LEZ sign in Gothenburg

Low Emission Zones in Europe:
Access restriction criteria, vehicle identification essentials for implementation

Martin Lutz
Berlin Senate Department for Urban Development and Environment
Directorate IX, Environment Policy

Low Emission Zones (LEZ)

☞ Definition

- **Broad**:
  Urban area where stricter requirements apply for polluting sources, like
  - ☞ Ban of certain fuels e.g. for domestic heating
  - ☞ stricter emission standards for certain plants
  - ☞ Stricter standards for construction machines and/or vehicles
- **Narrow**:
  Access restriction to urban area for certain vehicles depending on their pollutant emission (particles, NOx, hydrocarbons)
  - ↳ Legal ban
  - ↳ Road charging with emission dependant fees
  - ↳ Combination of ban and charges

☞ used in Europe, driven by pressure to meet AQ standards:

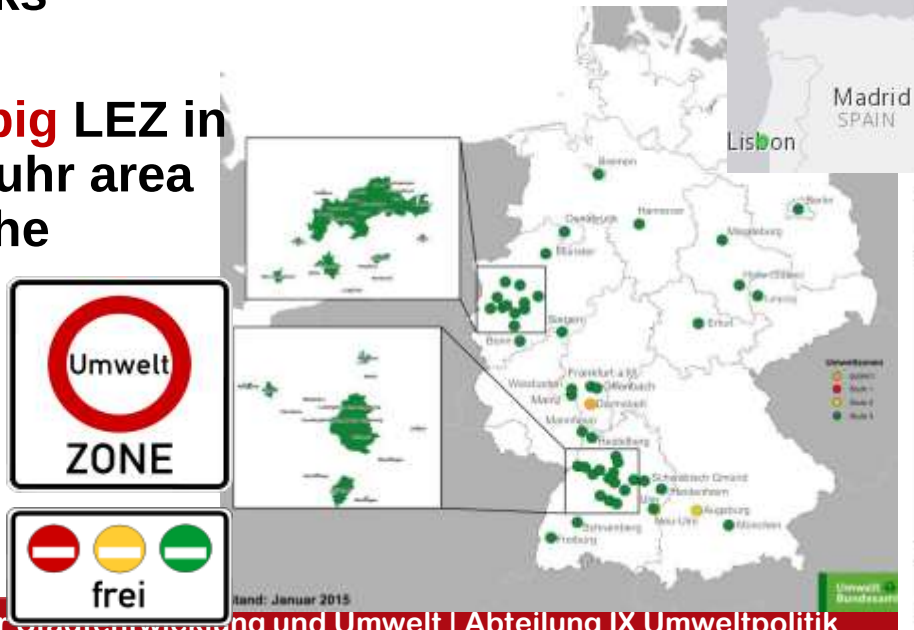
☞ common objective: Accelerated improvement of vehicle fleet

☞ Calming traffic is not the prime goal ☞ Ecozona

☞ urban mobility planning

LEZs in Europe

- ~250 in Europe
- ~ 70 in Germany
- Emission criteria based on Euro emission standards
- Most allow Diesel Particle Filter retrofits
- Most have 2+ stages
- National frameworks
  - Except IT & UK
- Areas range from big LEZ in London & Rhine-Ruhr area to small towns in the Po valley



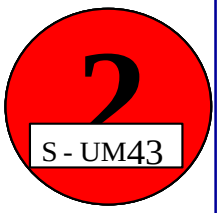
LEZ in Europe

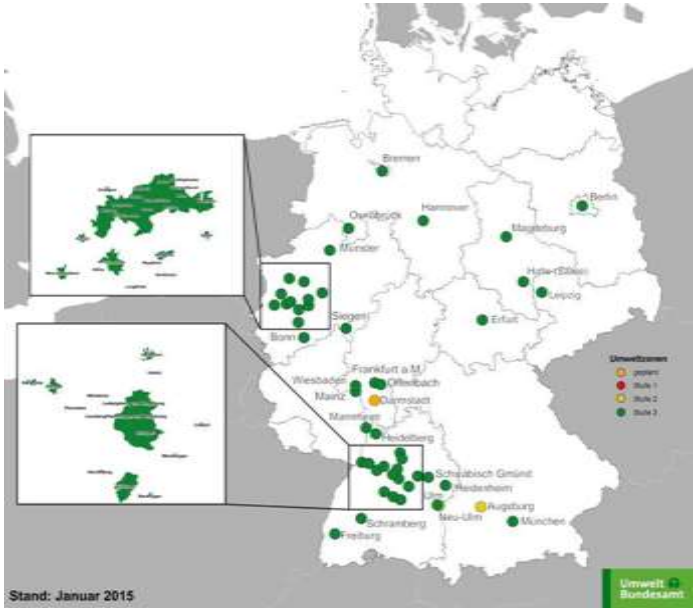
☞ Variants

- **Restricted vehicle types**
  - Only **heavy good vehicles**, some LEZ incl. light goods vehicles
  - Most LEZ incl. **buses**, coaches
  - Some LEZ (Italy) include **motor-cycles**
  - **All** vehicles (Germany)
- **Enforcement**
  - **Manually**, e.g. based on sticker system
  - **Automatically** with vehicle recognition technology
- **Operating hours**
  - **Permanent**
  - **Seasonal** (Italy, during **winter** half year)
  - Selected **daytime**, weekdays
  - **Episodic**, only when pollution levels exceed certain thresholds
- **Exemptions**
  - Emergency & other special vehicles
  - Some LEZ exempt **residents and/or businesses** in the zone
  - Many LEZ grant **individual** exemptions in case **of hardship**

LEZ ☞ German sticker system

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

sticker:			
minumum criteria for Diesel vehicles ban for Diesel veh. older than …	Euro 2, or Euro1 plus particle filter 1992	Euro 3, or Euro 2 plus particle filter 1996	Euro 4, Euro 3 plus particle filter 2000
minimum citeria 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 Berlin

☞ vehicle emission criteria & timing

Emission criteria based on EU vehicle emission standards…

- **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

Area:

about 88 km²
(Berlin total area: 892 km²)

Inhabitants:

about 1 Million

(Berlin total: 3,4 Mio)

By now...

- ☝ Up to 3 times more "green" vehicles
- ☝ More than 60.ooo filter retrofits
  (up to 25% of the Diesel vehicle fleet)
- ☝ LEZ in force in more than 70 German towns

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.ooo Diesel vehicles retrofitted with DPF
25% Diesel PC & 20% LGV/HGV!

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, not buses, LDV only in 3 largest cities**
- **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**

Details see http://urbanaccessregulations.eu/

Source: Lucy Sadler

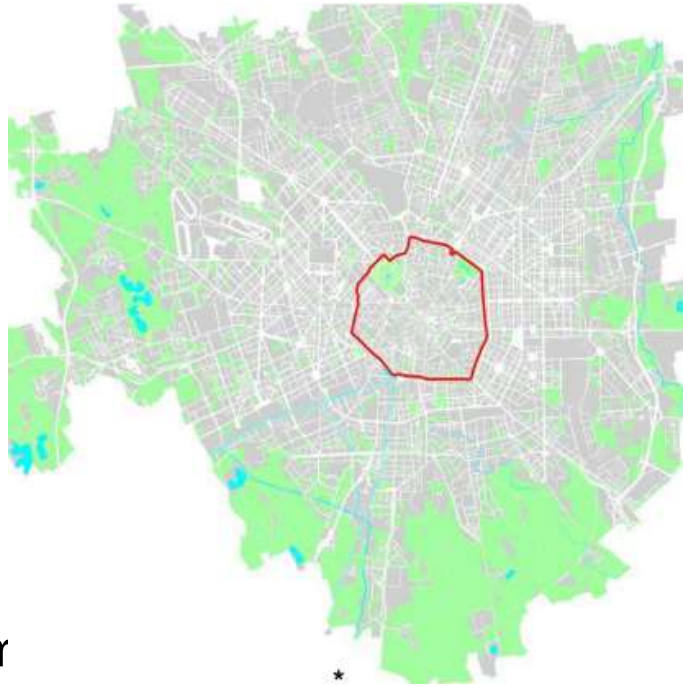
LEZ in Italy

- Many regional frameworks & individual LEZs
  - ↳ under an agreement of North Italian regions
- Cover all vehicles, including motorcycles
- Some LEZ time limited and/or only in winter
- Example Lombardy
  - ☞ Whole region: 2-stroke m/cycles & mopeds Euro 1, Buses Euro 3, permanent
  - ☞ In urban areas: Petrol Euro 1, Diesel Euro 3, Winter Mon-Fri 7:30-19:30
- Time dependence allows those on lower incomes to still access the city, but adds complexity and limits environment impact
- Funding to assist retrofit & those on low incomes

