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FINANCING PRIVATE GEOTHERMAL POWER PLANT PROJECTS, HURDLES AND OPPORTUNITIES

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ABSTRACT

Geothermal energy projects are generally small and often located in rural areas. These projects are also characterized by higher initial capital costs, on a cost/kilowatt basis, than large thermal power projects due to the fact that these capital costs include a lifetime supply of fuel. The combination of a sustainable non-fossil fuel and local rural power generation results in social, economic and technical benefits which makes geothermal energy projects highly desirable for emerging markets and developing countries. However because of their very nature geothermal energy projects face a number of financing hurdles, including: (a) barriers due to higher capital costs and credit risk issues in developing countries; (b) subsidized use of fossil fuels; (c) statutory limitations in the method by which multi-lateral agencies share project financing, and (d) time consuming and expensive reviews of projects, which may delay and even preclude project implementation. See Delphos (1996).

Fast track financing of private sector geothermal projects, and recognition of the real value of the benefits of geothermal power, will provide the opportunity for development of new geothermal projects worldwide. Financing participants should choose a team leader, establish a budget for financing costs and set a closing timetable. Host countries and multi-lateral agencies should provide quantifiable credits for geothermal benefits. Six months from planning through financing approval should be the realizable goal so that projects are developed when and where they are most needed.

INTRODUCTION

Summary of Issues

Geothermal Energy Projects are generally small, a few tens of MW at most, and often located in rural areas, where geothermal resources occur. These projects are also characterized by high initial capital costs to cover the lifetime supply of "fuel energy". The combination of non-fossil fuel and local rural power generation results in social, economic and technical benefits, which make renewable energy projects desirable for emerging markets and developing countries. However the multiple benefits of renewable energy projects are often ignored because these small projects are subjected to the hurdles of long term financing. Often the only financing feasible for such projects is with the participation of multi-lateral agencies such as the World Bank Group.

Private Sector Considerations

Developers and operators of conventional thermal power plants often view geothermal projects, as well as all renewable energy projects, as a form of competition. This is generally not the case in most countries, where large central station power plants are the backbone of the national power system of the country involved.

Geothermal energy projects can complement conventional thermal power projects by: (a) marginally reducing greenhouse gases and air emissions; (b) providing, clean, sustainable and cost effective power in rural areas and villages not otherwise served by the power grid; (c) utilizing indigenous resources in countries where fossil fuels are imported, or exported, for hard currency; and (d) developing diversified power sources that can sustain economic growth when fossil fuel supplies decrease or become prohibitively expensive. The complementary nature of renewable projects has been more universally recognized by both conventional energy companies which have entered the renewable energy power project field, and renewable energy companies, such as ORMAT, which have undertaken a number of project and product developments in the conventional energy power field.

ORMAT Power Technology Experience

ORMAT has constructed 600 MW of geothermal energy power plants in 23 countries from the USA to Iceland, New Zealand and Tibet, in the PRC. These Plants have already displaced 3.5 million tons of fuel and 11 million tons of CO_2 since 1986. Nevertheless, since ORMAT's inception, more than 30 years ago, we have also supplied power units that convert low grade fuels, biomass and industrial waste heat into commercial electricity. Over 3,000 of our multi fuel micro turbines, known generically as ORMAT Closed Cycle Vapor Turbogenerators, or CCVTs, provide highly reliable power at remote, unattended telecommunications and pipeline stations along high priority projects such as the Trans-Alaska Pipeline, the Argentine backbone telecommunications network and the Gazprom projects in Russia. We have also identified a niche in the rehabilitation of electrical power plants in smaller communities. Our first such project in Kazakhstan is a coal fired plant with an output of 440 MW of electricity and 1,000 MW of heat, and our second project is the rehabilitation and operation of the 70 MW Momotombo geothermal project in Nicaragua.
Within this framework of diverse power technologies

ORMAT has organized the financing of projects from US$ 2 to 200 million for a total of $ 1 billion in the past 10 years, in cooperation with US Ex-Im Bank, EBRD, IFC, CDC, Scudder, ING, Credit Suisse and others. The following presentation is based both on our experience and our desire to improve the ability to finance and implement geothermal and renewable energy projects, where and when they are needed to improve the quality of life of people on a worldwide basis.

HURDLES TO FINANCING

Barriers

Commercial financing barriers result from the higher up-front costs of geothermal energy projects. The cost of fossil fuel thermal power includes the power plant capital cost and a per unit fuel cost, while in geothermal projects the capital cost includes the well field development and power plant equipment for delivering and converting natural geothermal energy into electrical power for the lifetime of the project. As a result the front-end capital cost for a geothermal project is much greater than the comparable cost for a fossil fuel project of the same size. Commercial institutions view this as increasing the project's financial risk profile.

Credit risk barriers are particularly prevalent in geothermal and renewable energy projects since these projects are mostly located in developing countries. As a result countries which can benefit the most from renewable projects are often the least attractive to the financing institutions.

Institutional barriers may exist in emerging and developing countries due to national policies under which fossil fuel power is traditionally sold to a population with low earnings at subsidized prices. As a result the actual cost of renewable energy is often compared with the artificially low price of subsidized electricity. This however is gradually changing as some countries strive to achieve a market economy.

Financing Issues

Multilateral agencies with expensive and time consuming structured procedural requirements are often the only source available for financing rural electrification and geothermal power projects in emerging markets. In addition since these geothermal power projects are small compared to fossil fuel plants they often cannot receive the allocation of manpower from the agencies, which focus on large power projects.

