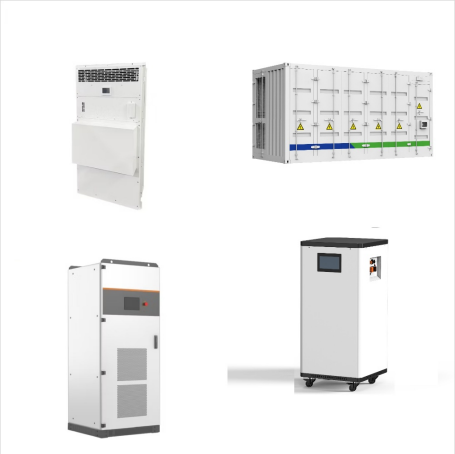
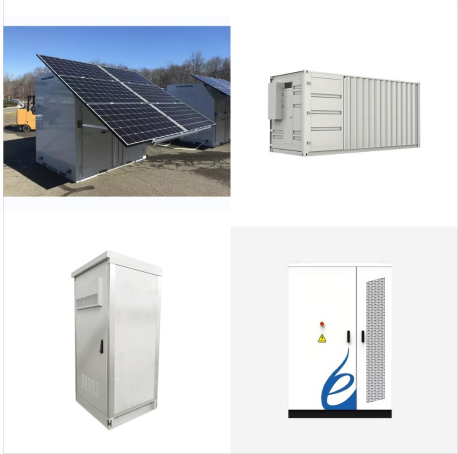
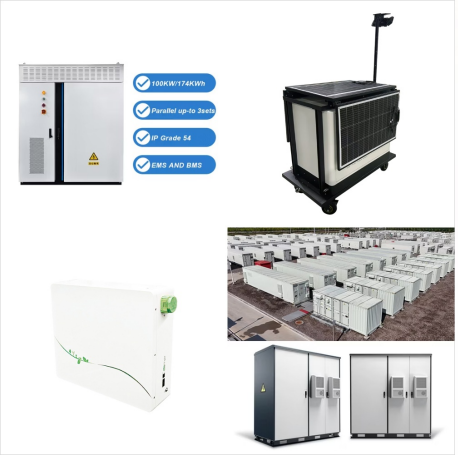


Renewable Energy Driving a Global Copper Crunch The U.S. was the fourth largest copper-producing nation in 2019, after Chile, Peru, and China. But analysts estimate global copper demand from wind, solar, EVs and battery applications will increase by 600%-

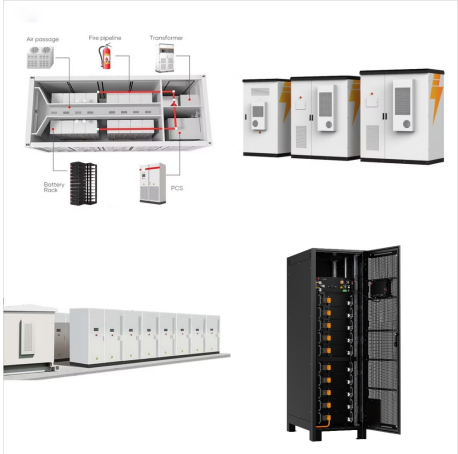


Renewable energy (or green energy) is energy from renewable natural resources that are replenished on a human timescale. Batteries, which are critical to enable storage of renewable energy, use large quantities of copper, nickel, aluminum and graphite. Demand for lithium is expected to grow 42-fold from 2020 to 2040.

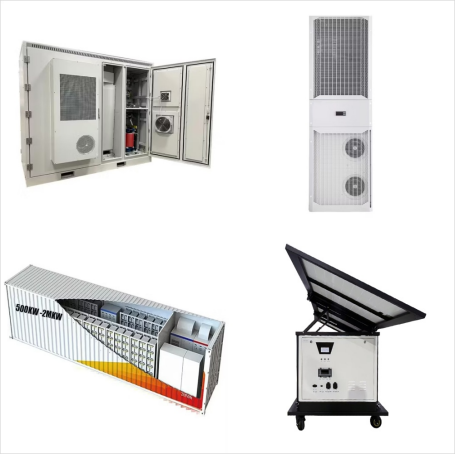


Powering the world with renewable energy will take a lot of raw materials. The good news is, when it comes to aluminum, steel, and rare-earth metals, Take copper, for example: the world has

