New Calculation Method for Measurement of Recycling Rates and Influence on Recycling Quotas

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• Legislative Basis
• Methods for Calculating of Recycling Rates
  – Input based calculation
  – Output based calculation
• Influence on Recycling Quotas
Legislative Basis

• **Europe**

  by 2020 recycling target minimum of **50% by weight** for at least
  **paper, metal, plastic and glass**

• **Germany**
  Kreislaufwirtschaftsgesetz (Law on Life-Cycle Management)
  of 24th February 2012

  by 2020 recycling target minimum of **65% by weight of total
  municipal waste (MSW)**
Calculation Methods

- Directive 2008/98/EC on waste allows 4 methods for calculating the recycling rates


Recycling Rates and Waste Amount from waste balance 2013 in Germany

- Method 1: 17,733 tons
  - Paper: 8,867 tons (50%)
  - Glass: 13,715 tons (50%)

- Method 2: 27,429 tons
  - Paper: 13,715 tons (50%)
  - Glass: 13,715 tons (50%)
  - Other separate collected fractions: 2,221 tons (65%)

- Method 3: 43,942 tons
  - Total household waste: 21,971 tons (50%)

- Method 4: 49,570 tons
  - Total municipal solid waste (MSW): 32,221 tons (65%)
  - Residual waste: 24,785 tons (50%)

Germany Law on Life cycle management:
Method 4
Statistics and Reality

• Calculation of recycling rate with input in recycling plants (R2-R13 operations)

• Recycling Rate 64% (31.6 million t) in 2013, recycling target nearly fulfilled

R2-R13-operations:
- Material Recovery Facilities (MRF),
- Disassembling facilities,
- Shredder plants,
- Composting and anaerobic digestion plants,
- Mechanical Biological Treatment plants (MBT)
Statistics and Reality

Calculating with input waste streams overestimates recycling

• When regarding the output from separate collection only the recycling of glass, paper & cardboard and metals reaches 85% - 90%.

• Only 50% (other sources say 20-30%) of the output from MRF’s for plastic and lightweight material is recycled, the rest will be incinerated.

• About 60% of biowaste will be used as compost, the rest is water, CO₂ and a small amount of contraries.

• Regarding mixed MSW treated in MBT plants only 6% mostly metals will be recycled.

• On the other hand 9% metals are recycled from bottom ashes from incinerators.
EU Circular Economy Package

**New Calculation Method for recycling targets**

- Only the input in a „final recycling process“ is counted
- The output of any sorting operation can be counted as recycled, when the waste streams for disposal or incineration remain below 10%.
- Metals from bottom ash of incinerators when entering a final recycling process will be counted as recycling when they fulfill certain quality criteria.

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Article 11a. Rules on the calculation of the attainment of the targets laid down in Article 11

Definition in 17a. "final recycling process" means the recycling process which begins when no further mechanical sorting operation is needed and waste materials enter a production process and are effectively reprocessed into products, materials or substances

2 Article 11a, 6.
Influence on Recycling Quotas

Calculating with input waste streams overestimates recycling (64%).

Calculating with output waste streams only a recycling rate of 44-48% can be reached.
## Influence on Recycling Quotas

