
EU- Air Quality Directive and the Implementation in Cities

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Berlin

EU Legal Basis Air Quality

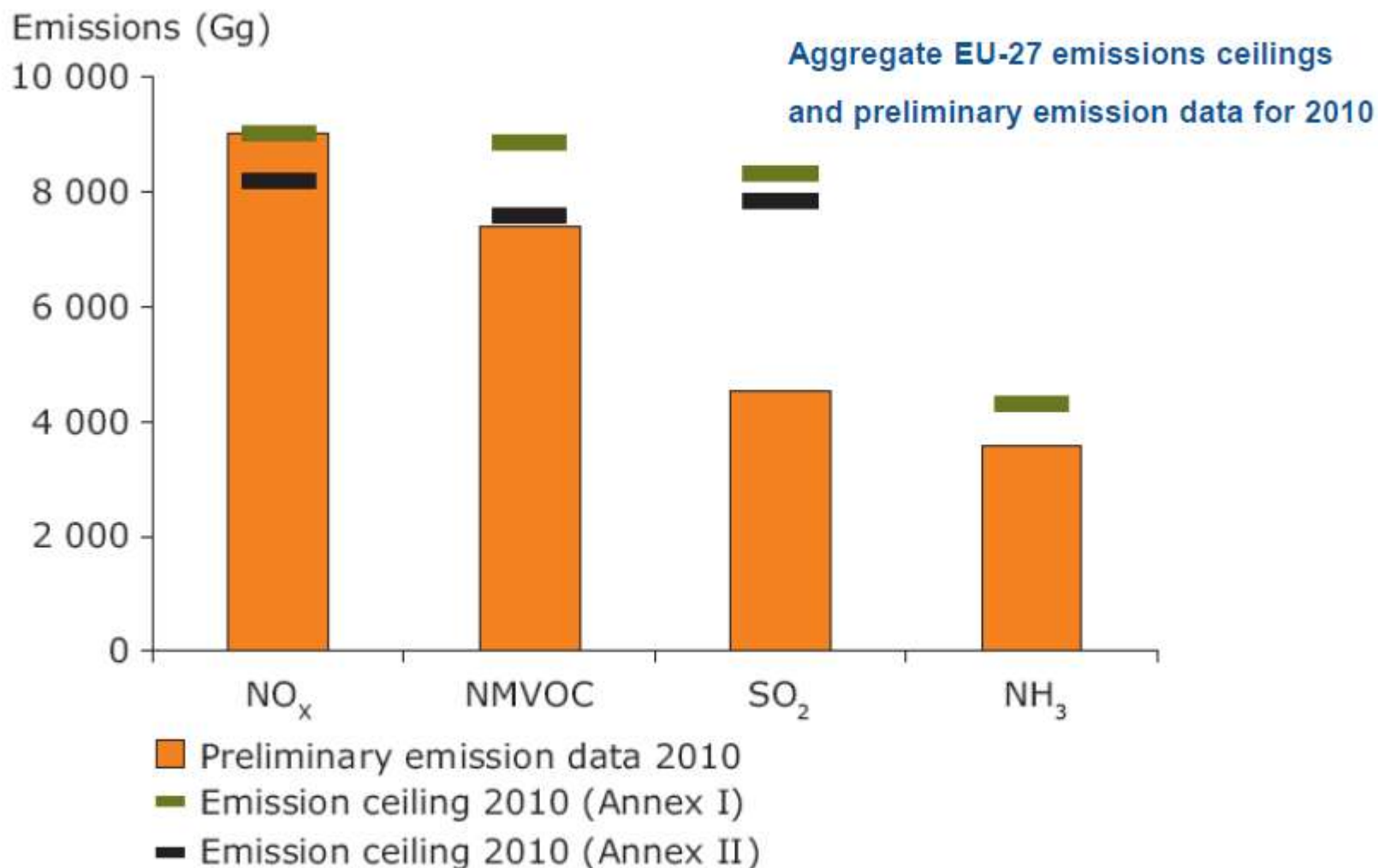
The International Air Quality Policy Framework

- The UNECE Convention on Long-Range Transboundary Air Pollution (CLRTAP) and its Protocols
- The knowledge base (EMEP, WGE, ...)
- ...

The EU Air Quality Policy Framework

- The 2005 Thematic Strategy on Air Pollution
- The National Emission Ceilings Directive
- The Ambient Air Quality Directives
- The EU Air Pollution Source Abatement Policy Framework
- National and Local Air Pollution Abatement Measures
- ...

National Emission Ceilings Directive

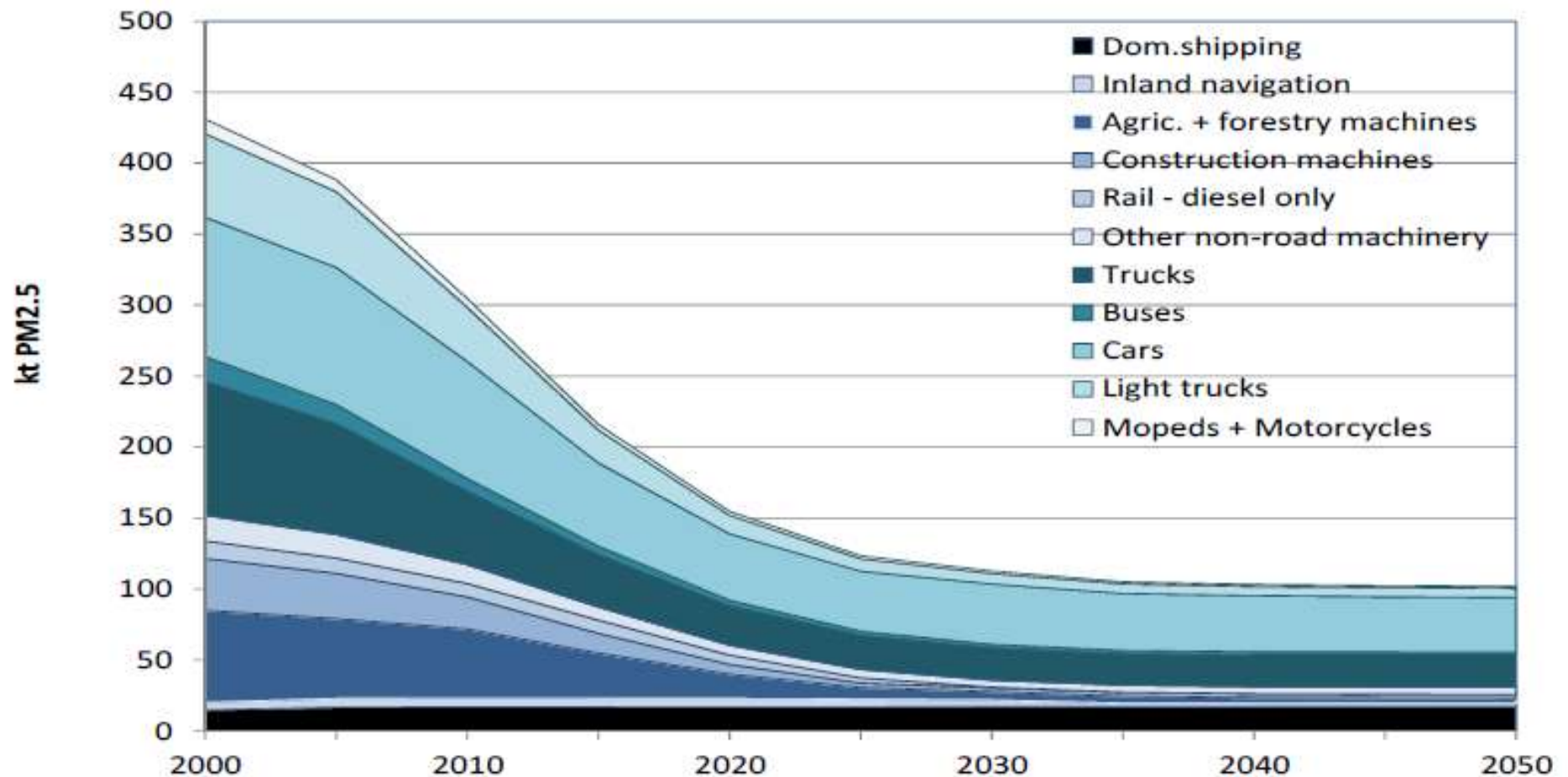


The emission ceilings shown are the aggregated EU-27 emission ceilings defined in Annex I and Annex II of the NECD. Annex II of the NECD does not define a ceiling for NH₃. Projections are aggregates of the projections reported by individual Member States.

EU Air Quality Directive 2008/50/EC

<i>Pollutant</i>	<i>Concentration</i>	<i>Averaging period</i>	<i>Legal nature</i>	<i>Permitted exceedences each year</i>
Fine particles (PM2.5)	25 µg/m ³ ***	1 year	Target value entered into force 1.1.2010 Limit value enters into force 1.1.2015	n/a
Nitrogen dioxide (NO ₂)	200 µg/m ³	1 hour	Limit value entered into force 1.1.2010	18
	40 µg/m ³	1 year	Limit value entered into force 1.1.2010*	n/a
PM10	50 µg/m ³	24 hours	Limit value entered into force 1.1.2005**	35
	40 µg/m ³	1 year	Limit value entered into force 1.1.2005**	n/a

Trends in Emissions



IIASA 2012 (Draft): Development of PM2.5 emissions from mobile sources in EU27

Note: Some NRMM categories do not follow trends and grow in importance (shipping, rail,)

European City Ranking



European City Ranking

OVERALL RANK	OVERALL MARK	MEASURE GRAPH	CITY	
01	B 84%		Berlin Capital of Germany	Berlin is the capital of Germany and with 3.4 million citizens also Germany's largest city. It is located in the eastern part of Germany, 70km west of the Polish border. More Information >
02	B- 82%		Copenhagen Capital of Denmark	Copenhagen is the capital and largest city of Denmark and with an city population of almost 550,000 and a metropolitan population of close to 2 million people it is also Denmarks ... More Information >
	B- 82%		Stockholm Capital of Sweden	Stockholm is the capital and the largest city of Sweden and constitutes the most populated urban area in Scandinavia with a population of 851,155 in the municipality (2010) ... More Information >
03	B- 80%		Vienna Capital of Austria	Vienna is the Capital of Austria and with 1.7 million inhabitants also the largest city. It hosts offices of many international organisations, in particular of the United Nations (UNO). More Information >
	B- 80%		Zurich Switzerland	With a population of 385,000 in the city and 1.1 million people in the surrounding area, Zurich is the largest city in Switzerland. It is situated in the north of Switzerland, near to the German ... More Information >
04	C- 71%		Amsterdam Capital of the Netherlands	Amsterdam is the largest city of the Netherlands with 783,000 inhabitants and a metropolitan population of almost 2.2 million people. The city is the official, cultural and financial ... More Information >
05	D+ 67%		Lyon France	Lyon is the 3rd largest city in France (population: 475,000) and is situated in the east, close to the Swiss border. The metropolitan area has a population of 1.3 million people. More Information >
06	D 64%		Glasgow United Kingdom	Glasgow is the largest city in Scotland and the third largest in the UK. The city has a population of almost 600,000, the greater Glasgow region almost 1.2 million and the whole region around the city around 2.4 million people. More Information >

European City Ranking

07

08

09

10

11

			city around 2.4 million people.	More Information >
D		Graz Austria	Graz is the capital of the state of Steiermark and with almost a population of almost 300,000 the second largest city of Austria. It is located in the south east of the country.	More Information >
D		Paris Capital of France	Paris is the capital of France and also its largest city. It is mentioned on a series of top ten lists. With a population of almost 12 million inhabitants in the larger ...	More Information >
F		Brussels Capital of Belgium	Brussels is the capital of Belgium and as a metropolitan region it has a population of 1.8 million. Brussels is a centre for international politics, among others hosting the headquarters ...	More Information >
F		London Capital of United Kingdom	London is the capital of the United Kingdom and the second largest city in the EU with 8.3 million inhabitants. The metropolitan area has a population of 12 to 14 million.	More Information >
F		Madrid Capital of Spain	Madrid is the capital of Spain and with a population of 3.4 million in the city and 6.3 in the metropolitan area it is the largest city in Spain and ranks as third largest in Europe.	More Information >
F		Stuttgart Germany	Stuttgart is the capital of the German state Baden-Wuerttemberg and Germanys 6th largest city. The city itself has a population of only 600,000, but the metropolitan area ...	More Information >
F		Duesseldorf Germany	Duesseldorf is situated in Western Germany in the Rhine-Ruhr metropolitan region and is the Capital of the German state North Rhine-Westphalia.	More Information >
F		Milan Italy	Milan is a city in the north of Italy and the capital of the region of Lombardy. The cities population is about 1.3 million, while the greater metropolitan region around Milan has 7.4 ...	More Information >
F		Rome Capital of Italy	Rome is located in the central-western part of Italy and is the countries capital and most-populated city with over 2.7 million inhabitants. Tourism is very important for the city and it is the ...	More Information >

