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THE ROLE OF GOVERNMENT IN PHILIPPINE GEOTHERMAL ENERGY DEVELOPMENT[1]

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ABSTRACT

The Philippines has, for almost one and one-half decades now, maintained its position as the world's second largest user of geothermal steam for power generation. Current installed capacity from geothermal power plants stands at 1,858 MW which is only about one-third of the country's estimated 6,000-8,000 MW geothermal potential. On the other hand, an additional 574 MW of geothermal power projects are planned for development between 1999 and 2008.

Historical records would show that major geothermal energy development activities in the Philippines have been spurred by crisis situations during which the expedient policy and regulatory framework was put in place and impediments to geothermal energy development addressed at the highest level of the bureaucracy.

The paper presents the Philippines' experience and the role of Government in geothermal energy development. It also identifies the policy and regulatory framework, institutional linkages and, more importantly, the lessons learned in geothermal energy development.

1. INTRODUCTION

After the revival of interest in geothermal energy development in 1993, 973 MW of electrical energy to be provided by geothermal power plants were commissioned in a span of 5 years, bringing to 1,861 MW the country's total installed generating capacity from geothermal power plants. The total represents 5.3% of the primary energy consumption of the country and 19.4 % of the electricity generation in 1997 (Figure 1). However, the geothermal industry is again faced with a "crisis", i.e., slowdown in developmental activity due to worldwide economic recession as a result of the currency crisis that has hit the Asian region. As in other milestones in the history of geothermal energy development in the Philippines, the Government is again considering to improve the institutional and commercial climate for geothermal investments to weather this "crisis."

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[1] *Note: The statements in this paper are the sole responsibility of the author and not of the Department of Energy nor the Philippine Government.*

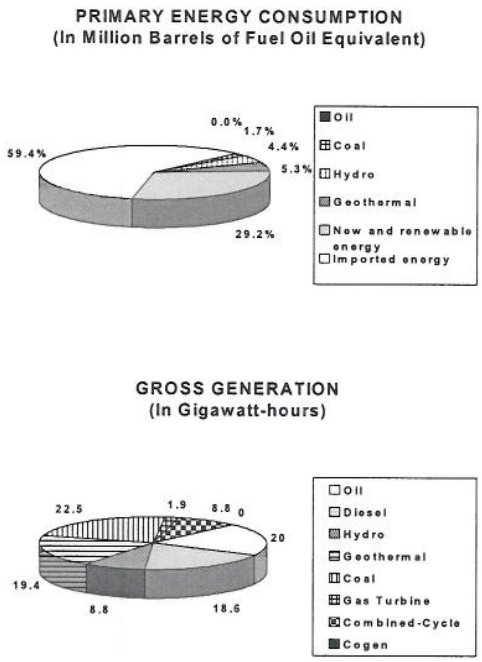

Figure 1: Primary energy consumption of the Philippines and the electricity generation

2. REGULATORY AND INSTITUTIONAL FRAMEWORK

Power development and management of the country's energy resources is a collaborative effort of several energy-related agencies, the Department of Energy (DOE), National Power Corporation (NPC), the Philippine National Oil Company (PNOC), and the National Electrification Administration (NEA).

PNOC, a government-owned and –controlled corporation (GOCC), through its subsidiary, PNOC-Energy Development Corporation (PNOC-EDC), conducts geothermal exploration, development and operations. It is responsible for the development of geothermal fields in Tongonan, Leyte; Palinpinon, Negros Oriental; Bacon-Manito (Bacman), Sorsogon/Albay; and Mt. Apo (Mindanao I), North Cotabato. It is also conducting advanced-stage exploration activity in Mt. Kanlaon area, Northern Negros; Mt. Cabalian, Southern Leyte; and in Mt. Labo, in the Bicol Region-Quezon Province.

