EXPLORATION, EXPLOITATION AND DEVELOPMENT AWIBENGKOK GEOTHERMAL FIELD IN WEST JAVA-INDONESIA

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ABSTRAK

Salah satu contoh pemanfaatan energi panas bumi di Indonesia terletak di Lapangan Panas bumi Awibengkok yang digunakan sebagai sumber penyedia tenaga listrik. Dalam pemanfaatannya, teknologi ini tidak menimbulkan pencemaran terhadap lingkungan.
Lapangan Panas bumi Awibengkok ini mempunyai sistem panas bumi *water dominated*. Eksplorasi yang telah dilakukan bertujuan untuk menentukan letak sumber panas, letak bagian akuifer yang dapat dieksploitasi, kondisi permukaan sistem dan daya yang dihasilkan.
Jumlah sumur produksi dan sumur injeksi yang ada saat ini yaitu sekitar 64 sumur dan ada sekitar 12 sumur yang belum produktif . Sampai saat ini masih dilakukan pembangunan sumur-sumur pengembangan untuk menambah kapasitas produksi. Hasil produksi Lapangan Panas bumi Awibengkok sampai saat ini mencapai 370 MW. Studi lebih lanjut membuktikan bahwa energi panas bumi Awibengkok secara ekonomis akan mampu membangkitkan listrik sebesar 300 MW di dalam areal seluas 1740 ha.

ABSTRACT

One of Geothermal energy usages in Indonesia is Awibengkok Geothermal Field, which is used as electrical power supply resource. In its utilization, this technology does not emerge pullution.

Awibengkok Geothermal Field has a water dominated geothermal system. The exploration conducted to determine thermal source location, aquifer location which might be explored, condition of system surface also generalized energy.

Recent numbers of production well and injection well are about 64 wells and around 12 wells are not productive yet. Recently, there are many establisments for development well to increase production capacity. The production result of Awibengkok Geothermal Field until today achieves 370 MW. Further study shows that Awibengkok Geothermal Field is able to generalize electricity of 300 MW economically, in 1740 ha of areal.

INTRODUCTION

The future of geothermal energy in Indonesia is potential. Moreover, it remains that geothermal energy usage as electricity supply resources is sort of technology that does not emerge pollution for environment. If the geothermal energy usage could develop in well, then cities around geothermal energy area, especially cities that are located in mountainous would adequate by electricity power from geothermal energy center.

If the geothermal energy available in enough numbers in Indonesia could optimally used, then increases of continuously electricity energy would fulfill by geothermal energy as electricity energy resources such already conducted in Awibengkok, Sukabumi, Jawa Barat. This helps significantly to develop further geothermal energy.

The aims of geothermal exploration are to locate thermal source, location of aquifer part, which could be explored, condition of surface system also generated capacity. Generally, the exploration of geothermal is carrird out performed through geologic, geophysic, and geochemistry approach, which generally finds hydrothermal alteration on rocks as clues on geothermal system.

THE HISTORY OF AWIBENGKOK GEOTHERMAL FIELD

Exploration was carried out performed in G. Salak during 1982–1986. The wells generate 2 phases that are high temperature of gaseous and water (reservoir temperature 220-230^{0}C).

In 1983, Awi-1 well succeeded to find geothermal resources, which values commercially. In 1985, performed drilling for 5 wells and proved to produce energy for 142 MW. In 1986, first well with large of diameter drilled, the energy which proved are 230 MW. In 1989, development plan submitted to build PLTP Unit 1 and 2 (110 MW) and Unit 3 (55 MW). In 1990, PLTP Unit 1 and 2 (110 MW) and gaseous production facility start to built. In 1993, proven energy is 330 MW. In 1994, unit 1 and 2 start to operate (110 MW). Then ika 1997, Unit 3, 4, and 6 start up for total capacity of 330 MW.

The development of geothermal energy electricity center started from 1990. First unit of PLTP G. Salak started to operate in March 1994 by 55 MW of capacity; whereas, second unit also run with installation capacity for 55 MW were just operated in June 1994.

The developments on field are still continuous and become 33 MW. Unit 3 installation (55 MW) handled by PLN; while Unit 4,5 and 6 (165 MW) installation handled by Unocal-Pertamina.

AWIBENGKOK GEOTHERMAL FIELD ACTIVITIES IN 2008

Exploration activities are yet continuously performed to find prospect location and reasonable exploited. Development wells are continuously

established to increase energy capacity.

Recent production wells are Awi 1, 3, 7, 8, 10, 11, 13, 16. However, among those wells that are active about 24 wells, which are Awi 1 (8 wells), Awi 3 (3 Wells), Awi 11 (3 wells), Awi 13 (5 wells), Awi 16 (5 wells).

Recent available injection wells, are Awi 9, 14, 12. Numbers of development wells for each well about 11 wells that are Awi 9 (6 wells), Awi 12 (1 well) full condensate, and Awi 14 (4 wells) that remains to be used are 3 wells.

CONCLUSION

Exploration activities carried out since 1982 until now show significant improvement, and increase annually.

Recently, the production and injection wells are 64 wells with addition for 12 wells that are not productive yet.

The production capacity generated by recent Awibengkok Geothermal Field is up to 370 MW. This field has high prospect values for use as PLTP in Indonesia, especially in West Java.

RECOMMENDATION

Drilling activities outside boundaries are carried out to identify existing reservoir capacity, so that it could be determine more prospects of new points.

The addition of production and injection wells also building of development wells could increase production capacity.

