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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CONAMA10
CONGRESO NACIONAL
DEL MEDIO AMBIENTE

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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

Sustainable Waste Policy

Content

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- Who we are
- What is waste?
- Germanys 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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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_2 emission trading.**

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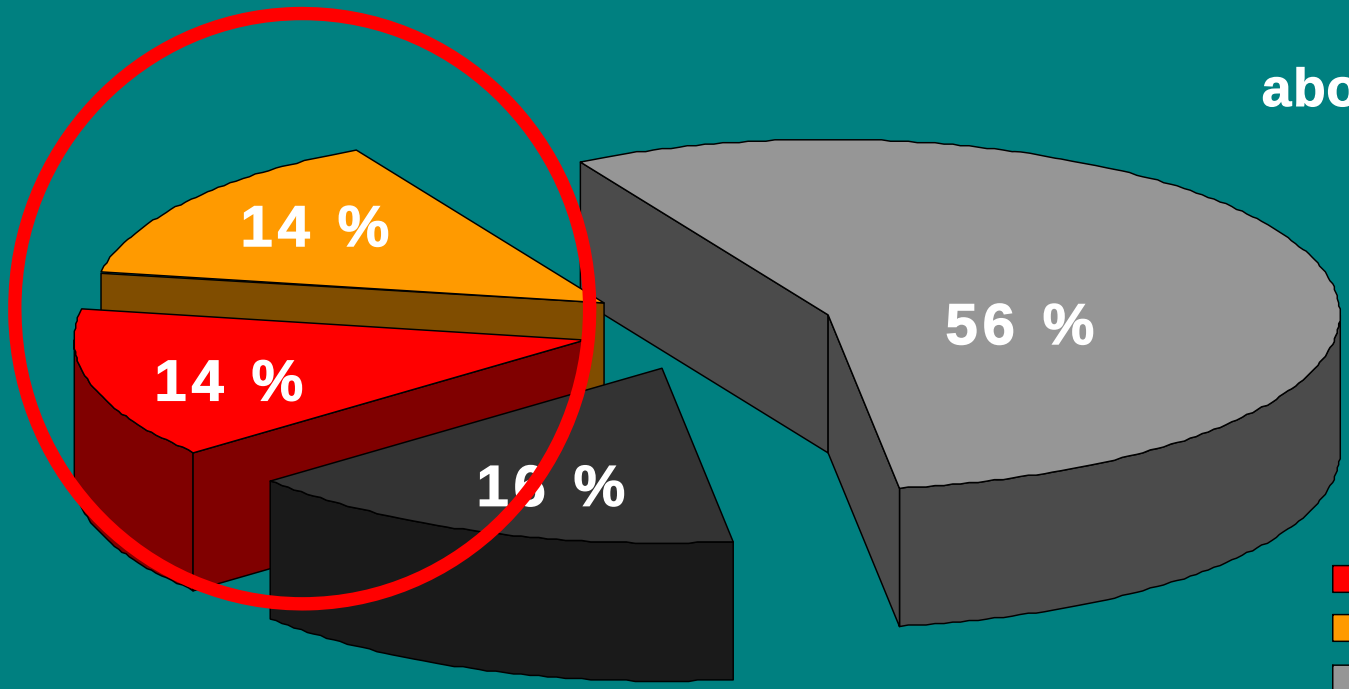
What is waste?

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.**

source: Stat. Bundesamt 2007

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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**

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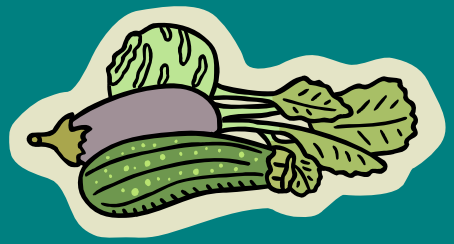
Benefits of separately collection and recycling

1990 **2004**



- 130 Mio. tons CO_2 eq./a

2 Mio. tons/a **8 Mio. Tons/a**

Organic waste, garden waste

- 2,300 Mio. tons CO_2 eq./a

0 tons **4.7 Mio. tons/a**

Light weight packaging

Research report from BMU/UBA/Oeko-Institut/ifeu, January 2010

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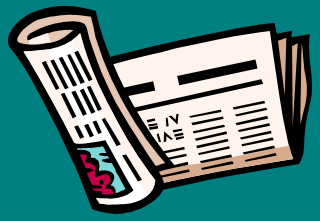

