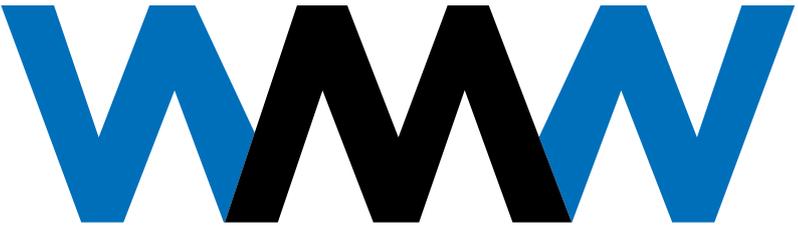


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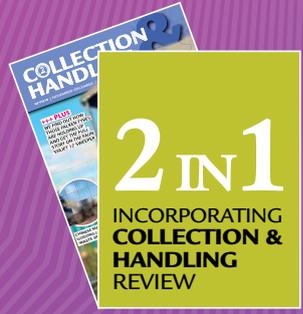
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Plastics

To Burn or Not to Burn?
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WHY SWITZERLAND DOES NOT ENFORCE PLASTICS RECYCLING

In a recently published research paper, Prof. Dr. Rainer Bunge of the University of Applied Sciences Rapperswil, Switzerland, argues that efforts to improve the recycling of plastics are not always the most environmentally beneficial. Energy recovery is often preferable. Here, the professor gives WMW readers a brief introduction to his findings.

Plastics recycling does not solve any problems in countries with proper waste management. In countries with an advanced waste management system, practically the entire amount of plastic waste is handled in the waste disposal system and is mainly disposed of in an environmentally sound manner (Fig. 1).

The problem of littering can hardly be solved by forced recycling of plastics.

Consumers who are unwilling to dispose of their waste in the nearest waste bin would not change their illegal behaviour due to an improved recycling system. Rather than forced recycling, the imposition of draconian penalties could be a solution to the littering problem.

The second „leak“ of packaging plastics into the environment results from the export of collected plastic waste fractions from countries with a controlled

FACTS

Only two „leaks“ remain, through which the packaging plastic waste may still end up in the environment:

- Littering (illegal dumping of waste into the environment by consumers)
- Export of separately collected fractions (e.g. plastics of inferior quality) to emerging countries

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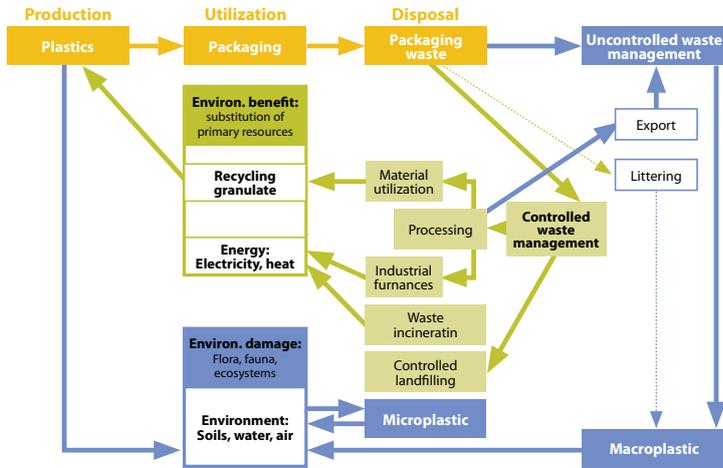
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FIGURE 1:
Schematic overview of the mass flows of packaging plastics.



waste management system, to countries with an uncontrolled waste management system. A substantial part of these mass flows ends up in the environment (e.g. in the oceans as „plastic islands“).

For reference: In 2016, EU member states shipped 46% of the plastics collected separately for „recycling“ to the Far East. As plastic recycling is the very cause of this problem, an obvious solution in countries with a proper waste management system would not be an even more aggressive recycling of packaging plastics but rather the abolition of plastics recycling altogether. Consequently, the EU action plan (100% recyclable plastics in 2030) does not solve any problem connected with plastics discharge into the environment in countries with a controlled waste management system.

