

# Efficient Resource and Waste Management as an Important Contribution for Close Loop Cycle and CO<sub>2</sub> Reduction – Example Vienna

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# Contents

- The contribution of the waste management sector to global warming
- Development of waste management
- Best practices
- Pillars and Key success factors for efficient and environment sound waste and resource management

# The Impacts of Waste Management are Manifold...

## Negative Impacts

- Methane emissions from landfills
  - When organic material is deposited untreated, without prior thermal treatment
  - For landfills without landfill gas collection using gas wells
- Emissions from the transport of waste and secondary raw materials
  - CO<sub>2</sub> emissions emitted by collection vehicles are significant

## Positive Impacts

- Energy recovery through the incineration of residual waste
  - Prevents methane emissions, only inert slags for landfilling remaining
  - The energy stored in residual waste is used in a very efficient way, for example to be fed into the district heating network
- Saving raw materials
  - by using secondary raw materials, e.g. glass cullet, waste paper, plastics, metals etc.
- Saving energy and emissions in industry through recycling and waste prevention

# Landfills and Climate Change

40% of waste worldwide still ends up untreated in dumpsites.

Direct landfilling of waste produces CO<sub>2</sub> and methane, both contribute negatively to climate change.

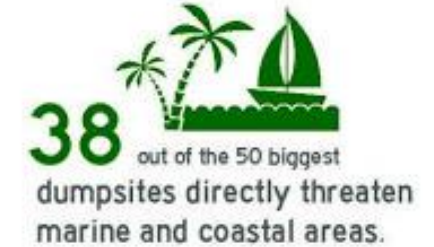
Globally, the waste management sector will contribute to 10% of global greenhouse gas emissions by 2025.

Therefore important first steps towards climate-friendly waste management are:

- Mechanical-biological or thermal treatment of waste as an alternative to landfilling
- State of the art landfills with a collection of landfill gas, so that it can be used energetically and not released into the atmosphere

## DUMPSITES:

A Global Health & Environmental Emergency



The 50 biggest dumpsites directly affect the daily lives of

**64 million** people, a population the size of France.



Big criminal business: the annual turnover of illegal waste dumps amounts to



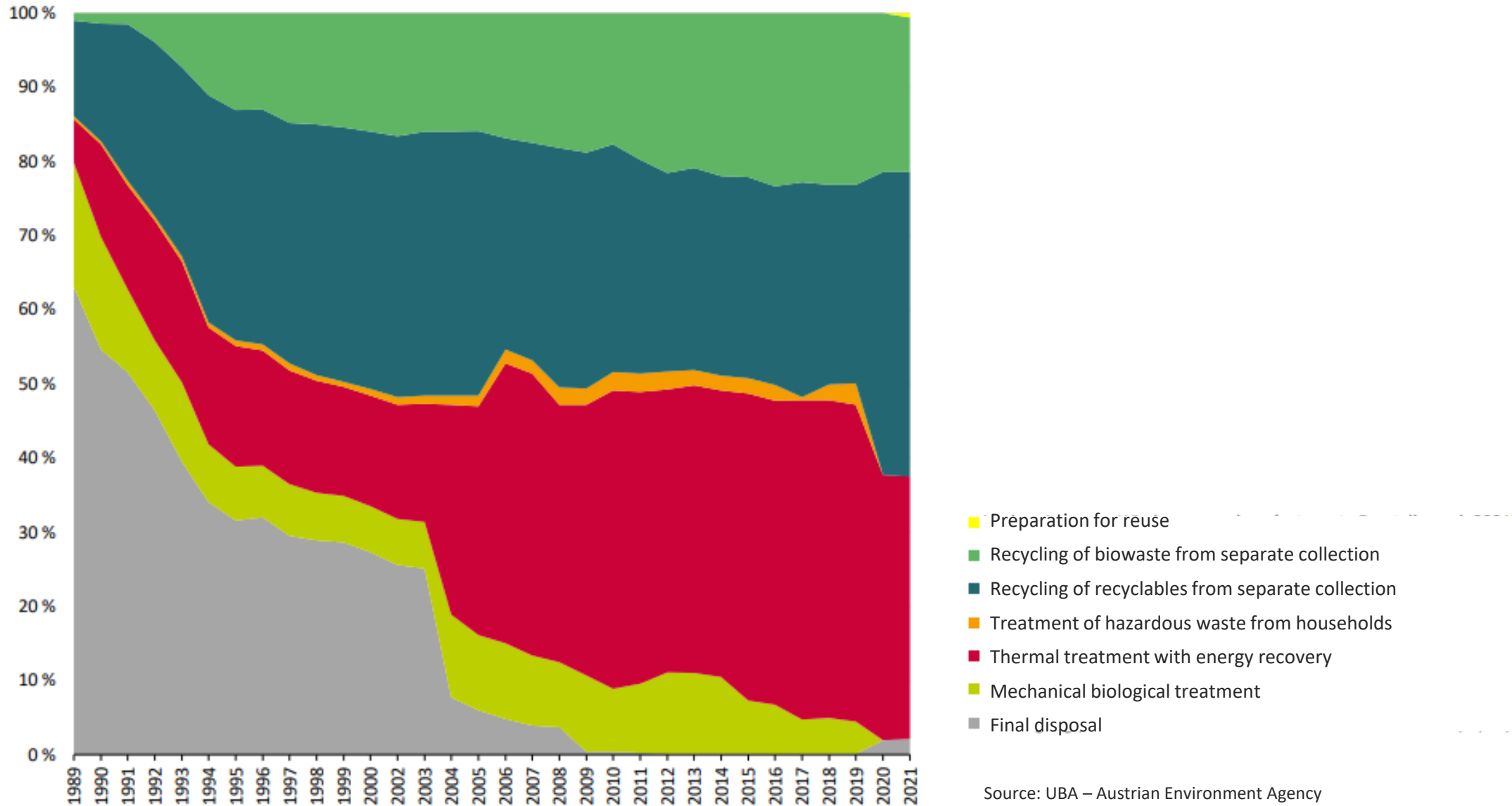
**10–12** billion USD.