- 6,000 Mio. tons CO_2 eq./a

1.6 Mio. tons/a

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

Paper, cardboard

- 900 Mio. tons CO_2 eq./a

1.3 tons/a

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

Glass

Research report from BMU/UBA/Oeko-Institut/ifeu, January 2010

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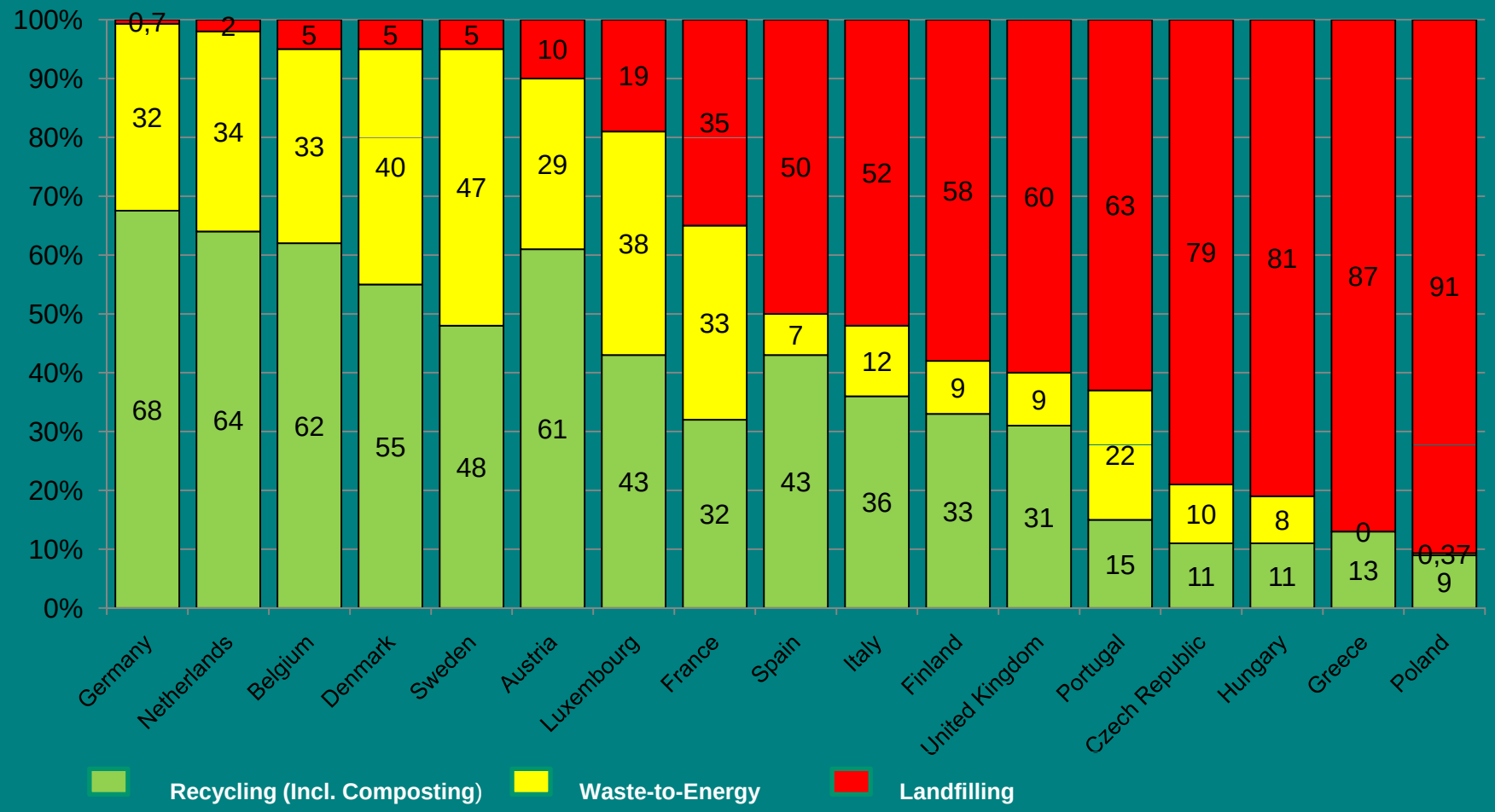
Treatment of MSW in the EU 27 in 2006



