Proc. 8th NZ Geothermal Workshop 1986

THE ROLE OF NEW ZEALAND IN THE GROWTH OF GEOTHERMAL TECHNOLOGY IN THE PHILIPPINES

Bernardo S. Tolentino and Balbino C. Buñing

PNOC-Energy Development Corporation, Philippines

ABSTRACT

The Philippines, in a span of 12 years from 1973 to 1985 received a total of NZ$21.5 million as grant for geothermal exploration from the New Zealand Government. The consultancy component of the grant was spent on the two 112.5-MW(e) power developments in Tongonan and Palinpinon, and other high-temperature fields in the Philippines. A major portion of its non-consultancy component was used for training the Filipino geothermists in various levels and disciplines, both in the Philippines and in New Zealand. The extensive interaction between the Filipinos and the New Zealand experts and the continuing technical training of the local geothermists resulted in a fast and effective transfer of geothermal technology.

The New Zealand grant, therefore, is very instrumental in the sweeping development of the geothermal technology in the Philippines, both in terms of operations and education.

Today, New Zealand continues to assist the Philippines in its quest for energy self-reliance through the same scheme it has committed itself before.

BACKGROUND

Not long ago, in the 1960's, the Philippines began its examination of its geothermal resources. The discovery of the resource in Tiwi, Albay Province arouse the interest of concerned government agencies, and legislations provided for the impetus which drove not only the local scientists but the foreign geothermal community as well to invest on the exploration and development of geothermal resources in the Philippines.

While the Philippines entered into contract with the Union Oil of California for the development and utilization of the Tiwi resource, it also sought the assistance of other countries for the exploration and development of other geothermal areas in the archipelago.

New Zealand responded to the call by sending over a number of its geothermal experts for consultative and reconnaissance works. Small-scale geoscientific exploration of the Tongonan field was thus pushed throughby the then Commission on Volcanology and later the National Power Corporation (NPC) with consultancy assistance from the New Zealand Ministry of Works and the Department of Scientific and Industrial Research.

With the encouraging results of the geoscientific works in Tongonan, the New Zealand Government granted in 1973 a NZ$0.4 million assistance to the Philippines for exploratory drilling in this field. Thus, a formal technical cooperation between the two countries in the field of geothermal energy development was born. Kingston, Reynolds, Thom and Allardice, Ltd. (KRTA) was named the executing agency of the grant for New Zealand, and NPC for the Philippine Government.

Later in 1974, the two governments agreed to expand their cooperation and embarked on an enlarged five-year programme, ending on March 31, 1979. This covered among other things the training of Filipino geothermists in New Zealand. The move would later produce 8 trainees in various short-term specialized on-the-job courses in exploration, in addition to one who had his special training in geothermal well measurement in 1972. The New Zealand Government, cognizant of the scope of the programme and the importance of its objectives, increased its original aid to NZ$10.0 million.

In 1976, execution of the programme was taken over from NPC by the Energy Development Corporation (EDC), a subsidiary of the Philippine National Oil Company (PNOC). A year later, New Zealand granted another NZ$3.5 million on top of the previous NZ$10.0 million. And in the concluding year of the technical cooperation programme, in 1979, the Philippine Government got assurance from the New Zealand Government for a "follow-on agreement" in view of the success in Tongonan.

GEOTHERMAL ENERGY COOPERATION PROGRAMME

The follow-on agreement involved:

(1) an additional NZ$5.0 million for the next five years;
(2) enlargement of the scope of the original aid to include, aside from Leyte and Negros, Manat-Masara in Davao, Manito in Albay, and an area in northern Luzon; and
(3) more short-term training grants in New Zealand.

This agreement was eventually termed the RP-NZ Energy Cooperation Programme (ECP).

The following years saw the sustained successes in geothermal exploration activities under the programme and the continued support of the donor government. In 1982, NZ$3.0 million was added to the assistance fund for a total of NZ21.5 million by the end of 1985. When ECP was about to be concluded as originally planned, the New Zealand Government again committed NZ$ 0.4 million for the programme which was subsequently extended to December 31, 1987.

