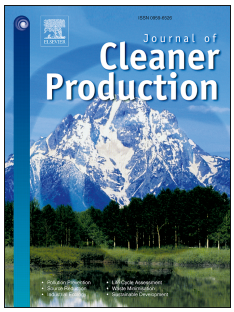
Accepted Manuscript



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PII: S0959-6526(18)31405-7

DOI: 10.1016/j.jclepro.2018.05.075

Reference: JCLP 12932

To appear in: *Journal of Cleaner Production*

Received Date: 30 December 2017

Revised Date: 1 May 2018

Accepted Date: 9 May 2018

Please cite this article as: Xue J, Liu G, Brown MT, Casazza M, Trash or treasure? Prospects for full aluminum chain in China based on the recycling options, *Journal of Cleaner Production* (2018), doi: 10.1016/j.jclepro.2018.05.075.

Trash or Treasure? Prospects for full Aluminum chain in China based on the recycling options

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Abstract

In this study, a Life Cycle Inventory (LCI), based on Emergy Analysis, was conducted for the Chinese aluminum industry. The following four process stages were considered: (1) deposit formation; (2) production processes (such as bauxite mining, alumina refining, electrolysis & ingot casting, manufacturing and fabrication); (3) end use; (4) aluminum recycling process. Unit Emergy Values (UEVs), a measure of resource use efficiency, were computed along every stage of China's aluminum production system and compared with the corresponding UEVs for the USA. Although the UEVs in China were higher than those of USA, the observed gaps narrowed along the aluminum production chain from bauxite mining to end use. Subsequently, the change of all aluminum outputs UEVs were evaluated considering the change of recycling rates. The effects of changes in domestic production and import policy of aluminum outputs on aluminum production efficiencies (UEVs) were also considered. This work found, in terms of providing the best overall increase in efficiency, Restricting bauxite mining and importing bauxite resulted the best option, which provided the best overall efficiency increase, as shown by decreases in UEVs. The impact on overall production efficiencies of increasing the recyclable aluminum quantity, by including a higher recycling amount, was tested. A reduction of 2.41E+09 sej/kg in bauxite, 1.76E+11 sej/kg in alumina, 3.24E+11 sej/kg in aluminum ingot, 8.96E+12

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