Source: EUROSTAT

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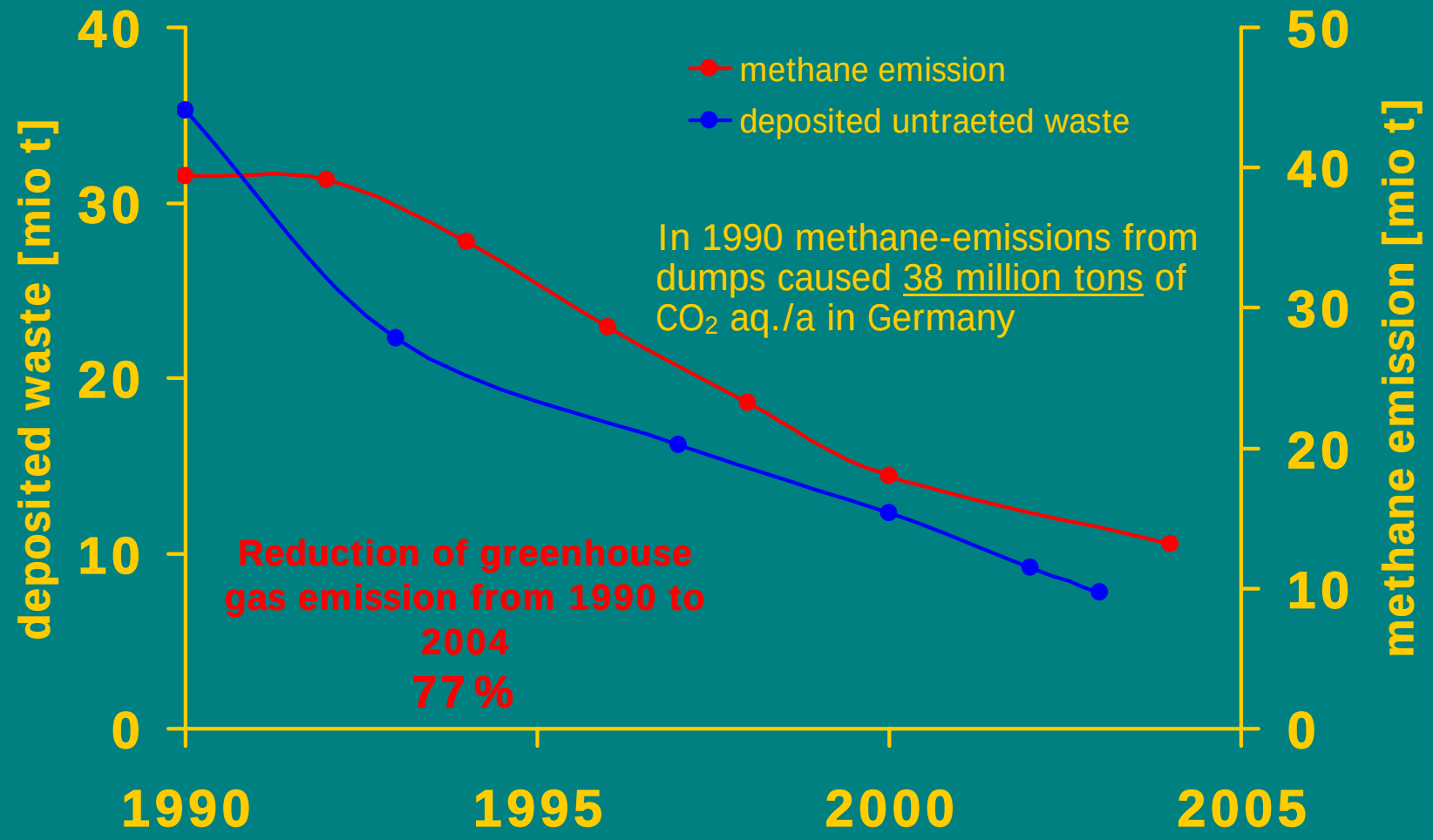
Climate benefits of treating waste before landfilling



Data from German Environmental Agency, Dessau 2006

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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_2 eq.,
  - 4.5 % reduction of greenhouse gas emissions since 1990 in Germany (56 Mio. tons CO_2 eq.)*,
- **is a job engine. 250.000 employees in waste economy in Germany in 2006,**
- **is a business with a turnover of 50 Bill. €uro per year in Germany,**
- **is a lead market for environmental technologies and technology transfer.**

