

The Low Emission Zone in Berlin: Rationale, Impact and framework conditions

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- ⊗ Air Quality in **Berlin** and emerging **need for action**
- ⊗ The **LEZ** scheme in Berlin
- ⊗ LEZ **Impact** Assessment
- ⊗ Requisite **steps** for successful **implementation**
- ⊗ **LEZ schemes elsewhere in Europe**
- ⊗ **Lessons learnt**

Berlin

☞ a few facts

- **low** commuter numbers & **car density**
- in the past: economic stagnation/slow growth due to severe structural changes after fall of the wall
 - ☞ per capita income 30% below Hamburg
- **now**: higher growth compared to rest of Germany
- ageing population, but slower process than elsewhere as Berlin attracts young people
 - ☞ about 150.000 students
 - ☞ 50.000 more residents/year
- dominance of service sector, media, IT, government
- lot of small & medium businesses
- **no heavy industries**
- largest district heating network in Europe
- flat orography

Still 30% lower than elsewhere in Germany

area: 889 km²

inhabitants: 3,4 million

48% car-free households

☞ car ownership: 317 cars/1.000 inhab.

☞ passenger cars: 1,1 million

bicycles: 1,8 million

147 bus lines - 1662 km

22 tram lines - 189 km

9 metro lines - 144 km

32 MRT lines* - 458 km

* S-, RB-; RE- lines

30% Diesel cars, still growing share



Berlin

👉 Federal State (“Land”) and municipality



Trigger for action

☞ EU AQ health standards

averaging period	limit value	attainment period	possible extension to..
24 h	50 µg/m³ PM₁₀ 35 excess days/year	1 Jan. 2005	2011  toughest
1 year	40 µg/m³ PM₁₀	1 Jan. 2005	2011
1 h	200 µg/m³ NO₂ 18 exceedances/year	1 Jan. 2010	2015
1 year	40 µg/m³ NO₂	1 Jan. 2010	2015  toughest
1 year	5 µg/m³ benzene	1 Jan. 2010	2015

Berlin AQ assessment

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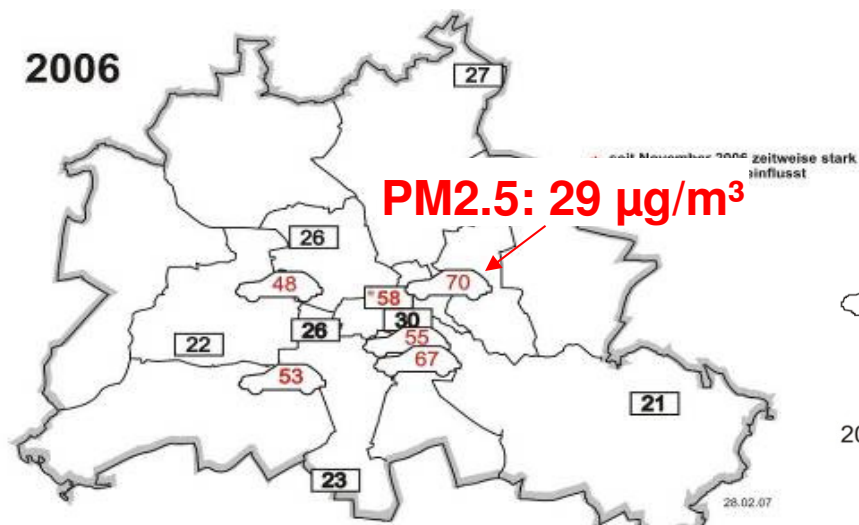


👉 **PM10** not yet solved

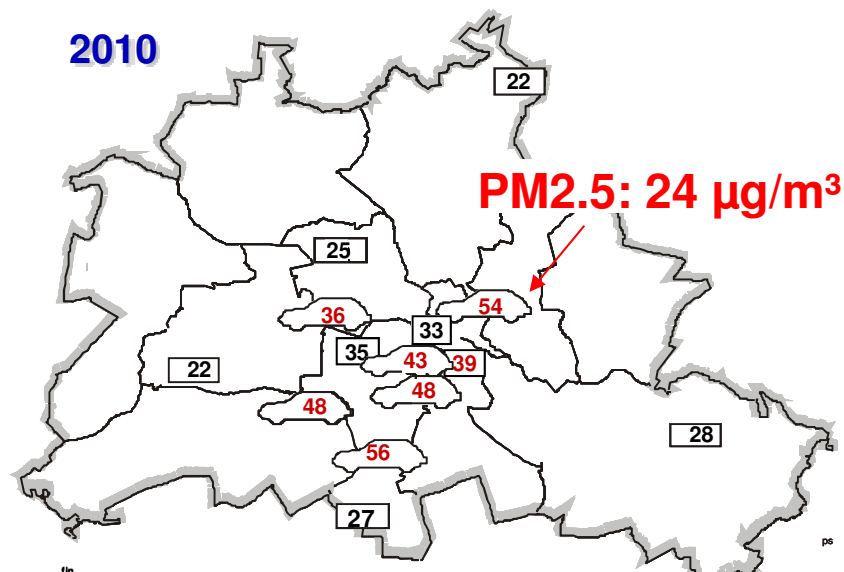
number of days above the 24h-limit value of $50 \mu\text{g}/\text{m}^3$ PM10 in Berlin

non-compliance in 2006/7, 2009-2011
and 2014

2006



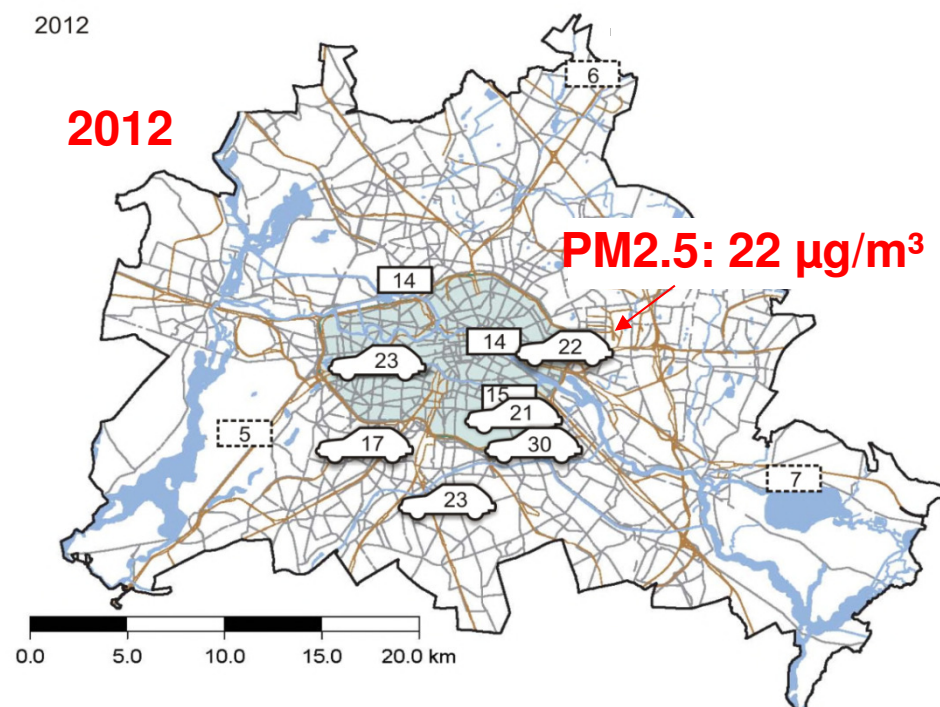
2010



traffic sites
stations in residential
areas or at the periphery

Red: limit value exceeded
Bold: limit value + margin of tolerance
exceeded

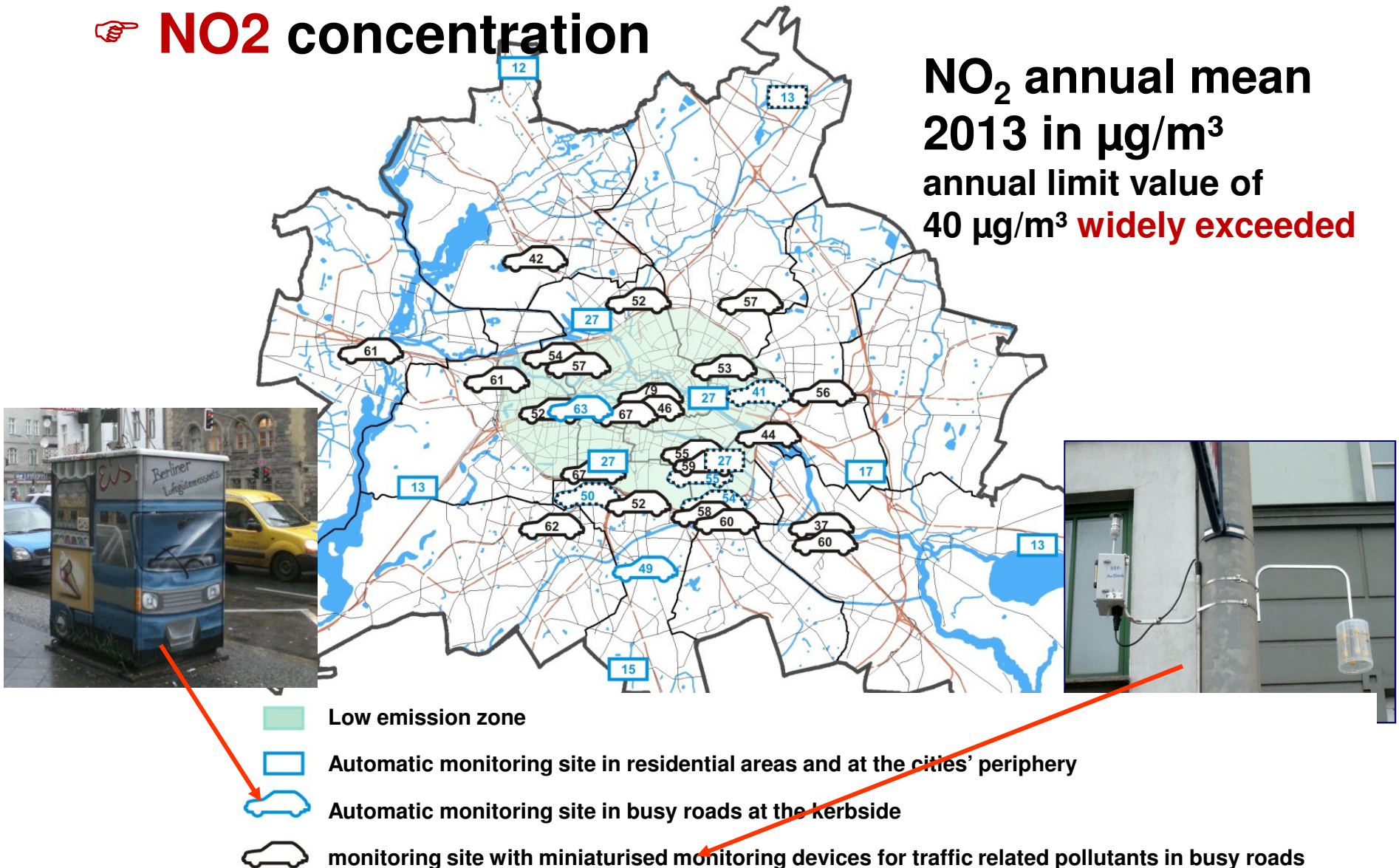
2012



Berlin AQ assessment

NO₂ concentration

**NO₂ annual mean
2013 in $\mu\text{g}/\text{m}^3$
annual limit value of
40 $\mu\text{g}/\text{m}^3$ **widely exceeded****



