

# Long-Term Experience with Separate Collection of Biowaste in Munich

[Guenther.langer@muenchen.de](mailto:Guenther.langer@muenchen.de)



## Waste Management Corporation Munich: facts & figures 2015

- Public service corporation run by the City of Munich since 1891
- 1,500 employees from 25 nations
- 146 collection crews with 703 collectors
- 177 trucks with waste compactors suitable for all types of waste
- Annual turnover: 204 million €
- 3 operating sites and 12 recycling centres
- Combined heat and power waste incinerator
- Waste disposal site (closed landfill) with biowaste treatment facility and soil factory

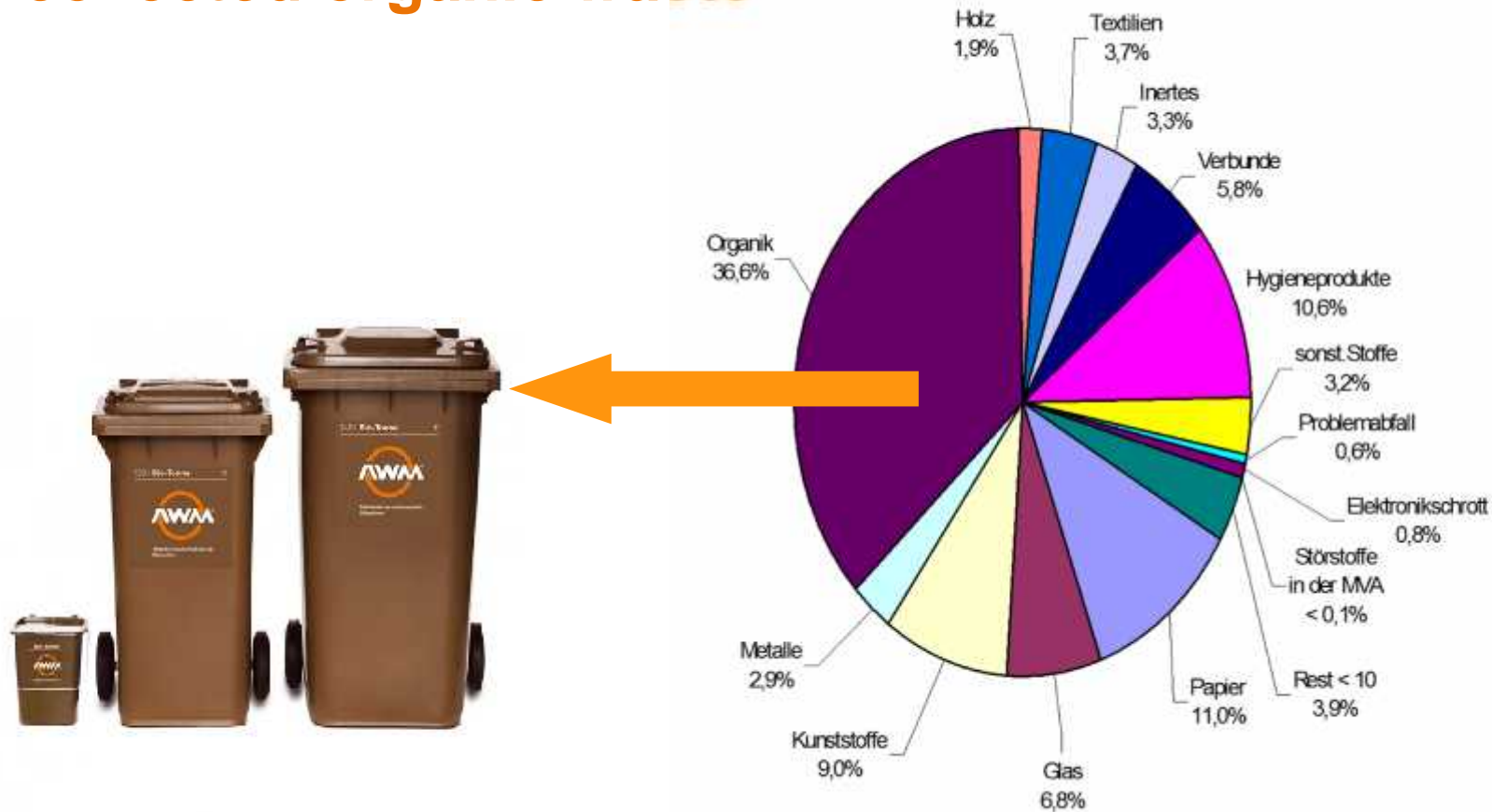


