RECENT EXPERIENCE WITH BOO AND BOT GEOTHERMAL DEVELOPMENTS

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Keywords: BOO, BOT, Joint Operation Contract, Risk Profile

ABSTRACT

Privately funded geothermal developmenu are becoming the norm in many parts of the world. Two countries in South East Asia, the Philippines and Indonesia. both of which have large geothermal reserves are aggressively pursuing the development of these resources. However, they are approaching it with two different structures. The Philippines model retains steamfield development while the Indonesian model allows a private power developer to have control over the steamfield development as well as the power plant development. This paper looks at recent Build-Own-Operate (BOO) and Build-Operate-Transfer (BOT) private power projects in these two countries. Based on the large number of reputable companies implementing these projects, both models for development appear to be successful.

1. INTRODUCTION

In South East Asian countries, the projected rate of growth in electricity is in the range of 10% to 15% or higher. Capital intensive generation development and additional expansion of transmission and distribution systems are required, which are becoming increasingly difficult for governments to fund. As a result, there is a tendency to open public sector electricity generation to private power development through the operation of BOO or BOT schemes. The national or local electricity authority enters into a contract with an Independent Power Producer (IPP) fur the purchase of electrical energy over a fixed co-operation period at an established price. This relieves the electricity authority of the need to finance, design, construct and operate the facility.

Two countries in South East Asia, the Philippines and Indonesia, have the largest geothermal resources in the region - 4,000 MW in the Philippines and over 15,000 MW in Indonesia. Recognising the need to develop these resources, due to their indigenous nature and environmental friendliness, the governments of the two countries have undertaken aggressive programmes to develop geothermal power projects through IPP schemes.

This paper discusses geothermal power developmenu which have been initialed in these two countries under the IPP schemes.

2. PRIVATE POWER PROJECT TYPES

A privately funded power project is defined as one in which the engineering, procurement. construction, commissioning and financing is carried out by a private power project developer on a limited or non-recourse hasis. Under this type of financing, the revenues from the project must he sufficient to cover the interest and principal repayments as well as provide a reasonable return to the equity investors. A number of approaches tu private power generation are possible. The common arrangements are the BOO and BOT arrangements. In BOO, the plant is huilt and operated for its normal lifetime and then decommissioned. In the BOT approach, the station is built and operated for a period of time hy the private generating company and then transferred to the electricity generating authority or steamfield developer at no cost.

2.1 Competitive Bidding

The electricity authority may make a formal request with an international hid lo procure the capacity or the project may he on a negotiated basis between the developer and the electricity authority. Competitive bidding for the procurement of electricity capacity has a long history in the USA and has evolved there to such an extent that developers there are facing highly competitive pressures. In the Philippines and Indonesia. both competitive and negotiated bidding is used. But there is a shift towards competitive hidding lor more transparency and efficiency. Both the World Bank and the Asian Development Bank support moves towards a competitive environment. However, the procedures for the bids. evaluation and negotiation of the tariff and the terms of the energy conversion or power sales contracts are undergoing modifications.

2.2 Models for Development

Every country carries out private power projects somewhat differently. This is most evident in the Philippines and Indonesia. the two countries in South East Asia, which have the largest potential for geothermal development. A factor of crucial importance in geothermal power projects is whether the project includes the development of the steamfield and power plant or just the power plant itself. In the former approach, the developer lakes the risk far exploration and development of the field and the tariff is based on the full cost of electricity. In the latter case, the developer is supplied the steam free of cost and the tariff of electricity is based solely on the conversion of steam to electricity. For the developers, the risks in the two approaches are quite different, especially as hanks are generally unwilling to fund geothermal exploration, leaving developers to fund exploration on their balance sheeu.

The growth of geothermal power in the Philippines is largely a result of the enlightened government actions, particularly the willingness of Philippines National Oil Company (PNOC) to take all the geothermal resource exploration risks. The philosophy is to ensure the sustainable, long-term development of geothermal resources, optimise reservoir management, and retain control by sub-contracting only the development of the power plants. A competitive bidding process is used for the power plants, offered on a IO-year BOT hasis. In Indonesia, private developers take all the exploration and development risk.

The agreement with Perusahaan Pertambangan Minyak Dan Gas Bumi Negara (Pertamina), called a Joint Operation Contract (JOC) requires exploration, development of the steamfield and development of the power plant. The power generated is sold to Perusahaan Umum Listrik Negara (PLN), the national electricity authority in Indonesia.

From the perspective of the government, the JOC approach allows a large number of geothermal fields to be explored simultaneously through private sector funding, expertise and management. In the case of the Philippines, this is constrained by the organisational capacity of PNOC.

The differences in the two models from a development perspective are shown in Table 1.

