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Dynamic Material Flow Modeling: An Effort to Calibrate and Validate Aluminum Stocks and Flows in Austria

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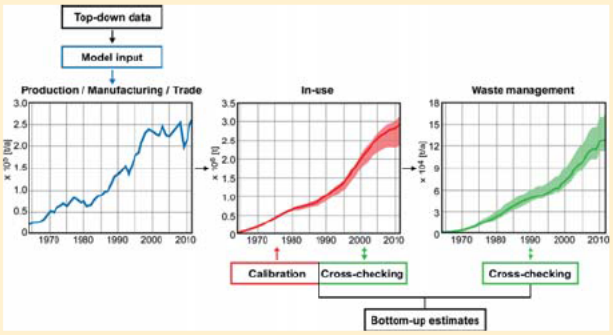
Supporting Information

ABSTRACT: A calibrated and validated dynamic material flow model of Austrian aluminum (Al) stocks and flows between 1964 and 2012 was developed. Calibration and extensive plausibility testing was performed to illustrate how the quality of dynamic material flow analysis can be improved on the basis of the consideration of independent bottom-up estimates. According to the model, total Austrian in-use Al stocks reached a level of 360 kg/capita in 2012, with buildings (45%) and transport applications (32%) being the major in-use stocks. Old scrap generation (including export of end-of-life vehicles) amounted to 12.5 kg/capita in 2012, still being on the increase, while Al final demand has remained rather constant at around 25 kg/capita in the past few years. The application of global sensitivity analysis showed that only small parts of the total variance of old scrap generation could be explained by the variation of single parameters, emphasizing the need for comprehensive sensitivity analysis tools accounting for interaction between parameters and time-delay effects in dynamic material flow models. Overall, it was possible to generate a detailed understanding of the evolution of Al stocks and flows in Austria, including plausibility evaluations of the results. Such models constitute a reliable basis for evaluating future recycling potentials, in particular with respect to application-specific qualities of current and future national Al scrap generation and utilization.



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