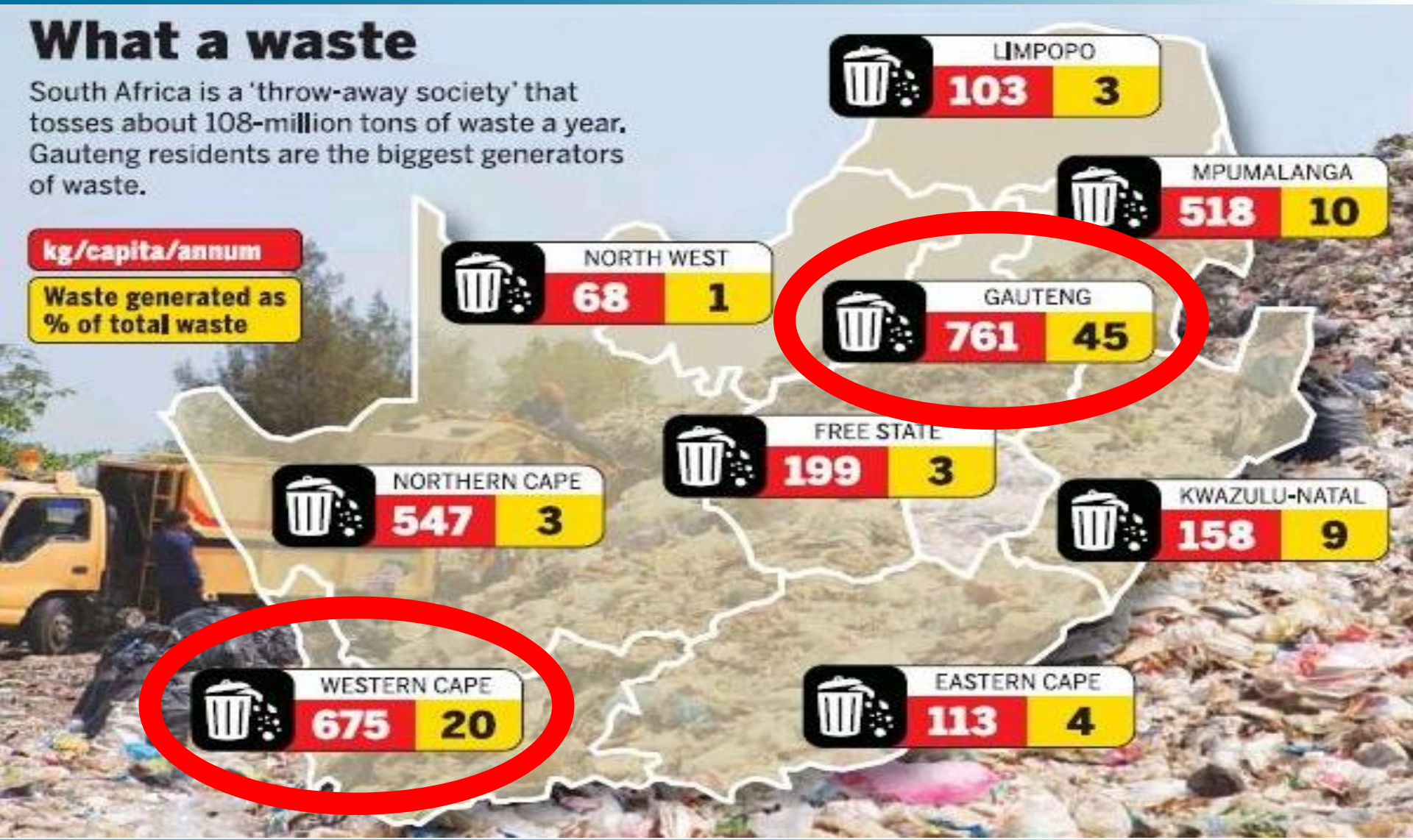
Waste management in Switzerland 1922 & 1974

Waste management systems

„polluted areas are still the results of our historical waste management system – therefore our waste management system needs further improvement“

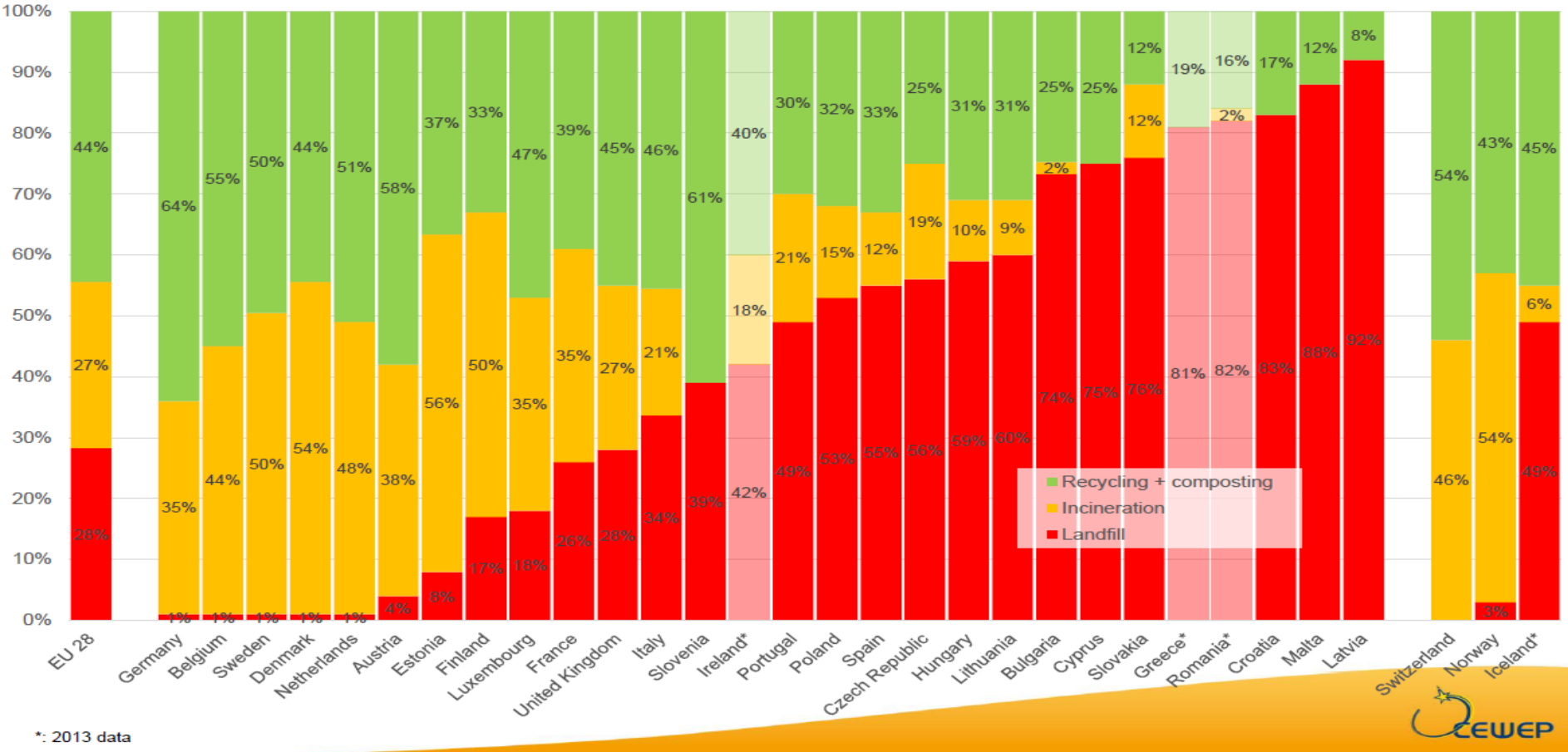
SA-Waste management systems



EU-Waste management systems

Municipal waste treatment in 2014
EU 28 + Switzerland, Norway and Iceland

Graph by CEWEP,
Source: EUROSTAT 2016



Waste management systems

Benfits of banning landfills of waste:

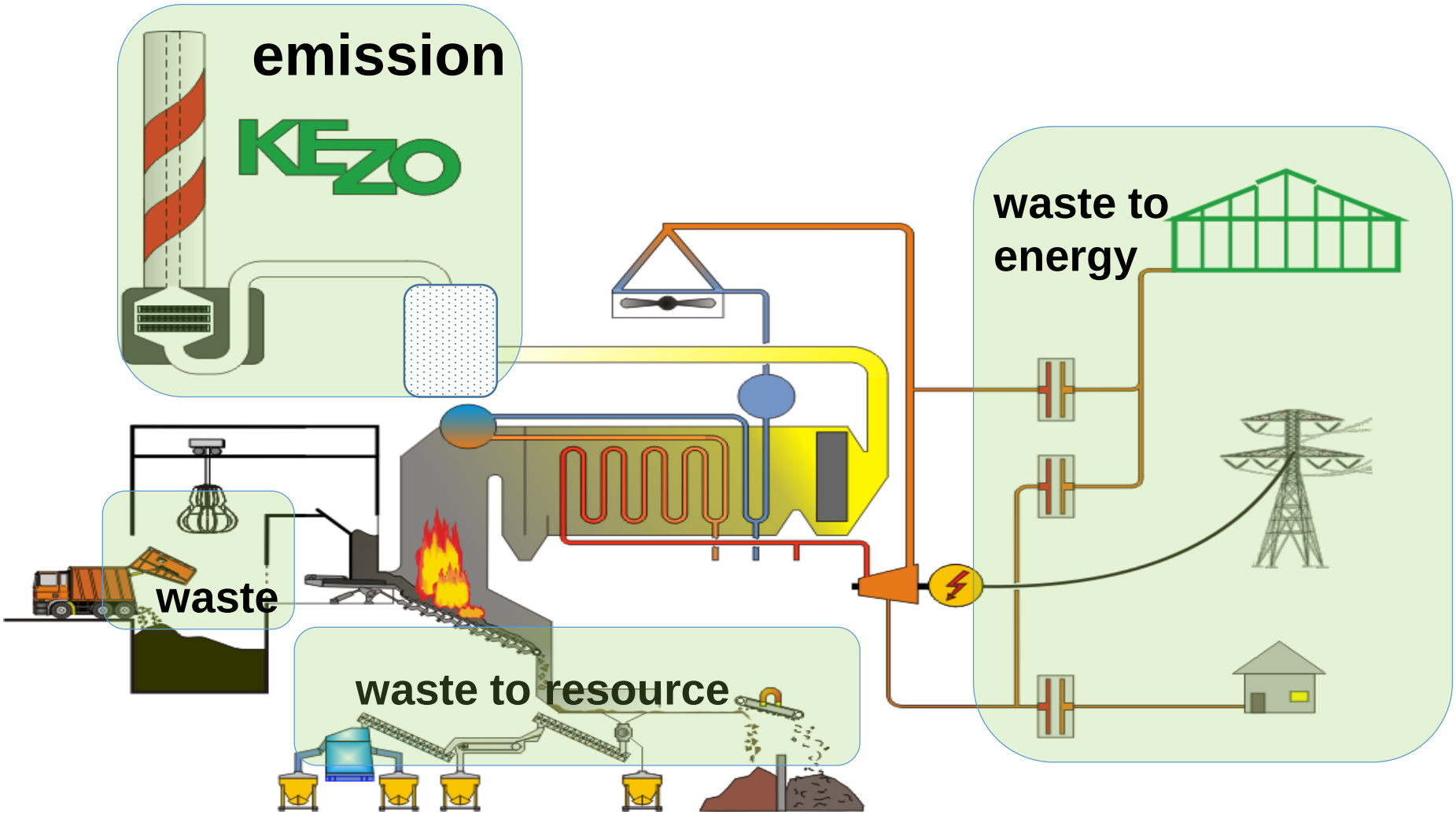
- **air pollution**
- **groundwater pollution**
- **soil pollution**
- **energy utilisation**
- **resource savings**
- **land savings**
- **climate protection (21 times less CO2 emission!)**

Thermo-Recycling

Waste to Energy & Recycling

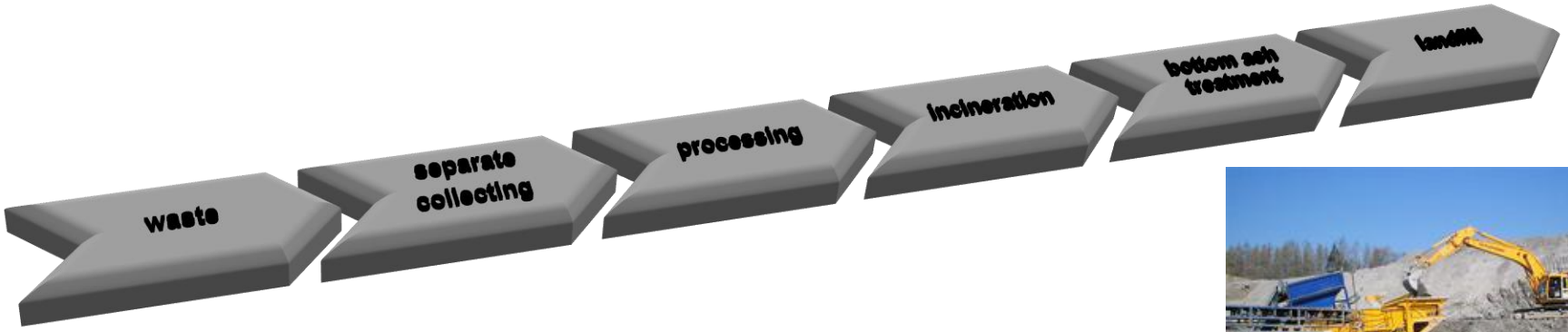
Waste to Energy Plant near the City of Zurich, Switzerland