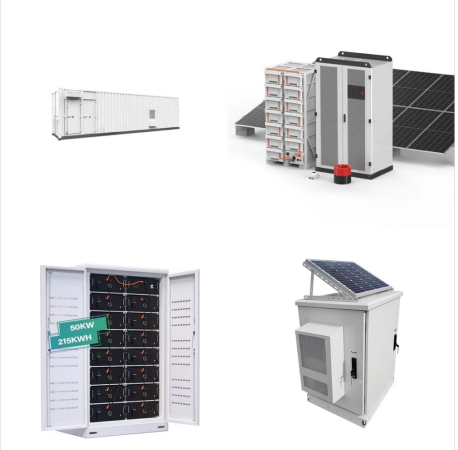
COPPER RENEWABLE ENERGY



Renewable energy comes from unlimited, naturally replenished resources, such as the sun, tides, and wind. Renewable energy can be used for electricity generation, space and water heating and cooling, and transportation. Non-renewable energy, in contrast, comes from finite sources, such as coal, natural gas, and oil.

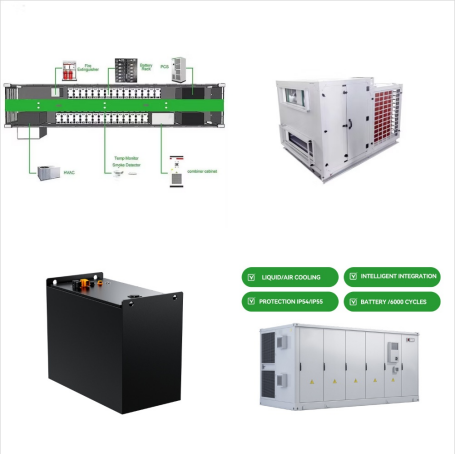


According to a 2021 report by Goldman Sachs, by its lowest estimates, renewable energy sources a?? like wind, battery and solar a?? will drive copper demand up nearly 600 per cent, or 5.4

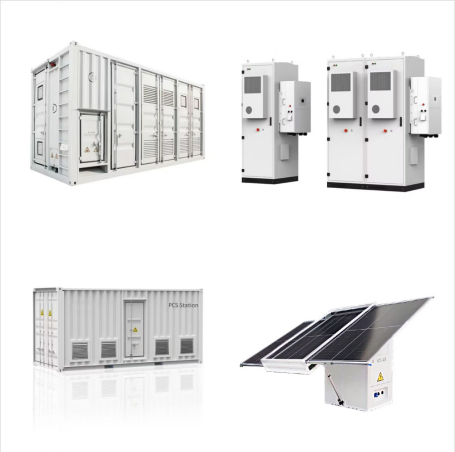


Copper-intensive low-carbon technologies Due to its multiple properties a?? thermal and electrical conductivity, corrosion resistance a?? copper has become an essential metal in our modern societies is widely employed in the manufacture of electric cables and wires, plumbing, electronic equipment (printed circuits, electronic chips), in the transport sector (braking a?|

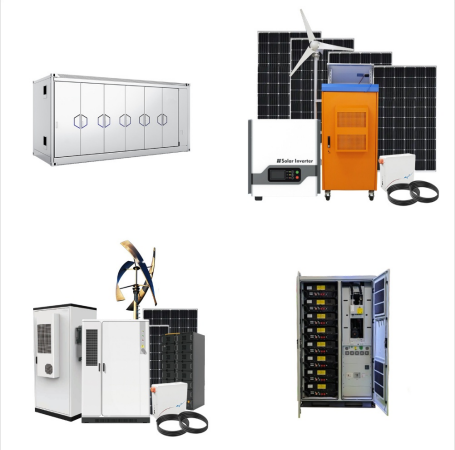
COPPER RENEWABLE ENERGY



It is projected that 262 GW of new solar installations between 2018 and 2027 in North America will require 1.9 billion lbs. of copper. Solar is the third-largest renewable energy source in the United States power sector. [Source: EIA] 4,700%: the increase in U.S. solar generation between 2008 and 2018. [Source: EIA]

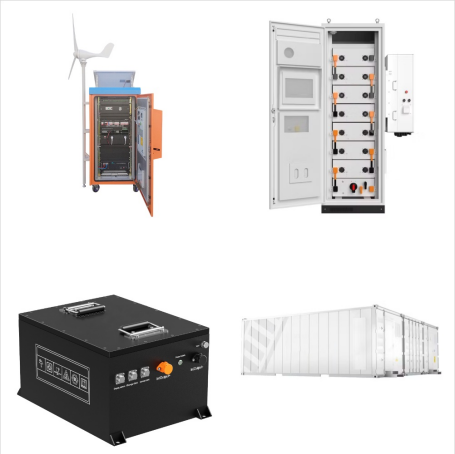


This study focuses on integrating renewable energy through a hybrid renewable energy system in a copper mining process in Chile. However, the proposed methodology and the conclusions obtained could be helpful for other mining processes and large-scale industries, which have the main characteristic of having a high and stable energy demand.