Climate change: without action, dumpsites will account for



**10%** of GHG (Greenhouse Gas) emissions by 2025.

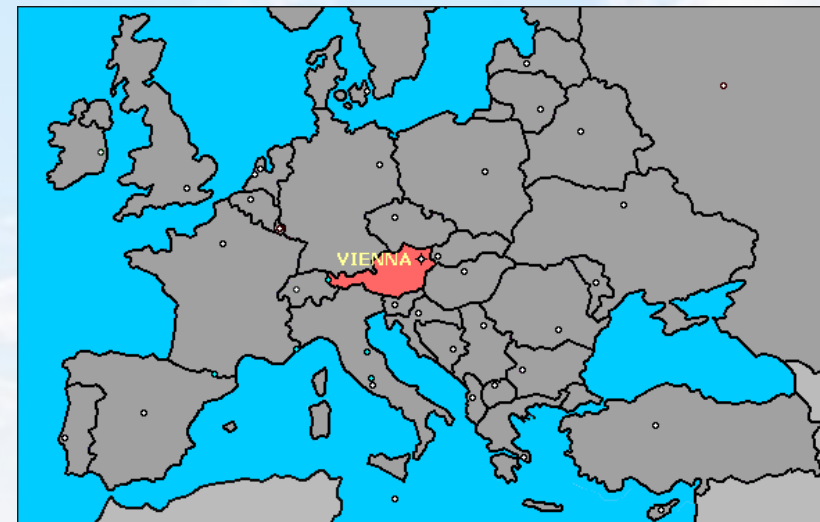
# Development of Municipal Waste Management - Example of Austria



Source: UBA – Austrian Environment Agency

# Vienna – Facts and Figures

Number of Inhabitants:	2 Mio.
Area of the City:	415 km <sup>2</sup>
Inhabitant/km <sup>2</sup> :	4 630
Households:	960 000
MSW generation:	473 kg/cap.a



# Municipal Waste Management in Vienna

The City of Vienna is responsible for the entire chain of municipal waste management:

**Planning - Collection - Treatment – Final disposal**

Operation: Municipal Department for Waste Management, Street Cleaning and Vehicle Fleet - **MA 48**

