



## **10º Congreso Nacional del Medio Ambiente (Conama 10)**

**Valorización energética de residuos: análisis de gestión y perspectivas**

**Saving resources and protecting the climate – waste policy concept of Alliance 90 / The Greens in Germany**

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## Sustainable Waste Policy

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# Saving resources and protecting the climate – waste policy concept of Alliance 90 / The Greens in Germany

Conama 10 Madrid, November 24th, 2010

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# Sustainable Waste Policy

## Content

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- Who we are
  - What is waste?
  - Germany's waste policy today
    - investments, successes, benefits
  - What needs to be done?
  - The Green 2020 Waste Concept
    - Green measures for “closing the loop”
  - How to deal with what is left?
    - Landfilling, Pyrolysis, MBT, Waste to Energy
  - Conclusions
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## Sustainable Waste Policy

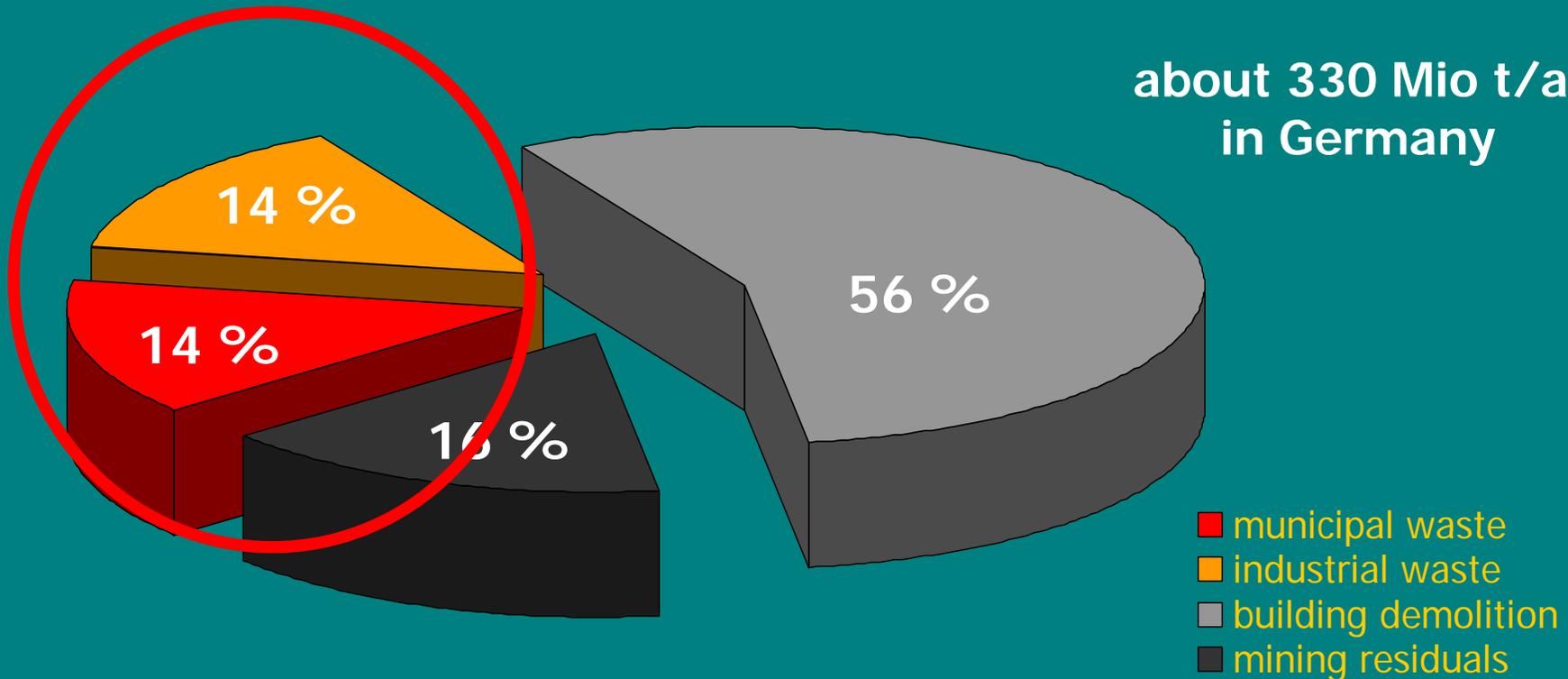
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### Alliance 90/The Greens -Who we are

- Our Mission: party of peace, social fairness, protection of the environment and sustainable development.
  - In German Parliament for more than 25 years. National election results up to 10.7 %.
  - From 1998 – 2005 part of the government; Mr. Jürgen Trittin was the first “Green” Federal Minister for Environment.
  - Key Green successes: phasing out of nuclear power, passing the Renewable Energy Act and implementation of CO<sub>2</sub> emission trading.
-

## What is waste?

about 330 Mio t/a  
in Germany



- Municipal waste is not the largest segment, but due to its inhomogeneous consistence it is responsible for the main part of the problem.



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### “Milestones” in waste regulation since the 90's

- Technical Guidance for Municipal Solid Waste 1991
  - Packaging Regulation 1992 (light weight packaging)
  - 17. Regulation to the Clean Air Act for waste incineration plants 1992
  - Law on Cycle-Waste-Management 1996
  - Regulation on Organic Waste 1998
  - Regulation on Disposal of Waste 2001 (obligation to treat before landfillig, directive under Green government)
  - Regulation on Waste Electrical and Electronic Equipment 2005
-

