Ormat Olkaria III Geothermal Power Plant in Kenya

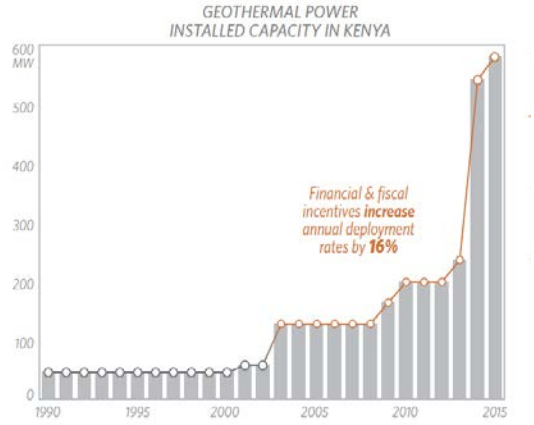
Project Summary

Ormat Olkaria III is the first privately funded and developed geothermal project in Africa. It has a total of 139 MW installed capacity and is located in the Hell's Gate National Park in the Olkaria region of Kenya. The cost of the first three phases of the project were USD 445 million. The Kenyan Government initially explored the area for geothermal resources in the 1980's. Once geothermal potential was established, an international public tender process was initiated, which the private energy firm Ormat won. Ormat then provided the entire initial equity investment without any outside financing. Once the private company was able to demonstrate project viability, the project received two subsequent rounds of financing to refinance its initial equity investment and to install two additional phases of construction which increased capacity by approximately ten-fold. The capacity of the Ormat Olkaria III geothermal accounts for 22% of Kenya's geothermal capacity and 6% of the country's total power capacity, thus providing renewable energy at low-cost and contributing to reductions in GHG emissions.

Geothermal Resources in Kenya

The Olkaria region was first recognized as a promising source of geothermal power in the 1960's. With the help of the UNDP, the first geothermal project in Africa (Olkaria I) was developed in the region in the early 1980's by the Kenyan state-owned enterprise KenGen.[1] In 2003, KenGen developed Olkaria II in the same region with substantial financing from multilateral funders. These projects, along with Ormat Olkaria III, have led to a dramatice increase in geothermal power capacity in Kenya (Figure 1).

Figure 1: Geothermal Power in Kenya Over Time



Source: Climate Policy Initiative, 2015[2]

Kenya hopes to derive 29% of its energy from geothermal sources by 2030 (from 15% as of 2015). This is essential to providing low-cost, and especially stable energy supply because hydro-electric plants have been subject to droughts.[3] In line with this strategy, geothermal capacity in Kenya doubled between 2013 and 2015,[4] and the Kenyan Government estimates that energy costs have been reduced by 30% because of the development of geothermal resources.[5]

1 Micale, V., Trabacchi, C. & Boni, L. (2015). Using Public Finance to Attract Private Investment in Geothermal: Olkaria III Case Study, Kenya. Climate Policy Initiative. Obtained on 18-04-2018 from https://climatepolicyinitiative.org/publication/using-public-finance-to-attract-private-investment-in-geothermal-olkaria-iii-case-study-kenya/

2 Micale, V. Trabacchi, C. & Boni, L. (2015). Using Public Finance to Attract Private Investment in Geothermal: Olkaria III Case Study, Kenya. Graphics Library. Climate Policy Initiative. Obtained on 18-04-2018 from https://climatepolicyinitiative.org/publication/using-public-finance-to-attract-private-investment-in-geothermal-olkaria-iii-case-study-kenya/

3 Ochuodho, Z. (2018). KenGen's plan to add 158MW geothermal capacity on course. Mediamax. Obtained on 18-04-2018 from http://www.mediamaxnetwork.co.ke/business/410414/kengens-plan-add-158mw-geothermal-capacity-course/

4 Mukkam-Owuor, R. & Kageni, E. (2018). Overview of the current energy mix, and the place in the market of different energy sources. Energy 2018 | Kenya. Global Legal Insights. Obtained on 18-04-2018 from https://www.globallegalinsights.com/practice-areas/energy-laws-and-regulations/kenya#chaptercontent1

5 Micale, V., Trabacchi, C. & Boni, L. (2015). Using Public Finance to Attract Private Investment in Geothermal: Olkaria III Case Study, Kenya. Climate Policy Initiative. Obtained on 18-04-2018 from https://climatepolicyinitiative.org/publication/using-public-finance-to-attract-private-investment-in-geothermal-olkaria-iii-case-study-kenya/

