

Short-Term vs. Long-Term Geothermal Resource Risk and Mitigation

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ABSTRACT

The exploration risk associated with geothermal resources is well known as a major hindrance to the development of geothermal capacity. Various public and private sector approaches and technical and financial mechanisms have been established to address this issue. This article will provide a critical review of instruments such as the Geothermal Risk Mitigation Facility (GRMF) and Munich Reinsurance's exploration risk insurance product. All available products address only short-term exploration risk.

Long-term geothermal resource risk, however, is often less understood and tends not to receive the attention that is warranted. Remarkably, this is a common problem in the industry and has caused serious damage to multiple projects in both developed and emerging countries. This article will discuss case studies of operating power plants that experienced adversity when the associated geothermal resources collapsed at once or over time. Some of these projects went bankrupt, causing significant losses to lenders and investors. The outcomes of each scenario will be discussed.

The nature of long-term resource risk as well as steps that can be taken to address these risks will be analysed. These steps encompass careful planning and execution and/or implementation of financial solutions.

As the geothermal industry matures, it has become increasingly vital to understand the short-term and long-term risks of geothermal project development, and more importantly, the measures that can be taken to mitigate these risks.

1. Introduction

The real estate sector is all about location. Similarly, the geothermal plants are all about the geothermal resource. The rationale here is as clear as daylight – the geothermal resource is the **ONLY** source of “fuel” a geothermal plant needs to operate. The geothermal resource cannot be replaced or moved around (but for short distance). Moreover, the quality of the geothermal resource cannot be improved. In other words, the essential parameters of the geothermal resource being temperature, pressure and enthalpy will never improve over time, i.e. the temperature and pressure of a resource tends to decline over time. Other parameters may change for the better (enthalpy, which indicates the steam fraction, comes to mind), but these are short-term phenomenon.

Hence, the geothermal resource should be at the center of any planning for a new project; i.e. Planning for how to find it and how to exploit it on a sustainable basis over time should be the top priority.

Naturally, we tend to focus on the short-term: When we consider a new plant, we spend more of our attention on the CAPEX even though the OPEX element is the one that will come back to bite us if not dealt with respect. Similarly, a huge effort is dedicated toward dealing with the first stages in the resource development, which is the exploration and production drilling. This effort seems to be justified as in geothermal greenfields, only 50% of the initial drilling operations prove successful. But once the exploration is successful, a lot of attention needs to be paid to the long-term as well. This is the focus of this article.

