The Role of Thermal Treatment in a Recycling Economy

Walter HAUER

Technisches Büro
HAUER
Umweltwirtschaft GmbH

A-2100 Korneuburg, Brückenstraße 6
✆ +43 2262/62 223 www.tbhauer.at

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ISWA
International Solid Waste Association

Goals

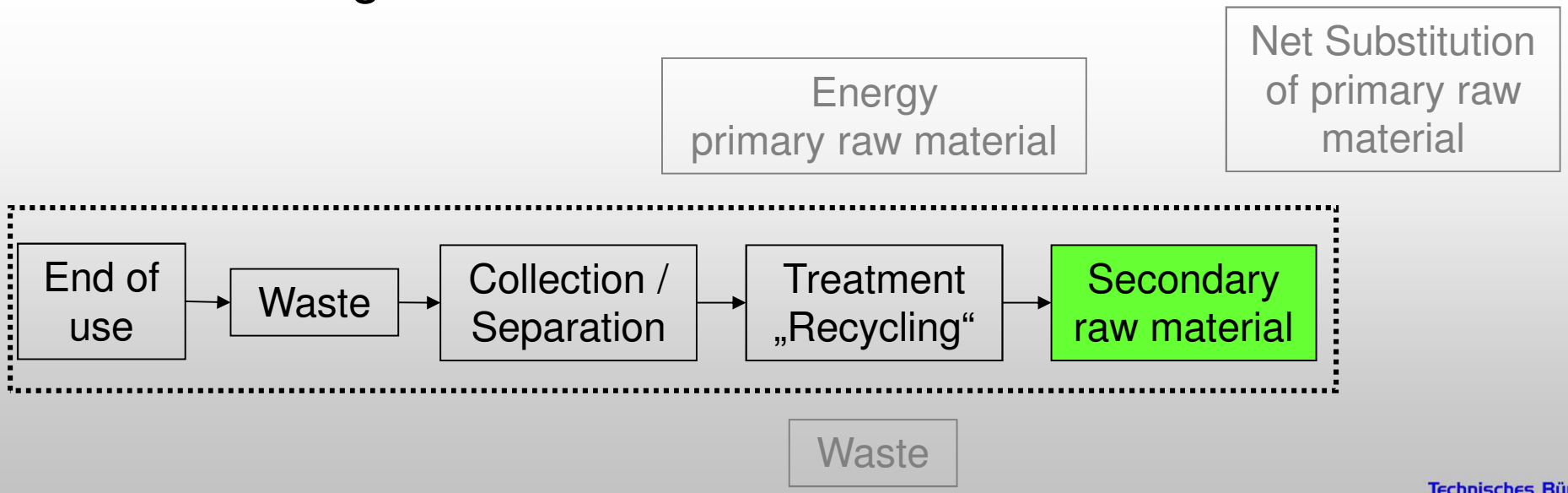
- EU as a „Recycling-Economy“
- Minimum of 50% Recycling of MSW and further increasing recycling rates
- Challenges on raw materials:
  Boosting resource efficiency and promoting recycling:
  „Urban Mining“

Priority

- Waste Directive
  1. Prevention
  2. Preparation for ReUse
  3. Recycling
  4. Recovery
  5. Disposal

How Recycling will be measured

- From the Input in „Recycling“-Facilities
- Where „Recycling“ starts is not defined well – sometimes baling for shipping will be named as „Recycling“.
- The real activities at the location of treatment are outside of viewing borders