Highest NO₂ of any capital city in Europe again

Posted on June 1, 2013 by Simon Birkett

Download PDF 

Boris Johnson must act in 'Green Week' in the 'Year of Air' after failing miserably to reduce air pollution

London again has the highest levels of nitrogen dioxide (NO₂), a toxic gas, of any capital city in Europe according to the latest data published by the European Environment Agency (EEA)

Marylebone Road monitoring station ranked the third worst of 2,836 monitoring stations across the whole of Europe for NO₂, falling from fourth worst in 2010. Government has stopped reporting results from Camden and Glasgow, previously in the 'Top 20' worst in Europe

London plummeted 346 places in the rankings for dangerous airborne particles (PM₁₀) as the Marylebone Road monitoring station showed no improvement between 2010 and 2011 as other cities successfully reduced air pollution

Latest from Twitter



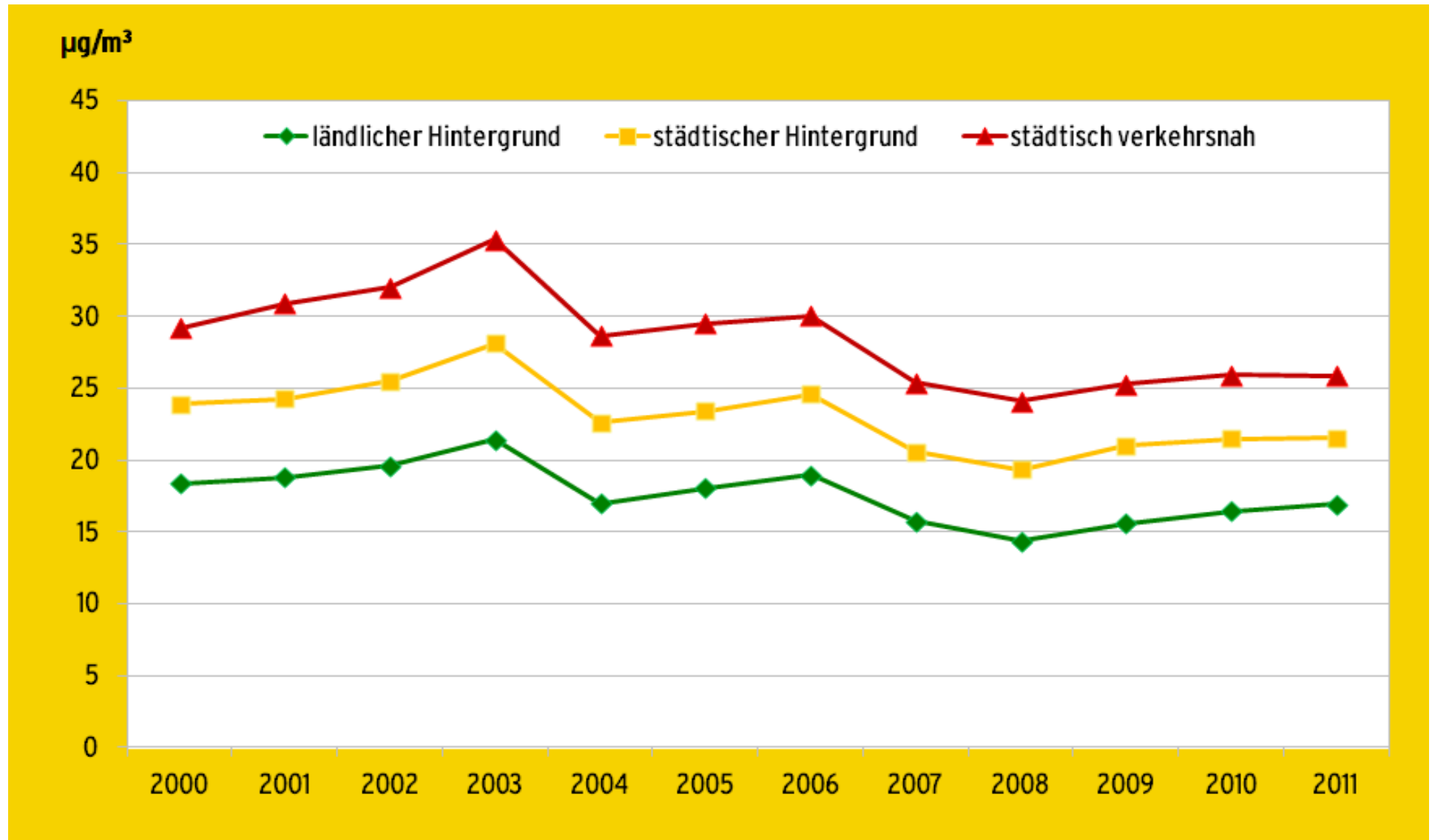
@guardianeco #GreenWeek #YearofAir:
#Boris must act after failing miserably to
reduce worst NO₂ #airpollution
[#](http://t.co/5XFLjSUDqz), 2 hours ago

@JessicaBG #GreenWeek #YearofAir:
#Boris must act after failing miserably to
reduce worst NO₂ #airpollution
[#](http://t.co/5XFLjSUDqz), 2 hours ago

@LBC_Dan #GreenWeek #YearofAir:
#Boris must act after failing miserably to
reduce worst NO₂ #airpollution
[#](http://t.co/5XFLjSUDqz), 2 hours ago

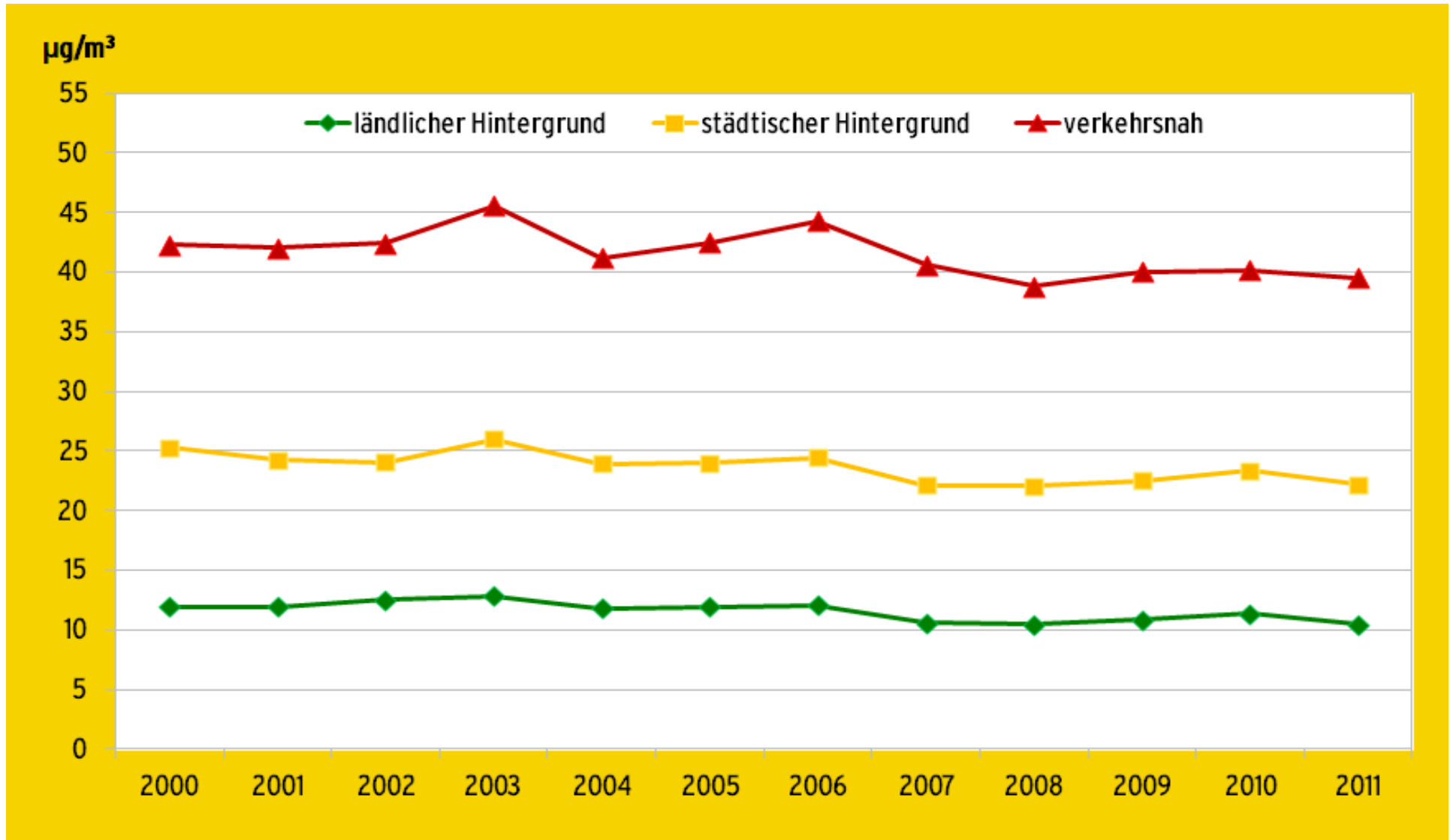
Development of the yearly Average pm_{10} Value

For the Stations „rural background“, „urban background“ and „urban near traffic“ between 2000 bis 2011



Source:UBA 2012

Development of the yearlyAverage NO₂ Value For the Stations „rural background“, „urban background“ and „urban near traffic“ between 2000 bis 2011



Source:UBA 2012

PM10 24h above the EU Limit in 2012

Messmethode: kontinuierlich (täglich aktualisiert, Stand: 23.3.2012)

Station	Messnetz	Stationsname	Tage
DENW203	Nordrhein-Westf.	Herne Recklinghauser Straße	36
DENW208	Nordrhein-Westf.	Gelsenkirchen Kurt-Schumacher-Straße	35
DESN025	Sachsen	Leipzig-Mitte	29
DENW188	Nordrhein-Westf.	Oberhausen Mülheimer Straße 117	27
DESN077	Sachsen	Leipzig Lützner Str. 36	26
DEBY115	Bayern	München/Landshuter Allee	25
DENW134	Nordrhein-Westf.	Essen Gladbecker Straße	25
DENW133	Nordrhein-Westf.	Hagen Graf-von-Galen-Ring	25