# Munich's biological cycle within the circular economy





## Increasing the amount of separate collected organic waste



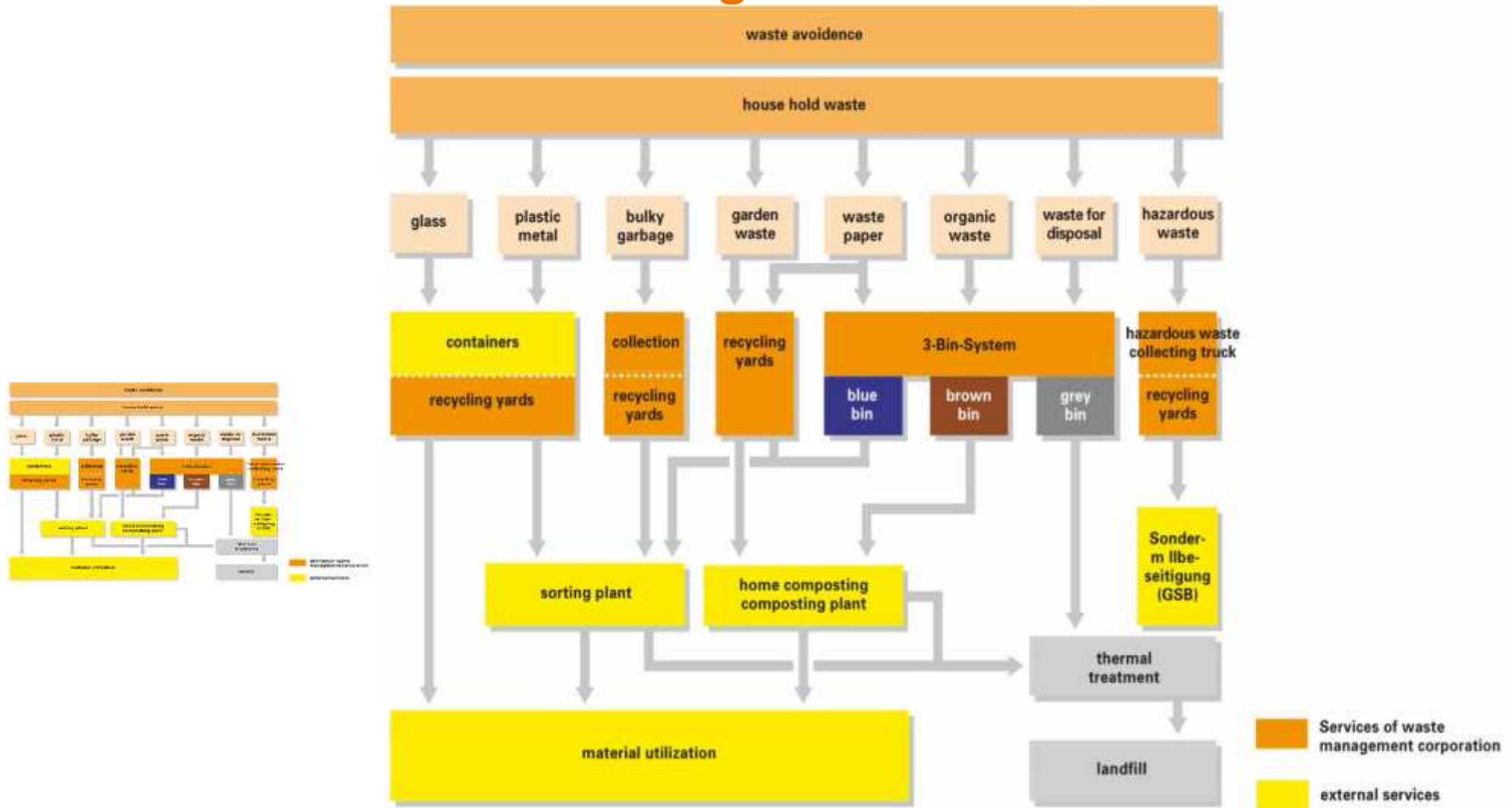
Munich's waste analysis 2007

## History of the separate collection of biowaste









- 1988 Waste management concept
- 1989 testing of the biowaste collection
- 1994 start of the 3-bin-system
- 1997 shutdown of a waste-to-energy-plant near the center of Munich
- 1999 3-bin-system is completed
- 1999 Second waste management concept
- 2003 building of a biogas plant with new dry fermentation technology
- 2008 Enlarging the biogas plant
- 2012 opening of the soil processing plant
- 2017 starting the new campaign to collect more biowaste