2. The Fallacy of the Geothermal Valley of Death

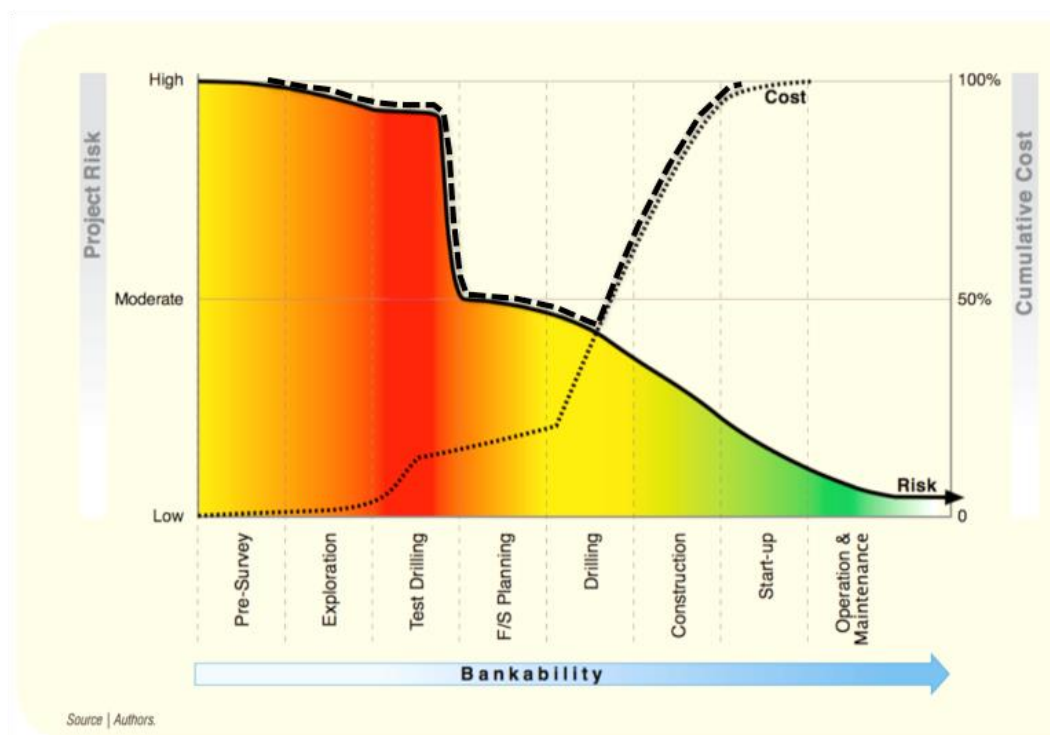


Figure 1: The Geothermal Valley of Death. From Gehringer et al (2012, p. 4)

Figure 1, is a graph that has been used extensively in discussion/presentation that centers around the subject of the geothermal risk. It however, tells only half the story: While the

exploration risk is immense and many companies are unable to cross the “Death Valley” as is accurately represented by the figure, getting to the other side does not mean that all is well with the project. Once the resource has been proven, the project has been “de-risked”, hence, the construction of the plant can now move forward and more importantly, financing is now within reach.

The problem that is missed by many when reviewing geothermal projects is the long-term resource risk that exists between the start of operations till the end of the project’s life. Geothermal projects require a substantial initial investment, which needs to be amortized over 20-30 years. During this period, the power plant needs a continuous supply of steam/hot water to convert into electrical power, which can be sold to pay for the large up-front investment (and O&M costs). Any interruption in the supply of thermal energy means less revenues and thus hardship for the investors/lenders to the project.

3. Long Term Geothermal Risk

Geothermal resources provide thermal energy in the form of steam, hot water or combination of both. The quality of the thermal energy relies on the resource temperature (which roughly reflects the enthalpy associated with the resource being the true measure of energy content), pressure and flowrate. In flash (condensing steam turbines) system, the pressure is a good indicator for the flowrate, which is not the case when lower temperature (usually pumped) geothermal resources are involved. Therefore, will use flowrate and temperature as the two underlined factors in analysis. The operation of the geothermal power plant will fall short in case of either one being deficient.

Generally speaking, resource deficiency can occur due to one of or both of the following two major reasons:

1. **Skin Damage** – This phenomenon occurs due to a problem during the drilling or completion of the well. Consequently, the flow of the resource into the well maybe restricted. Additional problems can occur due to the well chemistry. Adverse chemistry may cause scaling on both the production and injection wells. The “good news” here is that in most cases, any problems associated with drilling or operating of geothermal wells can be fixed technically. This article will not focus on any of the numerous mitigation measures but suffice it to say is that close monitoring and a qualified team can solve any well related issue without risking a long-term decline in the performance of the project.
2. **Geothermal Resource related issues** – this is the real problem that may sink an otherwise perfectly designed and constructed geothermal project. In essence, we experience issues with the two parameters mentioned below. Interestingly, the type of the resource (Steam or hot water) and the technology in place determines the severity of the problem:
 - i. *Reduced flowrate/pressure*: This phenomenon is typical to vapor (steam) dominated resource whereby the resource is either pure (dry) steam, or dual phase and is artesian. The issue here stems usually from the fact that the natural recharge of the fluid does not match the consumption of the resource. The technology most used for this type of resources will be single, double or triple flash. And in extreme circumstances (dry steam), no flashing is required. In any event, the operation of the power plant involves the consumption of great deal of the resource as part of the cooling process. Anywhere between 30%-80% of the resource is not returned back and thus a permanent deficit of the liquid is being built up. Some geothermal resources benefit from a strong natural recharge, so the

impact of partial reinjection may be felt after a very long time. The industry however had experience quite a few situations whereby the depleted reservoir limited the power production as will be demonstrated later on with actual examples.

