Air quality management in Berlin: tools, challenges and solutions

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

- Berlin’s past actions to combat winter smog
- Current challenges and need for additional action
- Example: the low emission zone
- Portfolio of extra measures
- Estimation of their likely impact on the AQ
- Link to other planning activities
- résumé
Framework for Air Quality Management in the EU

7th Environment Action Program

Controlling Emissions

National Emission Ceilings

- Mobile sources
  - EU-Standards for vehicle emission and fuel quality (EURO 5/V – 6/VI)
  - Product standards, e.g. solvents in varnishes, Eco-Design
- Stationary sources
  - EU-Directive to control industrial emissions (LCP, waste incineration, industrial plants)

Improving Air Quality

- AQ Directive 2008/50
  - sets air quality standards for
    - SO₂, PM, NO₂, lead
    - Benzene, CO
    - Ozone
    - PAH*, heavy metals*
  - requires Air Quality Plans in non-attainment areas
  - sets common criteria for air quality assessment
  - sets minimum requirements to inform the public about air quality

Air Quality Plans: additional measures on a local level, e.g.
- green public procurement
- traffic planning & management,
- small combustion units
- building sites, etc............
  short-term action plans if useful

Additional national strategies, e.g.
- Economic measures
- Road pricing
- Fiscal incentives for BAT
- Energy taxes
- Scrappage schemes....

Critical loads for Acidification & Eutrophication

*separate Directive 2004/107

to safeguard EU citizens from environment-related pressures and risks to health and wellbeing, like air pollution, and further reduce its impact on ecosystems and biodiversity
AQ assessment Berlin

need for action

■ Drivers:
  ➤ air quality standards for fine particles (PM10) and nitrogen dioxide (NO2) still exceeded
    ➤ need for city strategy to reduce air pollution
  ➤ obligation for noise actions planning
    ➤ Berlin’s target levels: 70 dB(A) day/60 dB(A) night
    ➤ long-term goal: 65 dB(A) day/55 dB(A) night
  ➤ ambitious goals to curb greenhouse gas emissions
    ➤ -40% CO2 emissions by 2020 compared to 1990
    ➤ control soot particle emissions as a driver for climate change

■ Focus on road transport:
  ➤ road traffic is main contributor to PM10 and NO2
  ➤ transport is the only sector with rising CO2 emissions
    ➤ +7% from transport since 1990, -10 to -40% other sectors
  ➤ urban noise pollution is mainly generated by road traffic

need for action to make road transport more sustainable
New air quality plan 2011-17

- Stipulated type of measures

- Regional-, urban- and landscape planning
- Traffic on road, rail and inland waterways
  - Vehicle technology
  - Traffic management
  - Avoiding & shifting traffic to more sustainable transport modes
  - Transport infrastructure improvement
- Domestic heating
  - Study on PM contribution from wood combustion
  - Potentially regulate small combustion sector
- Construction sector
  - DPF for construction machinery
- Industry and commerce
- Measures not pursued
  - No tightening/extending of the LEZ
    - But exemptions will largely end in 2015
  - No road pricing/city toll/congestion charge
    - Lacking legal ground
    - Might generate traffic or push it in city areas without road pricing
New air quality plan 2011-17

Clean vehicle technology & fuels

- Funding and benefits for Euro 6/VI vehicles
  - Vehicle tax discount, labelling  
  - reduced parking fees

- Promoting natural gas for vehicles and domestic use
  - Programme for gas taxis & garbage collection vehicles

- Promoting electro mobility
  - The Berlin Capital Region as one of 4 national showcases for electromobility
    - Focus on practical implementation of electromobility in concert with intelligent energy and transportation concepts
    - 74 projects will be implemented
  - Underpinned by Berlin’s Energy Strategy aimed at boosting renewable power production

PV panels on roof of Berlin’s new main railway station
New air quality plan 2011-17

Emphasis on Diesel exhaust control

- 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
- 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

