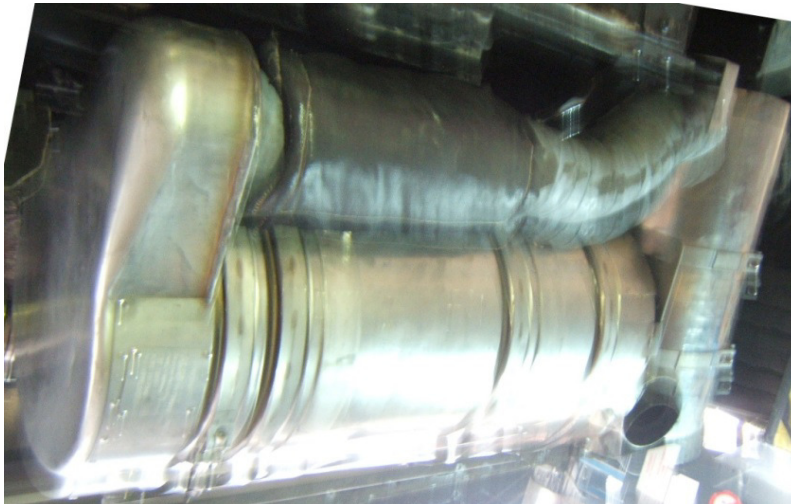


# German government supports SCR-retrofits for public transport and more

10<sup>th</sup> VERT FORUM

Best available emission  
control technology for  
in-use and OE-engines

10 years VERT Forum – A moment to celebrate



## Volker Schlickum

Senate Department for the Environment,  
Transport and Climate Protection

Berlin

# Emission reduction of the main polluters

the main polluters could be a few big sources

- power plants
- factories

or many small sources

- domestic heating (not in Tehran!)
- road transport
- other transport
- small industry
- others

## Clean Air Plan Berlin list of actions

### Large stationary sources:

- **Best Available Technology**; already largely exhausted

### Domestic heating:

- cleaner fuels (nat. gas), heat&power cogeneration
- promotion of energy saving measures
- renewables (but strict emission limit values for wood fired burners)
  - option: stricter emissions standards for wood heating systems ( $< 10 \text{ mg/m}^3$ )
- ☺ only few single coal fired stoves left ( $< 2\%$  of all flats);

### Construction:

- Guidelines & information about dust abatement measures
- Regulations based on Berlin's regional Pollution Control Act

### Transport:

- **Cleaner vehicles and fuels**
  - municipal vehicle fleet (CRT retrofit & CNG)
  - filter retrofit of passenger cruising ships
  - **LEZ** (low emission zone)
- **Less traffic through sustainable transport- and city planning**
  - master plan transport, "StEP"
- **Optimized traffic management**
- **Speed limits (30 km/h)**
- **Ban of heavy duty vehicles in single streets**
- ...