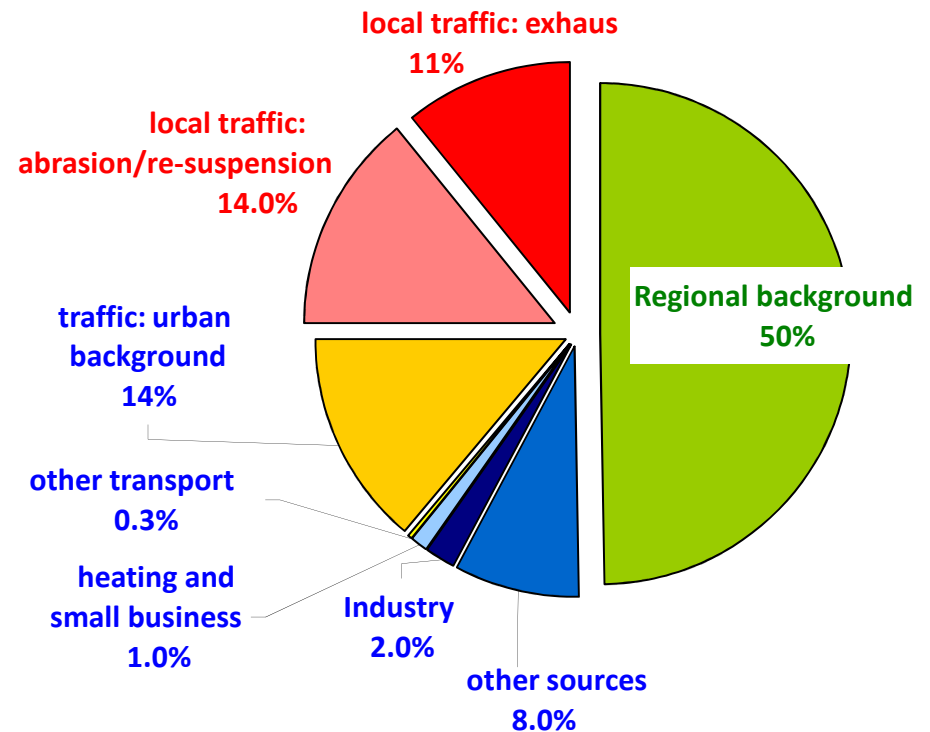
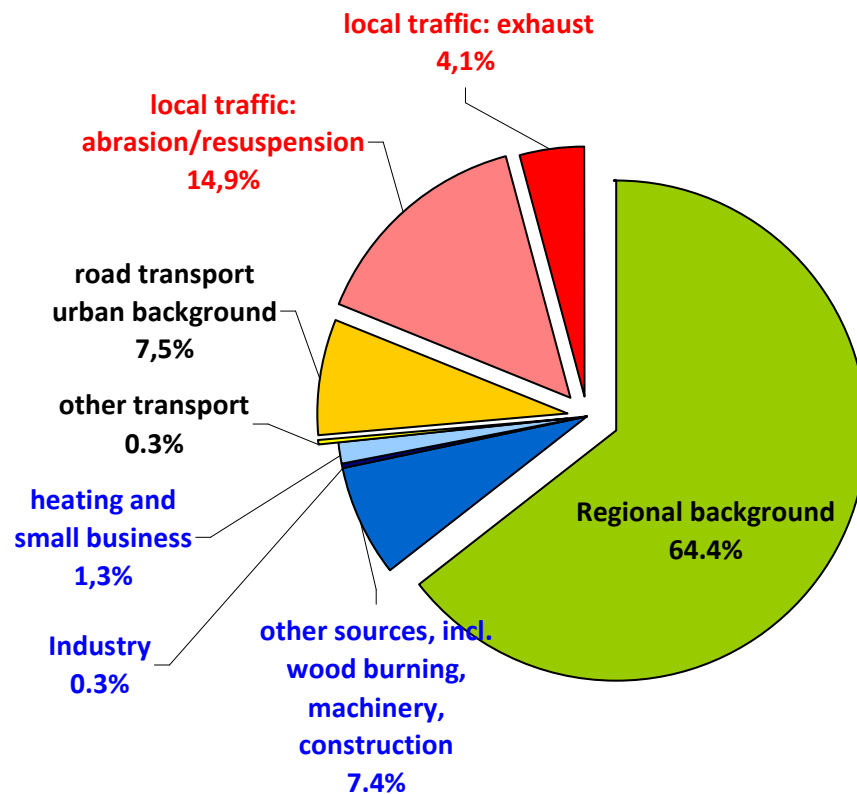
Source analysis Berlin

👉 sectoral origin of kerbside PM10

2009

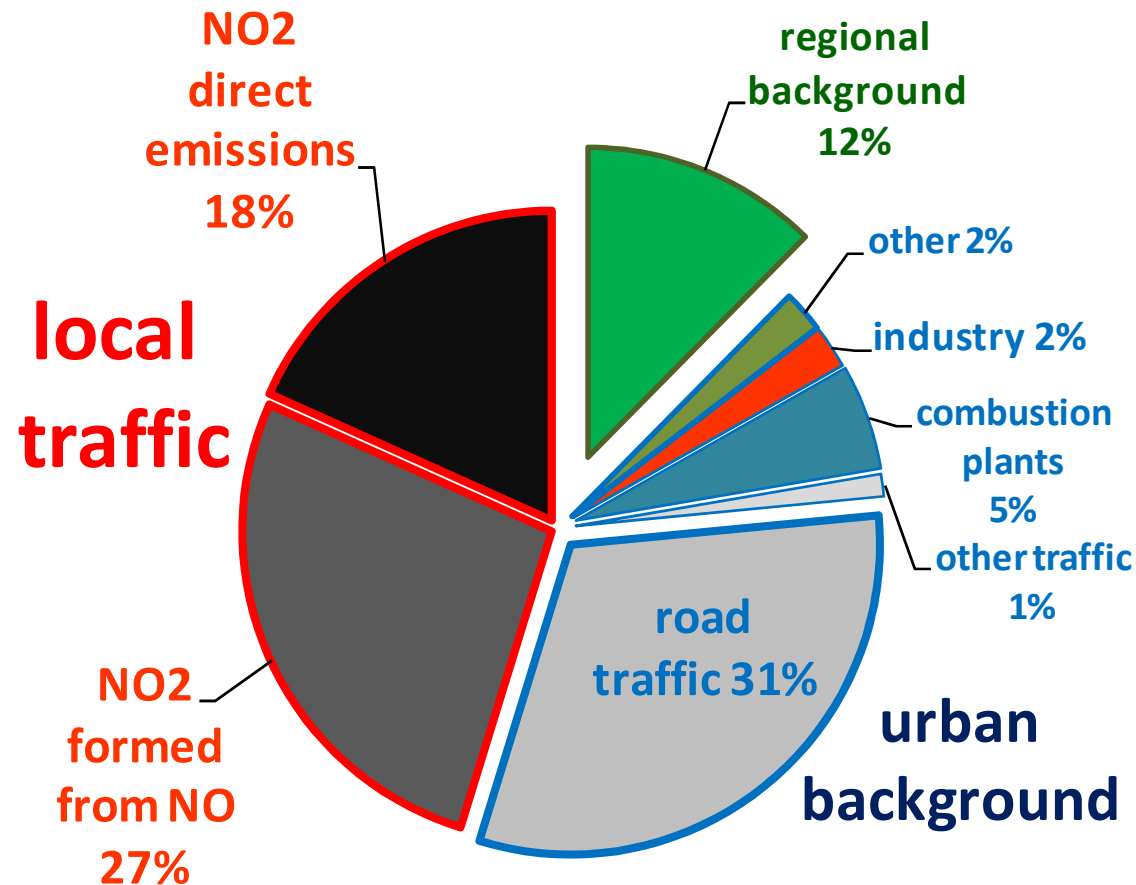
based on dispersion modelling

2002



Source analysis Berlin

👉 origin of kerbside NO₂



Based on dispersion modelling

LEZ Berlin reasons

low emission zone Berlin – why?

- exceedances mostly in main roads
 - ↳ road **traffic** is **main contributor**
 - ↳ ~40% of total PM10 pollution
 - ↳ ~80% of total NO2-pollution
- **previous measures insufficient**
 - ↳ e.g. modernisation of municipal and taxi fleet
- need for **accelerated** improvement of the **growing** Diesel vehicle **fleet**
 - ↳ **replacing** polluting by new cleaner vehicles
 - ↳ **retrofitting** existing vehicles with particle **filters**
- Apply existing filter technology to **control toxic** Diesel emissions
 - ↳ Gain maximum health benefits at relatively low costs
- AQ standards **exceeded** in **many roads** concentrated in **central city** areas
 - ↳ selection of most densely populated central city area **delimited** by light **rail ring**
 - ↳ Size of **zone sufficiently large** to avoid pushing traffic in adjacent areas
- **short-term** temporary traffic bans **barely effective** during pollution episodes
 - ↳ alarm management of **ad hoc traffic bans** too **complicated**
 - ↳ many **exemptions needed** for commercial traffic



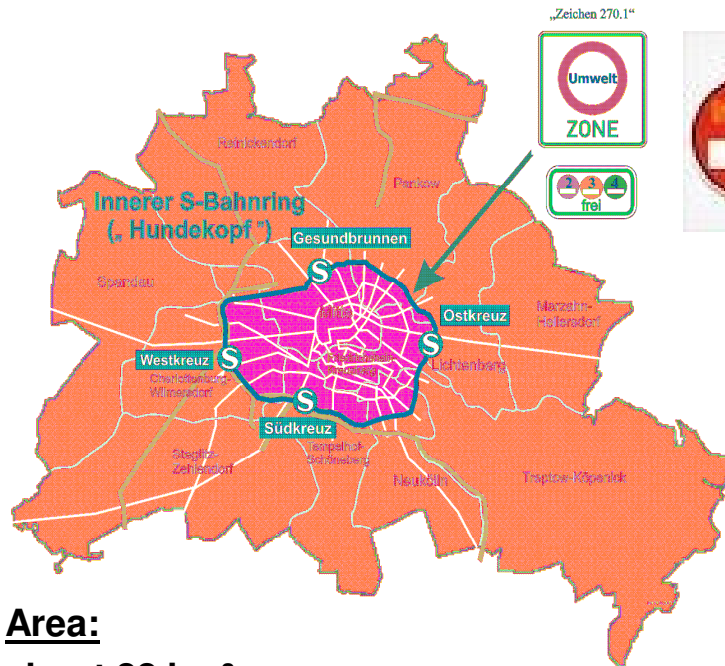
LEZ Berlin reasons

- **LEZ Berlin: selective traffic ban for polluting vehicles**
 - ↪ **durable:** not only on days in excess of 24h-limit value
 - ☞ reduction of long-term exposure creates extra health benefits
 - ↪ **large-scale:** not only in single roads but covering the whole (potential) non-attainment area
 - ↪ **local scale** traffic restrictions merely **shift** problem in other roads
- **transition period (> 2 ½ years) prior to the start & staged concept 2008/10**
 - ↪ ensures **proportionality**
 - ↪ **no general exemptions** for residents and commercial traffic
 - ↪ **but individual** temporal exemptions possible
 - ☞ **if retrofit impossible**
 - ☞ **restrictive** for **private** vehicle use
 - ☞ limited to cases of **hardship**
 - ☞ **charges** 20-1000€, depending on vehicle type and duration
- Includes (almost) **all types** of vehicles

LEZ Berlin

👉 what's needed?

Emission criteria based on EU vehicle emission standards...



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 **Euro1**
- 👉 affected **7%** of the vehicle fleet

■ 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}
- 👉 affected **10%** of the vehicle fleet

By now...

