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GEOHERMAL DEVELOPMENTS IN THE PHILIPPINES - 1980

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ABSTRACT

The Philippines installed 3 MW geothermal in 1977, 55 MW in 1978, and 165 MW in 1979 and proposes to install 223 MW during 1980 to bring it's total installed geothermal generating capacity to 446 MW.

An additional 223 MW geothermal has been proven and a goal of 1,261 MW has been set for 1989 from eight geothermal fields.

In the Philippines, a lead time of about four to six years after the start of subsurface exploration is required before commercial production can commence.

Successful pioneering exploration began about 1970 by Union Oil Company of California at Tiwi and Makban on Luzon Island. The Philippine National Oil Company is exploring five other areas and is developing two other areas. Ten other areas are being explored and evaluated by the Philippines Bureau of Energy Development.

The Republic of the Philippines is actively engaged in an aggressive geothermal development program whose goal is to have 1,261 MW geothermal on stream by 1989 and an additional 714 MW geothermal steam availability developed by that time.

Commercial geothermal exploration in the Philippines began about 1970 when Union Oil Company of California, having established itself as a successful commercial geothermal operator at The Geysers geothermal field in Northern California, organized Philippine Geothermal, Inc. and entered into an agreement with the Philippine Government to undertake exploration on Luzon Island in the northern Philippines at Tiwi (near Mount Mayon, which last erupted in 1978) in the southern Luzon Province of Albay and at Mak-Ban (Makiling-Banahaw) in the south-central Province of Laguna.

Under the leadership of Dr. Carel Otte, Union has drilled 45 wells at Tiwi and 48 wells at Mak-Ban. Four 55 MW power plants have been installed, two at Tiwi and two at Mak-Ban; a proven power capacity of 435 MW has been established and a production goal of 880 MW has been targeted.

On June 11, 1978 President Ferdinand Marcos signed Presidential Decree No. 1442 "To Promote The Exploration and Development of Geothermal Resources". This Decree replaced an exploration permit scheme which had existed under Republic Act No. 5092.

Under the 1978 Decree the Government of the Philippines was authorized to enter into service contracts with technically and financially capable contractors for the exploration, exploitation and development of geothermal resources. The Decree provides that "if the service contractor shall furnish the necessary services, technology, and financing" he may be paid a fee of up to 40% of the gross value of geothermal operations after deducting necessary expenses. The Philippines Bureau of Energy Development, a Bureau of the Ministry of Energy, is the designated agency to directly supervise service contractors.

Rules and Regulations for filing applications for negotiated service contracts under the Decree were issued in November 1978 by W. R. De La Paz, Acting Director of the Bureau with the approval of Geronimo Z. Velasco, the Minister of Energy. Circular No. 78-10-19, Series of 1978, Bureau of Energy Development.

Applicants must have a minimum working capital of P (Pesos) 20 million to support an approved work program for at least two years and be able to demonstrate its capability to raise an additional working capital of at least P 40 million, subject to change due to inflation or economic factors.

The Bureau has also issued a Model Service Contract which provides that the contractor assumes all risk and will not be entitled to reimbursement for any expense in the event commercial geothermal resources are not developed.

The Contract also calls for a 7 - 10 year exploration period and a twenty-five to forty year extension in the event commercial resources are discovered. The contractor is guaranteed repatriation of investment and profits and the tax-free importation of required capital equipment. The contractor is exempted from all taxes, except income taxes.

As of 1979 the Philippines installed electrical generating capacity totaled 4,157 MW :

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<u>Plant Type</u>	<u>MW</u>	<u>%</u>
Oil Thermal	2,230	53.6
Hydro	934	22.5
Diesel	745	17.9
Coal	25	0.6
Geothermal	223	5.4
	<u>4,157</u>	<u>100.0</u>

To decrease oil imports from 74.8 million barrels in 1979 at a cost of \$1.5 billion to 47.9 million by 1989 (while consumption rises from about 80 million barrels a year in 1979 to 184.6 million barrels a year by 1989 - or about 2 barrels per-capita in 1979 vs. 3.24 in 1989), the Philippines has developed and embarked upon a Ten-year Energy Program.

A budget of \$US 9.7 billion has been established to support this program. \$347 million ((3.58%) has been set aside for the geothermal exploration and development program. 82.69% of the budget is to support power grid development, downstream facilities and electricification.

The program's goal to change the national energy mix as follows: (millions of barrels):

<u>Power</u>	<u>1979</u>	<u>1989</u>	<u>1989 %</u>
Oil	20.70	11.41	6.2
Hydro	5.84	23.55	12.8
Coal	.30	11.41	6.2
Geothermal	1.5	13.48	7.2
Nuclear	-	6.48	3.5
Nonconventional	-	3.54	1.9

Nonpower consumption totaled 63.7 MMBOE in 1979 and is expected to reach 114.7 MMBOE in 1989 (62.2% of the total national energy mix).

The first geothermal power plant in the Philippines was installed on Leyte Island at Tongonan (3 MW). 25 wells have been drilled there and a proven capacity of 180 MW has been established. A 412.5 MW power production target has been established for that area. The developers are the Philippines National Oil Corporation and the consulting firm of Kingston, Reynolds, Thom and Allardice of Auckland, New Zealand.