Successful pilot project on DPF retrofit of passenger cruising vessels

- retrofit of 3 vessels with different filter systems:
  - >90% filter efficiency, no extra fuel consumption
  - successful filter regeneration also in difficult operation conditions
- Retrofit programme funded through EU regional funds
New air quality plan 2011-17

Emphasis on Diesel exhaust control of mobile machinery

Reason for action

- Machines release 5-10 time more Diesel – PM than comparable Diesel trucks
- NRMM emission standards lag 5 years behind road vehicle standards
- Even latest standard tier IIIB does not require efficient DPF
- Cost-efficient solution exists for older machinery by retrofit of closed/regulated DPF
  - vast experience in Switzerland, cost/benefit ratio >> 3:1
- Diesel soot is a health and safety issue at work places

Implementation in Berlin:

- Demonstration project with DPF retrofit
  - Retrofit is technically & economically feasible for different machines and operation modes
- Setting environment standards in public tenders for construction services as from 2014:
  - Machinery need to meet the latest EU particle emission standard (IIIB/IIIA depending on the size of equipment), or
  - Retrofit with an efficient regulated/closed Diesel particle filter, type-approved with reference to new UN-ECE REC-regulation
- Setting similar criteria in permits granted to operators of large construction sites

Impact: in Berlin about 60-100 t/a reduction of Diesel soot emissions

- This is of the same magnitude as the benefit of the low emission zone
- Problem: missing incentives to invest in NRMM with DPF
Chronology of EU emission legislation:

**on-road vs Non-Road Mobile Machinery**

- **EURO I** 8.0/0.36
- **EURO II** 7.0/0.15
- **EURO III** 5.0/0.10
- **EURO IV** 3.5/0.02
- **EURO V** 2.0/0.02
- **EURO VI** 0.4/0.01 + PM-Number#
- **Stage I** 9.2/0.54
- **Stage II** 6.0/0.20
- **Stage IIIA** 4.0/0.20
- **Stage IIIB** 2.0/0.025
- **Stage IV** 0.4/0.025
- **Stage V** 0.4/0.025 + PM-Number#

**Source:** F. Jaussi, Liebherr
small combustion plants

fuel dependant emissions

Emissions of small combustion units depending on fuel use

100% = oil combustion

source: UBA-Forschungsbericht 2009

Emissions per TJ fuel relative to oil combustion

- CO
- NOx (as NO2)
- Benzene
- Particles
- VOC (as total C)
- BaP
- PAH

- natural gas
- light oil
- wood pellets
- wood slices
- single wood pieces
- wood oven as secondary heating

Martin Lutz | LEZ Workshop Mexico City, December 2014
New quality plan 2011-17

Focus on house heating

- We undertake extra source analysis
- We’ll consider setting stricter standards than the national regulation for solid fuel combustion with single units
- We might expand existing restriction in central Berlin to set up new small heating systems based on solid fuel
- Assumption for impact analysis until 2015:
  - Replacement by particle free/reduced heating technology (natural gas/district heating)
  - Reduction of PM emissions of house heating by 60%

Needs joint regulation with region surrounding Berlin
Sustainable City & Transport Planning

Traffic management measures

- Re-route lorry traffic
  - Reduces PM pollution by 7-9%
  - Needs alternative lorry routes
  - Application limited in large 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 large cities
  - Can reduce pollution by up to 8% (PM) or 15% (NO2)
Improving public transport

- extra bus lanes
- traffic light priority

Expanding the tram network into West Berlin

• 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

- Building the new Main station
- Enhancing Berlin's connectivity
- Making railway more attractive

Closing gaps in the metro network

Closing gaps in the light-train network
Sustainable City & Transport Planning

Enhancing inter-modality

- Bike & Ride
  - makes PT & cycling more attractive
  - shifts car traffic to cleaner modes

- Park (& Charge) & Ride
  - incl. priority for electric vehicles
  - makes PT more attractive
  - reduces car trips in the city
  - incentives electric vehicles

- For freight transport...
  - makes rail-road more attractive
  - keeps lorries out of sensitive urban areas
  - reduces noise and air pollution
  - makes freight transport more energy efficient
Sustainable City & Transport Planning

- promoting bicycle use

Setting up a dense cycle – route network
- Safe riding through smaller roads and parks
- Attractive new routes through the centre along the former wall

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

Free ride on bus lanes
Sustainable City & Transport Planning

- promoting walking

- Berlin’s pedestrian traffic strategy

- Some examples...