# The beginning

## 1400 Busses for municipal public transport

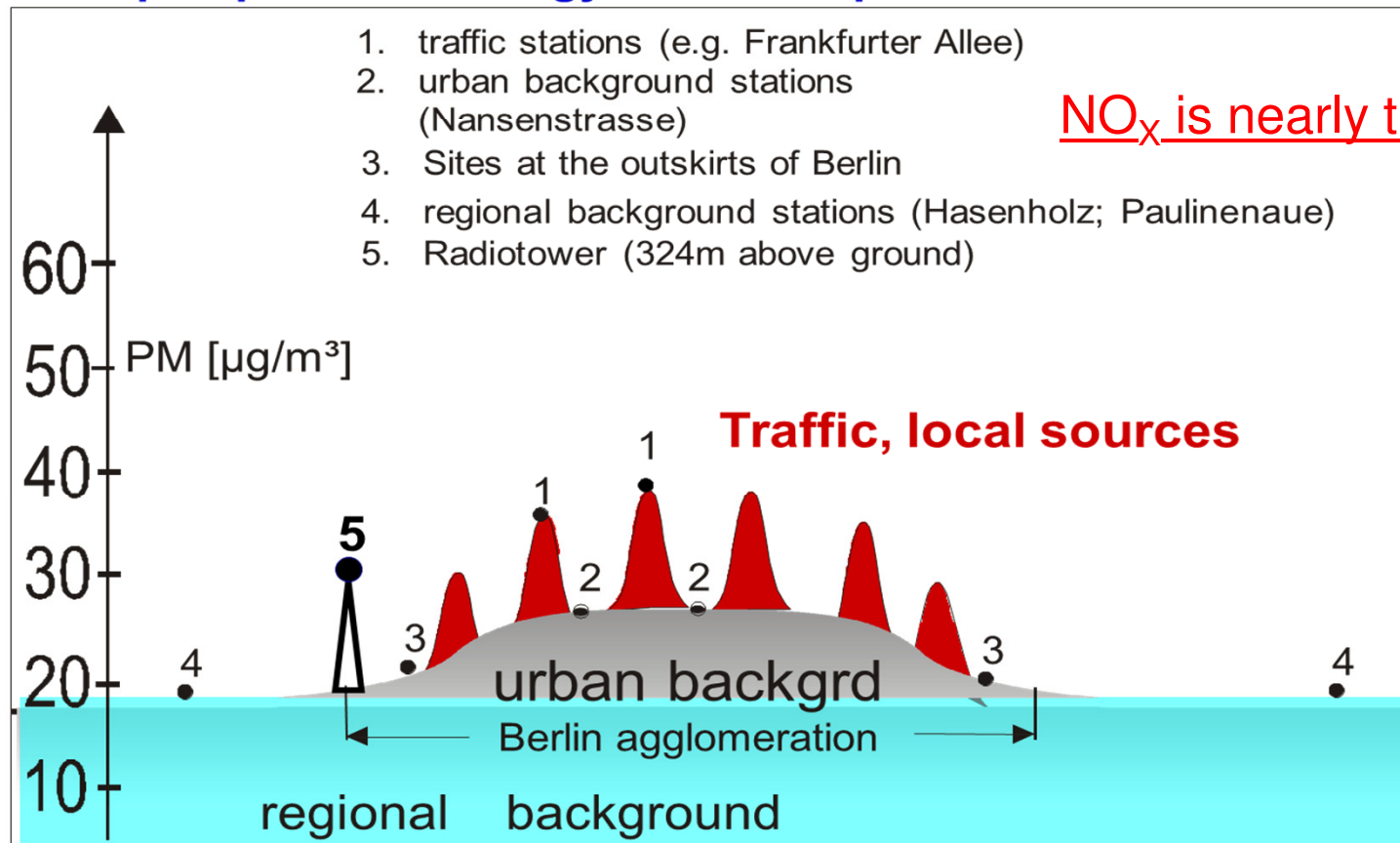
100% in only 8 years with particulate filter

	Referenz 2004	2005	2006	2007	2008	2009
EURO 0	28%	22%	10%			
EURO 0 with CRT- <b>Particulate filter</b>	11%	7%	7%	4%		
EURO 1 with CRT- Particulate filter	12%	12%	12%	12%	3%	
EURO 2 with CRT- Particulate filter	35%	35%	35%	35%	35%	26%
EURO 3 with CRT- Particulate filter	12%	21,9%	22%	22%	22%	22%
EURO 4 with CRT- Particulate filter	0,1%	0,1%	12%	12%	12%	12%
EURO 5 with Particulate filter / EEV	2%	2%	2%	15%	28%	40%

