

Rare Earth Minerals are the new global battlefield

OUTLINE

1- Introduction

Rare Earth Minerals are chemical elements that exhibit unique magnetic and conductive properties. The modern life is overdependent on REMs due to which there is geopolitical competition between world powers to control the supply chains of REMs.

2- What are Rare Earth Minerals and why it is becoming the new global battlefield?

3- Reasons behind Rare Earth Minerals becoming the new global battlefield.

3.1- Overly dominance of China

a- China controls the supply chains of rare earth minerals

(China produces more than 90% of the world rare earth magnets)

b. "Big Six" supersized, state owned firms of REMs
(In 2021, Beijing consolidated more than 40 rare earth firms into 6 supersized firms to control and strengthen China's monopoly)

2 3.2 US overly dependent on China's rare earth minerals supply chain

a) Military dependence of US on China's supply chains
(REM used in F-35 fighter jets, submarines)

~~1.1 - insufficient production of REMs~~

b) Insufficient production of rare earth minerals

(Only 12.4% production of REM in USA)

3.3 - Excessively used in daily life

a) Significant for transition from fossil fuels to clean energy.
(Rare earth minerals are used in solar panels)

b) Rare Earth Minerals are used in biotechnology

1) Rare Earth Minerals are crucial for hardware of AI.
(Use of "gadolinium" for heat control)

4- What are the implications for the world due to geopolitical competition over REM's supply chains?

4.1- US under Trump's administration to counter the dominance of China over REM's supply chains

a) fasttrack domestic production of critical minerals
(invoked Defense Production Act)

b) Increased spending in REM's projects
(rise in federal spending funding 1.2b reserved for rare earth emergencies)

4.2 - More countries joining the race and signing deals

a) Saudi Arabia and UAE forming partnerships with key mineral rich countries

b) Critical Mineral Deals between US and Australia, US and Ukraine
(Ukraine Mineral Deal)

4.3 - More climate risk & damage to environment

a) China shifted the whole city away from mining site

b) Contamination of water, soil and air due to REM mining.

4.4 Weaponisation of Rare earth minerals by China

a) China halted rare earth exports to Japan & USA

5 4. Misadventures can be averted through diplomatic channels (Recent trade talks between USA & China)

6 Conclusion

In 1992, Deng Xiaoping said "The Middle East has oil and China has rare earths". He predicted the importance of rare earth minerals in 21st century and their excessive use in modern daily life. With excessive modernisation of world and over-dependency on modern tools and gadgets like smartphones, earphones, solar panels, which are in return depend on REMs due to which REMs have become a new global battlefield and there are numerous reasons behind it. Starting from the hegemony of China over REM's supply chains, as a major producer of rare earth minerals through Big Six firms of REMs. Due to China's hegemony USA is overdependent on China for critical minerals supply. Furthermore USA's own production of REMs is insufficient. To counter the China's dominance more countries are joining the race and signing deals. USA is increasing its spendings and signing deals with other countries. Middle East countries are forming partnerships with rich countries. To counter the other ^{mineral} countries efforts and maintain its monopoly China is using rare earth minerals as a weapon by restricting its supply to other countries. With the geopolitical tension going over

environment is getting damaged due to mining and refining of rare earth minerals. However in era of globalisation where states are interdependent on each other, misadventures can be averted through diplomatic talks. While for the environment, more effective waste dumping methods should be introduced. Rare earth elements are have unique magnetic and conductive properties. The modern life is overly dependent on REMs due to which there is geopolitical competition between world powers over the supply chains of REMs. This geopolitical tension is becoming the new global battlefield over rare earth minerals.

Rare earth minerals are not so rare, they are present everywhere in the world. However due to low concentration they are not suitable for mining. Secondly the mining process of REMs is very costly which doesn't justify the mining of low-concentration REMs. There are 17 rare earth minerals in the periodic table who have properties high electrical conductivity, magnetic strength and heat resistance. They are used in daily life gadgets like refrigerators, smartphones, flat screens, airpods, electric cars, in health care. Furthermore and

they are crucial for defence weapons like fighter jets and submarines. They are present in abundance and in high concentration in China, USA, Brazil, Australia, Vietnam and India. Due to their excessive use and over dependence of modern life on REMs, these rare earth minerals are becoming the new global battlefield.

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3.1- China is overly dominating the supply chains of rare earth minerals. China controls the supply chains of REMs through trade. It is the world largest producer and exporter of REMs. According to US geological survey of 2020 China controls the 10% of global rare earth production and 90% of refining capacity. Those countries who produce the rare earth, send it to China for refining because they don't have the capacity or infrastructure to refine the REMs. China dominated the supply chains through aggressive and sustained investments in numerous global mining sites. Low labor costs gave the Beijing advantage. Furthermore, China has complete supply chain which includes mining and extraction, processing and refining, manufacturing of components and lastly export of finished products. This control over supply chain gives China an

leverage over other countries.

4.1 As USA is overly dependent on China for rare earth minerals, it is trying to overcome the dependency. USA depends on China's REMs supply chains for its military aircrafts and submarines, Tesla electric cars and smartphones, clean energy and biotechnology. The Trump's administration is striving hard to counter Beijing's dominance by increasing its fundings and spending in mines. Washington has evoked the Defence Production Act, a cold war era law to fast-track the domestic production for critical minerals for national security reasons. This evoking of the Defence Production Act, Washington is very well known of its vulnerability and the strong hold of China over supply chains of REMs. The Trump's administration is trying to manufacture its own supply chains of rare earth which can fulfill its demands. To minimize the hegemony of China over REMs production, USA is trying to construct its own supply chains of rare earth.