SCOPE OF THE PROGRAMME

EXPLORATION AND CONSULTANCY

Aside from funding exploratory drilling in Leyte and Negros islands, the RP-NZ ECP also made available funds for the following activities:

(1) Prefeasibility and feasibility studies of Tongonan, Palinpinon and Bacon-Manito;
(2) Resource assessment for Tongonan, Palinpinon, Bacon-Manito and Amacan (Davao);
(3) Reservoir behavior analysis of the Tongonan, Palinpinon and Bacon-Manit0 fields;
(4) Surface and downhole exploratory data review of Amacan, Northern Negros, Baslay Dauin (Southern Negros), Burauen (Leyte), Anahawan (Leyte), Southeast Tongonan, Mt. Apo-Kidapawan (Mindanao) and Mt. Pinatubo (Zambales); and

(5) Surface geoscientific surveys and data review of other smaller geothermal areas.

All of these activities culminated in either the immediate writing off of areas for non-viability or the continued exploration and development of those found having marketable potential.

NON-CONSULTANCY

The non-consultancy component of the ECP is only worth about 10% of the overall aid funds, but its impact on the totality of its objectives is just as significant and one that will stay permanently with the Filipino people. Covered by this component are (a) training, (b) specialized inputs, and (c) instruments, equipment and books.

Training

By training, the agreement categorically means the "transfer of geothermal technology" to the Filipino geothermists through training in various disciplines.

Since its inception in 1980, the ECP has already sent 54 geothermists for a mixture of training in New Zealand --- accounting for 47% of the total overseas-trained personnel involved in PNOC-EDC's geothermal operations. On top of this, the older NZ Geothermal Assistance Programme had put 9 PNOC geothermists on training in different geothermal fields in New Zealand from 1972 to 1979, for a total of 63 availments or 55% of the total overseas-training opportunities offered to the personnel of PNOC-EDC (Figure 1).

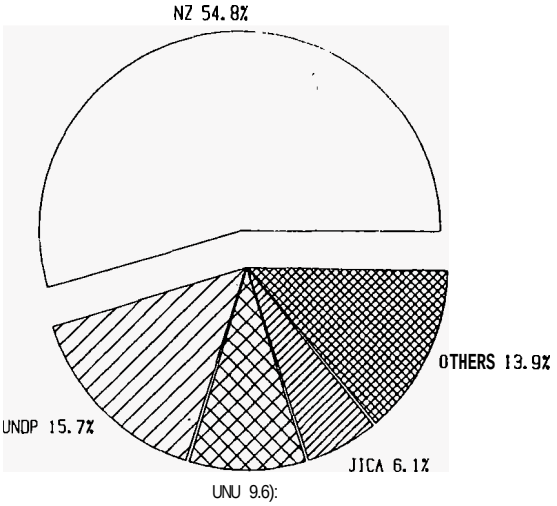

Figure 1. Geothermal training mix by sponsors, as of June 1986

Nonetheless, not all training in New Zealand attended by PNOC-EDC geothermists were covered by the aid agreement. But the contribution of the aid programme to PNOC's own foreign training programme in New Zealand institutions has been an overwhelmingly large 78% in terms of placements.

Types of Training

In the early days of the aid programme, dating back to 1972, short-term specialized courses were offered to the Filipino geothermists in an effort to transfer geothermal technology as quickly as possible. Those were the days when the worldwide "oil crisis" necessitated the immediate commissioning of virtually every local energy source the nation had. The situation, therefore, called for "instant technicians" in the field; and the training deemed to produce them was the "on-the-job" type. Such customatized training courses were held in the geothermal fields of New Zealand.

When the energy crisis eased up in the late 70's, at the time when the development pace of the country's geothermal resources was being stepped up, the need for a deeper understanding and sophistication in the exploration and development operations emerged. Realizing further that the Filipinos would inevitably be left alone in the future to tend their own resources, the two governments agreed that a higher level of training was necessary.