PNOC-KRTA are also developing an area in the Southern Negros at Palimpinon-Dauin where nine wells have been drilled, 14 MW of proven power capacity has been established, and a power production target of 112.5 MW has been set.

PNOC's Exploration Development Corporation is itself exploring 5 areas at Manat, Manito, Mambucal-Mandalagan, Daklan-Bokod and Naujan-Montelgo.

The Philippine's Bureau of Energy Development and Electroconsult of Italy are evaluating 8 areas at Batong-Buhay, Mainit, Acupan, Asin, Cagua, Mabini, Bulusan and Pinatubo (the latter project is supported by U. S. AID).

These locations are indicated on a map provided through the courtesy of the Philippine Ministry of Energy and it's Planning Chief, Gary S. Makasiar whose assistance in providing data for this paper is gratefully acknowledged.

A copy of the Ministry's Ten-Year Energy program (106 pages) is available from it's office at:

Ministry of Energy
 Republic of the Philippines
 7901 Makati Avenue, Makati
 Metro Manila, Philippines

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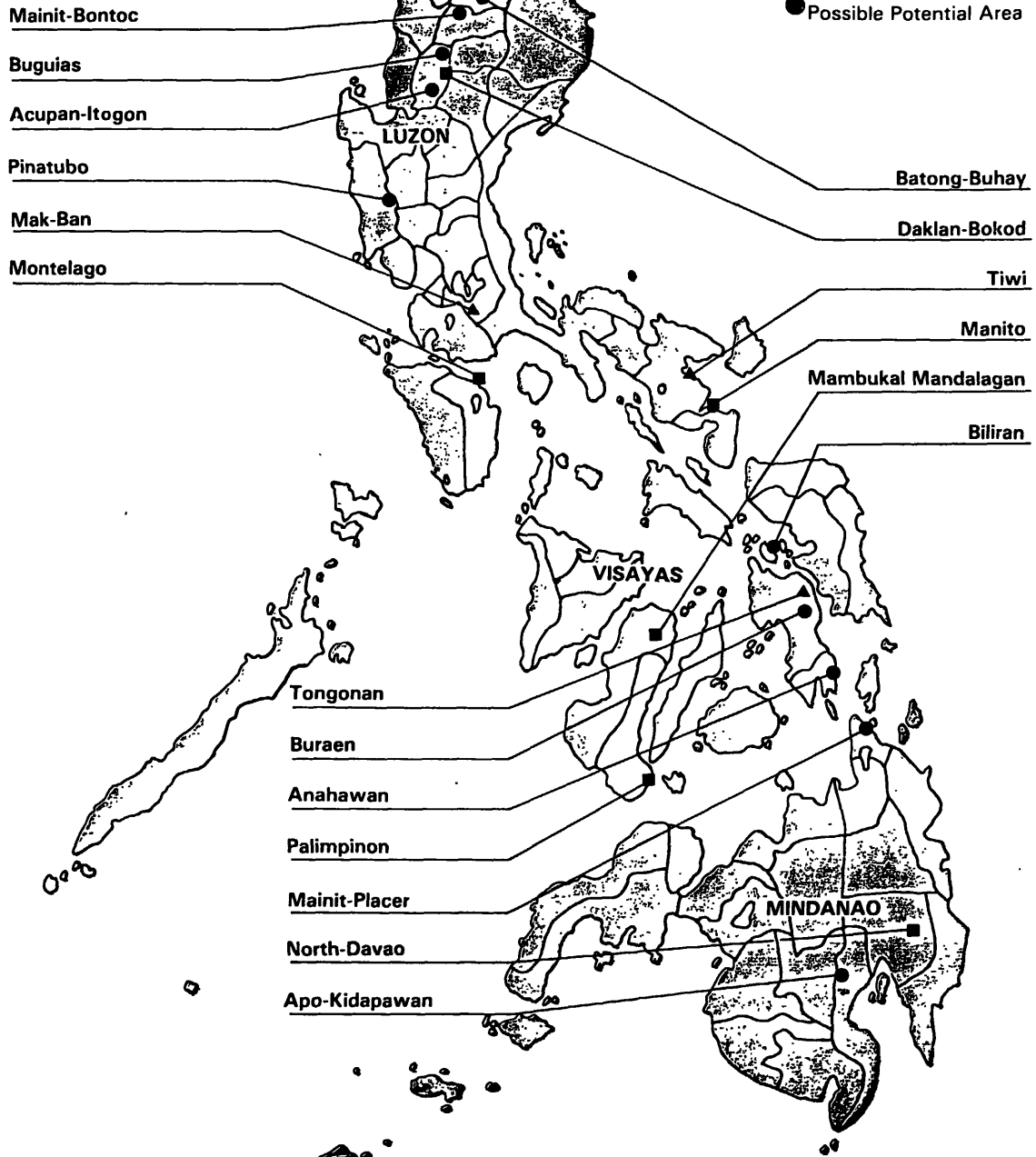
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Personal communication from Gary S. Makasiar, Chief, Planning Service, Ministry of Energy, February 19, 1980.

Potential Geothermal Areas



Source: Planning Division, Ministry of Energy, Republic of the Philippines, Jan. 1980.