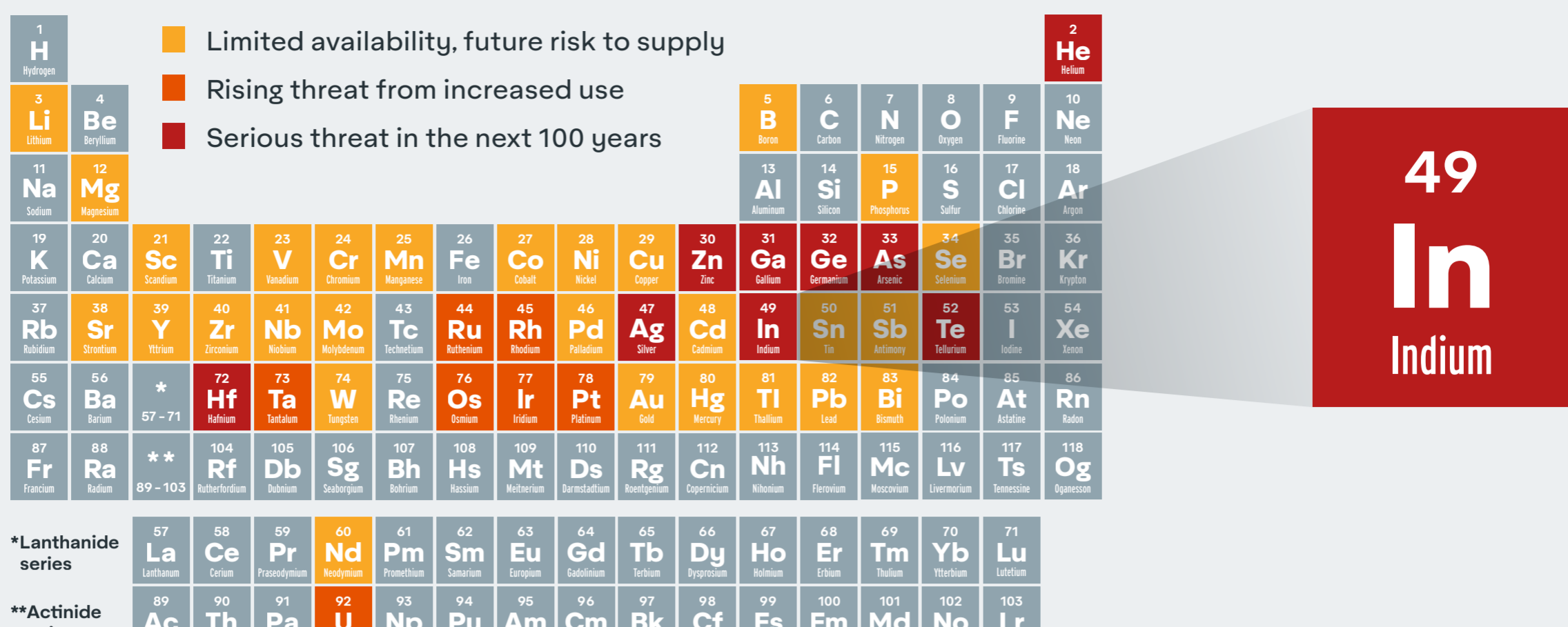


Indium — An Illuminating Element

THE PERIODIC TABLE'S ENDANGERED ELEMENTS



Indium

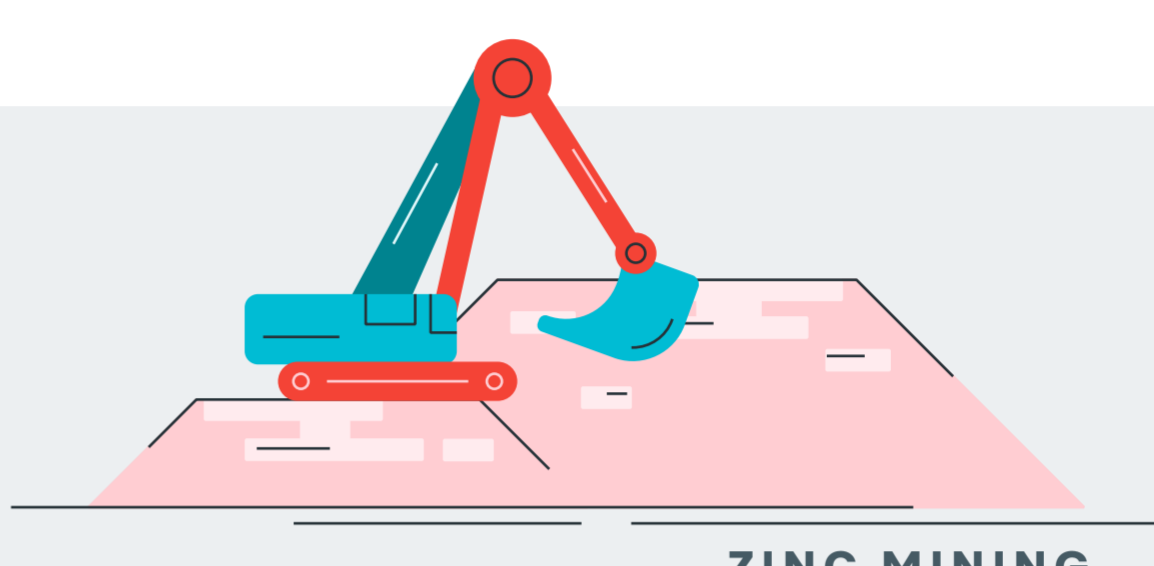


Indium is a silvery-white metal named for its indigo blue line in the atomic spectrum. Relatively scarce on the Earth's crust, indium is found with zinc sulfide ores, as well as iron, lead and copper ores.

Sustainable indium usage in solar panels is critical to helping us meet U.N. Sustainable Development Goal #7: Affordable and Clean Energy

Where is it from?

The vast majority (~90%) of indium is isolated as a byproduct of zinc mining.¹

