

Critical Minerals, the Petroleum Geoscientist and the Wider Application of Hydrocarbon Exploration and Development Techniques and Business Practices

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Abstract

Established in 2019, the purpose of the Critical Minerals Committee is to facilitate the engagement of AAPG members with the current and emerging technologies for exploration, resource modelling, economics and extraction of critical energy minerals. The committee defines a critical mineral as a naturally occurring and extractable-from-rock commodity (exclusive of petroleum and uranium), that is vital to current and emerging energy technology, and at the same time, limited in supply by current or forecast requirement. Critical minerals and elements include REE, PGM, Lithium, Graphite, Manganese and Helium. Critical minerals are typically sourced by mining and processed by extractive metallurgy, as either primary or co/by product, overwhelmingly the domain of the established hard rock mining industry which uses systems and processes for the most part unfamiliar to geoscientists of the oil and gas business. Emerging energy technology demand, be it storage or generation from renewable sources, such as wind, tidal or solar is expected to provide unprecedented demand for critical minerals. As with all disruptive technology, there will be winners and losers and the scale of the disruption is impossible to predict with any certainty. Nonetheless, the growth of renewable energy production represents both a potential threat and an opportunity to the fossil fuel energy business. The threat is centred upon loss of energy market share and, in the extreme, the view held by some influencers and decision makers that renewables are environmentally beneficial, unlike fossil fuels and alarmingly, the

potential for governments to restrict or outlaw fossil fuel production. Further threats to business viability are developing from the incidence of intervention by single-purpose activist shareholder groups. The opportunity for the oil and gas business is centred on the potential to enter the critical mineral market by application of its geoscientists expertise and the application of exploration technology and workflows into critical minerals and consideration of the objective critical scientific and commercial basis for thinking about the future of the oil and gas business, which still has a large part to play in delivering dramatic quality of life enhancements to developing nations populations. This paper discusses critical minerals for which there already exists petroleum geoscience application skills and Play Based Exploration is already apparent; such as Lithium, Graphite, Manganese and Helium and some considerations for other critical minerals.