THE PHILIPPINE GEOTHERMAL PROGRAM (1990-2000) AND THE ENVIRONMENTAL CHALLENGE

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My friends, ladies and gentlemen:

We are greatly honored by the organizers of this conference, the Geothermal Institute of the University of Auckland, for being invited to discuss the Philippine experience in geothermal energy development. That our country's policies and programs should merit attention in this prestigious gathering is very heartening.

Our sense of pride is tempered, however, by the fact that many of our achievements are traceable to the kind assistance of other nations who served as our tutors and models. In effect, our technology is thus a combination or mixture of the best knowledge and experience drawn from different countries, and the response of Filipino technologists to some of our uniquely Philippine problems, all of whom deserve a share of the honors.

Among these countries, we are very grateful to New Zealand whose advanced technology in developing hot-water dominated geothennal fields fitted exactly the Philippine conditions. In particular, we wish to cite the consulting firm of Kingston Reynolds Thom and Allardice, now just KRTA, for teaching us and helping us in geothermal exploration and development. KRTA started as the principal executing agency in the bilateral New Zealand-Philippines Energy Cooperation Program (ECP), geothermal aid program, and KRTA remains to this day as direct consultant to the PNOC geothennal program.

We would like also to cite the Ministry of Foreign Affairs (now Ministry of External Relations and Trade, or MERT) of the New Zealand government. The Ministry initiated the energy cooperation program and provided financial and technical aid to the Philippine geothermal industry. The Ministry also continues to facilitate the training of PNOC employees in various New Zealand institutions.

Early in our association with New Zealand, it was the Department of Science and Industrial Research (DSIR) which conducted geoscientific studies in PNOC fields, as well as initiated technology transfer programs with Filipino technicians and scientists. For its part, the Ministry of Works and Development undertook the drilling of the first 12 Tongonan and first three Palinpinon exploratory wells. As a paning gift, the Ministry of Works donated to us one Ideco drilling rig which is still in use in our geothermal areas.

This is likewise a fitting occasion to acknowledge the great assistance provided by the Geothermal Institute, University of Auckland, where over 70 PNOC geothermal employees have studied and completed diploma and masters courses in earth science and engineering disciplines. In addition, we have the first Filipino doctoral candidate at the Institute and he is now close to graduation. We expect to enrol further doctoral students in future years.

The assistance from New Zealand over the past decade has specifically helped us to develop two geothermal fields which are now in operation, Tongonan-I and Palinpinon-I, both in islands in Central Philippines.

On being commissioned in 1983, their combined power generating capacity of 225 megawatts raised total country capacity to 894 megawatts and made the Philippines a world-ranked geothermal producer, second only to the United States of America. That ranking remains to this day.

Moreover, as a result of accelerated geothermal activity over the past two decades, the Philippines has developed into a leader and model developer in wet steam field technology. Some sectors consider our staff very well advanced in the field of reservoir engineering and we have also pioneered some innovative environmental management and protection methods.

Many of these technological improvements and innovations are now being adopted by other countries - surely a shining example of transfer of technology in reverse. And now your former Filipino students find immense pleasure in reciprocating the learning imparted by their former teachers from other lands, by sharing our knowledge and experiences with you today.

THE PHILIPPINE GEOTHERMAL PROGRAM UP TO THE YEAR 2000

First, the good news. We are very happy to inform you that we have managed to weather the financial depression which befell the Philippines in 1983. As a result, the Philippine geothermal industry is back in harness and going literally "full steam ahead."

After several years of virtual inactivity during the mid-Eighties, the power industry now has its hands full in trying to cope with the rapidly increasing demands for electricity. "Catching up" may be a more appropriate term. When the national economy recovered and rebounded after the 1986 revolution, the country started suffering from power shortages because no additional power generating capacity was installed since 1983. Last summer, the power "brown-outs", as we euphemistically call these power outages, were lasting as long as four hours daily, forcing the government to impose drastic power-saving measures.

The National Power Development Program has thus been revised to meet the energy requirements of socio-economic growth. The plan now calls for doubling of the power generation capacity, from 6,000 megawatts to 12,000 megawatts, in the ten-year span from 1990 up to year 2000. Moreover, in the light of uncertainties in the crude oil market, the program calls for greater energy self-reliance by utilizing more indigenous resources.

