

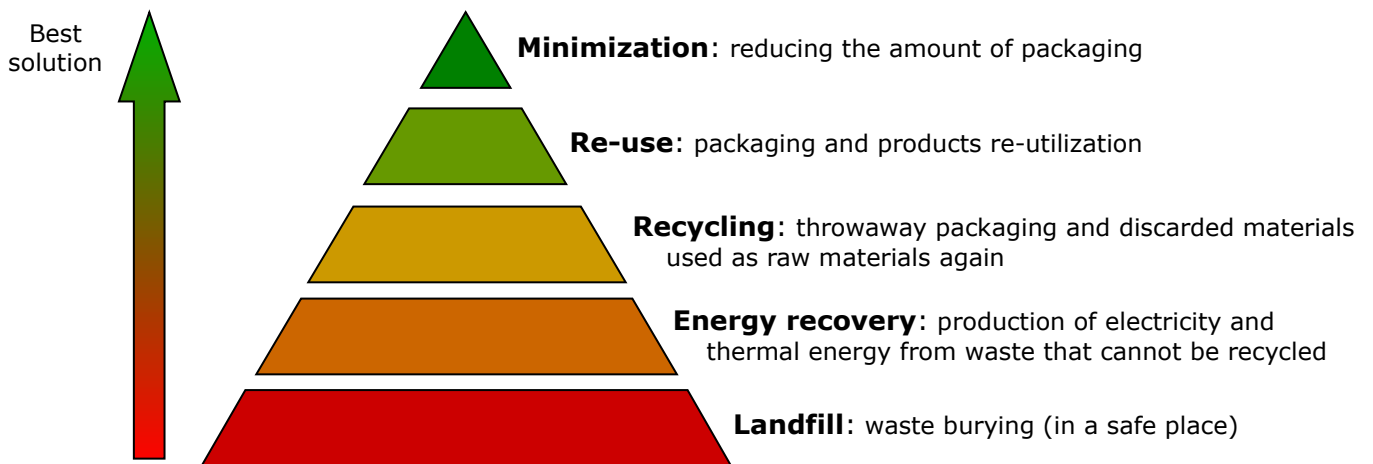


**CGE Engineering**  
Compagnia Generale

**Waste  
to Energy  
Plants**

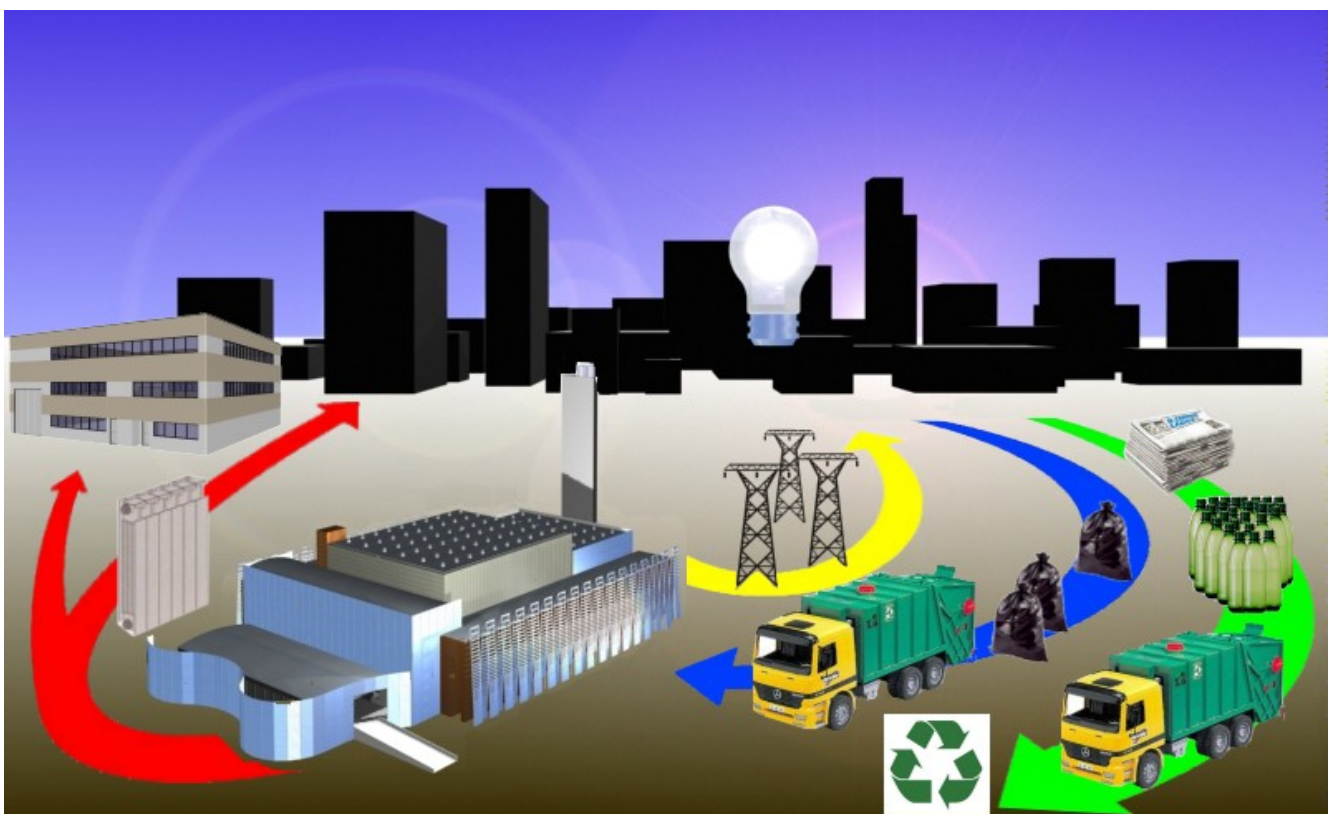
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## Waste management gold rules