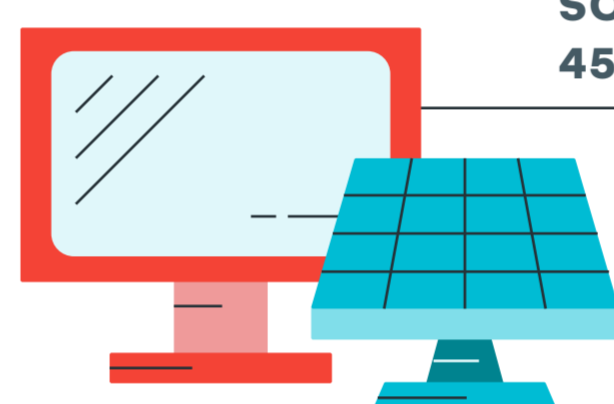


The top producers of indium are China (40%), Korea (31%), Canada (9%) and Japan (9%). There is no indium production in the United States.²

China controls between 43% and 66% of the indium reserves.¹

How is it used?

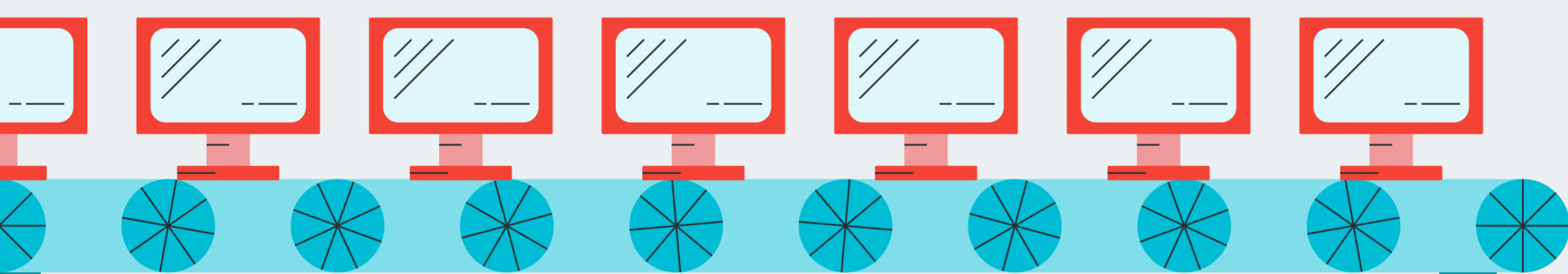
Indium tin oxide, an electrical conductive film used to make LCD displays and photovoltaic panels, accounts for 45% of all indium usage.³ Other uses include specialty alloys, microchips and semiconductors.⁴



LCD DISPLAYS AND SOLAR VOLTAIC PANELS
45%

Why is it a critical element? DEMAND IS GROWING...