NPC is a state-owned corporation and was mandated under Presidential Decree (PD) No. 40 to be the sole producer of electricity for eventual sale and distribution to various consumers. With the passage of the Build-Operate-Transfer (BOT) law in 1990, additional players are allowed into this field. NPC is responsible for the large-scale generation and transmission of electric energy from all sources including geothermal. It is also responsible for the development of the Tiwi and Makiling-Banahaw (Makban) geothermal power plants in Albay and Laguna provinces, respectively. NEA, on the other hand, administers the electric cooperatives that handle the distribution of electricity in the rural areas.

The DOE is mandated to, a.o., prepare, integrate, coordinate, supervise, and control all plans, programs, projects, and activities of the Government relative to energy exploration, development, utilization, distribution, and conservation. The DOE exercises administrative supervision over NPC, PNOC and NEA. The DOE Secretary acts as the ex-officio chairman of NPC, PNOC and NEA Boards. This institutional setup ensures that all energy projects are well coordinated among the agencies concerned.

The Department of Environment and Natural Resources (DENR) is the primary agency responsible for environmental management and regulations. DENR discharges its responsibilities through its regional offices and the Environmental Management Bureau (EMB). The regional offices of DENR are responsible for tree-cutting permits, the monitoring of emissions and effluents, and the enforcement of environmental regulations. The EMB is responsible for review of Environmental Impact Assessments (EIA) and the issuance of Environmental Compliance Certificates (ECCs) for energy projects.

Other government agencies involved in environmental management and regulation affecting geothermal power development include the Housing and Land Use Regulatory Board (HLURB) which is responsible for determining compliance of facilities with surrounding land uses; the Department of Labor and Employment (DOLE) for worker health and safety; the Department of Health (DOH) for waste management and activities that can potentially affect community health; the Local Government Units (LGUs) for local clearances and solid waste management; and the Department of Trade and Industry (DTI) for the grant of incentives on the use of pollution equipment (Geothermal Task Force, 1993).

3. GEOTHERMAL ENERGY DEVELOPMENT HISTORY

There are at least four distinct milestones in the history of geothermal energy development in the Philippines (Javellana, 1995; Benito, 1996). These milestones are preceded by crisis situations that led the Government to implement necessary policy and a regulatory framework to spur major geothermal energy development activities.

3.1 Pre-development phase (prior to 1977)

It had taken almost 15 years, since geothermal research was first initiated in 1953 by the Government, before the Philippines was able to demonstrate the use of geothermal energy with the lighting in 1967 of several incandescent bulbs in Tiwi, Albay Province with a turbine generator utilizing geothermal steam. The first geothermal research was conducted by the then Philippine Commission on Volcanology through the efforts of a group led by Dr. Arturo P. Alcaraz, who is now considered the "Father of Geothermal Energy" in the Philippines. These research initiatives have been the foundation for the commercialization of geothermal energy leading to the first geothermal service contract (GSC) executed in the Philippines between Union Oil of California (UNOCAL) and the state-owned NPC. The GSC gave UNOCAL the right to explore and develop geothermal resources in Tiwi, Albay and Makban area, Laguna Province. UNOCAL then formed a local subsidiary, Philippine Geothermal, Inc. (PGI) to implement the terms of the GSC. The following year, 1972, the Government through NPC entered into a Bilateral Energy Cooperation Program for the exploratory geothermal drilling at Tongonan, Leyte Province and Southern Negros.

It was the 1973 world oil crisis, however, and the projections that energy would become scarce worldwide that provided the impetus for sustained Government initiatives to develop indigenous energy sources, specifically geothermal. The government embarked on an energy development plan with self-sufficiency as one of the objectives. The adoption of the plan was understandable for a country that was 95% dependent on imported oil for its energy requirements. The need to accelerate the development of indigenous energy sources has been described by the Government as a "siege situation", thus, diversification from imported fossil fuels to renewable energy has become a national objective.