- 👉 Up to **3 times** more “**green**” vehicles
- 👉 More than **60.000 filter** retrofits (up to **25%** of the **Diesel vehicle fleet**)
- 👉 LEZ in force in more than 70 German towns

LEZ precondition

■ (national) vehicle **labelling scheme**:

sticker :			
minumum criteria for Diesel vehicles	Euro 2, or Euro1 plus particle filter	Euro 3, or Euro 2 plus particle filter	Euro 4, Euro 3 plus particle filter
ban for Diesel veh. older than ...	1992	1996	2000
minimum criteria for petrol cars			Euro 1 with catalytic converter

general exemptions for

- ↗ police, fire brigade, military, ambulance, etc
- ↗ two wheelers, mobile machinery, vintage cars

■ technical **criteria** for DPF **retrofit** kits

☹ **no** EU-wide harmonisation until now

LEZ impact analysis

👉 approach & **needed tools**

1. impact on **traffic flows**?

- has road traffic decreased within the LEZ?
- has road traffic been re-routed to areas outside the LEZ?
- has road traffic been avoided?

👉 **monitoring of traffic flows**

2. effect on the **vehicle fleet composition**?

- change in the characteristic of the registered vehicle fleet?
- change in the real fleet on the roads in & outside the LEZ?

👉 **evaluation of vehicle registration data base**

👉 **monitoring of real vehicle fleet**

3. impact on the pollution **emissions** from road traffic?

👉 **calculation of the exhaust emissions**

👉 **comparision with default fleet and situation before/after LEZ**

4. impact on the **air quality**?

👉 **evaluation of routine air quality monitoring data: PM10, PM2.5, NO, NO2, NOx**

👉 **evaluation of extra AQ measurements: PM-species (EC, OC, sec. PM, passive samplers)**

👉 **dispersion modelling with LEZ-related emission reduction**

Berlin LEZ – impact analysis

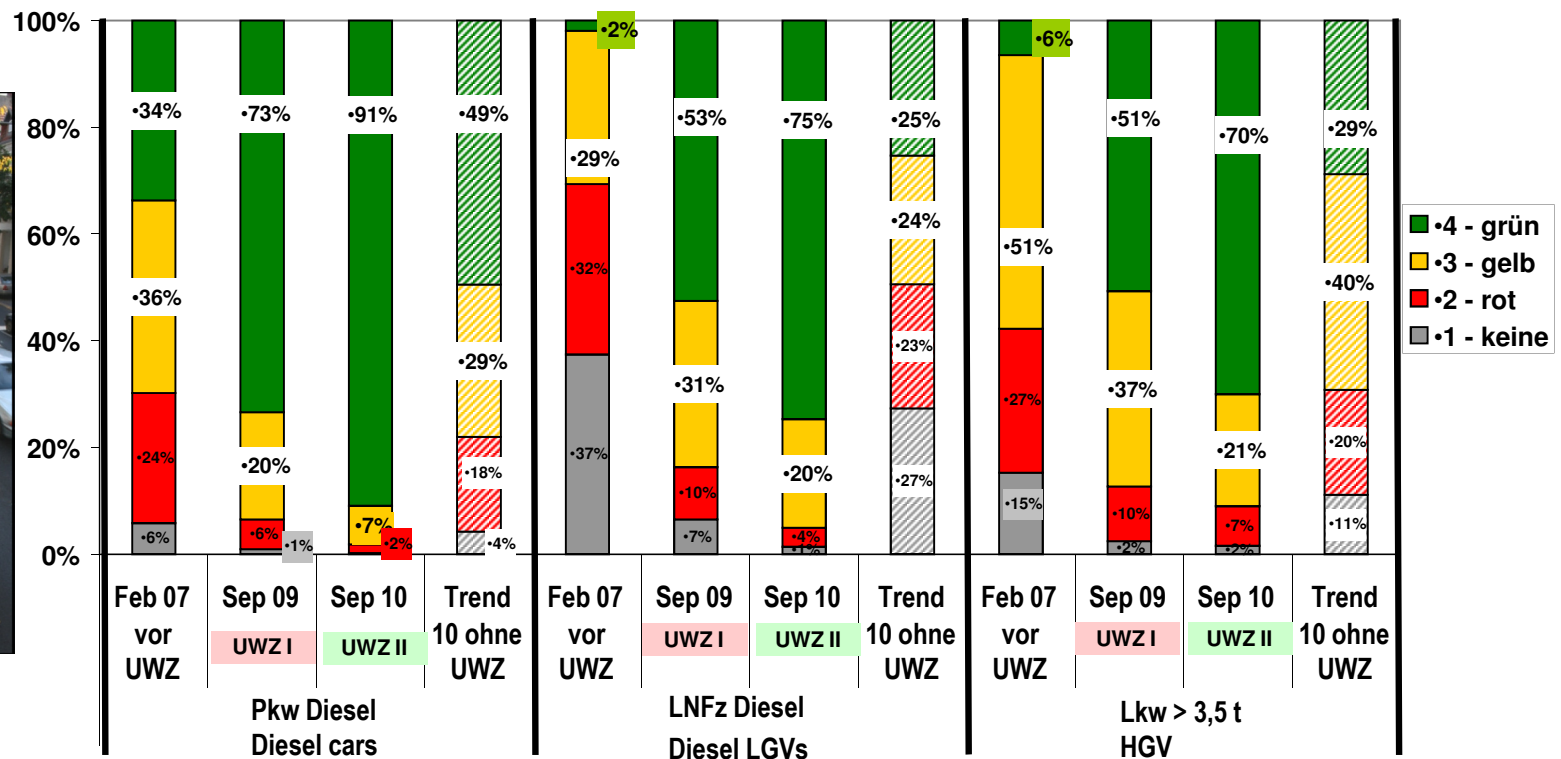
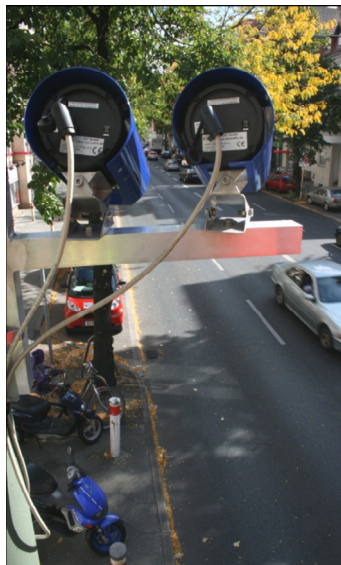
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👉 vehicle fleet composition

change of the vehicle fleet composition on the road

(from number plate recognition Frankfurter Allee)



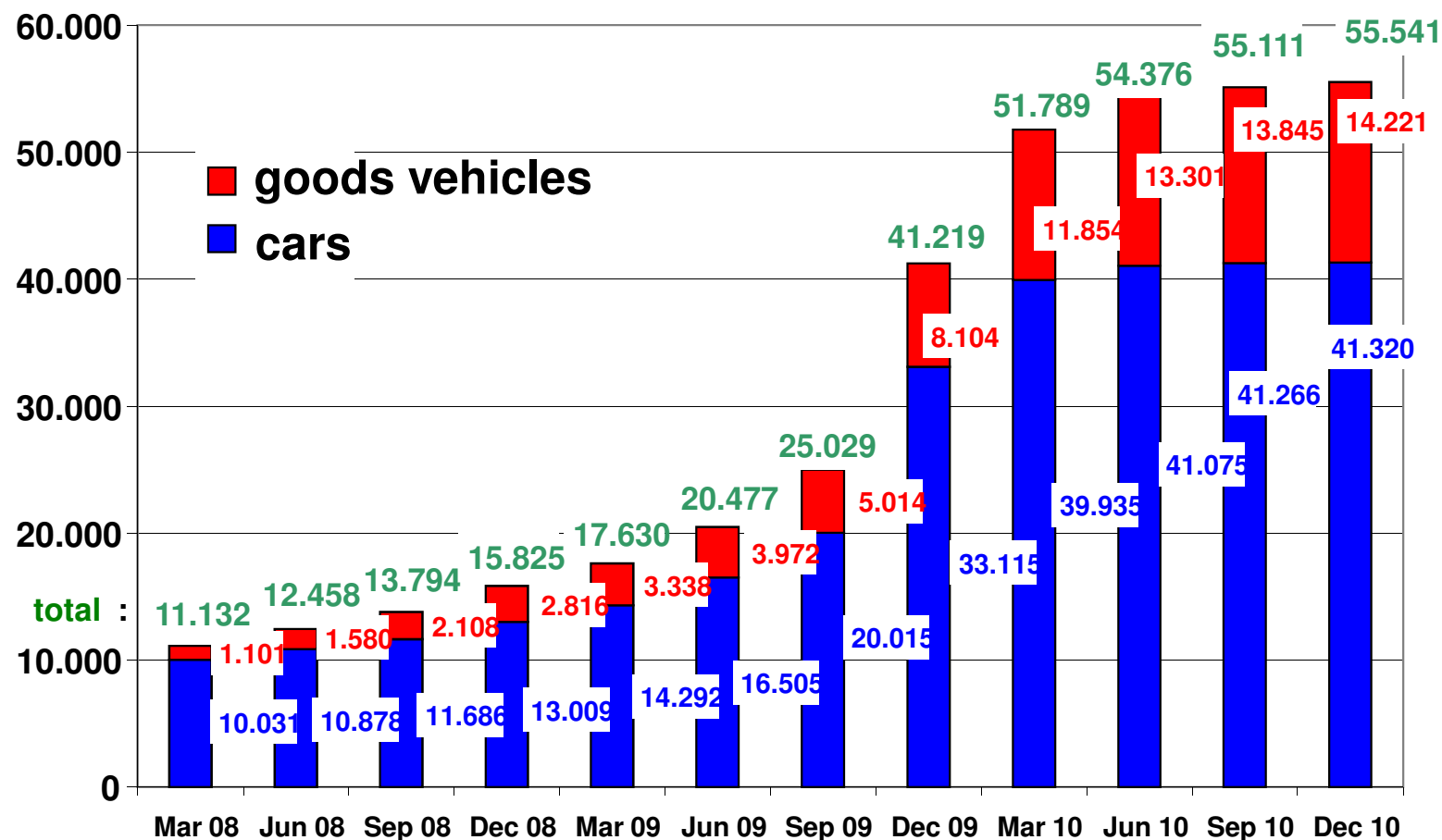
decrease: cat.1 (no sticker) by 70-90 %; Cat 2 (red) by 50-80 %
increase: category 4 (green) by factor 1,5 to 3