LEZ in Italy

☞specialty: Milan Ecopass/Area C

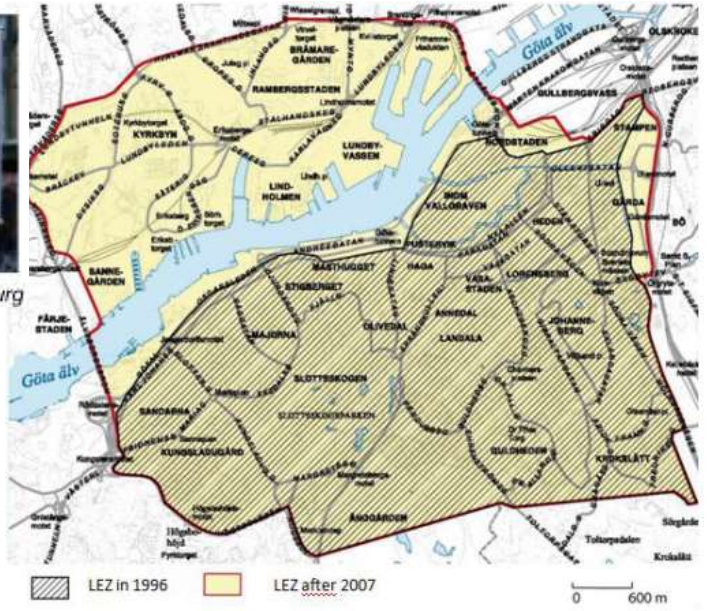
- Emission dependent road charging scheme & LEZ ban
- In force since 2008, covers the city centre
- polluting vehicles charged for entry 7:30-19:30
  - Free: Class 1
    - ☞ AFV; gas, electric, hybrid
  - Free: Class 2
    - ☞ Petrol: cars Euro 3+
    - ☞ Diesel: cars & GV Euro 4+ or with filter
  - 2€/day: Class 3
    - ☞ Petrol Euro 1, 2
  - 5€/day: Class 4
    - ☞ Petrol: cars Euro 0; GV Euro 1, 2;
    - ☞ Diesel: cars Euro 3; GV Euro 3; buses Euro 4 & 5
  - 10€/day: Class 4
    - ☞ Diesel: cars Euro 0; GV Euro 0-2; bus Euro 0-3
- Resident & multiple entry discounts (non-comm
- In addition to Lombardy winter LEZ controls
- Was fairly effective in reducing traffic & pollution
- Now replaced by
  - LEZ Euro 4 Diesel/Euro 1 petrol, from 2017 DPF required
  - 'flat' congestion charge ("Area C"): 5€ standard/2€ residents per day, E-vehicles, hybrids, bi-fuel, CNG and LPG free



LEZ in Sweden

- Example : Gothenburg
- In force already since 1996
  - Focus on PM10/PM2.5
  - zone size 15 km2
- Phase 2 since 2007
  - Zone enlarged to 25 km2
    - Requested by transport companies in phase 1 zone
- Access restriction limited to heavy vehicles and buses
- Criteria combine Euro standard with vehicle age
- Similar LEZ in Stockholm & Malmö
- Initially city schemes, later underpinned by national regulation

LEZ sign in Gothenburg



The LEZ of Gothenburg

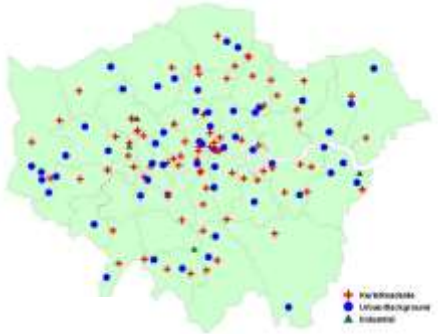
First year of registration, regardless of country	According to the general rule	Euro 2 (MK 3)	Euro 3 (MK 2000)	Euro 4 (MK 2005)	Euro 5 + EEV (MK 2008)
2002	2006	2010	2010		
2003	2009		2011		
2004	2010		2012	2016	
2005	2011		2013	2016	2020
2006	2012		2014	2016	2020
2007	2013		2015	2016	2020
2008	2014			2016	2020
2009	2015			2016	2020
2010	2016			2016	2020
2011	2017				2020
2012	2018				2020
2013	2019				2020
2014	2020				2020

Definition table of the year restriction of the Swedish LEZs

The London Low Emission Zone (from Ellison et al, 2003)

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
- **No ban,** but **heavy charges** £100-200 per single entry for **non-compliant vehicles**
- **Penalties** apply if charge isn't paid in advance
- Part of (comprehensive) AQ Actionplan
- Retrofit possible with Diesel particle filter (DPF)
- Efficient "closed" **DPFs** required, with **limit to primary NO_2 increase**
- Foreign vehicle registration scheme
- ~98% compliance rate
- Extensive monitoring of air quality



Details see http://urbanaccessregulations.eu/

Source: Lucy Sadler

London LEZ for goods vehicles & buses

☞ emission citeria

Key implementation dates

From February 2008, a standard of **Euro III** for particulate matter (PM) for **Heavy Goods Vehicles** (HGVs) **over 12** tonnes in weight;

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;

From October 2010, a standard of **Euro III** for PM for heavier Light Goods Vehicles (LGVs) and minibuses; and

From January 2012, the standard will be tightened to **Euro IV** for PM for goods vehicles over 3.5 tonnes, buses and coaches

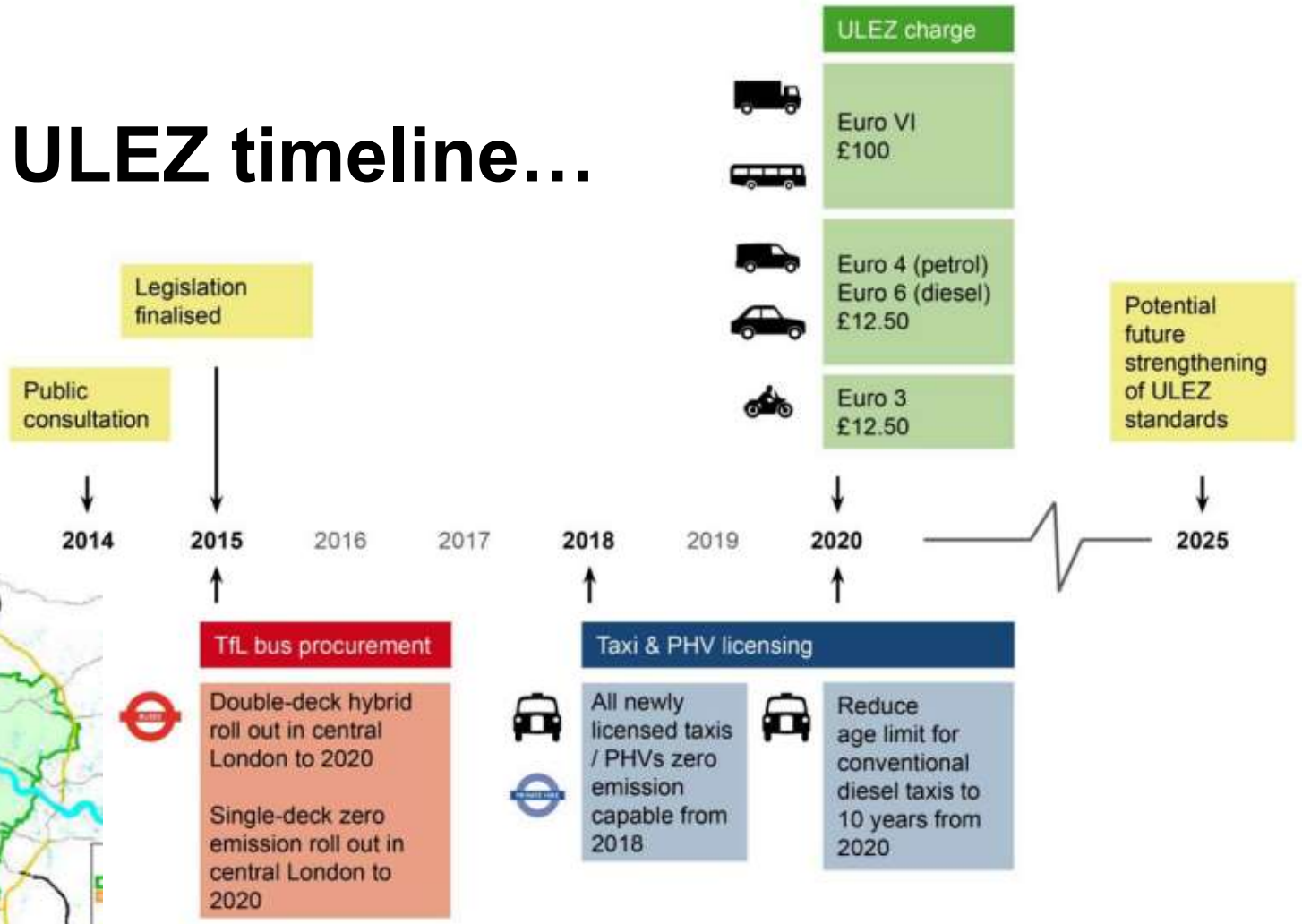
Charge/Penality:

HGV's/Buses: £200, Penalty: £500 (paid within 14days) up to £1000

LGV's: £100, Penalty: £250 (paid within 14days) up to £500

Future Ultra-Low Emission Zone in London

ULEZ timeline…



LEZ in France

☞ Paris

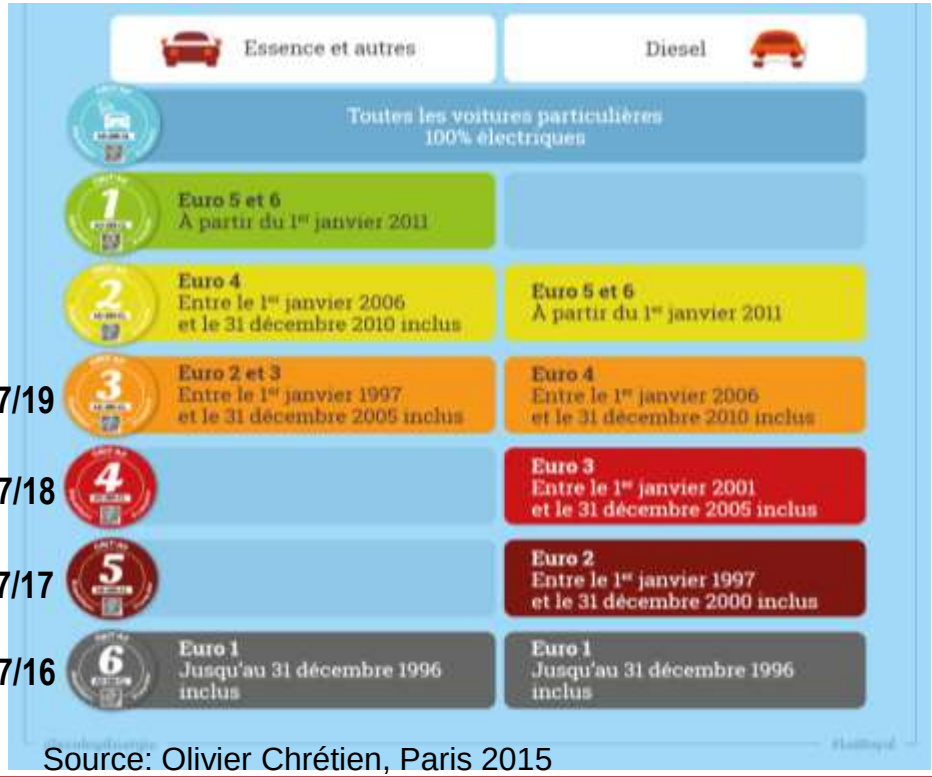
- Area: whole Paris
- From 1 July 2015: HGV at least Euro 1
- From 1 July 2016: All vehicles at least Euro 1
- Operation time: daily from 08:00 - 20:00
- National sticker scheme
- Future restrictions not yet adopted
- Diesel will not get a green sticker, because of high NOx emissions, even of new Euro 5/& Diesel cars