*** witch outphasing landfills + increased recycling and recovery activities**

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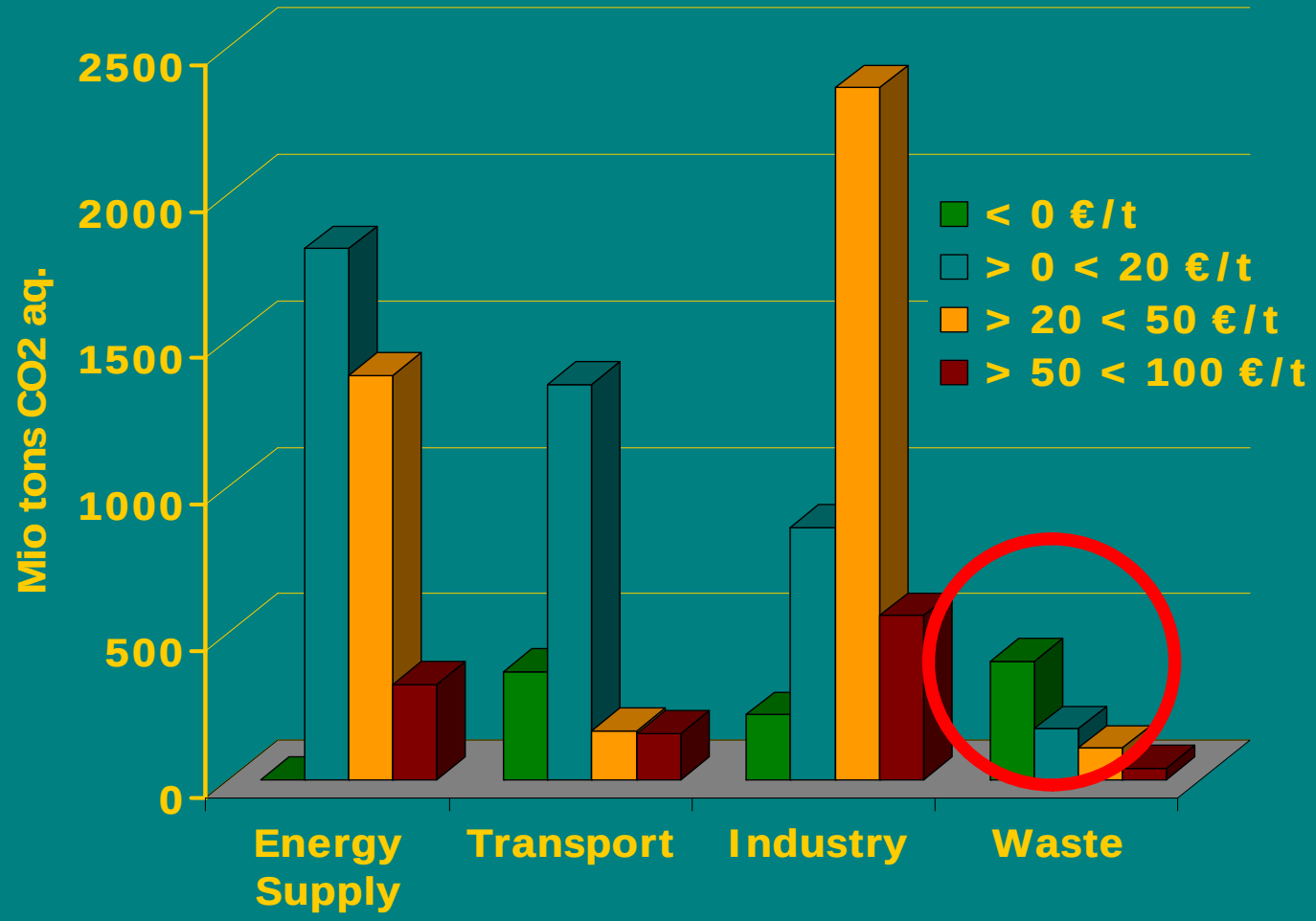
Costs in GHG reduction