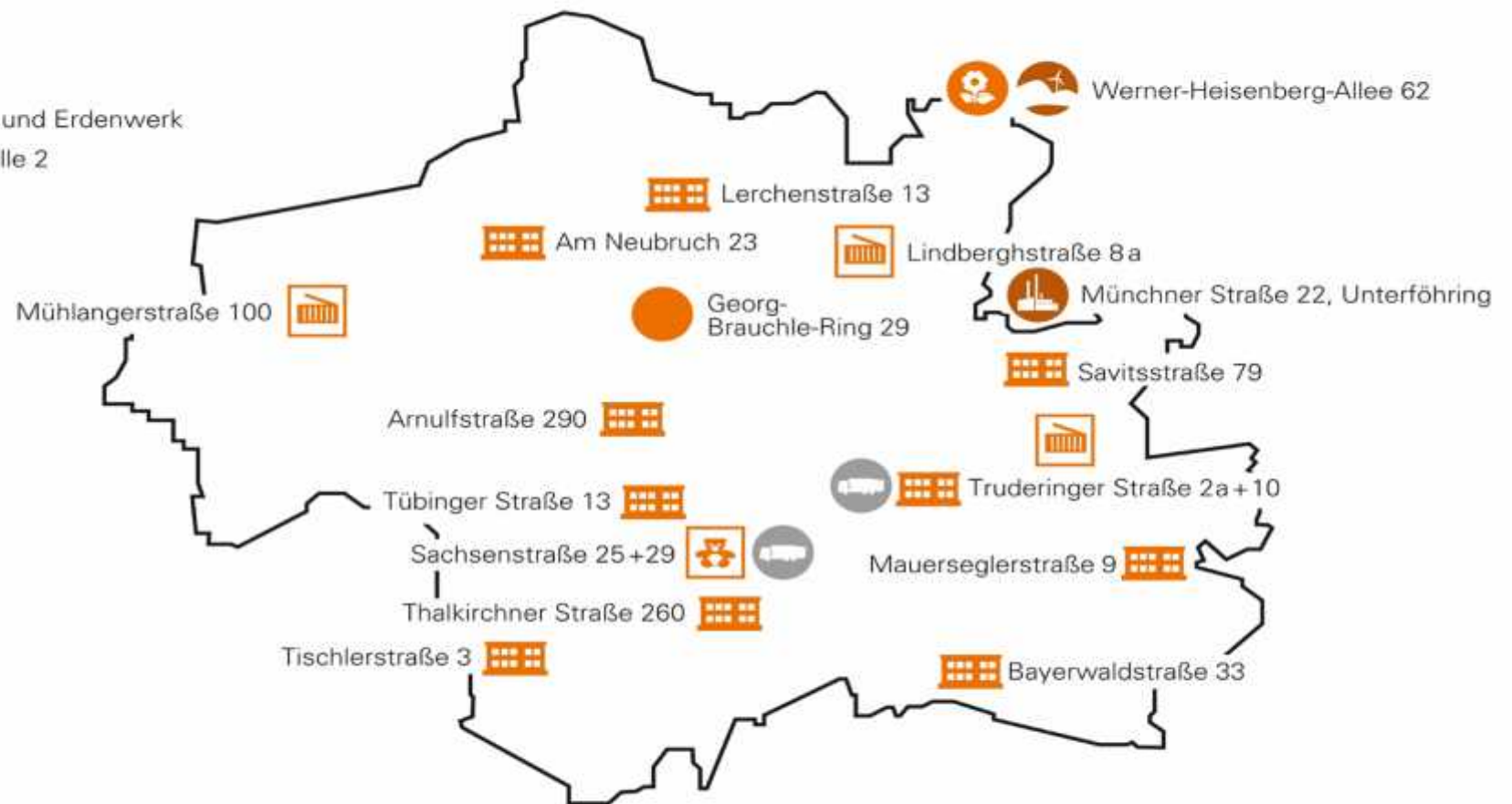


# Household Waste Management Plan



# Facilities of the AWM

-  AWM Zentrale mit zwei Betriebshöfen und Kfz-Werkstatt
-  Wertstoffhof
-  Wertstoffhof plus
-  Betriebshof
-  Trockenfermentationsanlage und Erdenwerk
-  Gebrauchtwarenkaufhaus Halle 2
-  Heizkraftwerk Nord
-  Entsorgungspark Freimann



# Seperate Collection in Munich 2015 (1,439,318 inhabitants)

795,000 Properties



12 Recycling Centers



750 Containers



950 Packaging-Cont



Residual waste:  
311,375 tons  
216 kg/inh/a

Paper: 92,920 tons  
65 kg/inh/a

Organic: 42,117 tons  
29 kg/inh/a

Bulky waste,  
hazardous waste,  
recyclables  
75,114 tons  
52 kg/inh/a

Used clothing,  
used shoes  
3,480 tons  
2 kg/inh/a  
(since July 2013)

Glass, cans,  
lightweight  
packaging  
35,664 tons  
25 kg/inh/a



## Biowaste separation list

### What goes into the bio bin?

- Fruit and vegetable scraps
- Potato peels, egg shells
- Coffee filter, teabags
- Bunches of withered flowers
- Pot plants (without pots)
- Garden wastes (such as foliage, grass, weeds, trimmings, flowersoil)
- Paper towels, paper napkins, kitchen paper
- Crumpled newspaper to absorb moisture



**Cooked food waste will be allowed in the future!**

## Collection in 2015

**Brown Bio-Bin: 42,117 tons (29 kg/inh/a)**

**Recyclings Centers: 13,014 tons ( 9 kg/inh/a)**



### **Recovery (bio bin):**

**11,582 t** treated in AWM's dry fermenter (TFA)

**30,535 t** treated in composting plants