agenda



Waste management systems

100 % of waste ends on the landfill

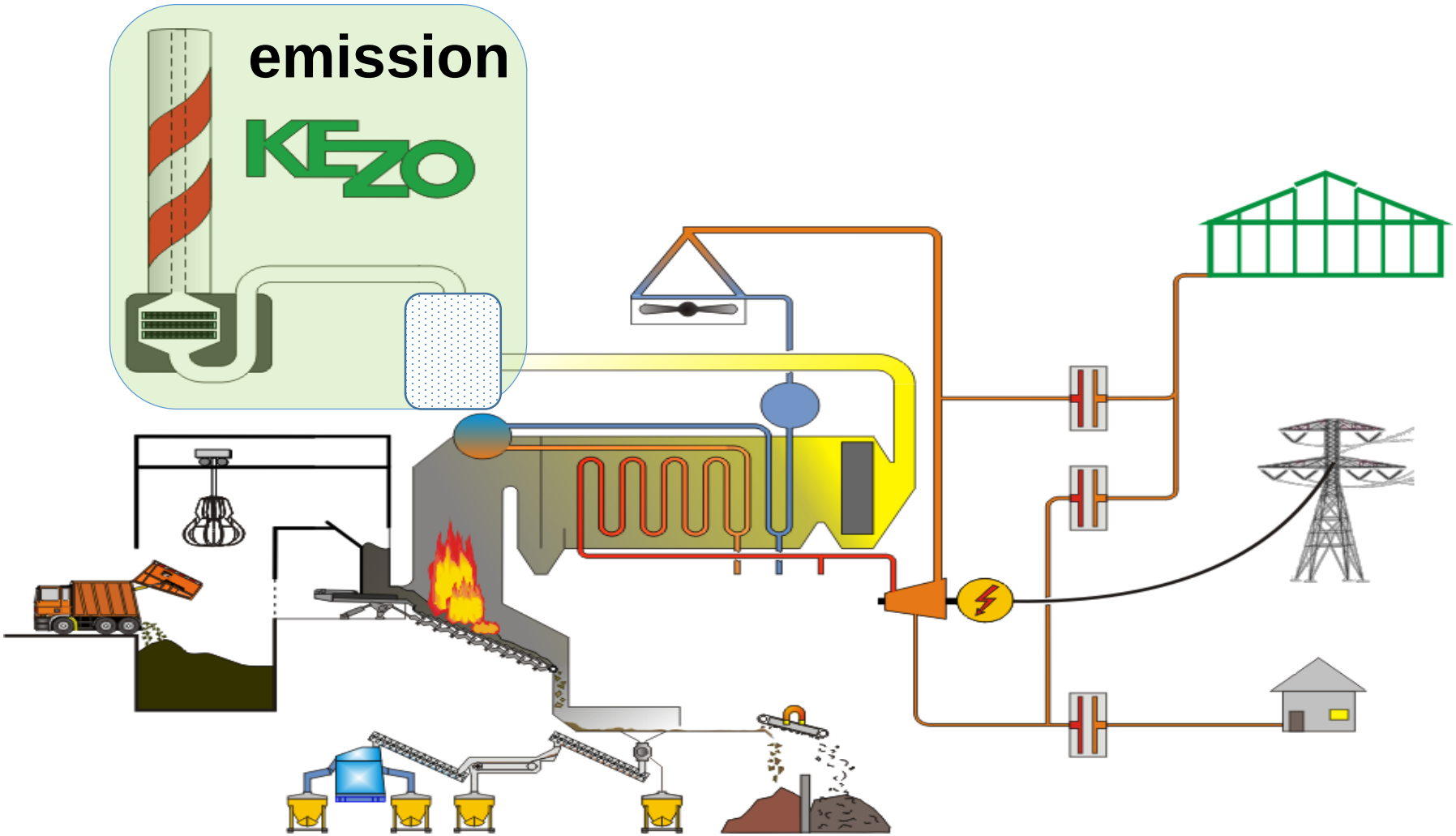


10 % or less of waste ends on the landfill

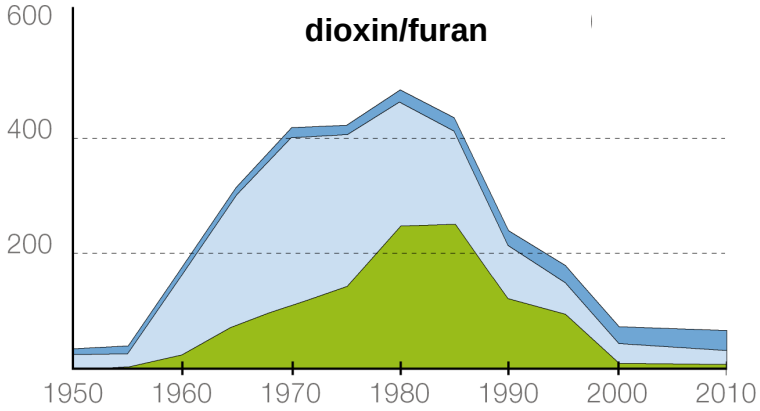
Swiss-Waste management systems

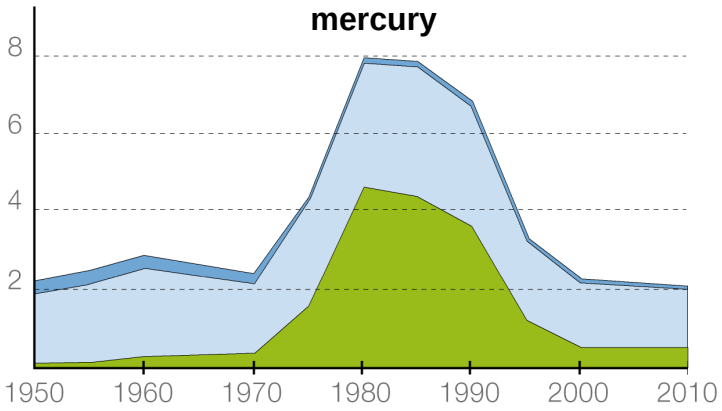
BAFU (2013): Siedlungsabfälle und Separatsammlung 2012

