermal field. Meanwhile, the financial documents consist of the annual financial statement for the last 3 years from the business entity or its parent company and a statement letter on the provision of funding to implement the PSPE of at least US$10,000,000 (ten million United States dollars) as an Exploration Commitment. Next, the top-ranking prospective PSPE executors are required to place a portion of exploration commitments (5% of exploration commitments) in accordance with the statement letter that has been submitted to the PSPE Selection Committee in the form of a standby letter of credit at an Indonesian state-owned bank based in Jakarta.

3.2 Rights and Obligations of PSPE Holders

The exploration phase of a geothermal project aims at locating geothermal reservoirs for possible exploitation and at selecting the best sites for drilling production wells. Before proceeding with the specific aspects of the process, it is necessary to consider the relevance of the preliminary survey phase which involves a work program to assess the already available evidence for geothermal potential within a specific area (perhaps a country, a territory, or an island). The objectives of geothermal exploration are to (Lumb, 1981):

1. Identify geothermal phenomena.
2. Ascertain that a useful geothermal production field exists.
3. Estimate the size of the resource.
4. Determine the type (classification) of a geothermal field.
5. Locate productive zones.
6. Determine the heat content of the fluids that will be discharged from the wells in the geothermal field.
7. Compile a body of basic data against which the results of future monitoring can be viewed.
8. Determine the pre-exploitation values of environmentally sensitive parameters.
9. Acquire knowledge of any characteristics that might cause problems during the field development.

PSPE holders have the following rights to:

1. Conduct preliminary and exploration surveys in accordance with statutory provisions.
2. Use geothermal data and information from the assignment area during the period of the PSPE.
3. Conduct a temperature gradient survey when needed.
4. Use public facilities and infrastructure in accordance with statutory provisions.
5. Propose changes to the work plan and budget that have been submitted.
6. Obtain fiscal facilities in accordance with statutory provisions.
7. Propose changes to the coordinates of the PSPE area followed by technical considerations.
8. Receive the exploration commitments placed if the PSPE Holders:
   a. Declare that they will not continue the PSPE no later than 3 (three) months before the PSPE period ends; or
   b. Finish fulfilling all PSPE obligations.
9. Propose the extension of the PSPE period.

10. Obtain the reimbursement for the term of the PSPE if there is a force majeure and/or adverse situation which results in the termination of part or all of the PSPE activity.
11. Have other rights in accordance with statutory provisions.