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After considering and comparing cost efficiencies, resource availabilities and construction timetables, the resulting targets of the government's Power Development Program to meet the 6,000 MW mark, by resource category in round figures, are as follows:

Coal, 2,400 megawatts or 40 percent;
Geothermal, 1,600 megawatts or 26 percent;
Hydroelecmc, 1,000 megawatts or 17 percent; and
Diesel-fired and gas turbines, 1,000 megawatts or 17 percent

The addition of 1,600 megawatts of geothermal capacity is, in any language, a large order. It will mean triple the present capacity of 894 megawatts. It will mean developing all known reserves and potentials into producing fields within ten years. And it will require the employment of huge resources - manpower, financial, technology, equipment and supplies.

Right now, geoscientific personnel are crisscrossing the entire country on surface exploration. Drilling crews have recently completed exploratory drilling at Mounts Apo, Natib and Pinatubo, and are currently working on Mounts Cagua and Labo - all in the island of Luzon. Production and reinjection wells are being drilled in Leyte and Negros, while pipelines for steam gathering systems are being installed in the Bacon-Manit0 field which is being rushed into production.

By early 1993, PNOC expects to add about 230 megawatts of capacity - 110 MW from Bacman I, 40 MW from Bacman II, and 80 MW from Palinpinon II. At the Tongonan field, we already have close to 400 megawatts under the wellhead, awaiting the construction of powerplants and installation of a subsea cable interconnection to Luzon, to be undertaken by the National Power Corporation.

In short, we feel we are doing quite well and, with the support of friends like you, we are confident we will complete these tough assignments. We would certainly be more successful should foreign investors or joint venture partners participate in these PNOC geothermal projects. They are certainly very welcome.

THE ENVIRONMENTAL CHALLENGE OF THE NINETIES

And now, the bad news. While we are highly optimistic, we are also keenly aware of the wave of environmentalism that has placed many energy development projects in jeopardy. In our case, some exploration and development projects have fallen behind schedule by as much as one year due to delays in the granting of permits and environmental clearance certificates. These delays have been directly due to public concerns which had first to be settled.

A case in point is the Mount Apo project. We were initially allowed to drill two exploratory wells in 1988, and we discovered a resource ranging from 240 to 440 megawatts. After spending about P100 million, however, we are now delayed by two years in developing the area. Some sectors claim that since Mount Apo is a national park and sacred to some tribal groups, it should not then be exploited commercially. In response, we have proven that geothermal, which depends for sustenance on a good watershed, is highly compatible with park conservation. We have also designed a package for the protection of ancestral rights and provision of benefits to tribal communities, similar to that successfully applied to the Maori cultural concerns during the development of the Ohaaki geothermal field.

Our environmental controversy has reached nationwide proportions. Several legislative committees held public hearings on the legal issues. Anti-geothermal propaganda have filled the airwaves and newspapers. Top government official, especially congressional leaders, have been deluged by protest mail generated by foreign lobbyists, particularly the Rainforest Action Network, Society for Threatened Peoples and other Non-Government Organizations or NGOs. In addition, some environmentalists and ecologists have held anti-geothermal teachins - even in schools, civic meetings and church socials.

We thought that we were in a very unique situation until we came across an article in Time magazine two months ago, on August 13, 1990, entitled "Hot tempers in Hawaii" which I quote in part

"On the Big Island of Hawaii, the state government and several energy companies hope to replace much of Hawaii's imported foreign oil with a supply of clean, natural and endlessly renewable power. But America's environmentalists are anything but happy. Local conservation groups, along with such national organizations as the Rainforest Action Network call the geothermal project unsafe and unnecessary. They argue (that) drilling rigs, power plants, transmission lines and connecting roads will harm or destroy tracts of precious rainforest. Even native Hawaiian religious groups oppose the scheme, claiming that it will rob the volcano-dwelling goddess Pele of body heat."

"The fight over geothermal energy has become one of the most divisive issues in Hawaii's history, pitting scientist against scientist, and triggering demonstrations bigger than anything the state has seen since the Vietnam War."

Indeed, concern for the environment has become firmly fixed in the consciousness of today's generation, and it may well be that an industry or business enterprise will gain or lose public goodwill depending on how it helps preserve and promote environmental integrity.