Waste treatment equals low costs for climate protection



source: PIK Potsdam 2009

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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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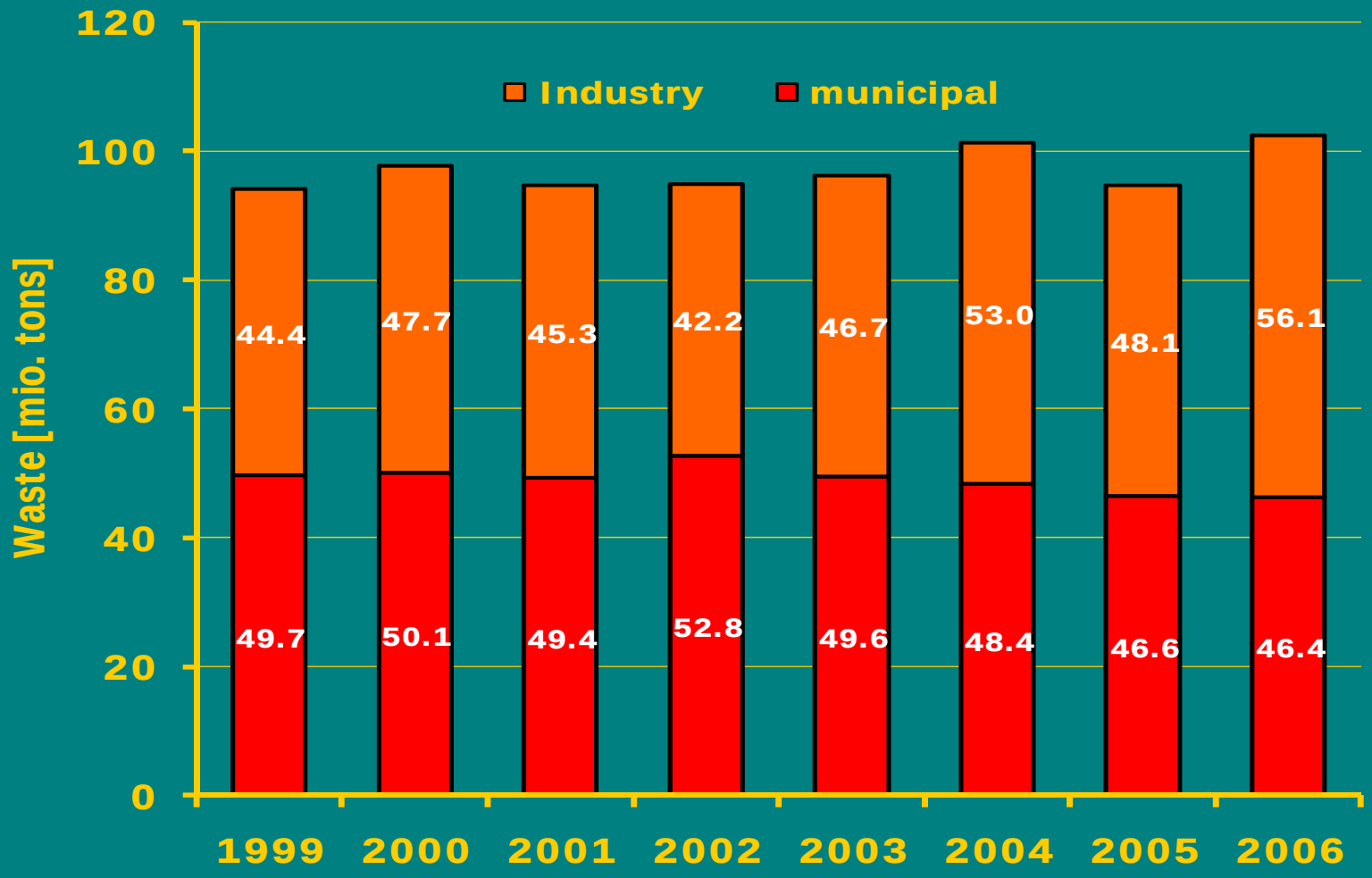
What needs to be done



No avoidance of waste (!)

source: Stat. Bundesamt 2007

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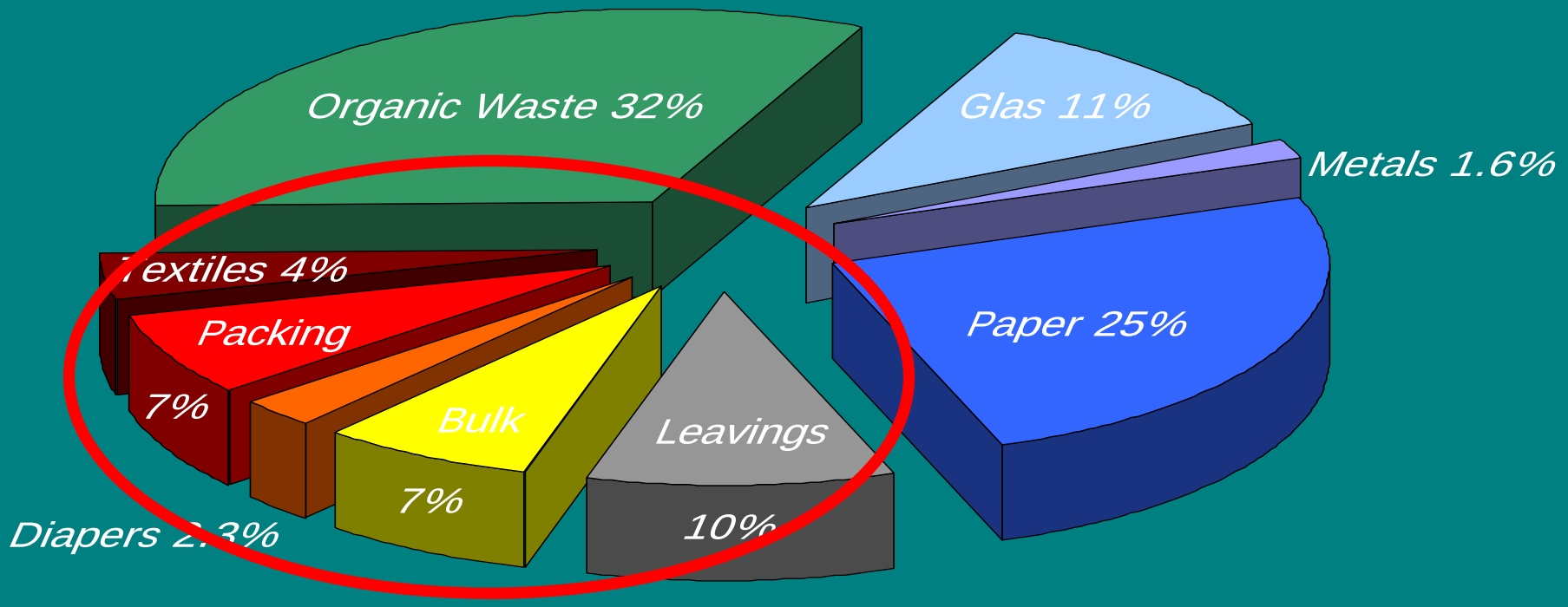
What needs to be done

Challenges in the recycling process



source: IFEU, Heidelberg, study municipal waste 2006

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Plastic as a source of concern

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)!

