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Establishing and testing the "reuse potential" indicator for managing wastes as resources

Joo Young Park [1], Marian R Chertow [2]

Affiliations

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Abstract

This study advances contemporary ideas promoting the importance of managing wastes as resources such as closed-loop or circular material economies, and sustainable materials management by reinforcing the notion of a resource-based paradigm rather than a waste-based one. It features the creation of a quantitative tool, the "reuse potential indicator" to specify how "resource-like" versus how "waste-like" specific materials are on a continuum. Even with increasing attention to waste reuse and resource conservation, constant changes in product composition and complexity have left

material managers without adequate guidance to make decisions about what is technically feasible to recover from the discard stream even before markets can be considered. The reuse potential indicator is developed to aid management decision-making about waste based not on perception but more objectively on the technical ability of the materials to be reused in commerce. This new indicator is based on the extent of technological innovation and commercial application of actual reuse approaches identified and cataloged. Coal combustion by-products (CCBs) provide the test case for calculating the reuse potential indicator. While CCBs are often perceived as wastes and then isolated in landfills or surface impoundments, there is also a century-long history in the industry of developing technologies to reuse CCBs. The recent statistics show that most CCBs generated in Europe and Japan are reused (90-95%), but only 40-45% of CCBs are used in the United States. According to the reuse potential calculation, however, CCBs in the United States have high technical reusability. Of the four CCBs examined under three different regulatory schemes, reuse potential for boiler slag and flue-gas desulfurization gypsum maintains a value greater than 0.8 on a 0-1 scale, indicating they are at least 80% resource-like. Under current regulation in the United States, both fly ash and bottom ash are 80-90% resource-like. Very strict regulation would remove many reuse options decreasing potential for these two CCBs to 30% resource-like. A more holistic view of waste and broad application of the new indicator would make clear what technologies are available and assist public and private decision makers in setting quantitative material reuse targets from a new knowledge base that reinforces a resource-based paradigm.

Keywords: Circular economy; Materials management; Reuse potential; Technological innovation; Waste; Wastes as resources.

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