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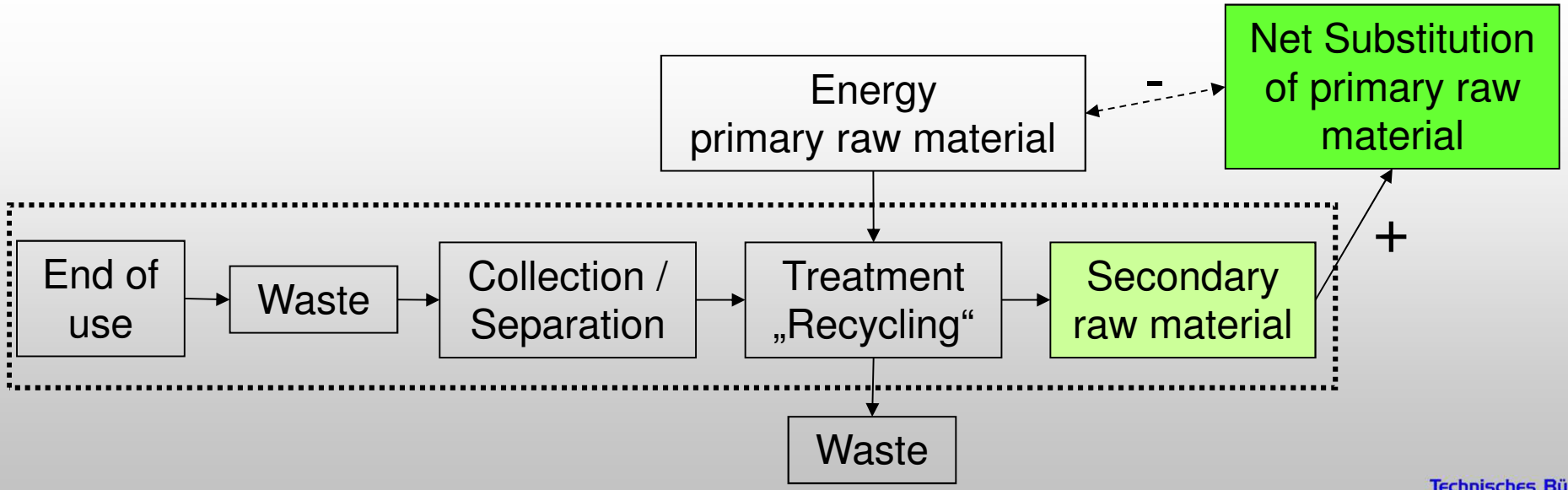
What really counts

- The amount of primary material substituted – not the input in a „Recycling“ facility
- Though this data are not available in all cases and more difficult to evaluate.