- ii. *Plummeting resource temperature*: This phenomenon characterizes the liquid dominated resources, which usually will reinject close to 100% of the resource, that is pumped out, thus eliminating the potential reduced production. On the other hand, liquid dominated resources are lower temperature by nature and thus more susceptible to a drop of even a few degrees. Here the issue mostly centers on the heat being mined from the rocks and its recovery. The biggest challenge is usually the delicate balance in spudding the production and injection wells. Locating the injection wells too close to the production area, the cooler injection fluid is bound to reduce the temperature of the resource. On the other hand, placing the injection wells too far from the production zone will lead to a loss in pressure support, which means a bigger draw down.

4. Real Life Examples

The following are three instances where a long-term risk management approach would have helped the management.

4.1 The Geysers story – The rise, the fall and the rise again.

With an 11 MW project in 1960, the US Geothermal industry was created. It happened in The Geysers where a large dry steam reservoir was discovered. In the following 25 years, many power plants were developed at the site of The Geysers by numerous developers and PG&E was only too happy to buy the output to feed San Francisco with clean (and very cheap) energy. At the height of this development, The Geysers field, which was and still is the single largest geothermal field in the world, had an operational capacity of 2,000 MW. And then, the bottom fell from under the developers and operators of the field. Production declined rapidly and within a few years, the same field delivered no more than 1,000 MW and was falling. The culprit turned out to be a depleted reservoir because the liquid level was going down year after year. It was a classic case of the tragedy of the commons as there was no one entity in charge and the resource was exploited without any considerations regarding the neighbors who in turn could not care less about their neighbors and so on. Only 20% of the produced steam would get back into the reservoir, so the field was running out of media to bring the heat up to the surface. Initial measures such as better use of cooling towers increased the percentage of reinjection to 33%, but it was clear that this was not enough.

Fortunately, those who really cared about the fate of The Geysers undertook a few actions to save it. Firstly, the various players and various leaseholders consolidated under two players: 17 of the 19 power stations and the associated resource were now owned by one entity, Calpine. NCPA owned and operated the balance. Secondly, and more importantly, two major pipelines from Lake and Sonoma counties respectively were built to provide a continuous supply of treated wastewater to The Geysers (Appendix A), supplementing the injectee from the power plant. This exercise took place some 15 years ago and proved to be a real success. Operation stabilized, and The Geysers can continue to supply clean reliable and dependable clean power for the next 50 years.

4.2 Blue Mountain – The cost of greed

The Blue Mountain geothermal project is located in Eastern Nevada. From the time of the initial exploration, it was conceived to use the Organic Rankine Cycle (binary) technology. This technology is best suited for a medium temperature resource, which requires pumping. Originally designed as a 25 MW project, the exploration and production drilling continued in parallel to the construction of the power plant. But, and this is the crux of the matter, the geothermal field was not fully developed and tested (including the injection strategy) before the commitment for the power plant was made.

Incidentally, higher temperature and more production was discovered during the development of the geothermal field. This gave rise to unchecked optimism as a result of an expectation that a bigger resource was discovered. One of two strategies can be applied in such a case: 1) To go slow and build the project in phases over time and 2) To build all at once. The first approach (see Steamboat in NV which went from 5 MW to 70 MW over 20 years without any major issues) is slow and less profitable than the more aggressive approach which involves taking huge risks to get a marginally better financial reward. The problem was exacerbated by the fact that the banks (and their commissioned based agent) wanted to lend more and pushed for a larger project. Hence the fateful decision was made to go for a 50 MW project.

The article, “Stimulating Geothermal Power” (Kryzanowski, 2010) tells the complete story of how back in 2009 the project went on line and delivered 45 MW for a short while. But the euphoria was short lived and within 6 months the temperature of the resource and the production dropped dramatically as indicated in the graph (Appendix B).

All kind of fixes were applied but to no avail. The end, however, was unfortunate as:

- The developer of this project, Nevada Geothermal lost all the investment it had made and went out of business.
- The subordinated lender (The senior lender is the DOE), had to write off over \$100 million.