Involvement of the Private Sector

In addition to developing state-owned geothermal plants in Olkaria, KenGen also explored additional sites and found geothermal resources in the area where the eventual Ormat Olkaria III project would be developed in the early 1990's.[6] In 1996, the Kenyan Government offered an international public Build-Own-Operate tender for the Olkaria III concession. In 1998, the tender was awarded to Ormat (a large publicly listed alternative energy provider). Also in 1998, Ormat signed a power-purchasing agreement (composed of a fixed monthly capacity payment and a floating energy payment for the energy delivered) with the state-owned energy distributor Kenya Power and Lighting Company Limited. The fact that the initial exploration was carried out by the Kenyan Government reduced the risk for the private sector by establishing a proven geothermal capacity. Risk was further reduced by the Kenyan Government and Ormat successfully negotiating the first power-purchasing agreement in the same year that the tender was awarded.

In 2000, Ormat developed a pilot phase of 8 MW capacity, which was subsequently raised to 12 MW. The pilot phase benefited from utilizing the exploratory wells that were drilled by KenGen in the past. This first phase of the project was entirely funded by Ormat with no outside equity or financing. The initial cost to Ormat was USD 40 million in 1998-99 and reached USD 150 million by 2006. Ormat received USD 37.5 million in MIGA insurance in 2000, but no external financing was utilized at this stage.[7]

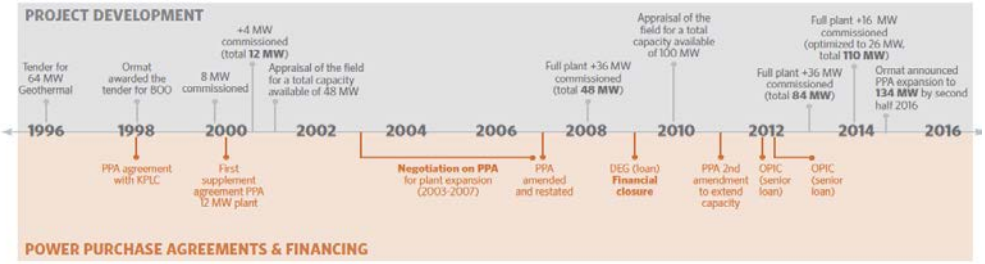
Based on the success of the pilot wells, as well as additional exploration and appraisal by Ormat, the company sought to substantially expand capacity.[8] Between 2003 and 2007, Ormat and the Kenya Power and Lighting Company Limited (KLPC) negotiated a new power-purchasing agreement, and Ormat commissioned an additional 36 MW of capacity in 2008.[9]

At this stage, Ormat had substantially reduced the risk profile of the project by 1) successfully providing all equity and operational costs of the pilot phase, 2) establishing the additional geothermal potential of the area, and 3) successfully negotiating power-purchasing agreements to offload capacity. Because of this reduction in risk, Ormat won two rounds of financing for expansion and the refinancing of its initial equity investment. Securing financing would not have been possible without the reduction in risk by KenGen (in conducting the initial exploratory drilling) and by Ormat (in providing the entire equity investment).

Project Financing for Ormat Olkaria III

The first round of financing was a USD 105 million loan of Deutsche Investitions (DEG) and KFW Development Bank that was used to refinance Ormat's initial investment.

Figure 2: Development timeline of Ormat Olkaria III



Source: Climate Policy Initiative, 2015[10]

The second round of financing came from the Overseas Private Investment Corporation (OPIC) in the form of a 19-year tenor senior loan of USD 310 million in 2012.[11] The OPIC financing was disbursed in three tranches and was used to finance further capacity development (Phase II and Phase III) and to further refinance part of Ormat's initial equity investment. Additional

6 A subsequent project was also developed after the Ormat project (Olkaria IV).

7 Chao, J. Harris, C. Hong, Seong. Rudnik, N. Park, J. Djalal, D. Delay, J. (2016). Private Participation in Infrastructure: Annual Update." World Bank Group, Public-Private Partnerships, Singapore: June 2017.

8 Micale, V., Trabacchi, C. & Boni, L. (2015). Using Public Finance to Attract Private Investment in Geothermal: Olkaria III Case Study, Kenya. Climate Policy Initiative. Obtained on 18-04-2018 from https://climatepolicyinitiative.org/publication/using-public-finance-to-attract-private-investment-in-geothermal-olkaria-iii-case-study-kenya/

9 Chao, J. Harris, C. Hong, Seong. Rudnik, N. Park, J. Djalal, D. Delay, J. (2016). Private Participation in Infrastructure: Annual Update." World Bank Group, Public-Private Partnerships, Singapore: June 2017.