run by private contractors (awarded by tender)

### **Recovery (garden waste):**

**12,143 t** treated in composting plants run by private contractors

**871 t** used as auxiliary material for composting of TFA digestate

## TFA AWM München – Expansion 2008



## Dry fermentation plant: facts & figures

- **Number of fermenters:** 4 fermenters at previous pilot facility and 6 fermenters at new facility (built in 2007)
- **Capacity:** rated capacity: 25,000 tons/year  
capacity utilisation: 22,500 tons/year
- **Digestion time:** 4 to 5 weeks at a temperature of 34 to 37 Celsius
- **Amount of digestate:**  
approx. 17,000 tons/year
- **Energy output:**  
2,600 MWh electricity per year plus  
process heat (utilisation heat for  
drying boxes and plant heating)
- **Compost output:**  
7,000 – 8,000 tons/year







## Gas-proof hydraulic gates with overhead opening equipped with inflatable seal



## Compost products 2015

- **Compost recovery (4,164 t):** Compost from TFA goes to a soil processing plant, where different types of soil for gardening and landscaping, plant soil etc. are produced. In September 2012 the AWM opened the soil processing plant on the landfill site.
- **Direct marketing:** compost is mixed with special substrates and slow-release fertilisers and sold as “Münchner Blumenerde” (flower soil from Munich)
- **45/20 litres of medium-priced flower soil: 7.43 €**  
Selected recycling centres of AWM and hardware stores sold about 1,400 sacks in 2015