The government then created a task force to hasten geothermal energy exploration and development and to provide liaison between the Office of the President and geothermal developers. It also created the PNOC-EDC in 1976 that has since assumed responsibility for geothermal exploration and development. It created agencies to formulate, implement and administer policies, rules and regulations relative to geothermal energy exploration and development.

3.2 First phase commercial development (1977-1984)

The policy and regulatory framework put in place by the Government as a result of the oil crisis contributed to the rapid development and subsequent installation of geothermal power plants (about 894 MW) between 1977 and 1984 or in a record 7 years (Table 1). Thus, from 1967, another decade was needed before the commercial exploitation of geothermal energy was started with the commissioning by PNOC-EDC of a 3 MW geothermal pilot plant in Tongonan, Leyte Province in 1977. By 1984, the Philippines attained its position as the world's second largest geothermal steam producer for power generation, next only to the United States.

3.3 Hiatus in geothermal power plant construction (1984-1992)

Due to a combination of political and economic factors, there was a lull in geothermal exploration and developmental activities from 1984 to 1992, hence the concomitant hiatus in geothermal power plant construction.

Table 1: Installed geothermal capacities (1977-1984)

Year	Location	Capacity, MWe
1977	Tongonan	3
1979	Makban 1 & 2	110
	Tiwi 1 & 2	110
1980	Makban 3 & 4	110
	Tiwi 3 & 4	110
	Palinpinon	3
1982	Makban 5 & 6	110
	Tiwi 5 & 6	110
	Palinpinon	3
1983	Tongonan I	112.5
	Palinpinon I	112.5
	Total	894.0

From 1983 to 1985, the Philippine economy shrank by 3.1 percent annually in the wake of the socio-political unrest triggered by the assassination of former Senator Benigno S. Aquino, Jr. and led to the now world-famous "Peoples' Power" event. Furthermore, imported energy dependence deteriorated to about 70% from 1986 mainly due to the softening of international coal and oil prices, thus decelerating in indigenous energy development. This made geothermal energy relatively more expensive to develop compared to fuel sources available for use by NPC. Thus, there was a hiatus in geothermal power plant construction from 1984 to 1992. Also, the Ministry of Energy was disbanded in 1987, leaving no central government agency to oversee and manage the energy sector. The situation was further aggravated by the Gulf Crisis of 1991 that once again demonstrated the vulnerability of the Philippines to developments in the volatile Middle East. The 650 MW Bataan Nuclear Power Plant that was initially scheduled to be commissioned in 1986 was mothballed by the Government without replacing it with another power plant of equivalent capacity. With the resulting severe electricity shortages and power rationing that hit the country from 1989 to 1993, the need to promote energy self-reliance was again recognized.

Again, Government acted to solve the institutional and regulatory problems that affected the geothermal industry. The state-owned NPC relinquished its sole control of power generation in the country when it failed to finance the huge investment needed to put up additional capacities to alleviate the power crisis. The legislature passed the Build-Operate-Transfer Law or Republic Act No. 6957 in 1990, allowing private-sector development of geothermal and other types of power plants and infrastructure facilities. The DOE was recreated in 1992 and allowed for the Government to develop strong initiatives in the energy sector. As mandated, the DOE annually prepares a Philippine Energy Plan (PEP) with the objective of ensuring, among others, the availability of energy supply at affordable cost and with due consideration to environmental concerns. An important feature of the PEP (1996-2025) and its subsequent updated versions is the targeted annual 40% self-sufficiency level, with respect to the share of indigenous energy sources such as geothermal, petroleum, coal and hydro, in the energy mix over the planning period. The self-sufficiency target would at least ensure that indigenous energy sources are considered in the drawing up of the country's Power Development Program.