Senatsverwaltung für Stadtentwicklung und Umwelt | Abteilung IX Umweltpolitik

Martin Lutz | LEZ Workshop Mexico City, December 2014

👉 Diesel particle filter retrofit

Number of Diesel vehicles in Berlin retrofitted with DPF

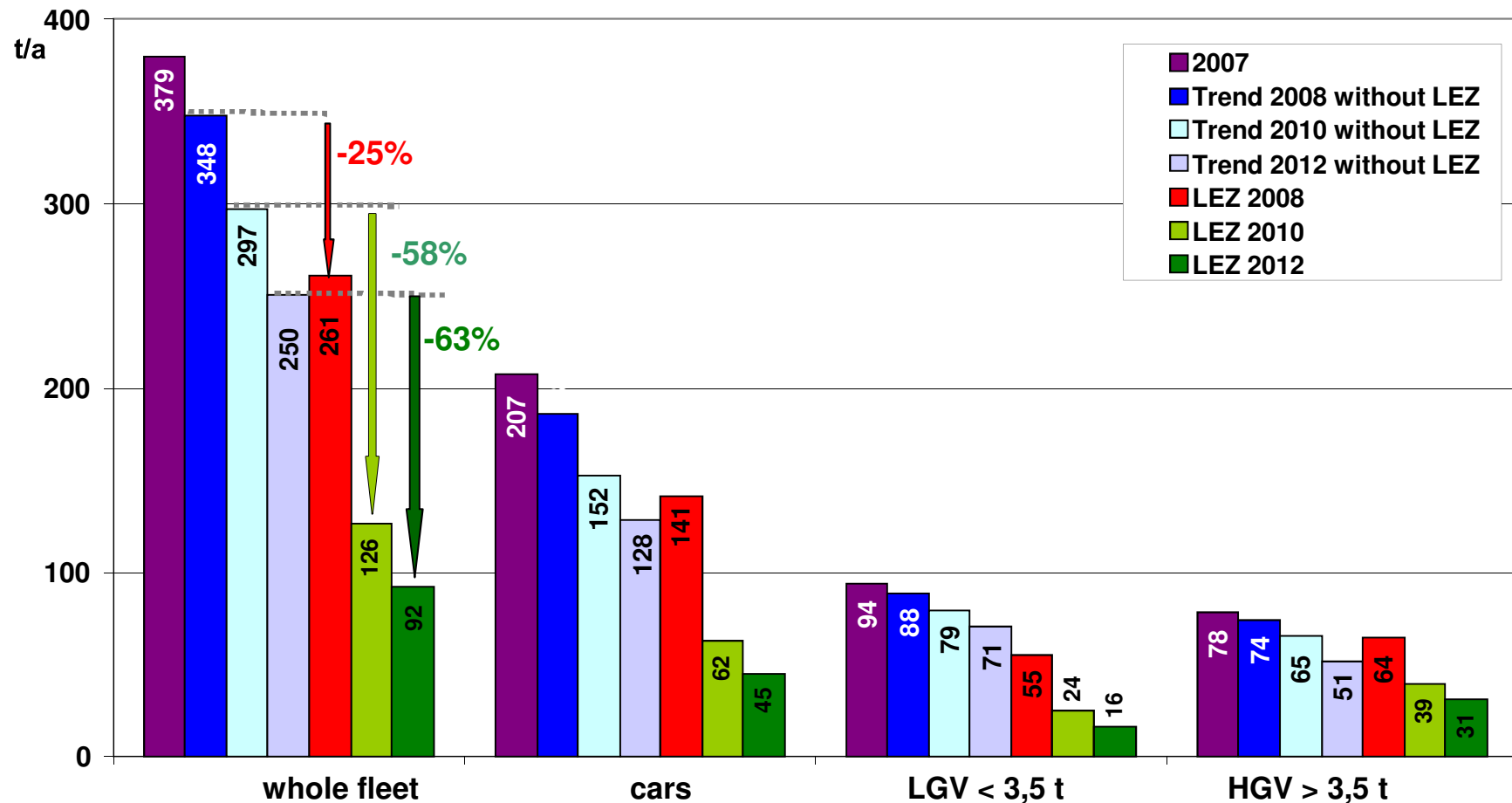


Berlin LEZ – impact analysis

👉 Emissions of PM

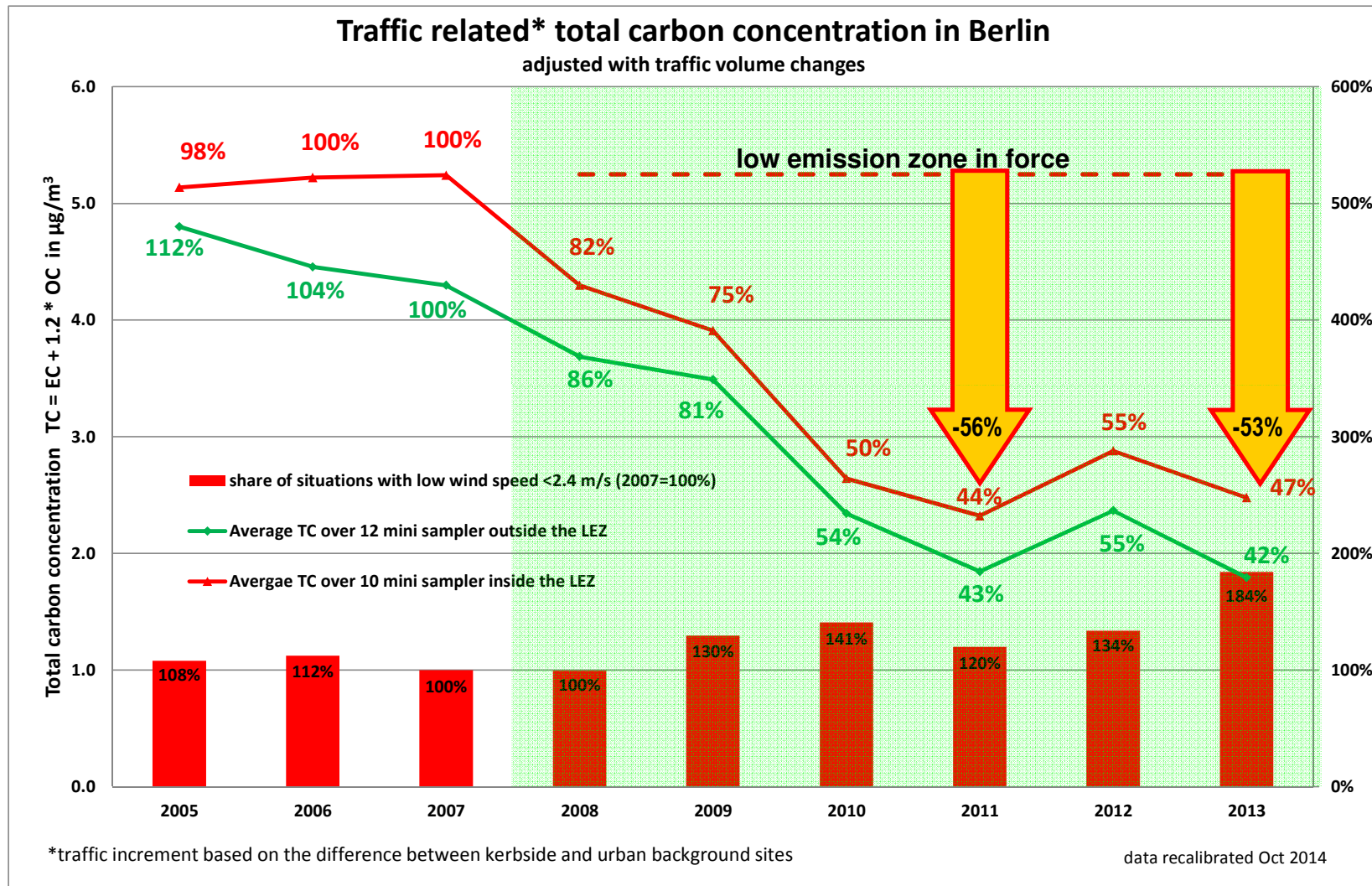
LEZ impact: change in **particle** exhaust emissions

based on fleet composition at a busy main road (new emission factor data base HBEFa 3.1)



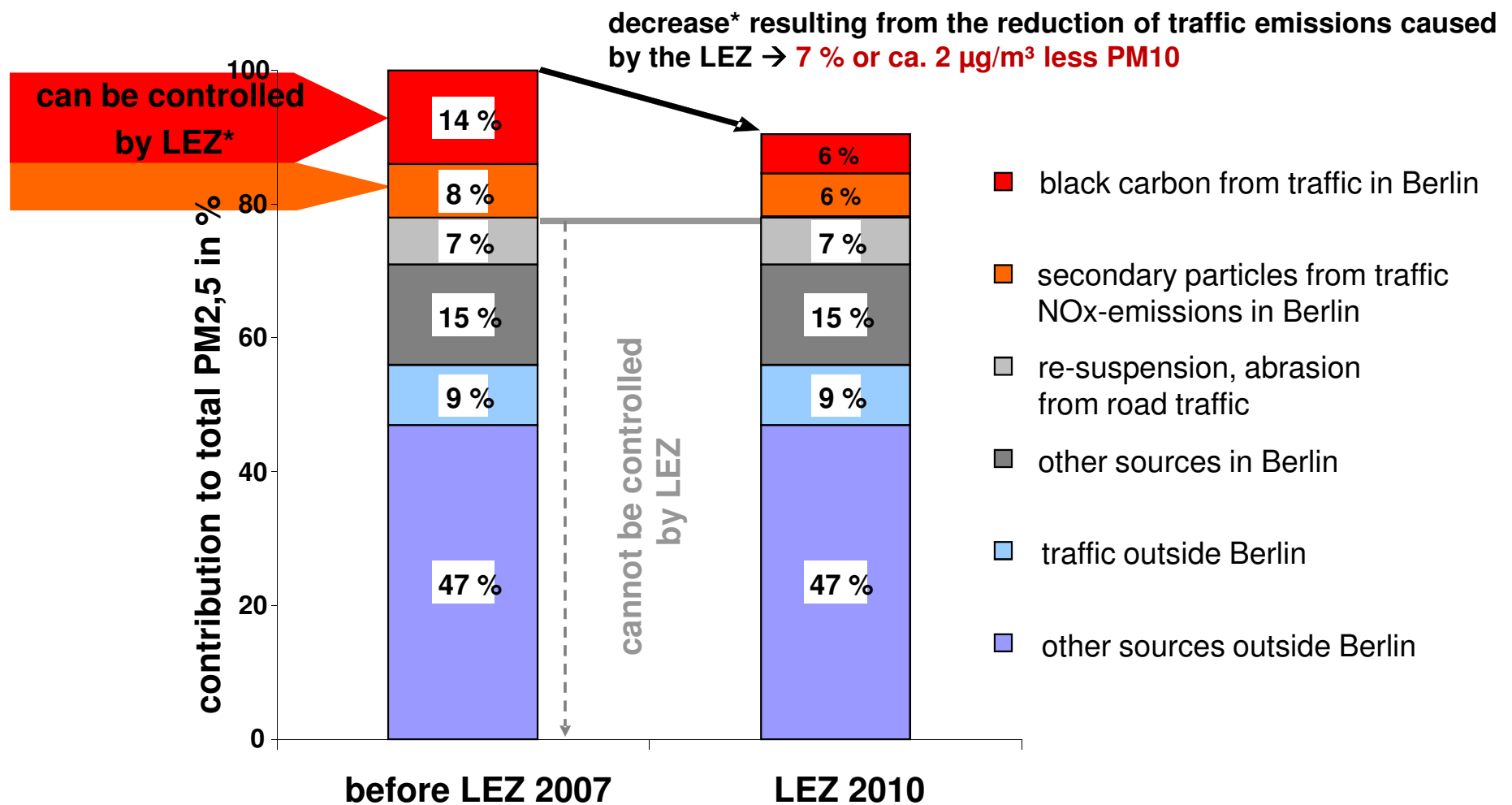
Berlin LEZ – **impact** analysis

👉 trend of total **black carbon** concentrations from **traffic**



Berlin LEZ – impact analysis

👉 on total **PM** concentrations....