## Benefits of separately collection and recycling

1990

2004



- 130 Mio. tons  
CO<sub>2</sub> eq./a

2 Mio. tons/a

8 Mio. Tons/a

Organic waste, garden waste

0 tons



- 2,300 Mio. tons  
CO<sub>2</sub> eq./a

4.7 Mio. tons/a

Light weight packaging

## Benefits of separately collection and recycling

1990

2004



- 6,000 Mio. tons  
CO<sub>2</sub> eq./a

1.6 Mio. tons/a  
Paper, cardboard

7.7 Mio. tons/a (recycling quota of 80 %)



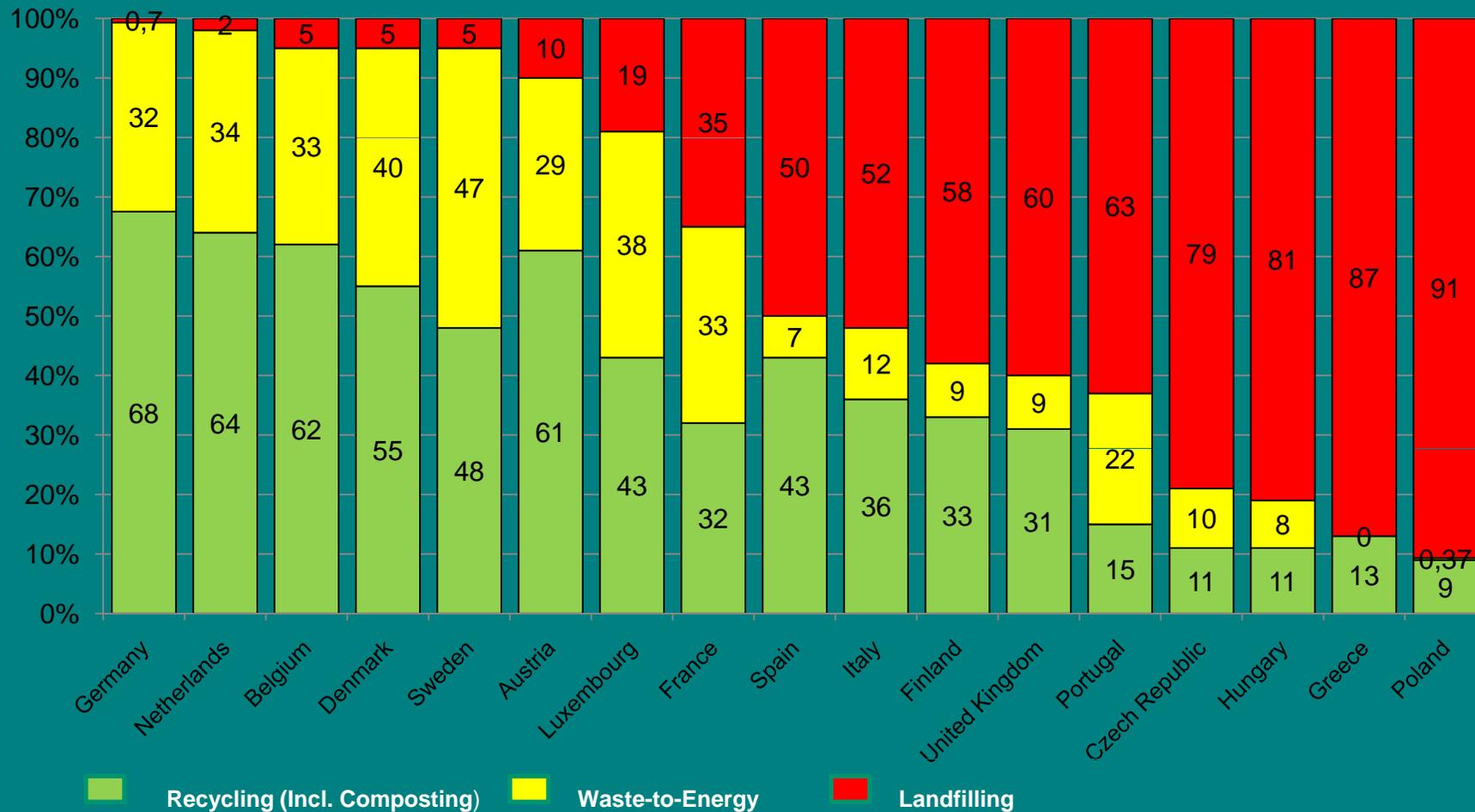
- 900 Mio. tons  
CO<sub>2</sub> eq./a

1.3 tons/a

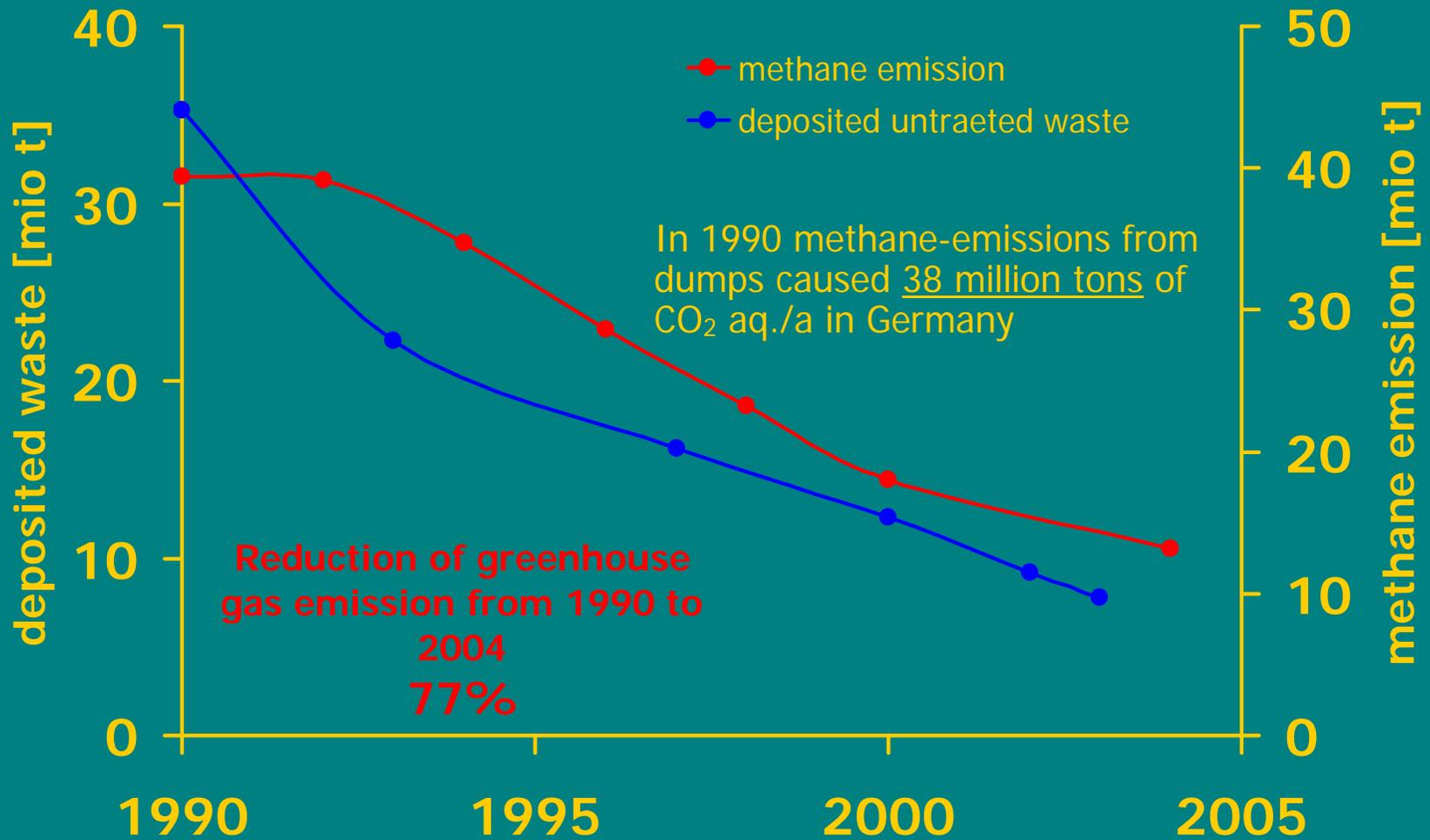
3.1 Mio. tons/a (recycling quota of 80 %)