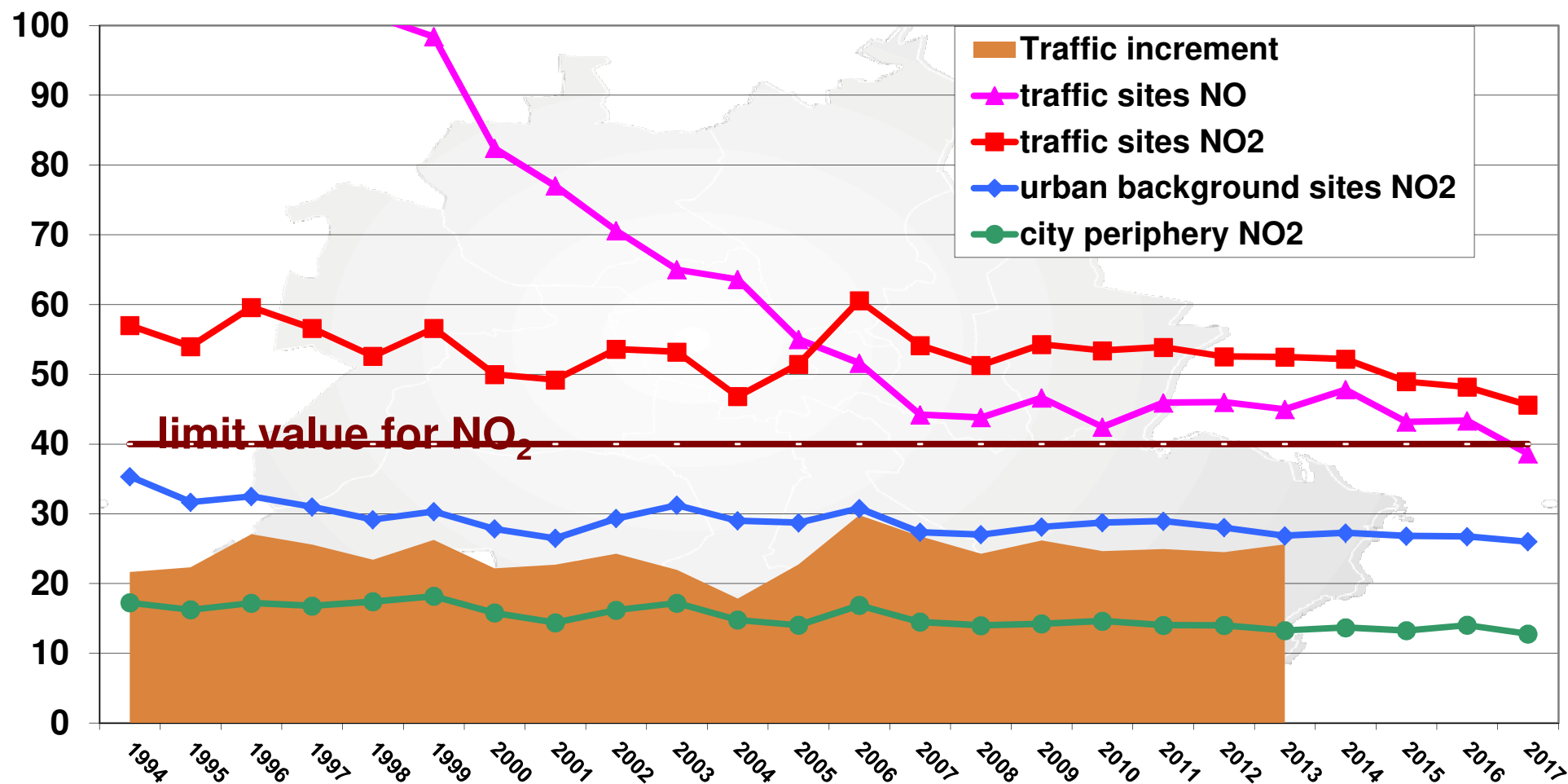
## source analysis

👉 where does it come from & how much ?

