The Growing Risk of Greenflation – A Focus on Critical Minerals

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1 The Green Transition at a Glance

Greenflation is defined as the persistent increase in the average price level of goods and services in an economy over time, attributed to the transition to a more renewable-energy-based, low-carbon emission economy. Multitudes of factors contribute to the risk of this economic phenomenon, including the forecasted demand and supply of critical minerals. The International Energy Agency (IEA) defines critical minerals as materials with relatively low volumes (under 100 megatons a year), and supply vulnerability, unlike bulk materials that are relatively widespread and abundant. They include rare earth elements (REEs) and other metals such as copper, nickel, lithium, cobalt, silicon, etc.

The potential scenarios for a green transition serve as the foundation for examining the risk of greenflation credited to critical mineral markets. The Network for Greening the Financial System (NGFS) provides a range of scenarios, each showcasing a possible evolution of annual CO_2 emissions over time. One example is the ambitious Net Zero Emissions (NZE) scenario, which seeks to achieve 1.5°C global warming above pre-industrial levels and global net-zero energy sector CO_2 emissions by 2050.

Consequently, in the 'Energy Technology Perspectives 2023' report, the IEA underscores a significant increase in the supply of renewables to 2050. Wind and solar output alone would jump 13-fold and 23-fold, respectively, complemented by substantial increases in nuclear energy production. The total capacity additions of renewables quadruple from 2021 to 2030, from 300 GW in the former to 1200 GW in the latter. Outside the energy sector, the global production of electric vehicles (EVs) is set to increase 15-fold to 2050, among other sizeable growth in green technology output.

2 Critical Minerals Outlook – Supply Shortages and Rising Demand

In the aforementioned report, the IEA emphasises the considerable demand for critical minerals during the production of clean energy technologies. Shockingly, the organisation forecasts that the gap between the projected demand and supply of these materials in 2030 could exceed 25% for nickel and lithium, and almost 20% for copper. Figure 1 illustrates the anticipated change in demand for certain critical materials in the NZE scenario between 2021 and 2030.

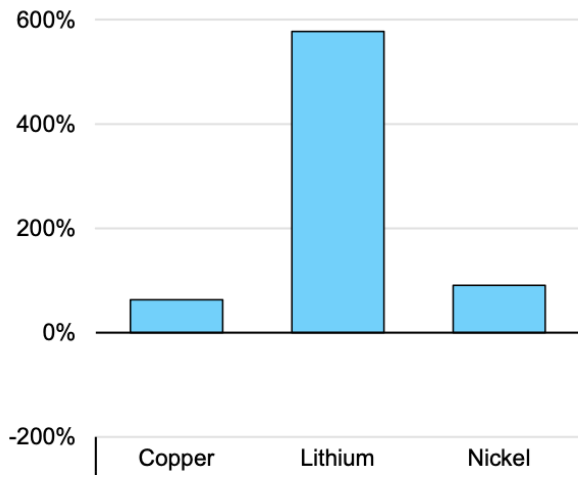

Figure 1: Change in global critical material demand, 2021-2030. From "Energy Technology Perspectives 2023" by the IEA, 2023, p. 161

While these climate-friendly technologies play a pivotal role in achieving sustainability goals, their current development is unfavourably mineral-intensive. For instance, a gas-fired plant requires nine times fewer mineral resources compared to an onshore wind plant with a similar capacity. Substandard durability would worsen this situation, as greater quantities of critical minerals would be required to manufacture and maintain technologies with shorter operational lifespans. Presently, the IEA warns governments of this issue:

> The operational performance of renewables such as solar PV and wind can drop after a decade, with most having a lifetime of around 25 years. In contrast, coal- and gas- fired power plants can operate for 30 to 40 years or more .... Some ICE [internal combustion engine] cars can be

used for several decades, especially second-hand ones that are sold to emerging economies at low prices, while EV batteries tend to degrade by up to 30% after 8 years. (IEA, 2023a, pp. 67–68)

3 Geographical Concentration of Processing

To complicate matters further, China dominates the processing of critical materials. According to the IEA, the country controls roughly 60-70% of global processing for lithium and cobalt, 30% for nickel, and close to 90% for REEs. On the one hand, China's revered low-cost production would benefit its trading partners, compared to more expensive processing elsewhere. On the other hand, this reality could threaten price stability in critical mineral markets by making their supply more vulnerable to geopolitical risks. Acknowledging China's deep participation in global value chains, the country's political stability is crucial to mitigating the risk of greenflation due to sudden surges in critical material prices.

4 A Recipe for Potential Greenflation

In the critical mineral context, what would primarily drive the risk of greenflation is relatively straightforward: excess demand and a shortage of supply. Unsurprisingly, a shortage of supply would lead those purchasing critical materials to bid up the prices of the specific commodities, rationing out those unwilling or unable to pay at higher prices. This would increase the production costs of the remaining firms that utilise these minerals as factor inputs. The direct effect would be an increase in the prices of finished goods produced with them. Indirectly, the increase in critical mineral prices could increase the costs of manufacturing renewable energy plants, potentially increasing energy prices in the short to medium term. Undoubtedly, this translates to higher marginal costs of production for firms, encouraging a lower level of output and upward pressure on prices. In other words, one could expect a degree of cost-push inflation to occur, involving a future fall in short-run aggregate supply and a higher average price level. An underlying assumption is that non-renewable options would be even more expensive due to factors beyond the scope of this article, such as carbon pricing.

Nevertheless, the risk of greenflation is, to an extent, correlated with the rate of the green transition; a faster transformation will likely be accompanied by increased upward price pressures. Unfortunately, the uncertainty following green transition scenarios only aggravates the situation due to conflicting expectations on future inflation, among a myriad of other factors. Unequivocally, the transition to a greener economy will not come without numerous economic costs, particularly in the context of dynamic critical mineral markets.

5 Bibliography

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