

4. Quality of ambient air

1. Please describe the present situation and development over the last five to ten years in relation to (max. 1,000 words):

The "Hamburg ambient air pollution network" (Hamburger Luftmessnetz - HaLM) exceeds the statutorily required standard and currently comprises 17 air quality monitoring stations and one mobile monitoring unit for measuring air quality; whereby a distinction is made between stations monitoring background, ozone and traffic emissions. Monitoring is effected constantly in accordance with EU directives and the Federal Immission Control Act (Bundesimmissionsschutzgesetz).

To facilitate the efficient measurement of air quality, a computer-controlled ambient air pollution network was developed for which both the hardware and software was completely restructured in 2002/2003. The concentrations of all pollutant components are continually measured by the measuring stations and collated into 10-minute values, which are sent on an hourly basis to the central computer of the "Hamburg ambient air pollution network" (Hamburger Luftmessnetz - HaLM) at the "Hamburg Institute for Hygiene and Environment" (Institut für Hygiene und Umwelt - HU). Following an automatic and manual plausibility check, the information is then recorded in a database where it can be evaluated with various software tools.

The mobile monitoring unit is used to record area-related air pollution and take reference measurements.

The monitoring stations are grouped in three different categories of stations:

- suburban background (stations located in suburban areas), such as the monitoring stations Blankenese, Bramfeld, Neugraben, and Tatenberg
- urban background (stations located in urban areas), such as the monitoring stations Billstedt, Airport, Heimfeld, Sternschanze, Veddel, and Wilhelmsburg
- stations located at kerbside/traffic hotspots, such as the monitoring stations Habichtstrasse, Kieler Strasse, Max-Brauer-Allee, and Stresemannstrasse.

The following tables present information on Hamburg's air quality:

Table 1: Number of days per year on which the daily mean value of PM10 concentration exceeded the threshold of 50 $\mu\text{g}/\text{m}^3$

Number of days per year on which the value of 50 $\mu\text{g}/\text{m}^3$ was exceeded for PM10					
	suburban background	urban background		kerbside/traffic hotspot	
	1 station	6 stations		2 (2001-04) / 3 stations	
		from	to	from	to
2001	-	8	22	31	32
2002	15	8	33	37	43
2003	25	23	54	49	49
2004	7	8	12	18	20
2005	11	9	29	19	45
2006	19	15	31	35	45
2007	7	6	23	14	26

Table 2: Number of days per year on which the ozone concentration (floating 8-hour mean value) exceeded the threshold of 120 $\mu\text{g}/\text{m}^3$

Number of days per year on which the value of 120 $\mu\text{g}/\text{m}^3$ was exceeded for ozone (8 h mean)				
	suburban background		urban background	
	4 stations		2 stations	
	from	to	from	to
1998	5	9	-	5
1999	12	23	5	7
2000	7	9	4	5
2001	1	5	1	2
2002	3	10	1	4
2003	14	23	7	13
2004	0	3	0	1
2005	2	7	1	2
2006	14	22	9	11
2007	3	11	3	8

Table 3: Annual mean values of NO_2

Annual mean concentration of NO_2 , [$\mu\text{g}/\text{m}^3$]						
	suburban background		urban background		kerbside/traffic hotspot	
	up to 4 stations		up to 6 stations		4 to 6 stations	
1998	19	19	30	42	46	62
1999	19	23	27	41	53	56
2000	17	21	20	37	49	51
2001	17	20	21	38	39	53
2002	17	20	21	39	46	60
2003	18	21	25	44	50	69
2004	15	19	23	41	54	64

2005	17	19	23	39	57	68
2006	19	20	23	39	62	73
2007	16	18	22	40	58	72

Table 4: Annual mean values of PM10

	Annual mean concentration of PM10 [$\mu\text{g}/\text{m}^3$]				
	suburban background	urban background		kerbside/traffic hotspot	
	1 station	6 stations		2 (2001-04) / 3 stations	
		from	to	from	to
2001	-	20	29	31	32
2002	21	21	28	32	32
2003	24	25	33	35	35
2004	19	21	27	29	31
2005	20	21	28	30	34
2006	21	22	29	31	36
2007	19	19	26	28	31

2. Please describe the measures implemented in the last five to ten years in order to improve air quality, including for example (max. 1,000 words):

2.1 Clean air plans

The Free and Hanseatic City of Hamburg presented a clean air plan in October 2004 and an air quality management action plan in December 2005. Both plans were prepared with the specified public participation and subsequently published. Since that time, the plans have been available for viewing on the internet at:

fhh.hamburg.de/stadt/Aktuell/behoerden/stadtentwicklung-umwelt/umwelt/luft/start.html .