### Example: phenomenology of the PM-pollution around Berlin



## $\mu\text{g}/\text{m}^3$ Development of nitrogen dioxide levels in Berlin





## Clean Air Plan Berlin ☞ transport measures

### Cleaner vehicles and fuels.....

#### cleaning up the **municipal vehicle fleet**

- **particle filter:** police, buses
  - 1000 old buses retrofitted with CRT since 1999
  - **full CRT coverage by 2008**
- **compressed natural gas & biogas:**
  - 25% of garbage collection vehicles, **50% by 2008**
  - **15 buses running on CNG and 5 on hydrogen**
- **SCRT retrofit** for public buses
  - retrofit programme of about 100 buses planned



#### CNG (compressed natural gas) for **private & commercial Diesel vehicles**

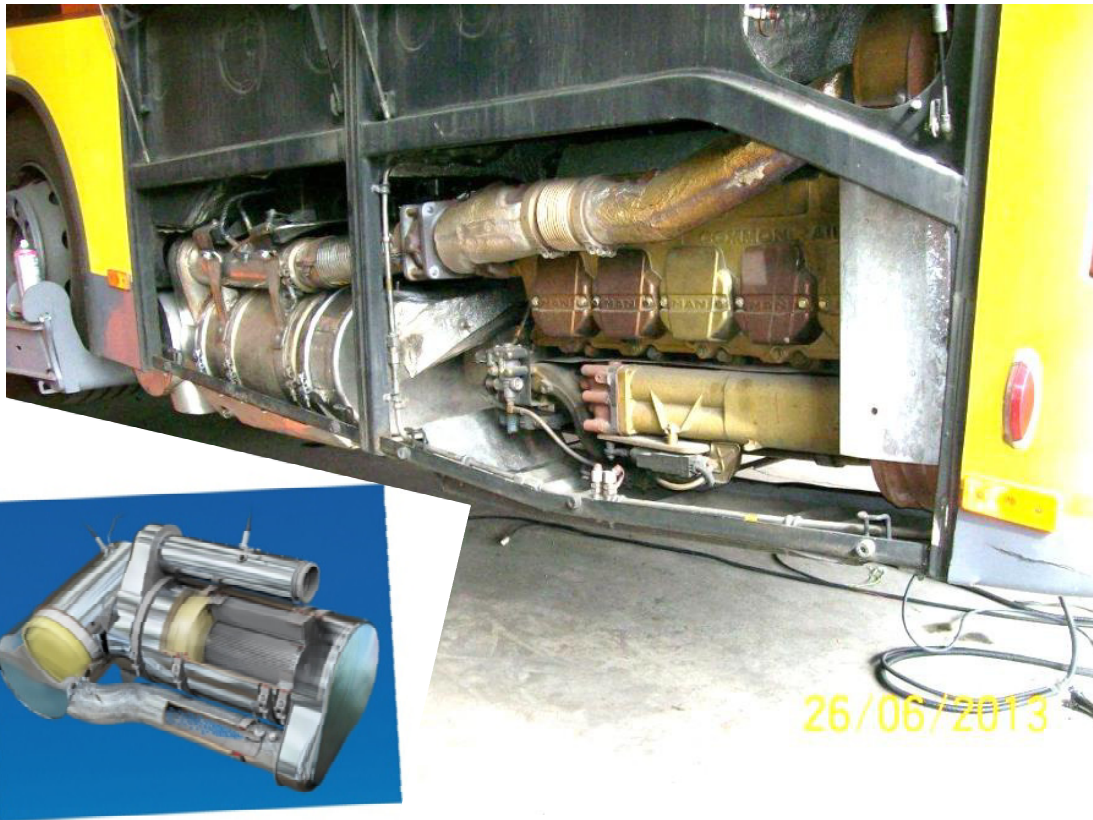
- 1000 private cars: gas-vouchers & tax refunds
- **1000 taxis** and driving schools: funding of new CNG-vehicles
- **100 HGVs&LGVs:** funding of new vehicles running on CNG