Glass

## Treatment of MSW in the EU 27 in 2006



## Climate benefits of treating waste before landfilling





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### Benefits for the environment and the economy

#### Waste treatment

- is climate protection:
  - collection und recycling is responsible for savings of 17,000 Mio. tons CO<sub>2</sub> eq.,
  - 4.5 % reduction of greenhouse gas emissions since 1990 in Germany (56 Mio. tons CO<sub>2</sub> eq.)\* ,
- is a job engine. 250.000 employees in waste economy in Germany in 2006,
- is a business with a turnover of 50 Bill. Euro per year in Germany,
- is a lead market for environmental technologies and technology transfer.

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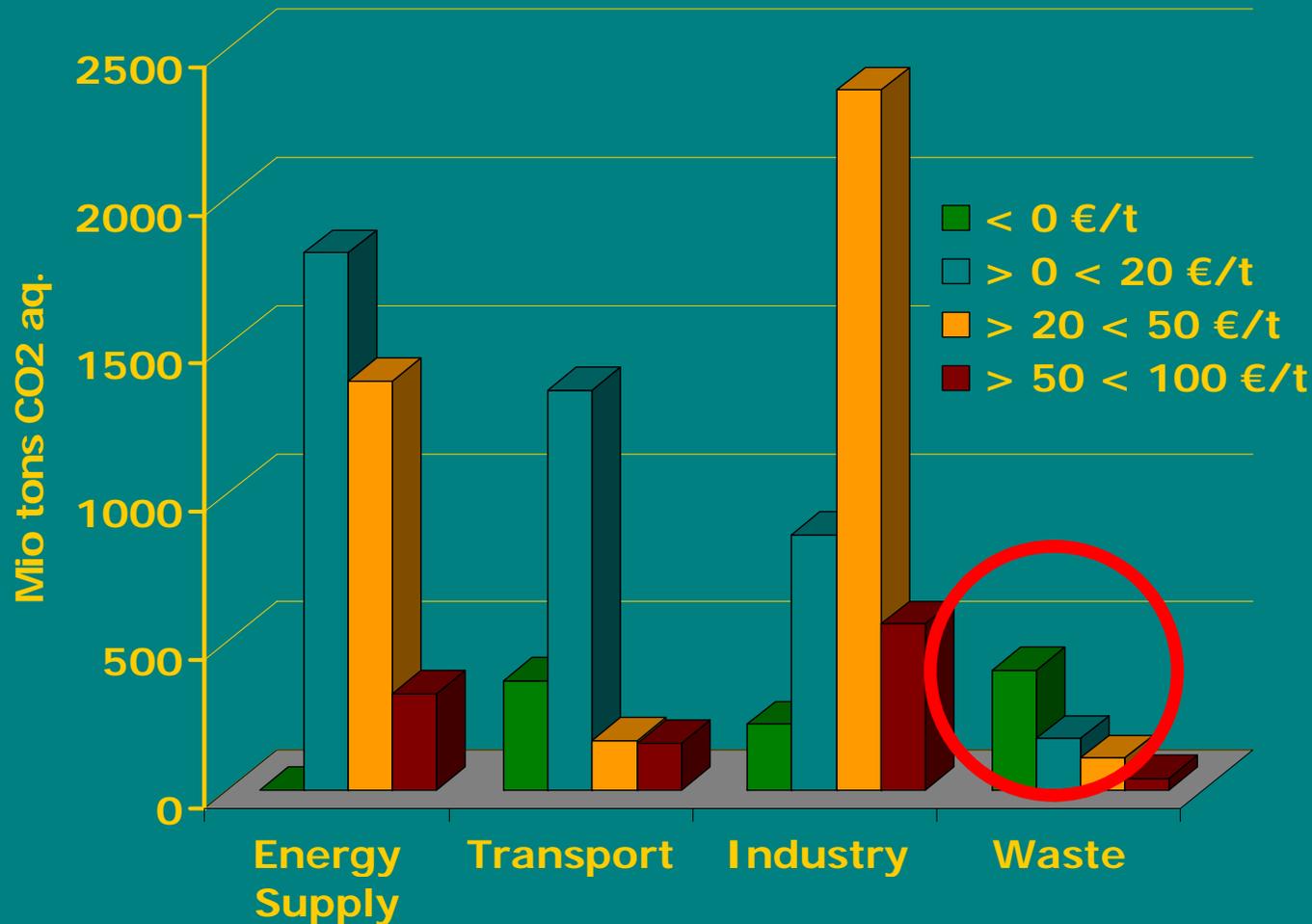
\* witch outphasing landfills + increased recycling and recovery activities