10 Micale, V. Trabacchi, C. & Boni, L. (2015). Using Public Finance to Attract Private Investment in Geothermal: Olkaria III Case Study, Kenya. Graphics Library. Climate Policy Initiative. Obtained on 18-04-2018 from https://climatepolicyinitiative.org/publication/using-public-finance-to-attract-private-investment-in-geothermal-olkaria-iii-case-study-kenya/

11 Chao, J. Harris, C. Hong, Seong. Rudnik, N. Park, J. Djalal, D. Delay, J. (2016). Private Participation in Infrastructure: Annual Update." World Bank Group, Public-Private Partnerships, Singapore: June 2017. Web.

MIGA insurance against political risk was also provided by expanding the insurance of Ormat's equity to USD 110 million.[12] The additions of Phase II and Phase III brought the total capacity of Ormat Olkaria III to 110 MW by 2014. A subsequent expansion in 2016 added an additional 29 MW of capacity, bringing the total to 139 MW.[13]

Outcomes and Key Takeaways

The returns of the project to Kenya have been substantial. According to a report by Climate Policy Initiative,[14] Ormat Olkaria III provides electricity at a 13% lower cost than comparable projects in Kenya. This same report estimates that the Ormat Olkaria III project has caused a reduction of 3% to 4% in carbon emissions from the Kenyan energy sector by replacing fossil fuels with geothermal energy.

The project has also been a success from the perspective of the private partner Ormat. Much of Ormat's growth has come from its investment in Kenya and the Olkaria project alone accounted for 8% of the firm's total revenue in 2011 (this is before additional capacity was added in Phase II and Phase III),[15] and the equity internal rate of return was 16% for the project.[16]

Despite these impressive outcomes, the success of the project was not always clear. Without the initial exploration conducted by the Kenyan Government, Ormat's equity IRR would have been 13% instead of 16%,[17] and the overall risk of the project at inception would have increased dramatically. Furthermore, even with the initial exploration carried out by KenGen, Ormat was still forced to use its own equity to demonstrate the capacity of the project before winning two rounds of financing. This highlights the importance of the public sector and of private capital that is able to take on the initial risks of a project. Ormat Olkaria III is an example of how private and public sector risk sharing can lead to success for both parties and to additional rounds of financing that result in further expansion.

12 Chao, J. Harris, C. Hong, Seong. Rudnik, N. Park, J. Djalal, D. Delay, J. (2016). Private Participation in Infrastructure: Annual Update." World Bank Group, Public-Private Partnerships, Singapore: June 2017. Web.

13 Richter, A. (2016). Ormat starts operation of 29 MW expansion at Olkaria III complex in Kenya. ThinkGeoenergy. Obtained on 18-04-2018 from http://www.thinkgeoenergy.com/ormat-starts-operation-of-29-mw-expansion-at-olkaria-iii-plant-in-kenya/

14 Micale, V., Trabacchi, C. & Boni, L. (2015). Using Public Finance to Attract Private Investment in Geothermal: Olkaria III Case Study, Kenya. Climate Policy Initiative. Obtained on 18-04-2018 from https://climatepolicyinitiative.org/publication/using-public-finance-to-attract-private-investment-in-geothermal-olkaria-iii-case-study-kenya/

15 Gachiri, J. (2014). US energy firm records revenue growth from Olkaria plant. Markets. Business Daily. Obtained on 18-04-2018 from http://www.businessdailyafrica.com/-/539552/2224740/-/b5dcfp/-/index.html

16 Micale, V., Trabacchi, C. & Boni, L. (2015). Using Public Finance to Attract Private Investment in Geothermal: Olkaria III Case Study, Kenya. Climate Policy Initiative. Obtained on 18-04-2018 from https://climatepolicyinitiative.org/publication/using-public-finance-to-attract-private-investment-in-geothermal-olkaria-iii-case-study-kenya/

17 Micale, V., Trabacchi, C. & Boni, L. (2015). Using Public Finance to Attract Private Investment in Geothermal: Olkaria III Case Study, Kenya. Climate Policy Initiative. Obtained on 18-04-2018 from https://climatepolicyinitiative.org/publication/using-public-finance-to-attract-private-investment-in-geothermal-olkaria-iii-case-study-kenya/