Planning/Design/Engineering/Construction/Financing/Consulting Services: **WKU**

# Municipal Waste Management Approach of the City of Vienna Follows the Waste Hierarchy

Fostering waste prevention and reuse

## Separate Collection

- Recyclables separated at source from residual waste
- Focus on high quality for material recycling



Waste Incineration with energy recovery of all residual waste

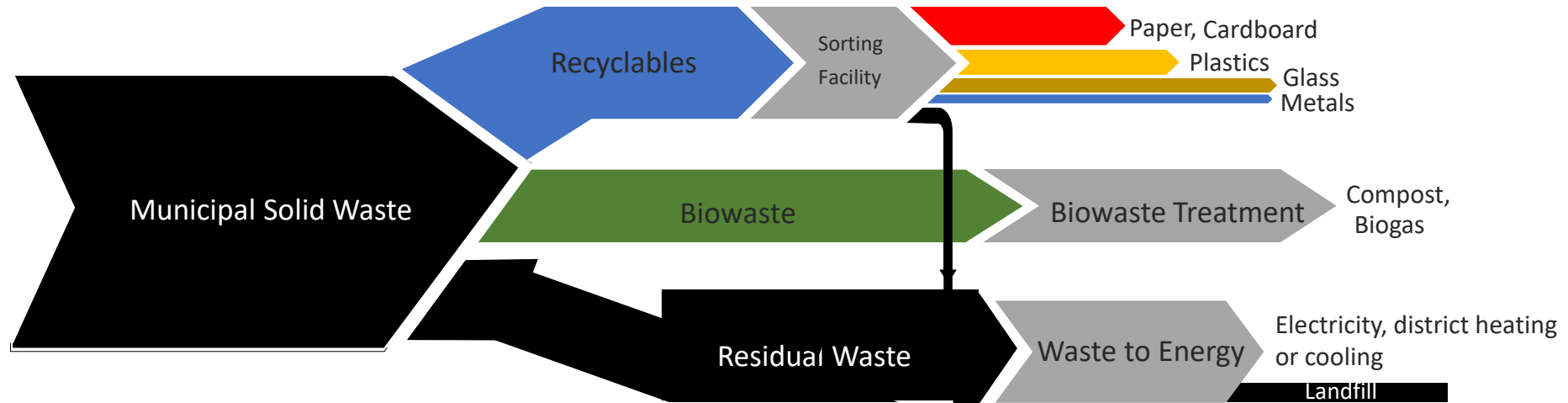
- Gaining Electricity and heating

- All waste must be treated before landfill
- Only inert waste may be deposited in a state of the art landfill
- Best environmental technology for any kind of waste treatment