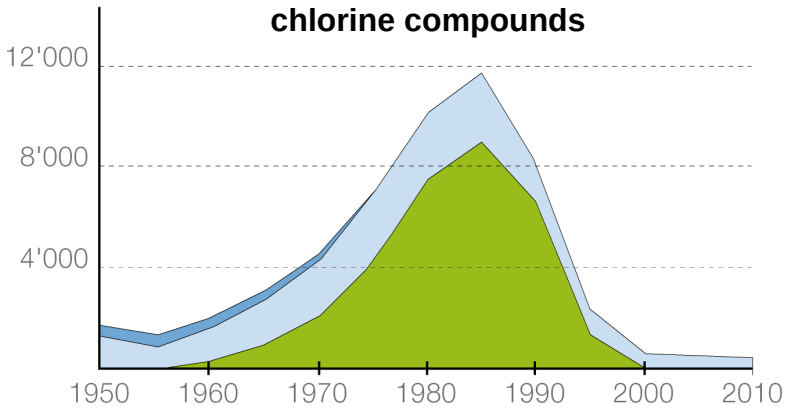
agenda

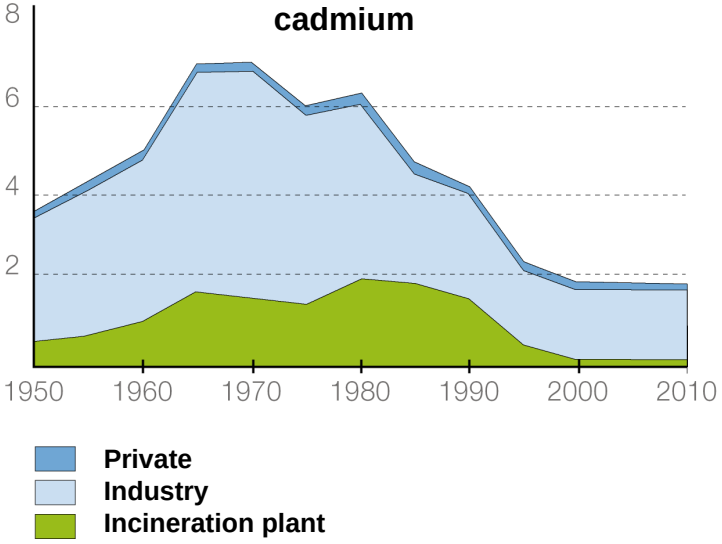


Emissions in Switzerland





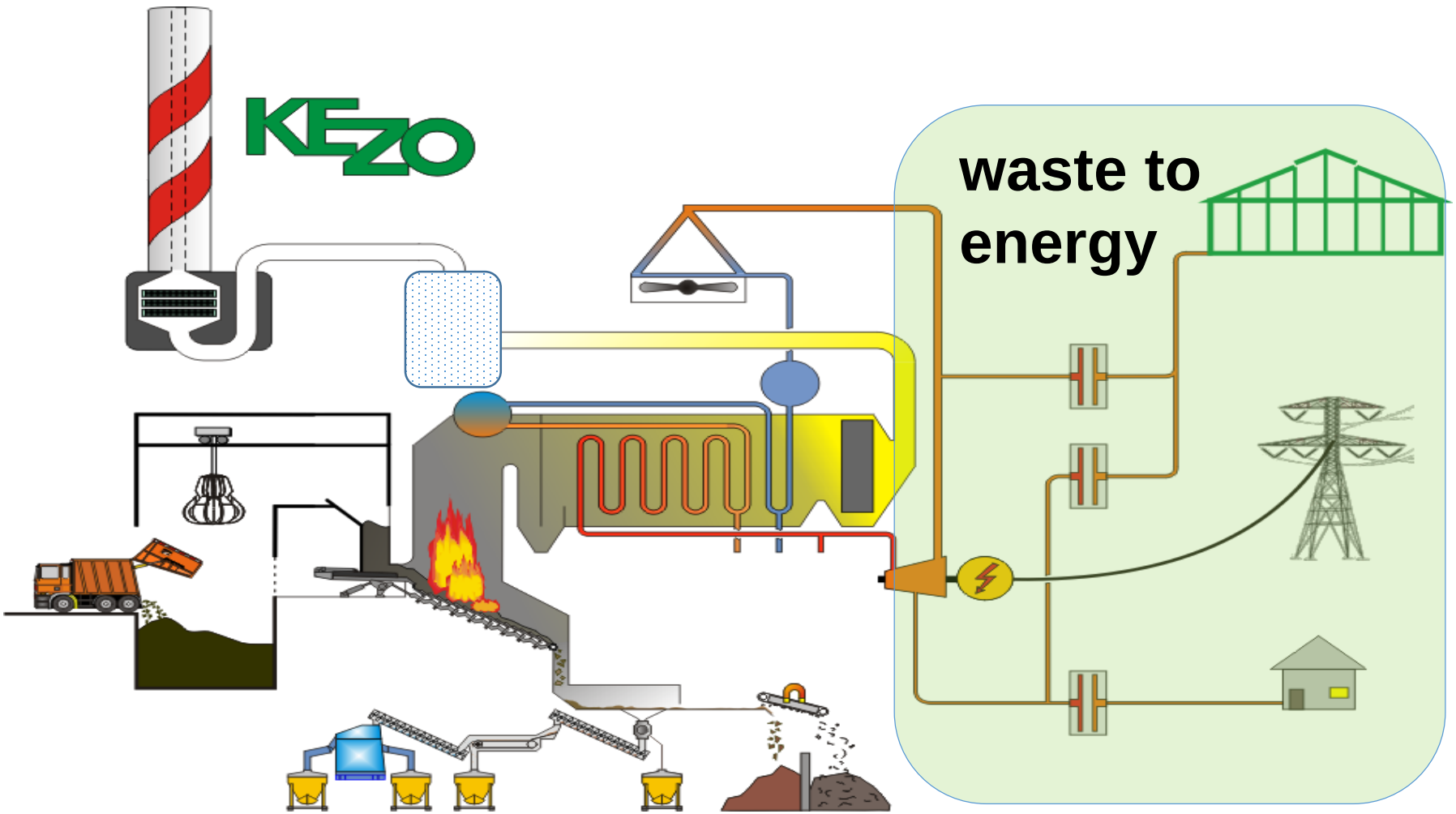




dust emission in Switzerland

all our 30 waste incineration plants generate about 63 t/y dust emissions

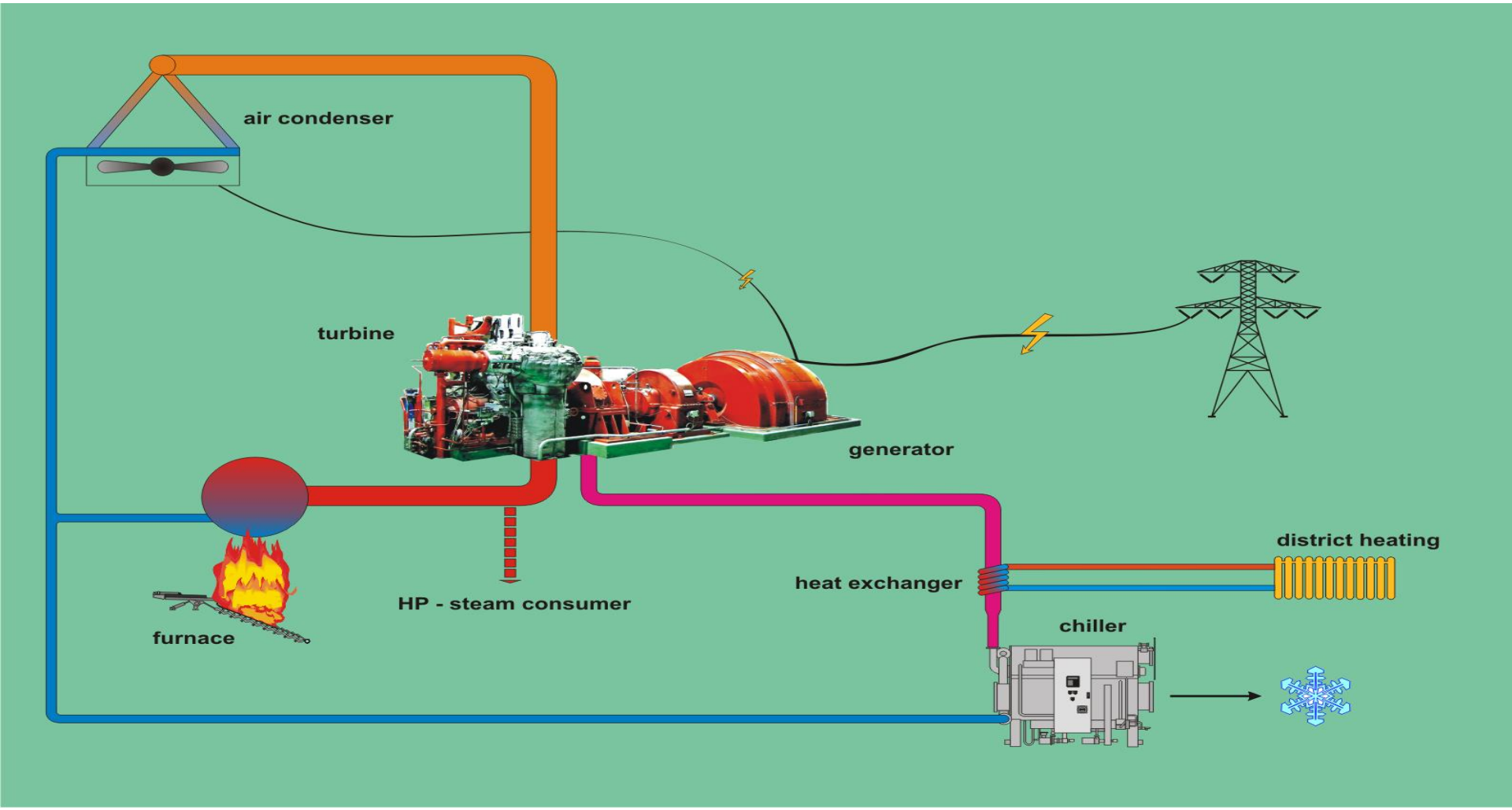
agenda



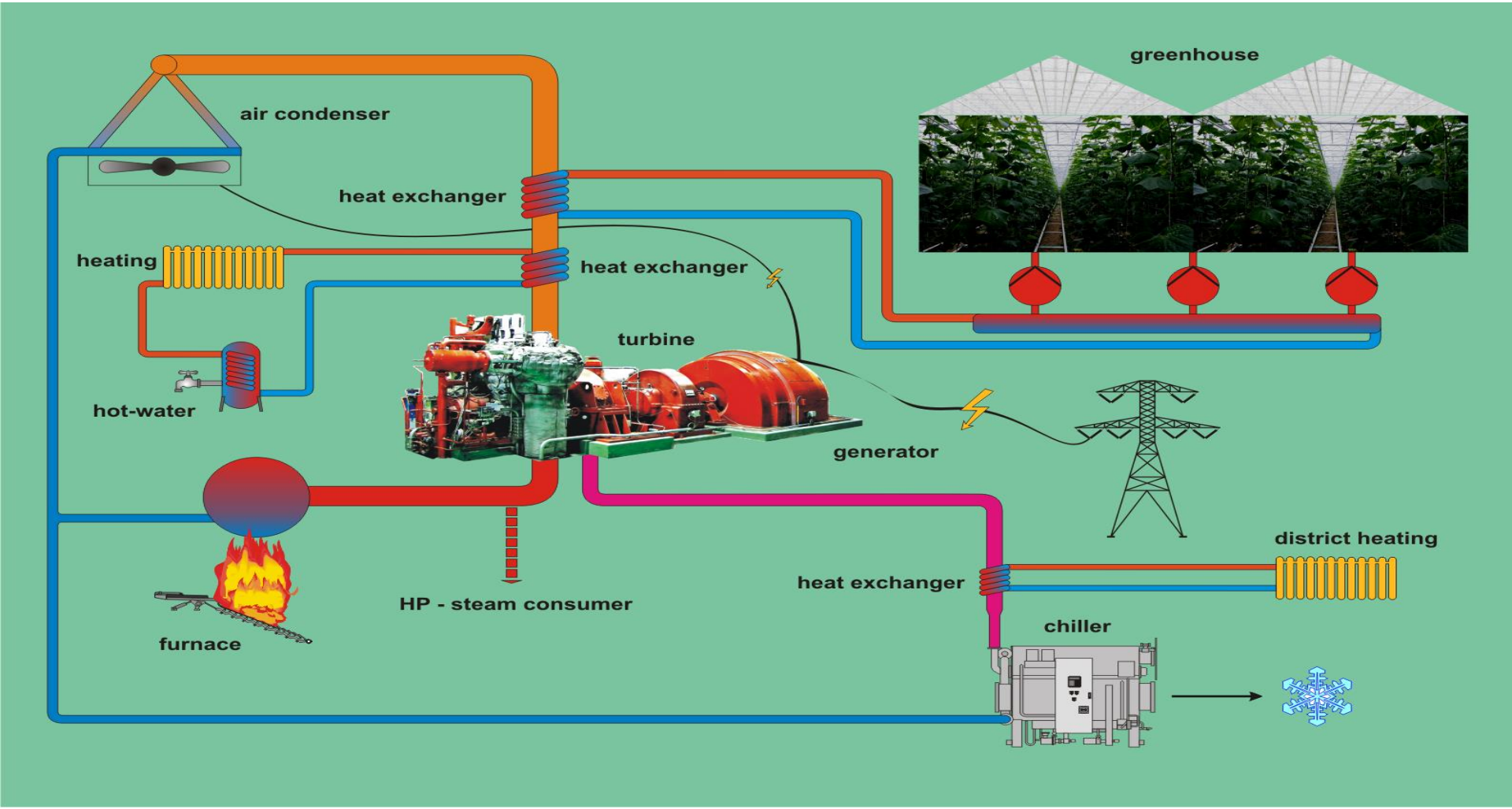
Waste to energie

300 l fuel oil

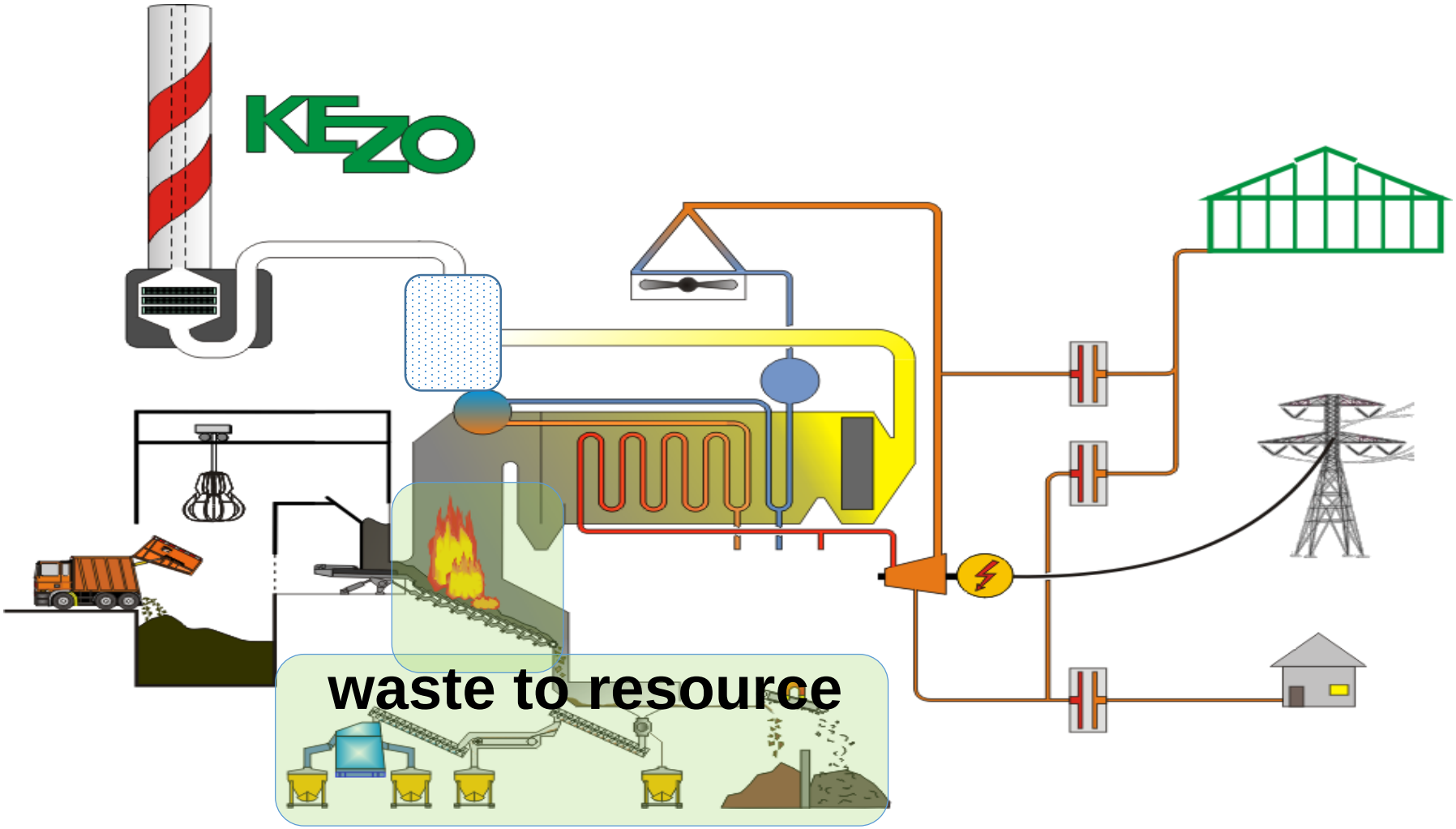
waste to energy



waste to energy

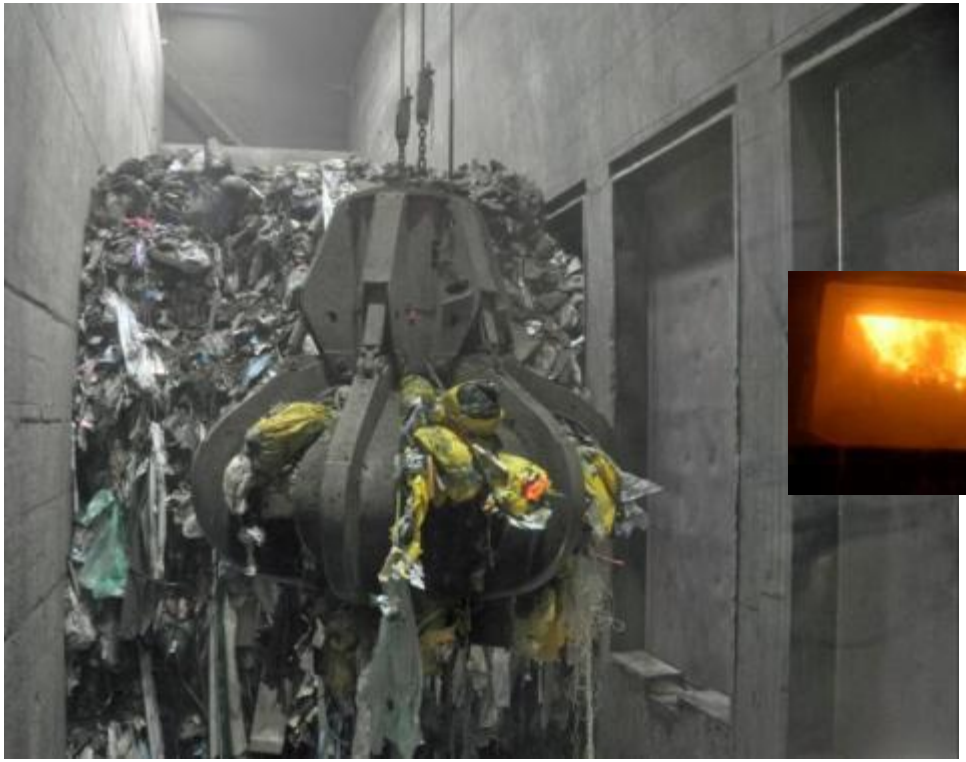


agenda



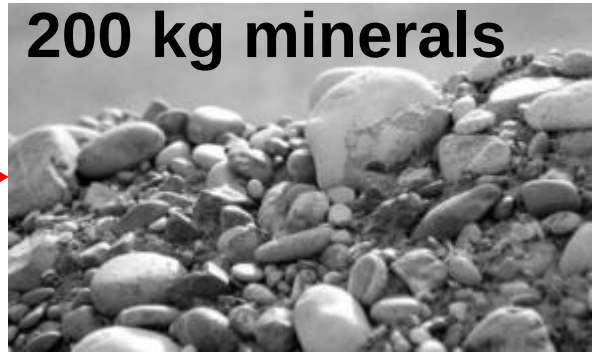
Waste to Resources

1 ton waste



300 l fuel oil

200 kg minerals

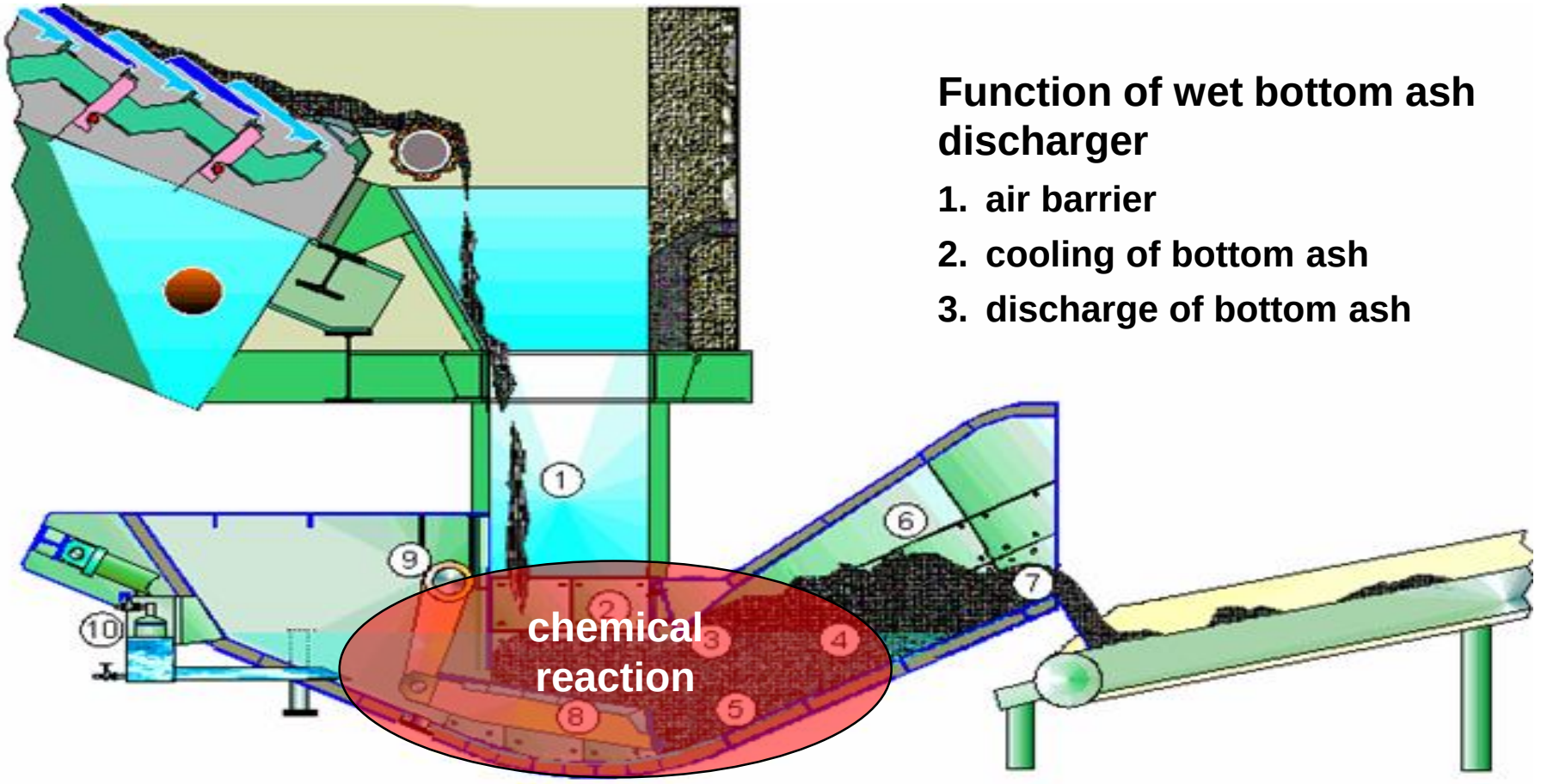


30 kg metals

efficiency of bottom ash treatment plants

difficult access to NF in wet bottom ash