Table 1 - Geothermal Development Models

	Philippine	Indonesia
Type	BOT	BOO
Term	10 years	*30* years
Steamfield Exploration Included	NO	Yes
Contract	Energy Conversion Agreement	Joint Operation Contract/Power Sales Agreement
Capacity Procurement	Competitive Bidding	Competitive Bidding/Negotiations
Contracting Parties	PNOC supplies steam and receives electricity	Pertamina allows exploration and development. Developer sells electricity to PLN.

3. RECENT DEVELOPMENTS IN SOUTH-EAST ASIA

3.1 Developments in the Philippines

The Philippines has considerable experience with geothermal energy. The country's installed geothermal capacity is near 1000 MW, ranking second in the world, just behind the USA. The country's officials are committed to developing the islands' geothermal potential and have assembled innovative policies and attracted companies capable of developing its 4000 MW of identified reserves. Some of these developments are described below.

Magma Power Company's geothermal power plant in the Malitbog sector, Tongonan geothermal field, Leyte consists of a 216 MW BOT project at Malitbog. The project consists of three turbine generator units, each of which has a 72 MW capacity. The first unit is expected to go into operation in mid-1996, with the other two going into operation, a year later. The project is being canied out under a 10-year BOT agreement with PNOC, with the electricity to be distributed to the islands of Cebu and Luzon. Under the terms of the BOT contract (Hodgson, 1994), PNOC funds exploration and assumes all resource risks and provides steam while Magma finances, builds, and operates the power plant. PNOC will buy the electricity on a take-or-pay basis and in turn will sell it to the National Power Corporation (NAPOCOR) of the Philippines. The government has reduced taxes for the first 5 years, and PNOC supplies most permits to Magma. Magma receives a capacity payment as long as its power plant is available to generate electricity. It receives no energy payment. The payments, in US dollars, are in the 10-year co-operation period and cover operating and maintenance expenses, debt service, and investment return. At the end of the 10 year co-operation period, the title to the power plant will be turned over at no cost to PNOC.

At the time of writing, Magma is considering its options of tapping the US 144a bond market (Yin, 1994) for raising debt in the capital markets. If successful, this will be the second project in the Philippines, after Enron's Subic Bay project, to use 144a band issues.

California Energy Co. (CE), a Nebraska based geothermal power plant developer and operator is sponsoring (Cass, 1994) two other projects on the Tongonan field in the Philippines. Tu fund its equity in these projects, and to have capital available to make loans lo these companies if necessary, CE has sold US$529.64 million of 10.25% 10-year senior discount notes in March 1994. The bonds were priced at 75.523% and, after a discount of 1.888% underwriting discount, netted the company US$390 million.

Cass (1994) and Burr (1994) comment that US$56 million of the proceeds will be used to fund the company's equity participation in the US$218 million, 120 MW geothermal project in Upper Mahiao sector of Tongonan, Leyte. The project is structured as a 10-year BOT development. PNOC is the offtake company for the power and is responsible for supplying the facility with the geothermal steam. PNOC will provide both the land for the facility and the geothermal steam to CE at no cost. The plant will be completed by mid-1996, and will be turned over to PNOC 10 years later. The Overseas Private Investment Corporation (OPIC) is providing political risk insurance for CE's equity stake and the Export-Import Bank of the US is expected to provide about US$162 million of 10-year non-recourse debt as well as political risk insurance during the project's construction phase. Ormat Inc Will construct the facility on a Build-Transfer-Operate (BTO).

The second project on Leyte sponsored by CE (Cass, 1994) and Kiewit is the US$310 million, 180 MW Mahanagdong project. The off-take agreement is the same as the Upper Mahiao project, except that the final electricity distribution will be to the island of Luzon instead of tu Cebu for the Upper Mahiao project. The construction is expected to be completed in the middle of 1997, by a consortium consisting of Kiewit Consmction Group and the Ben Holt Co. on a turn-key basis..

Ormat has been awarded two approximately 16 MW binary plant under a BTO contract (Independent Energy, July/August 1994), a variant of BOT, for installation at the existing Mak-Ban and Bacon Manito stations. PNOC has further announced for tender, the Mt. Apo field in Southern Mindanao with a 120MW project.

Overall, the model followed in the Philippines is that the projects are anchored on take or pay power sales contract with PNOC. PNOC will receive the electricity for selling to NAPOCOR, while guaranteeing steam production from the geothemal resource arcas under development.

3.2 Developments in Indonesia

The national oil company, Pertamina of Indonesia has granted CE the right to develop two geothermal prospects (Cass, 1994). The first one is in the Dieng region of Central Java. CE and the Indonesian company PT Himpurna Enersindo Abadi (PT HEA) will jointly develop the project.