3.4 Second phase commercial development (1993-1997)

As a result of the institutional and regulatory changes, an accelerated development and construction of geothermal power projects was seen, even surpassing the total capacity achieved in the first phase of commercial development of 1978-1984. The country added 972.98 MW of geothermal power plants from new fields and additional capacities from existing ones in a span of five years (Table 2) bringing the country's total installed capacity from geothermal power plants to its current level of 1,860.98 MW. Likewise, PNOC-EDC was awarded GSCs by the DOE in Mt. Labo, Northern Negros and Mt. Cabalian where it started exploratory surveys and drilling (Figure 2). These brought to 7 the number of GSCs awarded by the DOE to PNOC-EDC.

3.5 Transition phase (1998-?)

Philippine geothermal energy resource development is now in a transition phase. In mid-1997, over-investment in real property development in Thailand led to failures in numerous financial institutions in that country which triggered a loss of confidence among foreign investors holding Southeast Asian assets in their financial portfolios and, subsequently, an unprecedented depreciation in Asian currencies. The Philippine peso lost more than 50% of its value against the US dollar. Interest rates shot up before they stabilized at their current levels (NEDA, 1998). The currency crisis has affected geothermal operations of PNOC-EDC inasmuch as most of the funds used to finance its geothermal projects are dollar-denominated. As a result, PNOC-EDC requested and was subsequently allowed by the DOE to suspend, at least for 1998, the implementation of its exploration activity under its GSC in Mt. Labo, Northern Negros and Mt. Cabalian.

Table 2: Installed geothermal capacity (1993-1997)

Year	Location	Capacity, MWe
1993	Palinpinon II	80
	Bacman I	110
1994	Bacman II	40
	Makban Binary	15.73
1995	Makban Modular	80
1996	Mindanao I	52
	Leyte A	209.36
1997	Leyte B	385.89
	Total	**972.98**

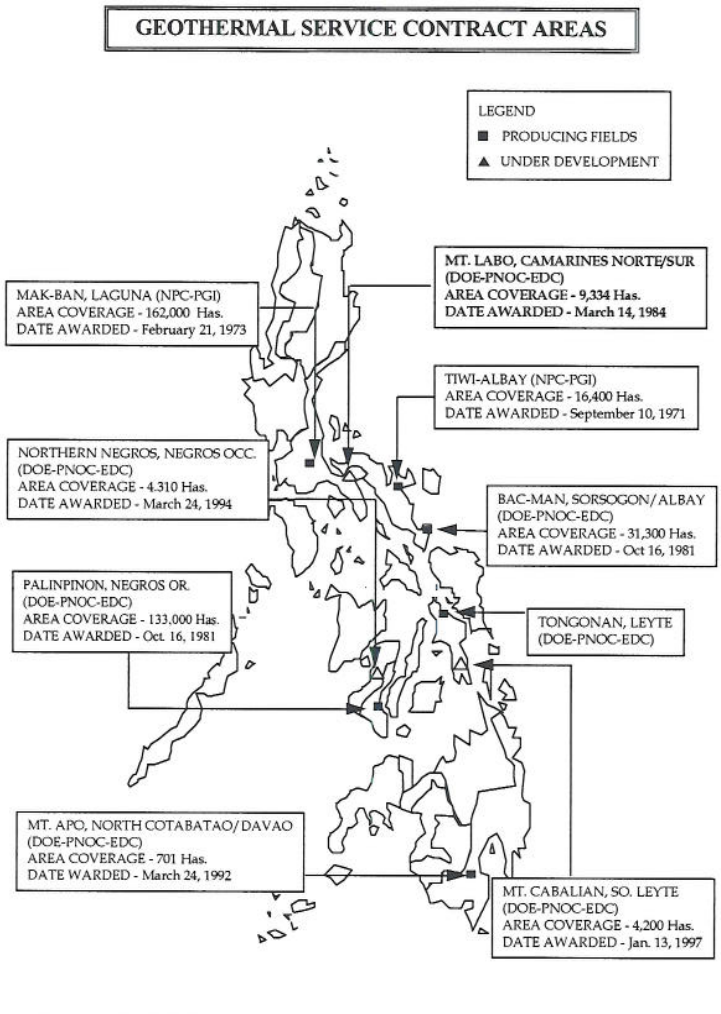

Figure 2: Geothermal service contract areas

The deferment of activities in these areas would enable the company to maintain its cash position at a level required in its covenants with creditor banks. The deferment is also due to its failure to negotiate Power Purchase Agreements (PPAs) with NPC for these projects.