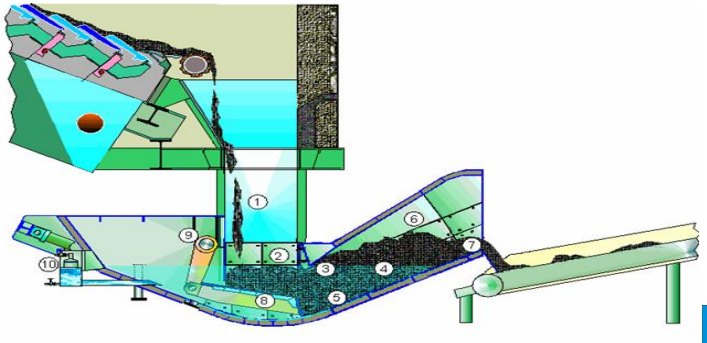
the problem



Function of wet bottom ash discharger

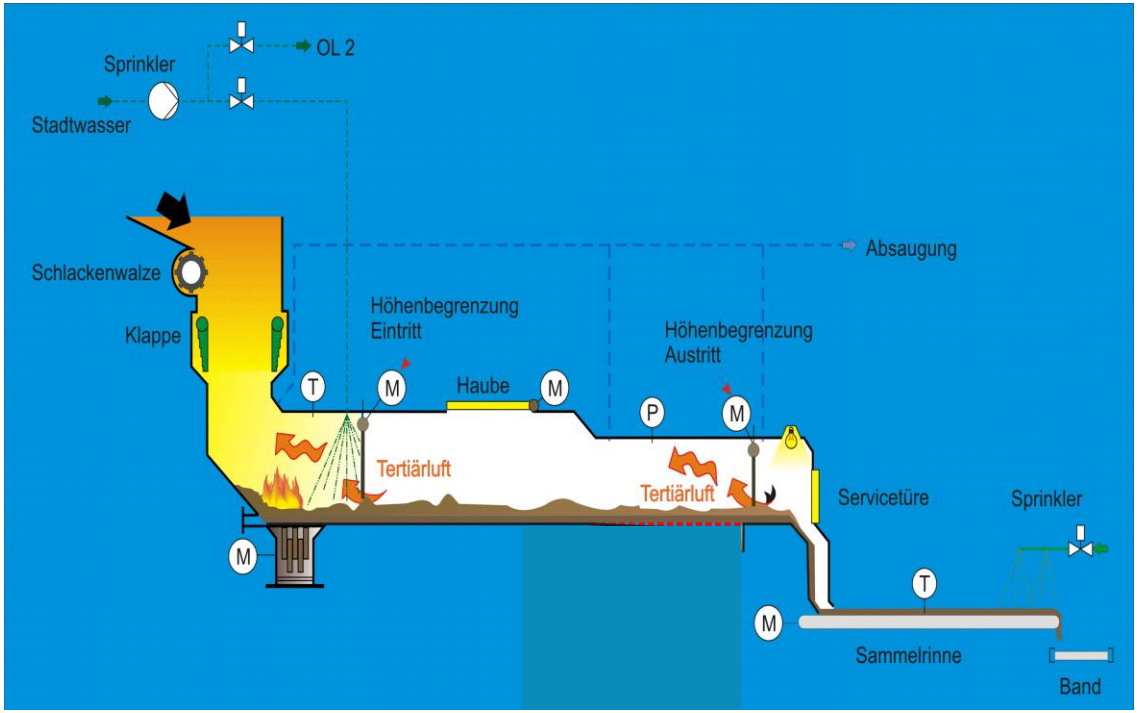
1. **air barrier**
2. **cooling of bottom ash**
3. **discharge of bottom ash**

a new approach



wet discharge of bottom ash prevents access to small particles

only dry discharge of bottom ash allows access to small particles



advantages

improved bottom ash quality

- total organic content (TOC) reduced
- leaching rate reduced

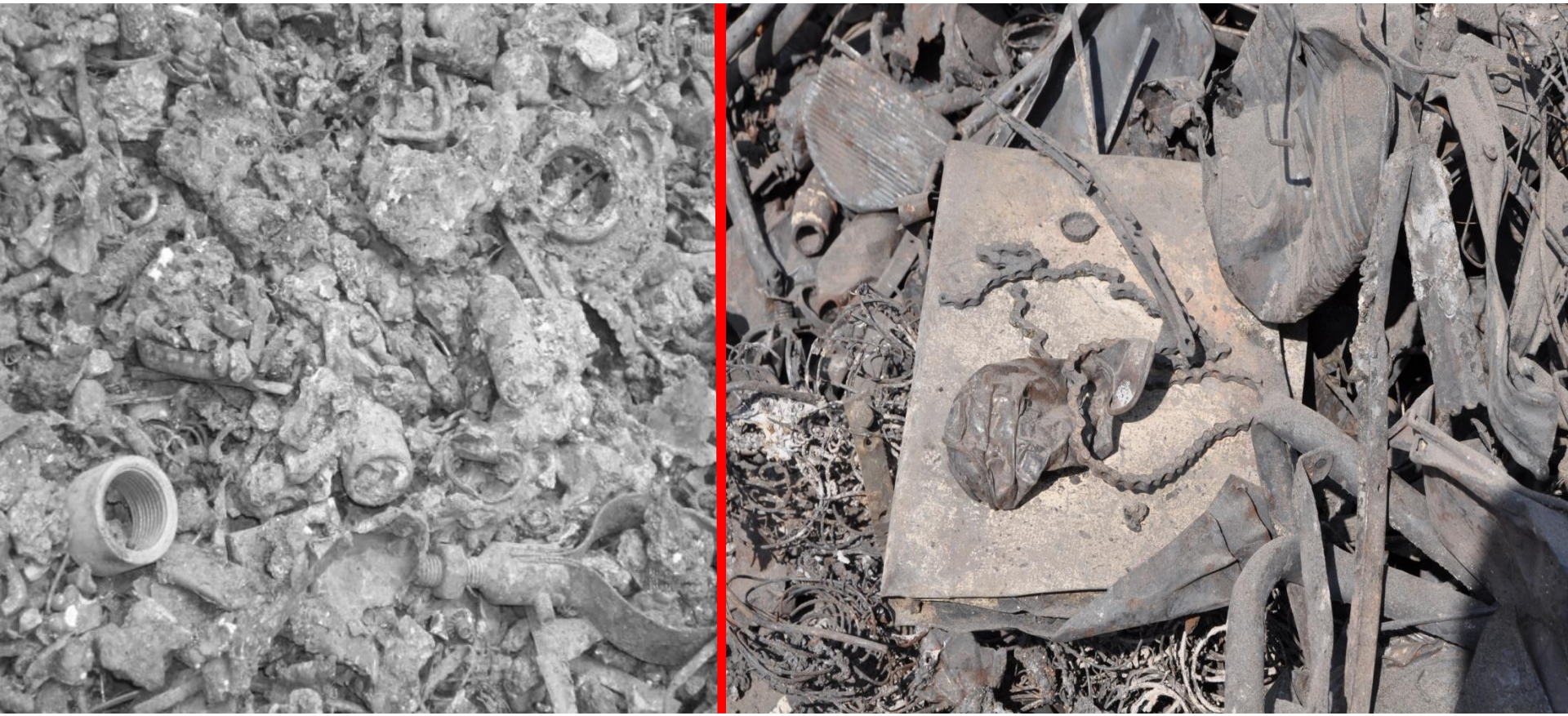
improved metal recovery

- higher efficiency
- better metal quality

weight reduction by 20 % (logistics)

no hardening of the bottom ash

advantages: metal recovery



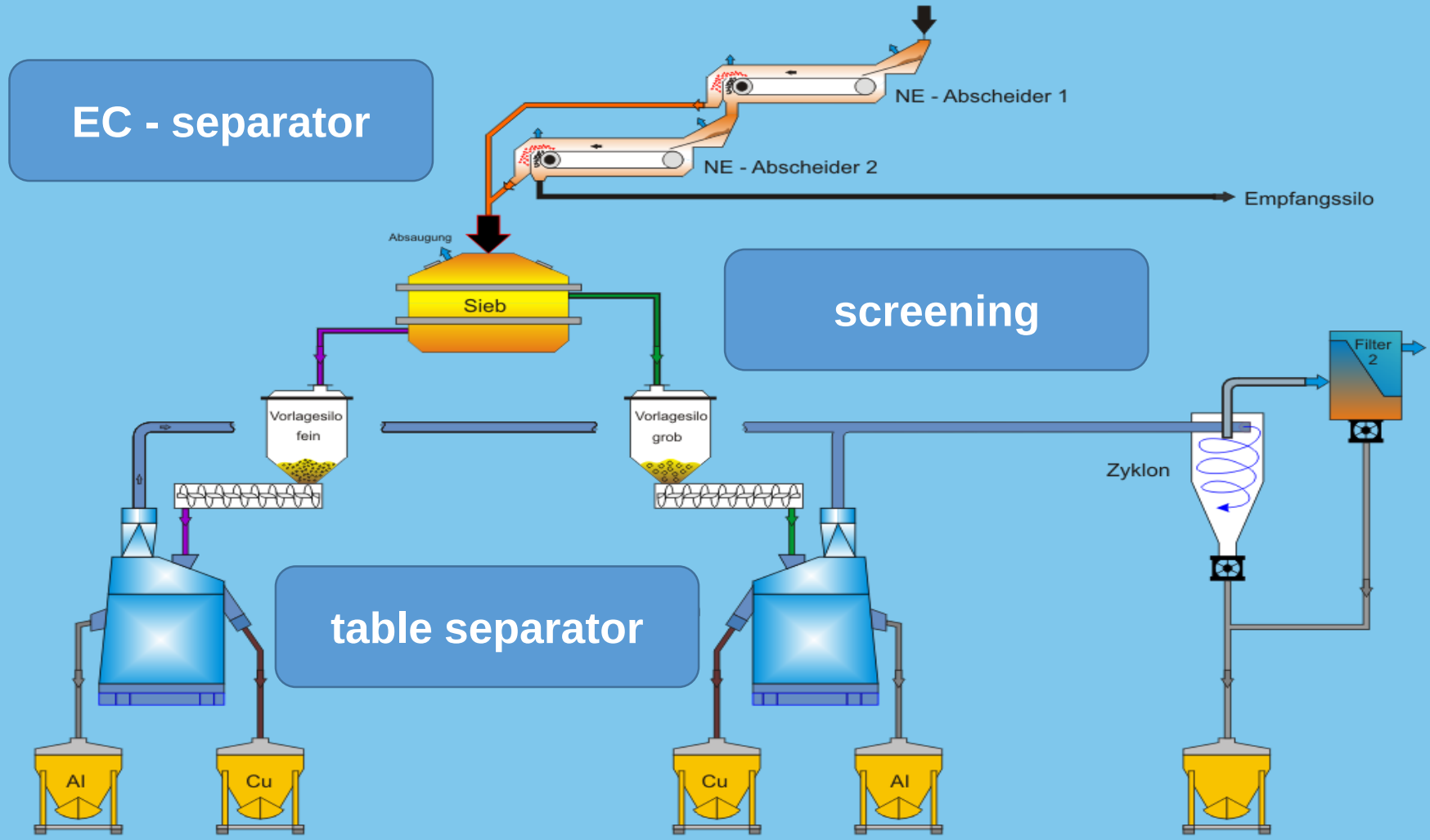
improved separation efficiency and metal quality