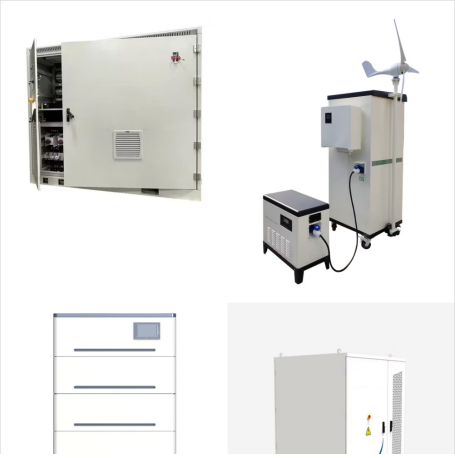


Matrix of metals and energy technologies explored in World Bank low-carbon future scenario study. World Bank 2017. Of course, these metals will not only be used for low-carbon technologies, but everything from smartphones to weaponry.. In his 2016 book The Elements of Power, David S Abraham argued that what he calls "rare metals" a?? those, such as cobalt and a?|

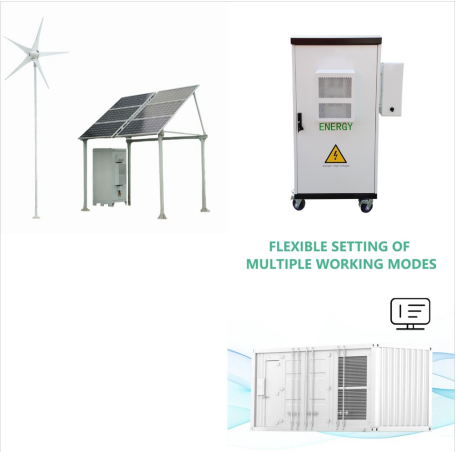
COPPER RENEWABLE ENERGY



DOE supports innovative research focused on overcoming the current technological and commercial barriers for copper indium gallium diselenide [Cu(In x Ga 1-x)Se 2], or CIGS, solar cells.A list of current projects, summary of the benefits, and discussion on the production and manufacturing of this solar technology are below.

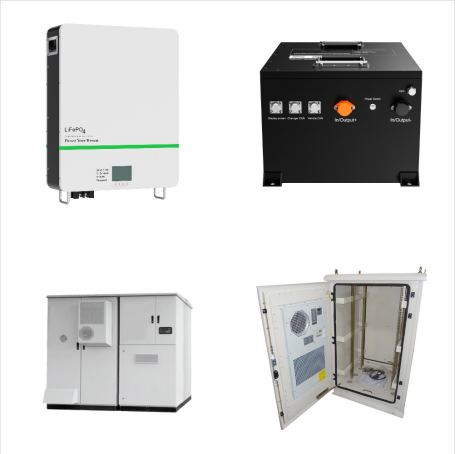


Globally, Chile is the No. 1 copper producer, and demand is likely to increase, as copper in "wind turbines, solar farms, and their transmission networks use[s] up to 12 times as much of the metal as nonrenewable energy systems." 3 Electric grids, electric cars, and car-charging stations, in addition to the post-pandemic economic recovery

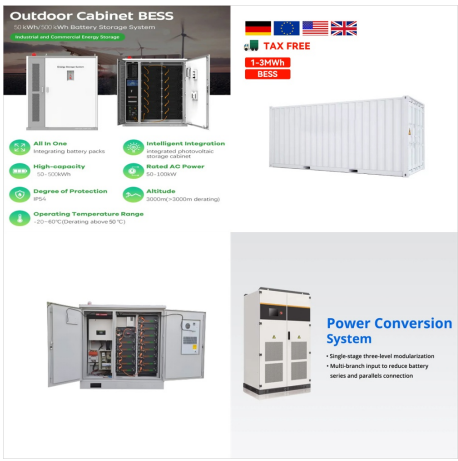


As the energy transition unfolds, we anticipate the roll-out of EVs to lift the transport sector's share of total copper demand from around 11% in 2021, to over 20% by 2040. 3 Copper is also needed for energy efficiency and conservation measures, such as smart grids, LED lighting, and heat pumps.