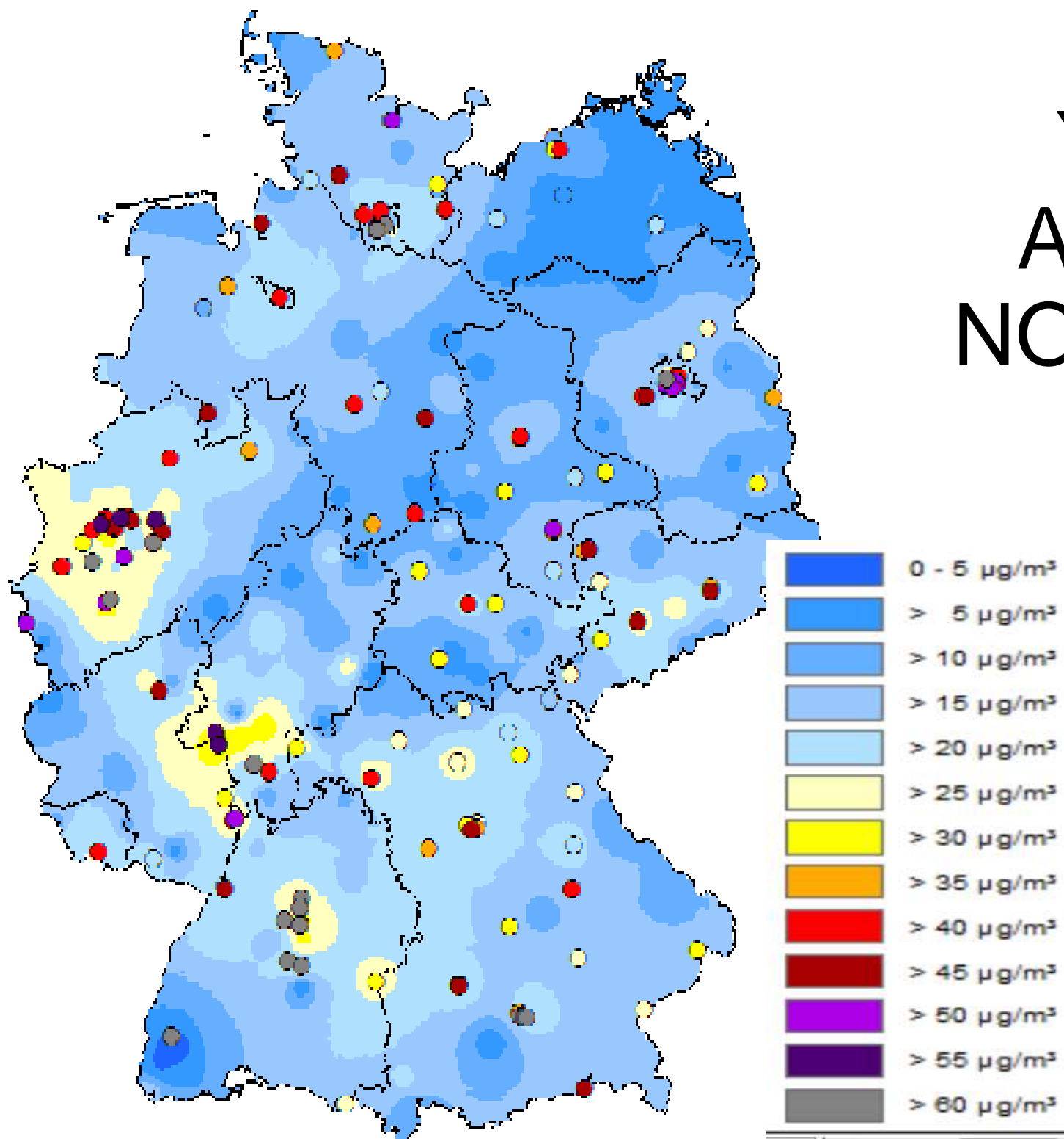
Messmethode: gravimetrisch (monatlich aktualisiert)

Station	Messnetz	Stationsname	Tage	Zeitraum
DEBW118	Baden-Württ.	Stuttgart Am Neckartor (S)	27	1.1.2012 - 26.2.2012
DEBW142	Baden-Württ.	Markgröningen Grabenstraße (S)	20	1.1.2012 - 22.2.2012
DEBW147	Baden-Württ.	Reutlingen Lederstraße Ost (S)	20	1.1.2012 - 13.2.2012
DEBW136	Baden-Württ.	Tübingen Mühlstraße (S)	19	1.1.2012 - 13.2.2012
DEBW137	Baden-Württ.	Tübingen-Unterjesingen Jesinger Hauptstraße (S)	19	1.1.2012 - 27.2.2012
DEBW117	Baden-Württ.	Ludwigsburg Friedrichstraße (S)	18	1.1.2012 - 15.2.2012
DEBW150	Baden-Württ.	Murg Hauptstraße (S)	18	1.1.2012 - 23.2.2012
DENW102	Nordrhein-Westf.	Duisburg-Bruckhausen	16	1.1.2012 - 29.2.2012

Measurement Stations with the highest NO₂ Values

Measurement Station	Typ of station	Yearly Av. in µg/m ³	number of hourly values > 200 µg/m ³
Stuttgart Hohenheimer Straße (S)	traffic	97	269
Stuttgart Am Neckartor (S)	traffic	90	76
München/Landshuter Allee	traffic	85	50
Reutlingen Lederstraße Ost (S)	traffic	84	43
München/Stachus	traffic	76	6
Tübingen Mühlstraße (S)	traffic	73	41
Köln Clevischer Ring 3	traffic	68	1
Freiburg Schwarzwaldstraße (V)	traffic	67	0
Hamburg Max-Brauer-Allee II (Straße)	traffic	67	4
Leonberg Grabenstraße (S)	traffic	66	8
B Hardenbergplatz	traffic	66	4
Stuttgart-Mitte-Straße (V)	traffic	65	6
Düsseldorf Corneliusstraße	traffic	64	2
Pleidelsheim Beihinger Straße (S)	traffic	63	22
Darmstadt-Hügelstraße	traffic	63	44
Ludwigsburg Friedrichstraße (S)	traffic	62	2
München/Prinzregentenstraße	traffic	61	7
Hamburg Habichtstraße	traffic	61	10

Yearly Average NO₂ Values 2011



Environmental Zones

Key points for a Label Ordinance

according to § 40 Abs. 3 BImSchG (2)

P- Cars

- **Red Group**




PM > **50 mg/km** (Emission limits Euro 2)

- **Yellow Group**

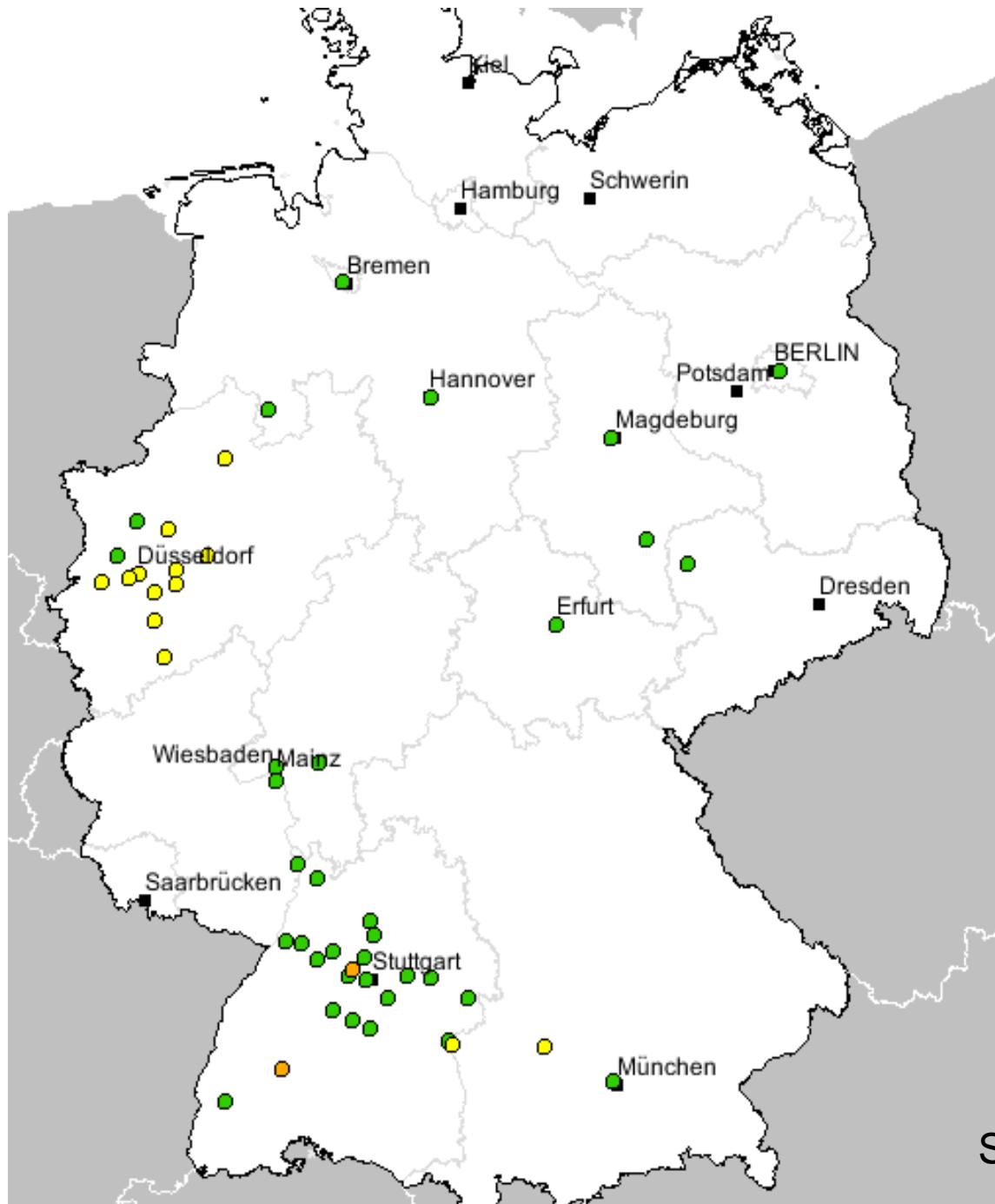
PM < **50 mg/km**, (Emission limit Euro 3). This limit can also be achieved by retrofit.

- **Green Group**

PM < **25 mg/km** (Emission limit Euro 4) This limit can also be achieved by retrofit.

Emissions class	1	2	3	4
Sticker	No Sticker			
Requirement for diesel vehicles	Euro 1 or worse	Euro2 or Euro1 + particulate filter	Euro3 or Euro2 + particulate filter	Euro4 or Euro3 + particulate filter
Requirement for petrol vehicles	Without a catalytic converter			Euro1 with catalytic converter or better

Environmental Zones in Germany



Entrance only with
yellow or green sticker

Entrance only with
green sticker

Bundesland	Ort	Status	<div>Stufe 1<div><div></div><div></div><div></div></div></div>	<div>Stufe 2<div><div></div><div></div></div></div>	<div>Stufe 3<div><div></div></div></div>
Baden-Württemberg:	Freiburg	Stufe 2	01.01.2010	01.01.2012	01.01.2013
	Heidelberg	Stufe 2	01.01.2010	01.01.2012	01.01.2013
	Heidenheim	Stufe 2	01.01.2012	01.01.2012	01.01.2013
	Heilbronn	Stufe 2	01.01.2009	01.01.2012	01.01.2013
	Herrenberg	Stufe 2	01.01.2009	01.01.2012	01.01.2013
	Ilsfeld	Stufe 2	01.03.2008	01.01.2012	01.01.2013
	Karlsruhe	Stufe 2	01.01.2009	01.01.2012	01.01.2013
	Leonberg	Stufe 2	01.03.2008	01.01.2012	01.01.2013
	Ludwigsburg	Stufe 2	01.03.2008	01.01.2012	01.01.2013
	Mannheim	Stufe 2	01.03.2008	01.01.2012	01.01.2013
	Markgröningen	Stufe 2	01.07.2011	01.07.2011	01.01.2013
	Mühlacker	Stufe 2	01.01.2009	01.01.2012	01.01.2013
	Pfinztal	Stufe 2	01.01.2010	01.01.2012	01.01.2013
	Pforzheim	Stufe 2	01.01.2009	01.01.2012	01.01.2013
	Pleidelsheim-Ingersheim-Freiberg	Stufe 2	01.01.2012	01.01.2012	01.01.2013
	Tübingen	Stufe 2	01.03.2008	01.01.2012	01.01.2013
	Ulm	Stufe 2	01.01.2009	01.01.2012	01.01.2013
	Urbach	Stufe 2	01.01.2012	01.01.2012	01.01.2013
Bayern:	Augsburg	Stufe 2	01.07.2009	01.01.2011	01.01.2013
	München	Stufe 2	01.10.2008	01.10.2010	01.10.2012
	Neu-Ulm	Stufe 1	01.11.2009	keine Angabe	keine Angabe
Berlin:	Berlin	Stufe 3	01.01.2008	01.01.2010	01.01.2010
Bremen:	Bremen	Stufe 3	01.01.2009	01.01.2010	01.07.2011
Hessen:	Frankfurt a.M.	Stufe 3	01.10.2008	01.01.2010	01.01.2012

Bundesland	Ort	Status	<div> <div>Stufe 1</div> <div> <div></div> <div></div> <div></div> </div> </div>	<div> <div>Stufe 2</div> <div> <div></div> <div></div> </div> </div>	<div> <div>Stufe 3</div> <div> <div></div> </div> </div>
Niedersachsen:	Hannover	Stufe 3	01.01.2008	01.01.2009	01.01.2010
	Osnabrück	Stufe 3	04.01.2010	03.01.2011	03.01.2012
Nordrhein-Westfalen:	Bonn	Stufe 1	01.01.2010	keine Angabe	keine Angabe
	Dinslaken	Stufe 2	01.07.2011	01.07.2011	keine Angabe
	Düsseldorf	Stufe 2	15.02.2009	01.03.2011	keine Angabe
	Hagen	Stufe 1	01.01.2012	01.01.2013	01.07.2014
	Krefeld	Stufe 2	01.01.2011	01.01.2011	keine Angabe
	Münster	Stufe 2	01.01.2010	01.01.2010	keine Angabe
	Neuss	Stufe 2	15.02.2010	01.03.2011	keine Angabe
	Ruhrgebiet (Bochum, Bottrop, Castrop-Rauxel, Dortmund, Duisburg, Essen, Gelsenkirchen, Gladbeck, Herne, Herten, Mülheim, Oberhausen, Recklinghausen)	Stufe 1	01.01.2012	01.01.2013	01.07.2014
	Wuppertal	Stufe 2	15.02.2009	01.03.2011	keine Angabe
Sachsen:	Leipzig	Stufe 3	01.03.2011	01.03.2011	01.03.2011
Sachsen-Anhalt:	Halle (Saale)	Stufe 2	01.09.2011	01.09.2011	01.01.2013
	Magdeburg	Stufe 2	01.09.2011	01.09.2011	01.01.2013
Thüringen:	Erfurt	geplant	01.10.2012	01.10.2012	01.10.2012



The bottom of the sign indicates which vehicle sticker(s) are allowed to enter.
A sticker must be bought and displayed in the windscreen.