PLASTICS RECYCLING IS INEFFICIENT AND INEFFECTIVE

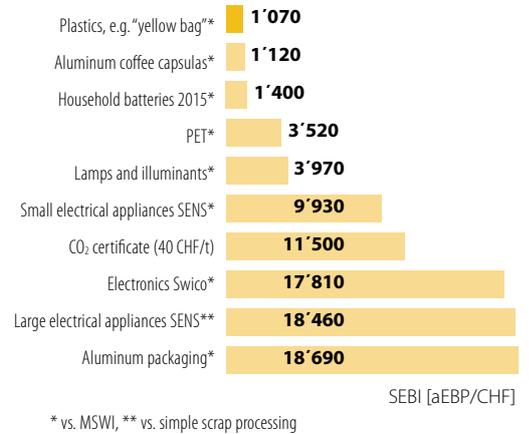
In Switzerland, most plastic waste is thermally utilised in municipal solid waste to energy incinerators and not physically recycled. Of the approximately 68,000 tonnes of plastic waste from households that are collected separately in Switzerland each year, 50,000 tonnes are PET bottles. The remaining 18,000 tonnes consist of other plastics from households, which are mainly collected by recycling systems that are voluntarily provided by retailers. The potential for an increased plastics recycling was determined as an additional 120,000 tonnes per year.

Due to increasing political pressure toward plastics recycling, the federal gov-

FIGURE 1:
Schematic overview of the mass flows of packaging plastics. In a controlled waste management system, the path between plastic waste and the environment is largely interrupted. Damage to the environment is primarily caused by the export of “recycling fractions” to emerging countries.

FIGURE 2:
At around 1,000 aEBP/CHF, the recycling of plastics is at the inefficient end of the SEBI spectrum. For reference: SEBI through the purchase of a CO₂ certificate for 40 CHF/t is 11,500 aEBP/CHF.

FIGURE 2:
At around 1 000 aEBP/CHF, the recycling of plastics is at the inefficient end of the SEBI spectrum.



ernment, several cantons, and environmental associations have commissioned a study on the ecological benefits and associated costs of plastics recycling.

Methods for life cycle assessment were used to quantify the ecological benefit of environmentally relevant measures. In Switzerland, the “method of ecological scarcity” is the most widespread. It involves assigning polluting activities with “environmental burden points”, or EBP. The mechanism is similar to the ecological evaluation of climate-relevant emissions using CO₂ equivalents.

The ecological benefit of plastics recycling in Switzerland compared with MWI was calculated as 0.5 million EBP/t. The additional costs of plastics recycling compared with MWI are around 500 CHF/t.

A cost-benefit efficiency indicator was derived from the ecological and cost balance as the quotient of the environmental benefit, avoided environmental impact points per tonne (aEBP/t), and the additional costs incurred in CHF/t. This “Specific Eco Benefit Indicator” SEBI indicates how much ecological benefit the recycling measure achieves per additional Swiss franc spent compared to a „reference scenario“, in this case the thermal recovery in a municipal waste incinerator MWI:

$$SEBI = \frac{\text{environmental benefits compared to reference}}{\text{costs compared to reference}} = \frac{\text{avoided environmental impact}}{\text{additional costs}} \left[\frac{\text{aEBP}}{\text{CHF}} \right]$$

Using the above data, the SEBI of plastics recycling is 0.5 million aEBP/t di-

vided by 500 CHF/t, which equals 1,000 aEBP/CHF.

The benchmark chosen for assessing the eco-efficiency of plastic recycling was a comparison with the eco-efficiency of other recycling measures already introduced in Switzerland. Figure 2 shows that plastics recycling is at the lowest end of the eco-efficiency spectrum established in Switzerland and is therefore about 18 times less efficient than, for example, the recycling of large electrical appliances and electronics. For comparison, the SEBI for the purchase of one CO₂ certificate for CHF 40 is shown in the figure. This, too, is about 10 times higher than for the collection of plastics.

Our study concludes that the collection of mixed plastic waste does generate a marginal ecological benefit at unrea-

sonably high costs. But plastics recycling is not only inefficient, it is also quite ineffective. In Switzerland the annual environmental benefit per capita would be equivalent to saving 30 kilometres of car driving or eating one less barbecue-steak.

Note that, in countries with a controlled waste management system, around 99% of the total environmental damage caused by the manufacture, consumption and disposal of a plastic-packed product is caused by the product itself. Only 1% is caused by the disposal of its packaging. Instead of introducing ever more intricate and costly schemes for reducing the 1% waste-related environmental damage of plastic packaging, it would be more productive to tackle the task of reducing the 99% consumption-related environmental impact. —

“THE EU ACTION PLAN DOES NOT SOLVE ANY PROBLEM CONNECTED WITH PLASTICS DISCHARGE INTO THE ENVIRONMENT IN COUNTRIES WITH A CONTROLLED WASTE MANAGEMENT SYSTEM.”

Prof. Dr. Rainer Bunge
University of Applied Sciences
Rapperswil, Switzerland