Ban proposed 07/19

Ban proposed 07/18

Ban proposed 07/17

Ban 07/16



Source: Olivier Chrétien, Paris 2015

Summary:
Result of impact studies of LEZ in Berlin, Germany and London

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

LEZ Berlin ☞ real impact

Emissioncategories of the real-world vehicle fleet

Videoerhebung an 5 Standorten

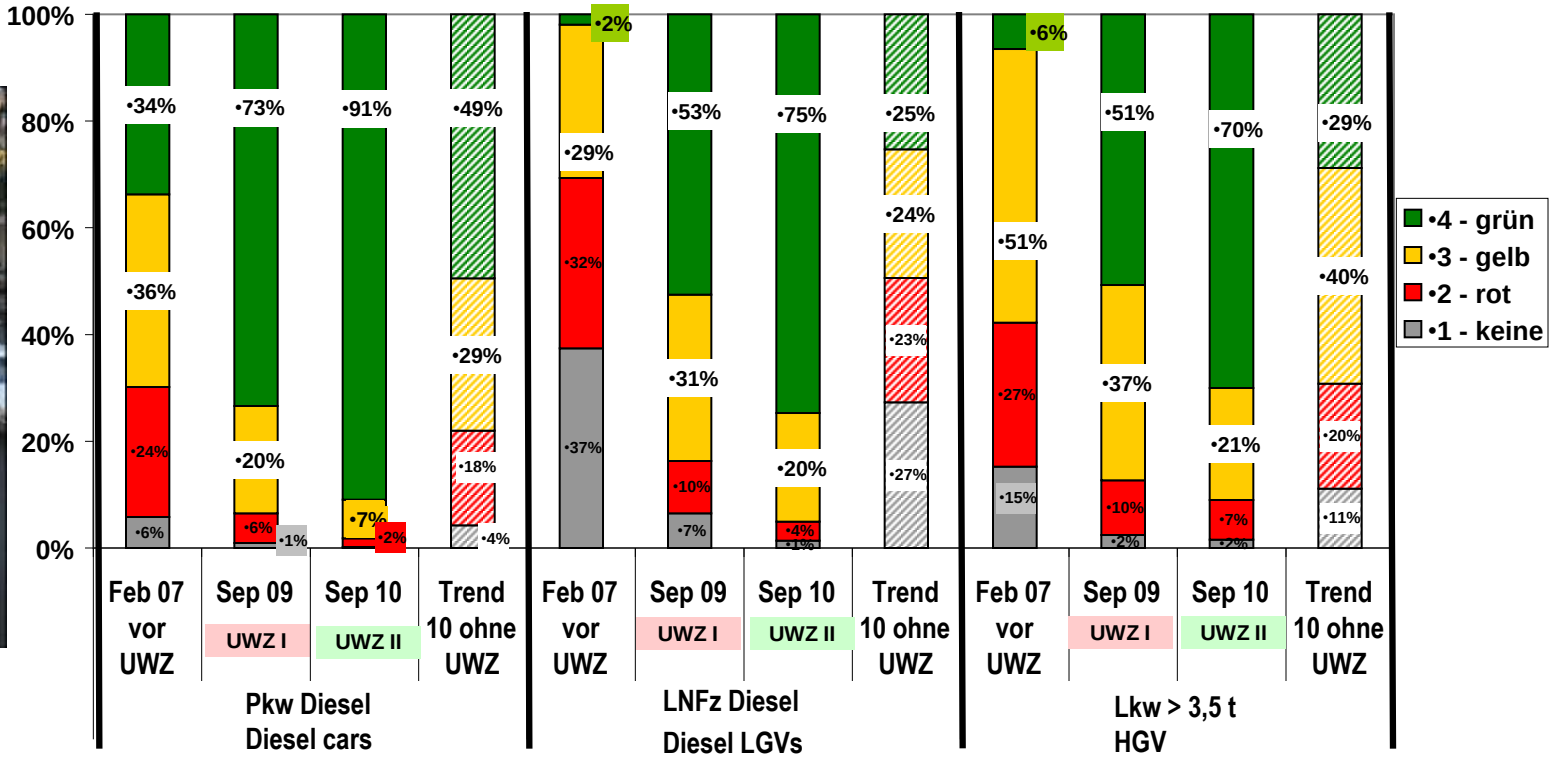
- emission standards of vehicles on the road in and outside of the LEZ
- identification through recording of the vehicle number plates at 5 spots,
  - ☞ 2 within,
  - ☞ 3 outside of the LEZ
  - ↳ evaluation through vehicle registration office n
  - ↳ Analysis of fleet characteristic
  - ↳ extrapolation on the whole mayor road network

Berlin LEZ – impact analysis

☞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

LEZ Berlin ☞ real impact

Emission of vehicle fleet in & outside of the LEZ

items for evaluation

- year of entry into service
- vehicle type
- Emission category
- fuel
- cylinder capacity
- deadweight
- gross vehicle weight
- number of axles

identification of the vehicle category in the handbook* of emission factors

calculation of the emissions of the vehicle fleet in and outside or before/after launch of the LEZ

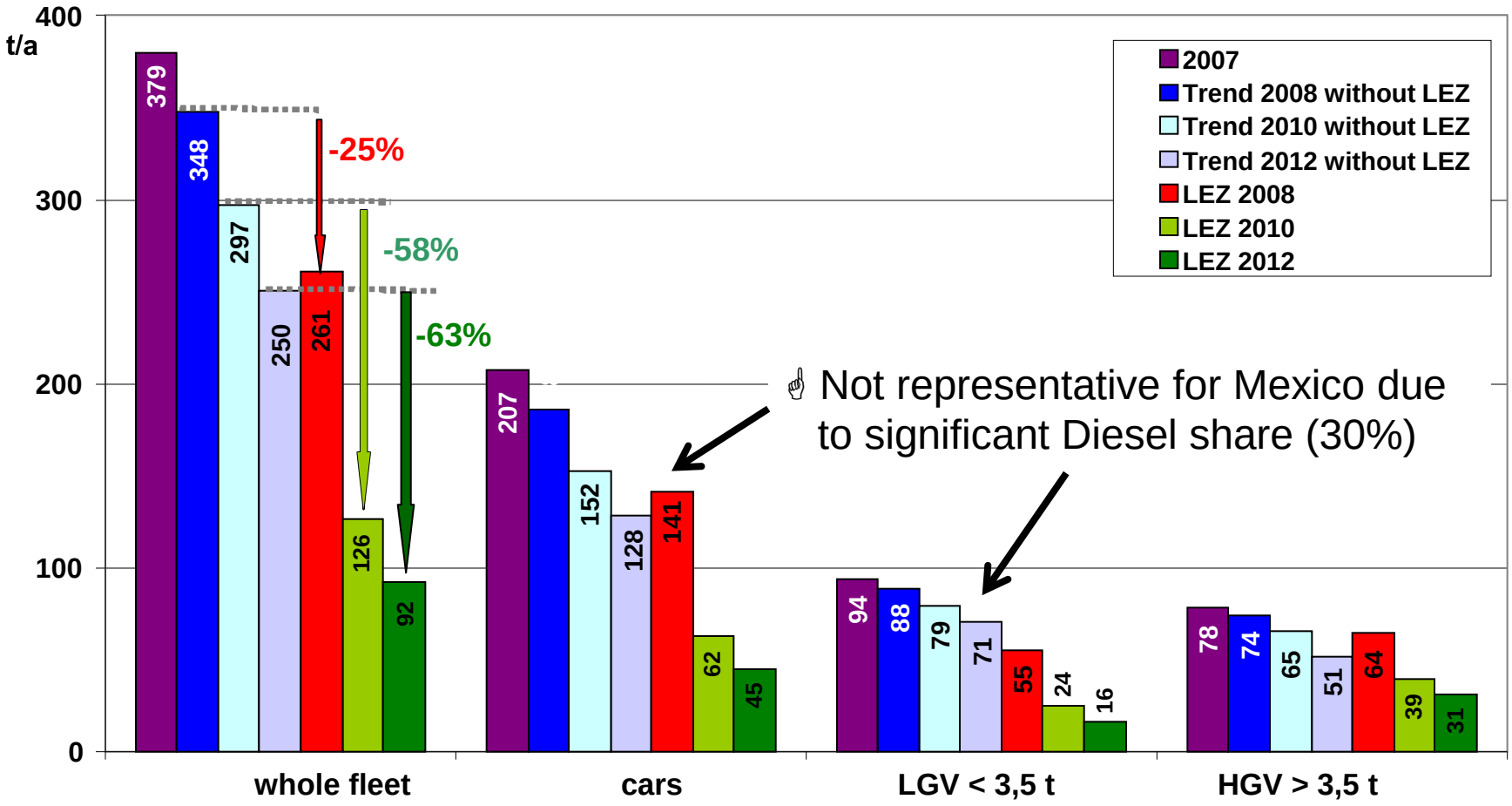
* Database of emission factors for different vehicle types, technologies and driving modes

