



To achieve the rapid clean energy transition, there is an urgent need for the sustainable supply of energy-relevant critical minerals and rare earth elements. Valuable energy-critical metals such as platinum group metals (PGMs) and Ni occur in low concentrations in mafic and ultramafic ores with complex mineralogy. PGM concentration, for



One group of natural resources that may prove essential for the next generation of electric motors and turbines are the rare earth elements (REEs)???17 elements consisting of scandium, yttrium, and the 15 lanthanides (Institute of Rare Earths and Strategic Metals, n.d.).



There are 17 rare earth elements that are used in the production of high tech devices such as smart phones and computers, defense equipment such as radar systems and guided missiles, and energy technologies such as electric cars and wind turbines. While these elements are common in the earth's crust, they are found in tiny concentrations and are mixed ???



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 driver of action on the

Table 2: Rare earth content of selected source minerals (% of rare earth oxide) .. 22 Table 3: Rare



Rare earth elements (REEs) including fifteen lanthanides, yttrium and scandium are found in more than 250 minerals, worldwide. REEs are used in various high-tech applications across various industries, such as electrical and electronics, automotive, renewable energy, medical and defence.



Critical minerals are vital for renewable energy. We must learn to mine them responsibly Published: February 16, 2020 1:55pm EST For most western economies, rare earth elements are the most

# RARE EARTH MINERALS RENEWABLE ENERGY



Critical and rare earth minerals will underpin the clean energy transition. Our national leaders have signalled the importance of mining and refining critical minerals in Australia. Most importantly, we need them for renewable energy, particularly for our wind turbines, electric vehicles, and batteries ??? without them, we have little hope

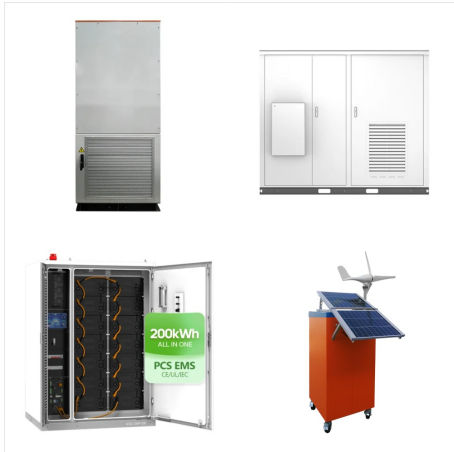


Demand for these minerals will grow quickly as clean energy transitions gather pace. This new World Energy Outlook Special Report provides the most comprehensive analysis to date of the complex links between these minerals and the prospects for a secure, rapid transformation of the energy sector.



New York, USA, 23 September 2024 ??? The World Economic Forum has today released a report exploring how to secure a sustainable, affordable and equitable supply of critical minerals globally spite the crucial importance of rare minerals and metals for various lower-carbon technologies, including those required for electric vehicles and solar panels, the report ???

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More than 20 energy transition metals (ETMs), including iron, copper, aluminium, nickel, lithium, cobalt, platinum, silver and rare earth metals, are predicted to face market pressure as the



Introduction Africa is emerging as a leading source for minerals used in the manufacture of batteries for electric vehicles and in other renewable energy applications. New graphite, lithium, and rare-earth mines have or could be opened in African countries from 2017 through 2026. Estimates of production capacities for graphite, lithium, and rare-earth mines for ???



Scott Morrison announced \$243 million in fresh grants for Australian projects that will source and refine critical minerals, including rare-earth metals. we need them for renewable energy

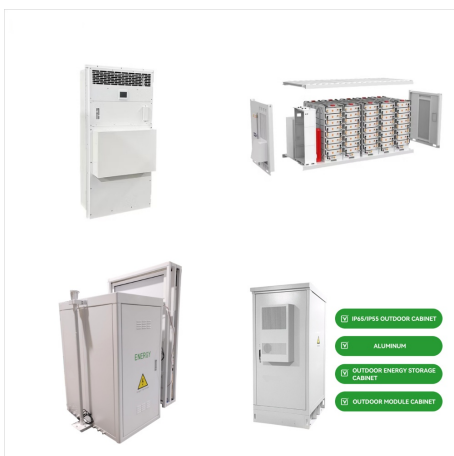
# RARE EARTH MINERALS RENEWABLE ENERGY



Therefore, an adequate and consistent supply of clean energy and rare earth minerals become fundamentally important for inclusive green growth with challenges lying in their best extraction and processing of REEs. These attached risks can be minimized by considering the following policy steps.



In this time of increased focus on renewable energy technologies, rare earth elements (REEs) are of critical importance. For example, neodymium (Nd) is a REE used in the generator and motor magnets of wind turbines and electric vehicles. Reliance on REE imports puts the U.S. at high risk for supply disruption.



Rare earth elements are in your smartphone, electric vehicles and used widely in renewable energy technology - in fact, they aren't very rare at all. For media. so they've spent the endless hours required to learn how to extract the rare earth elements from minerals. Additionally, they maintain industries which utilise the extracted



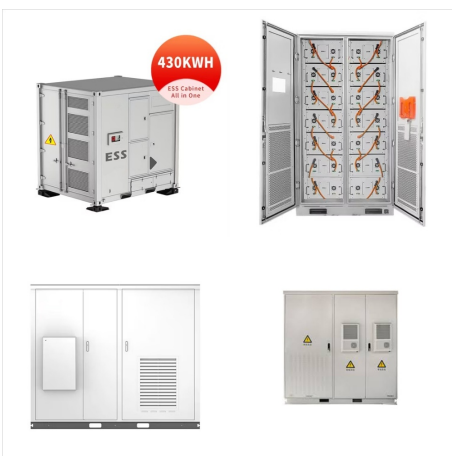
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The DOE Office of Energy Efficiency and Renewable Energy (EERE) Advanced Manufacturing Office (AMO) partners with industry, small business, universities, and other stakeholders to identify and invest in focuses on developing technologies for the recovery of rare earth elements and critical minerals from coal and coal-based resources. 7



Countries and companies have set ambitious renewable energy targets, with demand for critical minerals in the energy sector projected to increase six-fold by 2040. To avoid over-dependency on a handful of supplier countries and to achieve ambitious climate targets, there is a need for individual countries to revisit their mining policies and for global ???