#### **network** of **natural gas** refilling stations (14 stations by now)

- increasing share of biogas



## Public transport busses I



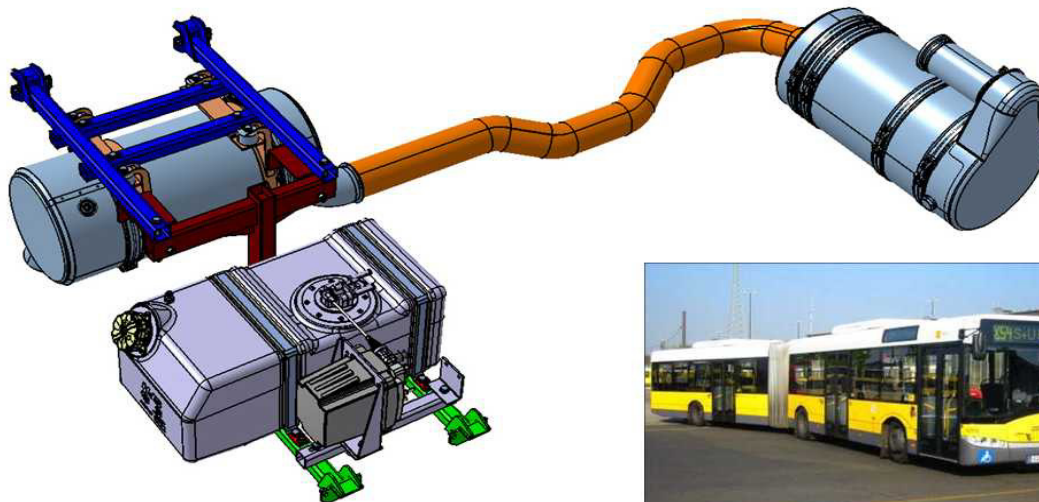
200 double-decker of the  
Berlin-BVG retrofitted with  
SCR, thereby approaching  
EURO VI values

**-75 % NO<sub>x</sub> per  
vehicle**



## Public transport busses II

SCRT®-System Solaris Urbino 18 - Einbaulage



70 articulated-long-busses of the Berlin-BVG retrofitted with SCR, thereby approaching EURO VI values

**-75 % NO<sub>x</sub> per vehicle**

transport measures by lower exhaust temperatures

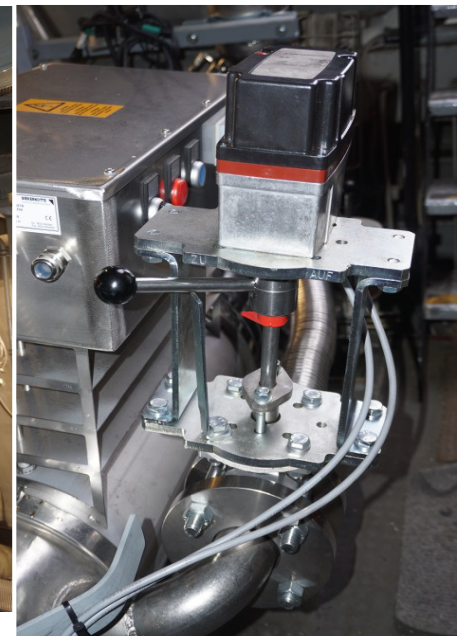
## SCR + particle filter in passenger cruise ships

**pilot project 2008-2010 with particle filter**

- **Now retrofit of 3 vessels with different SCR-systems**
- **monitoring of efficiency, performance and handling during routine operation**









transport measures by lower exhaust temperatures II

## ☞ SCR + particle filter in garbage trucks



Up to 75 waste collection vehicles of the BSR equipped with highly efficient NO<sub>x</sub> reduction (SCR) + exhaust particle filters thereby approaching EURO VI emission values.