- Redisigning road space along Boulevards

- Safer pedestrian crossing at frequented junctures

- New green walks along the former wall
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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

Conversion of former Tempelhof airport
## Berlin noise action plan

### Conceptual approach for traffic noise

<table>
<thead>
<tr>
<th>Concept</th>
<th>good for climate</th>
<th>good for air quality</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Urban Planning and Development</strong></td>
<td>(✓)</td>
<td>(✓)</td>
</tr>
<tr>
<td>- setting objectives for low-noise city planning</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Traffic Development and Planning</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- promotion of eco-mobility &amp; clean transport modes</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>- mitigation of source &amp; target traffic, area parking management</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>- mobility management by business</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>- enhancing intermodality, park &amp; ride</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Traffic network design and traffic control</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- re-routing traffic to new or existing roads outside of residential areas</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>- re-routing or ban of commercial traffic</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td><strong>Traffic management and road space re-allocation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- speed limits</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>- improving traffic flows without traffic growth</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>- altering road space design in favour of green transport modes</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td><strong>Technical noise control measures for vehicles and infrastructure</strong></td>
<td>✓ for PM</td>
<td>(✓)</td>
</tr>
<tr>
<td>- Renewal of road surface with silent asphalt &amp; silent tracks for trams/trains</td>
<td></td>
<td></td>
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<tr>
<td>- noise standards for vehicles</td>
<td></td>
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</tr>
</tbody>
</table>
Sustainable City & Transport Planning

Impact on traffic volumes & congestion

Less Traffic: trend in traffic volumes 2002-2013 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
**Sustainable City & Transport Planning**

**Impact** on CO2 – emissions

Shift towards cleaner means of transport

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**modal split 1998**
- **walking**: 25%
- **cycling**: 10%
- **public transport**: 27%
- **cars**: 38%

**modal split 2008**
- **walking**: 28%
- **cycling**: 13%
- **public transport**: 27%
- **cars**: 32%

**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**

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**transport means 2025**
- **walking**: 24%
- **cycling**: 16%
- **public transport**: 27%
- **cars**: 33%

**transport means 2025**
- **walking**: 28%
- **cycling**: 18%
- **public transport**: 29%
- **cars**: 25%

**objective of the master plan transport**

**incl. renewal of vehicle fleet**

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**source**: master plan transport 2011
AQ planning

relevance of urban planning processed

exemplary case Leipziger Straße

mitigation through new road link Axel-Springer Str

change in traffic volume
2009-2015

NO2-pollution 2009

NO2-pollution 2015
implementation of traffic management & vehicle-technology measures

still limit values excess despite LEZ & mitigation by 10,000 less veh/d due to alternative route

additional traffic load (+3,000 veh/d) due to planned business & shopping centre not yet taken into account
traffic management measures

- potential impact on air quality

- shift modal split from motor traffic to clean transport modes
  - Berlin's planning objective:
    - 10% less motor traffic in 10-15 years
    - results in up to 10% NO2, 3-4% less of total PM10

- optimizing traffic flows (progressive signal systems):
  - impact difficult to quantify
    - local effect, traffic signal coordination works only in one direction, potentially negative effects on cross-roads
  - conflict with acceleration of bus/tram
  - risk that gained road capacities will attract more traffic
  - small net gain in pollution control

- truck ban:
  - example HEAVEN project: up to 20% less NO2, -7% PM
    - only local effect in single roads, merely shift to other roads, no net reduction

- speed limit 30km/h whole day:
  - example Schildhornstraße Berlin: -10% of total NO2, -6% of total PM
    - if traffic light coordination with 30 km/h works well speed limit is enforced
    - also less noise and traffic accidents