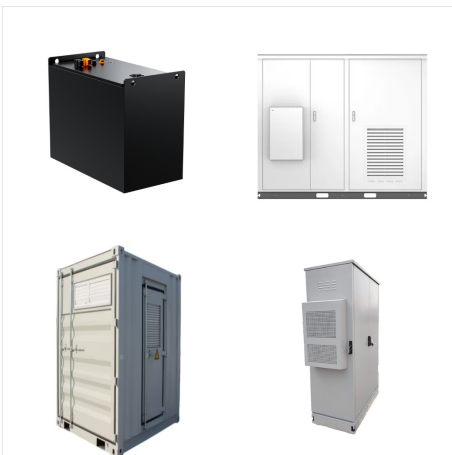


The supply chains for critical and rare minerals are vulnerable to political and economic disruptions that could hamper the global shift to a renewable energy future. copper, uranium, gold, and so-called rare earth elements (REEs) ??? are prized for their electronic and magnetic properties and play a crucial role in the production of modern

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On September 19, the U.S. Department of Energy (DOE) today announced up to \$156 million in funding from President Biden's Bipartisan Infrastructure Law for a first-of-a-kind facility to extract and separate rare earth elements (REE) and critical



India's rare earths production is far below its potential, considering the nation holds almost 35 percent of the world's total beach sand mineral deposits, which are significant sources of



Renewable energy is necessary to achieve the United Nations sustainable development goals (SDGs), such as affordable and clean energy (SDG 7), sustainable cities and communities (SDG 11), and responsible consumption and production (SDG 12) (United Nations, 2015). Many major industrialised countries have committed to becoming carbon neutral by 2050 and have set ???



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



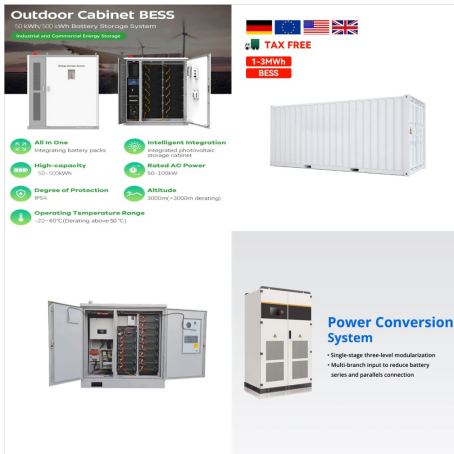
The first section provides an overview of critical minerals and renewable energy technologies. The essay then examines the nature of demand for renewable energy, the increasing monopolization and concentration of supply chains of rare earths, and the subsequent impact of all these developments on the global efforts toward climate change



Although all rare earth minerals are generally open-pit mined, energy requirement for crushing and grinding varies depending on (i) their hardness and the gangue minerals associated and (ii) the chemical form that they extract (Peir? and M?ndez, 2013). In the production stage, the manufacturing of permanent magnets containing REEs is analyzed



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Rare earth oxides of gadolinium, praseodymium, cerium, samarium, lanthanum, and neodymium. Photo courtesy of USDA ARS. Rare earth elements (REEs), which comprise of only 17 elements from the entire periodic table, play a critical role to our national security, energy independence, environmental future, and economic growth.



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 the minerals are there. The problem is that

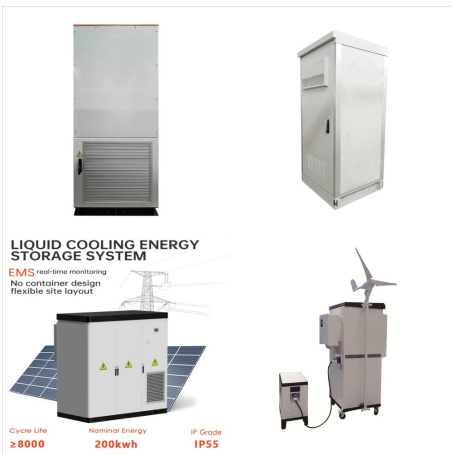


to 2019, more than 95% of Costa Rica's electricity was generated from renewable energy sources (Rodriguez 2019). And it isn't just states that are driving this shift; consumer preferences and the private sector are also fuelling this change. Similarly, demand for minerals like cobalt, lithium and rare earths Footnote 1 is

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These include lithium used in the batteries that run EVs, rare earth minerals in the magnets that allow wind turbines to make electricity. The volume of fossil fuels we mine today dwarfs the amount of clean energy minerals the world will need in the future. Renewable energy is energy from sources, like wind, solar, and hydropower, that



If the world is to move away from fossil fuels, we will need to extract far more rare minerals, to power renewable energy sources such as wind turbines and solar plants. However, energy experts point out that mining these minerals can be a dirty process, ravaging the environment, and leading to human rights abuses.