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Treatment of cooling appliances: Interrelations between environmental protection, resource conservation, and recovery rates

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Abstract

The treatment of cooling appliances in Austria is primarily influenced by two factors. On the one hand is their changing composition and on the other hand the ordinance on Waste Prevention, Collection and Treatment of Waste Electrical and Electronic Equipment (WEEE ordinance), which stipulates a minimum recycling rate of 75% for cooling appliances. This paper investigates whether this recycling rate leads to optimal treatment practices for cooling appliances with respect to resource conservation and environmental protection. Two different treatment technologies which achieve recycling rates between 50–60% and 80–90%, respectively, are compared both for cooling appliances containing Chlorofluorocarbons (CFCs) and for appliances containing Volatile Organic Compounds (VOC). Materials and energy balances are developed for each model. To evaluate resource consumption, expenditures as well as savings of energy and materials are incorporated via the Cumulative Energy Demand (CED). In order to analyse the environmental impact of the different practices, balances for CFC, CO_2, HF, HCl and solid residues are established.

The results show that the treatment type aiming for a maximum of materials recycling contributes more to resource conservation than the other treatment type. But for CFC appliances the former is associated with substantial CFC emissions, which turn out to be most relevant when treating these appliances. Generally, it is found that the optimum recycling rate is a function of the composition of the appliance and the technologies applied, both in recycling and in primary production. A high

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