- noise ~0.5dB(A)
- noise ~1 dB(A)
- Noise ~2 dB(A)
Impact of different measures / current emission reduction

- Fight congestion: only small scale effect: up 30% reduction of local traffic contribution
- More gas vehicles: reduction of particle emission in t/a
- Speed limit 30 km/h: only small scale effect: up 30% reduction of local traffic contribution
- Filter retrofit buses: reduction of NOx emission in t/a
- Improving public transport & cycling: reduction of particle emission in t/a
- Low emission zone: reduction of NOx emission in t/a

Total PM10-Emission in 2005: 3854 t/a
Total NOx-Emission in 2005: 20292 t/a
New air quality plan Berlin

Impact of extra measures by 2015

Impact of different bundles of measures on emissions

Impact of various measures on vehicle emissions relative to the trend scenario 2015

- E5 with E6 ambition
- Optimised traffic flow
- Bundle vehicle technology
- SCR Retrofit
- E-Mobility
- Funding of E6
- LEZ without exemptions
- Speed limit 30 kph at all hot spots

PM10
-exhaust PM
-NOX
New air quality plan 2011-17

.simulated NO2 - pollution 2009

>50 km of main road sections in non-attainment with more than 50,000 people living there

Limit value

with Berlin-specific vehicle fleet composition of 2009
New air quality plan 2011-17

Simulated NO2 - pollution trend scenario 2015

Additional measures needed to comply with NO2-limit values, for example a reduction of traffic volumes by 10-50%

>12 km of main road sections in non-attainment with more 10,000 people living there

Measures taken into account:
- low emission zone
- master plan transport 1.0
- BAT emission control in stationary sources
- EU-wide implementation of existing environment regulations
Simulation of NO2-pollution 2015

action bundle vehicle technology

Measures taken into account:
- trend scenario 2015
- retrofit of buses with SCR
- retrofit of HGV with SCR/EGR
- LEZ without exemptions
- E6 funding

>7 km of main road sections in non-attainment with more 6,000 people living there
simulation of NO2-pollution 2015

scenario E5 with ambition of E6

Measures taken into account:
- trend scenario 2015, plus
- implementation of our plea of 2005:
  - set new Euro 5 NOx- emission standard for Diesel – vehicles at an level equal to E4 petrol vehicles = 80 mg/km
  - equivalent to E6 introduction 5 years earlier

0.14 km of main road sections in non-attainment with about 150 people living there
New air quality plan 2011-17

- simulated PM10 - pollution 2009

>30 km of main road sections in non-attainment with more 25000 people living there
New air quality plan 2011-17

- simulated PM10 - pollution trend scenario 2015

<table>
<thead>
<tr>
<th>Luftqualitätsplan Berlin 2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jahresmittelwert PM10 2015 in µg/m³</td>
</tr>
<tr>
<td>&lt;= 28</td>
</tr>
<tr>
<td>28 - 30</td>
</tr>
<tr>
<td>30 - 32</td>
</tr>
<tr>
<td>32 - 34</td>
</tr>
<tr>
<td>34 - 40</td>
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<tr>
<td>&gt; 40</td>
</tr>
</tbody>
</table>

- trend scenario: implement only of measures already planned (incl. LEZ)

- >15 km of main road sections in non-attainment with more 14000 people living there
New air quality plan 2011-17

Simulated PM10 - pollution trend scenario 2015

Excess of 24h-standard

Trend scenario plus:
- Ban of solid fuel for house heating
- Retrofit of mobile machinery
- >9 km of main road sections in non-attainment with more 8500 people living there
New air quality plan Berlin

Impact of various measures on AQ

Impact of different bundles of measures on NO₂ and PM₁₀ pollution

Road length and number of residents in excess of the NO₂-limit value

- 2009
- Trend 2015
- MB speed limit 30kmph at all hotspots 2015
- MB vehicle technology 2015
- MB traffic flow optimization 2015
- Euro 5 as Euro 6 2015
- Trend 2020