The Government's current thrust to privatize NPC and PNOC-EDC will also affect the future of geothermal energy development in the country. Under the proposed Omnibus Power Industry Restructuring Bill now pending in Congress, NPC shall sell part of Government's interests in power generation and transmission systems in the country. The proposed privatization of NPC would, among others, ensure the reliability, security and affordability of power supply; promote competition and accountability among industry participants; enhance the flow of private capital to broaden the ownership base in power generation, transmission and distribution sectors. All NPC-owned geothermal power plants and steam fields shall be privatized. The geothermal assets of NPC include the steam fields and geothermal power plants in Tiwi (330 MW) and Makban (426 MW), and the geothermal power plants in PNOC-EDC's steam fields, i.e., Bacman (150 MW), Tongonan I (112.5 MW), and Palinpinon I & II (150 MW). The current administration has targeted June 1999 to have the bill passed by Congress and to effect NPC's privatization.

On the other hand, the Government shall sell 60% of the shares of PNOC-EDC but would limit acquisition of these shares by foreign entities to 40% as required by Philippine law on ownership of natural resources. The geothermal assets of PNOC-EDC include steam fields totaling 1350 MWe and BOT power plants with an aggregate capacity of 670 MWe.

The privatization of NPC and PNOC-EDC is seen as "the last nail in the coffin," so to speak, that would hinder development of new geothermal areas and limit activities only in existing GSC areas. Under the current contractual regime, only GOCCs have invested in geothermal projects as they have access to lower financing schemes afforded by banks to GOCCs. Also, GOCCs can target lower internal rates of return for their investments compared to private companies (Bodell, 1994).

4. THE GEOTHERMAL LAW

Under PD 1442 or the Geothermal Law, geothermal resources in the Philippines are developed through GSCs awarded by the Government through the DOE to geothermal developers or investors. Under the Geothermal Service Contract System, the State owns the geothermal resource and the exploration, development and utilization of the resource is under its full control and supervision. The State may directly undertake such activities or it may enter into co-production, joint venture or production sharing agreements with qualified entities. The State retains ownership of the resource and the geothermal operator or Contractor is awarded a GSC to explore, develop, exploit, process and market the resource. The Contractor provides all the financial, technical and managerial resources. In return, the Contractor is allowed reimbursement of his costs, and the net proceeds, the difference between the gross proceeds and investment/operating costs are then shared between the Government and the Contractor on a 60%-40% basis, in favor of the Government. It should be noted that recovery of investment and operating costs is limited to 90% of the gross value in any year with carry-forward to the succeeding years of the unrecovered cost. In this way, there is always a minimum of 10% net proceeds that is shared by the Government and the Contractor in any year. The term of the GSC is for 25 years and extendible for another 15 years, if the Contractor has not failed in its work and financial obligations.

Incentives and privileges that are granted to the Contractor under the GSC include: (a) exemption from all taxes except income tax; (b) income tax obligation of the Contractor is paid out of the Government's share; (c) depreciation of capital equipment over a 10-year period; (d) exemption from tariff duties and compensating tax on the importation of machinery, equipment, spare parts and materials needed in the operations; (e) easy repatriation of capital investment and remittance of earnings; (f) entry of alien technical and specialized personnel including members of immediate families.

