



Full length article

In-depth analysis of aluminum flows in Austria as a basis to increase resource efficiency



Hanno Buchner*, David Laner, Helmut Rechberger, Johann Fellner

Christian Doppler Laboratory for Anthropogenic Resources, Vienna University of Technology, Karlsplatz 13/226, 1040 Vienna, Austria

ARTICLE INFO

Article history:

Received 13 May 2014

Received in revised form 8 September 2014

Accepted 29 September 2014

Keywords:

MFA

Resource management

Aluminum

Austria

Recycling

Scrap

ABSTRACT

Based on the method of material flow analysis (MFA), a static model of Austrian aluminum (Al) flows in 2010 was developed. Extensive data research on Al production, consumption, trade and waste management was conducted and resulted in a detailed model of national Al resources. Data uncertainty was considered in the model based on the application of a rigorous concept for data quality assessment. The model results indicated that the growth of the Austrian "in-use" Al stock amounts to $11 \pm 3.1 \text{ kg yr}^{-1} \text{ cap}^{-1}$. The total "in-use" Al stock was determined using a bottom-up approach, which produced an estimate of $260 \text{ kg Al cap}^{-1}$. Approximately $7 \pm 1 \text{ kg of Al yr}^{-1} \text{ cap}^{-1}$ of old scrap was generated in 2010, of which 20% was not recovered because of losses in waste management processes. Quantitatively, approximately 40% of the total scrap input to secondary Al production originated from net imports, highlighting the import dependency of Austrian Al refiners and remelters. Uncertainties in the calculation of recycling indicators for the Austrian Al system with high shares of foreign scrap trade were exemplarily illustrated for the old scrap ratio (OSR) in secondary Al production, resulting in a possible range of OSRs between 0 and 66%. Overall, the detailed MFA in this study provides a basis to identify resource potentials as well as resource losses in the national Al system, and it will serve as a starting point for a dynamic Al model to be developed in the future.

© 2014 Elsevier B.V. All rights reserved.

Buchner, H., Laner, D., Rechberger, H. & Fellner, J. (2014): In-depth analysis of aluminum flows in Austria as a basis to increase resource efficiency. *Resources, Conservation and Recycling*, 93:112– 123.

DOI: dx.doi.org/10.1016/j.resconrec.2014.09.016