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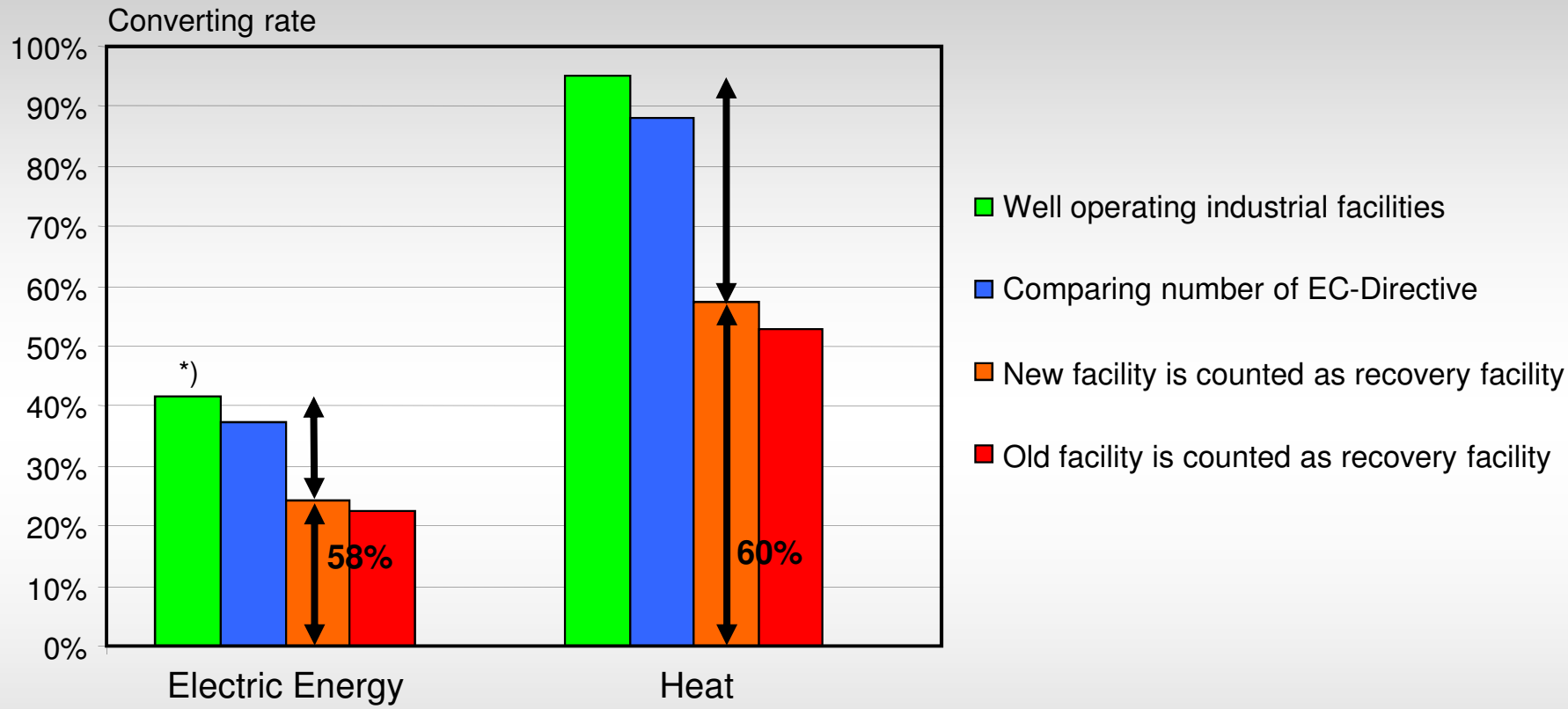
Performance of Waste Incineration

- Incineration is a method where some articles are splitted
  - Combustible parts – substituting primary energy sources
  - Inert parts – partly usable for recycling

Energy Substitution – how much?



Conclusion:

1. A new waste incineration facility is counted as recovery facility if with 1.0 energy-unit from waste 0.6 energy-units from primary energy sources are substituted – within the facility.
2. It will not be calculated how much energy will be delivered to the user respectively substituted at the user

*) E-control 2009: Average Austria 42%

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Separation of Metals after Incineration

- With a simple magnetic separation of metals from slag about half of metals can be seperated
- With additional classification of slag in different particel sizes and a magnetic and inductive separation the separation of metals can be doubled.
- From MSW in total about 2% of MSW-input in incineration or 10% of the slag.

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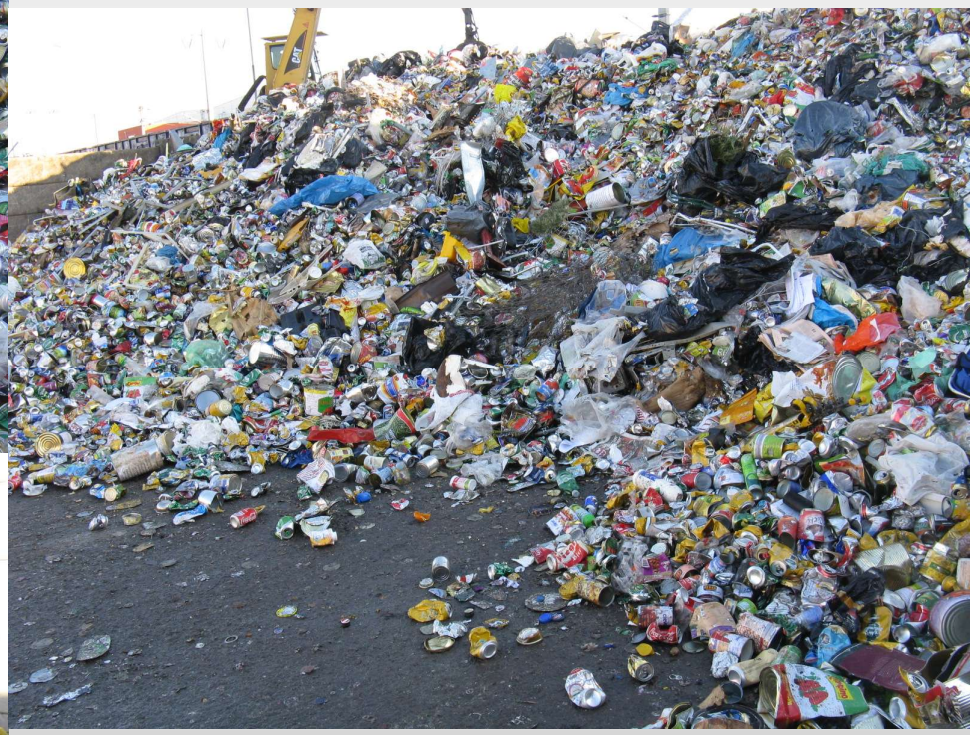
Metals from Separate Collection – Good Quality