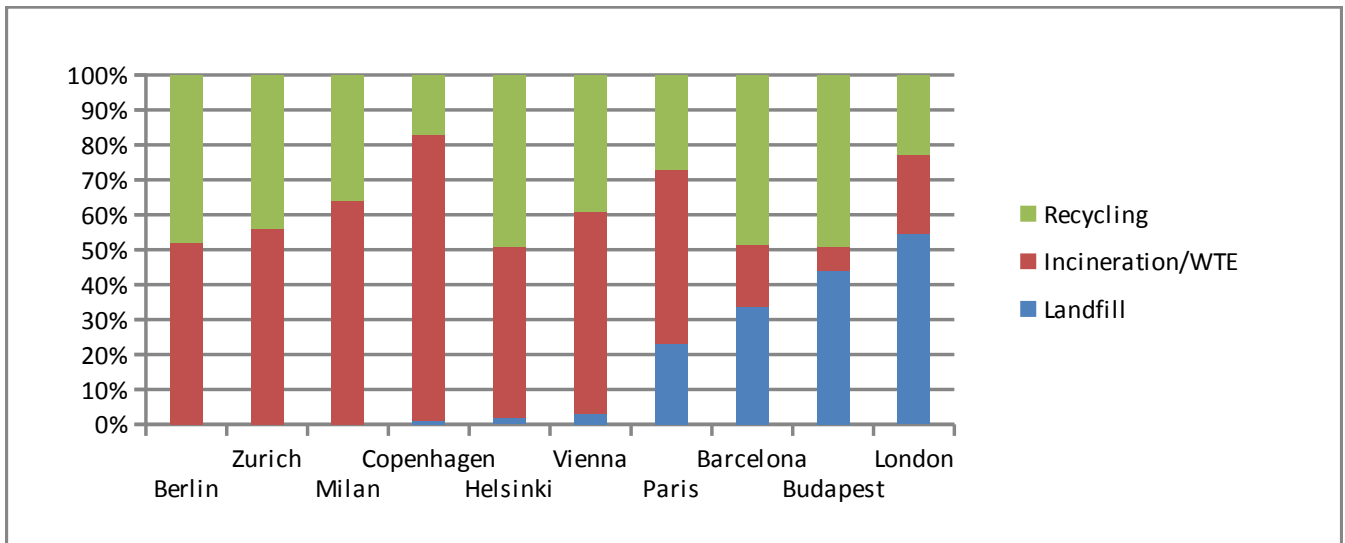


The **integrated waste management system** is set up by:

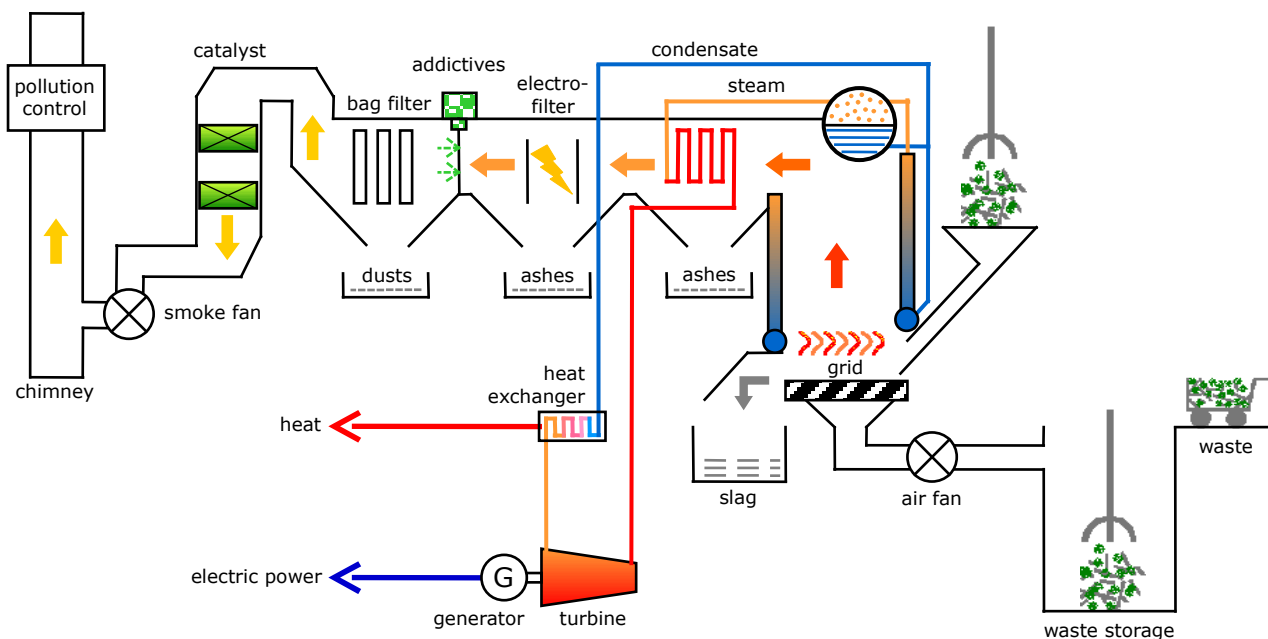
1. **Differential collection:** aim is maximizing the recyclable materials recovery
2. **Waste to Energy:** combustion of un-recyclable materials, retrieving from them as much energy as possible
3. **Minimum environmental impact** from waste collecting and energy recovery activities, reducing to the least the use of landfills



## WASTE DISPOSAL modalities in main European cities



## The BEST TECHNOLOGY for energy and environment



**WTE plant** is roughly subdivided in the following sections:

1. Waste delivery and storage
2. Combustion chamber and steam generation
3. Electric power and heat production
4. Solid residual collection (slag, ashes, dusts)
5. Smoke abatement and pollution control