In 1982, the RP-NZ ECP began funding the training of Filipino geothermists in high-level academic courses in New Zealand. Initially, an engineer was sponsored to take the Diploma Course in Geothermal Technology at the Geothermal Institute of the University of Auckland. In the following years, masterate and doctorate courses were pursued without disruption (Figure 2).

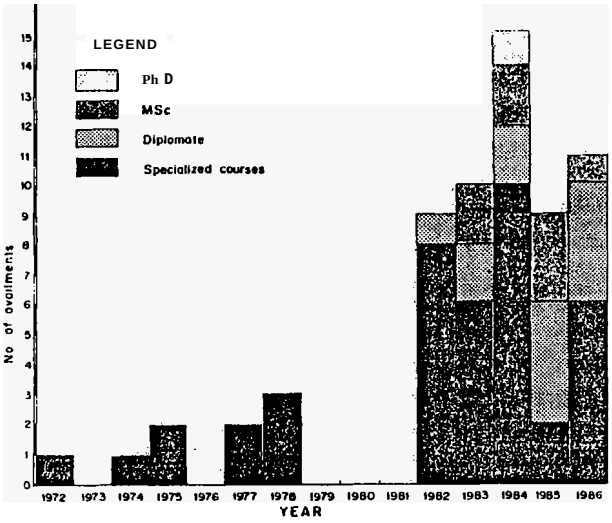

Figure 2 NZ-ASSISTED TRAINING MIX showing yearly total availment of PNOC-EDC staff. The training component of the RP-NZ GECP was drawn up in 1980-81 and was implemented beginning in 1982

To date, PNOC-EDC has 24 graduates from the Diploma Course, 9 of which have been ECP grantees. Four fellows just recently finished their masterates while three others are expected to graduate soon -- all with funding from the ECP. Before the year 1986 ends, a geochemist-grantee of the same aid programme will receive his doctorate degree from the Victoria University of Wellington, New Zealand; and four more local geothermists will graduate from the Diploma Course in Geothermal Technology in Auckland.

Specialized Inputs

Training under the RP-NZ ECP does not necessarily happen only in New Zealand. In fact, it is also implemented locally through the specialized input component of the assistance. This is accomplished by sending New Zealand experts over to the Philippines and having them stage seminars and lectures on different aspects of geothermy. In most cases, "transfer of technology" is done most effectively during consultations on current issues or most demanding problems in the exploration and development of PNOC's geothermal projects. Thus, this type of training does not only cater to personnel development but to solving immediate operational problems as well.

Instruments, Equipment and Books

Though the RP-NZ ECP, PNOC has acquired for its geothermal exploration and development operations quite a number of equipment and instruments. New Zealand turned over to the Philippine Government own-

ership of an IDECO H525 drilling rig for the exploration and production drilling in Tongonan. In addition to this, PNOC–EDC received several field vehicles, two HP microcomputers, one set of fluid inclusion equipment, stereo microscopes and a downhole flowmeter, among other things.

Books and computer programs have also been donated through the aid programme.

THE ENERGY PROGRAMME

In the late 1970's, the Philippines formulated an energy development programme (Figure 3) which would bring the country's dependence on foreign oil down to 55% by the end of 1985 from more than 90% at that time. The goal was supposed to be achieved by tapping local indigeneous energy sources, 1774 MWe of which would be from geothermal resources by late 1985.

While the energy programme looked very ambitious, the potential resources already discovered at that time and the growing local technical and managerial expertise the nation had dampened skepticism and pessimism. Thus, the initial programme was even extended to 1988 when, as energy planners projected, a total of 2654 MWe of installed geothermal generating capacity (Malixi and Tolentino, 1982) would be a reasonable target. Subsequently, this energy development programme became one of the bases in the country's negotiations with other countries for economic aids and loans. The World Bank, the Japanese Government thru the Overseas Economic and Cooperation Fund (OECF), and the New Zealand Government thru the RP–NZ ECP provided financing for the programme. But as in any undertaking involving national interests, political, social and economic developments somehow got in the way and caused considerable changes in the energy programme --- reducing the original geothermal development target to an actual installed capacity of 894 MWe by 1985 (Tolentino and Buñing, 1985). Nonetheless, the New Zealand Government, in a display of confidence and support, even extended its programme of technical and financial assistance for two more years and with an additional fund of NZ$0.4 million for the continuing high–level training of the Filipino geothermist.