Penalty;

40 € fine and one point in the national traffic penalty register

Low Emission Zones in Europe



Berlin

Air Quality Management in Berlin

- Berlin has had serious problems with ambient particulate matter (PM) pollution
 - ↳ huge **excess** of EU air quality standards more than a decade ago
 - ↳ even now **remaining risk** of exceedances in year with „difficult“ weather conditions
- Berlin has focused on Diesel soot emission control
 - ↳ emphasis on **health benefits** as **soot** particles are considered the most **toxic** PM component
 - ↳ recent WHO classification in **highest** category of **cancerogenous** substances
 - ↳ **soot** particles contribute to **climate** change
 - ↳ **cost-efficient** Diesel particle filter (DPF) technology **exists**
 - ↳ important **element** of Berlin's **strategy** to attain the particle pollution standards

Air Quality Management in Berlin

Emphasis on Diesel exhaust control

• Berlin has a long tradition in tackling Diesel soot emissions...

– already in 1999 launch of a **filter retrofit programme** of Berlin's fleet of 1400 Diesel **buses**, resulted in

- > 90% reduction of Diesel soot emissions

- - **37 t/a** Diesel soot emissions

2005 adopted a **low emission zone** for motor **vehicles**

- more **60.000 vehicles** retrofitted with DPF

- - 60% Diesel soot emissions,

- - 175 t/a in total Diesel emissions from road traffic

- - **30 t/a** diesel emissions of heavy goods vehicles > 3.5t

– successful demonstration project on

DPF retrofit of passenger cruising **ships**

- retrofit of 3 vessels with different filter systems with **promising results**:

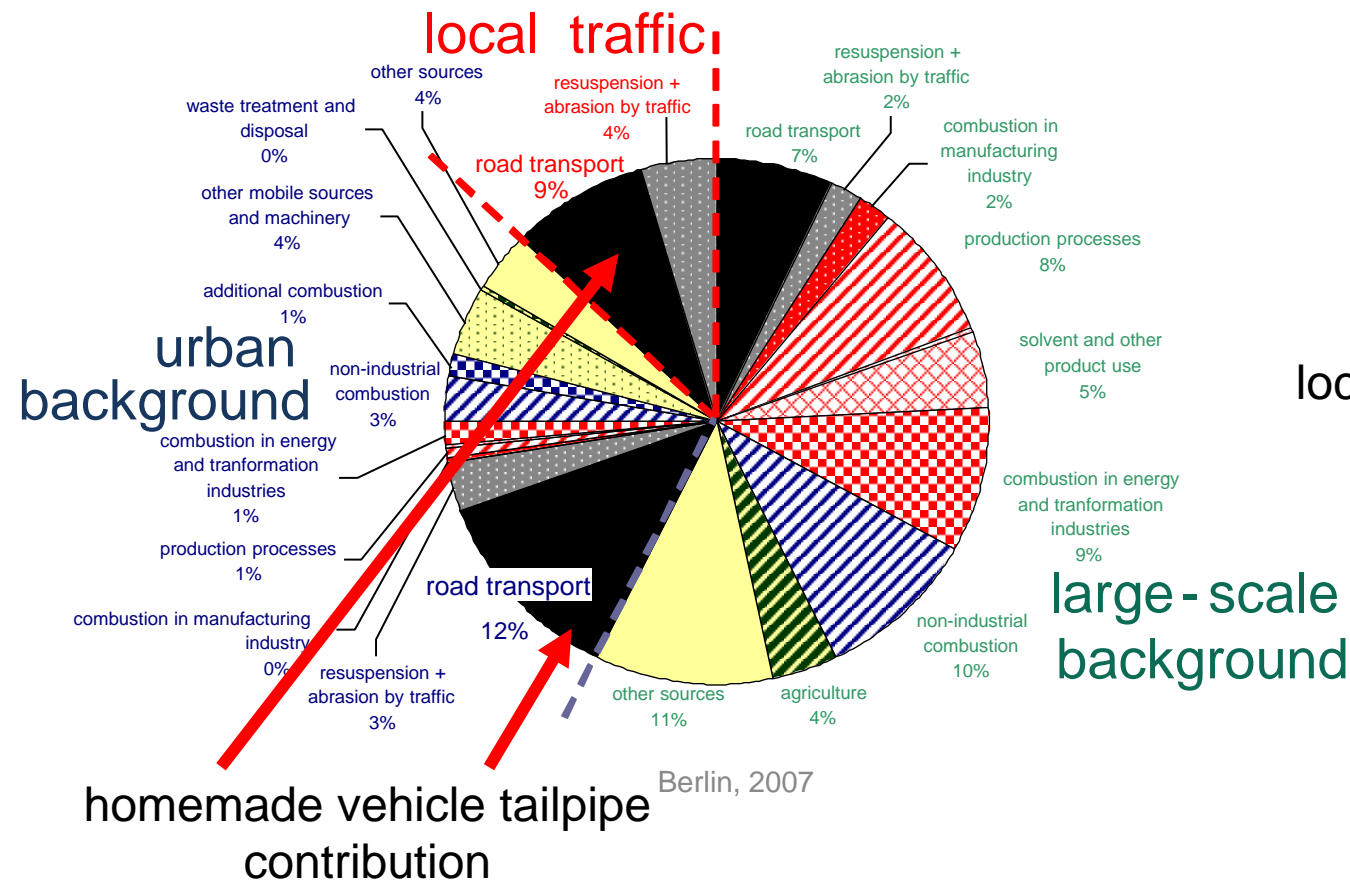
- >90% filter efficiency, no extra fuel consumption

- successful filter regeneration even under difficult operation conditions

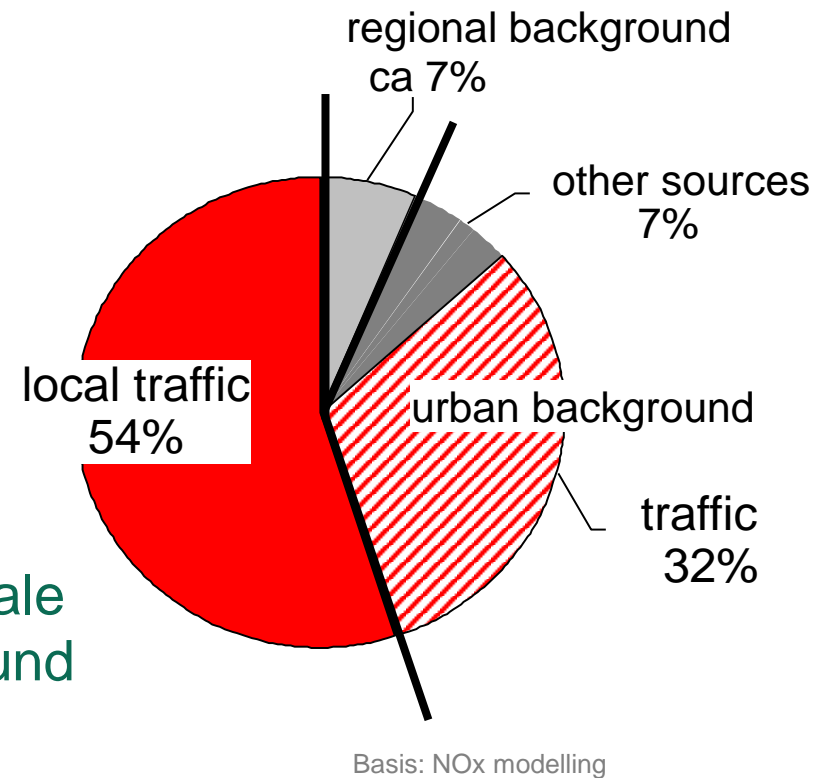


Origin of Kerbside PM2.5 and NO2 in Berlin

sources of roadside
PM2.5 pollution



sources of roadside **NO2** pollution



Berlin Environmental Zone

Emission Criteria



Area:

about 88 km²
(Berlin total area: 892 km²)

Inhabitants:

about **1 Million**
(Berlin total: 3,4 Mio)

Stage 1: since 1.1.2008



- Diesel vehicles: at least **Euro 2** or Euro 1 & retrofit
- Gasoline vehicles: at least **Euro 1**
- **7%** of vehicle fleet **affected**

Stage 2: since 1.1.2010



- Diesel: Particle emission **Euro 4**:
- cars: **Euro 3 + particle filter** or better
- goods vehicles: also **retrofit** of Euro 1-3 towards Euro 4_{Particle}
- **10%** of the vehicle fleet **affected**

👉 more than 40 LEZ planned/in force in Germany, 30 LEZ in the EU, but with different emission criteria

Stage 2: Free entry only with **green** sticker affected vehicles 2010:

(according to registration data base of 1. January 2010)



■ Diesel Passenger cars:

↪ 14.000 PC (7%) with red sticker

→ can be  retrofitted to

↪ 60.000 PC (30%) with yellow sticker

→ can be  retrofitted to



■ commercial Diesel vehicles:

↪ 10.000 LDV/HDV (12%) with red sticker

 can be partly retrofitted to

↪ 25.000 LDV/HDV (30%) with yellow sticker

 can be retrofitted to

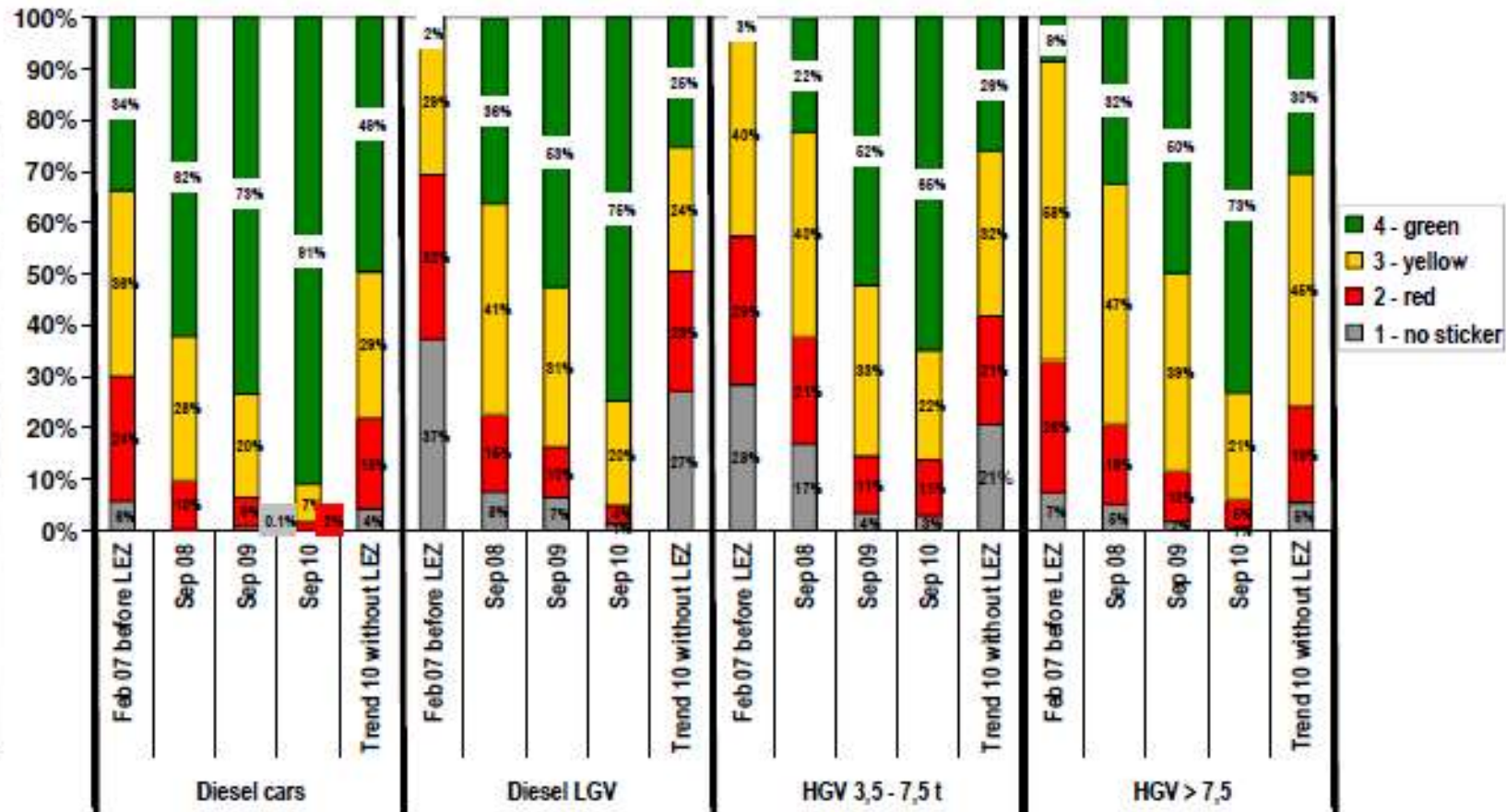


affected vehicles in total: **ca. 124.000**

by mid 2010: **25%** Diesel PC & **18%** LGV/HGV **retrofitted!**
40% of Diesel PC have a **DPF** with **60%** closed systems