The plans include fundamental information on the "Hamburg ambient air pollution network" (Hamburger Luftmessnetz - HaLM), traffic development, long-term developments, air quality and the causes of NO₂ and fine particulate matter PM₁₀. The plans also detail long-term and short-term measures to reduce pollution, which have been specifically developed or which are relevant for the reduction of pollution throughout the city area.

Active air quality management has been pursued in Hamburg since the early 1980s:

In terms of traffic (cf. also question 2), a whole host of traffic control and emission-reducing measures have been introduced. For example:

- A hierarchical road network (national motorways and national trunk roads, main roads and secondary roads) is in place to handle the various types of traffic and their tasks.

- Priority for local public passenger transport - such as the introduction of special bus lanes, or traffic light controls manipulated by bus traffic (green-light responses).

In addition to motor vehicles, industrial facilities make up the second sector that is responsible for considerable air pollutant emissions, often of a singular nature. In comparison to previously applicable threshold values, in many cases the new threshold values represent a reduction by over half. Over a number of years, air-polluting facilities in Hamburg have been refurbished and upgraded in line with the Technical Instructions on Air Quality Control, with the result that they now operate well-within or frequently well-below permissible emission levels. Enhancements in the degree of efficiency and/or energy-saving measures will further reduce fuel consumption, in turn reducing NOx emissions from these facilities.

The most important measures commenced to date are:

- Introduction of adaptive network management / "intelligent traffic lights"
- Promotion of cycle and pedestrian traffic
- Expansion and upgrading of the local public passenger transport system (for example, links to the airport and HafenCity)
- Fitting busses run by "Hamburger Hochbahn AG" public transport company and City administration vehicles with carbon-particulate filters
- Implementation of a study determining the components of particulate matter
- Deployment of low-emission fuel cell busses
- Additional monitoring of pollution through the installation of passive collectors measuring nitrogen dioxide levels.
- Regularly implemented car-free Sundays, when public transport (HVV) may be used free of charge
- Support measures to equip ships with diesel particulate filters within the scope of the "Hamburg Environmental Technology Sponsorship Programme" (Hamburger Förderprogramm für Umwelttechnologie)
- Special monitoring at the Cruise Center terminal in HafenCity for the measurement of nitrogen dioxide and sulphur dioxide levels

- Throughout recent years, industrial facilities have been upgraded in accordance with statutory requirements. With regard to emission-relevant facilities, such as incineration plants, requirements have also been stipulated which extend beyond state-of-the-art technology.
- Implementation of road construction measures to improve traffic flow in Hamburg

2.2. Actions by public enterprises

Hamburg's municipal and public enterprises have implemented various projects with the goal to reduce traffic-induced air pollution. First and foremost is the use of vehicles fuelled by natural gas. Their engines are almost free of any emissions of sulphur dioxide, carbon and other particulates. They produce 25% less CO₂ than petrol-fuelled cars. Therefore, natural gas vehicles do not only reduce air pollution, but also contribute to climate protection.

2.2.1. Hamburg Wasser (Hamburg Water)

"Hamburg Wasser" (Hamburg Water) is the largest municipally owned drinking water supply and waste water disposal company in Germany.

- For its business uses, the company operates the largest natural gas motor pool in Hamburg: In 2008, 57 vehicles are in operation, in 2009, about 25 more will be put into service.
- Simultaneously, the company is developing a technology to produce biogas from sewage sludge. So in future, the company's vehicles could be powered by fuel which is generated as a by-product of waste water treatment.

As of today, 20 natural gas fuelling stations exist in the Greater Hamburg area, to supply and service public and private natural gas vehicles.