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## Costs in GHG reduction

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Waste treatment equals low costs for climate protection





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**So is everything going fine?**

**Can we sit back and relax now?**

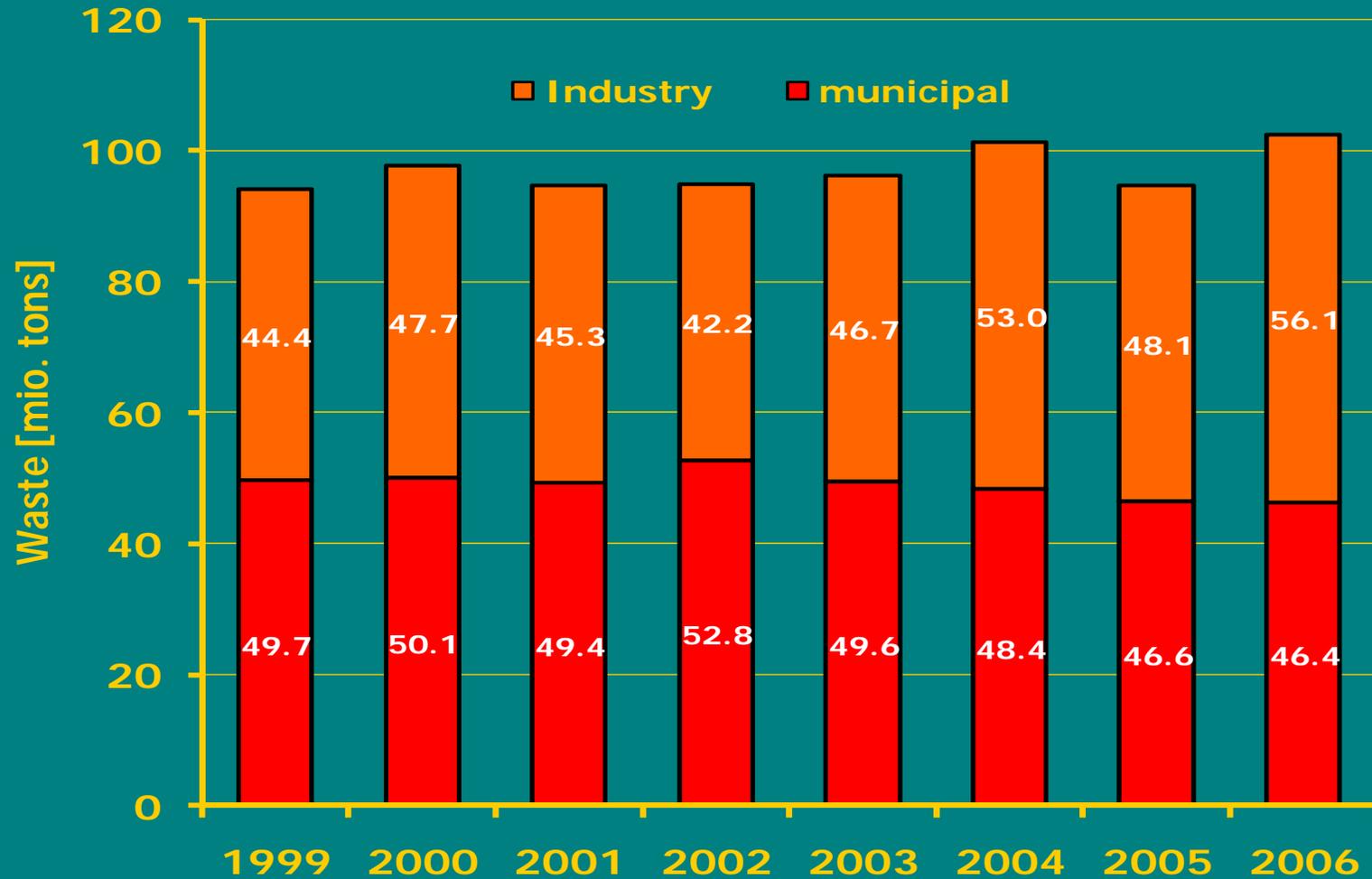
**No, there is still a lot of work do to!**

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## What needs to be done

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No avoidance of waste (!)