Berlin Environmental Zone Impact Analysis

change of the vehicle fleet composition on the road
(from number plate recognition)



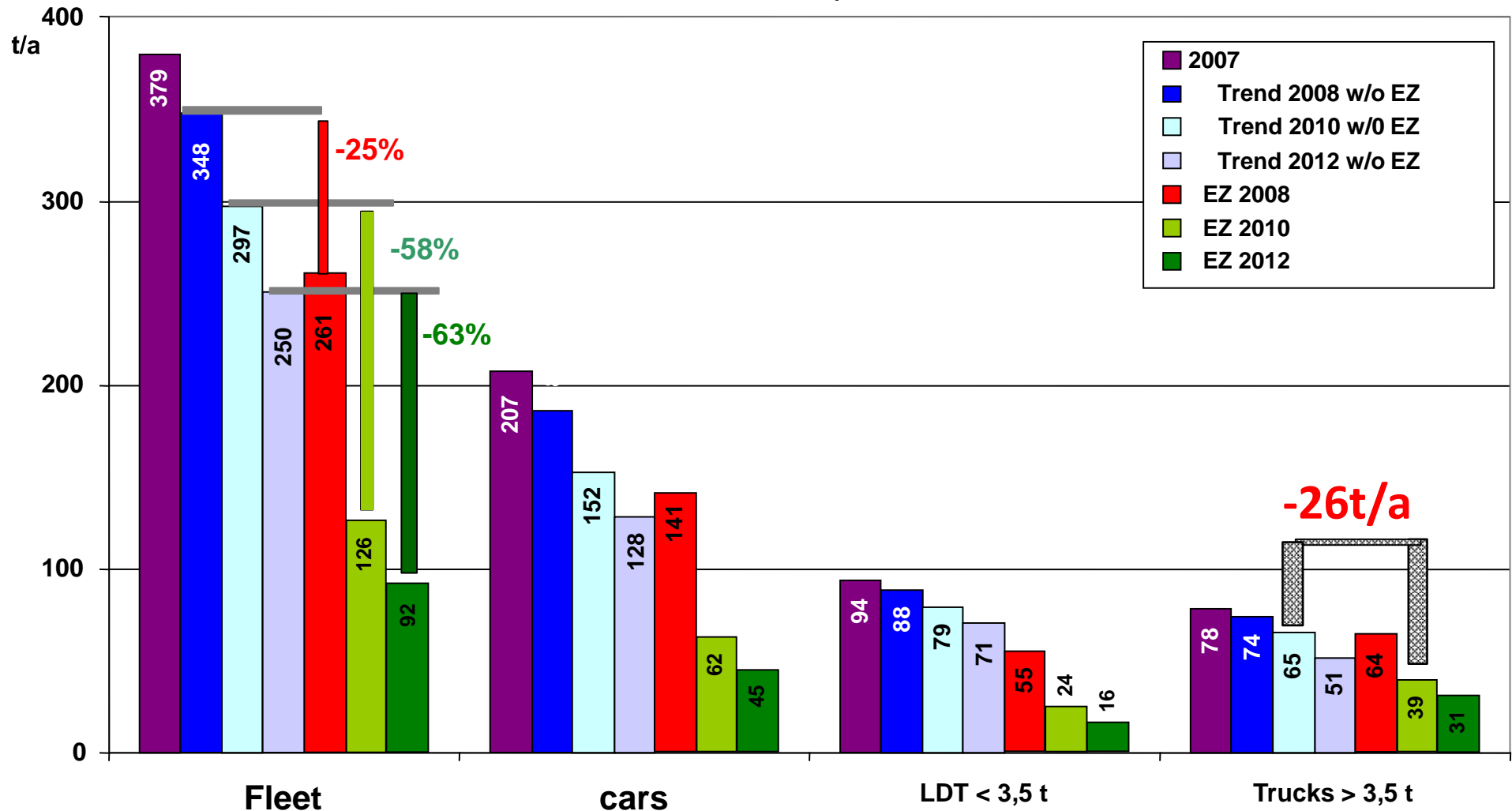
decrease: cat.1 (no sticker) by 70-90 %; Cat 2 (red) by 50-80 %
increase: category 4 (green) by factor 1,5 to 3

Air Quality Management in Berlin

Reduction of Diesel **Soot-**

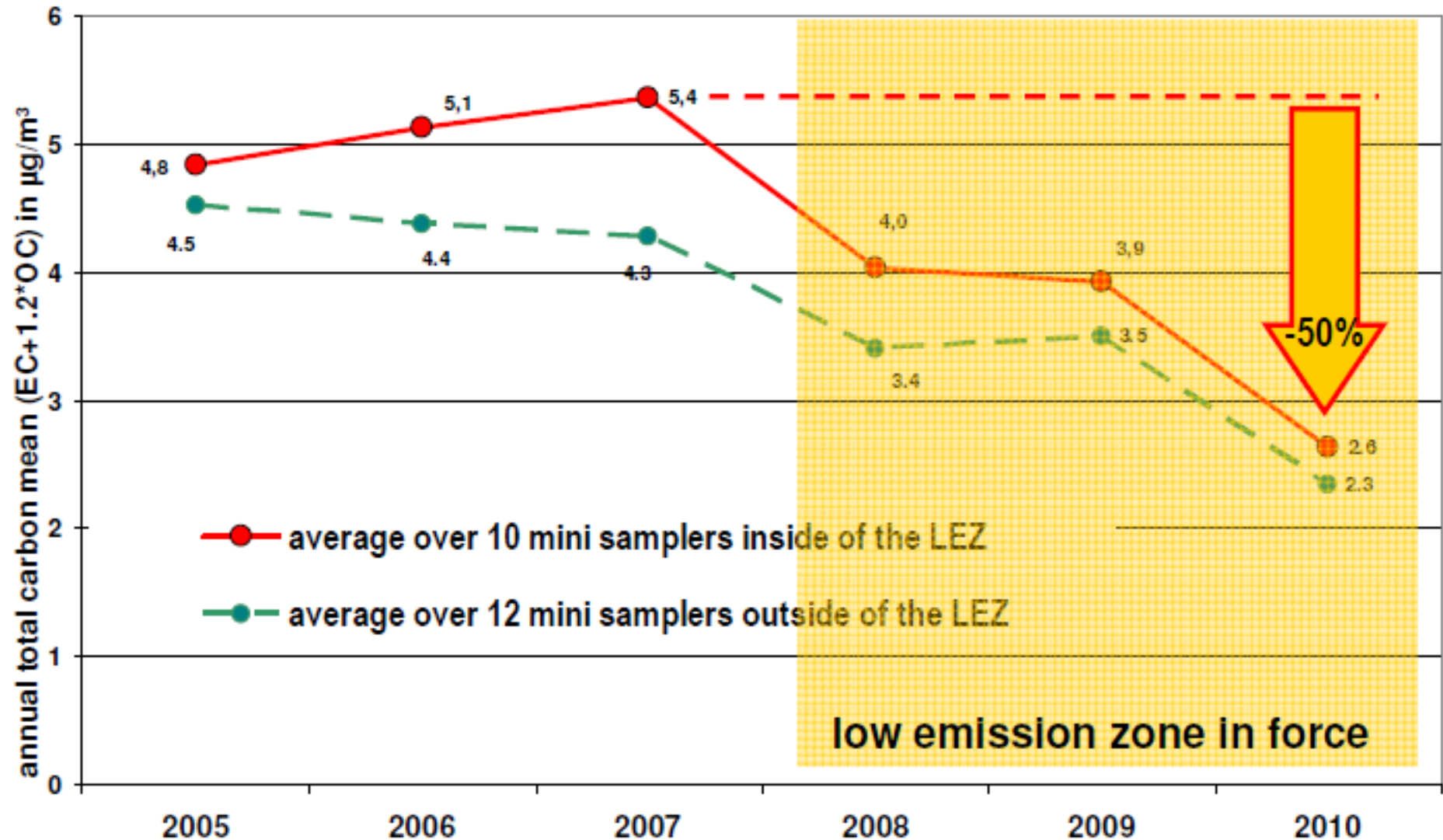
Emissions by the EZ

Based on observed fleet composition at the Frankfurter Allee



Berlin Environmental Zone Impact

traffic related* black‡ carbon particle concentration in Berlin



* local BC increment at traffic sites, adjusted to traffic volumes trend relative to 2007 before LEZ came into force

‡ elemental carbon (EC) particles plus other deposited organic compounds (OC)

Estimation of the positive health impact by the Environmental Zones (EZ) in Berlin and Munich

Reduction of traffic related diesel particle concentrations by implementation of the EZ by about 60% in Berlin and about 30% in Munich

Early death rate by diesel particle in urban areas in Germany 240 of 1 Million in inhabitants

Impact of EZ inside and outside the same

	Berlin	München
inhabitants	~ 3.530.000	~ 1,430.000
All death cases per year	~ 31.000 (100%)	~ 11.000 (100%)
Avoided death cases per year through the EZ	~ 500 (1,6%)	~ 100 (0,9%)

**Basic assumptions: BC reduction by the EZ in Berlin 60%,
in Munich only 30% because the EZ is not as strict**

**500 premature death per avoided in Berlin,
100 in Munich by the implementation of the EZ**

Health (Ultrafine Particles)

Ultrafine Particle Study Women in North- Rhine- Westphalia



Long term Health Effects of Ultrafine Particles

LANUV-Fachbericht 31

(www.lanuv.nrw.de)