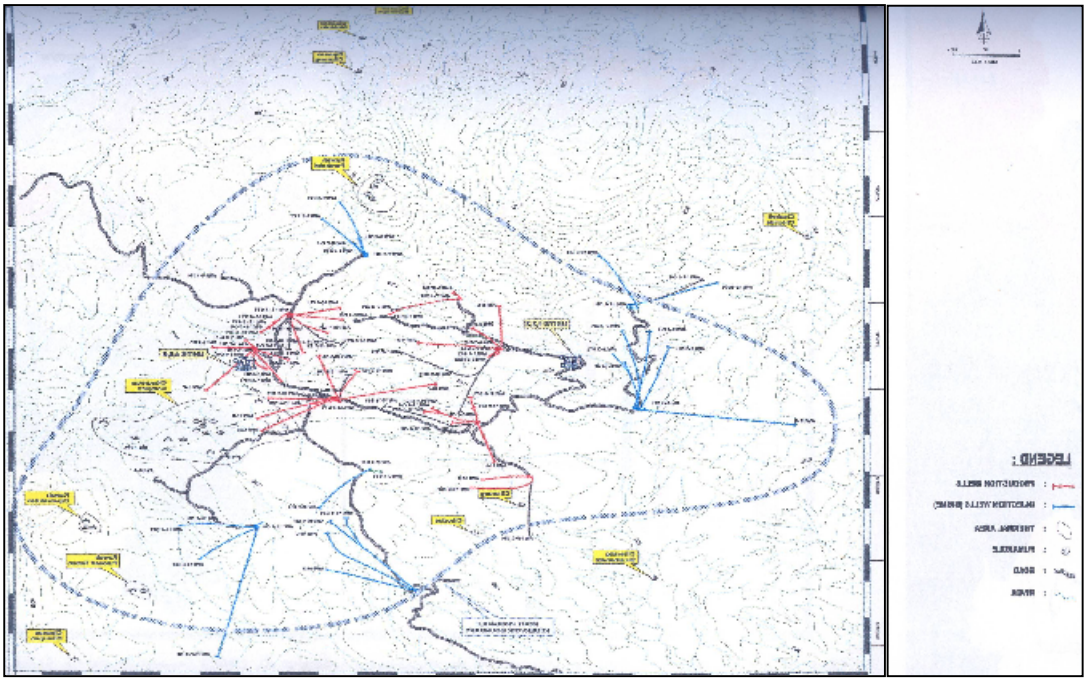


Figure 1. Awibengkok Geothermal Field Boundary (Acuna et al, 1997)

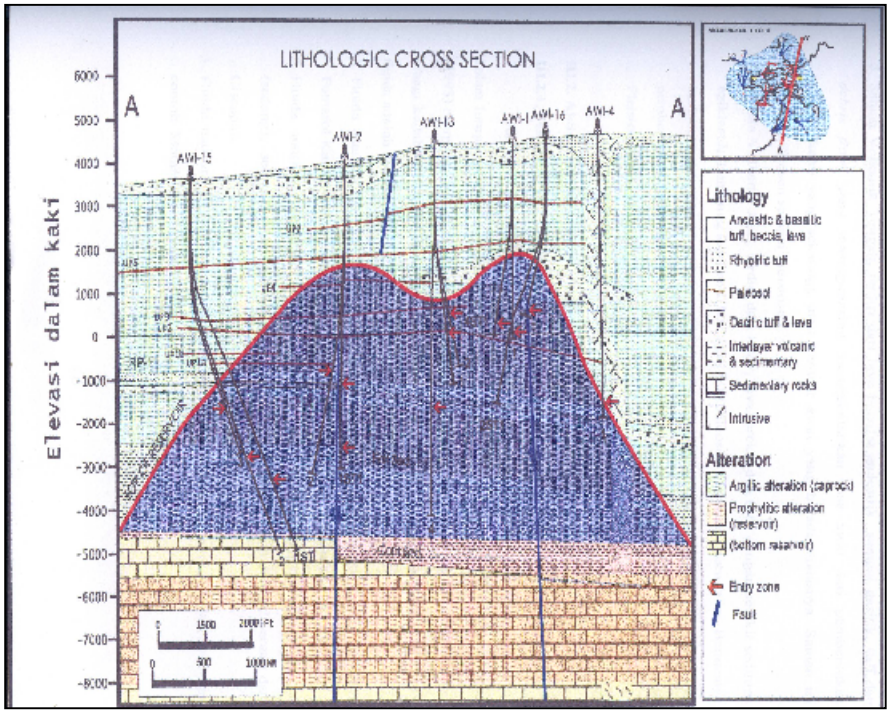


Figure 2. Lithologic Cross Section (Acuna et al, 1997)

Table 1. Awibengkok Stratigraphy Column

Formation	Dominant lithologies	Approximate Age	Possible Origin and Significance
Upper Volcanic	Andesite to Rhyolite	Pleistocene to Recent	Modern cone construction and parasitic silicic volcanism. Near source rhyolitic tuffs and lavas
Middle Volcanic	Andesite to Dacite	Pliocene to Pleistocene	Pre-to Early modern cone construction stage, includes numerous distal to proximall fallout tuffs
Lower Volcanic	Basalt to Rhyolite (Silicic tuff sequence at top)	Late-Miocene to Pliocene	Main arc stage; terminated with deposition of the rhyodacite marker bed. Transition from marine to sub aerial conditions
Sedimentary Basement	Carbonates, ash turbidites, and volcaniclastic rocks	Early to Late-Miocene	Marine sedimentary sequence (pre-and syn-volcanic sediments) includes some lavas and intrusive rocks

Table 2. Awibengkok Production Well

PRODUCTION WELL	TOTAL WELL
AWI-1	10
AWI-3	5
AWI-7	5
AWI-8	9
AWI-10	3
AWI-11	6
AWI-13	8
AWI-16	7

Table 3. Awibengok Injection Well

INJECTION WELL	TOTAL WELL
AWI-9	6
AWI-12	4
AWI-14	1