Thermo-recycling

Fine Bottom Ash

Urban mining: products

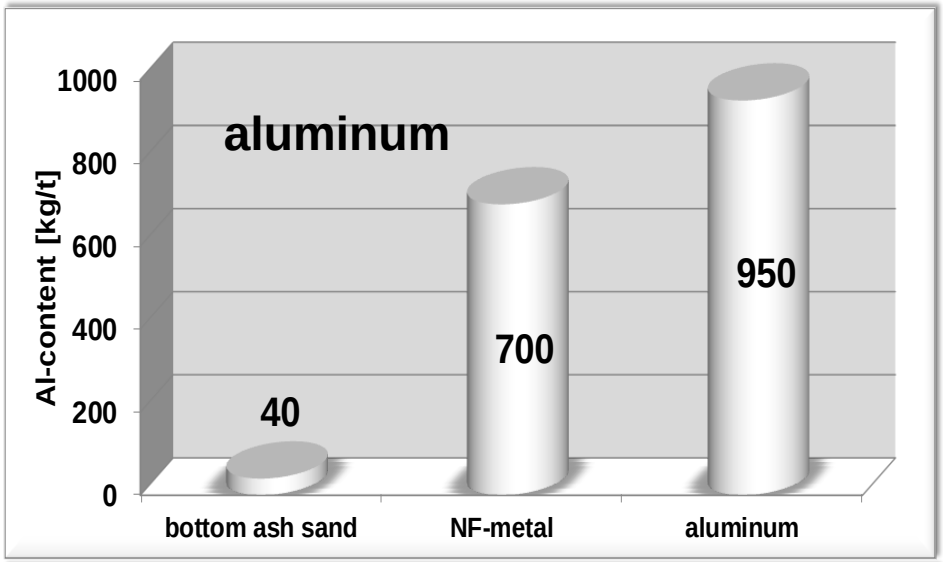
Treatment Plant for Fine Bottom Ash

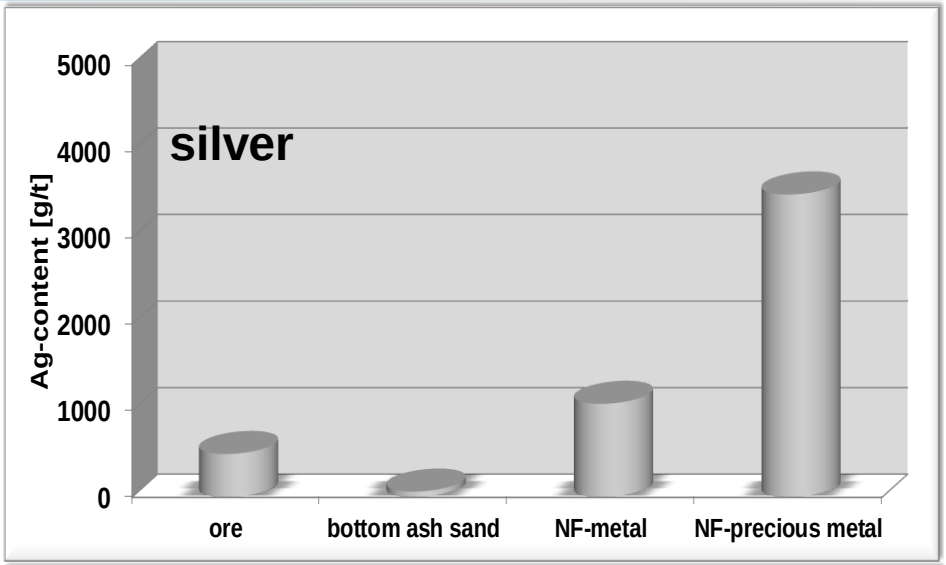


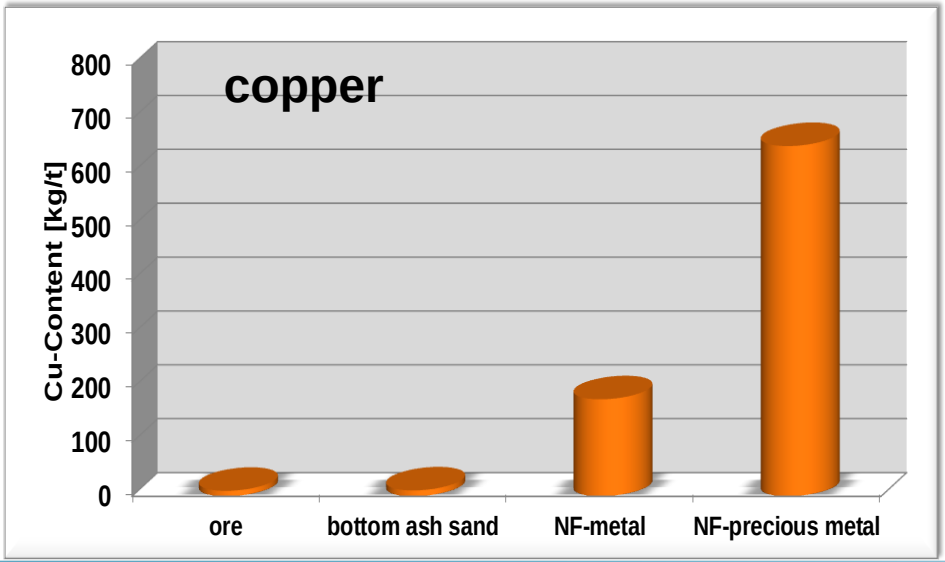
Performance

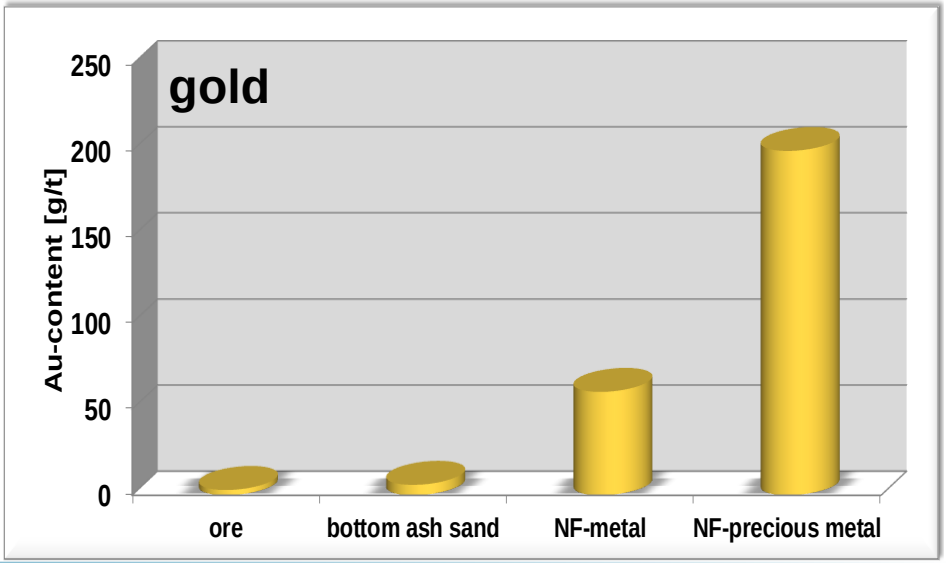
- automatic – dust free operation
- separation efficiency > 95 %
- NF-metal content in the bottom ash (1.0 – 5.0 mm) > 5 %
- low mineral content in the metals