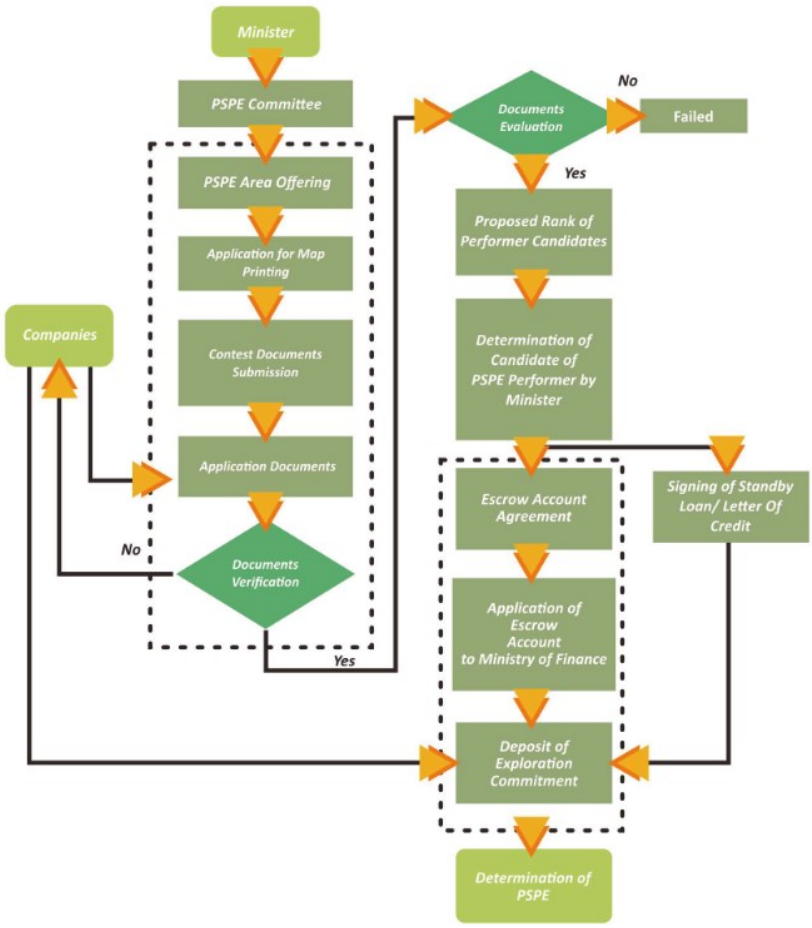


Figure 3: Diagram of PSPE Offering Mechanism.

PSPE holders are obliged to:

1. Submit the work plan and budget.
2. Carry out preliminary and exploration surveys based on the work plan and budget approved by the Minister of Energy and Mineral Resources through the Director General of New Energy, Renewable Energy, and Energy Conservation.
3. Obtain the approval when changing the work plan and budget as well as the PSPE area.
4. Report to the local government before conducting any PSPE activities.
5. Before conducting exploration, PSPE holders must:
   a. Carry out land use settlement in accordance with statutory provisions;
   b. Have an environmental permit; and
   c. Appoint a Head of Geothermal Engineering for the PSPE phase.
6. Conduct drilling on at least 1 (one) exploration well within 3 (three) years from the issuance of PSPE.
7. Carry out exploration in accordance with good engineering practices in geothermal energy.
8. Submit a periodical report of PSPE every 3 (three) months no later than 20 (twenty) working days after the last 3-month period.
9. Submit the final report on the results of PSPE before the end of the assignment, including reports on technical and economic feasibility.
10. Save, secure, keep in secret, and submit all data and information during PSPE activities at the end of the assignment period.
11. Maintain PSPE assets until the stipulation of geothermal permits by taking into account Health, Safety, and Environmental aspects and the protection of the geothermal environment.
12. Carry out recovery and improvement measures for the environment and ecosystem quality in order for these to function in accordance with the original designation.
13. Plug and abandon the exploration well if the PSPE holders do not continue to the geothermal exploitation stage.
14. Submit PSPE assets if the PSPE holders return the PSPE or are no longer a geothermal license holder.
15. It is prohibited to transfer geothermal data and information from the PSPE results.
16. Carry out other obligations in accordance with statutory provisions in the geothermal field.

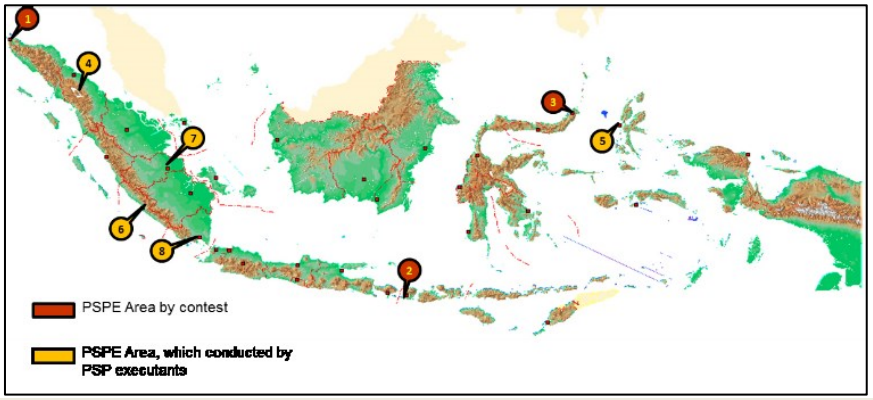
A PSPE will be declared completed based on the results of an evaluation by the Ministry of Energy and Mineral Resources which states that the PSPE implementer has fulfilled all obligations in accordance with the work program for the implementation of the PSPE in the form of a final report detailing the technical and economic feasibility. Then a GWA will be stipulated with a maximum period of 60 working days.

