Global sulphur shortage threatens food security and advancement of green technology, scientists warn

A shortage of sulphuric acid could hamper the advancement of green technologies and threaten global food security, scientists have warned.

Sulphuric acid is a vital chemical in modern industry as it is required for the production of phosphorous fertilisers and for extracting rare metals from ores such as cobalt and nickel, which are used in high-performance lithium-ion batteries.

However, researchers at University College London (UCL) said demand for sulphuric acid is set to rise from 246 to 400 million metric tonnes by 2040.

More than 80% of the global sulphur supply currently comes from the desulphurisation of crude oil and natural gas to reduce sulphur dioxide gas emissions that cause acid rain.

However experts warned more intensive agriculture and the world moving away from fossil fuels in order to deal with climate change will significantly reduce the production of fossil fuels and subsequently the supply of sulphur.

The researchers estimated a shortfall in annual supply of between 100 and 320 million metric tonnes, or between 40 and 130% of current supply, depending on how quickly decarbonisation occurs.

Professor Mark Maslin, lead author of the study, said: “What we’re predicting is that as supplies of this cheap, plentiful, and easily accessible form of sulphur dry up, demand may be

met by a massive increase in direct mining of elemental sulphur.

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“This, by contrast, will be dirty, toxic, destructive, and expensive”

The researchers estimated three sulphuric acid demand scenarios from 2021 to 2040 based on historic and forecast

demand, with annual growth rates ranging from 1.8 to 2.4%.

They suggested several ways to meet the demand for sulphur, including recycling phosphorous in waste water for use in the fertiliser industry, increasing the recycling of li-ion batteries or by using lower energy capacity to weight ratio batteries, as these require less sulphur in their production.

“Research is urgently needed to develop low-cost, low environmental impact methods of extracting large quantities of elemental sulphur from the abundant deposits of sulphate minerals in the Earth’s crust,” Prof Maslin added.

“The international community should consider supporting and regulating sulphur mining to minimize the impacts of the transition and also to avoid cheap unethical production from distorting the market.”

The researchers also questioned whether it would make economic sense to invest in alternative sulphur production methods, especially because it is not currently possible to predict how quickly the supply of sulphur as a waste product from oil and gas desulphurisation will decrease as decarbonisation of the global economy is only just beginning.

Study co-author Dr Simon Day, from the UCL’s Institute for Risk & Disaster Reduction, said: “Our concern is that the dwindling supply could lead to a transition period when green tech outbids the fertiliser industry for the limited more expensive sulfur supply, creating an issue with food production particularly in developing countries.”

The study is published in The Geographical Journal.