transport measures by lower exhaust temperatures III

👉 light delivery- and craftsman's van





## subsidy directives

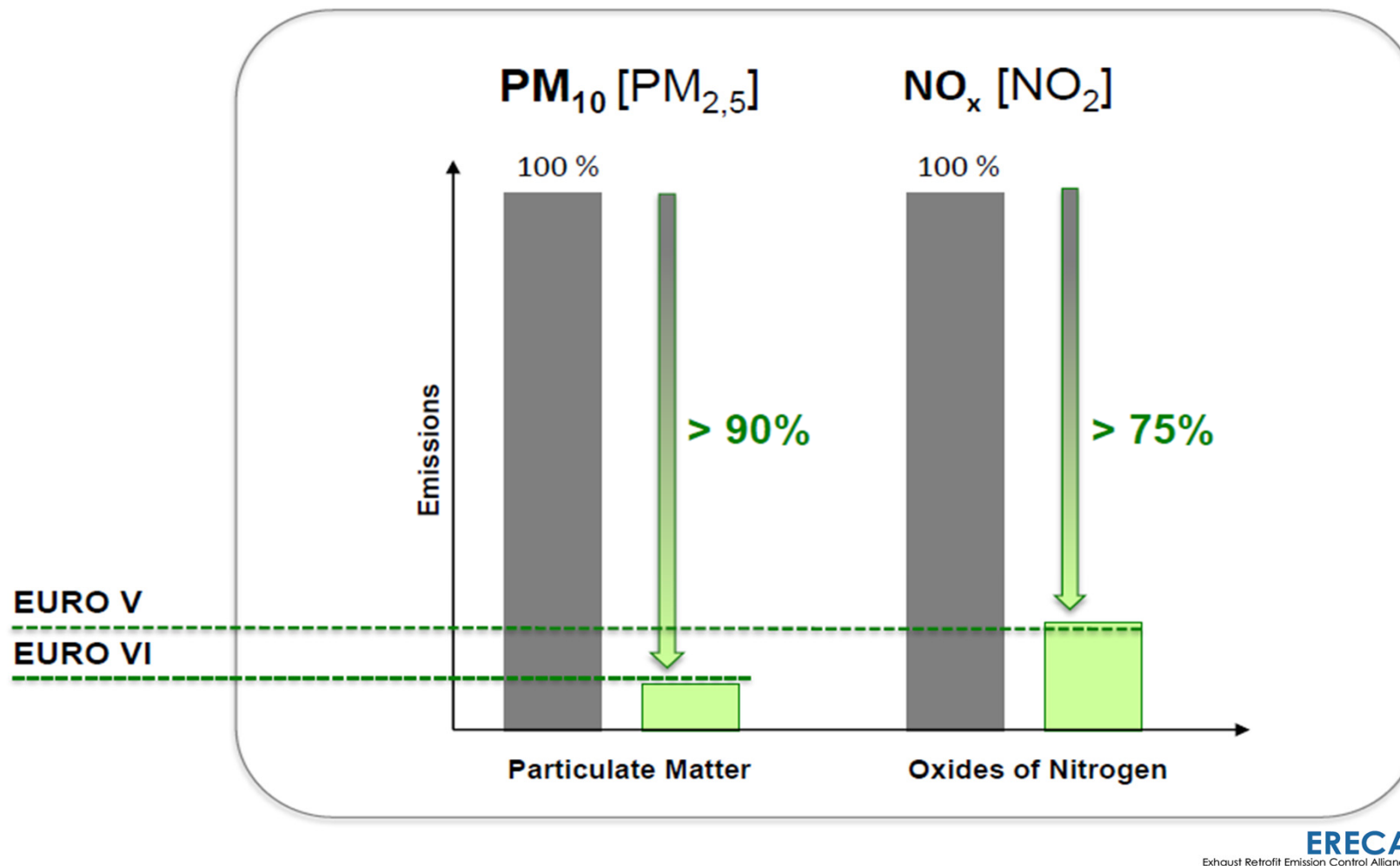
The funding guideline for public-busses (heavy-duty):  
40-60% (80%) published in the Federal Gazette.

funding guideline for heavy-duty municipal vehicles .  
40-60% (80%) published in the Federal Gazette.