In fact, even if geothermal is the safest and cleanest among today's conventional energy forms, industry in general and energy developers and producers in general must still bear at least two responsibilities.

The first responsibility is to serve as faithful caretaker or steward of the environment, complying with the standards and rules not only from a technical or legal viewpoint, but meeting the spirit as well as the letter of the law.

The Second responsibility is to cooperate with the people in understanding and resolving environmental issues, and in the process preventing the dialogues from deteriorating into antagonistic and polarizing argumentation. In other words, the burden for environmental and risk communication lies in the hands of industry.

INNOVATIONS IN ENVIRONMENTAL OPERATIONS

PNOC addresses these two responsibilities both as a government agency and as a responsible corporate citizen. Under Philippine laws, for example, PNOC has been deputized to manage close to 300,000 hectares of geothermal reservations in Leyte, Negros and the Bicol region in Luzon. Aware of the importance of watersheds to the geothermal system and cycle, PNOC fulfils its role with gusto, over and above expectations.

For example, one PNOC forest guard covers 2000 hectares, instead of the usual one guard to 5,000 hectares, to protect the forests from the harmful practices of illegal loggers and nomadic slash-and-bum farmers.

PNOC's Environmental Management Division has a complement of over 140 specialists representing various disciplines, including botanists, foresters, agriculturists, chemists, oceanographers and marine biologists. They serve not only as a support group but also as an internal audit team on environmental matters.

In each project, for example, a Civil Works Committee headed by an environmental officer who sure of minimal disturbance during road, wellpad construction and similar work requiring proper handling of spoils from earthmoving activities.

In addition, we have pioneered the following interesting initiatives:

1. Directional Well Drilling. Although it costs from 15 to 30 percent more to drill a directional well, it is frequently a better option than relocating a populated area or disturbing a critical forest stand. In addition, directional drilling minimizes rig movement and construction of wellpads especially in steep and unstable mountain environments.

2. Compact Field Development The directional drilling option also leads to the development of a compact geothermal field, with fewer wellpads with the wells clustered together, and shorter pipelines. Moreover, we note that the local inhabitants and even the environmentalists appreciate a compact field which minimizes the land area devoted to the project.

3. Recycling of Drilling Wastes. Instead of maintaining only one waste sump at a drilling site, PNOC constructs two or three more. By the time the wastewater reaches the third pond, it is sufficiently cooled and clarified through the settling out of the drilling mud to be reusable again. Hence, we minimize potential pollution while cutting operating costs through this method.

4. Reinjection System. Instead of discharging hot geothermal water into the rivers; lakes and seas, PNOC practices 100 percent reinjection in all of its projects. This means added costs in drilling and maintaining additional wells. Reinjection, however, minimizes chemical and thermal pollution in surface waters, and it helps recharge the underground geothermal reservoir.

5. Solid Waste Disposal. Third party environmental scientists claim that we are practising in our producing fields the state-of-the-art techniques in proper handling of hazardous solid wastes through selective metal fixation in cement which is subsequently stored in lined underground cellars. These are some of the interesting innovations with which we would be glad to keep you posted on from time to time. But for now, allow me to move on to the second responsibility of industry in respect to environmental protection and management.

APPROACHES IN ENVIRONMENTAL COOPERATION AND COMMUNICATIONS

Apart from being faithful stewards, we must also cooperate with other sectors in resolving environmental concerns as well as in educating people on environmental matters. This is important in getting the cooperation of the community as well as in improving the credibility of business and industry.

Sad to say, industry is always suspected of being guilty of "environmental disregard" and of "presumed pollution." In what may be termed as an epic "environmental battle" industry is also disadvantaged right from the start since environmentalists are thought to represent the public interest. They get front page and prime time coverage because they provide media with conflict, which is the main ingredient for news. They also have an almost symbiotic relationship with some politicians who are quite often critical of business and industry.

In the Philippines we have responded in various ways to this situation. We have been able to answer and neutralize many Critics and have gained essential public support through a number of activities.

1. Compliance with the EIA system. The Environmental Impact Assessment reporting has only recently been adopted in the Philippines and PNOC is perhaps one of a few Philippine companies which now fulfils this requirement. First of all, we want to be sure that all environmental standards are met satisfactorily. Secondly, we never proceed without the Environmental Clearance Certificate which defines the conditions under which the project can operate by the appropriate government authorities.