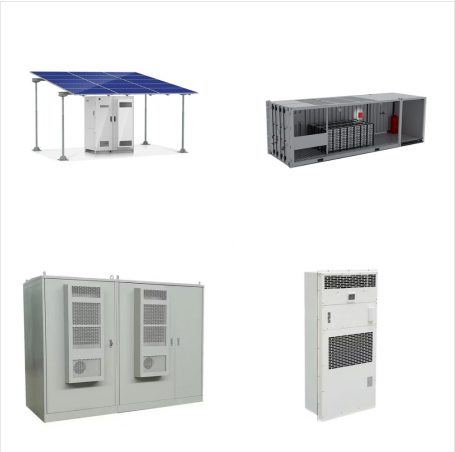
COPPER RENEWABLE ENERGY



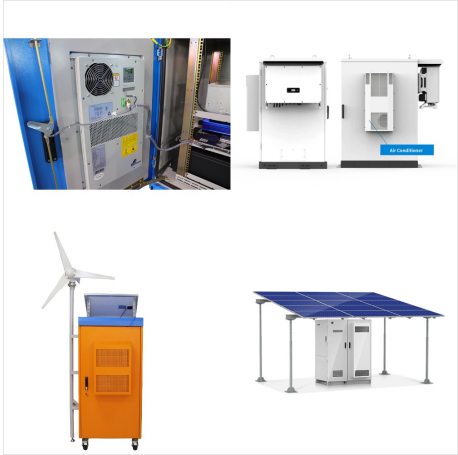
This report provides an outlook for demand and supply for key energy transition minerals including copper, lithium, nickel, cobalt, graphite and rare earth elements. Demand projections encompass both clean energy applications and other uses, focusing on the three IEA Scenarios a?? the Stated Policies Scenario (STEPS), the Announced Pledges



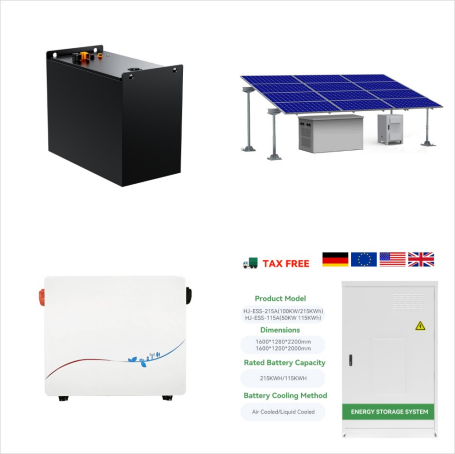
Projections from the International Energy Agency (IEA) suggest that by 2040 the demand for copper could more than double, while the demand for lithium could grow over 40 timesa??if, Renewable energy is energy from sources, like wind, solar, and hydropower, that we cannot run out of. Explainer.



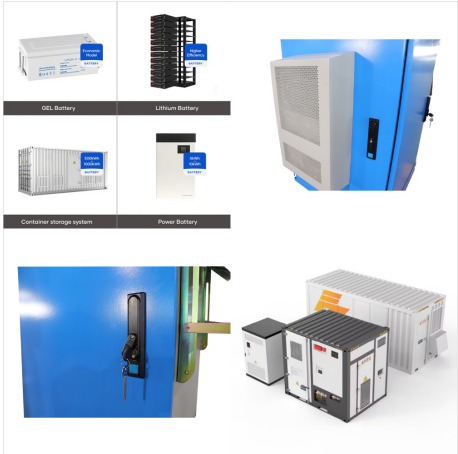
Copper usage averages up to five times more in renewable energy systems than in traditional power generation, such as fossil fuel and nuclear power plants. [144] Copper in renewable energy; Copper nanoparticle; Erosion corrosion of copper water tubes. Cold water pitting of copper tube; List of countries by copper production;



The results show that global final demand for copper could increase by a factor of 2.5 between 2015 and 2050, reaching 62 million metric tons, with approximately 4% of the increase coming from copper used in renewable energy-based power plants and 14% coming from electric vehicles.



Copper's superior electrical and thermal conductivities increase the energy efficiency of countless energy-driven systems that rely on electric motors and transformers. The same physical properties are vital in the collection and distribution of energy from solar, wind and other renewable sources.