Recently, the project was operating at 25 MW. It was acquired by another geothermal player, which continues to try to improve its operation.

4.3 COSO Geothermal – The musical chairs game – multiple losers

Coso Geothermal was developed during the 80s in California and was developed responsibly; It generated about 240 MW from 8 different power plants which were developed over time. In other words, it was only when it was clear that the resource could support additional development that a new plant was brought on line.

This strategy worked for a while and consequently, this project made a lot of money. And there was always a buyer who was willing to buy into the project. Originally developed by the Bishop family in partnership with CalEnergy (currently, BHE), the family bought Calenergy’s share for what seemed at that time to be a considerable sum of money. The family in return turned around and refinanced it position with public bonds to the tune of \$626 million (Appendix C). Debt was raised based on the fact that the generation of this project will not only stay on track but would go up to about 270 MW (Appendix D). In

addition, close to \$100 million was raised from a large insurance company and Citi in a sale lease back transaction.

Later on, the family sold its portfolio of projects including Coso to a private equity fund, which had no experience in the geothermal space. Hence when reality finally caught up with the project as the depletion rate move up dramatically, two things were missing:

- *Expertise*: The local team tried to take a page from Calpine's books and signed up with a local ranch to procure its water rights. A pipeline was built from Hay Ranch and a large amount of water was pumped into the field. Unfortunately, the Calpine success story was not studied in full and the water injection plan backfired. The project stabilized finally at about 160 MW and could not be prompted to perform at a higher level.
- *Money*: The project changed many owners and, in the process, and was leveraged to the tilt based on unrealistic assumptions. Hence, any hiccup created a major problem to the financing partners. In addition, no funds were left in the project for a "rainy day".

Moody's summarized the outcome in the report as follows (Appendix E):

- The project went bankrupt as it was not able to service the public debt
- The private equity fund lost it position
- The lessor which tried to support the project financially finally lost hope and threw in the towel and wrote off its investment as well
- The bondholders took over the project in return for a major "hair cut" to the value of their holdings.

5. Conclusion

Geothermal resources can be capricious. They should be dealt with cautiously. A few lessons that can be taken from the examples above and others that maybe helpful are that:

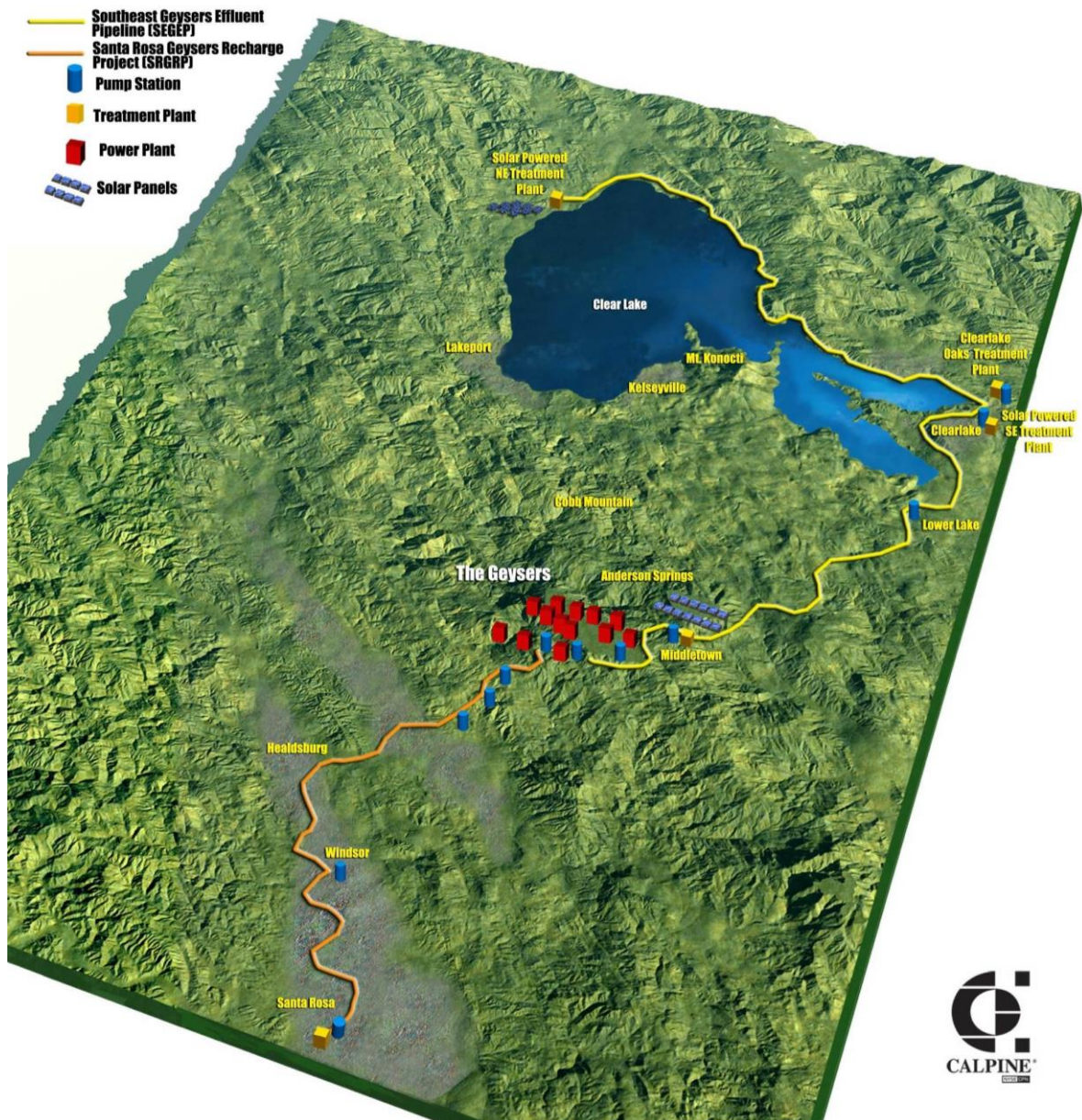
1. You should always assume the worst. Assume that long-term the resource will decline. The temperature may drop and so will the flowrate. The earlier a potential problem is detected, the better are the chances that the issue can be dealt with timely.
2. Monitoring and analysis needs to be a priority expense. A numerical model is a must and it should be maintained and updated by the best talent the company can afford.
3. Proper manpower and equipment need be in place to address contingencies head-on.
4. Phased development, albeit slower and more expensive, is the best strategy. Frankly, there is no other strategy.
5. It is best to not try and squeeze every last cent from the project by charging large fees and over-leveraging. It is a tried and tested recipe to lose the project. Consequently, an appropriately sized war chest should be kept aside for contingencies. They will likely happen sometime during the lifetime of the project.
6. Pray if you believe it can help. One needs a fair amount of luck in this business.