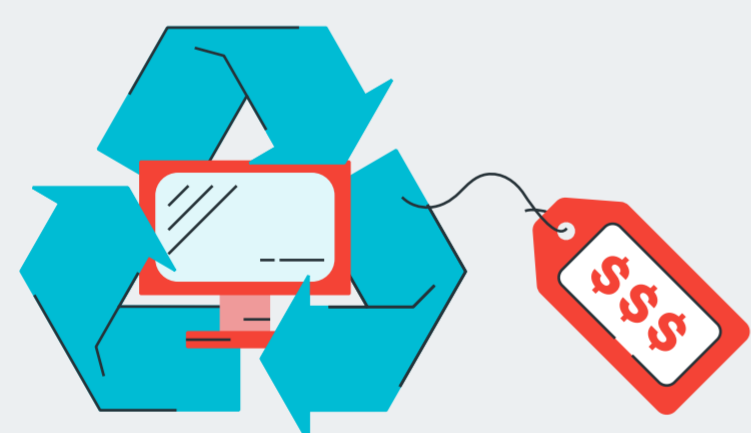
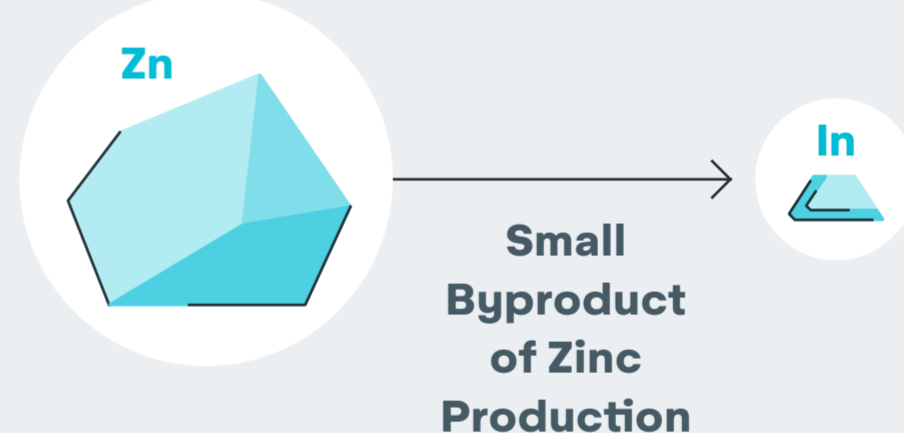
Growth in the use of LCDs and touch screens, as well as the expanding solar cell industry, are driving demand.



...BUT PRODUCTION IS LIMITED AND DEPENDENT ON ZINC MINING

Supply is dependent upon the zinc mining industry of which indium is a small byproduct. Zinc itself is a critical and endangered element.

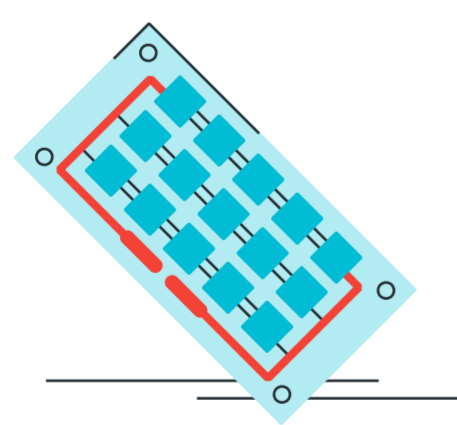
Because of its dependence on zinc mining, it is difficult to rapidly increase the supply of indium. Unless the price of indium rises dramatically, additional sources of indium will not be economical to exploit.¹



INDIUM RECOVERY FROM POST-CONSUMER PRODUCTS IS COST PROHIBITIVE

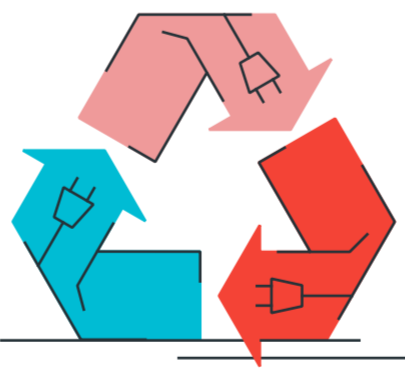
Indium recycling occurs in the indium tin oxide manufacturing process to increase the efficiency of the process. However, with only small amounts of the element in any given device, recovering indium from post-consumer LCD scrap is cost prohibitive.¹

What can we do about it?



CHEMISTS

- Research on reducing the amount of indium used in LCD displays (e.g., indium zinc oxide has comparatively less indium than the traditional indium tin oxide).
- Research on alternatives to indium in LCDs from more abundant materials, such as antimony, carbon nanotubes and conductive polymers.^{2,4}



INDIVIDUALS

- Extend the lifetime of your LCD screens (phone, computers and tvs) by upgrading less often, donating devices.
- Recycle old devices and screens rather than storing them in your house or workplace.



INSTITUTIONS

- Support company take-back programs: It is easier to recycle a single stream of the same product from the same brand than mixed devices.
- Increase the efficiency of extracting indium from mines. Currently only 20% of indium is recovered.
- Increase the efficiency of the current indium tin oxide production process.

Find out more about Critical and Endangered Elements: acs.org/endangered-elements

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