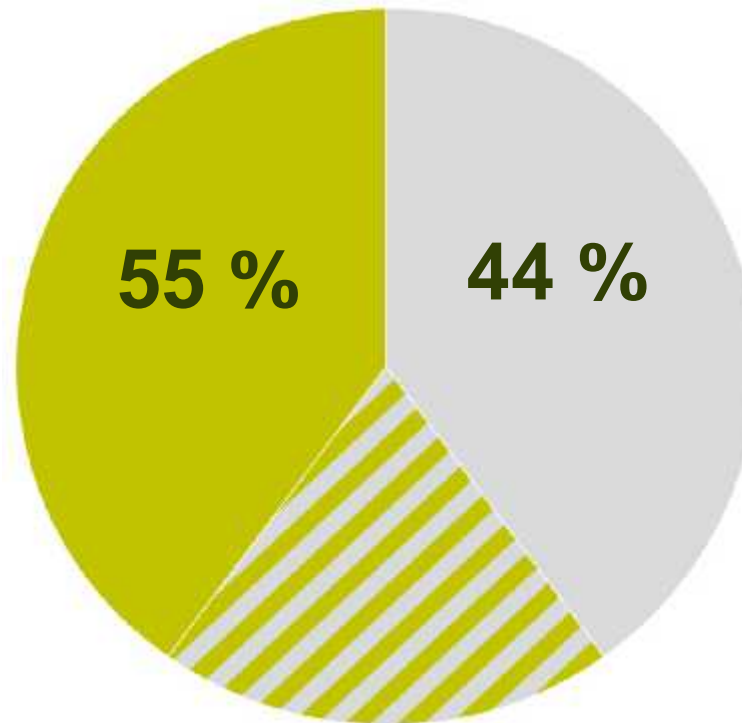


## Recycling Rate in Munich

### Recycling

- Organic
- Garden Waste
- Paper/ Cardboard
- Glass/ Metal
- Packaging
- WEE
- Used Textile
- Slag

1% Landfill



### Energy Utilisation

- Residual Waste
- Bulky Waste
- Mixed Waste from Construction Sites
- Treated Wood

## The Waste Fee Provides the Following Services

- Collection of the bins for residual, paper and organic waste
- Using the Recycling Centers for 30 different waste fractions open 6 days a week
- Collection of hazardous waste
- Collection of christmas trees
- Information material
- Consulting and awareness campaigns
- Providing the waste collection bins (13 different sizes)
- Rearrangement of waste bins
- Call-Center





## The Actual Waste Fee

<b>Tonnengröße</b>	<b>Wöchentlich</b>	<b>14-täglich</b>
80-Liter-Tonne	232,44 €	120,12 €
120-Liter-Tonne	297,96 €	156,00 €
240-Liter-Tonne	502,32 €	260,52 €
770-Liter-Großbehälter	1.311,96 €	692,64 €
1.100-Liter-Großbehälter	1.765,92 €	959,40 €
70- Liter-Sack	6,00 €	



## Contract Design of the Waste Fee is one Step on the Road to Success

- Under German Legislation the municipalities are commissioned and authorised to rise a waste fee
- AWM invoices directly from the ground landlord
- AWM demands the fee for the grey bin only
- All other services of the AWM are free of charge and included in the grey bins fee
- The amount of the fee depends on the size of the grey bin
- If people separate waste correctly, they can use a smaller grey bin to save money



## Lessons learned from 29 years of separate collection

- The implementation of the bio bin as a part of the 3-bin-system was successful
- Integrated marketing campaign at the beginning was necessary (We spent 0,50 €/inh/a)
- High amount of garden waste in the bio bin (about 50%)
- Citizen in low densed areas collect more and cleaner biowaste
- Low impurities in the bio bin (5,5% in total)
- Content of biowaste in Munich's residual waste is high (30-40%)
- Amount of bio bins would be sufficient for increase of quantity
- Citizens have meanwhile little knowledge about biowaste separation and recycling





# Thank You Very Much

[Guenther.langer@muenchen.de](mailto:Guenther.langer@muenchen.de)