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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!**

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Bioplastics as part of the solution II

- **<u>non</u> 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!**

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Closing the cycle in 2020

Cornerstones of the Green 2020 Waste Concept

1.) **Focus on avoiding wastes by introducing a new compulsury 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".**

The Green 2020 Waste Concept

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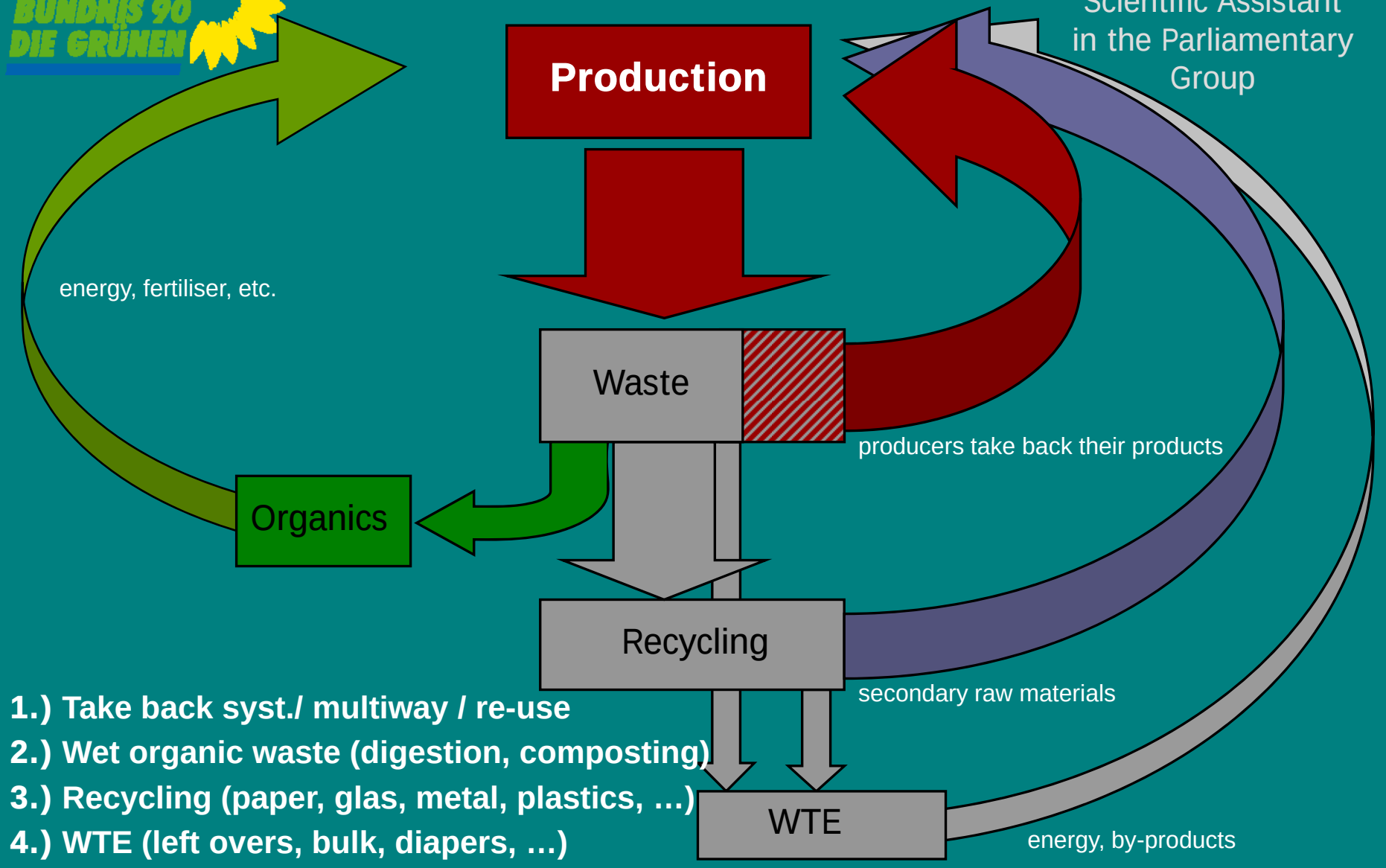