* related to PM_{2,5}-levels in a busy main road in Berlin's city centre in 2007 before the LEZ

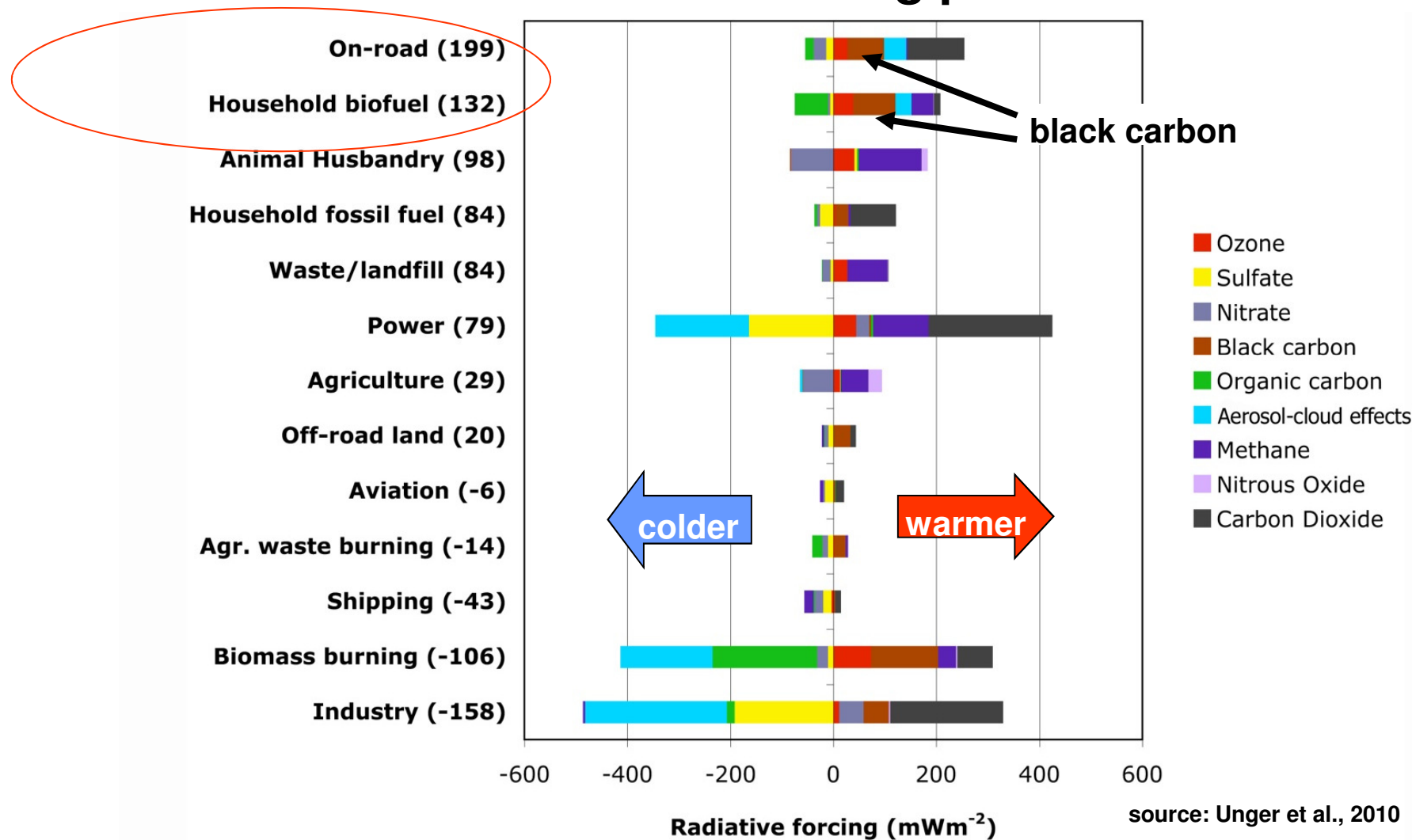
Berlin LEZ – impact analysis

👉 benefit for climate change

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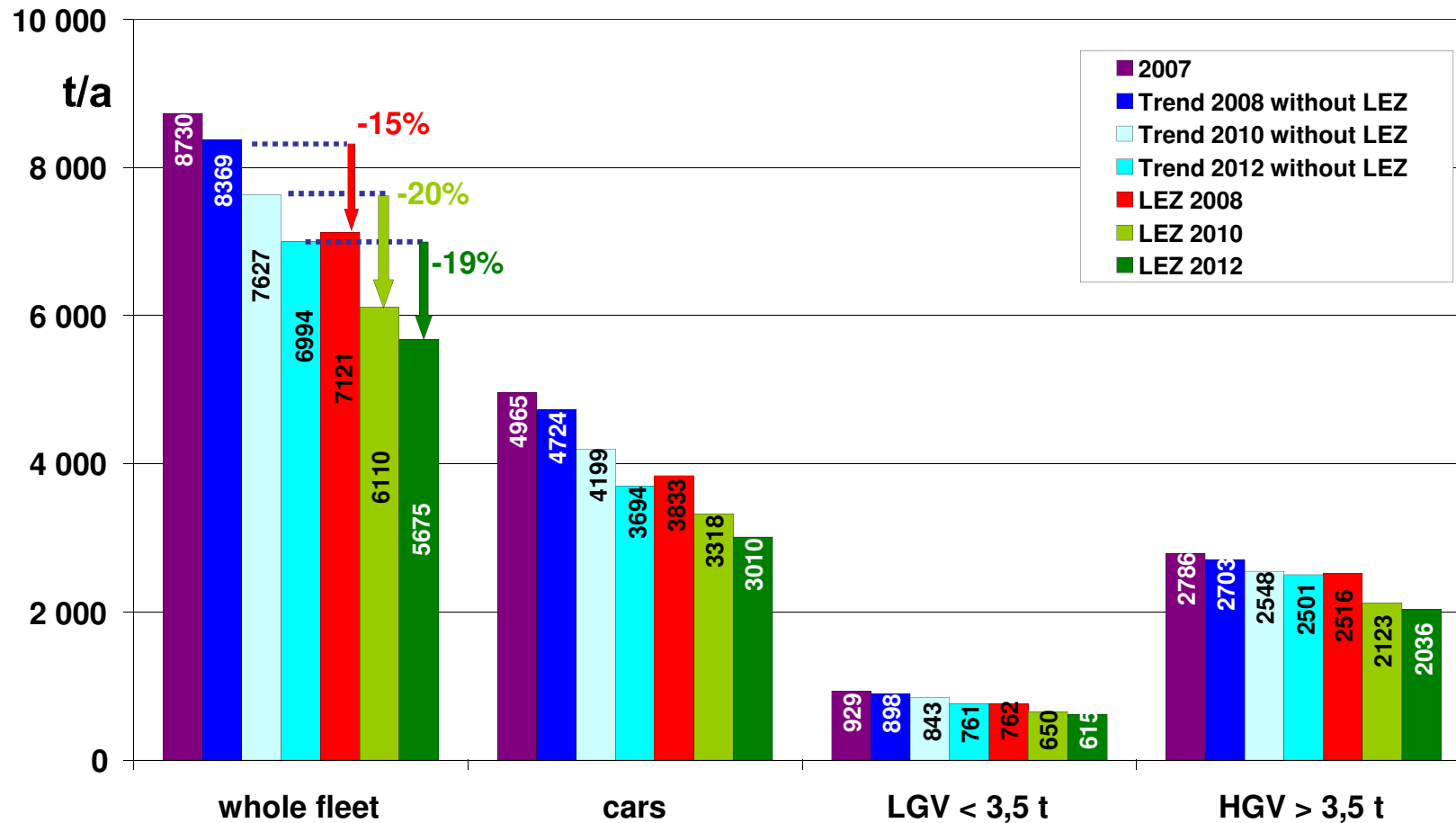
radiative climate forcing per sector



Berlin LEZ – impact analysis

👉 NOx emissions

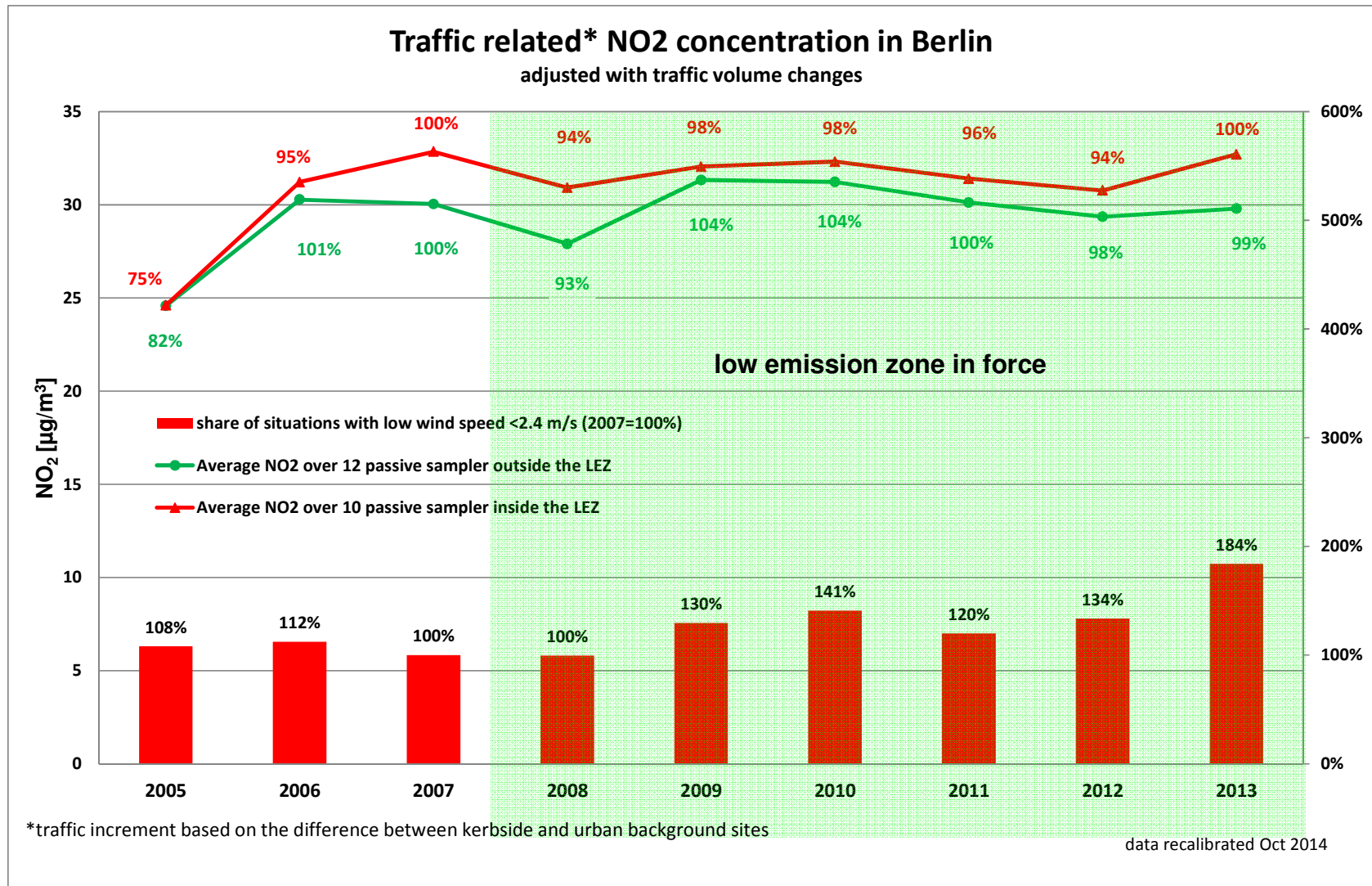
based on fleet composition at Frankfurter Allee (new emission factor data base HBEFa 3.1)



emissions extrapolated to the entire main road network based on the fleet composition at Frankfurter Allee (with DPF-retrofit, only warm emissions, no cold start impact)

Berlin LEZ – impact analysis

👉 trend of **NO₂** levels from **traffic**



LEZ in Germany

☞ **summary** of impact analysis

■ **no visible shift** of **traffic** into surrounding areas

☞ provided that LEZ covers sufficiently large parts of a city

■ **significant modernisation of the vehicle fleet:**

☞ **Increase** of category 4 (green) vehicles by **factor 1.5 to 3**

☞ more than **60.000 vehicles** retrofitted with DPF

■ **decrease of traffic emissions** on top of trend :

☞ - **60% toxic** Diesel exhaust particles, -20% NOx

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

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

■ **LEZ is effective, if**

☞ based on **ambitious** emission criteria

☞ covering a **larger** area

☞ introduced **not** too late

☞ exemptions are **limited**



☞ **now!**

■ **potential benefit** for the **air quality**

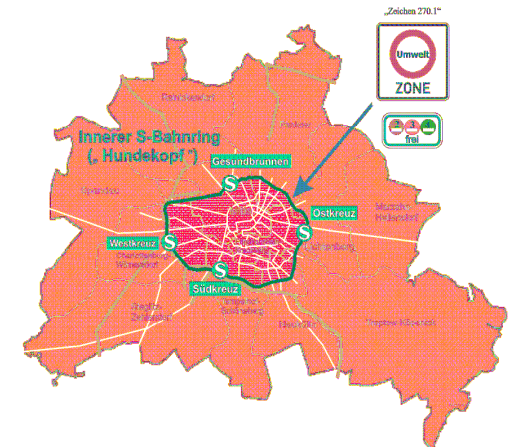
☞ **5-10% reduction** of total **PM10/2.5**