**No need of landfills**



**No illegal waste disposal**



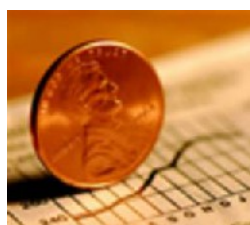
**Environmental improvement**



**Energy recovery**



**Know-how improvement**



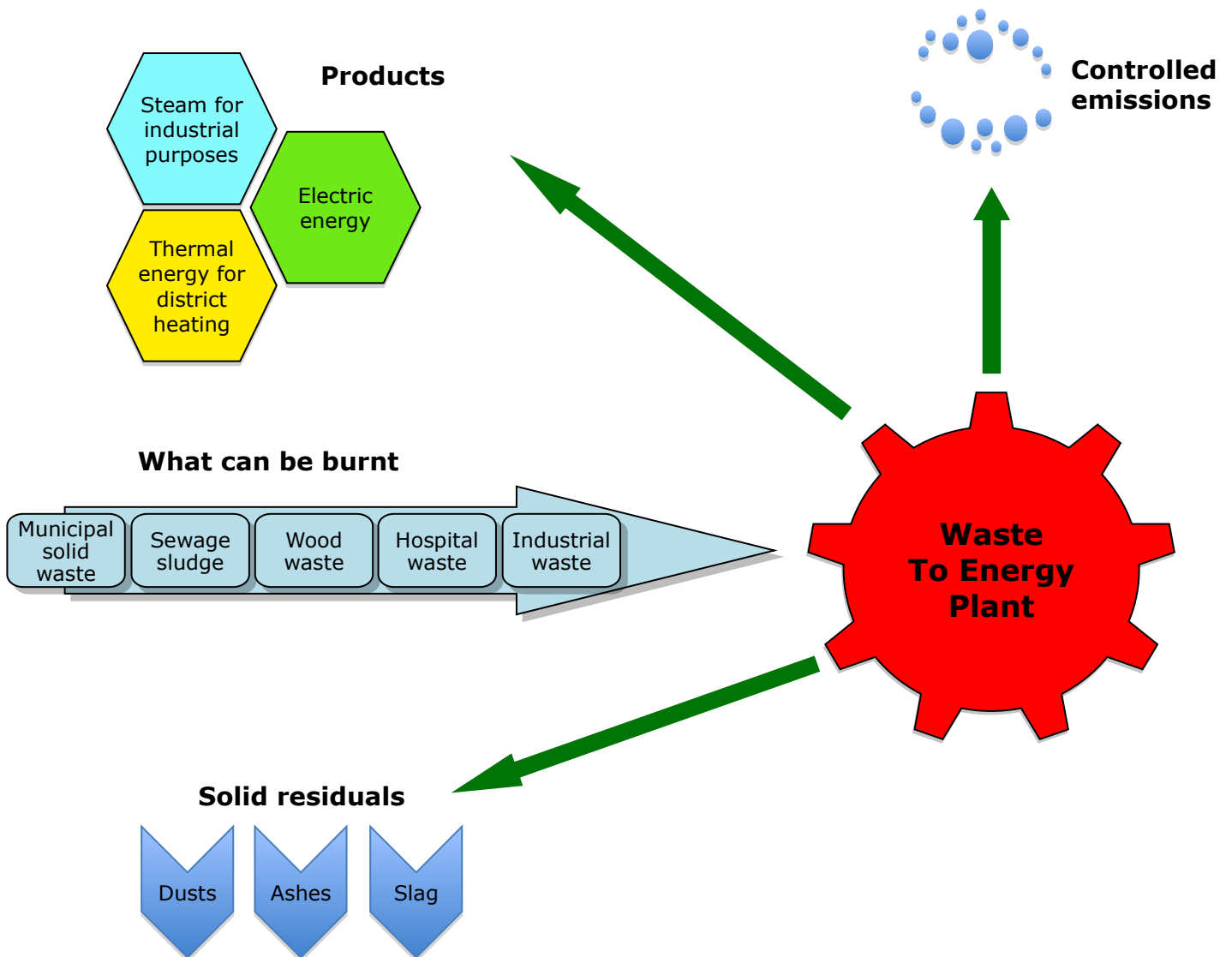
**Pay investment**



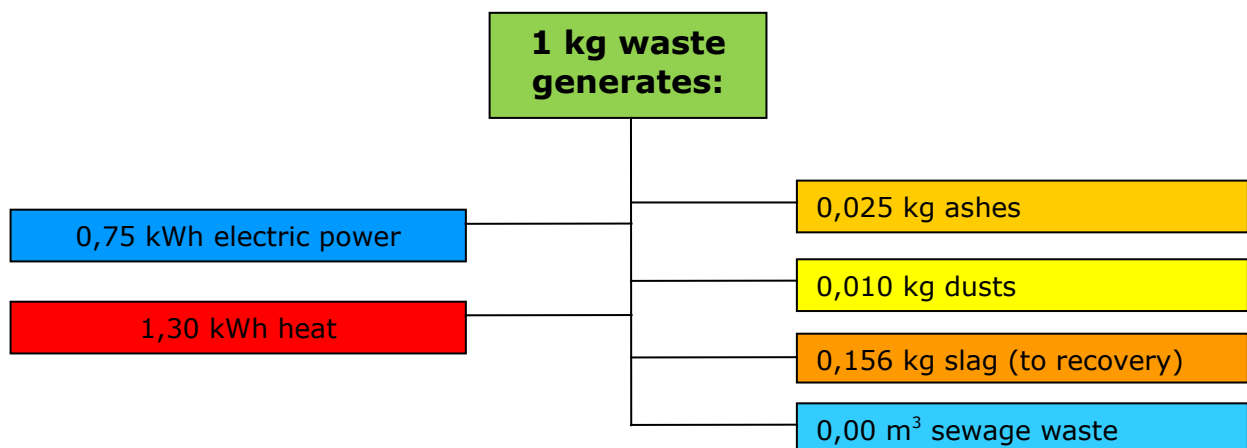
**High-tech employment development**

**Main advantages and problems solved by WTE plants**

## WTE plant fuels, products and by-products



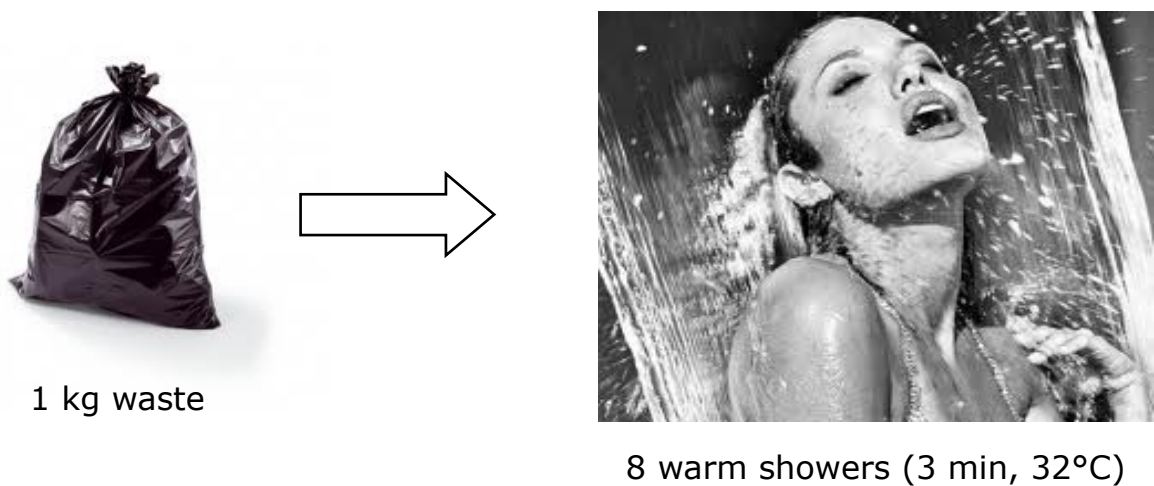
## Energetic and mass balance



## How much electric power can be recovered?

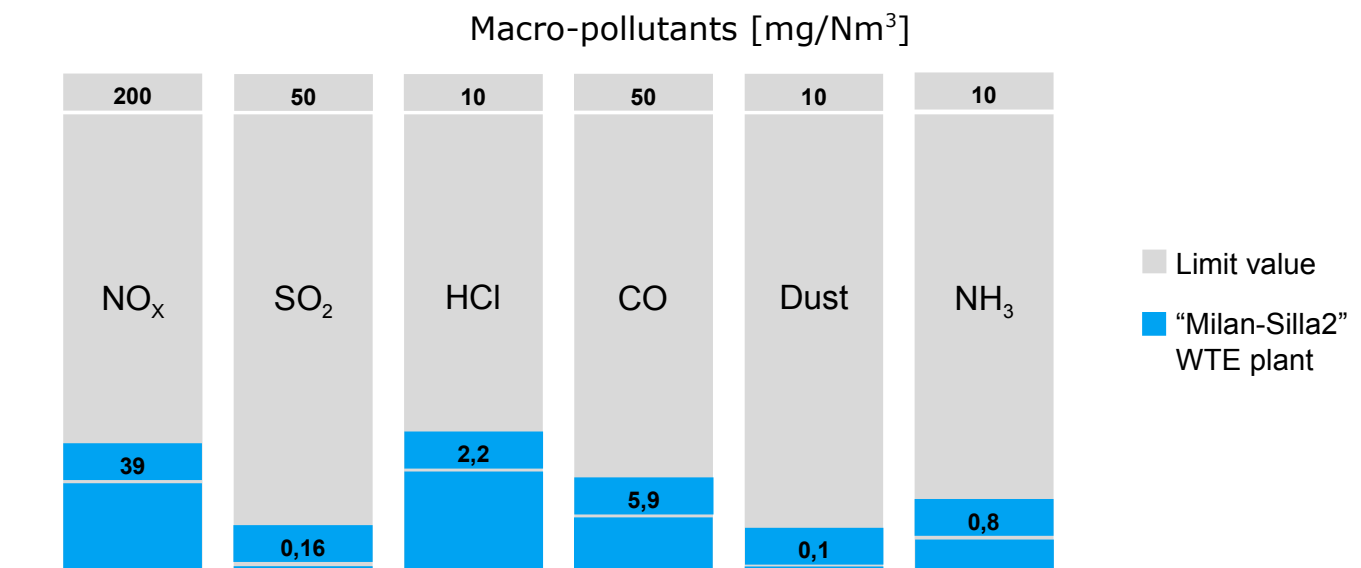


## How much heat?



## Gas emissions

(average 2010 values related to the "Milan-Silla2" WTE plant compared with limit values from Directive 2000/76/CE)