# Design for Comprehensive Waste and Resource Management System

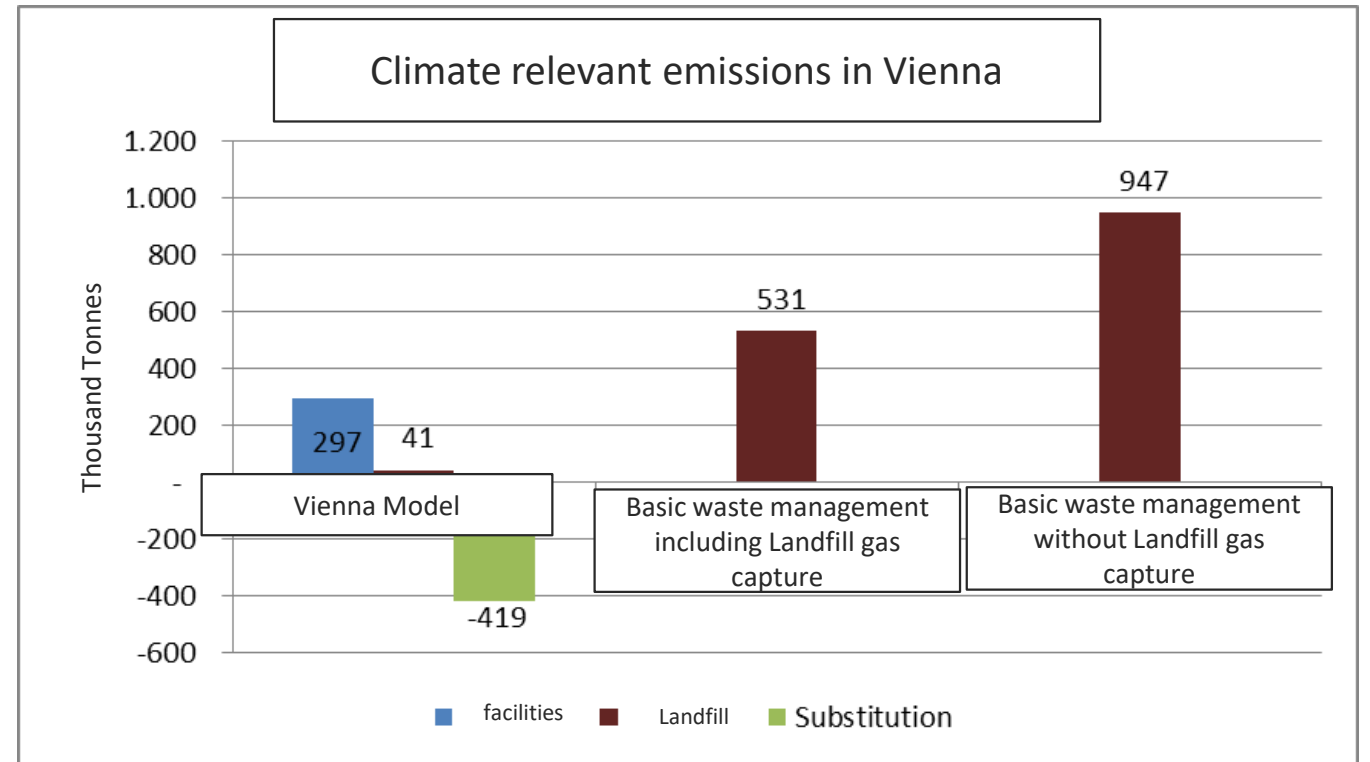
The right mix of treatment types is key to reach the goals towards climate neutral waste management



# Saving of CO<sub>2</sub> Emissions – the Viennese Model

In case all of Vienna's household waste were dumped without pretreatment and without landfill gas collection, the CO<sub>2</sub> emissions would be 947,000 tons.

The implementation of the Landfill Ordinance 2008, and other measures results in savings of more than 1 million tons CO<sub>2</sub>-equivalents per year.



The Vienna waste management system today has a positive CO<sub>2</sub>-e balance of -81,000 tons.  $(419,000 - (297,000 + 41,000)) = -81,000$  tons).

**This results in a saving of > 1 million tons of CO<sub>2</sub>-equivalents!**

$(947,000 - (-81,000)) = 1,028,000$  tons)

# The First Step to High-Quality Recycling: **Separate Collection**



230,000 Container for residual waste in Vienna

Choose the right bin for your waste!



225,000 Containers for separate collection in Vienna

# Why Packaging Waste is so Prominent on the Resource Management Agenda

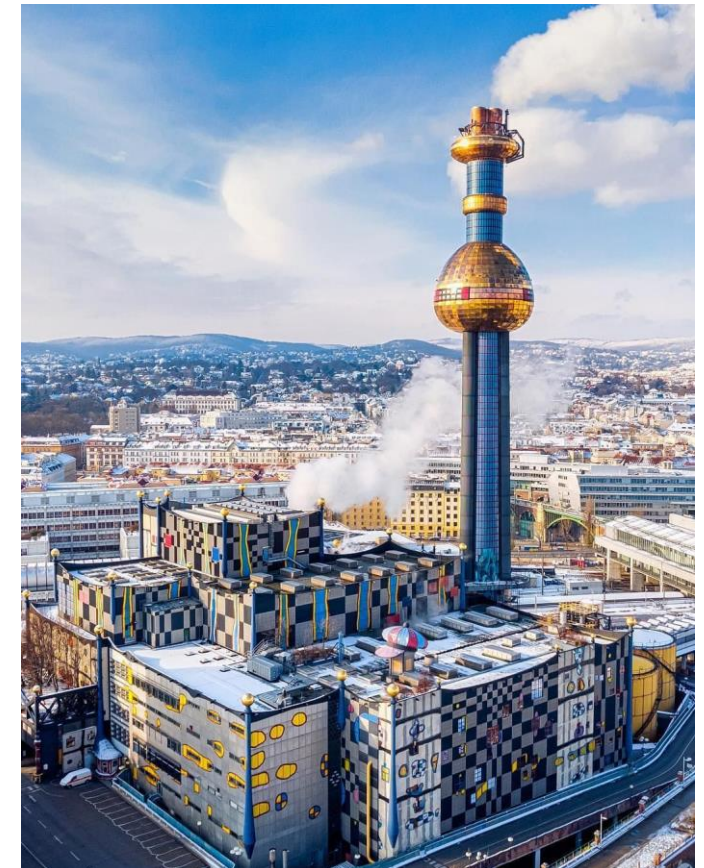
- Packaging waste constitutes about 25% of Municipal Solid Waste (MSW) and its main components paper, plastic, metal and glass are considered valuable secondary raw materials.
- Consequently, packaging waste became one of the prime targets for measures of waste reduction and qualified recycling within national waste management strategies.
- Legal basis with recycling targets have been set accordingly in the EU, including Extended Producer Responsibility Schemes.