REFERENCES

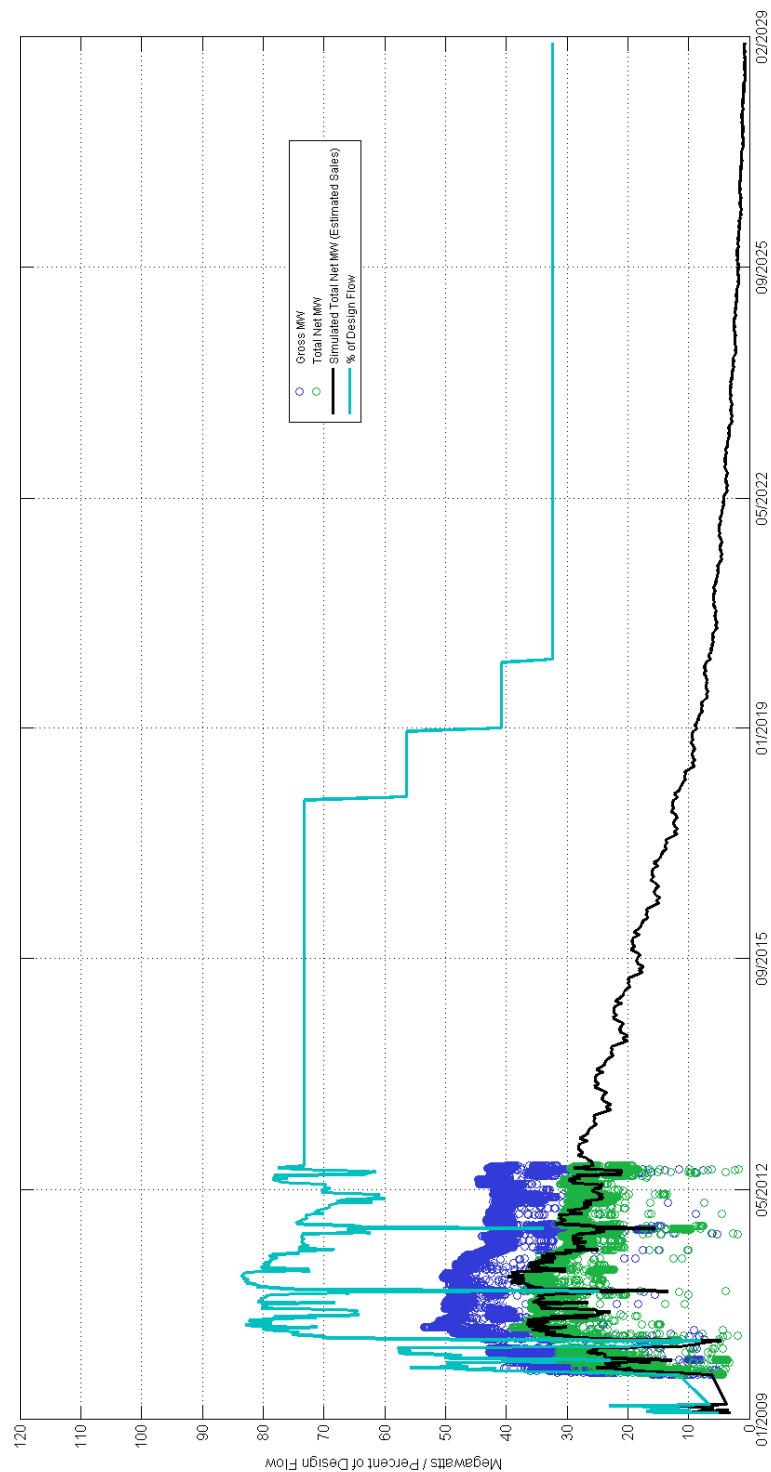
Gehringer, Magnus; Loksha, Victor. 2012. Geothermal Handbook : Planning and Financing Power Generation. ESMAP technical report;no. 002/12. World Bank, Washington, DC. © World Bank. License: CC BY 3.0 IGO.

Kryzanowski, T. (2010, July/August). Stimulating geothermal power. Retrieved June 13, 2018, from http://www.altenerg.com/back_issues/index.php-content_id=357.htm