Accumulation of Metals

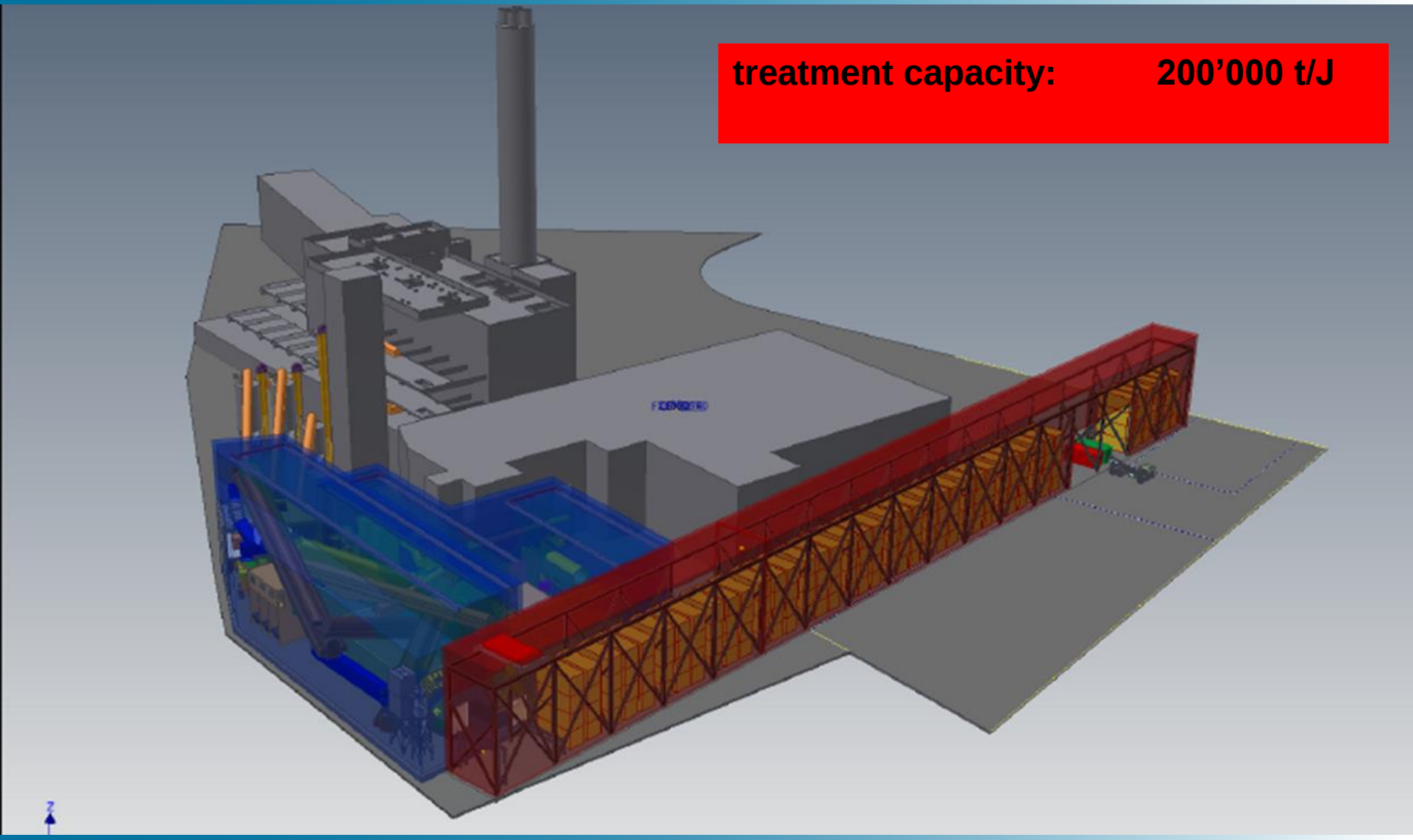




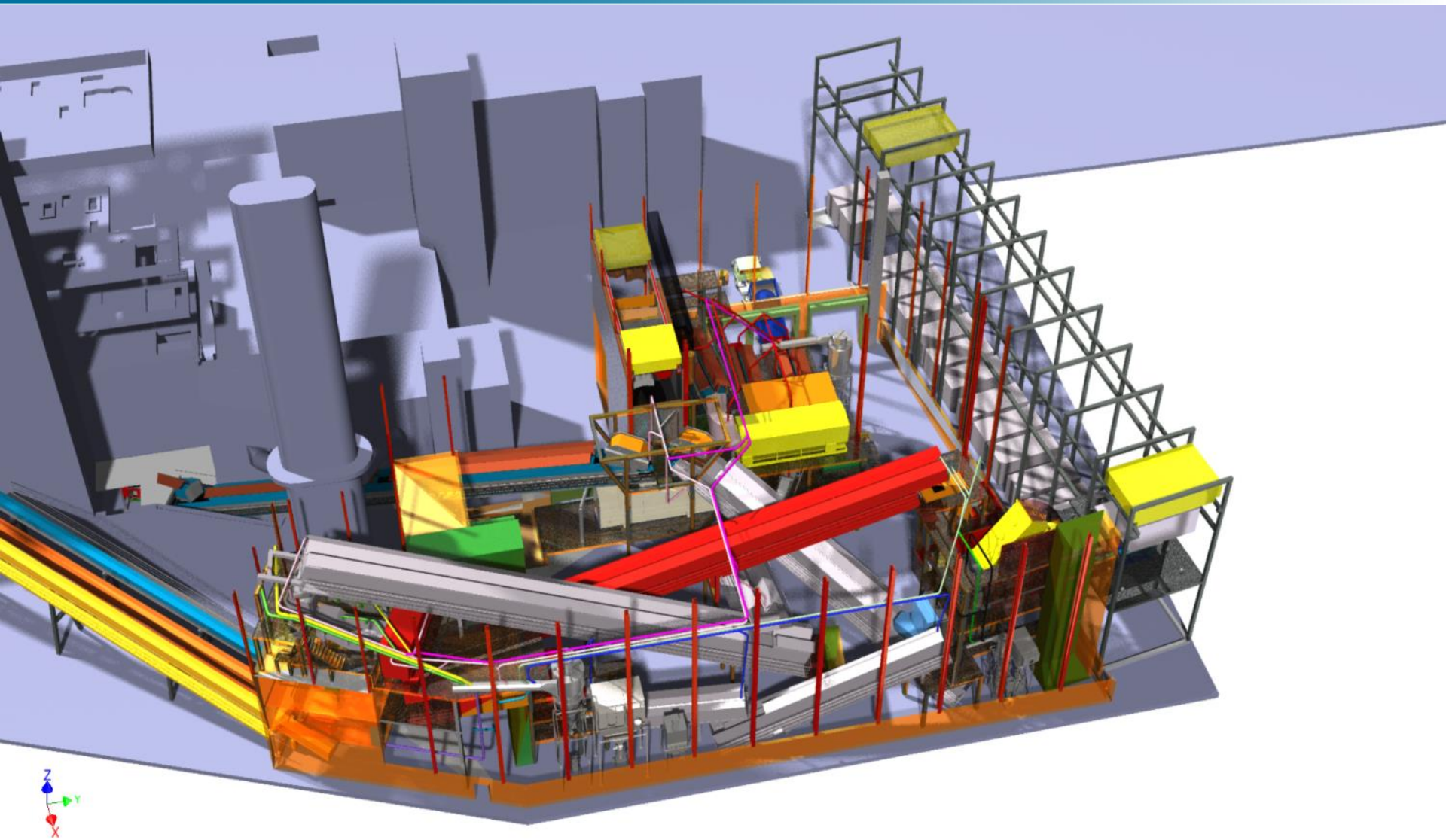




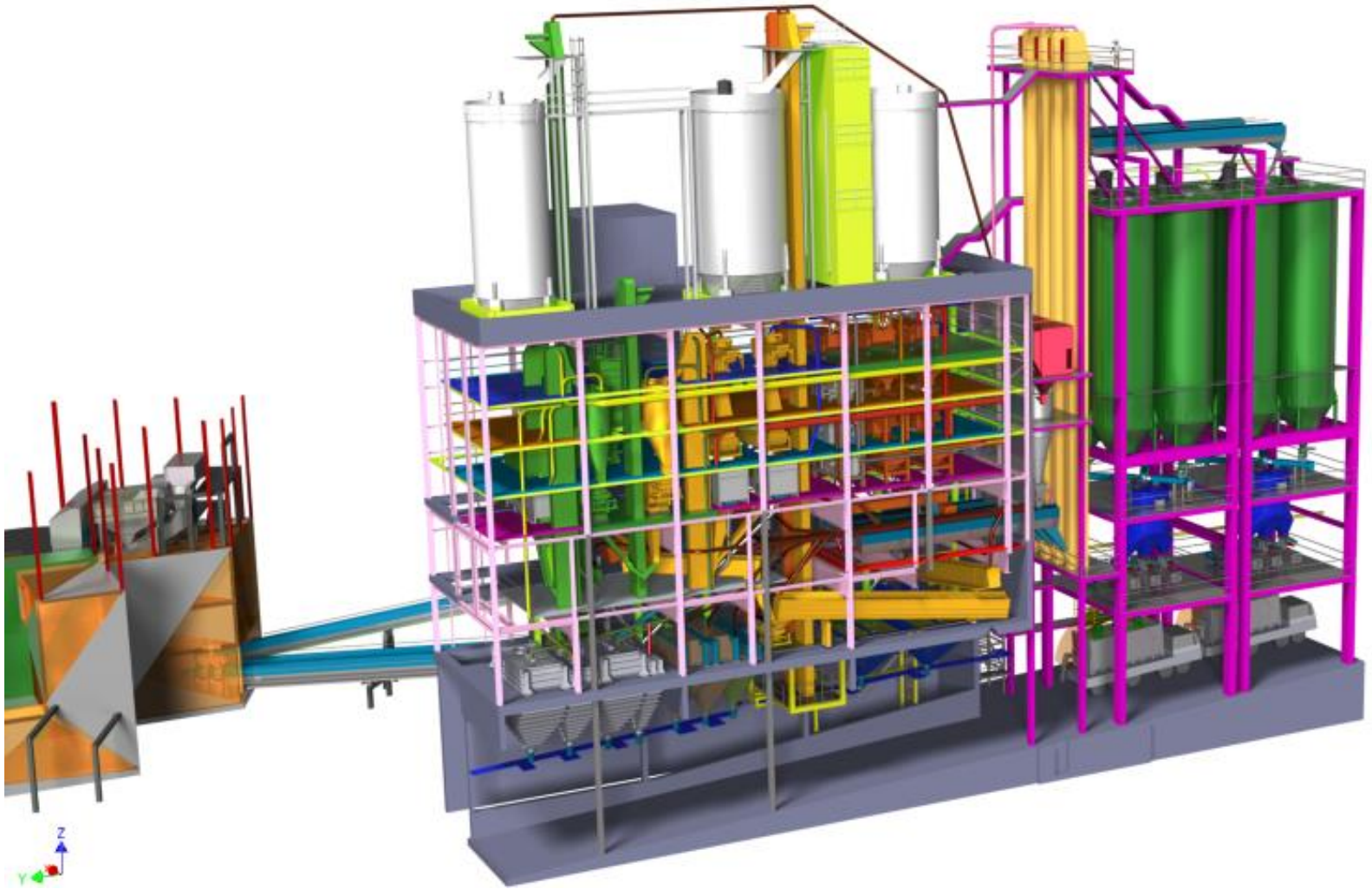
ZAV Recycling AG



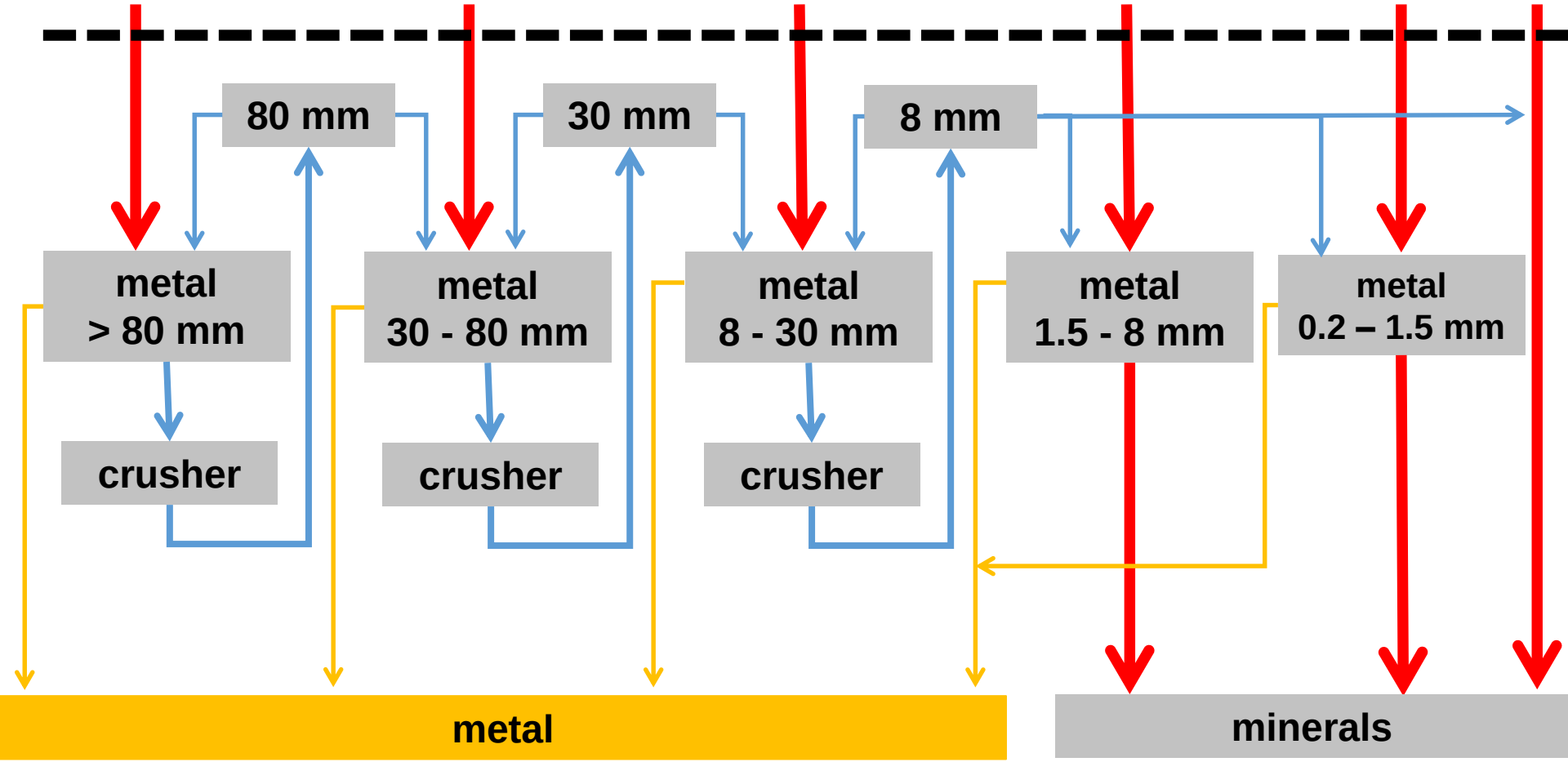
ZAV Recycling AG: Layout



ZAV Recycling AG: Layout

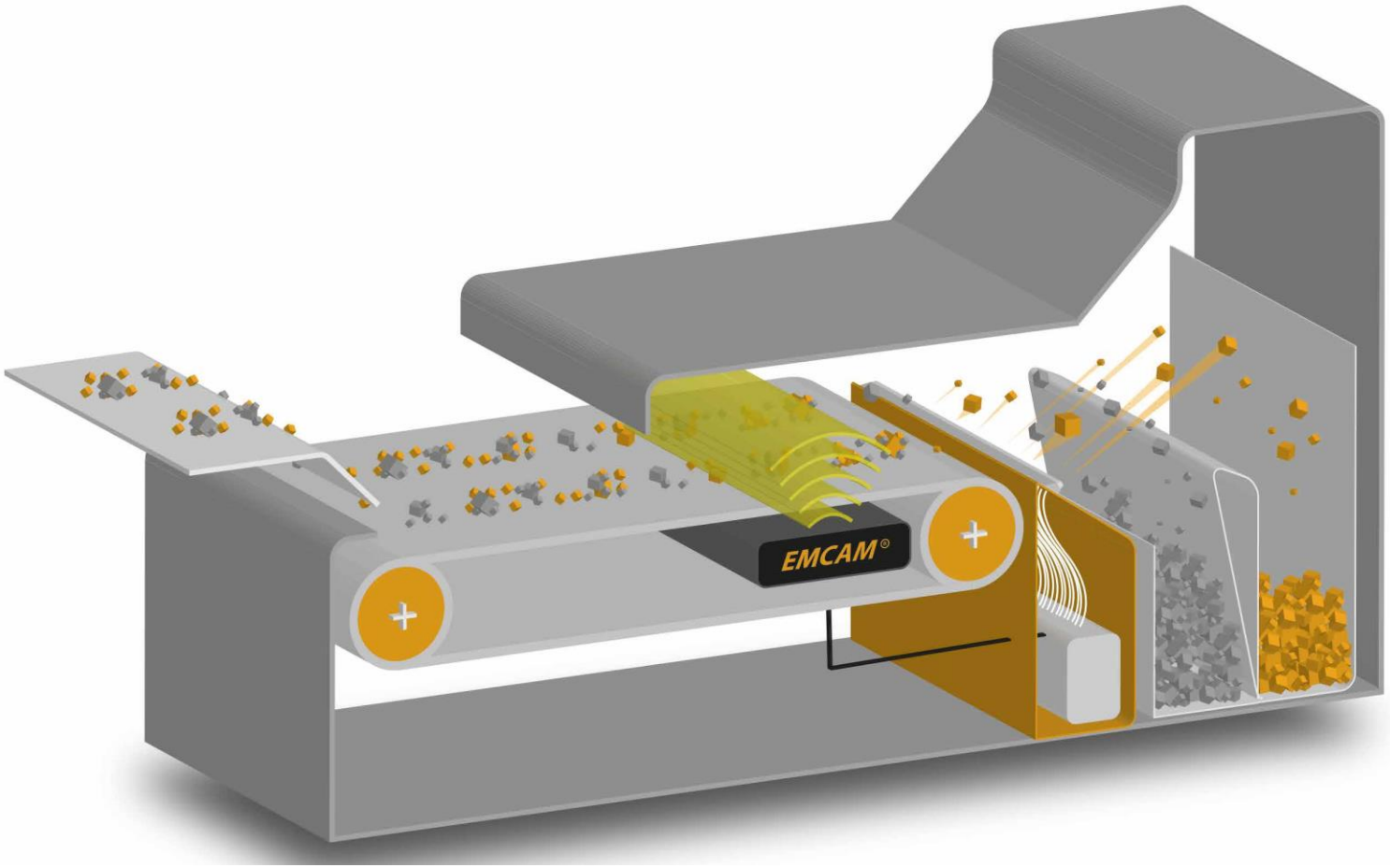


Step by Step Fractioning



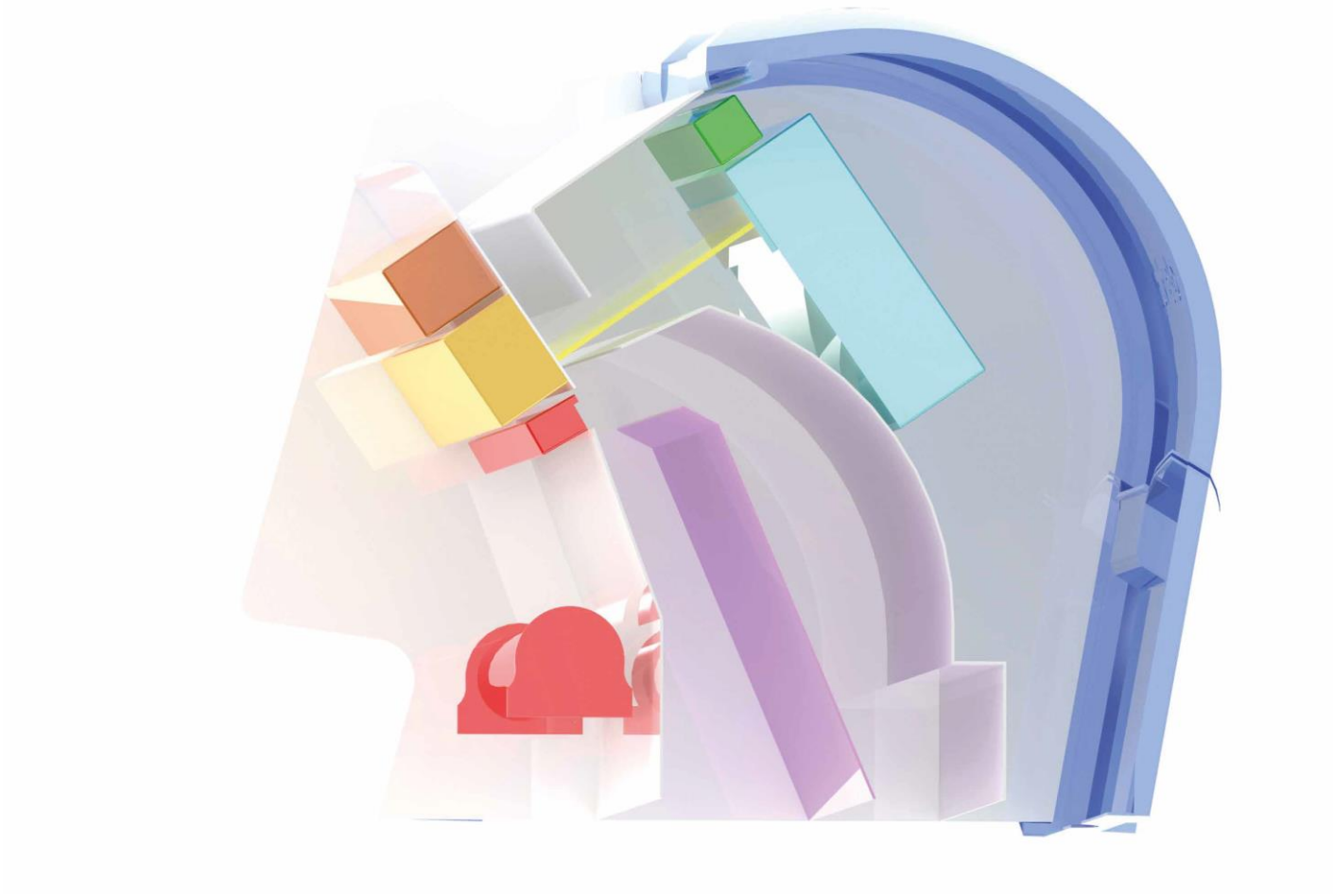
Non-Ferrous-Metals

Stainless Steel Separator



Stainless Steel

Glass Separator



Glass

Bottom Ash After Treatment

100’000 tons of waste
→ 17’000 tons dry bottom ash

Key Factors

- **efficiency of metal recovery**
  (efficiency factor > 95 %)
- **high grade metal**
  (supply to the smelter)
- **dust emission free operation**
- **24-h operation**
  (small equipment – professional Q-System)

performance of the treatment plant

	[%
bottom ash	
ferrous	
no	
	0.5
	1.0
ource Σ	16.0

Value of metals per tons of Bottom ash: 96.- USD/t (2017)