1.) Take back syst./ multiway / re-use
2.) Wet organic waste (digestion, composting)
3.) Recycling (paper, glas, metal, plastics, …)
4.) WTE (left overs, bulk, diapers, …)

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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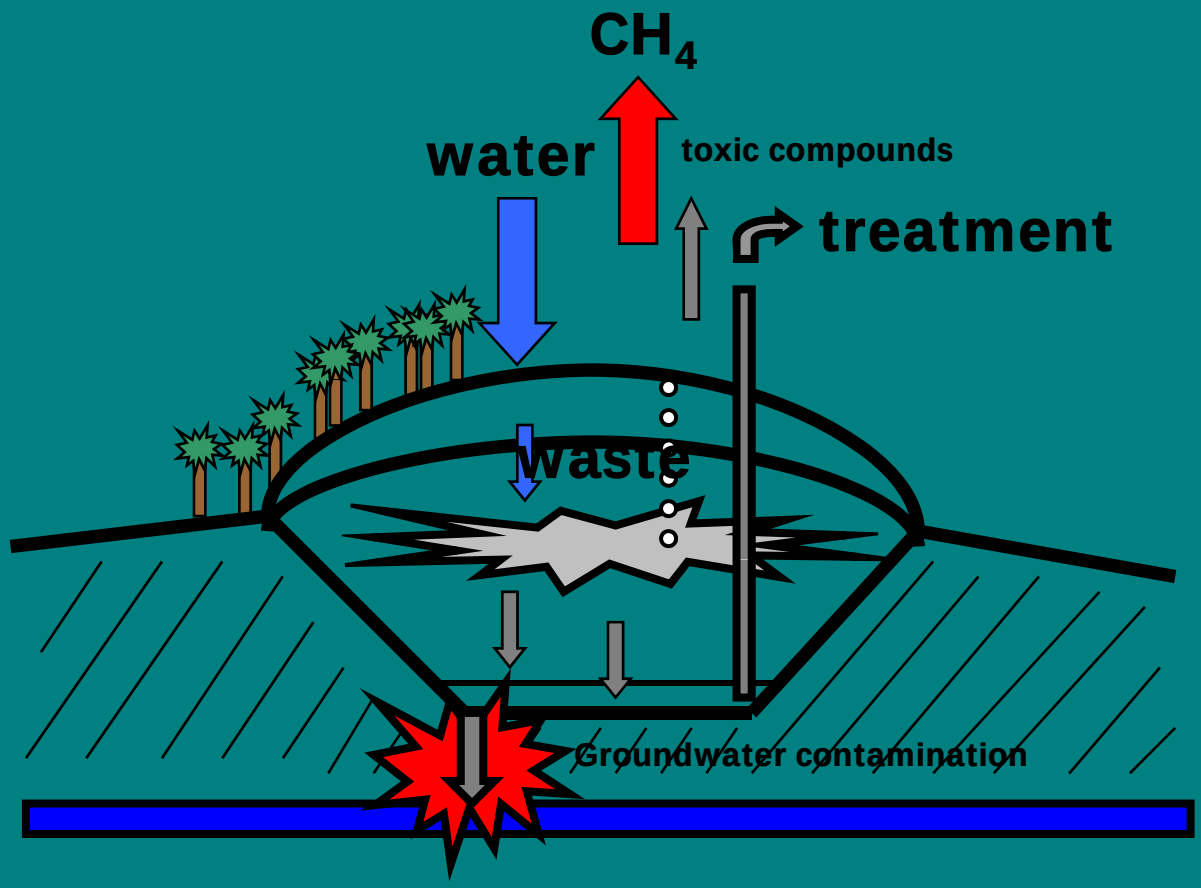
Landfilling causes problems



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Components of landfill gas

Methane	CH_4	up to 65 Vol.%
Carbon Dioxide	CO_2	up to 65 Vol.%
Carbon Monoxide	CO	up to 2,8 Vol.%
Ammonia	NH_3	up to 0,35 ppm
Hydrogen Sulphide	H_2S	up to 700 ppm
Acetaldehyde	CH_3CHO	up to 150 ppm
Benzene	C_6H_6	up to 800 ppm
Vinyl Chloride (VC)	C_2H_3Cl	up to 72 mg/m^3
Dichlormethane	CH_2Cl_2	up to 2400 mg/m^3
Chloroforme	$CHCl_3$	up to 11 mg/m^3
Trichloroethylene	C_2HCl_3	up to 251 mg/m^3
Tetrachloretylene	C_2Cl_4	up to 182 mg/m^3
...		

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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

source: “Der Spiegel” 38/96

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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.

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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.**

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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!