Citation: Gielen, D. (2021), Critical minerals for the energy transition, International Renewable Energy Agency, Abu Dhabi. About IRENA The International Renewable Energy Agency (IRENA) serves as the principal platform for international co-operation, a centre of excellence, a repository of policy, technology, resource and financial knowledge, and a

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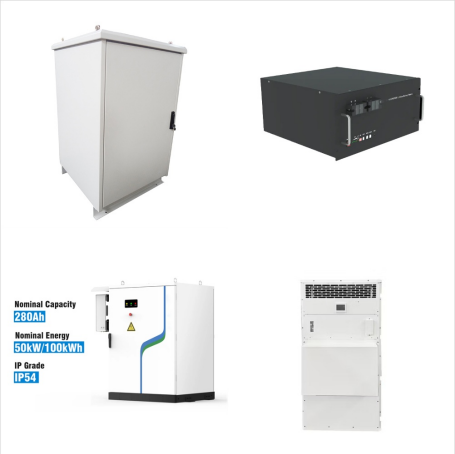
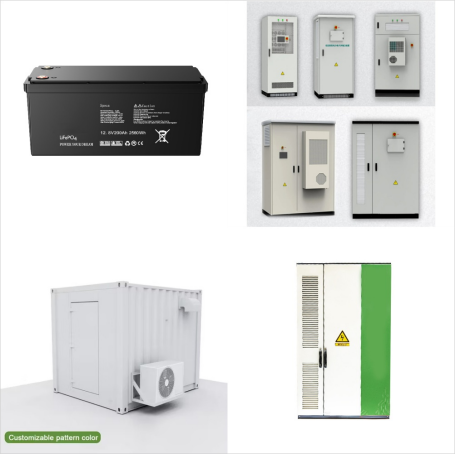
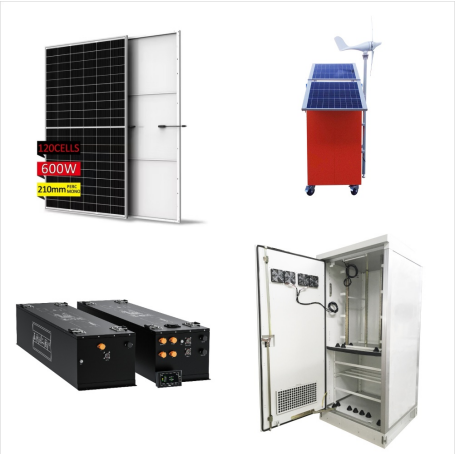


Copper production is a basic raw material industry that provides one of the key non-ferrous metals for infrastructure and buildings. It is also energy intensive as energy is used in the whole life cycle of copper production, including mining, beneficiation, smelting and refining, not only in the directly processes but also through the indirectly production of inputs, e.g. electricity a?|

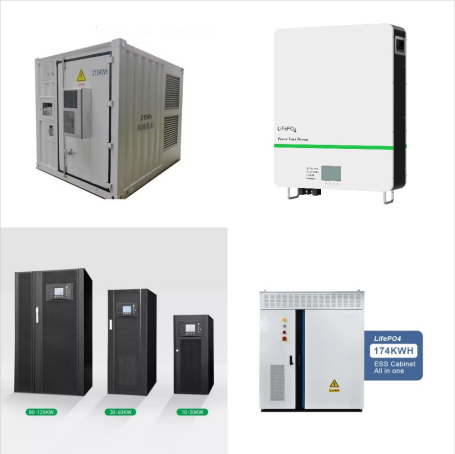


U.S. ENERGY STORAGE PROJECTS (announced and commissioned) Copper in Energy Storage Source: BloombergNEF Energy in America 2018 CABLING WIRING SWITCHES Copper wiring and cabling connect renewable power generation with energy storage devices while the copper in the switches of transformers help to deliver power at the right voltage.



The renewables sector will account for the strongest green copper demand growth over our forecast period, as it is 12 times more copper intensive than traditional energy systems.The renewable energy sector will account for an average 62% of annual green copper demand between 2021 and 2030 and approximately 7.9% of total copper demand by 2030, up a?|

COPPER RENEWABLE ENERGY



The future of renewable energy is clear. The future of renewable energy relies on essential resources. If the world is to stay within a 1.5oC budget, it will need to transition to renewable energy. This transition will rely on essential resources like the copper, nickel and iron ore produced by BHP.