<http://www.lanuv.nrw.de/veroeffentlichungen/fachberichte/fabe31/fabe31.pdf>



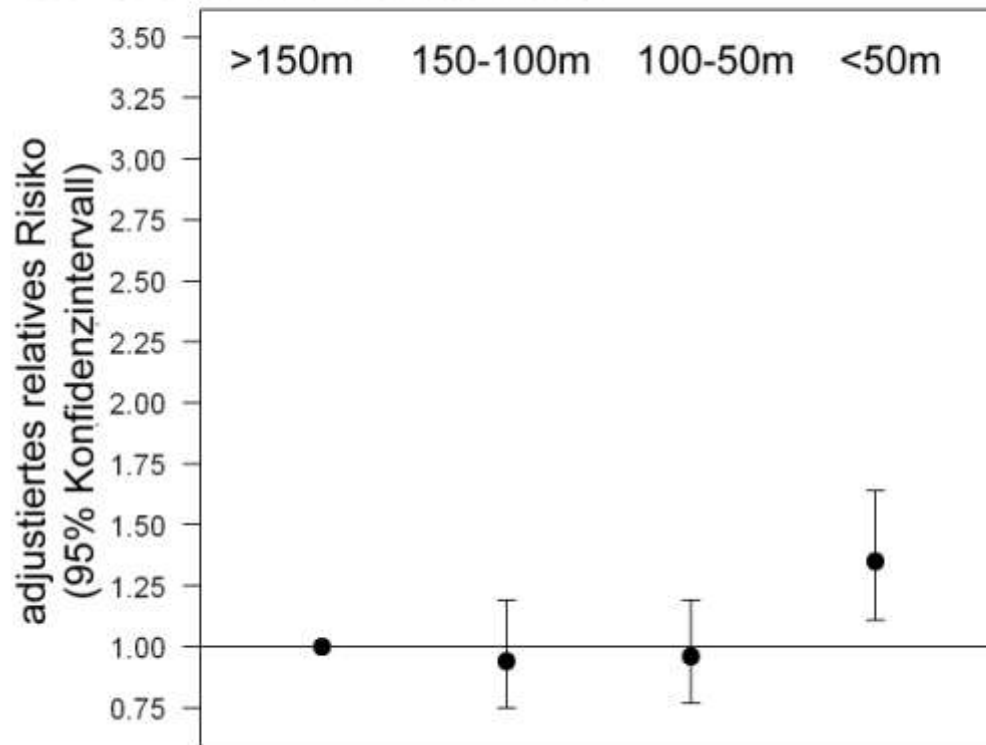
Wichmann, Thiering, Heinrich 2011

Living near on traffic intensive roads

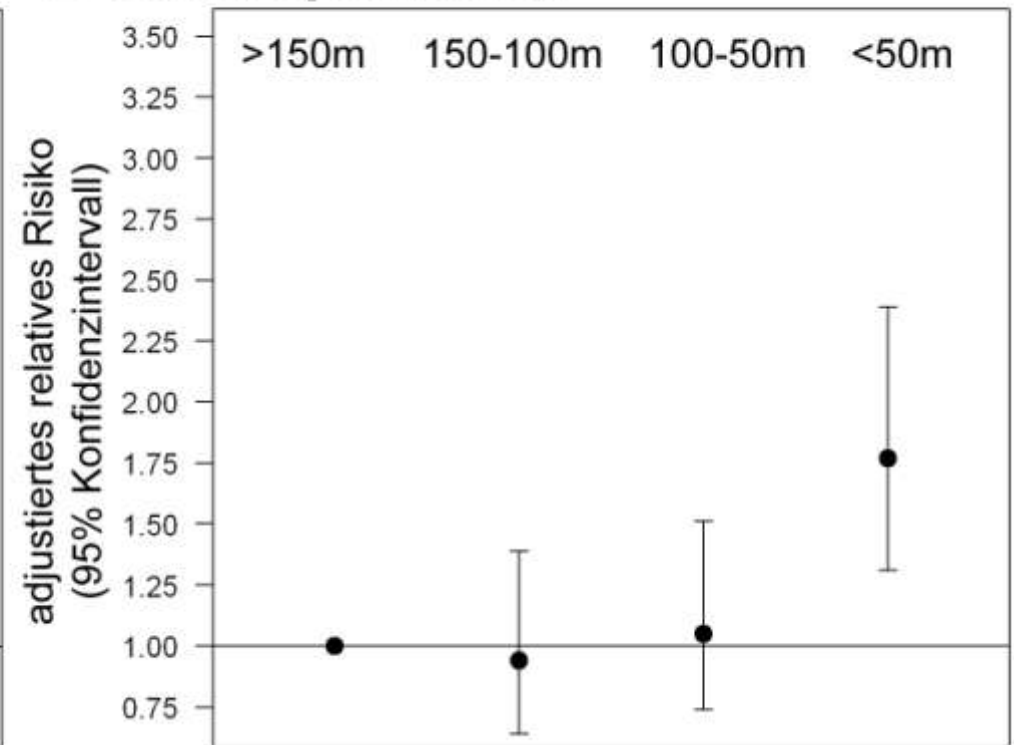
Distance less than 50 m

Increase of total mortality by 38% and of cardiopulmonary death cases by 77%

A Gesamtmortalität



B Kardiopulmonal



Verkehrsreiche Straßen: 5000 Fahrzeuge pro Tag; aRR: adjustiert für Sozialstatus und Rauchen

The effect of particle size on cardiovascular disorders – The smaller the worse

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Health effects

Time series analysis

Environmental medicine

ABSTRACT

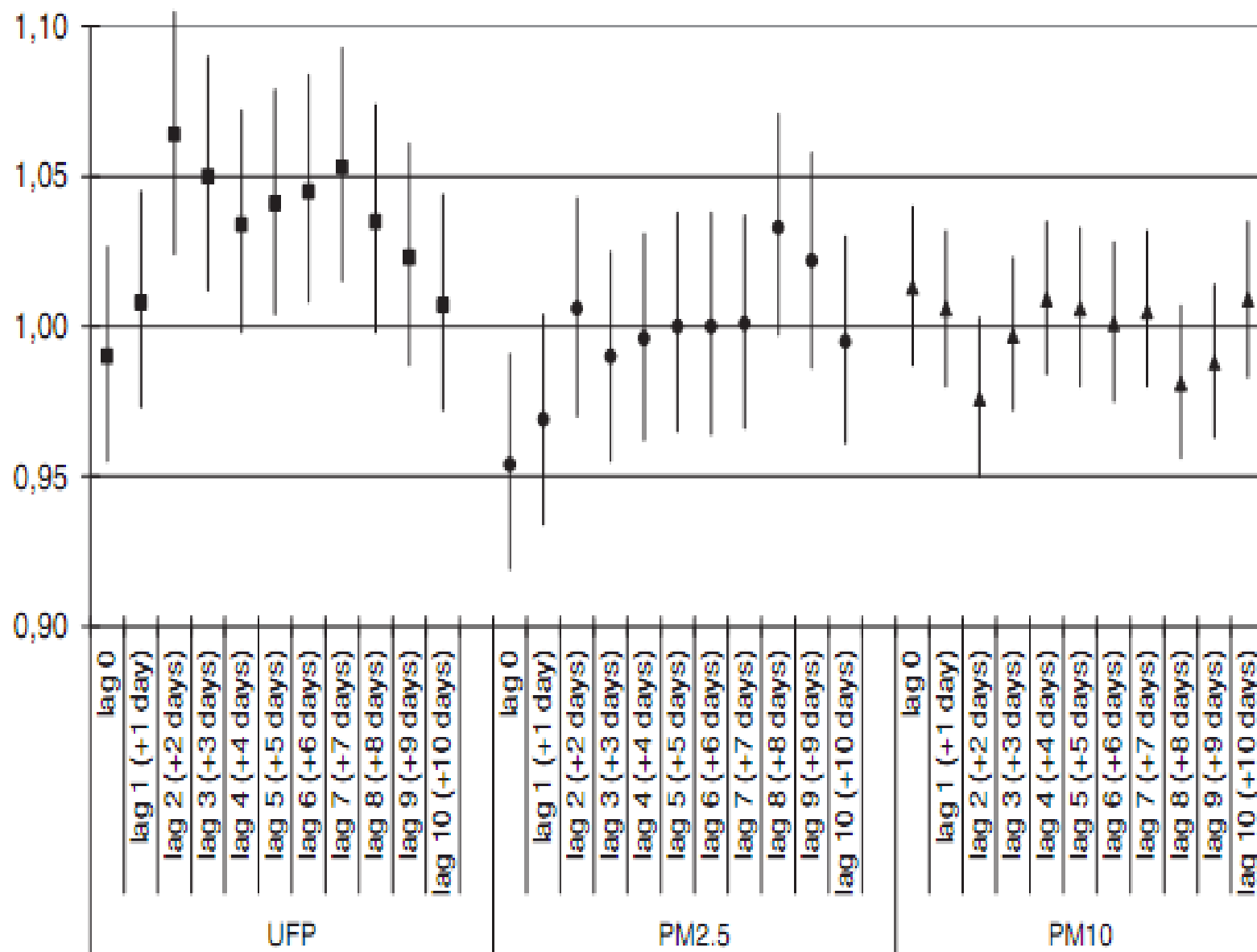
Background: Previous studies observed associations between airborne particles and cardio-vascular disease. Questions, however, remain as to which size of the inhalable particles (coarse, fine, or ultrafine) exerts the most significant impact on health.

Methods: For this retrospective study, data of the total number of 23,741 emergency service calls, registered between February 2002 and January 2003 in the City of Leipzig, were analysed, identifying 5326 as being related to cardiovascular incidences. Simultaneous particle exposure was determined for the particle sizes classes <100 nm (UFP), <2.5 µm (PM_{2.5}) and <10 µm (PM₁₀). We used a time resolution of 1 day for both parameters, emergency calls and exposure.

Results: Within the group of cardiovascular diseases, the diagnostic category of hypertensive crisis showed a significant association with particle exposure. The significant effect on hypertensive crisis was found for particles with a size of <100 nm in diameter and starting with a lag of 2 days after exposure. No consistent influence could be observed for PM_{2.5} and PM₁₀. The Odds Ratios on hypertensive crisis were significant for the particle size <100 nm in diameter from day 2 post exposure OR = 1.06 (95%CI: 1.02–1.10, p = 0.002) up to day 7 OR = 1.05 (95%CI 1.02–1.09, p = 0.005).

Conclusion: Ultrafine particles affect cardiovascular disease adversely, particularly hypertensive crises. Their effect is significant compared with PM_{2.5} and PM₁₀. It appears necessary, from a public health point of view, to consider regulating this type of particles using appropriate measurands as particle number.

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OR and 95% confidence interval in emergency calls related to hypertensive crises depending on time of exposure to airborne particles and size of particles (ultrafine[UFP]–fine [PM2.5]–coarse [PM10])

Source: U. Franck et al. / Science of the Total Environment 409 (2011) 4217–4221

Berlin LEZ – impact analysis health benefit

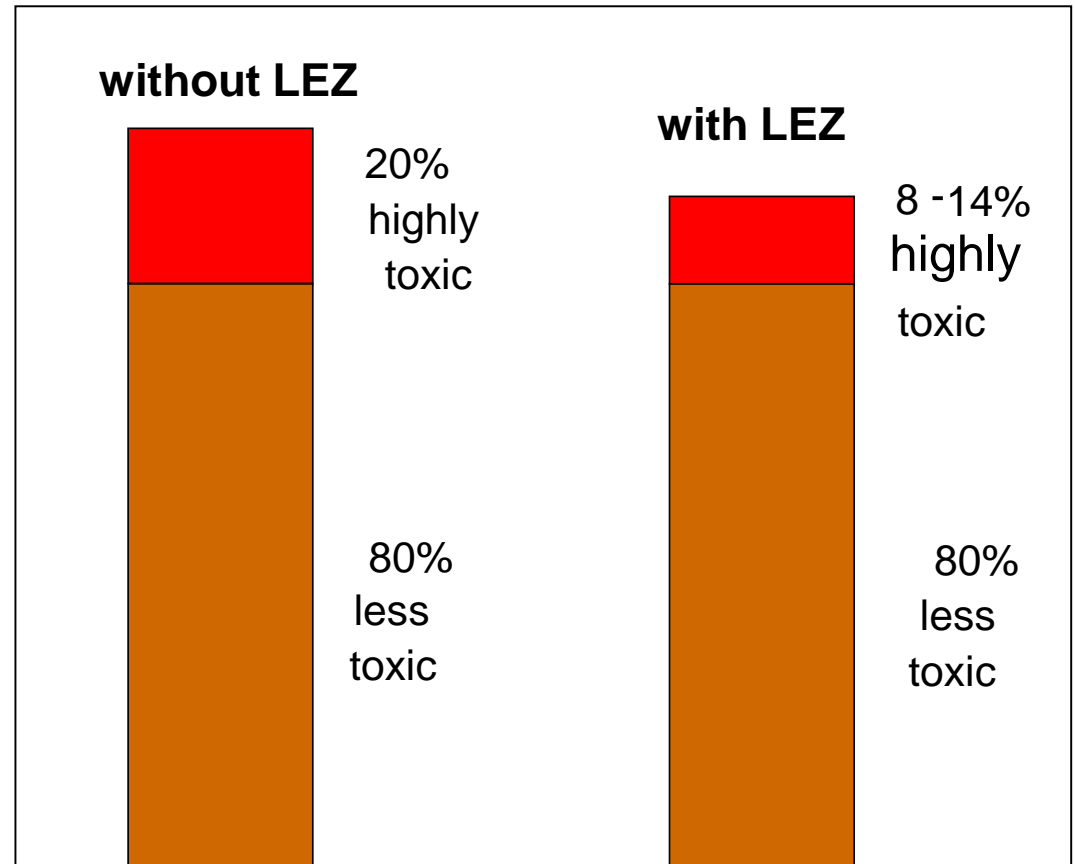
LEZ benefit for public health

some essentials:

about **20%** of total PM10 consists of highly toxic **diesel soot**

30- 60 % reduction of Diesel soot emissions also mitigates **health risk by 30-60%,**

even though **total PM10** levels fall by only **about 7 %** (in Berlin)