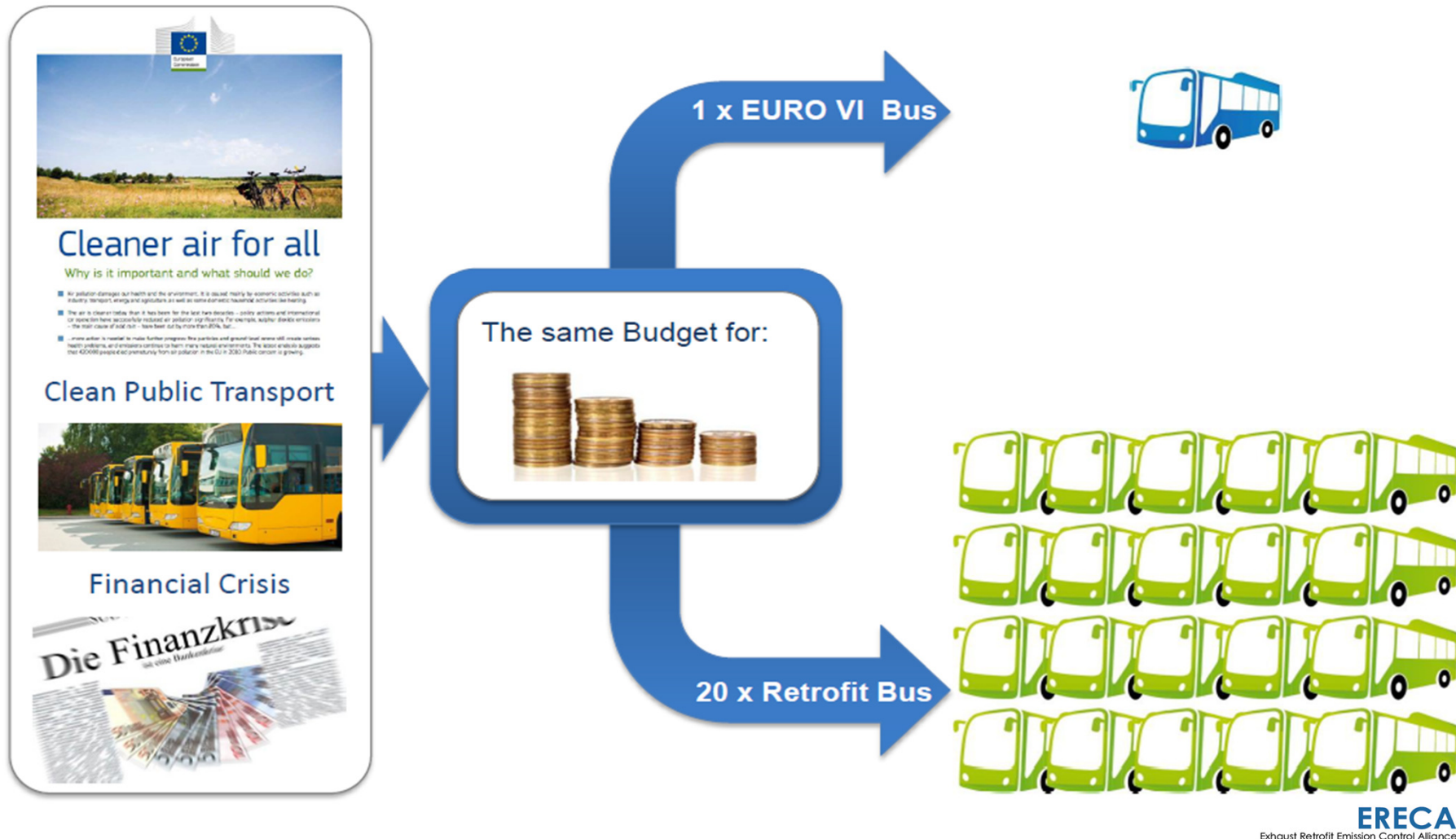
funding guideline for heavy-duty delivery- and craftsman's vehicles (3,5-7,5 t):  
40-60% published in the Federal Gazette.

funding guideline for light delivery- and craftsman's vans (2,8-3,5 t):  
40-60% published in the Federal Gazette.