Berlin LEZ – impact analysis

☞ Emissions of PM

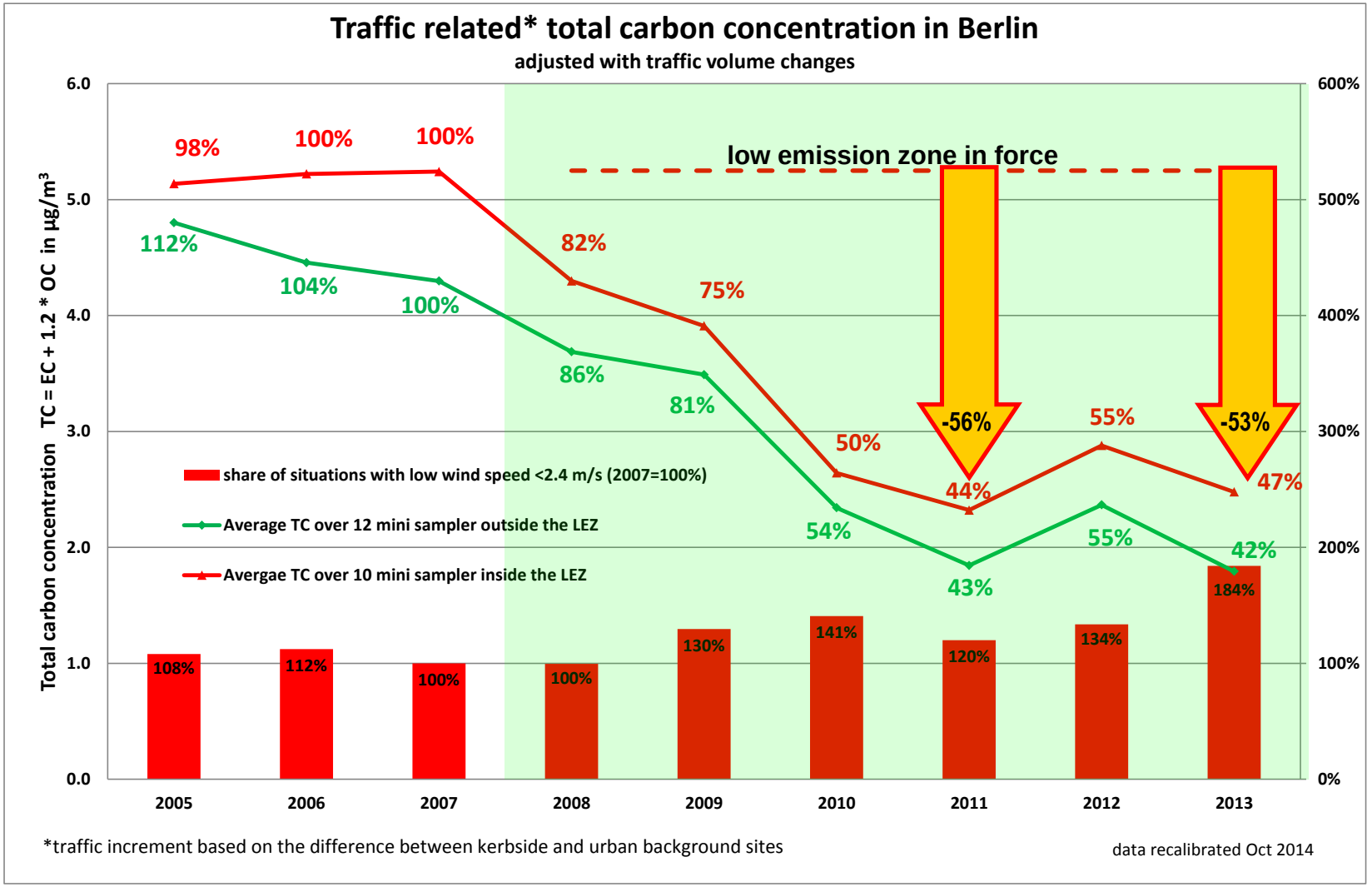
LEZ impact: change in particle exhaust emissions

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



Berlin LEZ – impact analysis

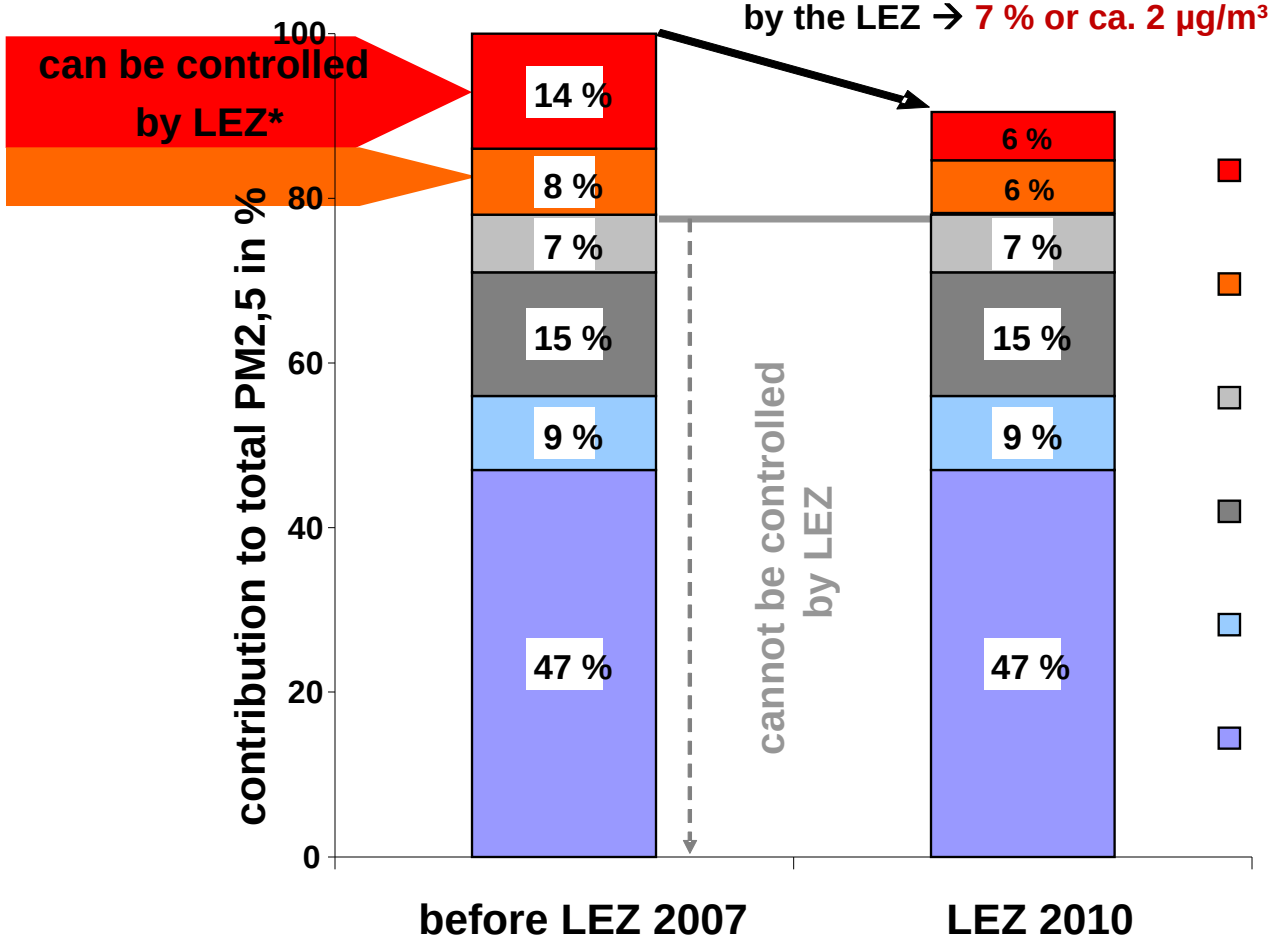
☞ trend of total black carbon concentrations from traffic



Berlin LEZ – impact analysis

☞ on total PM concentrations….

decrease* resulting from the reduction of traffic emissions caused by the LEZ → 7 % or ca. 2 µg/m³ less PM10

