Rare Earth Elements

Policy Position Statement

Key message:

Rare earth elements are metals that are used for a variety of purposes, some of which provide clear benefits to humanity and the environment,. However, there are potential public health risks associated with rare earth element extraction and processing, particularly in relation to radioactivity. Rare earth elements coexist with radioactive minerals such as uranium and thorium.

Rare earth element extraction and processing may result in radioactive exposures and radioactive waste generation. Rare earth element extraction and production can also leave a large environmental footprint through resource and pollution intensive processes, which need to be monitored.[1] Tangible actions designed to mitigate these risks are required.

Key policy positions:

1. Attempts at reducing, reusing, and recycling existing rare earth elements should be made, irrespective of further extraction.
2. Any rare earth element extraction operation in Australia or using Australia's resources should only take place under strict environmental guidelines recognizing the potential long-term risks of environmental, worker, and community exposures to radioactive materials and other minerals or chemicals involved in or produced by REE extraction and processing.
3. Similarly, Australian Government and industry should advocate for the above principles internationally, regardless of location or source of minerals.

Audience: Australian, state, and territory governments, policy makers, and program managers of industry involved in the process of REE

Responsibility: PHAA Ecology and Environment Special Interest Group

Date adopted: 23 September 2021

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PHAA affirms the following principles:

1. Rare earth elements (REEs) can provide benefits to society, however, these need to be weighed against their adverse impacts.

PHAA notes the following evidence:

2. REEs are a group of seventeen distinct metals. They are: lanthanum, cerium, praseodymium, neodymium, promethium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, lutetium, yttrium, and scandium.[2]

3. One of the main uses of REEs is in chemical catalysts (75% of use in the USA), particularly for motor vehicles.[3] They are used in renewable technologies, such as some solar panels and magnets for some wind turbines, devices such as illuminated screens on electronic devices, computer memory hardware, DVDs, mobile phones, rechargeable batteries, fluorescent lighting, phosphors, and as chemical catalysts and polishing compounds. They are also used in some medical equipment and for military purposes such as night-vision goggles, precision-guided weapons, communications equipment, and global positioning system equipment.[3]

4. The demand for rare earth elements is increasing rapidly,[2] particularly in renewable energy technologies, medical technology, electronics, and electric vehicles.

5. Currently, much of the world's REEs come from mines in China (72%)[4], but Canada, the United States of America, Vietnam, and Australia also contribute.[3-5] Australia is currently the second largest producer in the world (11%)[4], and there may be mounting pressure on Australia (along with other countries) to supply increasing amounts of REEs due to reduced exports from China.[6]

6. As of December 2018, Australia has two operational REE mines: one at Mt Weld, and a pilot mine in Browns Range, both in Western Australia.[5] Several other potentially viable deposits in Australia have been identified. The Nolan's Project in the Northern Territory had an environmental impact assessment completed in January 2018, which concluded that the project "could be managed to avoid unacceptable environmental impacts and risks", but that the "proposal comes with long term environmental risks that will require a high level of ongoing regulatory scrutiny across Government".[7] The Dubbo Project in New South Wales was granted a Mining Lease in 2015, but as of 2021, has yet to begin operations.[8]

7. REEs coexist with radioactive elements such as uranium and thorium. REE mining and milling produces long-lived radioactive waste.[9]

8. Water, terrestrial, and airborne pollution (including radioactive waste, heavy metals, and chemical reagents) from REE mining and processing can pose a threat to surrounding populations, both in terms of health and impacts on land use.[9] Detailed investigation of REE-induced human health problems has

been scarce. Reported health impacts may include kidney disease, heart disease, occupational lung disease, and increasing incidence of certain cancer types.[10,11] However, long-term epidemiological studies are lacking.[10]

9. Transportation of REEs for processing and the waste products created poses risks of radioactive or heavy metal contamination in the event of an accident.

10. Final refining and separating of REEs from WA's mines mostly takes place in Malaysia. There is a small volume of resource that is exported to China. [4] The Malaysian plant has been criticised for the potential to cause extensive local pollution and harm to public health unless the stringent operating standards are adhered to.[6]

11. REEs from recycling currently constitute less than 5% of the global REE supply. There is also work being done to enhance extraction of REEs from existing mine-tailings.[12]

12. Implementing this policy would contribute towards achievement of UN Sustainable Development Goals: Goal 7 – Affordable and clean energy; Goal 9 – Industry, innovation and infrastructure; Goal 12 – Responsible consumption and production; and Goal 17 – Partnerships for the goals.

PHAA seeks the following actions:

13. A feasibility study should be conducted by international independent organisations regarding global REE supply and demand before further approval processes for future REE mines are undertaken. This should consider the potential for reducing REE use and dependency, and increasing reuse and recycling of REEs. Ideally this would be done at a global level.

14. Any radioactive waste incurred from REE extractive processes should be managed according to the world's best practice for radioactive waste management.[14] This includes reburial of the radioactive waste with suitable steps taken to minimise subterranean permeability and atmospheric interaction. Industry should bear responsibility for costs of waste management and other costs, including those of rehabilitation of land and management of incidents. These factors should be included in any development applications.

15. It should be a requirement that any REE refining and separating from Australian ore conducted overseas be carried out according to world's best practice.

16. Further research should be supported and conducted on recycling and extracting REE's from existing electronic and other types of waste to reduce environmental impact as much as possible.

17. REEs should be reduced, reused, and recycled so that local and global REE mining requirements are minimised.

18. REE mining should be opposed except in very sparsely populated areas of Australia, where it does not or will not affect areas that hold significant sociocultural impact for First Nation's peoples; where permission has been gained, where required, from local Elders; and where local communities have the opportunity to be involved in planning and risk mitigation processes.

19. A harm minimisation approach should be taken to REE mining, transportation, and refining/separation.

20. Further studies into the long-term environmental and health effects of REEs should be a priority, particularly if Australia intends to expand its REE mining sector.

21. Any increase in REE mining in Australia needs to handled sustainably. The use of energy for the extraction of REEs should be closely monitored because extraction via use of fossil fuels and large amounts of water may reduce or negate the environmental benefits of REE use in renewable energy technologies[1].

22. Collaboration in policy and procedure with other organisations with similar aims regarding REEs is desirable.

PHAA resolves to:

23. Advocate for the above steps to be taken based on the principles in this position statement.

First adopted 2015, revised 2018 and 2021

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