



# WORLD SUSTAINABLE DEVELOPMENT SUMMIT 2023

MAINSTREAMING SUSTAINABLE DEVELOPMENT  
AND CLIMATE RESILIENCE FOR COLLECTIVE ACTION

February 22-24, 2023  
New Delhi



**Date:** Thursday, February 23, 2023

**Time:** 11:30 AM – 1:00 PM Indian Standard Time (IST)

**Venue:** India Habitat Centre, Lodhi Road New Delhi 110003

## **Critical Minerals and Materials: Managing Supply Chain Constraints**

During the 26th session of the Conference of Parties, India committed to meeting half of its electricity requirements from renewable sources by 2030 compared to a quarter today, reducing the economy's carbon intensity to less than 45% cent in 2030 compared to 2005 levels, and achieving the net-zero emissions target by 2070. Achieving these goals would require a sharp ramp-up in the deployment of green technologies, including solar panels, wind turbines, and electric vehicles.

### **Rare Earth Minerals and Energy Transition**

The rare earths are of a group of 17 chemical elements, several of which are critical for the energy transition. Neodymium, praseodymium, dysprosium and terbium are key to the production of the permanent magnets used in electric vehicles (EVs) and wind turbines. Neodymium is the most important in volume terms. Yttrium and scandium are used for

certain types of hydrogen electrolysers, while europium, terbium and yttrium are used in energy-efficient fluorescent lighting.

- **Wind Turbine:** Research suggests that it will not be possible to meet the substantial increase in demand driven by the 2050 global wind power targets unless rare earth minerals production rises 11 to 26 times over present levels.
- **Electric Vehicles:** Some 29-35% of all rare earth materials were used for permanent magnets, less than 15% of which went into EVs. The supply of permanent magnet materials will need to increase substantially to meet the demand of a growing EV industry.

Scaling up the manufacturing of the technologies, including solar panels, wind turbines, batteries and electric vehicles will result in significant demand for and dependency on the supply of a range of minerals for the foreseeable future. These 'transition-critical minerals', especially rare earth minerals, are required to manufacture the green technologies needed for the transition to a low-carbon economy.

The mineral dependencies of green technologies, however, should not undermine the benefits of clean energy transitions. Stronger laws and policies are vital to addressing the environmental and social impacts of mining and processing. India is, for instance, a member of The Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development (IGF) that supports the advancement of good mining governance. Minerals, in comparison to fossil fuels, have the potential of recovery and recycling which is also key to supply chain resilience and sustainability. With efficient and sustainable sourcing, mineral-intensive clean technologies have far more climate, energy security and environmental benefits than a fossil-fuel economy requiring continuous supply of resources.

### **Current Scenario**

The production of critical minerals in the world today is largely monopolistic; there are risks in supply and there is a complex global supply chain in existence. These vital minerals are prone to supply problems due to the imperative nature of their application and rarity. Usually, several important minerals co-occur and need to be separated using laborious chemical procedures. Only a handful of companies or nations are involved in the critical materials market due to the complexity of the value chains, high processing investment costs, and tiny

marketplaces. Typically, one nation accounts for 50% of global production. 80 percent of all key material production, on average, is accounted for by the top three producers.

Critical minerals have highly complex global supply chains with a high degree of concentration in the extracting and processing countries resulting in largescale supply risks. For example, China produces 63% of the world's rare earth elements (REEs) and 45% of molybdenum. More than 70% of cobalt is mined in the Democratic Republic of Congo, with China having the majority ownership. Australia produces 55% of the world's lithium, with China as its major importer. South Africa mines 72% of the world's platinum output.

### **Global Concern**

Supply chain security for the minerals and materials needed in clean energy technologies has become a strategic issue, not only because it could affect the pace of clean energy technology deployment around the world but also because clean energy technology has become the latest frontier for the geoeconomic rivalries sparked by China's competitive manufacturing sector. An equally important factor is that China appears to recognize the strength of its critical minerals supply chains as geopolitical leverage. Additionally, Xi Jinping's call in April 2020 for the need to enhance global supply chains' dependence on China and "develop powerful retaliation and deterrence capabilities against supply cut-offs by foreign parties" has only fueled concerns amongst policymakers that heavy economic dependence on China for something as critical as rare earth minerals may translate into a vulnerability. A confluence of these developments has elevated the strategic importance of securing critical minerals supply chains, especially to a group of economies that are home to innovators and manufacturers.