Business entities are also given the opportunity to resign from the implementation of the PSPE if:
1. The results of geological, geochemical, and geophysical survey and integrated evaluations do not indicate any geothermal resource;
2. The results of first exploration drilling do not show any geothermal reserves; or
3. The results of the next exploration drilling do not show any reserves that adequately meet the economic feasibility.

4. RESULTS OF PSPE AREAS OFFER IN 2018

Since the issuance of the MEMR Minister's Regulation Number 36 of 2017, the government of Indonesia through the Ministry of Energy and Mineral Resources has offered PSPE to business entities that have implemented PSP and whose assignment areas have not been designated as GWA before the enactment of the Government's Regulation Number 7 of 2017 as the executors of PSPE in the assignment areas. Also according to the MEMR Minister's Regulation Number 36 of 2017, business entities who have implemented the PSP and whose assignment areas have been designated as WKP before the enactment of Government's Regulation Number 7 of 2017 can be offered to implement PSPE in the assignment areas which have gone through a PSP by first cancelling the GWA. PSPE, which is an upgrade from PSP, is implemented for a maximum of 3 years and can be extended at most only 1 time for 1 year. In addition to offering an upgrade to PSPE to business entities that have implemented preliminary survey assignment, the MEMR also offers several PSPE areas to business entities through the mechanism of contests. The PSPE offered through this mechanism is given for a maximum period of 3 years and can be extended at most 2 times, each in one year.

In 2018, the new scheme of geothermal business in Indonesia began to be sought after by business entities. As a result, 11 PSPEs were issued by the Minister of Energy and Mineral Resources, consisting of 5 PSPEs offered to PSP implementers whose areas had been designated as GWA (PSPE areas in Sekincau Selatan, Graho Nyabu, Tanjung Sakti, Simbolon Samosir, and Gunung Hamiding) and 3 PSPEs offered through a contest mechanism (PSPE areas in Gunung Geureudong Area, Hu'u Daha, Tanjung Sakti, and Klabat Wineru) as shown in Figure 4, altogether bringing in a total investment of 135 million USD in 3 years. Furthermore, in the beginning of 2019, 3 PSPEs were issued, consisting of 2 PSPEs offered through a bidding mechanism for PSP implementers whose assignment areas had not been designated as GWA (PSPE areas in Gunung Tandikat Singgalang and Lawang Malintang) and 1 PSPE offered through a contest mechanism (PSPE area in Bonjol), altogether bringing in a total investment of 25 million USD in 3 years as shown in Figure 3. Evidently, the PSPE offerings appeal more to business entities than the GWA offerings since PSPE holders are not subject to any fixed exploration fee, while IPB holders are liable to a fixed exploration fee of US$2/Ha every year. Second, PSPE holders are entitled to fiscal incentives for expedition activities, similar to IPB holders. PSPE holders are also given a longer period of geothermal exploitation as the Commercial Operational Date (COD) for PSPE is expected to be earlier than IPB.



NO	Area Name	Province	Resources (MWe)	PSPE Holder
1.	Gunung Geureudong	Aceh	160	PT Hitay Panas Energy (Investor from Turkey)
2.	Huú Daha	West Nusa Tenggara	65	PT Sumbawa Timor Mining (Investor from Brazil)
3.	Klabat Wineru	North Sulawesi	-	PT Ormat Geothermal Indonesia (Investor from U.S.)
4.	Simbolon Samosir	North Sumatera	155	PT Optima Nusantara Energi (Investor from China)
5.	Hamiding	North Maluku	265	PT Star Energy Geothermal Indonesia (Investor from Indonesia)
6.	Tanjung Sakti	Bengkulu	70	PT Hitay Tanjungsakti Energy (Investor from Turkey)
7.	Graho Nyabu	Jambi	200	PT EDC Indonesia (Investor from Phillipines)
8.	Sekincau	Lampung	378	PT Star Energy Geothermal Suoh Sekincau (Investor from Indonesia)

Figure 4: PSPE Areas in 2018 (DGNREEC, 2019)

5. CHALLENGES IN IMPLEMENTING PSPE

Some challenges that can hinder the implementation of PSPE and the mitigation actions regarding the legal, social, and economic aspects, the location of geothermal prospects, and the environment can be seen in Table 2.

