

Metals of the future: Commodities making the energy transition happen (Part one)

Published 8 May 2024

Mobeen Tahir

Director, Research

Key Takeaways

- Copper demand is expected to increase significantly as the world deploys more renewable energy and electric vehicles
- Nickel makes batteries more efficient and is also used to generate nuclear power
- Aluminium's conductivity and light weight make it a top choice for numerous applications, including high-power cables and hydrogen production
- Silver, the best electrical conductor in the world, has a valuable role to play in solar panels and electric vehicles.
- Tin is the glue that holds the energy transition together and it helps bind all electrical contacts
- Related Products [WisdomTree Energy Transition Metals](#) Find out more

There are 118 different known elements commonly illustrated in the periodic table and around 93 of them are metals¹. Everything we use in our daily lives either contains metals or has gone through a process involving metals to reach us. In clean technology, one common property makes metals particularly important – that they are very good conductors of heat and electricity.

Of course, there is considerable variation in terms of how abundant and important the metals are. For investors looking to invest in one of the most important megatrends of our time, the transition towards low-carbon sources of energy, then identifying the right metals matters.

This two-part blog series highlights the ten key commodities that make the energy transition possible. The blogs will offer a whistle-stop tour of why these metals are important in the energy transition with the aim of inspiring readers to further explore the fascinating world of energy transition metals.

How investors can access the opportunity

[WisdomTree Energy Transition Metals \(WENT\)](#) is a fully collateralised, UCITS-eligible Exchange-Traded Commodity (ETC) designed to provide investors with a total return exposure to a basket of ten energy transition metals futures contracts. The ETC is built in partnership with industry experts, Wood Mackenzie, and answers two key questions for investors: which commodities to pick and how to weight them. The

metal selection and weighting are informed by a forward-looking view on how important each metal is in the energy transition, subject to its investability.

Figure 1: WisdomTree Energy Transition Metals (WENT) 2024 target weights

1. Copper

Electrification is at the heart of the energy transition, which can only be made possible with copper. According to our energy transition industry expert partner, Wood Mackenzie, copper's annual demand is expected to rise from around 28 million tonnes in 2020 to over 68 million tonnes by 2050 – driven almost entirely by emerging sources of demand like electric vehicles (EVs), charging infrastructure, renewable energy, and energy storage systems².

According to the International Energy Agency (IEA), generating one megawatt (MW) of power from coal requires 1150 kilograms (kg) of copper. Generating the same amount of power from offshore wind requires 8000kg of copper. Similarly, an electric car can have 53.2kg of copper per vehicle compared to 22.3 kg for an internal combustion engine (ICE) car. For larger vehicles like electric buses, the numbers are significantly higher.

These are merely a few examples of how clean technologies will increase copper demand dramatically as the world ramps up its decarbonisation efforts.

2. Nickel

Today, stainless steel accounts for over two-thirds of nickel demand while batteries account for less than 10%³. Although not all nickel grades are suitable for batteries, batteries are expected to be the biggest source of demand growth for at least the next two decades. According to the Nickel Institute, "Nickel in batteries helps deliver higher energy density and greater storage capacity at a lower cost". Among the most dominant lithium-ion battery cathodes are NCA (nickel cobalt aluminium) and NMC (nickel manganese cobalt) chemistries. Within these mixes, the share of batteries with higher nickel percentages is expected to rise precisely for the reasons stated by the Nickel Institute.

According to the IEA, an electric car has nearly 40kg of nickel per vehicle compared to virtually nothing in a comparable ICE car. If nickel loadings keep rising, this could increase further. And even if solid-state batteries (which promise high energy efficiency, giving EVs longer ranges and short charging times) become mainstream, nickel is expected to remain relevant.

Another interesting avenue of nickel demand is nuclear power. The Nickel Institute states that nickel-containing heat and corrosion-resistant alloys play an important role in ensuring the integrity, durability, and long-term performance of nuclear power stations. They are used in the heat transfer, cooling systems and inside the reactor vessel. According to the IEA, generating one MW of power from nuclear requires 1297kg of nickel, the highest loading of nickel to generate power from the various sources of energy.

3. Aluminium

From wind and solar power to green hydrogen, and high-voltage cables to batteries, aluminium is fully integrated in the energy transition. In addition to being highly conductive and lightweight, aluminium is also corrosion-resistant, which makes it ideal for harsh outdoor conditions. According to the World Bank, aluminium accounts for more than 85% of the material used in solar power frames.

In batteries, aluminium's thermal conductivity prevents the battery from overheating or cooling down too much, improving the battery's performance and lifespan. In transmission and high-voltage cables, aluminium provides a superior conductivity-to-weight ratio compared to copper. In the production of green hydrogen, aluminium is used as a base plate metal. With a 360% increase in the deployment of hydrogen electrolyzers (the machine used to produce green hydrogen) in 2023 compared to 2022, this is another promising area of growth for metals like aluminium and platinum (more on that in part two)⁴. In heat pumps, which are quickly becoming a viable alternative to gas boilers for heating, heat exchangers are typically made with aluminium.

4. Silver

Silver forcefully makes its way among industrial metals in this list of energy transition commodities. Even as it stands, around 57% of silver's physical demand comes from industrial applications⁵. But solar power and EVs are expected to be the strongest growth areas for silver demand going forward.

A typical solar panel can contain as much as 20 grams of silver⁶. When light strikes the solar panel, a paste made from silver – considered to be the world's best conductor of electricity – helps carry the electrons that are set in motion, maximising the energy output of a solar cell. According to the IEA, there was an 85% annual increase in solar deployment worldwide in 2023, making it an exciting area of structural demand growth for silver.

