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Nippon Yakin Kogyo

Paper by Nippon Yakin Kogyo Employees Published in the *Journal of Industrial Ecology*

A paper authored by employees of Nippon Yakin Kogyo has been published in the *Journal of Industrial Ecology*, an international journal focusing on sustainability and the circular economy. The journal is published by the International Society for Industrial Ecology and Springer Nature. The paper proposes the Circularity Index for Material (CIM), a new indicator that integrates the use of recycled raw materials and material life. The index is expected to help clarify the contribution of materials to the circular economy and provide important guidance for future material development and resource strategies.

The paper published in the *Journal of Industrial Ecology* is available at the link below.

<https://link.springer.com/article/10.1007/s44498-026-00079-z>

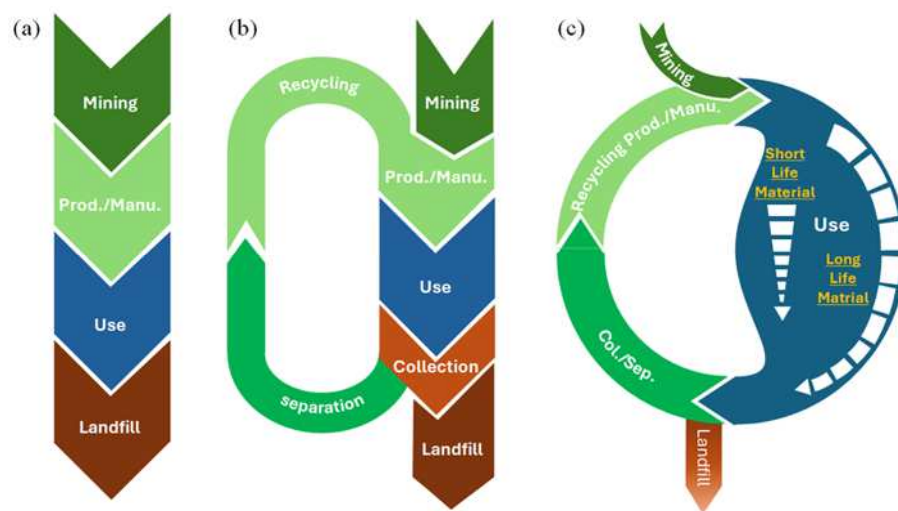
Paper Information

- **Title:** Assessing circularity performance of nickel containing materials: slowing or closing
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- **Journal:** *Journal of Industrial Ecology*

Overview

The present paper focuses on the circularity of nickel, which has a wide range of applications and is important for the broad economy. To efficiently use nickel scraps, it is crucial to allocate the available scraps wisely among the different nickel-containing materials in the context of circularity, not only for closing but also for slowing the material cycles. This study was conducted under the guidance of Professor Shinsuke Murakami of the University of Tokyo. We conducted a survey on the usage rate for recycled raw materials for 14 stainless steels and Ni-containing alloys. To measure the contribution to slowing, it is necessary to measure the life of the final product. However, measuring the life of their final products is difficult due to their wide variety of applications. Instead, this paper utilizes material life, which is estimated from the

material properties relating to degradation, including the material's corrosion rate and oxidation loss. Furthermore, we propose the Circularity Index for Material (CIM) to evaluate the closing and slowing of a material's cycle. It was verified using survey data on the recycled raw material ratios for stainless steel and high-Ni alloys, and the material properties of the alloys. Using CIM, high-Ni alloys are identified as better products in terms of resource circularity, even though their recycled raw material ratios are less than that of general-purpose stainless steel. CIM can quantify contributions to a circular economy from highly sophisticated material industries.



Prod. : Production, Manu.: Manufacturing, Col.: Collection, Sep.: Separation

FIGURE Types of material economies. (a) Linear economy, (b) recycling economy, and (c) circular economy.

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