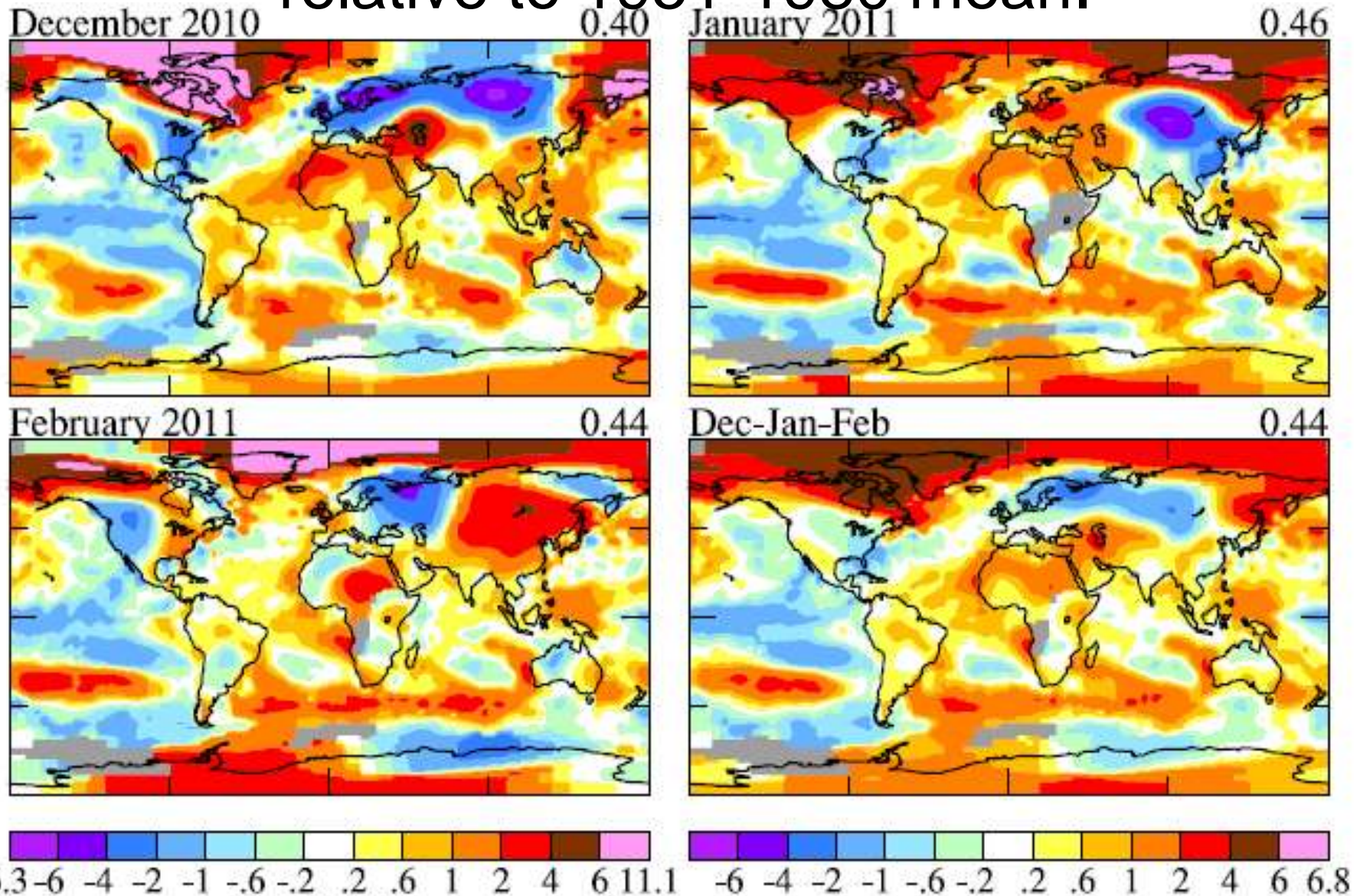
Estimation of the Health Impact of the Environmental Zones Berlin und München

		Berlin	München
Reduction of the traffic related soot concentration by about . 30% (60%)	People in the EZ	~ 1.000.000	~ 420.000
	All death cases per year in the EZ	~ 10.000 (100%)	~ 4.200 (100%)
yearly death cases caused by diesel soot in urban areas 240 per 1 Million inhabitons	Avoided death cases per year by EZ (red/yellow/green label)	~ 72 (0,72%)	~ 30 (0,72%)
	(only green label)	~ 144 (1,44%)	
30% (60%) of this: 72			

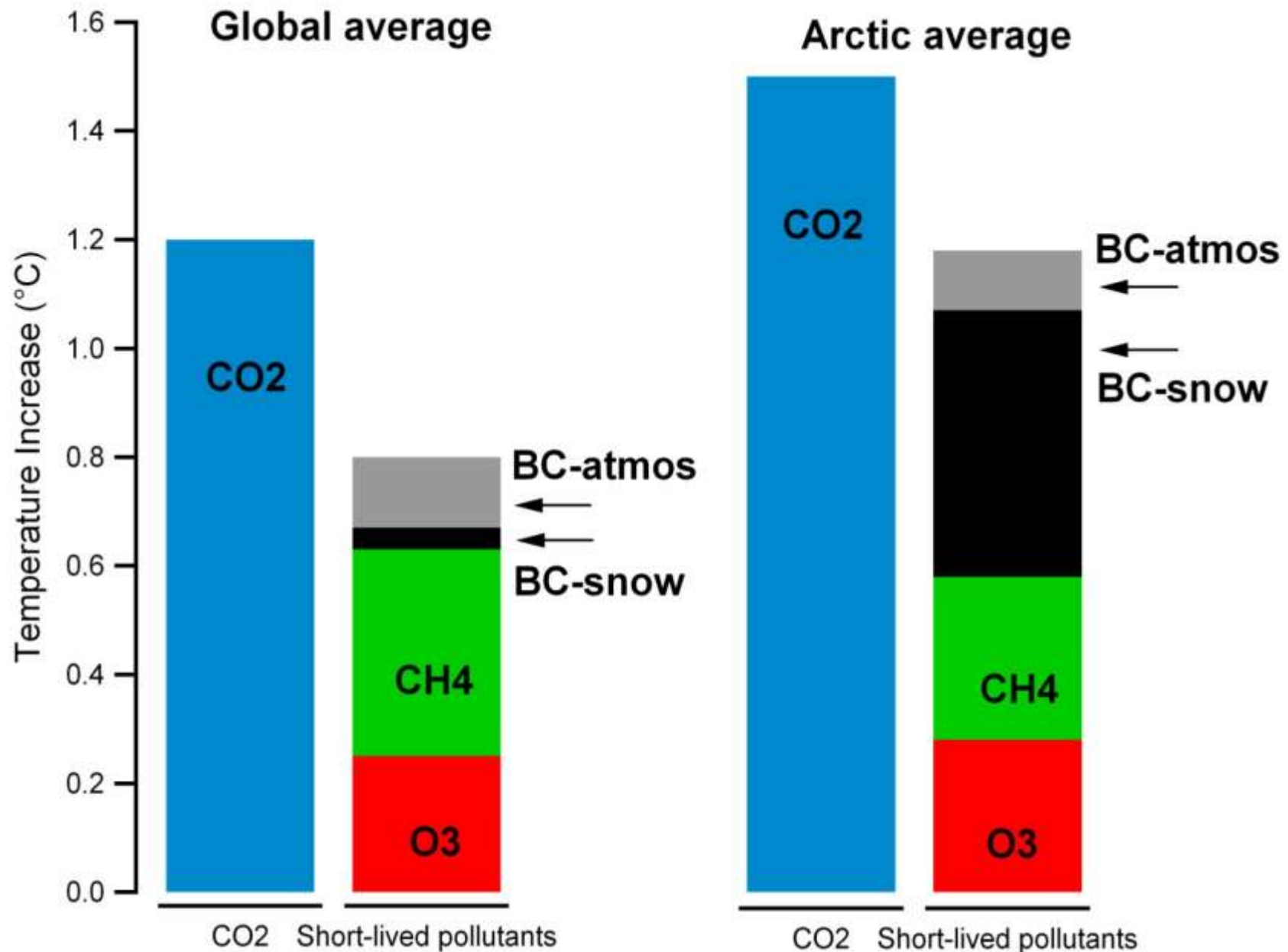
**Estimation: Per year about 144 premature death avoided
in Berlin and about 30 in Munich by the implementation
of the Environmental Zone**

Climate

Surface temperature anomalies in Northern Hemisphere winter 2010-2011 relative to 1951-1980 mean.



Global vs. Arctic Warming 1830 to the Present



Shindell, Faluvegi - April 2009



Black Carbon responsible for **50% or nearly 1.0° C of the 1.9° C temperature increase in the Arctic from 1890 to 2007**

20- and 100-year global warming potentials (GWPs) for fossil-fuel soot and black carbon within fossil-fuel soot.

X	20-year GWP	100-year GWP
FF soot	2530	840-1280
BC in FF soot	4470	1500-2240

The global warming potential is defined here as the change in temperature per unit emissions of X relative to the change in temperature per unit emissions of CO₂. Multiply the GWPs in the table by 12/44 to obtain the GWP relative to CO₂-C. BC= black carbon. FF soot=56% black carbon + 43% primary organic carbon + 1% sulfate

Legal Aspects

1. Court decision:

Federal Administrative Court Leipzig

March, 20th 2007

Legal Action at the federal administrative court Leipzig. Claimant was a citizen, Mr. Janecek from Munich, supported by the DUH, against the free state of Bavaria and the city Munich.

Mr. Janecek demanded extensive actions against particulate matter emissions

September, 27th 2007

The Federal Administrative Court confirms „enforcable right of clean air“. The city can be pledged to install „reasonable“ arrangements

Citizens have the right to demand arrangements which are beyond the existing concept.

=> The city has to override existing rules and act immediately against high particulate matter emissions.

2. Fundamental Decision: European Court of Justice; July, 25th 2008

The European Court of Justice established the enforceable right of clean air. **Affected citizens have the right with immediate effect to claim effective arrangements by the city.**

Affected citizens are entitled to demand that the city council installs action plans as well as plans for short-term arrangements, including immediate arrangements to improve the air quality.

The action plan has to include arrangements which make the compliance of the limits requirements step by step possible.

- October 2008 the environmental zone in Munich was established

All essential court decisions in the last years have been decided in favor of the established environmental zones and in favor of the concerned citizens.

Consequence: 44 Environmental Zones in Germany

Problems:

Most environmental zones aren't correctly implemented :

- lack of control and enforcement
- lack of strictness (e.g. only red labels not allowed)
- too small, size matters!!

→ We need more legal actions concerning the embodiment of Environmental zones

What was new in 2012?