In EVs, which also experienced a 35% increase in annual sales in 2023⁷, silver is used for its conductivity and corrosion resistance. In a car, all electrical connections are coated with silver. This not only applies to the electric engine, but also to features like power windows and seats, parking and braking assistance, infotainment systems and so forth.

5. Tin

Tin's primary industrial use is in making solder, a material used to create electrical connections. Therefore, tin is often referred to as the glue that holds the energy transition together. According to Wood Mackenzie, without tin, electrons don't flow, which means mobile phones don't work, EV batteries don't charge, and the Internet of Things ceases to exist.

Tin also has very specific uses in renewable energy. According to Fastmarkets, solar panels are formed of many individual solar cells, which are connected by a "solar ribbon" of copper wire coated in a layer of tin⁸.

EVs can require around 4kg of tin compared to an ICE vehicle, which requires just over 1kg. Although these are relatively smaller numbers compared to, say, copper, but for a much smaller commodity market, the multiplicative effect is still meaningful.

Closing word...

As evident from some of the highlights presented in this blog, the different metals have distinct roles to play in the energy transition. Indeed, each metal is influenced by its own set of demand and supply factors, which can be cyclical. And so, prices can fluctuate and diverge. A basket approach can give investors who are seeking long-term exposure to the energy transition megatrend diversification over the long run while capturing the broad opportunity set across the wide spectrum of investable metals.

This blog outlined the first five in our list of 10 metals. The discussion will continue in part two...

Source

1 LibreTexts, 2024.

2 Forecasts aligned to a 1.5-degree scenario.

3 Statista, 2024.

4 IEA Clean Energy Market Monitor, March 2024.

5 Metals Focus, March 2024.

7 International Energy Agency Clean Energy Market Monitor – March 2024.

8 Fastmarkets, April 2024.

Important Risks Related to this Article

IMPORTANT INFORMATION

Marketing communications issued in the European Economic Area (“EEA”): This document has been issued and approved by WisdomTree Ireland Limited, which is authorised and regulated by the Central Bank of Ireland. **Marketing communications issued in jurisdictions outside of the EEA:** This document has been issued and approved by WisdomTree UK Limited, which is authorised and regulated by the United Kingdom Financial Conduct Authority. WisdomTree Ireland Limited and WisdomTree UK Limited are each referred to as “WisdomTree” (as applicable). Our Conflicts of Interest Policy and Inventory are available on request. For professional clients only. Past performance is not a reliable indicator of future performance. Any historical performance included in this document may be based on back testing. Back testing is the process of evaluating an investment strategy by applying it to historical data to simulate what the performance of such strategy would have been. Back tested performance is purely hypothetical and is provided in this document solely for informational purposes. Back tested data does not represent actual performance and should not be interpreted as an indication of actual or future performance. The value of any investment may be affected by exchange rate movements. Any decision to invest should be based on the information contained in the appropriate prospectus and after seeking independent investment, tax and legal advice. These products may not be available in your market or suitable for you. The content of this document does not constitute investment advice nor an offer for sale nor a solicitation of an offer to buy any product or make any investment. An investment in exchange-traded products (“ETPs”) is dependent on the performance of the underlying index, less costs, but it is not expected to match that performance precisely. ETPs involve numerous risks including among others, general market risks relating to the relevant underlying index, credit risks on the provider of index swaps utilised in the ETP, exchange rate risks, interest rate risks, inflationary risks, liquidity risks and legal and regulatory risks. The information contained in this document is not, and under no circumstances is to be construed as, an advertisement or any other step in furtherance of a public offering of shares in the United States or any province or territory thereof, where none of the issuers or their products are authorised or registered for distribution and where no prospectus of any of the issuers has been filed with any securities commission or regulatory authority. No document or information in this document should be taken, transmitted or distributed (directly or indirectly) into the United States. None of the issuers, nor any securities issued by them, have been or will be registered under the United States Securities Act of 1933 or the Investment Company Act of 1940 or qualified under any applicable state securities statutes. This document may contain independent market commentary prepared by WisdomTree based on publicly available information. Although WisdomTree endeavours to ensure the accuracy of the content in this document, WisdomTree does not warrant or guarantee its accuracy or correctness. Any third party data providers used to source the information in this document make no warranties or representation of any kind relating to such data. Where WisdomTree has expressed its own opinions related to product or market activity, these views may change. Neither WisdomTree, nor any affiliate, nor any of their respective officers, directors, partners, or employees accepts any liability whatsoever for any direct or consequential loss arising from any use of this document or its contents. This document may contain forward looking statements including statements

regarding our belief or current expectations with regards to the performance of certain assets classes and/or sectors. Forward looking statements are subject to certain risks, uncertainties and assumptions. There can be no assurance that such statements will be accurate and actual results could differ materially from those anticipated in such statements. WisdomTree strongly recommends that you do not place undue reliance on these forward-looking statements. Issuer Disclaimer Wording – WisdomTree Multi Asset Issuer PLC WisdomTree Multi Asset Issuer PLC (the “Issuer”) issues products under a Prospectus (“WTMA Prospectus”) approved by the Central Bank of Ireland, drawn up in accordance with the Directive 2003/71/EC. The WTMA Prospectus has been passported to various European jurisdictions including the UK, Italy and Germany and is available on this document. For Investors in Switzerland – Qualified Investors This document constitutes an advertisement of the financial product(s) mentioned herein. In Switzerland, this communication is only targeted at Qualified Investors. The prospectus and the key investor information documents (KID) are available from WisdomTree’s website <https://www.wisdomtree.eu/en-ch/resource-library/prospectus-and-regulatory-reports> For Investors in Monaco This communication is only intended for duly registered banks and/or licensed portfolio management companies in Monaco. This communication must not be sent to the public in Monaco.