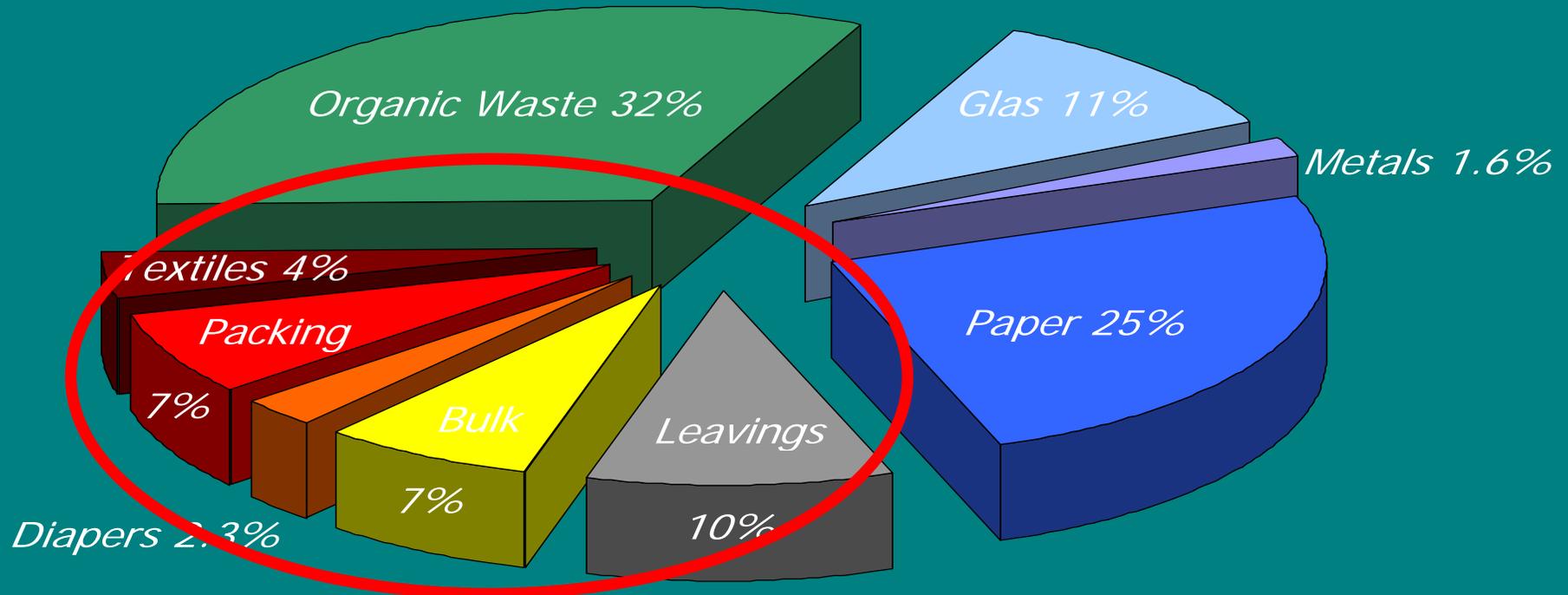


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## What needs to be done

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### Challenges in the recycling process





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# Plastic as a source of concern

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### Advantage:

- light and stable, more and more substitution of metals and glass, high potential to save energy during production and lifetime

**But: In Germany “only” 20 % of plastic waste goes into recycling, the greater part is still being converted to energy**

### Reasons:

- “the smell of waste lasts for ever”
- Plastics are a large variety of very specific and different products
- strong technical limits of using plastic as recycling material
- Recycling process could course more environmental impact than incineration or landfilling
- during capture and processing up to 50 % sorting rests!
- sooner or later even recycling materials become a not recyclable waste (Problem of downcycling)!



## Bioplastics as part of the solution

- Biodegradable Bioplastics



### Advantages:

- renewable raw material,
- ideal for packaging of food,
- can substitute mineral oil,
- compostable,
- waste avoidance in landscapes,
- waste to energy is more or less climate neutral!

## Bioplastics as part of the solution II

- non biodegradable bioplastics



### Advantages:

- renewable raw material,
- can substitute mineral oil in many products,
- if not recyclable, waste into energy is more or less climate neutral!





## Sustainable Waste Policy

### Closing the cycle in 2020

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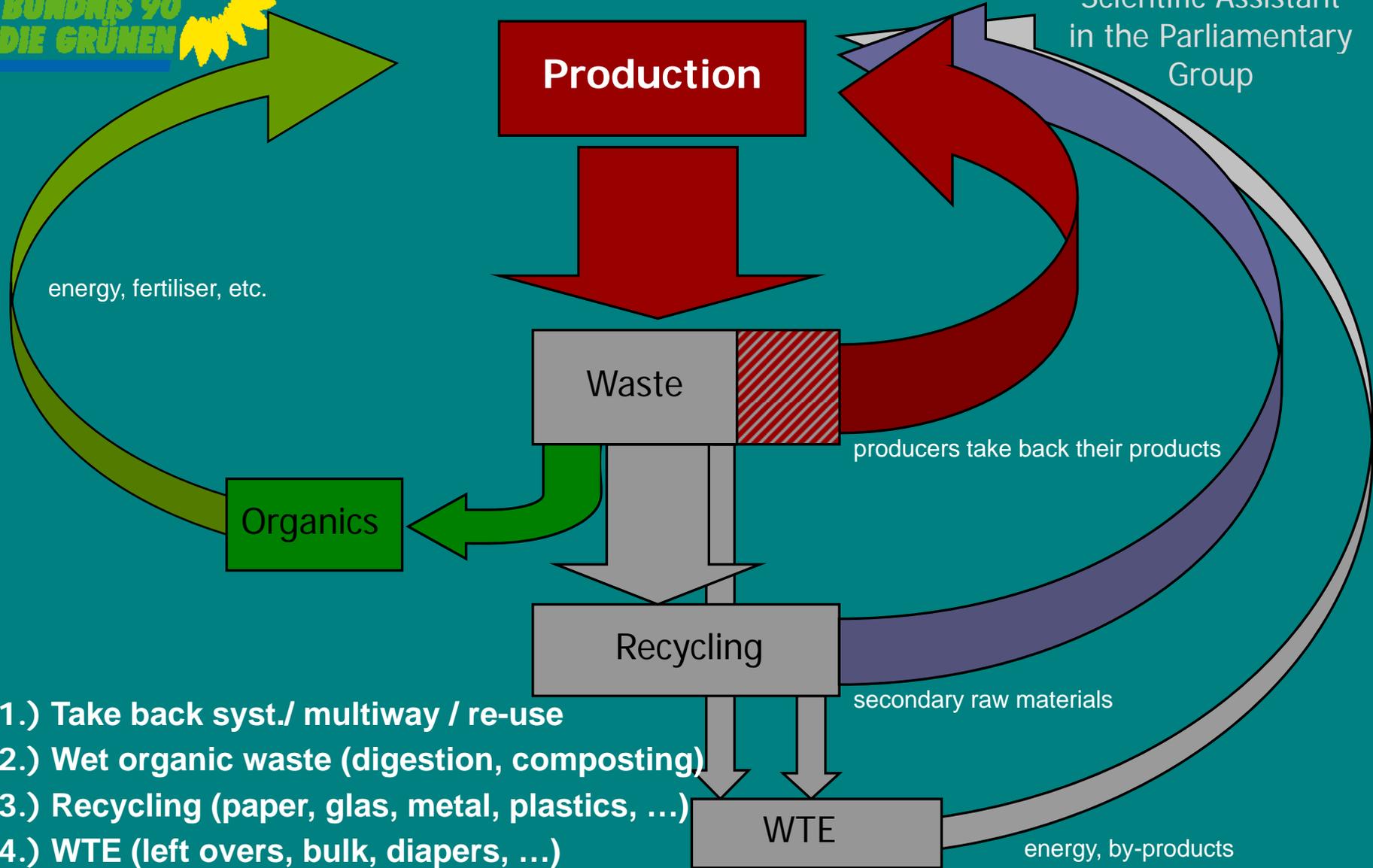
#### Cornerstones of the Green 2020 Waste Concept

