AN OPEN-SOURCE LIFE CYCLE ANALYSIS TOOL FOR RARE EARTH PRODUCTS CRITICAL TO THE CLEAN-TECH INDUSTRY

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Praneet has a background in mechanical and energy engineering, with research projects on renewable energy project implementation and life cycle analysis. As an interdisciplinary engineer, his interactions with people from different disciplines and cultures has shaped his perspective on solving complex problems.

While understanding various drivers for sustainability projects, his aim is to reduce under-utilization of resources and avoid wasted potential. To enhance his knowledge on renewable energy further, he obtained a certification for "Photovoltaic Site Assessor" from the Midwest Renewable Energy Association (MREA). He hopes to apply his knowledge and experience to develop and execute energy and sustainability strategies.

Abstract:

The clean-energy industry has been expanding drastically over the past decade because of economically scalable technology and favorable policies. Furthermore, governments and industries are now becoming conscientious of the adverse environmental impacts of blind wealth and economic growth. Rare earth elements, with unique chemical and physical properties have played a key role in this boom by improving the efficacy of certain clean-tech products.

However, its benefits are undercut by the drastic environmental impacts on the areas surrounding the mining and processing sites. An easily understandable and open-source Excel based package is created to calculate and model the environmental impacts of rare earth compounds and products. The detailed life cycle analysis can help researchers or decision makers identify environmental hotspots and judge the efficacy of potential improvements in the production process.

A cradle-to-gate model of rare earth compounds and its products is created using two source deposits in China – Bayan Obo mines and South China clays. Extensively using industry reports and academic papers, a detailed material inventory for each production process is created, some of which have never been studied before.