Road length [km] 0 10 20 30 40 50 60 70

Road length and number of residents in excess of the 24h PM₁₀-limit value

- 2009
- Trend 2015
- MB speed limit 30kmph at all hotspots 2015
- MB vehicle technology 2015
- MB machinery & heating 2015
- MB traffic flow optimization 2015
- Euro 5 as Euro 6 2015
- Trend 2020

Road length [km] 0 5 10 15 20 25 30 35

Thousand residents 0 10 20 30 40 50
New air quality plan Berlin

**NO2 reduction potential of local measures**

- Gap closure trend + veh. technology + traffic optimization + 30 kmph speed limit

*from model calculations at 6 automatic NO2-monitoring stations in main roads in Berlin*
Real Driving Emissions (RDE) of NOx

Performance of Euro 6 vehicles

In-use emission testing of 15 Euro 6 passenger cars

- Using PEMS during typical real-world driving modes but differing number & type of driving cycles per vehicle
- Average NOx RDE exceed Euro 6 by factor of seven
  - Excess mainly due to short emission peaks during high engine load
- Some vehicles almost meet Euro 6
- Huge variation of emissions among vehicles
- Weak relation between fuel consumption and emissions

🎉 Euro 6 needs an urgent overhaul

Source: ICCT, 2014
Impact of different bundles of additional measures to reduce particle pollution by 2015 & 2020

Expected decrease of particle (PM10) pollution* in Berlin

- Trend 2020
  - regional BG: -5%
  - urban increment: -14%
  - local increment: -23%

- Trend 2015 & traffic measures & control of small combustion mobile machinery with DPF &
  - regional BG: -3%
  - urban increment: -19%
  - local increment: -28%

- Trend 2015 & traffic management & vehicle technology
  - regional BG: -3%
  - urban increment: -8%
  - local increment: -28%

- Trend 2015
  - regional BG: -3%
  - urban increment: -3%
  - local increment: -9%

*averaged over 27 traffic spots, based on modeling

24h-limit value
Berlin AQ management

résumé

■ Efficiency of previous measures
  ➥ **Industry:** Requiring **Best Available Technology** for emission control & strict enforcement and permitting regime was huge success
  ➥ **Residential heating:** Enforcement of switch to **cleaner fuels** & expansion of **combined** heat & power generation
  ➥ **Road traffic:** significant reduction PM (black carbon) and NO2 due to LEZ
  ➥ improvement of similar magnitude through **transport planning** & traffic management

■ Focus on new measures
  ➥ Faster introduction of **Euro 6 vehicles** & **alternative concepts**
  ➥ Exploit potential of **optimizing traffic flows**
  ➥ clean up off road machinery & local shipping

■ remaining problems
  ➥ long-range transport of particulate matter
  ➥ missing **national** strategy
  ➥ timing of compliance critical with regard to ultimate NO2 compliance
  ➥ Requires national & **European** action
Air Quality Planning

Some final recommendations

- AQ Planning needs networking across different administrative levels, departments, interest groups, lobbyist, stakeholders
  - on the long-term: integration of environment objectives into other policy making processes
    - Commitment for other administrations to take into account the needs of air quality management in their business
  - Set up AQ Steering Committee as a durable platform for collaboration, also during implementation phase
    - consider setting up a sub-working group drafting the chapters on measures
    - Environment Department need to take the lead, invite important departments of transport, city planning, economic affairs, etc
  - provide for permanent sufficient personnel resources

- Some hints regarding the drafting of an AQ plan
  - measures to reduce the pollution are the essence of an AQ plan
  - put the focus on justification, description and definition of measures
  - try to be as concrete as possible
  - if concrete action is not possible now, stipulate a clear commitment for further scrutiny/study/investigation & subsequent decision on action
  - add steps to improve databases/tools/resources as measures
## Measures of Berlin’s Air Quality Plan 2011–2017