- 1.) Focus on avoiding wastes by introducing a new compulsory public charge / tax on raw materials.
  - 2.) More production of reusable, renewable and recyclable products by implementing producer responsibility. This supports an integrated product design. Unsustainable products must be fined or made more expensive
  - 3.) Automatic sorting of the residual waste and recovery of all valuable substances by ambitious recycling quotas and complete ban on landfilling in 2020.
  - 4.) **All unavoidable and unusable residues must be used to generate energy - duty to use the best available technology".**
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# The Green 2020 Waste Concept

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- 1.) Take back syst./ multiway / re-use
- 2.) Wet organic waste (digestion, composting)
- 3.) Recycling (paper, glas, metal, plastics, ...)
- 4.) WTE (left overs, bulk, diapers, ...)

**no more landfilling**



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### How to deal with residues today?

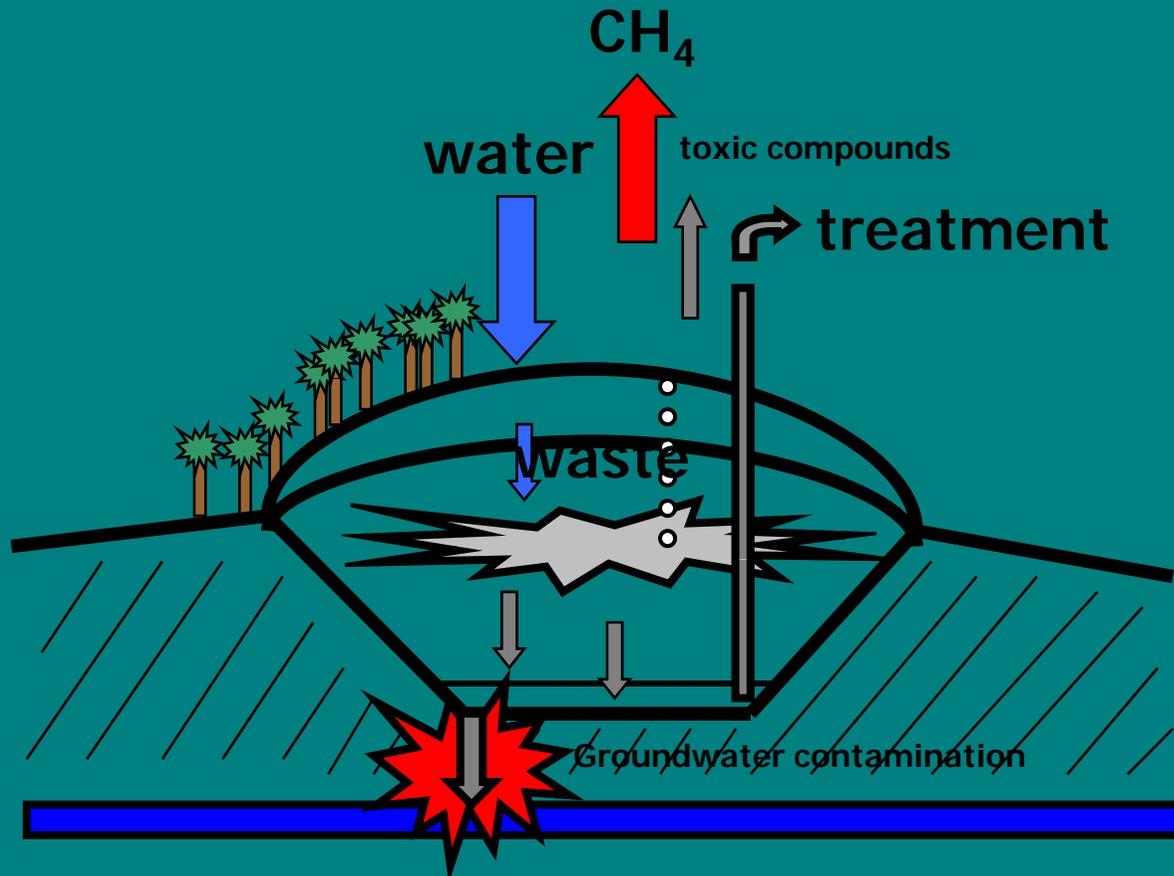
#### Alternatives:

- Landfilling / landfilling with methane recovery
- Pyrolysis, gasification and others
- Mechanical Biological Treatment
- Incineration

### Waste to energy versus landfilling?

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## Landfilling causes problems