Aluminium Cans

Steel Cans

Small Metals



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Contribution of different Methods for Metal Separation – Monitored Data

	Ferrous Metals	Aluminium
Separate collection	50%-60%	20%-50%
Mechanical separation from residual MSW	< 75%	< 25%
Separation from incineration residues	90%	10% thin-walled Al 60% massive Al
Combination of • separate collection and • separation from incineration residues	95%	25%-50% thin-walled Al 70%-80% massive Al

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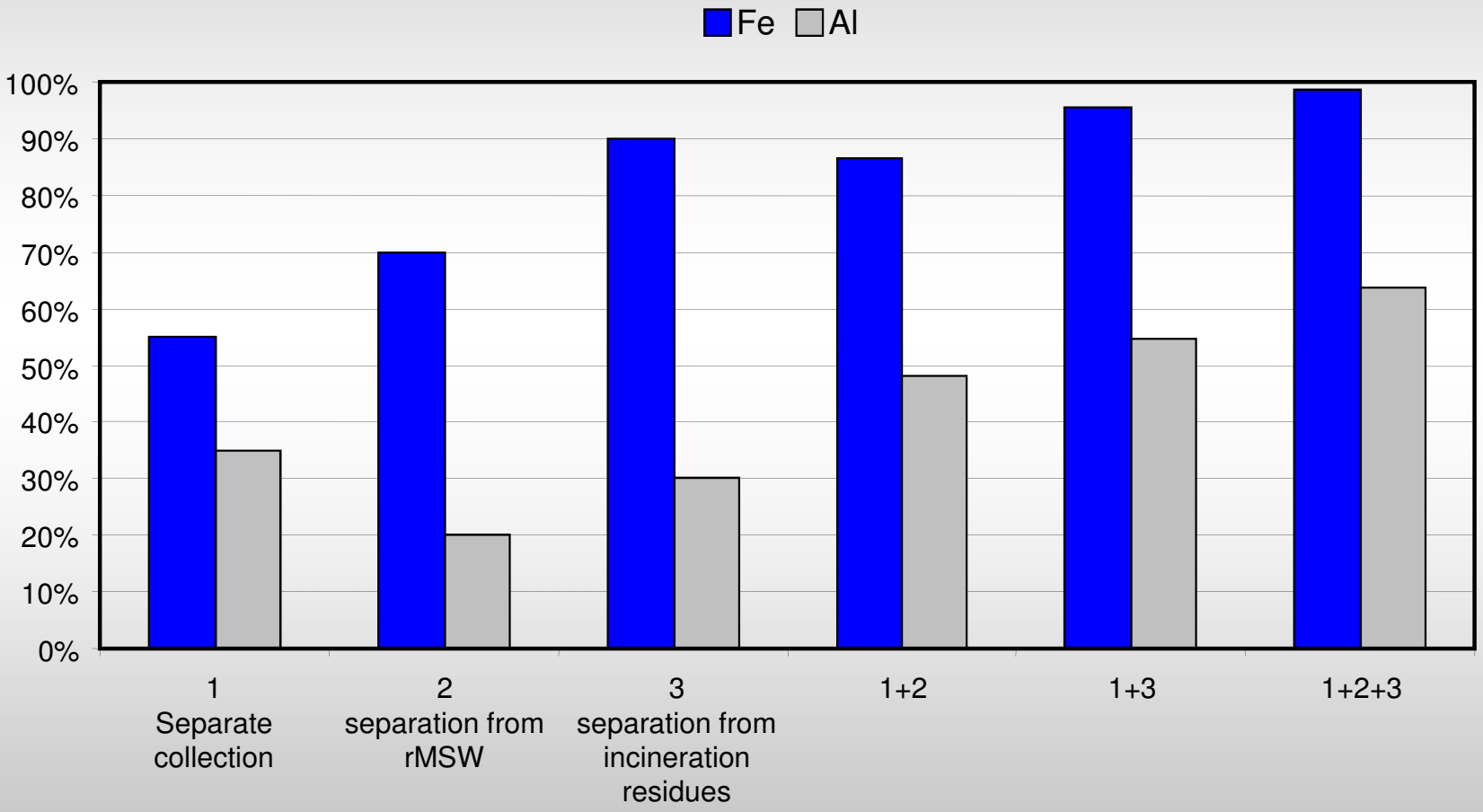
Contribution of different Methods for Metal Separation – Exemplary Data