- Results for recycling quotas with new calculation method

<table>
<thead>
<tr>
<th>Type of waste</th>
<th>Waste amount 2013 [million t]</th>
<th>Recycling plants</th>
<th>Recycling rate R2 - R13 [million t]</th>
<th>Calculation Recycling rates Variant 1</th>
<th>Recycling Variant 1 Output R2 - R13 [million t]</th>
<th>Calculation Recycling rates Variant 2</th>
<th>Recycling Variant 2 Output R2 - R13 [million t]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Household Waste</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>mixed municipal waste</td>
<td>14,0</td>
<td>MBT / MPS</td>
<td>2,1</td>
<td>6%</td>
<td>0,1</td>
<td>6%</td>
<td>0,1</td>
</tr>
<tr>
<td>bulky waste</td>
<td>2,5</td>
<td>MRF</td>
<td>1,3</td>
<td>20-50%</td>
<td>0,3-0,7</td>
<td>20-50%</td>
<td>0,3-0,7</td>
</tr>
<tr>
<td>bio waste</td>
<td>4,1</td>
<td>Composting/ anaerobic digestion</td>
<td>4,0</td>
<td>56%</td>
<td>2,3</td>
<td>100%</td>
<td>4,0</td>
</tr>
<tr>
<td>garden and park waste</td>
<td>5,0</td>
<td>Composting/ anaerobic digestion</td>
<td>4,8</td>
<td>58%</td>
<td>2,8</td>
<td>100%</td>
<td>4,8</td>
</tr>
<tr>
<td>biodegradable waste</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>glass</td>
<td>2,5</td>
<td>MRF</td>
<td>2,3</td>
<td>100%</td>
<td>2,3</td>
<td>100%</td>
<td>2,3</td>
</tr>
<tr>
<td>Paper, cardboard</td>
<td>7,6</td>
<td>MRF</td>
<td>7,5</td>
<td>100%</td>
<td>7,5</td>
<td>100%</td>
<td>7,5</td>
</tr>
<tr>
<td>plastic / lightweight packaging</td>
<td>5,5</td>
<td>MRF</td>
<td>4,5</td>
<td>20-50%</td>
<td>0,9-2,2</td>
<td>20-50%</td>
<td>0,9-2,2</td>
</tr>
<tr>
<td>discarded electrical / electronic equipment</td>
<td>0,6</td>
<td>MRF</td>
<td>0,6</td>
<td>70-80%</td>
<td>0,4-0,5</td>
<td>70-80%</td>
<td>0,4-0,5</td>
</tr>
<tr>
<td>other waste (composite materials, metals, textiles etc.)</td>
<td>2,1</td>
<td>MRF</td>
<td>1,5</td>
<td>60%</td>
<td>0,9</td>
<td>60%</td>
<td>0,9</td>
</tr>
<tr>
<td>Other MSW</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>mixed municipal waste</td>
<td>3,8</td>
<td>MRF</td>
<td>1,6</td>
<td>13-20%</td>
<td>0,2-0,3</td>
<td>13-20%</td>
<td>0,2-0,3</td>
</tr>
<tr>
<td>street cleaning residues / garden and park waste (soil, stones)</td>
<td>0,9</td>
<td>no information</td>
<td>0,7</td>
<td>0%</td>
<td>0,0</td>
<td>0%</td>
<td>0,0</td>
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<tr>
<td>biodegradable kitchen and canteen waste</td>
<td>0,6</td>
<td>Anaerobic digestion</td>
<td>0,6</td>
<td>78%</td>
<td>0,5</td>
<td>100%</td>
<td>0,5</td>
</tr>
<tr>
<td>waste from markets</td>
<td>0,07</td>
<td>Composting/ anaerobic digestion</td>
<td>0,06</td>
<td>56%</td>
<td>0,03</td>
<td>56%</td>
<td>0,03</td>
</tr>
<tr>
<td>fluorescent tubes and other mercury-containing waste</td>
<td>0,01</td>
<td>MRF</td>
<td>0,01</td>
<td>70-80%</td>
<td>0,00</td>
<td>70-80%</td>
<td>0,00</td>
</tr>
<tr>
<td>other separately collected fractions</td>
<td>0,2</td>
<td>MRF</td>
<td>0,1</td>
<td>10%</td>
<td>0,01</td>
<td>10%</td>
<td>0,01</td>
</tr>
<tr>
<td>MSW, total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waste amount 2013 [million t]</td>
<td>50</td>
<td>64%</td>
<td>32</td>
<td>37-41%</td>
<td>18,2-20,1</td>
<td>44-48%</td>
<td>22,0-24,0</td>
</tr>
<tr>
<td>Recycling rate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minerals from thermal treatment Min 10</td>
<td>Max 11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output R1 [million t]</td>
<td>0,1</td>
<td>0,4</td>
<td>37-41%</td>
<td>18,3-20,5</td>
<td>45-49%</td>
<td>22,1-24,4</td>
<td></td>
</tr>
</tbody>
</table>
Conclusion

EU Circular economy package

- 2025  Recycling target 60% of total municipal waste amount,
- 2030  Recycling target 65% of total municipal waste amount

- With the new calculation method Germany faces major challenges to reach the new targets.

- Representatives from Sweden and Austria came to the same conclusions$^1$.

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$^1$ Energy from waste meeting, 24-25 February Royal College of Surgeons, Lincoln's Inn Field, London
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¹ Energy from waste meeting, 24-25 February Royal College of Surgeons, Lincoln’s Inn Field, London