4.1 The royalty burden

The above-mentioned incentives and privileges granted to contractors, however, have failed to attract private sector investment in geothermal energy development. Since the promulgation of PD 1442 in 1978, only the government-owned and -controlled PNOC-EDC has entered into a service contract with the Government. As mentioned earlier, PGI forged its GSCs with the state-owned NPC (not with the DOE) long before PD 1442 was promulgated. The NPC-PGI contract was crafted under the old law, Republic Act No. 5092, which provides for a 1.5% royalty tax based on the market value of the energy produced or utilized from geothermal operations. The PGI-NPC service contract is, therefore, not covered by PD 1442 as the law has not removed from NPC, which is acting in behalf of the Government in the contract, the administration of geothermal resources in the Tiwi and Makban geothermal fields.

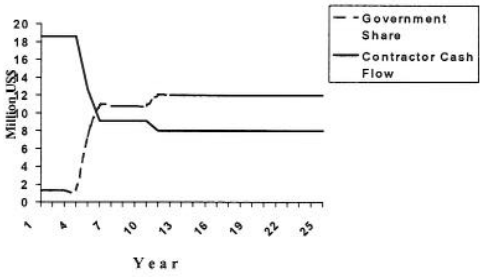

Figure 3: Projected cash flow for a 110 MW geothermal facility

Table 3: Sharing of proceeds under the geothermal service contract system

FOR EVERY PESO (P1.00) OF REVENUE		
A. Initial Years of Production		
Deductible Cost (90% of Gross)		P 0.90
- Operating Cost	P 0.17	
- Recovery of Investment	0.73	
Government Share		0.06
- Income Tax	0.02	
- Royalty Fee	0.04	
Contractor's Share		0.04
		P 1.00
B. Succeeding Years After Recovery of Investment		
Operating Cost		P 0.17
Government Share		0.50
- Income Tax	P 0.18	
- Royalty Fee	0.32	
Contractor's Share		0.33
		P 1.00

The absence of geothermal field developers other than PNOC-EDC and PGI is ironic because PD 1442 was intended to attract more private investments into the geothermal sector. An often-cited reason is the high government royalty structure imposed on steam developers. Under the law, Contractor's revenue may not exceed 40% of the net value from its geothermal operations. The government share, on the other hand, is 60% of net value, inclusive of the Contractor's income tax. The 60% government royalty on revenue effectively makes geothermal steam prices non-competitive with other alternative fuels. Figure 3 and Table 3 are the cash flow for a typical 110 MW geothermal facility and the sharing of the proceeds during production under the GSC, respectively. After recovery by the Contractor of its investment, which is about 5-7 years, a substantial amount from the net proceeds accrues to the Government. It is in this instance that a Contractor tends to "overspend" for operating and maintenance cost to keep its recovery cost ceiling at the maximum so as to "ease the royalty burden."

4.2 Geothermal steam pricing

Table 4 shows the comparative analysis of development options for power. While a geothermal power generating facility gives the lowest production cost, its fuel cost, i.e. steam price, is almost equal, if not higher than, the next best alternative, e.g., imported coal. Although developing geothermal energy has brought country benefits such as foreign exchange savings of about US $3.3 billion since 1977 (Table 5), and employment generation, etc., NPC has not been willing to accept steam price proposals from the private sector.

Table 4: Economic ranking of development options

Plant	Cap (MW)	Capital Cost ($/KW)	Plant actor (%)	Lead Time (years)	Production Cost (P/KWH)	Fuel Cost (P/K)
GEOTHERMAL	120	1,741	80	4	1.2170	0.6536-1.3087
Plant		1,046				
Field		695				
COAL	600	1,443	80	5	1.6387	0.6159-0.7141
COMBINED-CYCLE (Natural Gas)	600	800	80	3	1.1720	
COMBINED-CYCLE (Distillate)	600	800	80	3	1.4399	
GAS TURBINE	150	507	15	2	3.4395	2.0754-2.9575
DIESEL	50	1,704	75	2	1.6671	0.8477-1.0483
HYDRO	345	1,063	35	7	1.7754	0

Note: Production Cost with IDC Distillate Oil @25.66 $/BBL IDC 12%Per Annum Source: NPC PDP 1996