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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 €uro, 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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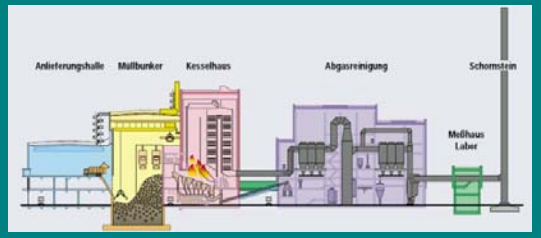
- **Advantage: proven technology for many years**
- **When using a facility with the best available technology - very low environmental impact:**
  - **recovery of heat and electricity**
  - **low emissions**
  - **use of different by-products by producing acid and gypsum**
  - **use of ashes e.g. in 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**



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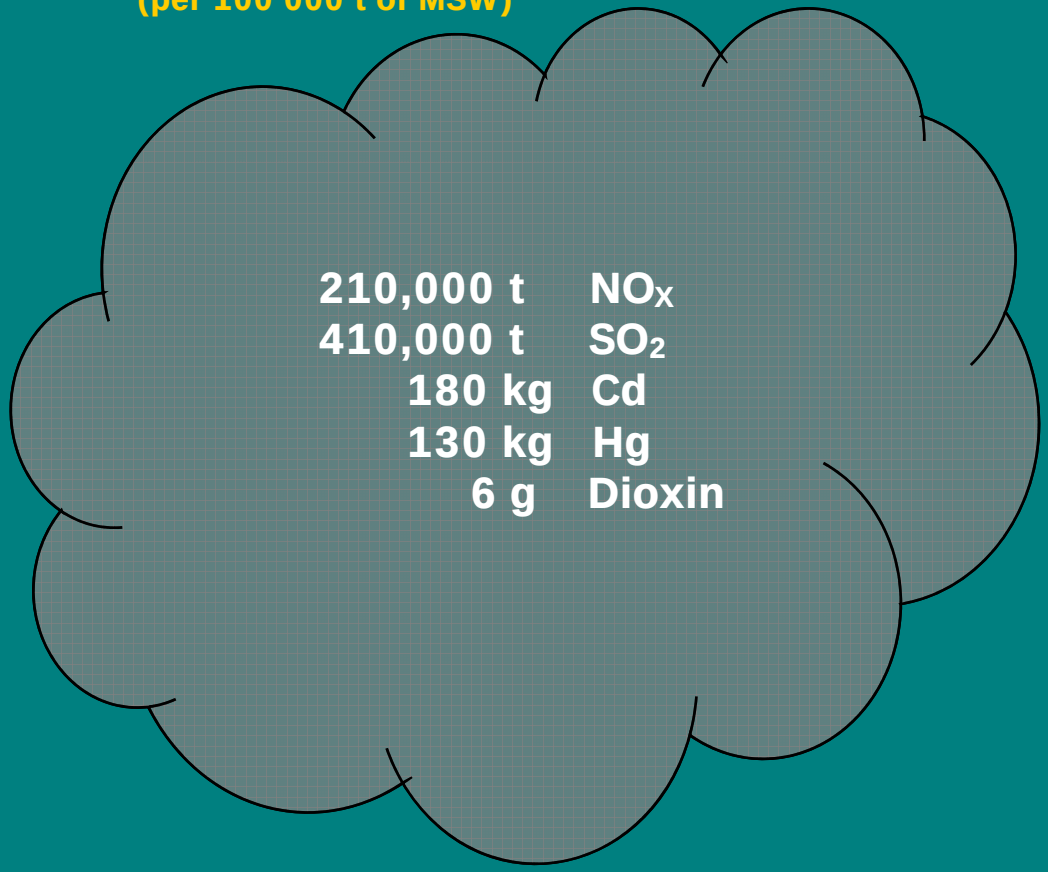
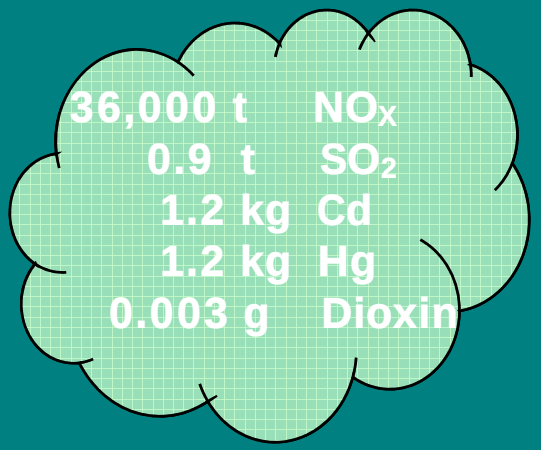
Emissions from waste incineration in Germany

(per 100 000 t of MSW)



before 1990



today

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Reliability is of high importance

Missing it is definitely the worst case for our environment!

- **examples: Napoli, Italy and not working MBT Technology**

source: WDR, German Television, DUH 2007

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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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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 witch 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 electricity**
  - **capacities of incineration must be matched witch regional demand.**