2.2.2. Flughafen Hamburg GmbH (Hamburg Airport)

In order to minimise air-polluting emissions at Hamburg's airport, the „Flughafen Hamburg GmbH“

(Hamburg Airport company) has implemented various measures, mainly in regards of the vehicles on the airport apron and the aircrafts' auxiliary power units.

- New service vehicles are being fuelled primarily with low-emission natural gas or liquid gas. As of today, 15 passenger cars are propelled with gas, and all 27 luggage tow tractors are equipped with a gas-fuelled engine.
- In order to acquire hands-on knowledge with the everyday use of hydrogen-fuelled vehicles, there is a scientifically monitored Hydrogen Project at the airport. It operates, among else, two fuel cell luggage tow tractors equipped with the emission-free hydrogen combustion technology.

2.2.3. Stadtreinigung Hamburg (Hamburg Municipal Sanitation Department)

"Stadtreinigung Hamburg", the municipal corporation in charge of disposing Hamburg's household waste from private households and commercial waste similar to household waste operates the following projects:

- Driver training in energy-saving driving style
- Successive changeover of all utility vehicles to Euro 5 engines and BlueTec technology
- Use of vehicles with low tare weight and high payload
- Test of 4 new vehicle types: 1 natural gas garbage collection lorry at the end of 2008, 2 fuel cell vehicles as of mid-2009 (waste paper basket vehicle and flat-bed vehicle), 1 hydraulics-hybrid garbage collection lorry early in 2009, 1 electro-hybrid garbage collection lorry in spring 2009

2.3. Public Relations

The most comprehensive information for the public is provided on the internet site of the "Hamburger Luftmessnetz" (Hamburg ambient air pollution network) at www.hamburger-luft.de, which publishes the full extent of measurement data pertaining to air pollution as well as a range of additional information, including the location of measuring stations.

Certain data (for example, in summer, the current hourly averages of ozone and nitrogen dioxide and the

most recent PM10 daily averages) are published via the videotext system of a local TV station (ARD-N3).

This is supplemented by a telephone information service that provides details of current air pollution levels (Tel. no. 42845 2424).

3. Please describe planned short- and long-term measures for improvement of air quality (max. 1,000 words):

The most important measures currently being planned are:

- Introduction of an environmental zone: Analysis is currently being carried out into whether certain areas of the inner city should be closed to vehicles that do not fulfil progressive exhaust emission standards.
- Promotion of cycle and pedestrian traffic
- Further expansion and upgrading of the local public passenger transport system
- Support for car-free residential projects
- Development of an incentive system for the introduction of 1,000 new „Green Taxis“ with gas-fuelled engines
- Development of innovative motor vehicle drive technology programmes
- Commissioning of studies to determine the impact of traffic measures on emissions (budget as of 2009: 100,000 euros per year)
- Creation of incentives to reduce shipping emissions by way of a budget-neutral differentiation of port fees in proportion to the environmental-friendliness of ships
- Study pertaining to an onshore power supply for cruise ships; whereby ships in port would be supplied with power from land-based facilities, to avoid using on-board generators. This would reduce emissions emanating from shipping
- Analysis into the use of natural gas as a fuel for ships with the short-term goal of supplying natural gas on land to the Cruise Center terminal, and the long-term objective of bringing natural gas into general use as a maritime fuel on both land and water

4. Please describe how the above issues can be documented in case your city is short listed to participate in the second phase of the evaluation (Documentation should not be forwarded in this phase) (max. 600 words):

The measures presented can be evidenced by means of the following documentation:

- 22nd Ordinance to the Federal Immission Control Act, http://bundesrecht.juris.de/bimschv_22_2002/index.html
- "Hamburger Luftmessnetz" (Hamburg ambient air pollution network) leaflets, see attachment "Halmfaltblatt 2006 und 2007"
- results of measurements taken by the "Hamburger Luftmessnetz" (Hamburg ambient air pollution network), <http://www.hamburger-luft.de>
- Coalition Agreement of Hamburg's governing parties for the current 19th legislature period, see attachment "Coalition Agreement"