According to Cass (1994) the Dieng Joint Venture, as the project company is called, will build, own and operate the US$450 million project, consisting of lour units with a capacity totalling 220 MW. Construction of the fint unit will begin in the fourth quarter of 1994. The Dieng N and Pertamina are negotiating a take-or-pay sales contract with the national electricity utility PLN. The Kiewit/Ben Holt consortium will design and build the facility.

An agreement similar to that for Dieng has been carried out by CE in joint venture with PT Enerindo Supra Abadi (PT ESA) for the Patuha geothermal field in Java. Like the Dieng JV, the US5450 million Patuha N will be built in four stages, with the total capacity expected to be 220 MW. CE and PT ESA has also formed a joint venture to develop geothermal resources in the Lampung/South Sumatera region.

Geothcrmal resources have a huge potential in Indonesia, with geothermal resources capable of providing over 15,000 MW of electricity.

3.3 Developments Summary

A summary of the BOO/BOT geothermal developments being undertaken in the Philippines and Indonesia arc shown in Tablc 2.

Table 2 - Summary of BOO/BOT Geothermal Developments

Project	Location	Sire
Malitbog	Leyte. Philippines	216 MW
Upper Mahiao	Leyte, Philippines	120 MW
Mahanagdong	Leyte, Philippines	180 MW
Mak-Ban Binary	Philippines	16 MW
Bacon Manito Binary	Philippines	16 MW
Mount Apo	Mindanao, Philippines	120 MW
Sarulla	N. Sumatera, Indonesia	1,000 MW
Dieng JV	Java Indonesia	220 MW
Patuha JV	Java. Indonesia	220 MW
Lampung JV	S. Sumatera, Indonesia	NIA
Ulubelu	S. Sumatera. Indonesia	3 x 20 MW
Rajabasa	S. Sumatera. Indonesia	3 x 20 MW
Lumut Bali	S. Sumatera, Indonesia	
Wayang Windu	Java, Indonesia	240 MW
Karaha	Java Indonesia	120 MW
Bedugul	Bali. Indonesia	

4. RISK PROFILE OF PRIVATELY FUNDED GEOTHERMAL PROJECTS

The major guarantees usually given by an IPP project developer when coneacting with a power purchaser can be summarised as follows:

- Project completion date
- Construction cost
- O&M cost
- Financing availability
- Plant output
- Plant availability
- Steam usage

For projects which are funded conventionally, these risks are carried by the utility implementing the project. Geothermal projects which include steamfield development have more risks than ones in which only the power plant is involved.

Although the risks are high, the steamfield is the area where greatest gains can be made should a field prove favourable. This is particularly relevant where a tariff has been negotiated before wells have been drilled.

5. FINANCING TYPES

Power projects developed as IPP's arc normally project financed with little or no recourse to the borrowers. The project assets and the cash flow from it are used for the placement of debt finance. This type of financing differs from corporate financing used by existing utilities which is on the basis of the asset backing and creditworthiness of the utilities (ie. in the strength of their balance sheets).

Financing with the United States Rule 144a debt funds, which providcs a safe harbour from the rcgiseation requircmcnts of the Securities Act for sale to qualified institutional buyers, offers a number of benefiu. The financing can be completed in a few months. Enron's Subic Bay project in the Philippines took two and a half months, although not a geothermal project and the funds raised when the construction was almost completed. This time frame is significantly faster than the 6 to 18 months it usually lakes to obtain funds from traditional banks or multi-lateral agency lenders. Also, 144a funds carry longer maturities.

6. REGULATORY FRAMEWORK

The introduction of private power generation requires the consideration of the legal and commercial status of private generating companies to permit such developments to occur. It may require the modification of existing laws or regulations relating to the controls on foreign investment in general, taxes, impon regulations, and currency transactions. Frequently, sovereign or central bank guarantees are necessary to underwrite the financial performance of the power purchaser and to improve the bankability of the project.

7. CONCLUSIONS

Two basic models for the development of geothermal resources are king implemented in the Philippines and Indonesia. One requires the private power developcr to build the power plant only, while the other requires the development of the steamfield as well as the power plant. The two have differing risk profiles and funds commitment from the host country.

Judging from the interest of reputable gcothcrmal developers. both models for development appear to bc successful.

8. REFERENCES

Bun, M.T., 1994 Mobilizing Private Power, Independent *Energy*. July/Aug 1994, pp 12.

Cass, D. 1994. Cal Energy Funds Equity Slakes With Junk Issue, Project Finance *International*, Issue 46, pp 3-4.

Hodgson, S.F., 1994. Financing Geothcrmal Projects. *Geothermal* Resources Council *Bulletin*, Vol 23, No. 7, July 1994, pp 239-244.

Geothermal in the Philippines, Independent Energy, July/Aug 1994, pp 98-100.

Yin, B.K., 1994. Magma Mulls 144a and Debt Route for Financing, Project *Finance* International, Issue 45, pp 2.