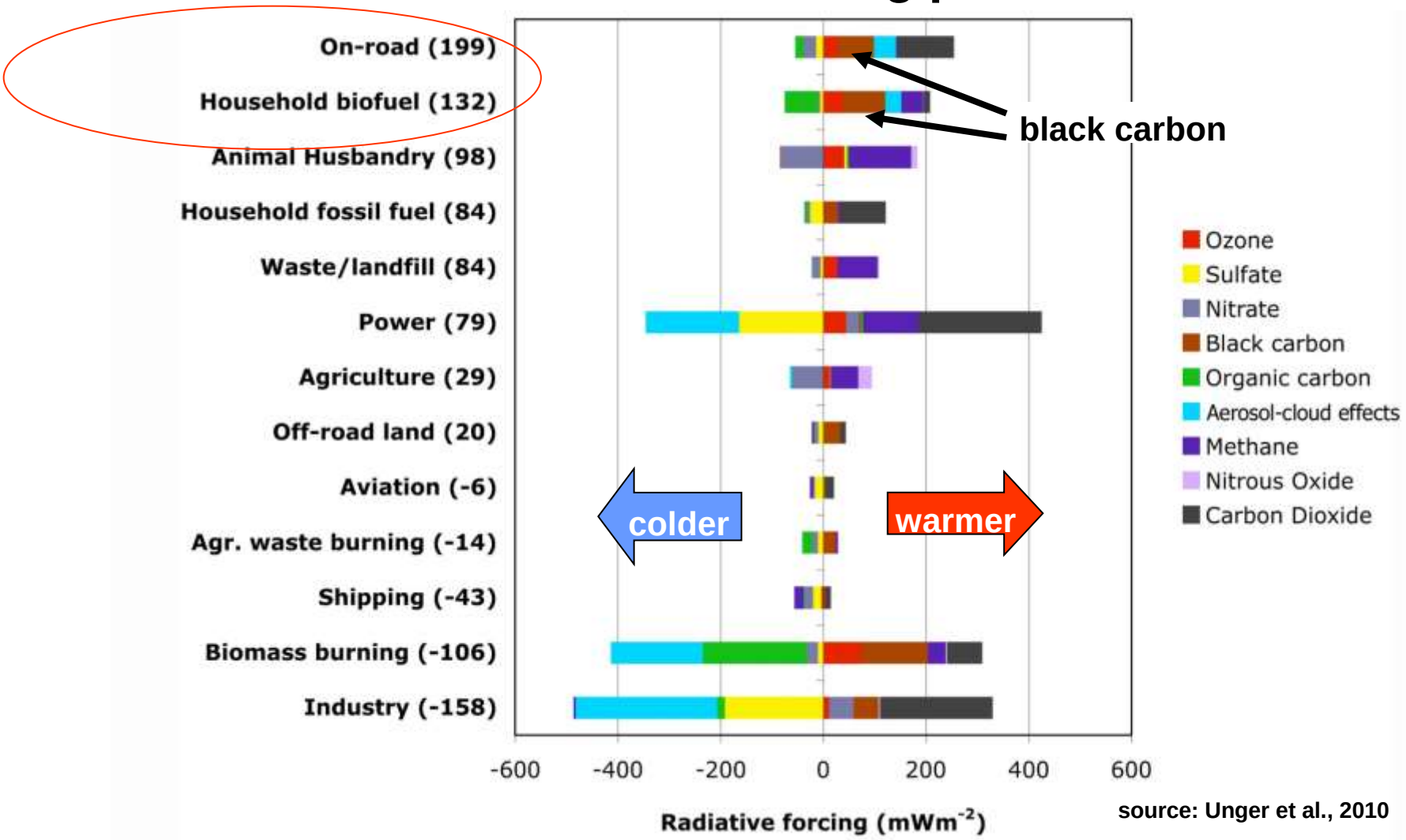


* related to **PM2,5**-levels in a busy main road in Berlin's city centre in 2007 before the LEZ

Berlin LEZ – impact analysis

☞ benefit for climate change

radiative climate forcing per sector

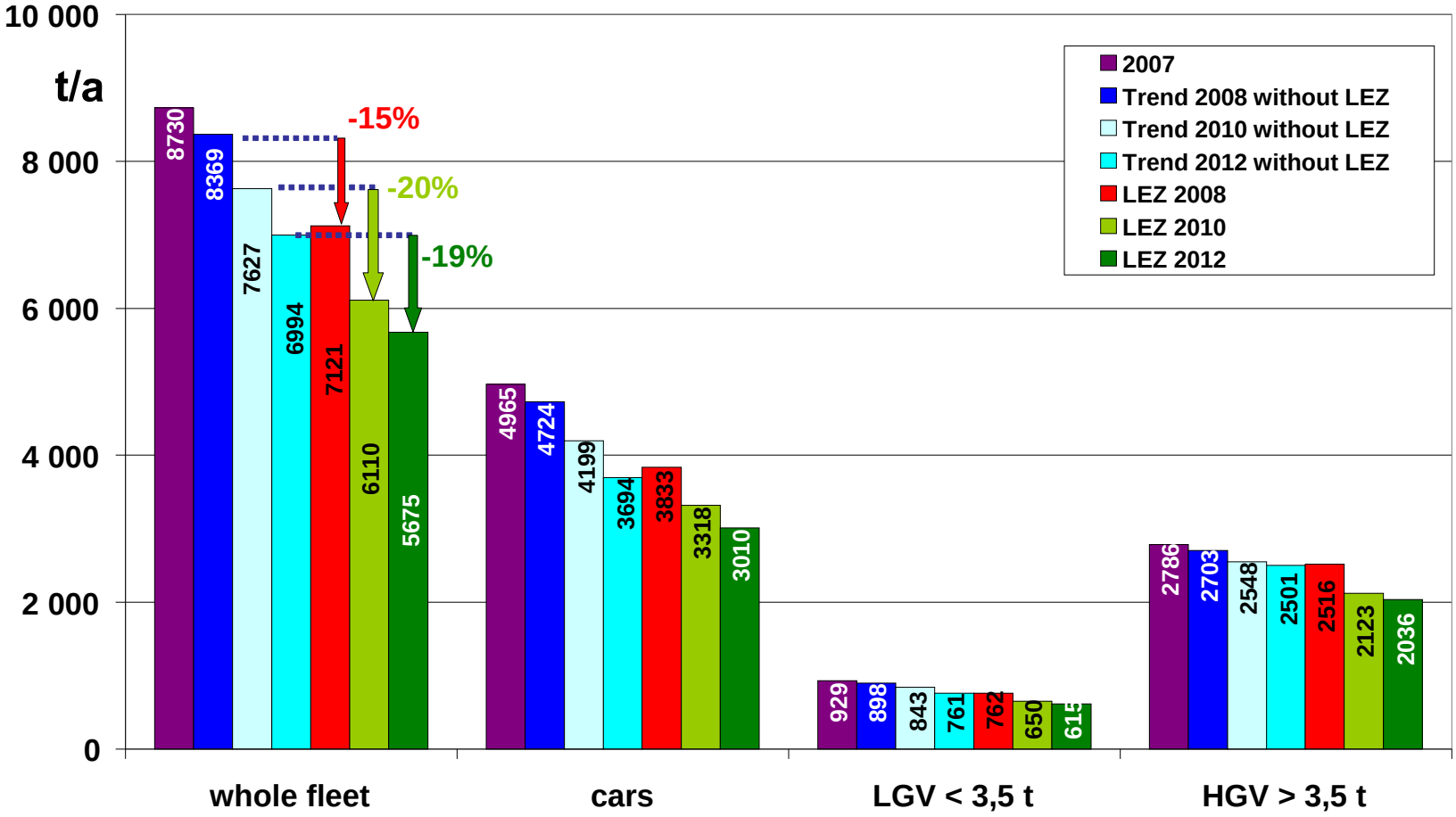


source: Unger et al., 2010

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)