### **Key Issues for India**

While India has always been dependent on imports for its energy security with more than 80 percent of crude oil and natural gas supplies coming from abroad, it has managed to maintain a reasonably diversified supply chain. However, the shift to green energy will potentially lead to a concentration of import dependence on China, which in 2019 accounted for 70 percent of imports for critical sectors. Additionally, refining operations are also highly concentrated, with China controlling 50-70 percent of the lithium and cobalt value chains, as well as almost 90 percent of rare-earth processing. India, however, unfortunately, lacks domestic endowments of some of these raw materials. A Department of Science and Technology

sponsored study in 2016 estimated that that risks to the supply of heavy rare earths, which are essential to most green technologies, will be at critical levels by 2030. Moreover, India has not invested sufficiently in technology and refining capacity for a number of these sectors. Supply chain disruptions in these materials can also impact the viability of industrial production, and while the government is incentivising companies to set up battery manufacturing plants, 40-50 percent of the raw materials will still have to be imported. Given that the central government is bullish towards establishing India as a self-sufficient manufacturing hub for global commodities, acquiring critical rare earth minerals is a key proponent of that ambition. Any interference in its supply can be catastrophic for India's ambitions.

Additionally, while in order to ensure mineral security of the nation and to attain self-reliance in the area of critical and strategic minerals, the Ministry of Mines has created a Joint Venture company namely Khanij Bidesh India Ltd (KABIL). Although an admirable effort the initiative is not enough. Apart from this in 2019 Australia signed a cooperation agreement with India, assuring that it will supply high quality and competitively priced critical minerals essential in the production of mobile phones, flat screen monitors, wind turbines, electric cars and solar panels.

### **Global Initiatives**

Countries such as Japan, USA, The European Union and China have invested heavily in building strategic largescale national initiatives around critical rare earth material and their access, making it a part of its national policy discourse. Further, in 2019 Quad members USA and Australia formalized their unofficial partnership to develop new critical mineral sources that include rare earth, cobalt, and tungsten. Additionally, the Inflation Reduction Act passed by the United States Government in 2022 has taken bold steps toward promoting domestic production of critical minerals for the energy transition. These provisions are intended not only to support a rapid energy transition, but also to lessen U.S. reliance on China and Russia, where geopolitical tensions are high.

## **Managing Supply Chain Constraints: Why Now?**

The breakdown in supply chain over the last few years due to the onslaught of the COVID-19 pandemic and the conflict between Russia and Ukraine have brought to light the need for radical upgradation and diversification of supply chains globally. A continual disruption across the value chain will not only enhance the risks associated with energy, manufacturing and consumption patterns, but will also potentially threaten India's ability to adopt and scale climate resilient products such as electric vehicles and li-on based batteries. Thus, risking the escalation of climate change-based disasters.

Minerals used in different low carbon technologies such as Aluminium, copper and nickel are all widely used in generating solar power, and have a range of other uses. Although, a largescale demand and alternative supply chain analysis of rare earth materials with respect to India is missing within the scholarly research, the demand for these elements, is likely to remain high over the next few decades, irrespective of the energy mix. While there are other uses too for resources which are still abundantly available, an element like Neodymium, in contrast, is used only in wind energy generation, but is a magnetic rare earth with a range of uses in electronic devices, including electric vehicles. Estimates suggest that the market for magnetic rare-earths will increase five-fold by 2030, with a supply shortfall of 48,000 tonnes for neodymium going forward.

Although rare earth minerals supply chain management was a burgeoning issue in 2010 at the G20 summit in South Korea, when China restricted their export to Japan, significant deliberations on the subject matter haven't been undertaken since. The G20 this year is well positioned to address this issue as one of its engagement group, 'Business20' has a taskforce on 'Inclusive Global Value Chain's for Resilient Global Trade and Investment' which is strategically focusing on the vulnerabilities and disruptions within the global supply chain. Since The Energy and Resources Institute (TERI) is a knowledge partner for the G20's Think20 engagement group, the deliberations garnered from this thematic track will directly feed into the conversation at the G20, impacting policy discourse at a global level.

## **Thematic Track Discussion**

In this thematic track we will deliberate upon the existing supply chain constraints for India, the security issues it presents, and how geopolitical blocks such as G20 can help stabilize the segments volatility.

### **Key Questions**

1. What role can G20 countries play in the diversification of supply chain for critical minerals and rare earth materials?
2. What kind of research endeavours must India undertake to significantly understand its exposure to the supply chain disruptions going forward?
3. What kind mutually beneficial collaborations can India forge to reduce its overall import dependency and exposure? Can this help in building alternative supply chains?
4. What kind of institutional mechanisms and tools can help bring about efficiency within the existing governance structure to deal with the matter at hand?

### **About the World Sustainable Development Summit (WSDS)**

The World Sustainable Development Summit (WSDS) is the annual flagship Track II initiative organized by The Energy and Resources Institute (TERI). Instituted in 2001, the Summit series has a legacy of over two decades for making 'sustainable development' a globally shared goal. The only independently convened international Summit on sustainable development and environment, based in the Global South, WSDS strives to provide long-term solutions for the benefit of global communities by assembling the world's most enlightened leaders and thinkers on a single platform. The 22nd edition of the annual flagship event is being held from 22-24 February 2023 in New Delhi. The Summit deliberations will focus on the umbrella theme: Mainstreaming Sustainable Development and Climate Resilience for Collective Action.