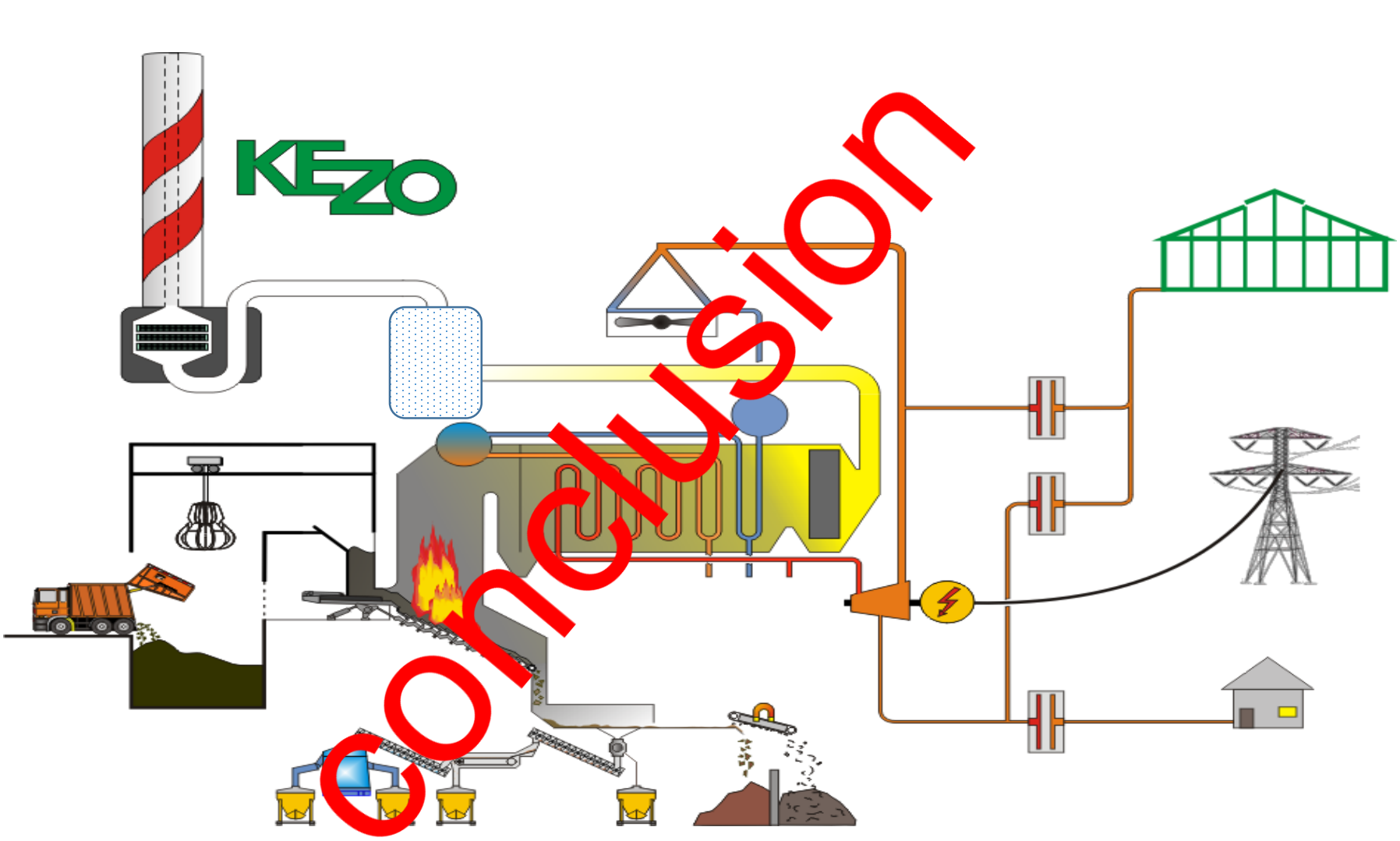
Key Factors

- **high efficiency of metal recovery and high grade metal**
- **full automatization**

Key Factors

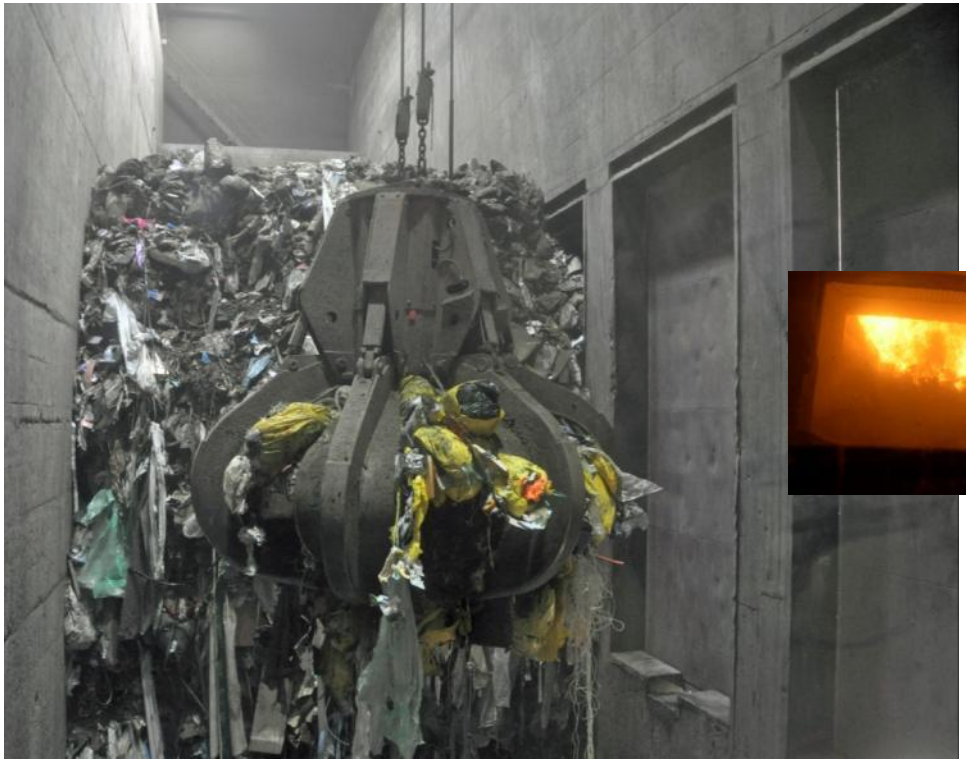
using your workforce for hand picking down to 10 mm and full automatization from 0.2 – 10 mm