2. Information and Consultation Campaign. It is now standard practice to conduct information drives among the inhabitants in the prospect areas before the drilling crews move in. The local leadership is also formally briefed and consulted -- and the end-product is often a written resolution endorsing the project. Again, this is a pre-emptive move. In the United States the community-right-to-know concept was embodied into law in October, *1986.* It is only a matter of time when other countries will enact similar laws. Already, some communities around our projects are clamouring for this right. Moreover, the resolutions are needed as proof that there is no local protest to our proposed activities -- a new requirement for the issuance of the Environmental Clearance Certificate.

3. Community Relations. We are acutely aware of the fact that partnership is the only viable position for companies and citizens sharing the same environment. Hence, the company considers itself an integral part of the community where it operates and it carries a social responsibility to assist the community in resolving its problems and in promoting self-reliance and self-pride. Community relations or COMREL projects, as we call them, include education and training, provision of livelihood opportunities and assistance, health and sanitation projects, as well as local infrastructural projects which help the residents gain some tangible benefits from the PNOC project. These, in turn help earn local goodwill for the company.

4. Integrated Social Forestry. Realizing that occupants or settlers are the single most important determinant on the status and quality of forest cover, PNOC assists upland farmers in improving their livelihoods in lieu of slash-and-bum farming and other harmful practices that deplete or destroy vegetation protecting *the* watersheds. We are particularly thankful to the New Zealand government for financially supporting the pilot Integrated Social Forestry Projects (ISFP) in our forest reservations in Negros, Leyte and Bicol involving growing rattan and several shade-tolerant crops under forest stands. As a result, the settlers direct their attention to these crops rather than to the forest trees. These ISF projects exemplify PNOC's commitment to the principle of multiple-use of watershed areas.

5. Cooperative Activities with DENR and Other Agencies. PNOC participates in the nationwide environmental quality monitoring program to prevent potential long-term impacts to human health. In addition, the company participates in a comprehensive environmental laboratory inter-calibration program initiated by the Department of Environment and Natural Resources (DENR). We also help the DENR develop zoning plans for watershed reservations as part of the Integrated Protected Areas System Project of the World Bank. We also cooperate with various Task Forces which monitor environmental compliance in PNOC projects, whether organized by government agencies or private groups. In the face of damaging anti-geothermal propaganda, the best testimonials in our favour come from respected scientists from Silliman University, Visayas College of Agriculture (VISCA) and other academic institutions close to our project sites.

6. PNOC's Open-House Policy. " The best antidote so far to anti-geothermal propaganda is the open-door, open-dialogue policy. Respected citizens, influential government officials and media representatives are invited to visit our operating fields, inspect all the facilities, and ask all the tough questions. A very recent example was a group of tribal leaders from the mountain villages of Mount Apo, who flew on an aircraft for the first time in their lives, to the Tongonan and Palinpinon geothermal fields to see for themselves how their area might-look once it is developed into a producing field. Upon their return they allayed the fears and suspicions of their people. From our current experience, after such visits even the representatives of previously critical non-governmental organizations undergo a change in attitudes and they often publicly acknowledge their previous misconceptions. Open dialogues with senators, congressmen and other public opinion leaders have also cleared up a lot of the disinformation and gained adherents to the geothermal option.

CONCLUDING REMARKS

That ends what I earlier termed as "bad news" but which, as you have seen, has turned out to be a blessing in disguise. As a result of the environmental challenge, we have become acutely aware of the concept of sustainable development.

Even as we work ceaselessly to provide the energy requirements of accelerated socio-economic growth, we have as well become dedicated caretakers and stewards of the environment, with as deep a commitment for the conservation and preservation of the natural resources for the benefit of succeeding generations.

With that resolve, we expect to move on and progress from being merely "fire-fighters" or "concerned citizens" to become "pro-activists" in environmental management in the coming days. Our dream is to become models for the environmental struggle in the energy sector or even the wider industrial community.

And our hope is that by that time the Philippine geothermal experience in confronting the environmental challenge will have become reasonably more comprehensive and more useful to other members of the international geothermal community, including our respected former tutors and models. Thank you and good day.