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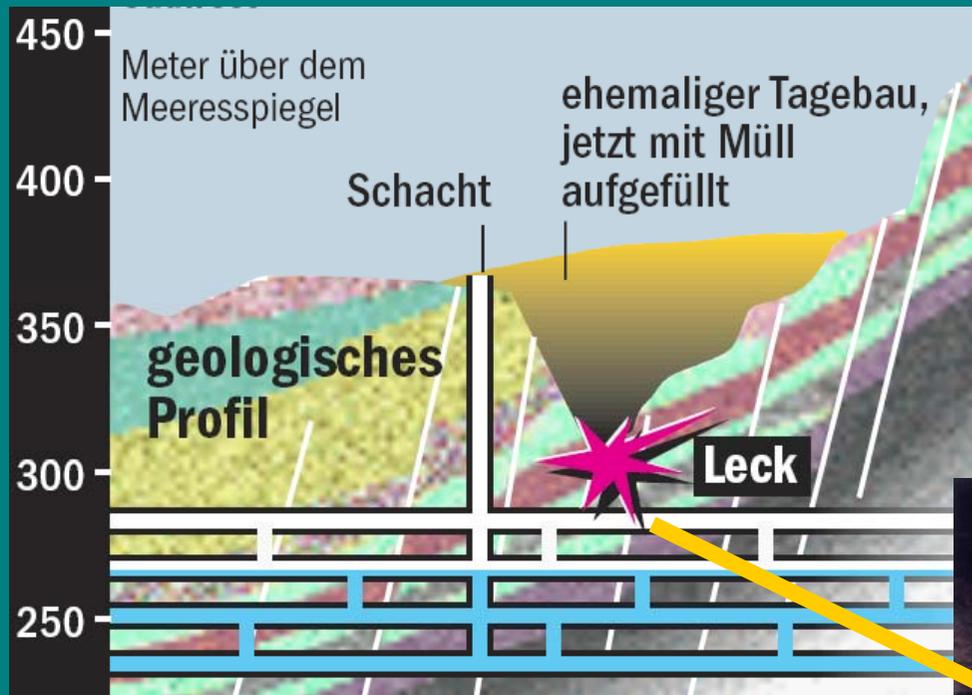
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### Components of landfill gas

Methane	CH <sub>4</sub>	up to 65 Vol.%
Carbon Dioxide	CO <sub>2</sub>	up to 65 Vol.%
Carbon Monoxide	CO	up to 2,8 Vol.%
Ammonia	NH <sub>3</sub>	up to 0,35 ppm
Hydrogen Sulphide	H <sub>2</sub> S	up to 700 ppm
Acetaldehyde	CH <sub>3</sub> CHO	up to 150 ppm
Benzene	C <sub>6</sub> H <sub>6</sub>	up to 800 ppm
Vinyl Chloride (VC)	C <sub>2</sub> H <sub>3</sub> Cl	up to 72 mg/m <sup>3</sup>
Dichlormethane	CH <sub>2</sub> Cl <sub>2</sub>	up to 2400 mg/m <sup>3</sup>
Chloroforme	CHCl <sub>3</sub>	up to 11 mg/m <sup>3</sup>
Trichloroethylene	C <sub>2</sub> HCl <sub>3</sub>	up to 251 mg/m <sup>3</sup>
Tetrachloretylene	C <sub>2</sub> Cl <sub>4</sub>	up to 182 mg/m <sup>3</sup>
...		

## Danger for groundwater and the environment

Leaching - example "Mechernich" Germany 1996



Barrier: plastic layer  
of 2.5 millimetre



Leakage of heavy metals!  
+ waste and even plastic bags

## Toxic compounds of leaching water

Lead	Pb	up to 1.0 mg/l
Arsenic	As	up to 1.0 mg/l
Cadmium	Cd	up to 0.1 mg/l
Mercury	Hg	up to 0.05 mg/l
...		
AOX		up to 3.5 mg/l

In samples of an MSW – Landfill site

AOX: Organic halogens subject to absorption. This is a measure of the amount of chlorine (and other halogens) combined with organic compounds.

### Problems with landfill sites cont.

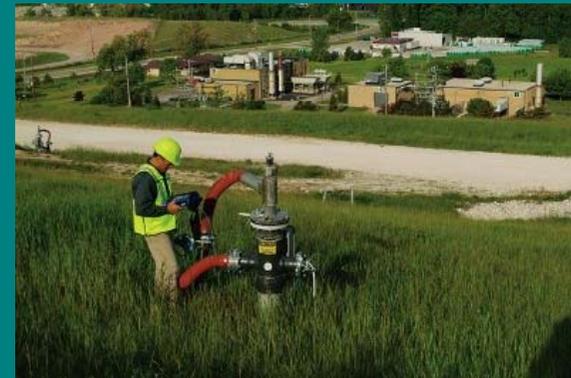
- Landfill sites are black boxes, with uncontrolled biological and chemical processes.
- They need intensive care for generations, leaching water has to be treated for years.
- Permanent danger of leaks and rents, with major impacts for groundwater and soil. Such problems are usually not reparable.
- **This is why the Greens are campaigning to entirely end the disposal of waste from human settlements on landfill sites by 2020.**



### Landfilling with Methane recovery

- Methane capture /recovery is a practical way of dealing with existing old landfills only.
  - Only up to a maximum of 50% of methane is being captured
  - high costs for landfill security
  - problem of leaches and danger of groundwater contamination is not solved
  - no sustainable solution black box
  - probably later need for remediation

**This technology is not for the future!**



### Pyrolysis, gasification and others

Experiences made in Germany in the past were not successful - High costs with poor results

- “Babcock- pyrolysis” capacity only 26.000 t/a in the 80’s
- “Schwel-Brenn-Verfahren” pilot plant never worked regular
- “Thermoselect” only one facility end in 2004, loss of 400 Mill. €
- “PKA –process” since 2007 off duty
- “black pump” 2004 sold for one Euro, since 2007 using coal
- ...