# Waste to Energy Plays an Important Role for Comprehensive and Sustainable Waste Management

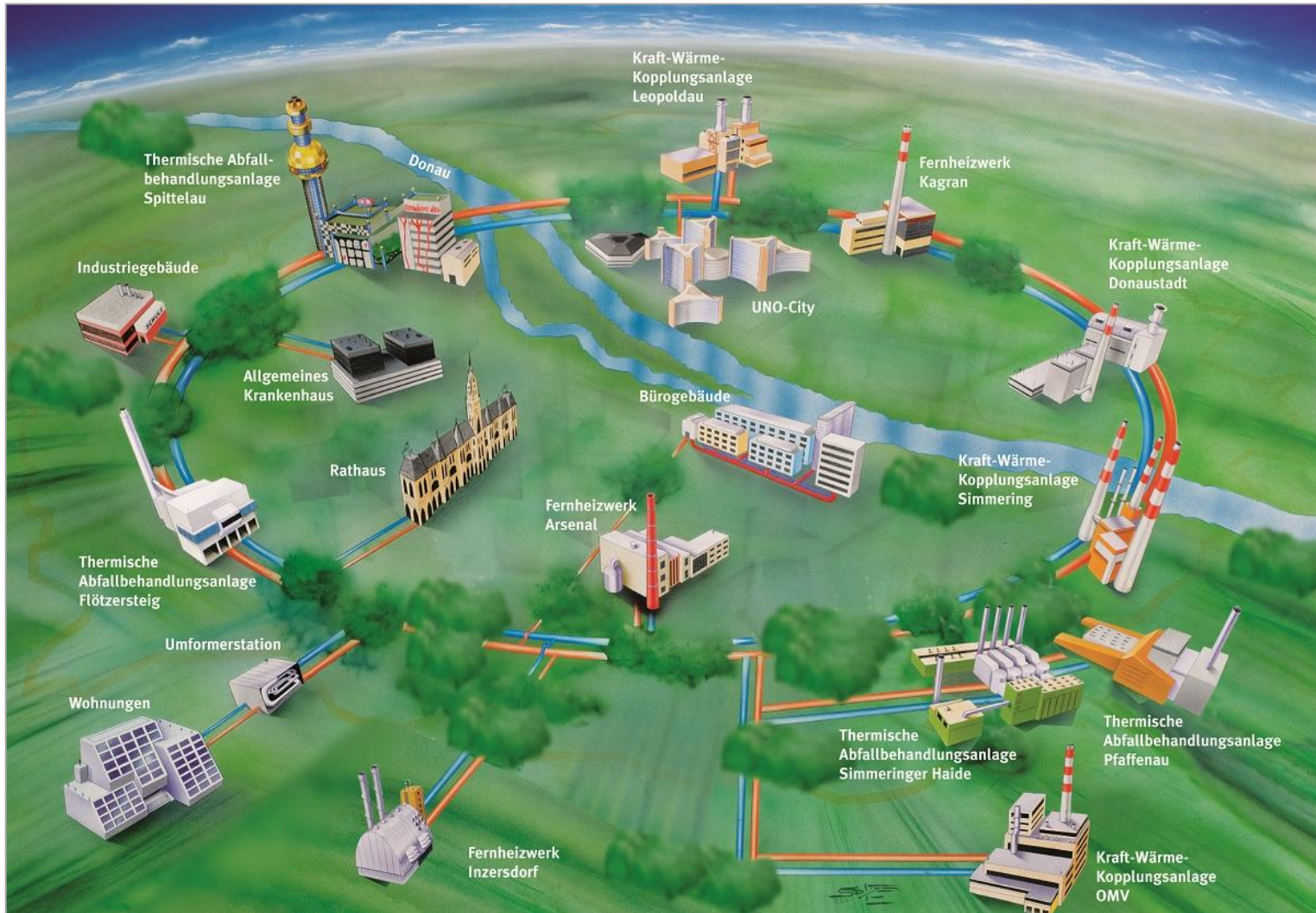
We run WtE plants for waste that cannot be recycled.