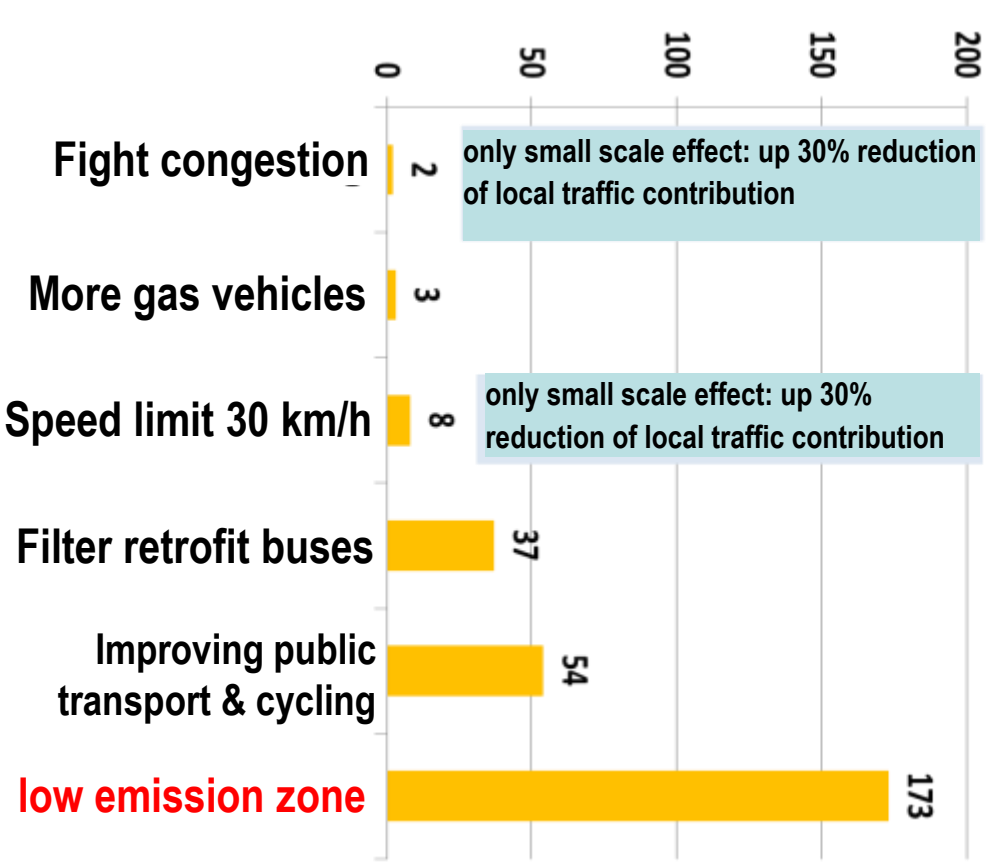
LEZ in Germany

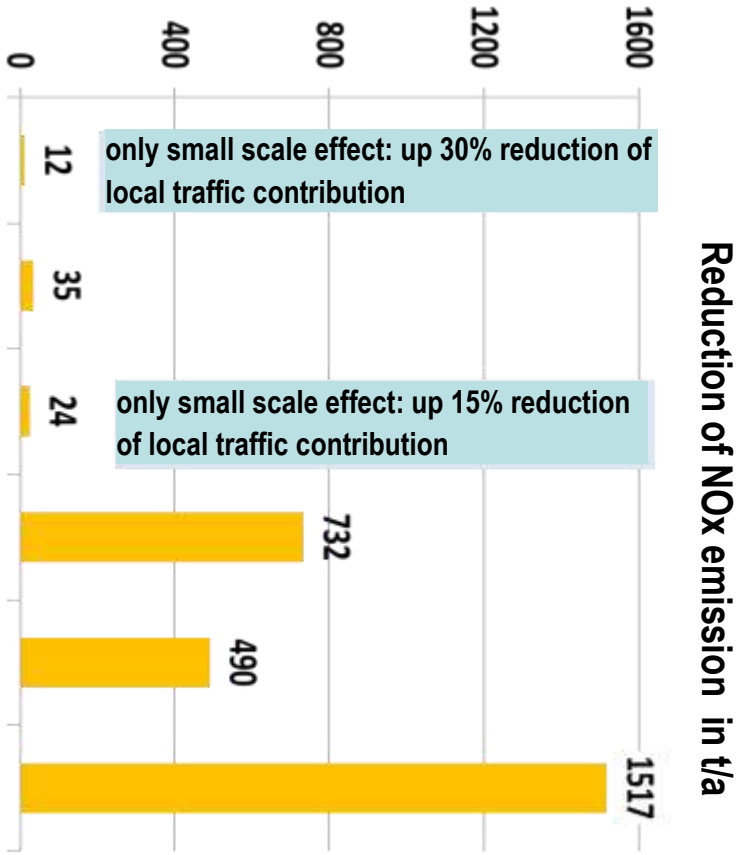
☞ summary of impact analysis

- 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 ☞ 4 S - UM43
  - ↳ covering a larger area
  - ↳ introduced not too late ☞ now!
  - ↳ exemptions are limited
- 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 in Berlin & Germany

☞ summary of environment impacts

AQ emissions
- Smaller, more harmful PM metrics -60%
- PM10 -20%
- NOx <20%

AQ concentrations
- -50%
- Smaller, more harmful PM metrics
- $PM_{2.5}$ -10 to -15%
- PM_{10} -7 to -10%
- NO_2 < 5%

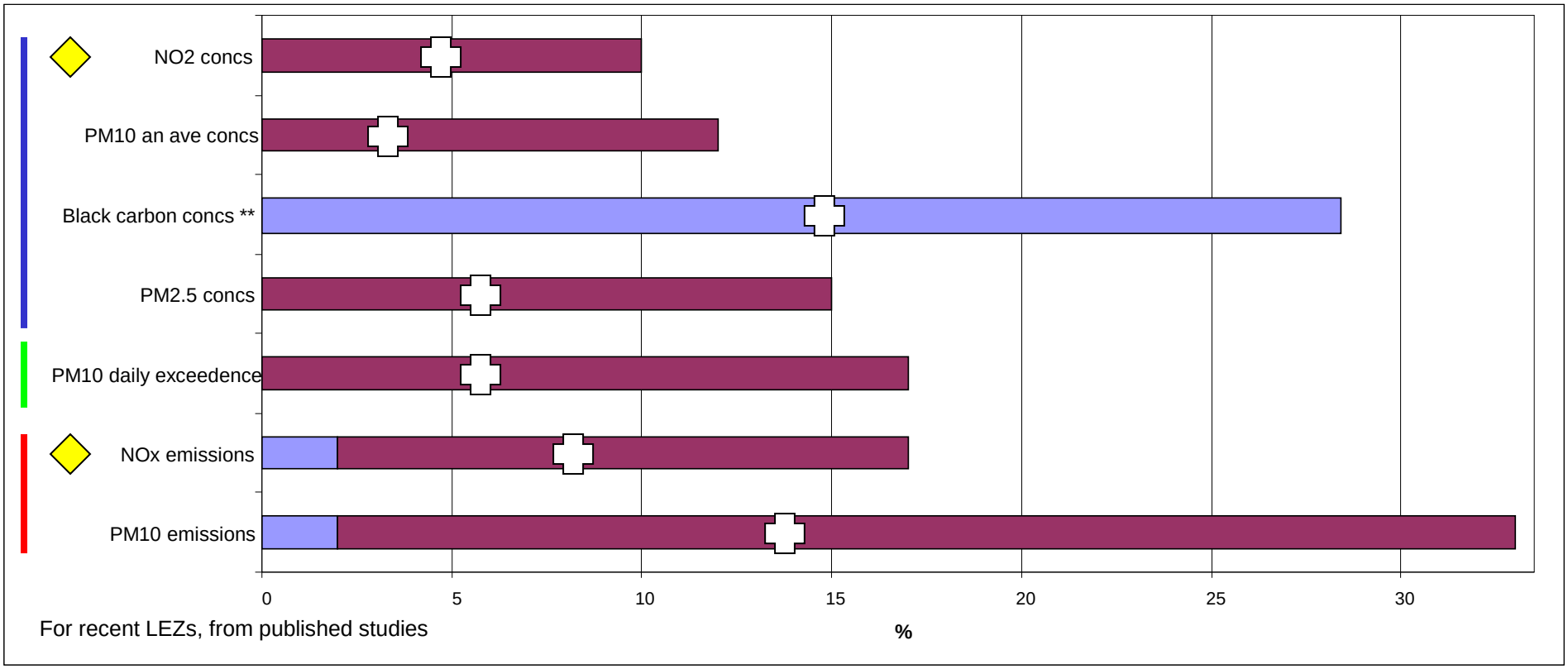
Climate Change
- Black Carbon -60%
- CO_2

noise

- Yet larger change
- Larger change
- Small change
- No measureable change

Source: L. Sadler, modified

LEZ air quality impacts



average

** 2 assessments

concentrations

PM_{10} daily exceedences

emissions

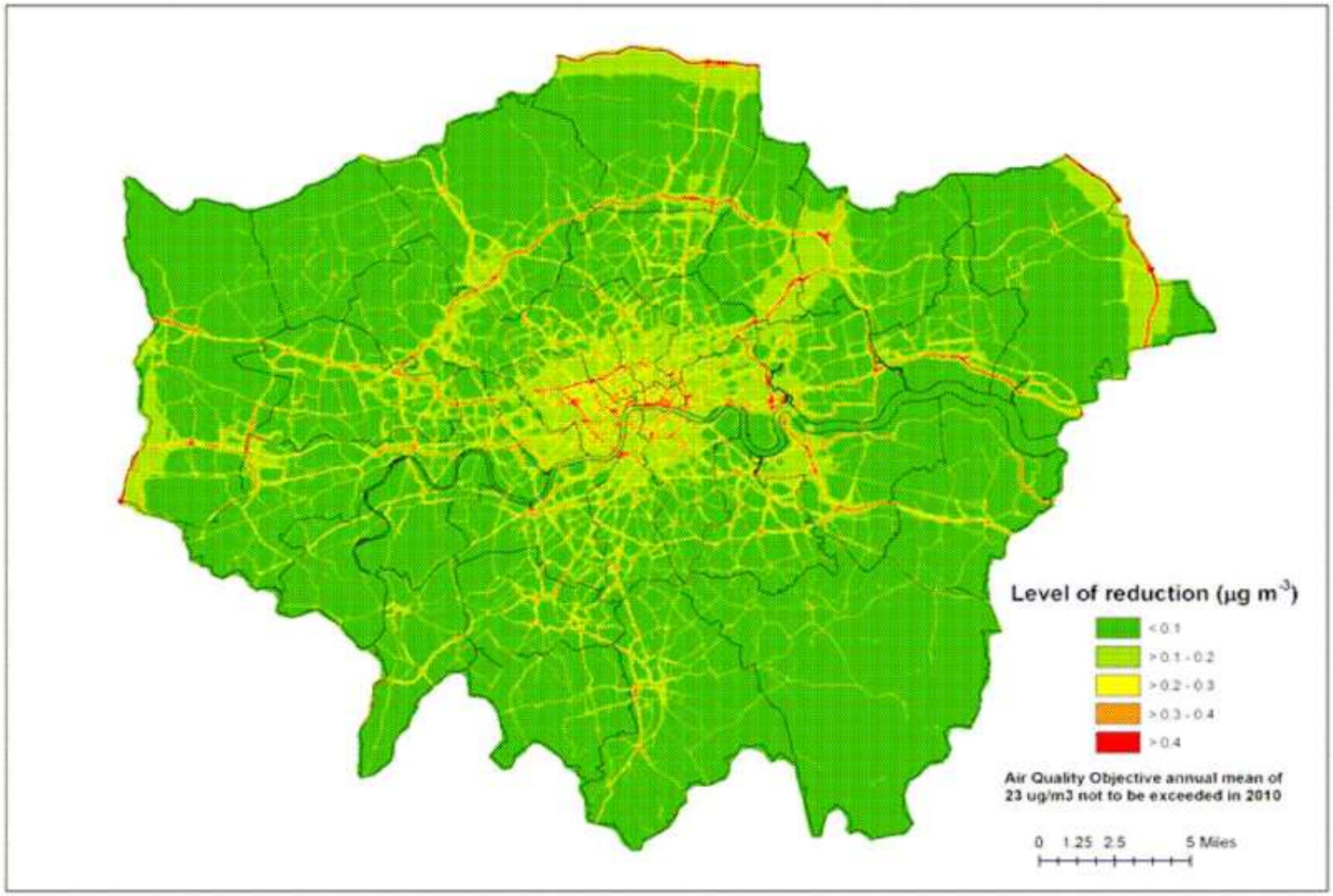
NO_2/NOx

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

For details see http://urbanaccessregulations.eu/

Source: Lucy Sadler

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

Summary:
What needs to be considered when implementing a LEZ

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

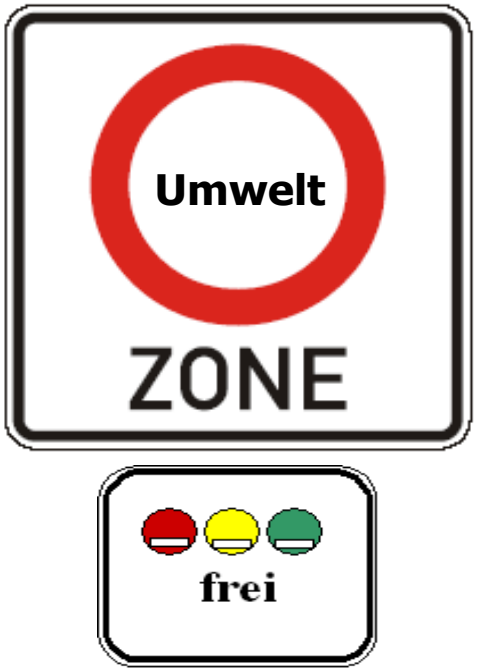
LEZ implementation

☞what‘s needed ?