**These technologies have not shown reliability so far!**

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### Mechanical Biological Treatment

#### Mechanical Biological Treatment:

- separation of waste stream in a recycling chain (metal, wood), a solid fuel strain (paper, plastics) and the biological treatment of the almost organic rest with a following landfilling.
  - there are still technical problems
  - bad market for solid fuel
  - landfilling is still necessary

**This technology is to be seen as an intermediate solution!**



Explosion in MBA in Göttingen 2006

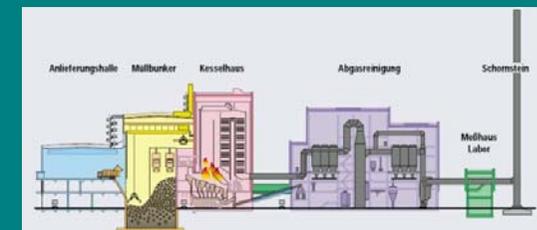


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## Incineration

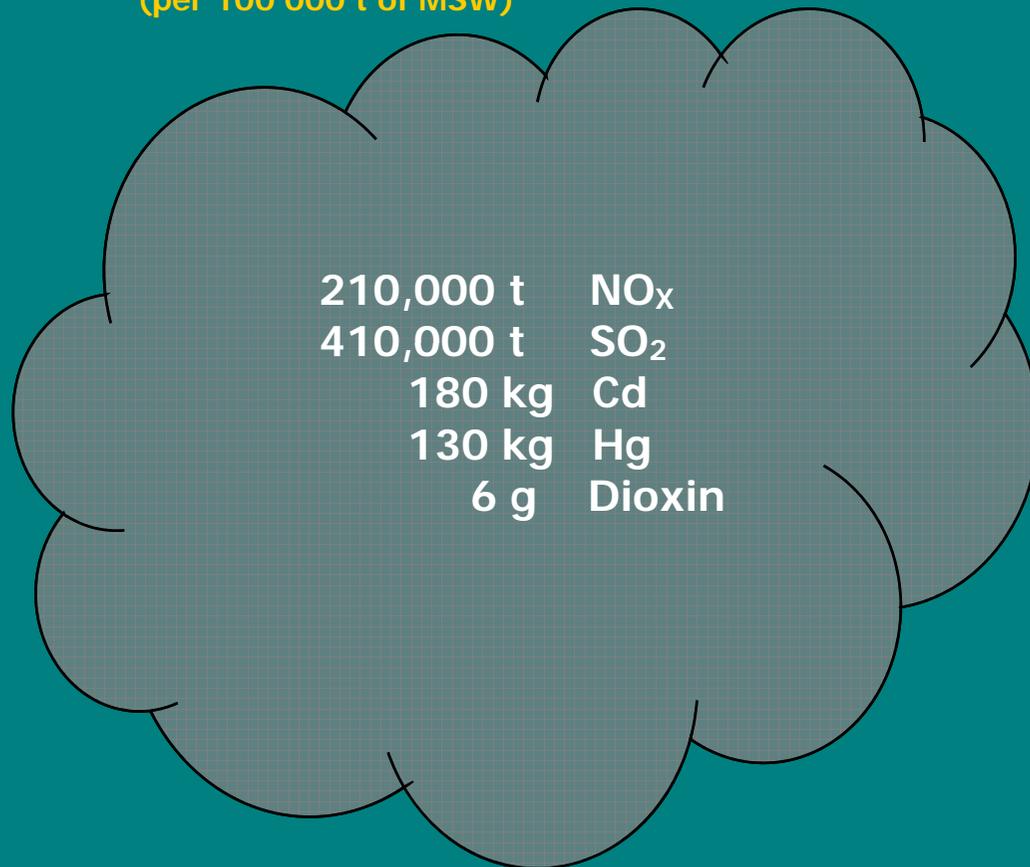
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- Advantage: proven technology for many years
- When using a facility with the best available technology - very low environmental impact:
  - recovery of heat and electricity
  - low emissions
  - use of different by-products by producing acid and gypsum
  - use of ashes e.g. in the construction industry
  - no landfilling, only small amount of the input has to be left over to be deposited in the subsoil
  - potential to be developed into more decentralized, flexible structures
  - producer responsibility leads to products free of harmful substances, like heavy metals, means future potential for much lower emissions

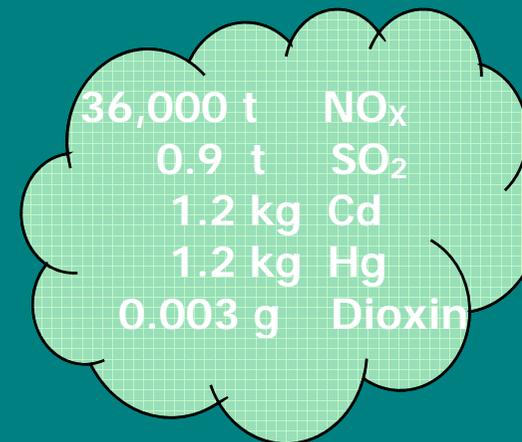


## Emissions from waste incineration in Germany

(per 100 000 t of MSW)



**before 1990**



**today**

## Reliability is of high importance

Missing it is definitely the worst case for our environment!

- examples: Napoli, Italy and not working MBT Technology





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### Conclusions

- Avoiding waste and ambitious recycling quotas have to be the major Elements of a waste concept, but they cannot be sufficient to solve all problems related to municipal waste.
  - Recycling has limits, e.g. plastic, hygienic products like diapers, and others...!
  - Even recycling products become waste after use, problem of "downcycling".
  - Using the best available technology for the incineration of residual waste leads to less impact on the environment and on the climate than landfilling.
  - Environmental commitment is an important requirement for developing cleaner incineration technologies.
-



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### There are still challenges to face

A sustainable waste management is a central element of environmental and climate protection. This includes

1. establishing re-use and take back systems;
  2. closing the cycle for raw materials, including integrated product-design and increased recycling;
  3. no more landfilling at the earliest possible point;
  4. residues should generate heat and electricity – using the best available and reliable technology.
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**Thank you for your  
attention**

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## Sustainable Waste Policy

### The Role of the Greens

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- In the 80's against Incineration because of low emission standards (in particular Dioxin).
  - During the 90's Greens environmental commitment became successful: cleaner incineration technologies became available.
  - The awareness about global warming as a major problem grew in the 90's. Methane emissions from landfill sites were recognized as a serious problem in this respect.
  - Today: Waste to Energy with low emissions is accepted to play a secondary part in a waste concept. Requirements:
    - no shift of problems from landfill to air
    - use of byproducts such as heat and electricitycapacities of incineration must be matched with regional demand.
-