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Metals separated from residual MSW – Bad Quality

Ferrous Metals from MSW-Splitting

Ferrous Metals from residues after Incineration

How to split materials from incineration residues

- Dry settled slag / bottom ash with dry methods
- Wet settled slag with wet methods – sink-float flotation

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Separation and Recycling of Glass after Incineration

- From dry slag or dry bottom ash from fluidized bed incineration glass can be separated.
- Bottom Ash contains 30% to 50% by mass of glass
- Up to 50% of the glass can be separated by light detection
- Glass can be used for purposes like foam glass or other glass products which do not need the high quality raw material used for window glass or beverage glass

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Glass separated from bed ash after sink-float flotation

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Quality of Glass from separate collection and from incineration residues

Glass from separate collection

Glass separated from bed ash after fluidized bed incineration by optical separation

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Recycling of Stones and Briks after Fluidized Bed Incineration

- Bottom ash from fluidized bed incineration is not contaminiated with heavy metals and has no organic components.
- Stones and bricks are usable as a substitute of gravel

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Results

- The quantity of Recycling should be calculated from the primary material substituted, not from the input in „recycling“ facilities
- **Separate collection of recyclables is the first choice**
- MSW-Incineration substitutes only 60% of primary fuel – by thermal energy
- After incineration metals can be separated
  - Metals which have been metal products in MSW
  - Metals which have been parts of products in MSW like fittings, studs from clothes or shoes, nails, …
  - Aluminium gets lost in a high percentage
- After incineration glass can be separated
  - Dry: Optical separation from bottom ash or dry extracted slag
  - Wet: Optical separation from slag after sink-float flotation
- After incineration stones and briks can be separated from bottom ash (fluidized bed incineration) for construction purposes

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Conclusion

\+ Separation of recyclable materials from incineration residues should be intensivated

– „Recycling“ of grid incineration slag means a distribution of hazardous substances in the environment and should be avoided

Priority only for Waste?

- Waste Directive
  1. Prevention
  2. Preparation for ReUse
  3. Recycling
  4. Recovery
  5. Disposal

- Primery material
  1. Prevention
  2. Use of structure
  3. Use of Energy (fuel)
  4. Waste management

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Wrong ways

- Incinerating fresh wood
- Use of primary material for landfill construction (use of secondary material is penalised in some cases in Austria, e.g. material added for stabilisiation of residues)