GEOTHERMAL FIELD	1977	1978	19	1980	1981	1982	1983	1984	1985	1986		1988	TOTAL
TONGONAN (LEYTE)	3					112.5		110	220	330			771.5
BILIRAN (LEYTE)												220	220
BURAUEN (LEYTE)												110	110
PALINPINON (SO. NEGROS)				3	3		112.5		110	110			338.5
BAC-MAN(ALBAY/SORSOGON)									110		110		220
DAKLAN (BENGUET)									110				110
TIWI (ALBAY)			110	110		110			220				550
MAK-BAN (LAGUNA)			110	110					110				330
TOTAL	3		220	223	3	222.5	112.5	110	880	440	110	330	
CUMULATIVE TOTAL	3		223	446	449	671.5	784	894	1774	2214	2324	2654	2654

Figure 3. PHILIPPINE INSTALLED and PLANNED GEOTHERMAL GENERATING CAPACITIES IN MWe, 1977-1988
(AFTER MALIXI & TOLENTINO, 1982)

IMPRESSIONS

In a nutshell, the New Zealand Government, through its Ministry of Foreign Affairs and concerned technical agencies, helped the Philippines realize its programme for energy self–reliance.

Its material contribution might have been felt initially only within a very small sector of the Filipino community, those in the geothermal industry, but the effects of such contribution are far more reaching than what is visible today. For the local geothermal industry which is just in its infancy, a pool of scientists and engineers, who have for years worked hand–in–hand with experts in the technology and have enriched their experiences with theories from New Zealand academic institutions, is an investment worth a fortune. The growing confidence by the national leaders on the capability and expertise of these Filipino geothermists is clearly manifested in the fast–declining requirement for foreign consultancy services by PNOC–EDC (Figure 4) – a trend the New Zealand Government is undoubtedly happy about because it also reflects the success in the transfer of geothermal technology promulgated through the RP–NZ ECP.

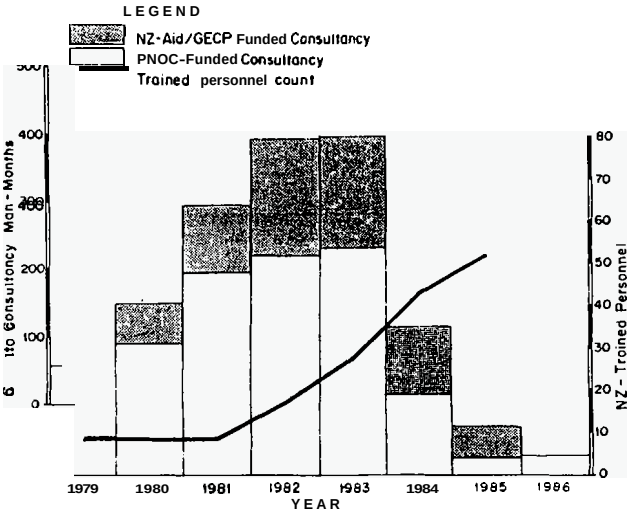

Figure 4. FOREIGN CONSULTANCY SERVICES employed by PNOC-EDC for its geothermal operations against the background of an increasing number of trained local geothermists. (Consultancy records courtesy of PNOC-EDC Geothermal Planning and Evaluation Department)

And finally, the legacy of New Zealand's support toward the Philippines' energy self–reliance programme cannot be further stressed than by its technical and financial contribution in the sweeping development of the Tongonan and Palinpinon geothermal fields which both culminated in the installationof 225 megawatts of electricity in Central Philippines.

REFERENCES

Malixi, P.V. and B.S. Tolentino (1982): Philippine Geothermal Potential and National Strategies for Its Development. Proc. Offshore South East Asia '82 Conference, Singapore.

Tolentino, B.S. and B.C. Buñing (1985): The Philippines' Geothermal Potential and Its Development : An Update. Proc. Geothermal Resources Council, California, U.S.A.