### Micro-pollutants [mg/Nm<sup>3</sup>]

Parameters	"Milan-Silla2" WTE plant	Limit value
Polycyclic Aromatic Hydrocarbons	< 0,00003	0,01
Dioxins and furans (PCDD+PCDF)	0,0009 × 10 <sup>-6</sup>	0,1 × 10 <sup>-6</sup>
Cadmium + Thallium	< 0,0013	0,05
Mercury	< 0,006	0,05
Nickel	< 0,001	0,1
Metals (Sb+As+Pb+Cr+Co+Cu+ Mn+Ni+V+Sn)	< 0,0115	0,5

## Best Available Technologies emissions comparison

Parameters	Limit value [mg/Nm <sup>3</sup> ]	BAT plant (IPPC 2006) [mg/Nm <sup>3</sup> ]	"Milan-Silla2" WTE plant (year 2010) [mg/Nm <sup>3</sup> ]
SO <sub>2</sub>	50	1-40	0,16
NO <sub>x</sub> (determined by measuring NO <sub>2</sub> )	200	40-100	39,3
Dusts	10	1-5	< 0,1
CO	50	5-30	5,9
HCl	10	1-8	2,2
NH <sub>3</sub>	10	< 10	0,8
TOC (Total Organic Carbon)	10	1-10	0,44
HF	1	< 0,001	< 0,0001
Cd+Tl	0,05	0,005-0,05	< 0,00013
Hg	0,05	0,001-0,02	< 0,006
As+Co+Cr+Cu+Mn+Ni+Pb+Sb	0,5	0,005-0,5	< 0,0115
Dioxins and furans (PCDD+PCDF)	0,1 × 10 <sup>-6</sup>	0,01-0,1 × 10 <sup>-6</sup>	0,0009 × 10 <sup>-6</sup>

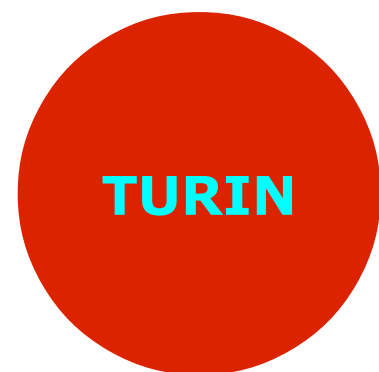
### Ultra-thin particles < 0,1 μm [number of particles / cm<sup>3</sup>]

Wood domestic fireplace	81'000
Diesel fuel heater	67'000
Wood pellet heater	52'000
"Milan-Silla2" WTE plant	18
Milan downtown air	32



## Views of existing and under construction Italian WTE plants





## INTERIORS