☞ traffic related decrease of **black carbon** ~50%

☞ ~**10** less excess **days** > 50 µg/m³ PM10

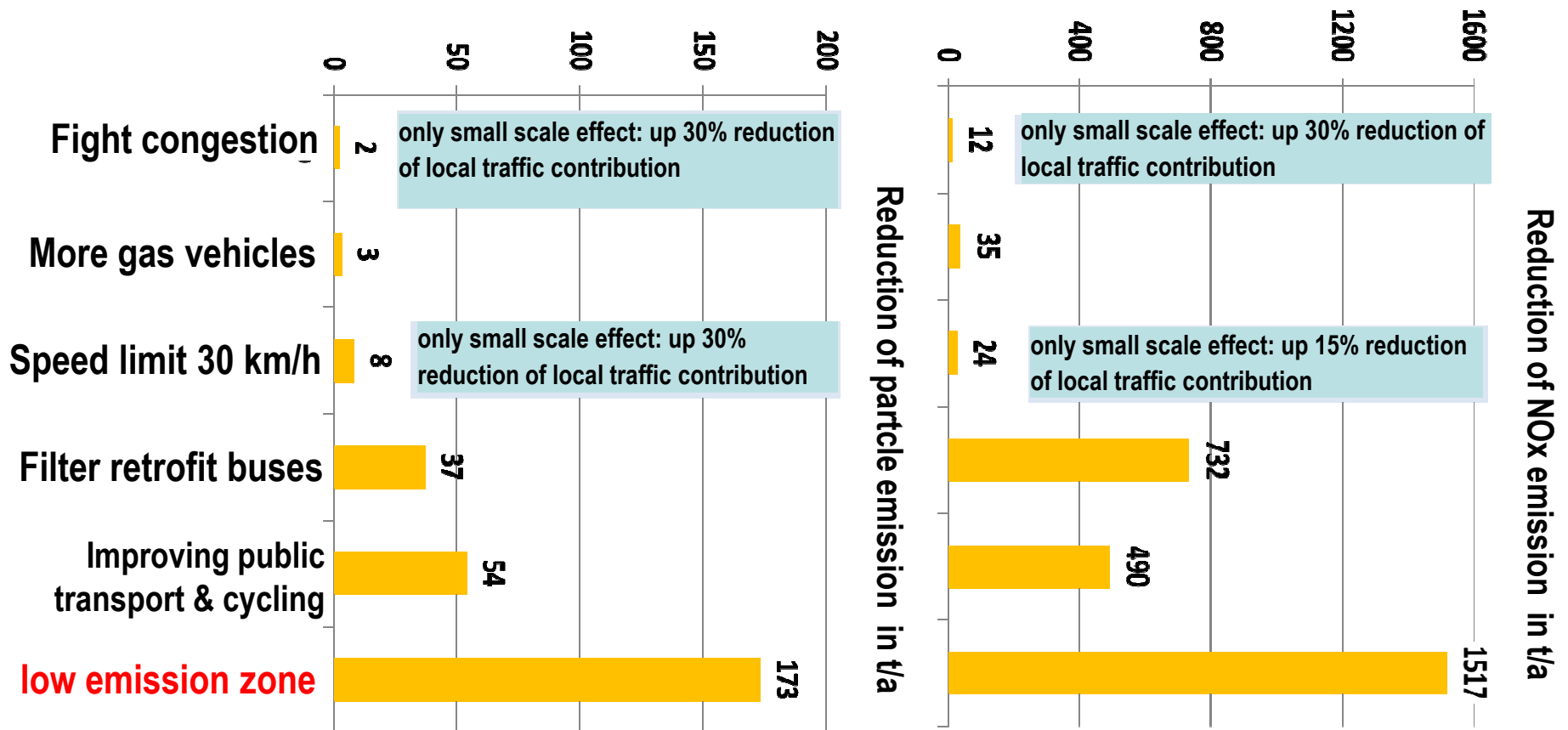
☞ smaller progress for NO2: **<5%**

■ **Reduces the most toxic PM component & mitigates CC impact**



Impact of **implemented measures**

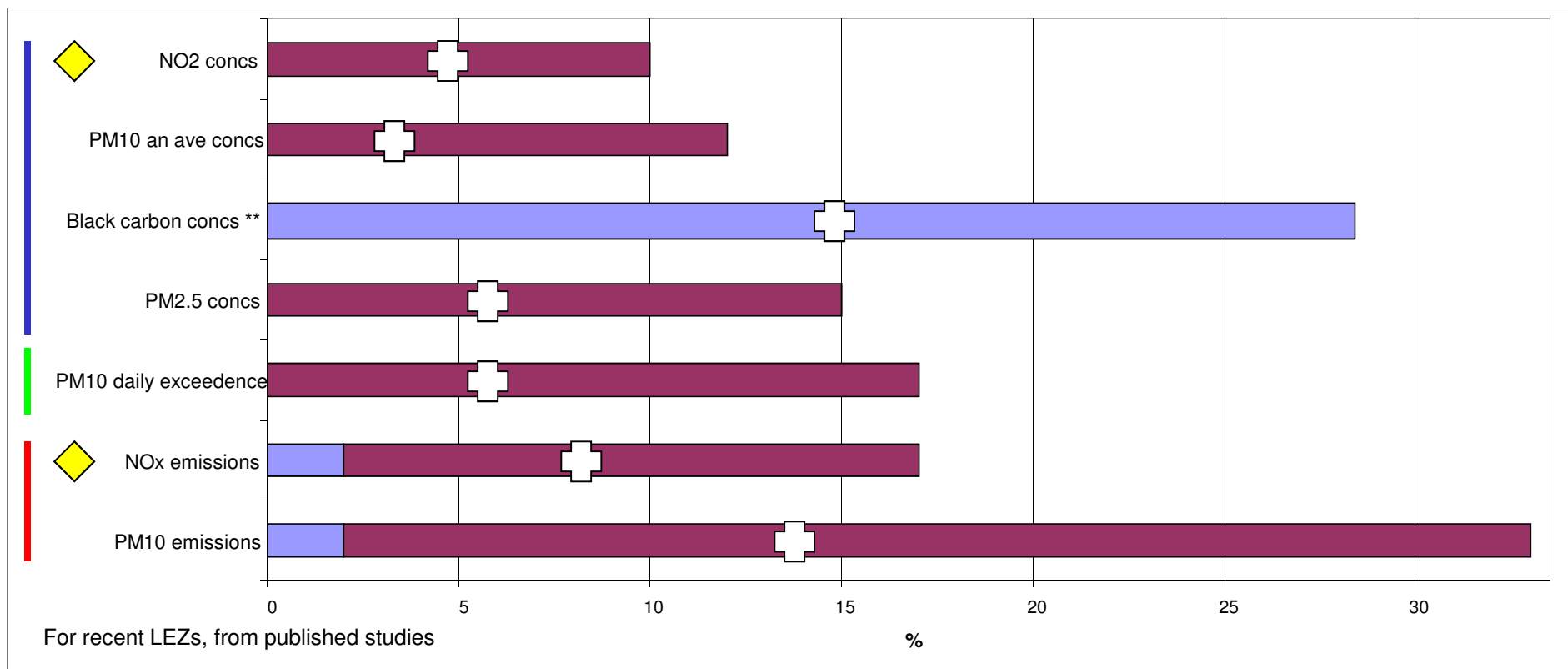
👉 **estimated emission reduction**



Total PM10-Emission in 2005: 3854 t/a

Total NOx-Emission in 2005: 20292 t/a

LEZ air quality impacts



• Vary with scheme details

- emissions standard, vehicles affected
- existing vehicle fleet: age & type
- compliance / enforcement
- topography / meteorology
- % contribution from traffic / imported background



average

** 2 assessments

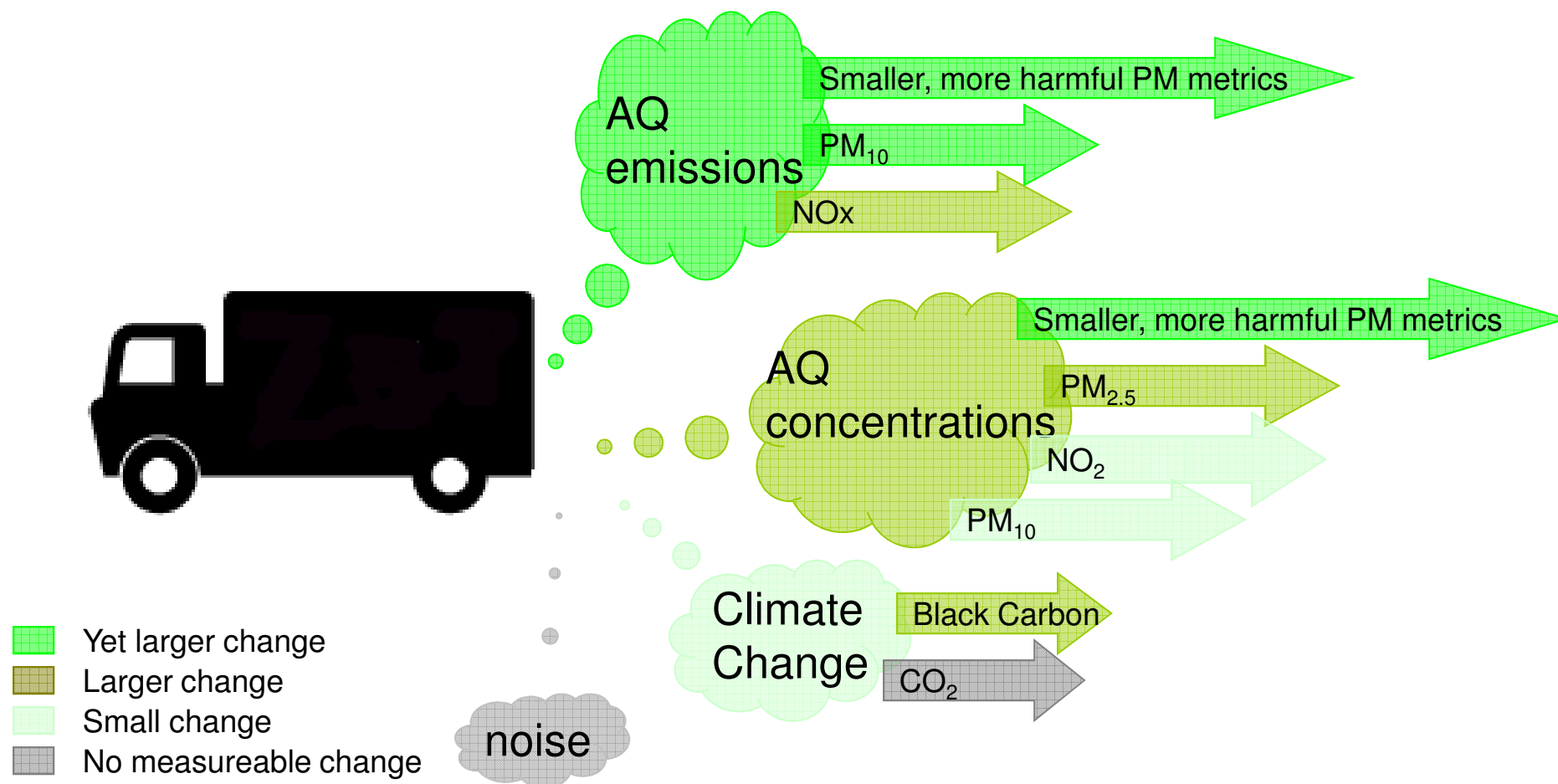
concentrations

PM₁₀ daily exceedences

emissions

NO₂/NO_x

LEZ environmental impacts



some **technical issues**

■ **NOx urban** cycle-beating

- ↪ Euro 5 heavy duty vehicles with SCR & Euro 4-6 cars show less impact than expected
 - ↪ impact still slightly positive

■ **Increased** primary **NO₂** from diesel / some DPFs

- ↪ reduces potential impact on NO₂
- ↪ no increase in NO₂ reported from LEZs - when impact, positive
 - ↪ banning older Euro standards reduces NOx
 - ↪ retrofitting light duty reduces primary NO₂
 - ↪ not all heavy duty retrofits increase NO₂
- ↪ certification of retrofits can limit NO₂ increase

■ **Partial/full** Diesel Particulate **Filters**

- ↪ full DPFs reduce all PM fractions by ~95% and more
partial filters ~30-50%
- ↪ currently most retrofit DPF certifications allow both
- ↪ retrofit certifications can require full DPFs

☞ what's needed?