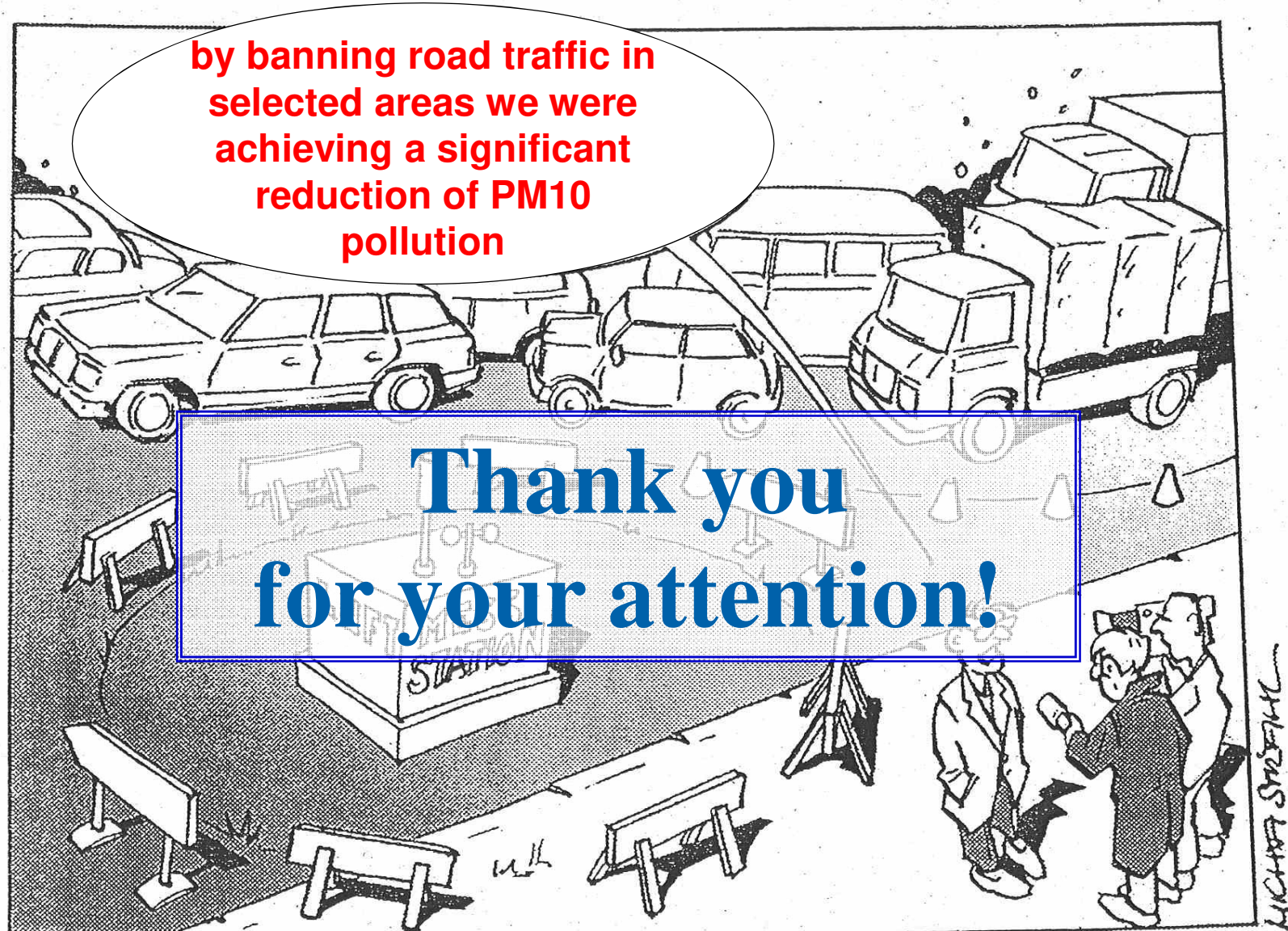
## Retrofit – Efficiency SCR + DPF® Systems



# Retrofit is more cost-effective







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