Table 2: Challenges and Mitigation in Conducting PSPE.

No.	Aspect	Challenge	Mitigation
1.	Legal	PSPE arrangements in forest areas have not been accommodated.	Coordination and facilitation for the settlement over regulations with the Ministry of Environment and Forestry for the implementation of PSPE in protected forests or production forests through Lending Use Forest Areas (IPPKH) and in conservation forest areas (National Parks, Forest Parks, and Nature Parks) through Permit for Utilization of Geothermal Environmental Services (IPJLPB).
		Fiscal incentive arrangements for PSPE have not been accommodated unlike the exploration for Geothermal License.	Coordination and facilitation for the settlement over regulations with the Ministry of Finance regarding fiscal incentives during PSPE activities.
2.	Social	Resistance from the local communities against geothermal exploration activities.	Introducing PSPE activities to the surrounding community by involving community leaders and the local government since or before the commencement of the activities and/or during exploration activities.
3.	Economic	Certainty about electricity purchases from PT PLN (Persero).	Pre-Transaction Agreement with PT PLN (Persero) will be conducted after a PSPE is completed and geothermal licenses have been issued. This has been regulated in the MEMR Regulation Number 37 of 2018.
		The timing of the implementation of the PSPE is delayed from the stipulated period of 3 years.	Business entities are welcome to resign from PSPE before the expiration date. Then the PSPE area will be offered back to other business entities through a contest mechanism.
4.	Environment	The geothermal prospects are located in a geo-park or conservation forest areas which are categorized as the world's heritage.	The inventory of geo-park spots and exploration activities are not carried out in the whole prospect area but in zones/blocks of utilization, instead. There must also be an absolute commitment to manage the environment and biodiversity impacts.

6. CONCLUSION

In an attempt to accelerate geothermal development by improving the quality of data prior to the GWA tender, the government has made a breakthrough by implementing PSPE. In PSPE activities, in addition to conducting a preliminary survey similar, PSPE executors are also required to conduct geothermal well exploration drilling. Activities done by PSPE executors include: 1) geological, geochemical, and geophysical surveys, and integrated evaluation; 2) exploration well drilling; and, 3) geothermal reserves calculation.

PSPE offering is conducted through a contest mechanism to select the best applicant. The geothermal developers implementing PSPE are entitled to fiscal facilities in accordance with the applicable regulations. PSPE is carried out in a period of three years with an extension of 2 times, each in one year. Within a period of three years since the establishment of PSPE, a PSPE executor is obligated to drill at least one exploration well.

In the case of a PSPE area having been determined as a GWA, a PSPE executor will get a chance to participate in the tender for GWA resulted from PSPE, in which the participants are limited to the PSPE executor and state-owned enterprises (SOEs). As a note, SOEs are invited to anticipate if the PSPE executor signals a resignation from the PSPE. The PSPE executor will be declared as the first rank and get the first opportunity to bid in the second stage of GWA tender. If the winner of the GWA is not the PSPE executor, the costs incurred for the PSPE will not be replaced by the winner of the tender. PSPE is carried out at the expense of the business entities without any reimbursement, but the executors will get the privilege or priority to obtain a Geothermal License after the PSPE is completed.

Due to the positive response and support from geothermal stakeholders, the issuance of PSPE business scheme has attracted successfully investors who have technical and financial capabilities to support the acceleration of geothermal development in

Indonesia. Government of Indonesia continues to make better efforts in preparing geothermal business policies and arrangements as well as facilitates the implementation of development to meet the target.

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