Expert Insights

Overcoming Limited Resources

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Joined the Metal Mining Agency of Japan (MMAJ) in 1980 (JOGMEC was established in 2004 through the integration of Japan National Oil Corporation and MMAJ). Over the past 35 years he has been involved with development and innovation in mineral exploration projects, both domestically and abroad, and metal mining and exploration technologies (especially exploration technology). Past appointments include General Manager of the MMAJ Santiago Office in Chile and of the MMAJ Lima Office in Peru. In recent years, he has led a resource evaluation project regarding deep-sea mineral resources in both Japan's exclusive economic zone (EEZ) and the high seas, and also the development of mining technology for deep-sea mineral resources. Since 2014 he has been an Executive Director and Member of the Board of JOGMEC.

The 1972 report of the Club of Rome made the case that, because finite resources place a limit on growth, at some point growth must come to an end. While the question of what to do when non-renewable resources such as fossil fuels run out has come up again and again since the two oil shocks in the 1970s, the theory of peak oil that has circulated widely in recent years has been dampened by the shale revolution in which technical innovation has enabled the development of unconventional resources. Similarly, for all that metals can be recycled, the quantity of underground mineral resources is finite and overcoming limited resources requires ongoing cost reductions achieved through technical innovation.

Using as an example the South American nation of Chile, where one-third of the world's copper is produced, a series of large open-pit copper mines have been developed since the 1990s, and extensive use has been made of the solvent extraction and electrowinning (SX-EW) technique, which produces copper cathode directly from ore by spraying sulfuric acid over the piled ore to dissolve it (heap leaching), separating copper ion from others (solvent extraction) and then using an electrochemical process to obtain the metal (electrowinning). Recently, bioleaching has been applicable to take advantage of the ability of bacteria to dissolve ores that would otherwise be difficult to dissolve. Unfortunately, as more copper ore is mined, production conditions become progressively more difficult. The depth of exploitable ore gets deeper, ore grade gets lower, mine developments are located more remotely, the level of impurities in the ore rises, and so on. Because the most exploitable deposits are mined first, it is self-evident that exploration, development, and production cost will all rise over time. In Chile, meanwhile, obtaining water for use in mines places them in competition with other industries, and fulfilling the rapidly growing demand for electric power presents a difficult balancing act. The only way to overcome these various problems is through technological innovation. Mine sites present a large number of technical challenges (needs).

On a different note, once every two years Chile hosts EXPOMIN, a large trade show for the mining industry. With regard to construction machinery, although Japanese manufacturers can sometimes be found at the world's mining industry trade shows, unfortunately it is rare to see Japanese products at such events. At the oil and gas division of Japan Oil, Gas and Metals National Corporation, we have established a technical solutions project that seeks to utilize the advanced technologies of Japanese companies to solve the technical challenges facing such organizations as the state-run oil companies of oil-producing nations. Our aims are both to help create new business opportunities and to strengthen relationships with oil-producing nations. In the case of metals, meanwhile, because most production companies are privately run, even in emerging nations, an approach based on resource diplomacy often presents difficulties. Nevertheless, given the advanced technical capabilities of Japanese companies, I believe that even companies that have not been involved with the mining industry in the past have the potential to make major contributions to resolving the technical challenges that mine sites face. Especially now, with the depression of metal prices, I see scope for Japanese companies to take on the task of overcoming these various technical challenges. This, I believe, is how we can overcome the "The Limits to Growth" resulting from limited mineral resources.