☞ **Define simple traffic sign for LEZ**

German LEZ traffic sign

„Zeichen 270.1



LEZ in Berlin/Germany/Europe

☞ lessons learnt with potential relevance for Cuernavaca

- ☒ **Define the zone sufficiently large**
  - ☞ to avoid pushing traffic in neighbouring areas
  - ☞ to create an impact on the vehicle fleet in the whole city
- ☒ **Undertake a thorough ex-ante impact assessment study**
  - ☞ To be convincing enough to get sufficient support by the public & important stakeholders
- ☒ **Set ambitious environment criteria**
  - ☞ To avoid introducing merely a bureaucratic scheme without convincing benefits for health and urban quality of life
- ☑ **Few general exemptions from traffic ban, but allow for (limited) individual exeptions in cases of economic hardship**
  - ☑ But no exemptions for the public fleet to maintain role model
- ☑ **Allow sufficiently long transition periods in combination with ..,**
- ☑ **economic incentives**
  - ☞ Tax discounts, funding for cleaner/retrofitted vehicles (with particle filters, gas)
  - ☞ to mitigate the burden for vehicle owners, to help especially businesses to do the necessary investments
  - ☞ Serves also a stimulus to the (local) economy

LEZ in Berlin/Germany/Europe

☞ lessons learnt with potential relevance for Cuernavaca

- ☒ Focusing on heavy Diesel vehicles could be a useful option
  - ☞ Examples in London, Copenhagen & Scandinavia
- ☒ (national) vehicle classification scheme (& stickers)
  - ☞ The simpler to convey the better
  - ☞ Extent current hologramme scheme by particle emission component
  - ☞ Promote retrofit options as a cheap means to clean up vehicles
- ☑ Install effective enforcement & sanctions
  - ☞ To avoid loosing acceptance by those who abide by the rules
- ☑ Extensive public information campaign
  - ☑ Including early stakeholder involvement in the preparatory phase
  - ☑ Focusing on presenting the benefits for the urban population
- ☑ Prepare for appropriate ex-post impact assessment
  - ☑ To encounter resistance with convincing data
- ☑ Undertake complimentary measures,
  - ☑ Especially foresee a modernisation programme for public vehicle fleet, like buses, garbage collection, road cleaning vehicles, etc
  - ☑ Serves as role model for the private sector

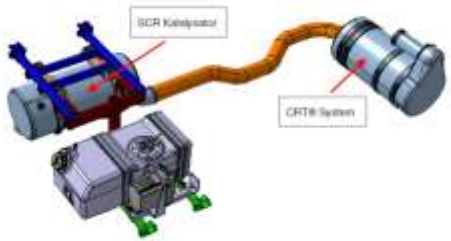
LEZ implementation

☞ How to manage public busfleet

Example Berlin:

- **Definition of quality of PT in "Public Transport Management Plan"**
  - Includes environment criteria for bus fleet
  - Provides basis for issuing concessions/service contracts with public and private bus companies
- **since 1999: filter retrofit & fleet modernisation programme of Berlin's 1400 Diesel buses, resulted in**
  - **> 90% reduction** of Diesel soot emissions
  - **- 37 t/a Diesel** soot emissions
    - ¼ of the mitigation effect of the LEZ
  - **- 732 t/a NOx** emissions
    - ½ of the mitigation effect of the LEZ

- **Now: setting criteria for public bus services**
  - attainment of **Euro 5/EEV-standard** for NOx in the **whole fleet** by 2014
    - 300 t/a less NOx emissions
  - **SCR – retrofit of** 200 Euro IV busses by 2015
    - 50% funding through EU regional funds



SCRT® Anordnung für SOLARIS Urbino 18 (Quelle: HJS)

  - **Upgrade of OEM** Euro V/EEV buses to **enhance SCR performance**
    - Better **insulation** of tailpipe & extra **heating** to ensure operation of SCR during **urban driving mode**
  - **Accelerated replacement** by **Euro-VI**/CNG/biogas-vehicles
    - Procurement condition: **E VI performance required** in urban driving conditions

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 assessement

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

Measures supplementing Berlin‘s LEZ

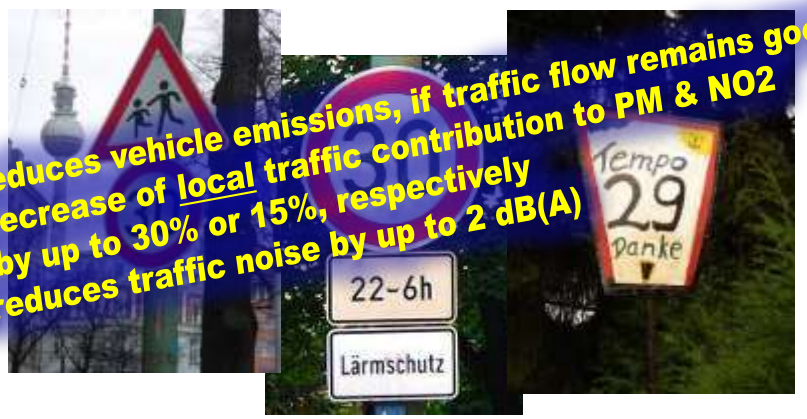
☞ Sustainable City & Transport Planning

☞ traffic management measures

■ Re-routine lorry traffic

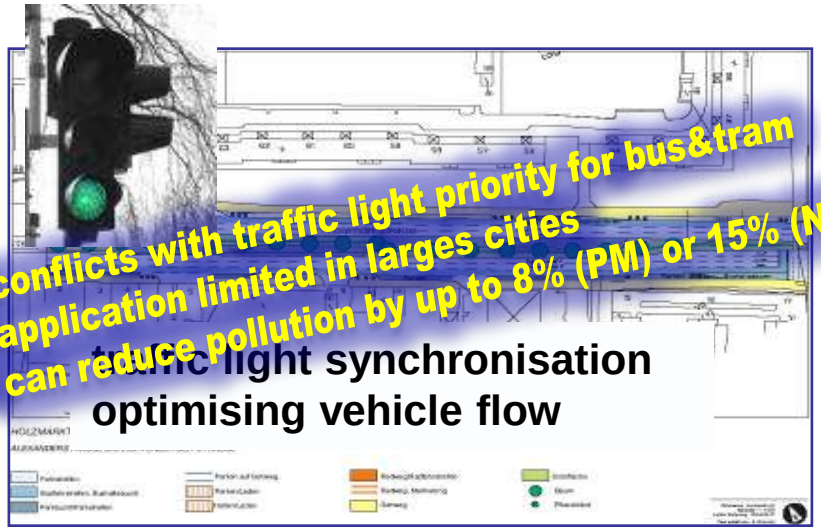
•Reduces PM pollution by 7-9%
•needs alternative lorry routes
•Application limited in larges cities

■ City-compatible speed limits



• reduces vehicle emissions, if traffic flow remains good
• decrease of local traffic contribution to PM & NO2 by up to 30% or 15%, respectively
• reduces traffic noise by up to 2 dB(A)

■ Traffic flow optimisation



• conflicts with traffic light priority for bus&tram
• application limited in larges cities
• can reduce pollution by up to 8% (PM) or 15% (NO2)

traffic light synchronisation
optimising vehicle flow

Measures supplementing Berlin‘s LEZ

☞ Sustainable City & Transport Planning

☞ Improving public transport

- makes public transport more attractive
- avoids car trips in urban areas
- reduces air & noise emissions
- makes transport more energy efficient
- Hence: strongly linked noise action planning, CC and AQ strategies

Measures supplementing Berlin‘s LEZ

☞ Sustainable City & Transport Planning

☞ Enhancing inter-modaliy

- **For freight transport…**

- **Bike & Ride**

- **Park (& Charge) & Ride**
  - ☞ incl. priority for electric vehicles

Measures supplementing Berlin‘s LEZ

☞ Sustainable City & Transport Planning

☞ promoting bicycle use

Setting up a dense cycle – route network

☞ Safe riding through smaller roads and parks

☞ Attractive new routes trough the centre along the former wall

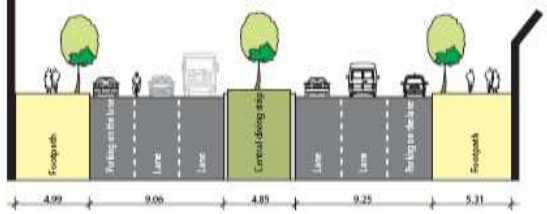
- makes bicycle us more attractive
- aviods car trips in urban areas
- reduces air & noise emissions
- makes transport more energy efficient
- good for public health
- Hence: strongly linked noise action planning, CC and AQ strategies

Re-allocation of road space in favour of cyclists & pedestrians:

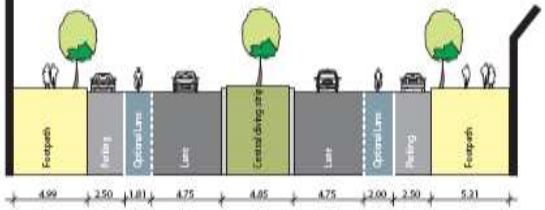
☞ Safe riding on extra bicycle lanes on the road

☞ Reduces noise levels at the building line

before



after



Measures supplementing Berlin‘s LEZ

☞Sustainable City & Transport Planning

☞ promoting walking

- **Berlin‘s pedestrian traffic strategy**

  ☞Some examples…

New green walks along the former wall

Measures supplementing Berlin's LEZ

☞ Sustainable City & Transport Planning

☞ Focus on urban climate adaptation

Micro-scale: measures for single streets & buildings

- increase albedo of building surfaces
- roof and facade greening
- courtyard greening
- tree planting
- de-sealing of surfaces

Good also for AQ (dust concentrations)

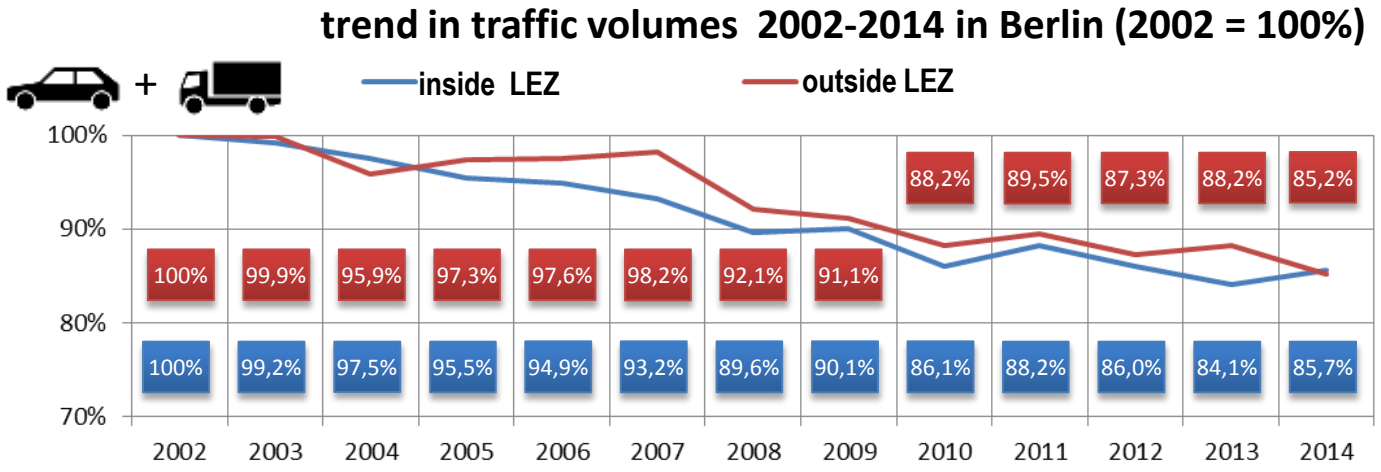
Macro-scale: Largely maintaining open space & green areas so as to keep free flow of fresh and cool air into the city centre ☞

Measures supplementing Berlin's LEZ

☞ Sustainable City & Transport Planning

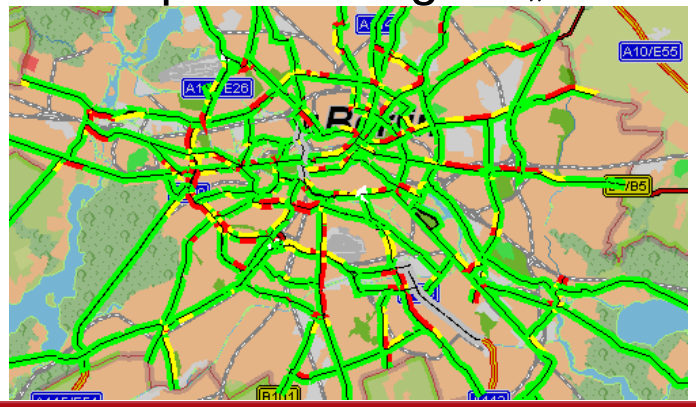
☞ Impact on traffic volumes & congestion

Less Traffic: trend in traffic volumes 2002-2014 in Berlin (2002 = 100%)



Less congestion: Morning traffic peak during an „normal" Thursday

(Forecast from 24/02/10 for the 25/02/10)
Quelle: Verkehrsmanagementzentrale Berlin i.A. der Senatsverwaltung für Stadtentwicklung. www.vmzberlin.de/vmz



Traffic Jams
Disruptions
No Problems

Measures supplementing Berlin‘s LEZ

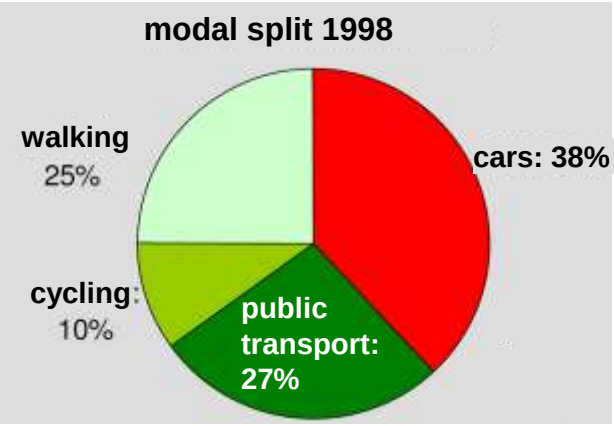
☞ Sustainable City & Transport Planning

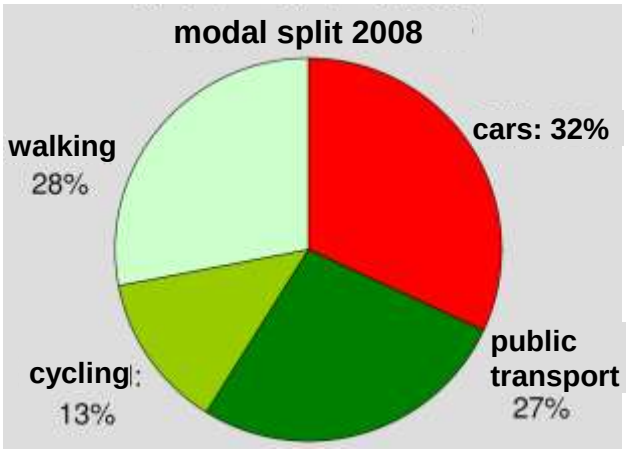
☞ Impact on CO2 – emissions

Senatsverwaltung für Stadtentwicklung und Umwelt

Berlin

Shift towards cleaner means of transport





source: master plan transport 2011

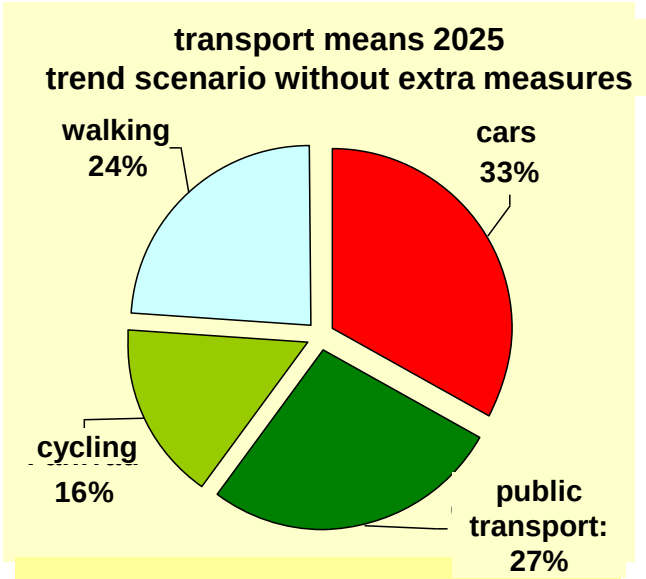
expected decrease of CO2-Emissions from road transport on Berlin’s main road network

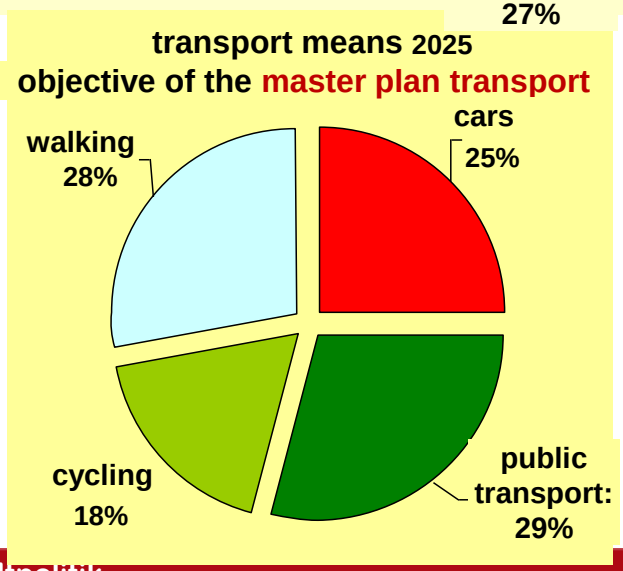
2.6 Mio t CO2 in 2006

⇩ -38%

1.6 Mio t CO2 in 2025

incl. renewal of vehicle fleet





¡Muchas gracias!

Email: Martin.lutz@senstadt.berlin.de

For more information on

- **Berlin‘s LEZ see www.berlin.de/umweltzone (also in EN and ES)**
- **LEZ in Germany see http://www.umweltbundesamt.de/umweltzonen/index.htm**
- **LEZ-cities in Europe visit http://urbanaccessregulations.eu, run by Lucy Sadler of SadlerConsultants funded by the EU**

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