Financing costs, procedures and timetables are usually geared for large national projects. This imposes costly time consuming hurdles on the smaller geothermal energy projects. Financing expenses, especially if more than one multilateral agency is involved, are often the same, in total amount, as for the large fossil fuel projects, and are thus disproportionate in size for the smaller geothermal projescts.

Statutory limitations on the share of the financing that single agencies can subscribe to, usually 30 to 35%, necessitates that two or more agencies must work together, each with its own specific procedures, which often creates additional complications and delays.

Review standards for small geothermal projects, with innovative technologies, are often more stringent and time consuming than for well defined large fossil fuel plants. Delays in the extensive financing process may affect national goals and in fact weaken the project's feasibility.

ACCELERATING PROJECT IMPLEMENTATION

The implementation of relatively small geothermal energy projects can be accelerated by reducing the expenses and time delays required to arrange and close the financing for these projects.

Fast Track Process for "One Stop" Financing

Financing of geothermal projects should be processed on a FAST TRACK, utilizing experience with similar projects, standardized procedures and increased reliance on the history of the project participants.

Agency Financing Requirements

The Agency financing requirement should be identified at the beginning of the review period to keep the financing process on a smooth fast track, as follows:.

The Review Period for the project through financing approval, should be targeted at six months. This period is generally sufficient for a diligent and thorough review of a geothermal project.

The Financing Participants should choose a TEAM LEADER, who will represent the needs of the participants without having to coordinate the time schedules. This will keep the financing process on schedule and control its costs. Limitations on the percentage of investment which a single agency can undertake should be raised to 75% to minimize the number of participants.

Agency Teams should be assigned to the projects from inception through project review and financial closing. The shorter financing period will avoid the need to change teams during the process because of the needs of other projects, resulting in a smoother financing process.

Standard Power Purchase and Project Agreements such as were used in the USA for small power projects, should be developed and specifically tailored for financing of geothermal and other renewable energy projects.

The Closing Schedule, including costs and timetable should be agreed upon during the review period, with

reasonable efforts made by all parties to adhere to this schedule.

Accelerated Implementation Benefits

The reduction of the financing hurdles which geothermal and renewable energy projects must endure will accelerate project implementation and produce the following benefits:

Project Costs will be decreased, thus decreasing the cost of power production. This will make geothermal energy more cost effective and encourage more such projects.

Electrical Power will be produced earlier and at lower cost to accelerate local and regional economic development.

Developers will focus on technology improvements and project enhancements. This will provide for more efficient and cost effective future projects, more geothermal projects will be developed, when and where needed, as illustrated by Table 1, from Gawell, Reed and Wright (1999). From Table 1 we can see that over 600,000,000 people living in developing countries could conceivably receive 100% of their electrical power from geothermal resources!

CONCLUSIONS AND RECOMMENDATIONS

Governments, multilateral and bilateral agencies should recognize that renewable energy power projects cannot be evaluated by the same criteria as standard fossil fuel projects, due to; (a) the typically small size of geothermal energy projects, (b) the significant up-front investment to secure the plant's fuel over the project's life; (c) the credit risk barrier encountered by developing countries, and (d) the new, different and innovative technologies which are employed. To enable companies like ORMAT and others to play an expanding role in the development of geothermal and renewable energy projects, the following steps should be taken:

1. **To encourage the development of geothermal energy power projects**, with commitments to the environment and the reduction of CO_2 emissions, governments should adopt fiscal incentives and administrative measures as appropriate. Subsidies to fossil fuels should be reduced, and redirected to investments in distributed sustainable energy systems where possible

2. **To accelerate, and significantly reduce the transaction costs** of geothermal energy power projects, multilateral and institutional financing agencies should:

   - Apply a standard contract for each type of renewable energy source, and
   - Adopt a "one-stop" financing approach.

3. **To facilitate geothermal projects, regulatory agencies** should recognize that:

   - A power sector structure based on merchant plants, dispatched according to power costs, is not compatible with the development of geothermal power plants, since the up-front investment in the geothermal energy resource must be recovered on a continuous basis.
   - The use of new technologies should not be inhibited by micromanaging project specifications. Developers and manufacturers should be encouraged to take advantage of proven experience and track records by introducing new technologies.
   - Carbon offsets should be implemented and utilized as the most flexible approach to address the long term environmental benefits of geothermal and renewable energy power. The aim of developing more geothermal energy for its long-term environmental and societal benefits should be addressed through valuing all of geothermal energy's external benefits.

REFERENCES

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Table 1. 39 COUNTRIES WHICH COULD BE 100% GEOTHERMAL POWERED

Country	Population	Country	Population
Bolivia	7,957,000	Martinique	389,000
Burundi	6,457,000	Montserrat	11,000
Comoros Islands	658,000	Mozambique	18,880,000
Costa Rica	3,841,000	Nicaragua	4,807,000
Djibouti	623,000	Panama	2,767,000
Dominica	71,000	Papua New Guinea	4,600,000
Ecuador	12,175,000	Peru	24,797,000
El Salvador	6,032,000	Philippines	72,944,000
Ethiopia	59,649,000	Rwanda	6,604,000
Fiji	796,000	Solomon Islands	417,000
Grenada	93,000	Somalia	9,237,000
Guadeloupe	443,000	St. Kitts & Nevis	39,000
Guatemala	10,801,000	St. Lucia	150,000
Honduras	6,147,000	St. Vincent	112,000
Iceland	276,000	Sudan	28,292,000
Indonesia	206,338,000	Tanzania	32,102,000
Kenya	29,008,000	Tonga	98,000
Malagasy Republic	15,057,000	Uganda	20,554,000
Malawi	10,346,000	Vanuatu	182,000
		Yemen	16,887,000
		TOTAL	620,637,000