<table>
<thead>
<tr>
<th>Measures vehicle emission control technology</th>
<th>City-wide</th>
<th>Year</th>
<th>Responsible Party</th>
</tr>
</thead>
<tbody>
<tr>
<td>M 2.1 low emission zone without exemptions</td>
<td>city-wide</td>
<td>to 2015</td>
<td>SenStadtUm</td>
</tr>
<tr>
<td>M 2.2 funding of purchase of Euro-6-vehicles</td>
<td>city-wide</td>
<td>to 2015/16</td>
<td>SenStadtUm, Federal Gov.</td>
</tr>
<tr>
<td>M 2.3 funding of purchase of CNG vehicles</td>
<td>city-wide limited</td>
<td>laufend</td>
<td>SenStadtUm, Federal Gov. GASAG</td>
</tr>
<tr>
<td>M 2.4 Promotion of electro mobility</td>
<td>city-wide; unclear</td>
<td>medium- to long-term</td>
<td>SenStadtUm, SenWiTechForsch, Federal Gov. Districts</td>
</tr>
<tr>
<td>M 2.5 clean vehicles for public transport</td>
<td>city-wide /local ++</td>
<td>short- to long-term</td>
<td>SenStadtUm, BVG</td>
</tr>
<tr>
<td>M 2.6 clean municipal vehicles</td>
<td>city-wide /0</td>
<td>Medium-term</td>
<td>all municipal enterprises</td>
</tr>
<tr>
<td>M 2.7 retrofitting Euro-4-Diesel vehicles</td>
<td>city-wide /0</td>
<td>Medium-term</td>
<td>SenStadtUm, Federal Gov.</td>
</tr>
<tr>
<td>M 2.8 Particle filters for passenger cruising vessels</td>
<td>local /0/+</td>
<td>short- to medium-term</td>
<td>SenStadtUm, Districts</td>
</tr>
<tr>
<td>M 2.9 environment standards for Diesel locomotives</td>
<td>local /0/+</td>
<td>medium- to long-term</td>
<td>SenStadtUm, Federal Gov., VBB</td>
</tr>
<tr>
<td>M 2.10 Communication campaign to promote procurement of clean vehicles</td>
<td>city-wide /-/0</td>
<td>medium-term</td>
<td>SenStadtUm, business associations</td>
</tr>
</tbody>
</table>
New AQ Plan
Berlin:
Example how to describe measures

### M 1.2 Avoid new pollution hotspots

<table>
<thead>
<tr>
<th>Time frame</th>
<th>Competence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Until the end of 2013</td>
<td>SenStadtUm, Bezirke</td>
</tr>
<tr>
<td>Reduction potential</td>
<td>Costs</td>
</tr>
<tr>
<td>To be modelled for the individual case</td>
<td>n.A.</td>
</tr>
</tbody>
</table>

Changes in the urban development must be examined with regard to their impact on potential limit value exceedances. Particular attention should be given to street canyons, which are characterized by largely enclosed roadside structures on both sides of the street. The narrower and the more closed the canyon is, the worse is the dilution of exhaust gases from vehicles. High air pollution levels thus occur particularly on roads with high traffic volumes, and concurrently, a low width/height ratio.

**Objective:**
No additional road sections or pollution hotspots as a result of urban development changes.

**Implementation:**
- Development of guidelines and recommendations on the preservation of wide road spaces and the avoidance of new pollution hotspots due to urban development changes
- Guidelines on modelling air quality
- Consideration of the guidelines in the context of mandatory urban land-use planning
- Examination of the effects of ventilation passages in areas with high pollution levels and poor ventilation

**Effect:**
Locally high - depending on the initial situation, the traffic-induced incremental pollution on a local level can more than double through the creation of a street canyon. The shorter the distances to the next building and the higher the buildings are, the higher is the air pollution from traffic. Gaps between buildings in the development of road spaces reduce the traffic-induced local incremental pollution by/through a better dilution. The share of empty sites/gaps between buildings at 20%, leads to an incremental pollution that is approximately 10% lower than of enclosed road spaces.
Thanks for listening!

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)
- The air implementation pilot by EEA http://www.eea.europa.eu/themes/air/activities/the-air-implementation-pilot-project

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