☞ Emission dependent **vehicle identification**

■ **Automatic** vehicle recognition systems (with cameras like in London)

☹ Expensive & clashes with strict data privacy law in Germany

or

■ **stickers** based on (national) vehicle labelling scheme

☞ **Set out the emission dependent sticker system**

☞ Define requisite properties (e.g. forgery-proof, non-removable)

☞ Define emission classes

☞ Set technical requirements for Diesel filter retrofit systems

☞ **Set modalities for issuing the stickers**

☞ Unambiguous way to identify emission class from vehicle papers
(Germany: emission code number)

☞ **Define competent institutions issuing the stickers**

☞ Germany: Car workshops eligible to conduct emission inspections,
vehicle inspection centres and vehicle registration offices

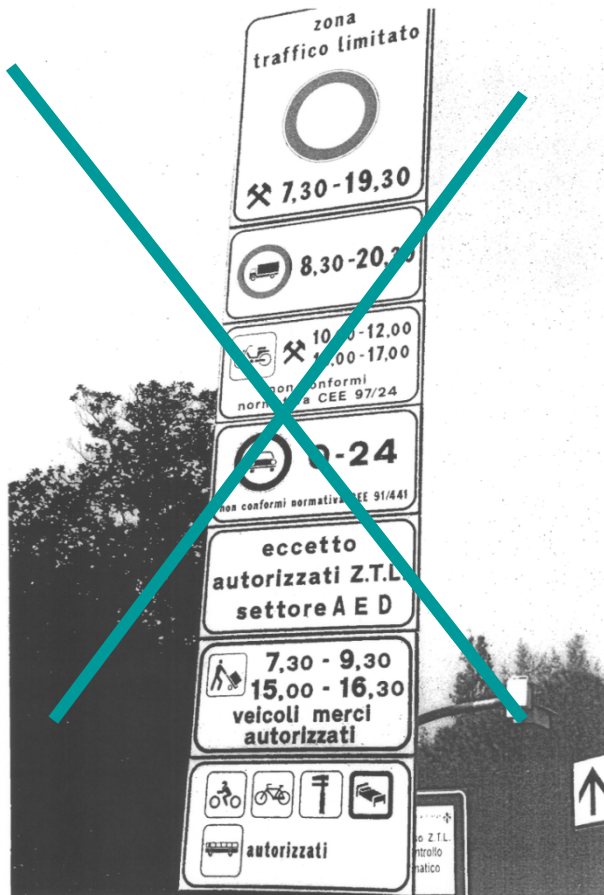
☞ **fees**

■ General (national) framework for **exemptions** from the LEZ

LEZ implementation

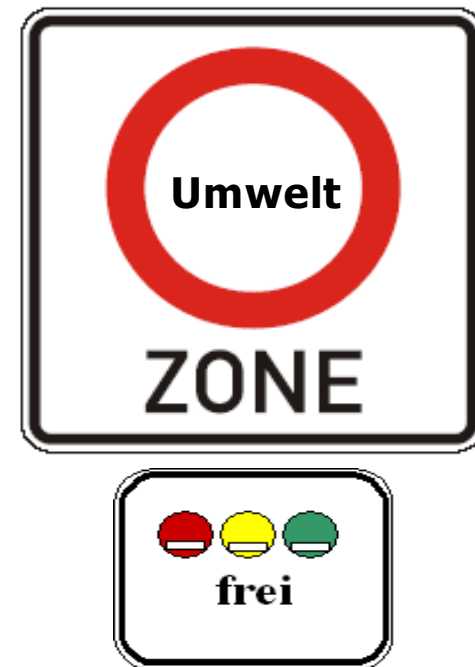
👉 what's needed ?

👉 Define simple **traffic sign** for LEZ



German LEZ traffic sign

„Zeichen 270.1



LEZ implementation

👉 what's needed?

■ national labelling scheme: General exemptions in Germany for...

- 👉 ambulance and doctors' emergency vehicles in use
- 👉 vehicles used by severely disabled people
- 👉 vehicles granted special traffic rights, e.g. garbage collection, road cleaning vehicles, police, fire brigade etc.
- 👉 military

exempted, though not necessary....

- 👉 vintage vehicles older than 30 years
- 👉 Mobile machinery
- 👉 agricultural or forestry tractors
- 👉 two or three-wheeled motor vehicles



Berlin's Low Emission Zone stage 2

👉 **affected vehicles end of 2009**



■ Diesel Passenger cars:

↘ 14.000 PC (7%) with red sticker → can barely 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 2011: **more 60.000 Diesel vehicles retrofitted with DPF**
25% Diesel PC & 20% LGV/HGV!

LEZ implementation

👉 what's needed?

individual exemption in case of hardship 👉 **basics**

■ tenet in the national labelling ordinance on individual exemptions from the traffic ban...

👉 *“The competent authority, and in undeferrable cases the police, may permit the use of unlabelled vehicles ... where this is in the **public interest**, in particular where necessary for the supply of the population with essential goods and services or where **overriding and undeferrable interests of individuals** so require, in particular where manufacturing and production processes could not otherwise be maintained.”*

■ Berlin: guidance for its practical implementation

- ↪ precept: **no compromise** on environmental benefits of the **LEZ**
- ↪ objective: exemption for maximum **10%** of polluting vehicles effected by the ban
 - 👉 proportionate with regard to 2½ years transition phase since adoption of the LEZ scheme
 - 👉 more **ambitious** than regulations in other German cities
- ↪ basic preconditions
 - 👉 vehicle registered before **1.03.2007** by the owner
 - 👉 **retrofit** with particle filter **not possible**
 - 👉 **substitution** by a cleaner vehicle unreasonable due to social/economic reasons
 - 👉 use of the polluting vehicle essential due to **public interests** or overriding and **non-deferrable interests of individuals**

LEZ implementation

👉 what's needed?

Possible individual exemption in case of hardship 👉 **categories**

■ Private trips

👉 Exemptions **limited** to....

- 👉 persons with **mobility impairment**
- 👉 commuters with **unfavourable working times** (e.g. night shift workers)

👉 **no** public or private interest e.g. concerning...

- 👉 private health care of relatives
- 👉 visitors of residents living in the LEZ
- 👉 allotmentiers within the LEZ
- 👉 Transport of children to/from kindergarten, school, etc
- 👉 shopping trips
- 👉 camper vans

LEZ implementation 📌 what's needed

individual exemption in case of hardship 📌 categories

■ commercial traffic of public or private interest

📌 if existence of the business would be at risk

📌 for special vehicles:

📌 if vehicle represents the business concept (e.g. London-Taxi)

📌 special vehicles, e.g. heavy transporters, special market vehicles with a stall, tractor units of showmen

📌 optional need to upgrade the vehicle to the best possible emission standard (e.g. catalytic converter for 2-stroke East German Trabant cars)



📌 bonus scheme for vehicle fleets > 4 vehicles

📌 stepwise adaptation of the fleet possible in case of purchase of a certain share of very clean vehicles (green sticker)

■ no public or private interest regarding...

📌 health care services, doctors (except emergency operations),

📌 public sector vehicles and buses

📌 emergency services for lifts, door locks, animal care, etc.

📌 taxis

LEZ implementation

👉 what's needed

individual exemption in case of hardship 👉 duration

categories	Maximum duration
general	
in the event of delays in the availability of a filter retrofit kit or delivery of a new vehicle, which have already been ordered	by the expected date for installation/delivery, max. 18 months
Private trips	
persons with mobility impairment	18 months , at the latest by expiry of their disablement documentation
commuters	up to 18 months
commercial traffic	
special vehicles, e.g. for touristic purposes	18 months , prolongation possible in the absence of retrofit options
special vehicles : heavy transporters, special market vehicles with a stall, tractor units of showmen, vehicles used as work places with fixed coachwork	until retrofit is possible, maximum 3 years
vehicle fleets > 4 vehicles	maximum 18 months
cases of hardship	maximum 18 months

LEZ implementation

👉 preconditions

individual exemption in case of hardship 👉 fees

■ fees, depending on

↪ administrative effort

↪ economic benefit (value of vehicle, duration)

$$\text{Fee} = \text{Effort} + \text{BasicFee} \cdot (1 + \text{DurationinMonths} / 10)$$

■ example for heavy goods vehicle > 7.5 t

basic fee = 200,00 €

duration of the exemption: 9 months

administrative effort 1h = 51.20 €

👉 fee: 431.20 €

■ in case of delayed retrofit only 25€

■ aim: incentive to clean up the vehicle fleet

LEZ implementation

👉 what's needed?

👉 Lessons learnt on individual exemptions

- definition of **criteria and** information of the public well in **advance**
- **no/few** general exemptions
- **No** exemption for vehicles which can be **retrofitted** with a filter
- relative **strict** criteria when assessing cases of hardship
 - ↳ **require evidence** for a economically **precarious situation**
- **raise fees** related to the **value of the exemption**
 - ↳ take costs for filter retrofit as an orientation
- 👉 keep number of exemptions **below** the benchmark of **10%** of the number of banned vehicles
- 👉 **environmental benefit** of the LEZ **not at risk**
- 👉 „bureaucracy“ & fees kept application number at moderate levels

LEZ pros & cons

■ Objective:

-  faster modernisation of vehicle fleet


■ Criteria: When should a LEZ be considered?