Deutsche Umwelthilfe (DUH) claims today

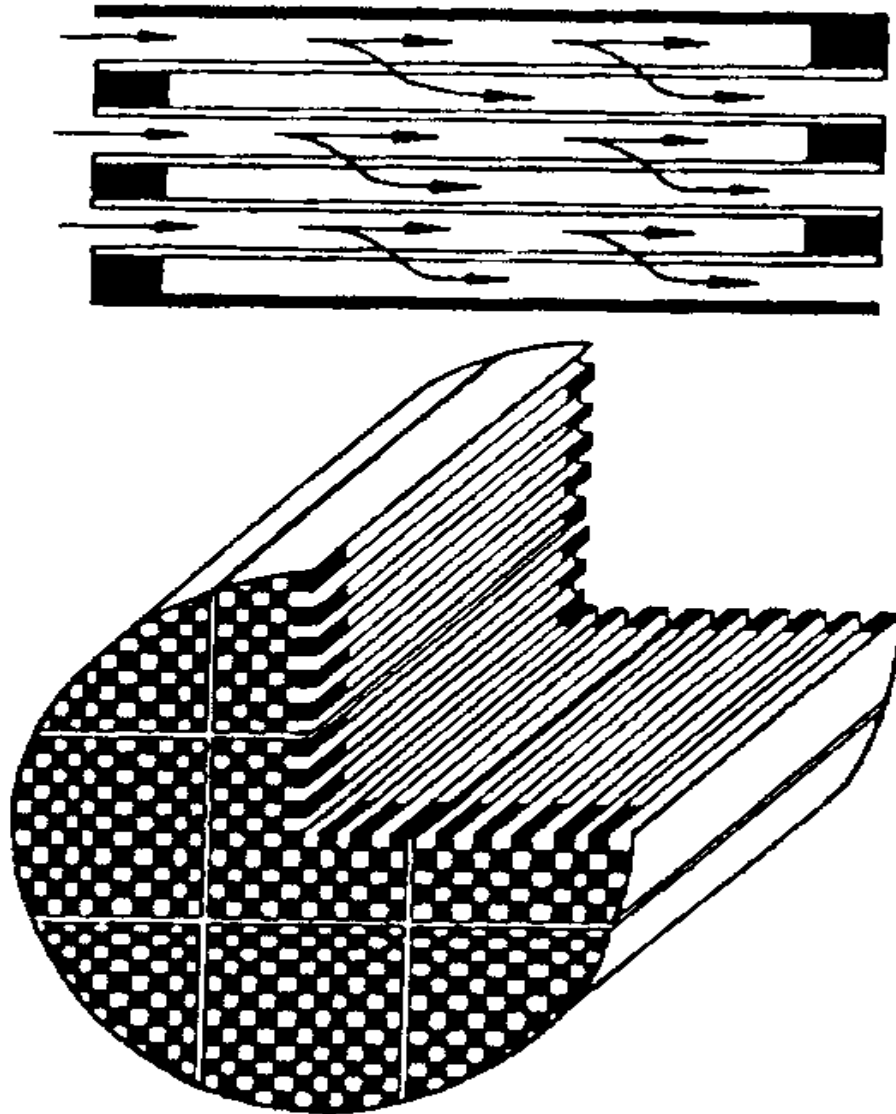
5 legal cases in different cities:

- Wiesbaden
- Mainz
- Darmstadt
- Reutlingen
- München
- planned Stuttgart and Cologne and others

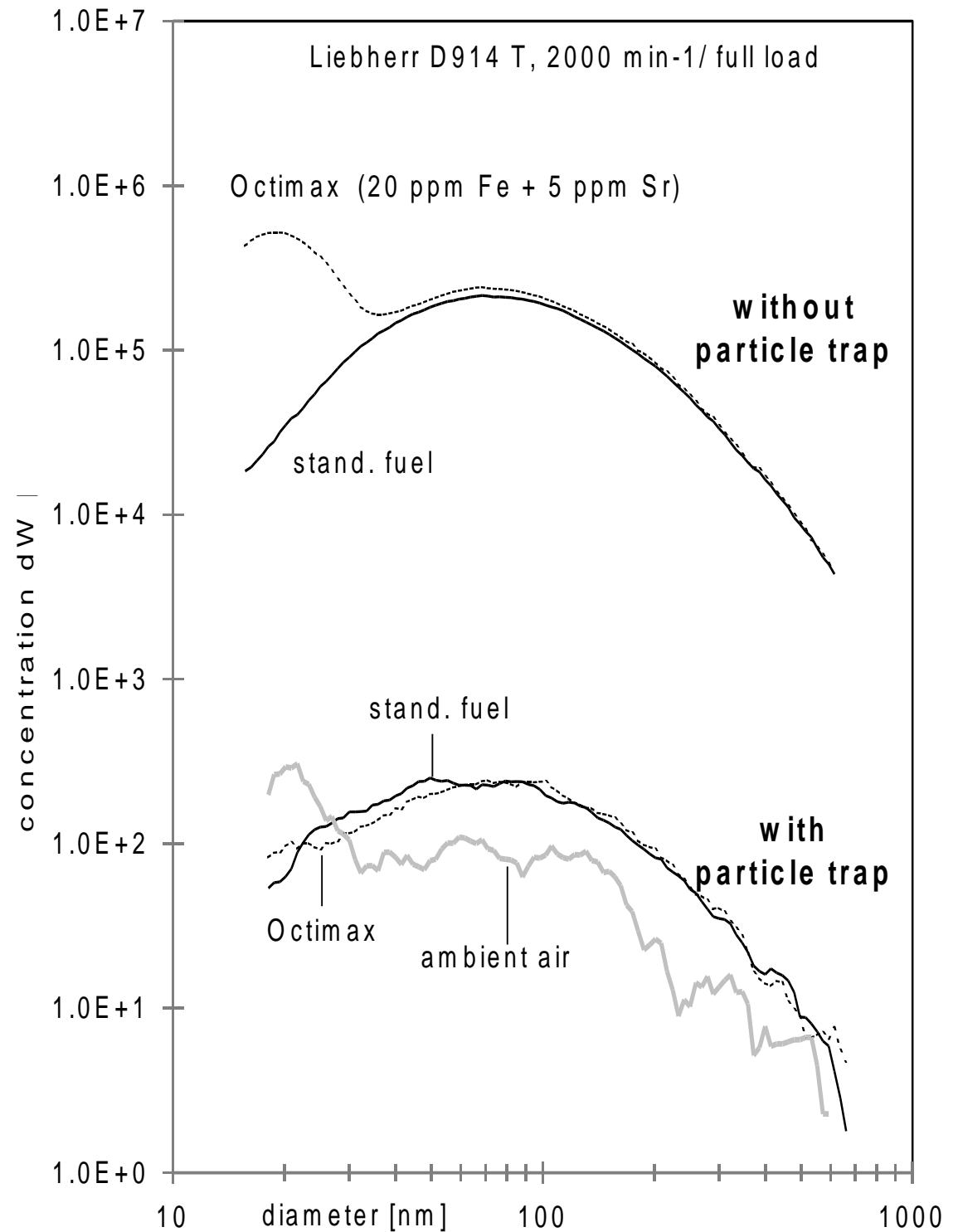
Abatement

The classic CORNING wall flow ceramic Substrate

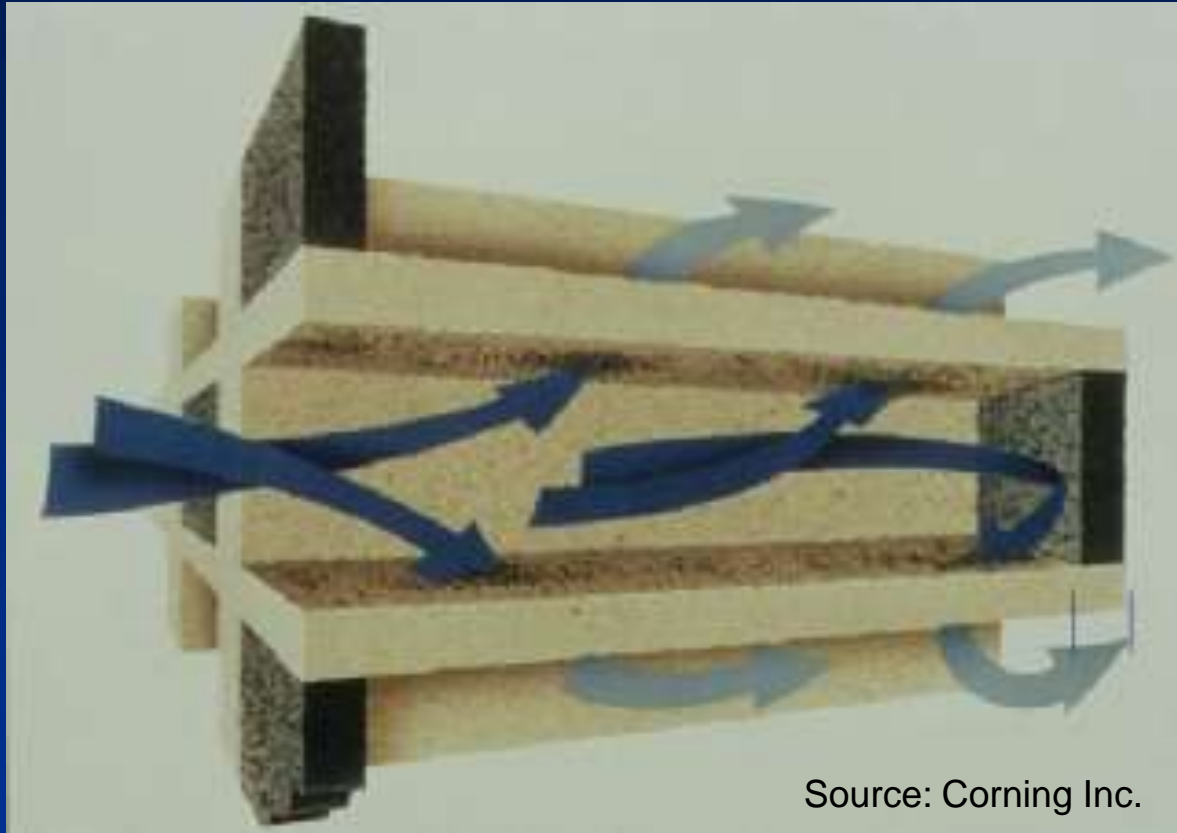
Source CORNING 1982



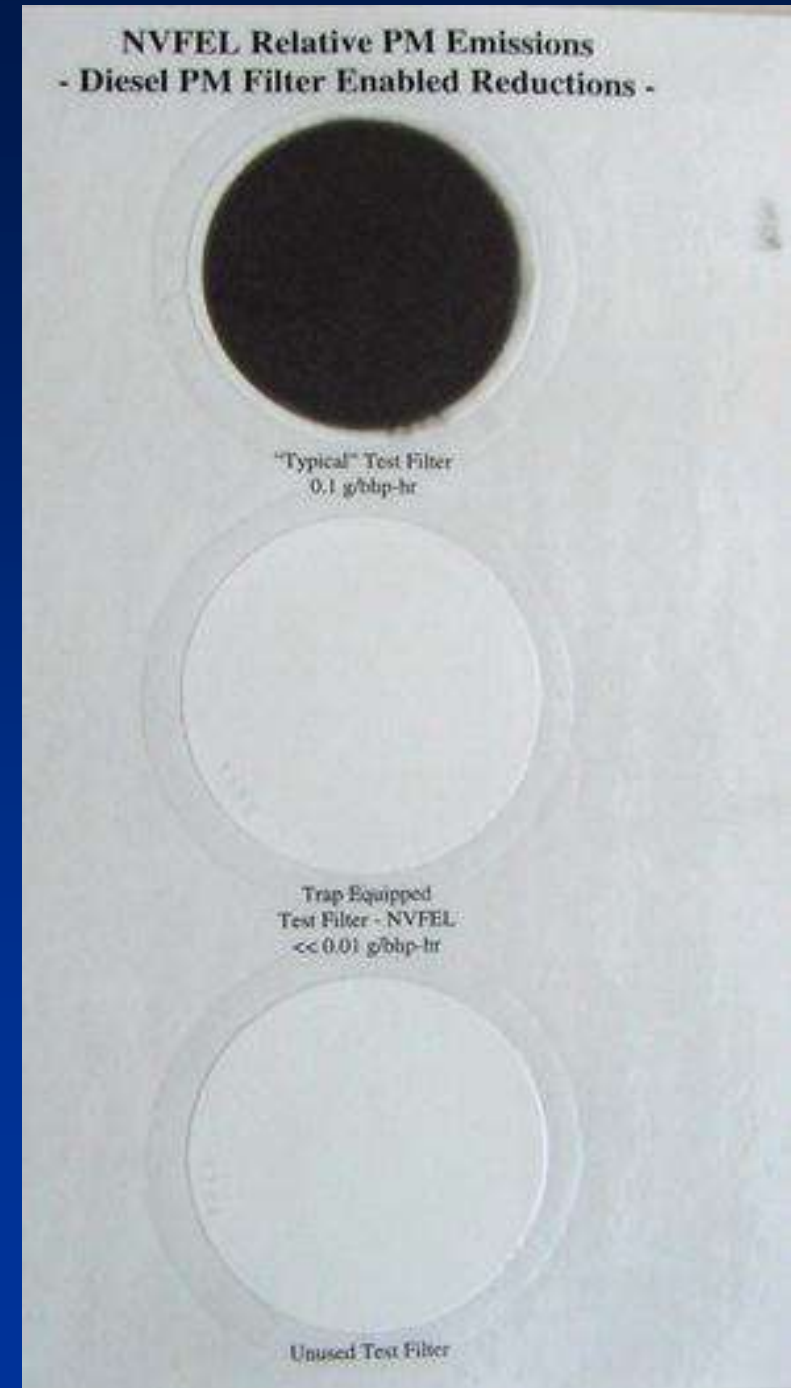
Particle Elimination with Particle-Filter



Enabling Near Zero Emission Levels



Diesel Particulate Filters (CDPFs)
eliminate more 99% of solid particles
(soot & metals)



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I have a Dream: Überall ist Kopenhagen!



Stau in der Rushhour in Kopenhagen Quelle: Fairkehr, April 2008