Table 5: Philippine geothermal energy performance

Year	Installed Capacity (Mwe)	Generation (GWH)	Fuel Oil Displaced (MMBFOE)	Foreign Savings (MMUS$)
1997	3	1	0.00	0.02
1978	3	3	0.01	0.06
1979	278	636.94	1.10	19.98
1980	446	2,044.85	3.53	105.03
1981	501	3,569.19	6.15	208.37
1982	559	3,563.86	6.14	201.54
1983	784	4,081.98	7.04	201.49
1984	894	4,531.46	7.81	217.90
1985	894	4,952.18	8.54	227.20
1986	894	4,577.30	7.89	103.07
1987	894	4,521.97	7.80	132.31
1988	888	4,845.91	8.36	113.04
1989	888	5,308.66	9.15	147.82
1990	888	5,464.76	9.42	235.55
1991	888	5,759.98	9.93	179.16
1992	888	5,696.80	9.82	177.58
1993	1018	5,667.25	9.77	156.34
1994	1074	6,319.69	10.90	172.37
1995	1194	6,234.52	10.58	175.57
1996	1448	6,538.73	11.27	210.25
1997	1819	7,430.88	12.81	234.07
1998	1861	3,908.82	6.80	87.48
TOTAL		95,559.73	164.82	3,306.21

**As of June 1998*

Since the energy-related agencies are institutionally linked as described above, PNOC-EDC has been pursuing its mandate of exploring and developing geothermal resources even without first seeking a buyer for its geothermal steam. In some of the recent geothermal projects, the steam fields of PNOC-EDC and power plants of NPC are already constructed even before PNOC-EDC and NPC have reached final agreement on the steam price such that the negotiations on the steam price have ultimately delayed the projects. The DOE has been requested to arbitrate in some of the steam price negotiations between PNOC-EDC and NPC. Steam price negotiations end in a stalemate when the minimum price that the developer (PNOC-EDC) can sell its steam is higher than the maximum price that the utility (NPC) is willing to buy, given its other alternative fuel sources. The problem arises when the company's involvement in the project is limited to either the development of the steam field or the conversion of the steam into electricity or construction of the geothermal power plant. In an integrated operation, i.e., the company owns both the steam field and the geothermal power plant, the company would have the option to shift the "royalty burden" from the steam field to the power plant thus controlling, in a way, the financial viability of the project.

In the 80"s, steam price negotiations were difficult to conclude as there was no established and accepted methodology to evaluate the geothermal steam price. The Government came out with a geothermal steam pricing study conducted through a grant from the Asian Development Bank. The study was conducted by ELC-Electroconsult and a mathematical model called PRIcing MOdel (PRIMO) was developed based on a proposed pricing formula and policy of the Government. The model and its subsequent versions are now used in the industry to evaluate steam price proposals.

4.3 A new geothermal law

The government has filed with Congress a proposed geothermal bill that would hopefully ease the "royalty burden" and make geothermal exploration and development more economically attractive to private investors. Among the salient features of this new bill are: an 8-year holiday on the royalty share of the national government; Filipino participation incentive allowance of 7.5% of the gross proceeds;

recovery of exploration costs in abandoned areas; development uplift allowance of 60% of the development cost. These additional incentives are projected to improve the contractor's IRR from 4-6%, thus, also improving the competitiveness of geothermal steam with other fuel alternatives.

In the meantime, the DOE has since 1979 granted PNOC-EDC a moratorium on its payment of the National Government share of the net proceeds from its geothermal operations until such time that a new bill that would "ease the royalty burden" is passed by Congress.

5. THE BUILD-OPERATE-TRANSFER LAW

When the then Ministry of Energy was abolished in 1987, it was replaced by the Office of Energy Affairs (OEA). The OEA, although under the Office of the President, did not have coordinating authority over PNOC-EDC, the geothermal developer, and NPC, the utility company. This lack of coordination compounded an existing conflict over steam pricing, i.e., geothermal energy is not the cheapest fuel as far as NPC is concerned. Since the state-owned NPC held monopolistic control on power generation, there was no way a field developer could integrate its operation with that of the power plant so as to remove the transfer price of steam and control the overall financial viability of a geothermal project, i.e., field development and power plant operations.