- ☑ high contribution of urban **traffic-related** air pollutants
- ☑ air quality limit values exceeded in many urban **streets**
- ☑ **low** proportion of **through** traffic or no alternative routes
- ☑ **High** share of **Diesel** vehicles

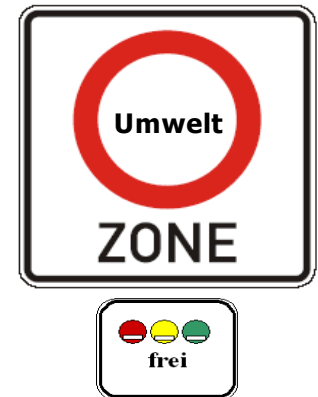
■ Advantages:

- 😊 aims specifically at the highest emitting vehicles
- 😊 **rewards** vehicle owners who invested in **clean** vehicles
- 😊 reduces the emission of the overall vehicle fleet all over the LEZ → decrease in all streets → decrease of urban background concentrations → **decreasing** urban **population exposure**

■ Disadvantages:

- ☹ financial **burden** for owners of high emitting vehicles
 -  in particular for small business
- ☹ in Germany: every car owner has to buy a sticker to facilitate control
- ☹ considerable **administrative** effort, e.g. for granting single exemptions

„Zeichen 270.1



LEZ what's needed

implementing an LEZ: lots of tasks - many stakeholders

tasks

- basic planning process
- delimitation, monitoring – deployment of traffic signs
- vehicle identification/labelling – stickers or camera systems
- granting some exemptions
- funding
- surveillance
- communication
- legal action
- evaluation, impact assesement



actors

- pollution control authority
- traffic authority
- local district authorities for traffic
- vehicle registration office
- police
- public order office
- department for the economy
- press/public relations bureau
- public banks, gas supplier (funding of clean vehicles/fuels)
- vehicle inspection agencies
- chamber for industry and commerce, haulier organisation, other lobby groups, NGOs

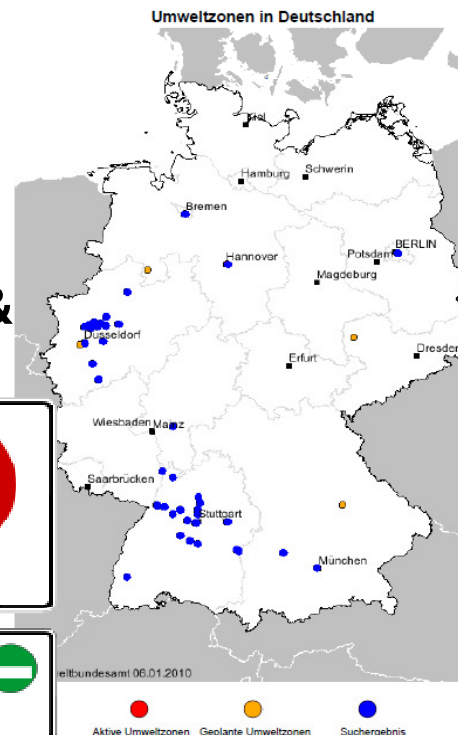
LEZ what's needed

- ☑ (national) **vehicle classification** scheme (& stickers) in force in time
 - ☞ The simpler to convey the better
- ☑ technical **criteria for retrofit** systems to be set early
 - ☞ UN-ECE REC regulation will ensure cross-border compatibility
 - ☞ require **full DPFs** & **limit** primary **NO2** increase
- ☑ sufficient **market coverage** for retrofit kits
- ☑ **economic incentives**
 - ☞ tax discounts, funding for cleaner/retrofitted vehicles (with particle trap, CNG)
- ☑ sufficiently long **transition period**
 - ☞ at least one year
- ☑ **few exemptions** from traffic ban
 - ☞ In Berlin less than 10% of vehicles affected from the access restriction
- ☑ intensive public **information** & appropriate **impact assessment**
- ☑ effective **enforcement** & sanctions
 - ☞ In Germany 80€ (☞ should be higher in practice)
- ☑ **Complimentary** measures, like improved public transport, freight logistics

LEZs in Europe



- ~1800 in Europe
- ~1725 in 12 Italian regions
- ~ 70 in Germany
- **Most** affect **HDFs**
 - IT all, DE all but 2-wheel
- Euro emission standard
- Most allow DPF retrofits
- Most have 2+ stages
- National frameworks
 - Except IT & UK
- Areas range from London & NRW to small towns in the Po valley



LEEZEN

www.lowemissionzones.eu

www.airqualitypolicy.co.uk

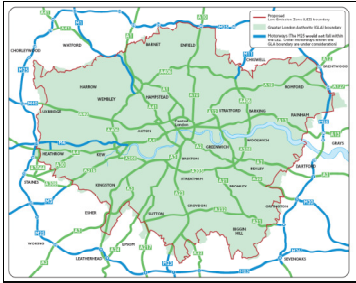


Netherlands LEZs

- National framework developed *together with* transport operators, clearly communicated, national website
- Local schemes under national agreement until national law in place, together with **extensive grants for retrofit**
- Clearly laid out LEZ plan, together with comprehensive national & local AQ Action Plans
- Framework requires complimentary measures, improving logistics
- Enforced with **cameras**, manual until cameras in place
- **Heavy duty lorries only**, vans & cars in preparation (not buses)
- Annually assessed



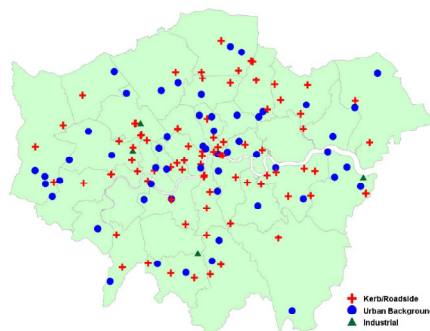
- **Until 2010**
 - Euro 1 & less banned; Euros 2 & 3 require filter
 - Euro 4, 5, 6, EEV, gas, hydrogen, E85 allowed in
- **After 2010 are:**
 - Euro 2 & less banned; Euro 3 require filter & must be <8 years old
 - Euro 4, 5, 6, EEV, gas, hydrogen, E85 allowed in
- **After 2013**
 - Only Euro 4, 5, 6, EEV, gas, hydrogen, E85 allowed in



London's LEZ



- Extensive assessment & consultation
- Clearly & extensively communicated in different languages
- **Heavy duty lorries & coaches only**, LGVs & vans stage 2 in Feb 2012
- **Enforced with cameras**, building on congestion charge
- £1000 (£500) penalty. **Can pay £200 (£100) per single entry**
- Legal mechanism is a congestion charge, no grants
- Part of (comprehensive) AQ Actionplan
- Full **DPFs** now required, with limit to primary NO₂ increase
- Foreign vehicle registration scheme
- ~98% compliance rate
- Extensive monitoring of AQ, noise, socio-economic....., planned into LEZ



2008

4th Feb: Euro 3 (PM) HGVs > 12T & bus > 5T

1st July: Euro 3(PM) HDVs >3.5T & bus

From 1st January 2012

Euro 3(PM) vans >1.2T & minibuses






Euro 4(PM) HDVs >3.5T & bus >5 T

LEEZEN

London LEZ for goods vehicles & buses

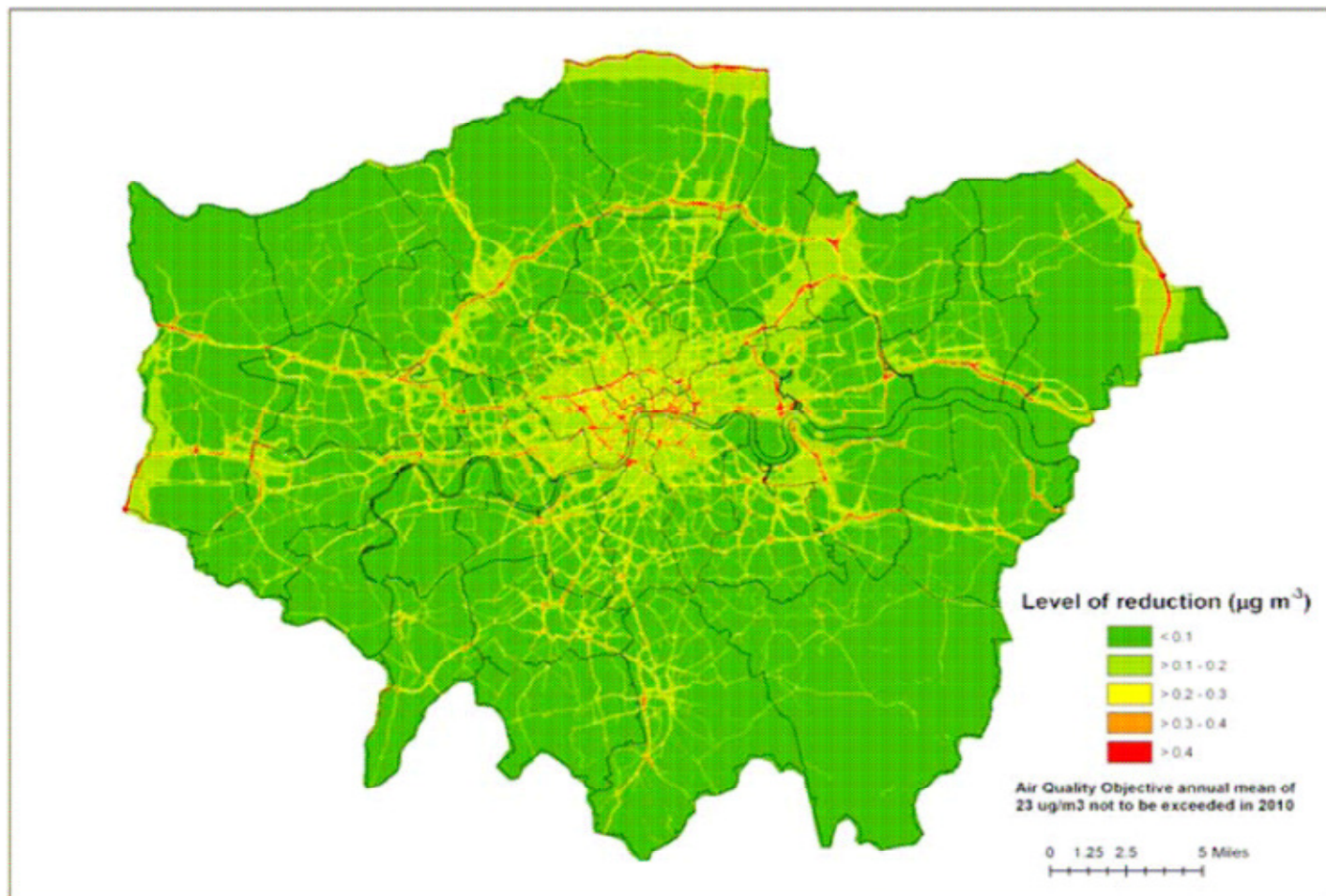
👉 **emission criteria**

Key implementation dates

	4 February 2008 Euro III for PM 3 January 2012 Euro IV for PM	From February 2008, a standard of Euro III for particulate matter (PM) for Heavy Goods Vehicles (HGVs) over 12 tonnes in weight;
	7 July 2008 Euro III for PM	From July 2008, a standard of Euro III for PM for goods vehicles between 3.5 and 12 tonnes in weight, and for buses and coaches ;
	3 January 2012 Euro IV for PM	From October 2010, a standard of Euro III for PM for heavier Light Goods Vehicles (LGVs) and minibuses; and
	4 October 2010 Euro III for PM	From January 2012, the standard will be tightened to Euro IV for PM for goods vehicles over 3.5 tonnes , buses and coaches
		Penalty: £200, (£500 (14days) up to £1000) – HGV's/Buses £100, (£250 (14days) up to £500) – LGV's

London LEZ

👉 modelled PM decrease 2012



source:
Sean Beavers,
Kings College,
London

London LEZ

estimated health impacts (NO2 and PM10)

Two approaches were used for quantifying health effects :

- New Defra methodology, as developed for the Defra UK Air Quality Strategy Review (AQSR), and published by the IGCB (the Inter-Department Group on Costs and Benefits) in April (IGCB 2006, COMEAP).
- the European Commission part of the Clean Air for Europe (CAFE) programme, a much wider range of health impacts (morbidity).

DEFRA : 5200 years of life gained, 43 respiratory and cardiovascular hospital admissions avoided.

EU – additionally: 310,000 cases of lower respiratory symptoms, 30,000 cases of respiratory medication and 231,000 restricted activity days avoided.

DEFRA discounted benefits: £200 million.

EC Café CBA analysis: £420 million.

Not just in London (central London saw greatest benefits).

SocioEconomic, Environmental perception, Noise and road safety.

Source: AEA, 2006, London Low Emission Zone. Health Impact assessment, final report. Report for Transport for London. www.tfl.gov.uk

¡Muchas gracias!

Better you slim
down rather than
the ice shelves.
So, take the
bike!

For more information on

- ➡ **Berlin's LEZ see**
www.berlin.de/umweltzone (also in EN)
- ➡ **LEZ in Germany see**
<http://www.umweltbundesamt.de/umweltzonen/index.htm>
- ➡ **LEZ-cities in Europe visit**
www.lowemissionzones.eu,
the website of the European Network of LEZ-cities (LEEZEN)
run by Lucy Sadler of SadlerConsultants funded by the EU

Thanks to Lucy Sadler for useful input on LEZ schemes in the EU