Waste incineration plants generate electricity, district heating and district cooling

As a result, primary fuels can be replaced – an important climate protection measure.



# District Heating and Cooling in Vienna through Waste to Energy



The district heating network of the city of Vienna is 1,300 km long

About 1/3 of the district heating demand is provided through thermal waste treatment and renewable energy sources.

In addition, there are 120 MWh of district cooling.

In Vienna, over 400,000 households are supplied with district heating.

# Treatment of Slags and Ashes after Waste Incineration

The end product of incineration are slags and ashes. Metals can be recovered from the incineration residues and can be sold to the recycling industry. The remaining slags and ashes are mixed with concret and then put on the landfill. These residues do not cause any emissions.

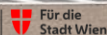


# Turn Biowaste in Sustainable Energy

Around 1,400,000 m<sup>3</sup> of biogas per year are created from kitchen waste.



City of Vienna



Für die Stadt Wien



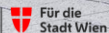
# Vienna has the Largest Municipal Composting Plant in Europe!

100,000 tons of garden waste turns into around 44,000 tons of A + compost.

& that saves  
9,000 tons of  
CO<sub>2</sub>  
per year

# We've got the E-Power

The first fully electric garbage truck in Austria



# The City of Vienna and Climate Protection – an Overview of Substitution Measures Already Implemented

- Waste prevention measures
  - Reuse shop
  - Viennese reusable cup
  - Viennese mobile tableware
- Making compost from garden waste
- Climate protection through recycling
- Biogas from the kitchen bin
- 4 incinerators
- Photovoltaic systems, heat pumps
- Facade greening
- Optimization of the collection
  - Route optimization
  - Yellow-blue bin
  - E-waste collection vehicle
- Optimization of the vehicle fleet

## Facts & Figures

- Manpower: app. 3,000 Employees
- Vehicle Fleet: app. 1,000 Vehicles
- Collection Infrastructure: app. 500,000 Waste bins and Containers
- 16 Recycling Centres
- 4 Waste to Energy plants  
Including Slag Treatment
- 1 Logistic Centre  
Including Sorting Plant
- 1 Composting Plant
- 1 Biogas Plant
- 1 Landfill



## Key Success Factors for Efficient and Environment Sound Waste Management

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- Strong and suitable legal basis
- Clear rules concerning responsibilities and competences
- Continuously and strict Monitoring
- Gate fees for landfill have to be sufficiently high
- Suitable planning, design and engineering
- Public Relations & Awareness rising
- State of the art facilities
- Obligation for all households to take part in the waste management system and pay the contribution accordingly.

# At a Glance

- Efficient and environmental sound waste management is based on different pillars. A combination of efficient and suitable measures and facilities is needed to reach the highest standards in waste management. This combination comprises of separate collection, recycling, waste to energy facilities and sanitary landfills for the residues.
- Vienna started already decades ago to establish sustainable waste management.
- The city of Vienna runs all waste management plants at the state of the art level; with that we have the best and longstanding expertise.
- Functioning waste and resource management is important for the quality of life for a city. And this is one reason Vienna has been awarded the most liveable city worldwide according to different studies.