The power crisis in Luzon in the early 90's which led to severe electricity rationing in Manila, also led to NPC relinquishing sole control on power generation. With the demand for power, NPC cannot on its own mobilize the large amount of capital required to put up the power plant capacities needed to solve the crisis. The eventual approval into law of the Build-Operate-Transfer scheme allowed the entry of the private sector and international power utilities to fund, construct and operate geothermal and other types of power plants and other facilities. This has allowed the Philippines to rapidly increase much-needed electrical generation capacity without increasing the national debt.

The BOT Law has since enabled PNOC-EDC to construct 17 power plant units in Greater Tongonan Field, Leyte of at least 640 MWe.

6. ENVIRONMENTAL CONSIDERATIONS

Environmental concerns are now considered critical factors in geothermal operations. Opposition to geothermal projects that are located in remote parts of the country inhabited by tribal peoples can prolong the gestation period of development. A case in point is the Mt. Apo Geothermal Project. It took PNOC-EDC almost 3 years to obtain an Environmental Clearance Certificate (ECC) to proceed with the development. Brine injection, for example, is now used in all Philippine fields where 100 percent injection of effluents is practiced. Although injection systems are costly to install, they are necessary to meet environmental protection laws.

To ensure the protection of the environment and the people surrounding geothermal and other energy projects and to stem the tide of protests over geothermal projects, appropriate laws have been passed to ensure that the benefits derived from energy projects accrue to host communities. Among the benefits accruing to hosts communities are priority in load dispatch in times of energy crisis, missionary electrification of resettlement/relocation site, reduction in the cost of electricity, skills development, preference in employment, procurement of local supplies and services, funds for reforestation, watershed management, health and/or environment enhancement and establishment/maintenance of a development and livelihood fund. Also, with the passage of the Local Government Code of 1991, local government units (LGUs) hosting energy resources now share in the royalties paid by the contractors to the National Government. The LGU share is computed at 40% of the 60% royalty share of the Government from the net proceeds which is about 1.28% of the gross proceeds.

7. CONCLUSIONS

Aside from technical, geothermal laws and Government policies determine the economic viability of geothermal investments. Government, therefore, has to balance the need for private investors to earn a reasonable rate of return on their investment commensurate to the attendant risk and the interest of the geothermal user which seeks to purchase geothermal steam at a price that is competitive to its next best alternative. The Government, which shares in the revenues through royalties or taxes, holds the balance to these competing sides. Towards this end, the Philippine Government is currently reviewing the geothermal law to rationalize, among others, the geothermal steam price in a manner that will satisfy the user and, at the same time, allow the steam producers to earn a reasonable rate of return. The Government is also considering the "country benefits" derived from the use of geothermal energy such as foreign exchange savings, that would otherwise be used to purchase imported fuel, taxes and royalties generated, employment, local wages, and supplies/materials purchase by the geothermal industry, in determining the appropriate steam price.

Table 6: Geothermal capacity addition (1999-2008)

Project	Capacity Addition (MW)	Commissioning Date
Mindanao II	48	1999
Northern Negros	40	2002
Montelago	16	2002
Cabalian	110	2006
Amacan	40	2007
Mt. Labo	20	2007
Batong-Buhay	120	2007
Buguias-Tinoc	120	2007
Bato Lunas	60	2008
Total	**574**	

Finally, the Philippine Energy Plan for 1999-2008 has targeted to commission additional geothermal power plants of 574 MW (Table 6). The success of the Government's geothermal energy development prospects from hereon can only be measured by the speed with which the country develops its potentials and Government's initiative to improve its fiscal incentives and regulatory framework.

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