APPENDIX A: The Geysers Wastewater Recharge Projects



APPENDIX B: Resource Temperature of the Blue Mountain Geothermal Project



APPENDIX C: Value of COSO Geothermal Public Bond Transaction

\$629,240,000

Coso Geothermal Power Holdings, LLC

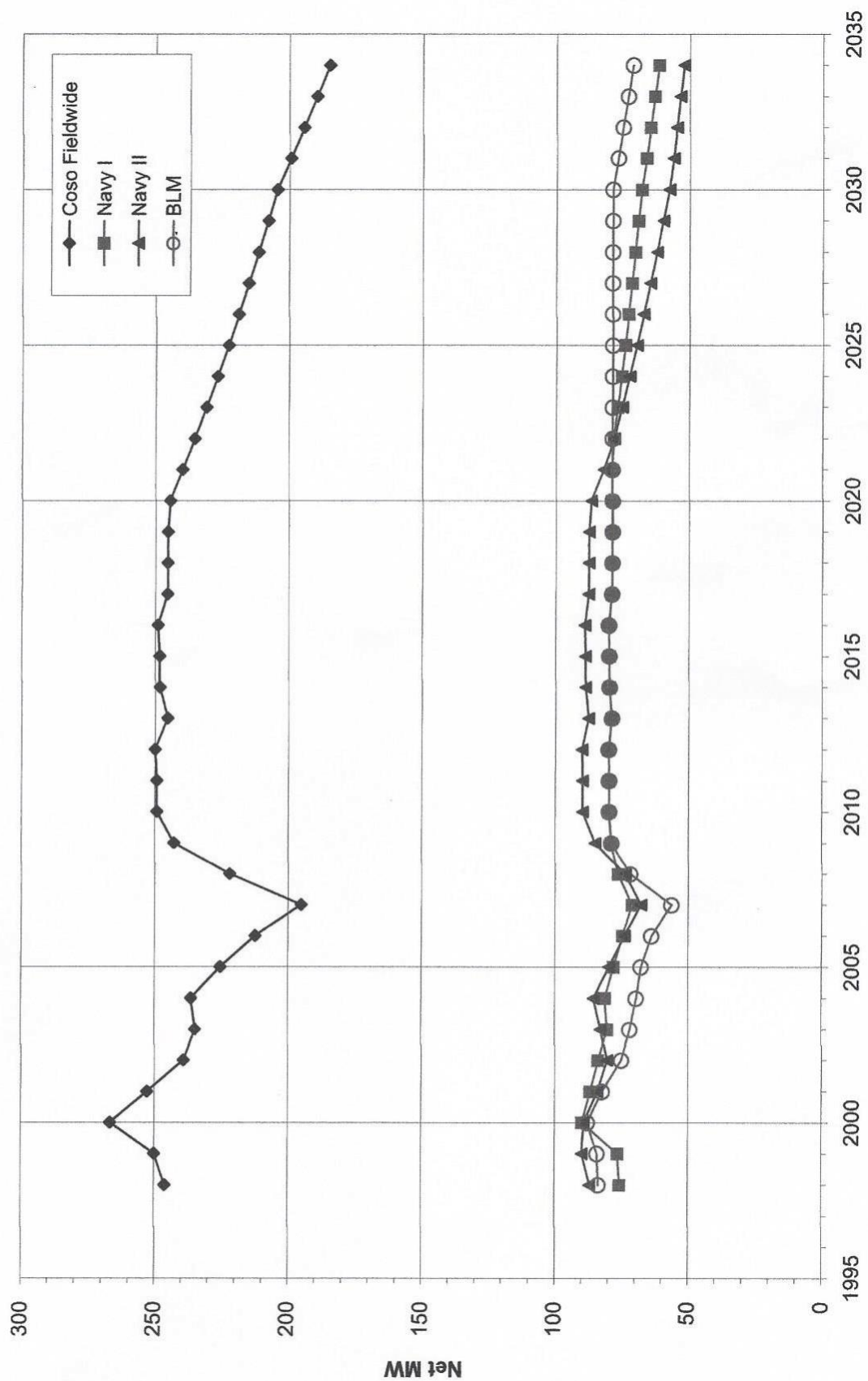
7.00% Certificates due July 15, 2026

OFFERING MEMORANDUM

December 3, 2007

Citi

APPENDIX D: Forecasted Generation for the COSO Geothermal Project



APPENDIX E: Moody's Advisory Report Following Debt Restructuring



Rating Action: **Moody's withdraws Coso Geothermal's rating and outlook following debt restructuring**

22 Feb 2017

Approximately \$400 million of rated debt previously outstanding

New York, February 22, 2017 --

Moody's Investors Service ("Moody's") has withdrawn Coso Geothermal Power Holdings LLC ("Coso") Ca rating and stable outlook following the completion of the issuer's debt restructuring earlier this month.

RATINGS RATIONALE

The rating action reflects Coso's debt restructuring that we understand occurred on February 16, 2017. The terms of the debt restructuring have not been publicly disclosed, although we understand that the previously rated instruments are no longer outstanding.

Please refer to the Moody's Investors Service's Policy for Withdrawal of Credit Ratings, available on its website, www.moody's.com.

Coso is a special purpose company formed as part of a sale-leaseback transaction of geothermal facilities totaling a gross 302 MW and located in California.

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