agenda



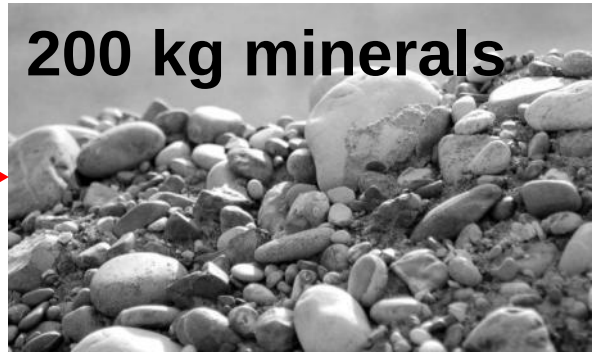
the potential of waste

1 ton of waste



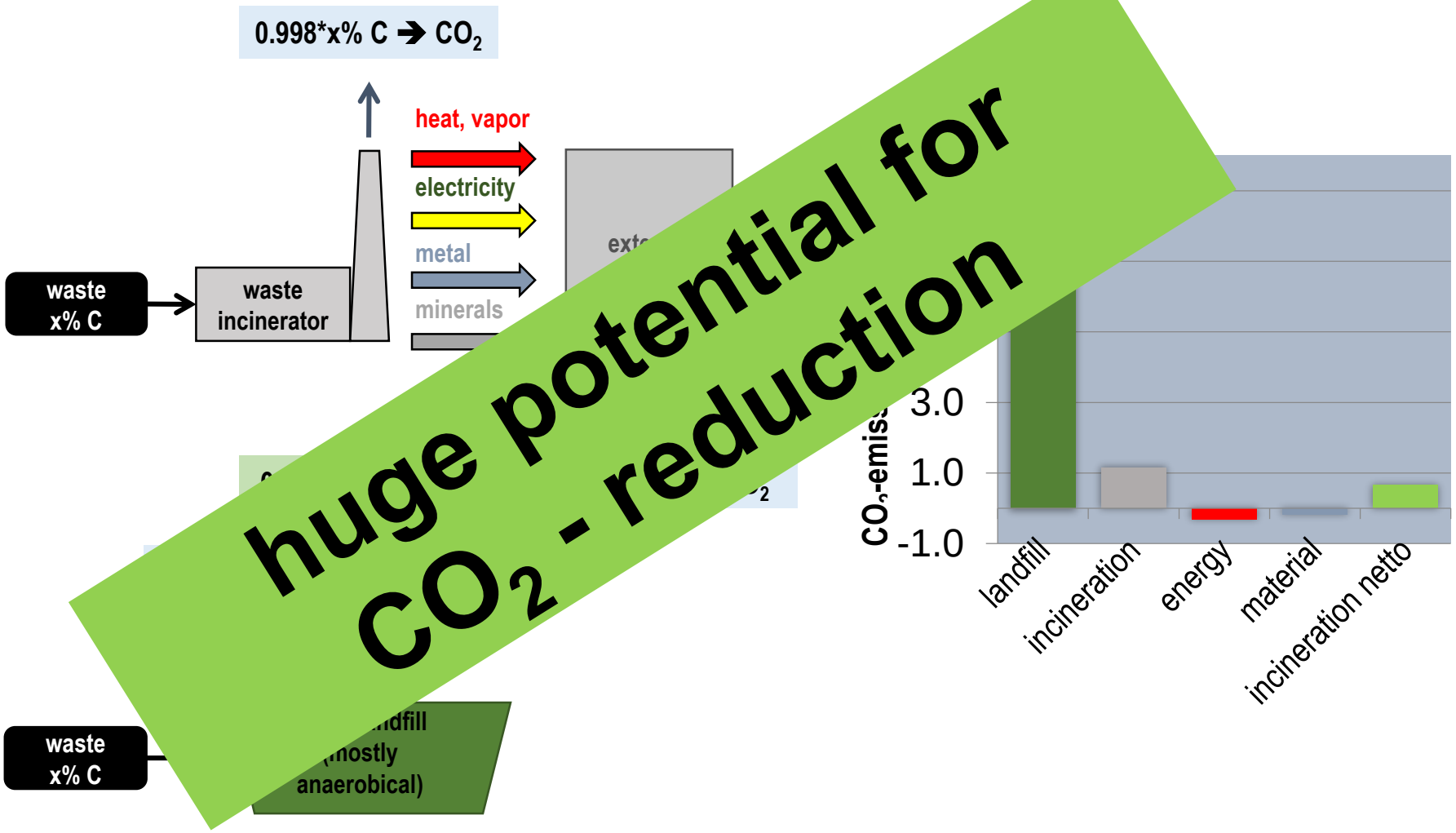
300 l fuel

200 kg minerals



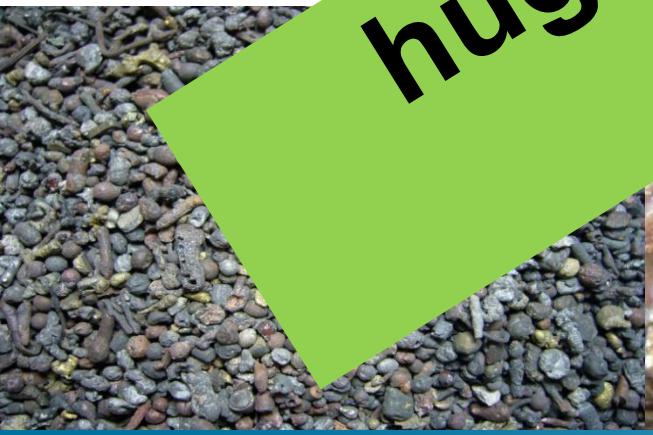
25 kg metal

CO_2 potential of waste

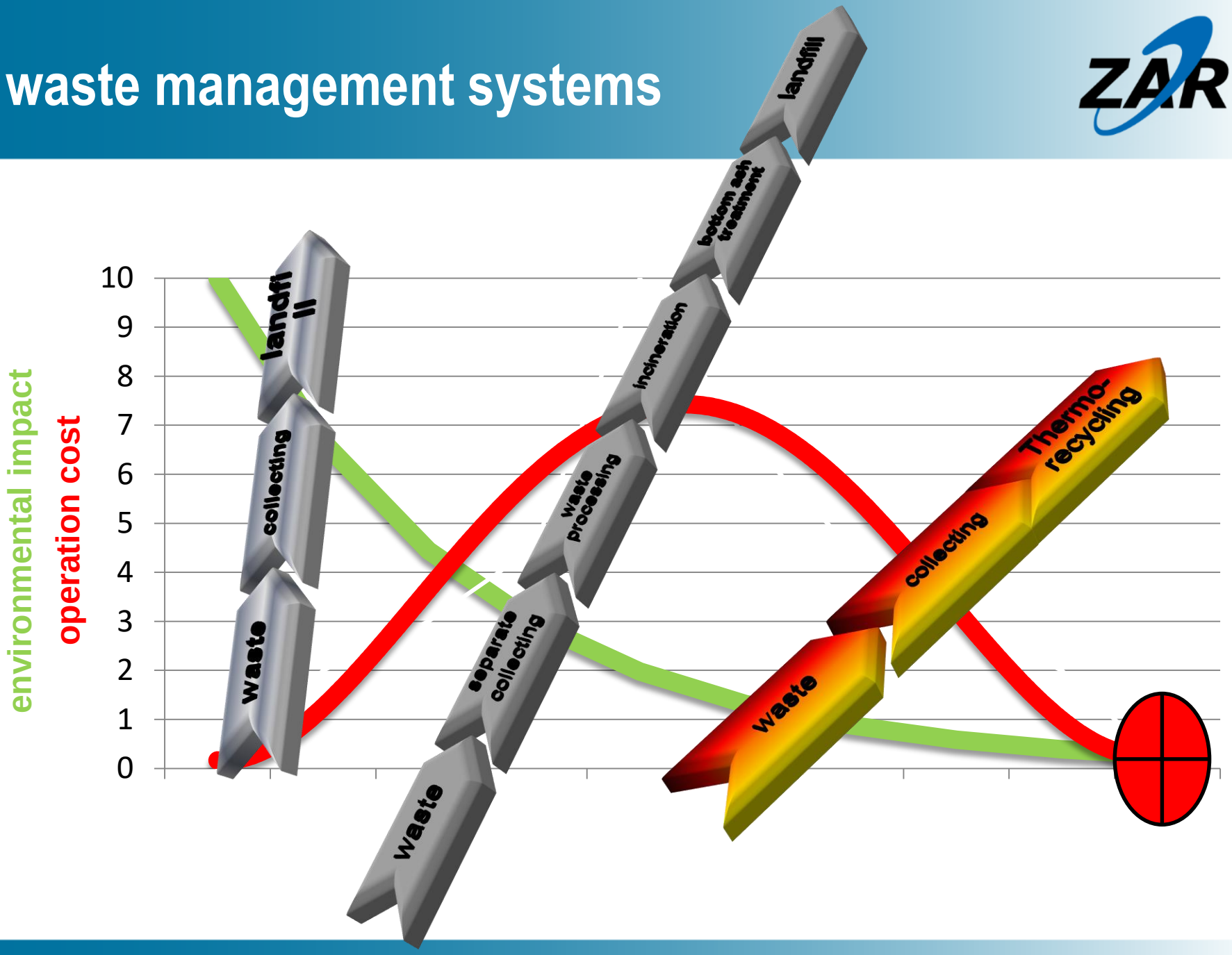


Thermo-Recycling

huge potential for metals



waste management systems



conclusion

- **the thermo-recycling process is relevant for the industries regarding the recycling rates**
- **the ecological significance for the proper treatment of the residues is essential**

Waste is a Precious Resource!

Assessment for Thermo-Recycling Plant

Assessments – Part 1

- State regulations and boundary values for air, water, soil
- State regulations regarding waste: Who owns the waste?
  Is it allocated or is there a free market?
- How does the waste get collected and delivered to the site?
- How is it ensured that the plant gets enough waste over the next 25 years?
- Waste quality re caloric value (fuel value), metal content, etc.
- Prices for electricity, steam, district heating, cooling
- Labour costs
- Requirements for bottom ash (slags), so it can be used as raw material

**These assessments are crucial,
in order to secure investment and
success of the project before it is started.**

Assessments for Thermo-Recycling

Assessments – Part 2

- Costs for the disposal site of bottom ash and electro-filter ash
- Costs for capital
- Potential fees for reception of waste
- Is a CO2 compensation feasible? (Carbon Credits)
- What is the position of politics and government towards thermo-recycling? (long-term)
- What is the position of politics and government towards separate collection of different waste components and their recycling? (long-term)
- How are building & operation permits issued?
- Who is the investor? Government, community, private, mixed form?

**These assessments are crucial,
in order to secure investment and
success of the project before it is started.**

Thank you!

- **End of official presentation**
- **Following files = more detailed information**

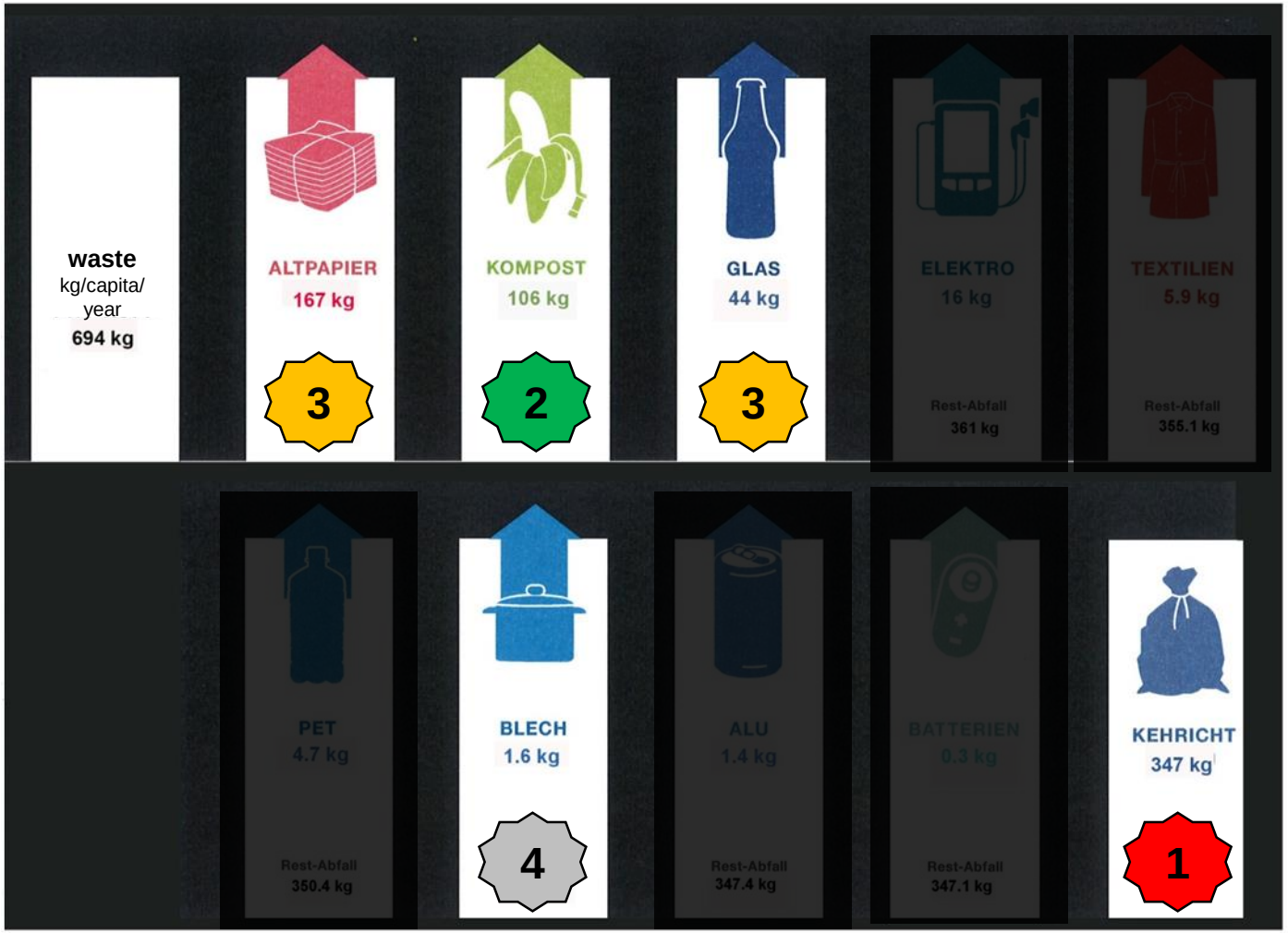
priorities of a new waste management system

1. Priority: ThermoRe (incineration)

2. Priority green waste

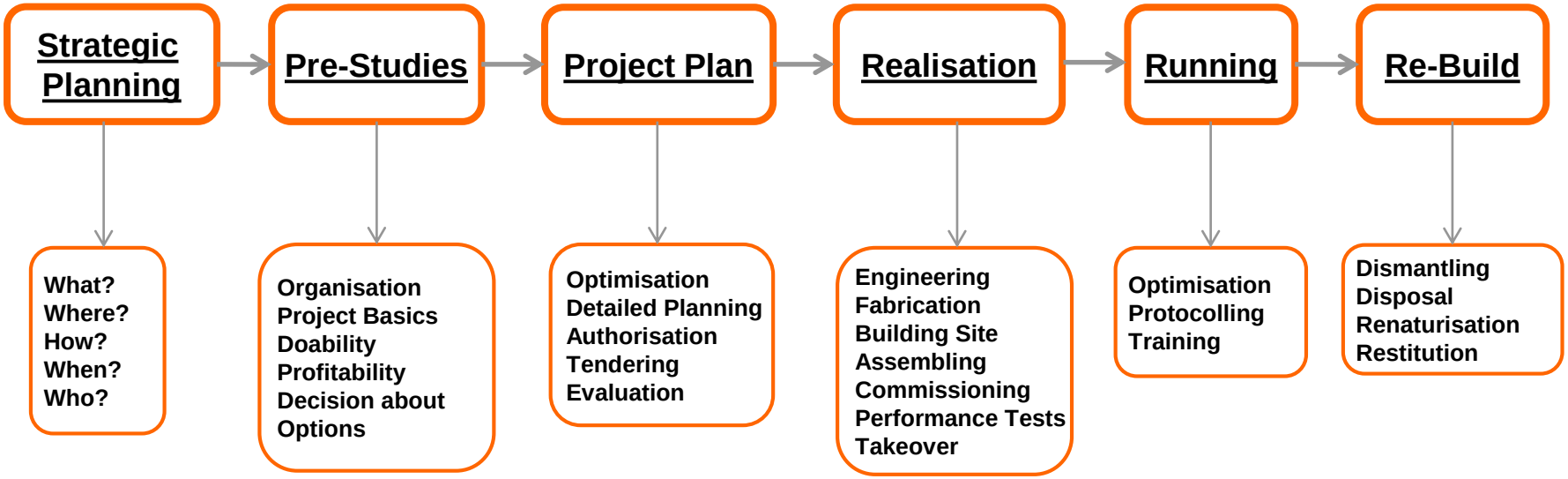
3. Priority paper, cardboard, glass

4. Priority ferrous



BAFU (2013): Siedlungsabfälle und Separatsammlung 2012

Project Process Phases
Assessment, Planning, Building, Running, Dismantling



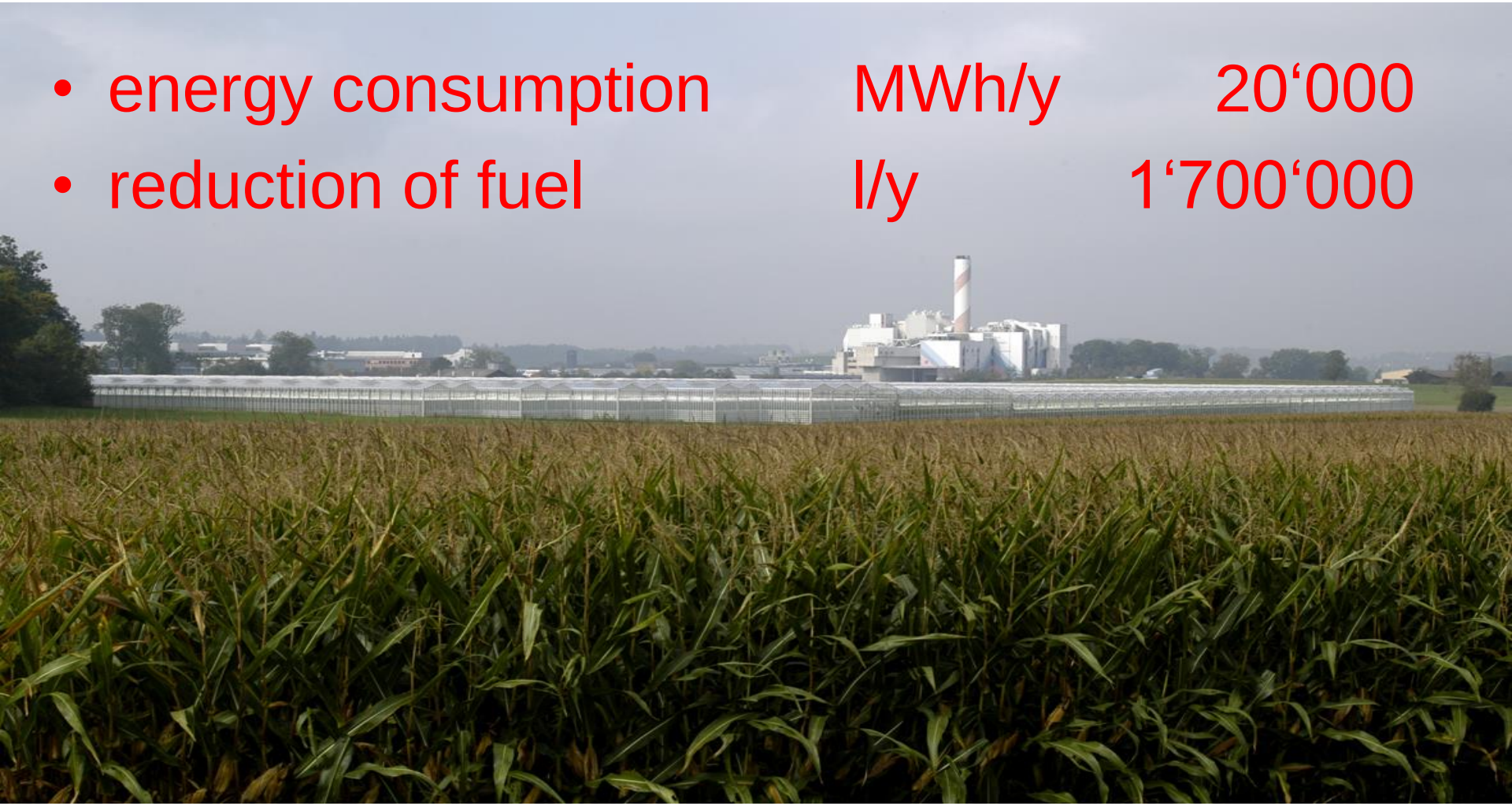
Environmental Impact Assessment
Example for strategic planning

Site-Evaluation for thermo-recycling plants (2015)

Basis: defining transparent and comprehensible criteria (economical and ecological aspects), for the search of the placement of a waste to energy plant

- GIS based selection of suitable sites
- Evaluation and triage of the selected sites

waste to energy: greenhouse



- energy consumption MWh/y 20‘000
- reduction of fuel l/y 1‘700‘000

waste to energy: greenhouse

myclimate
Protect our planet

myclimate certificates CO_2 free vegetable production