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Air quality in stations

Introduction and the European legislative framework

BONTINCK Willy,
Head of the Environmental Department
SNCB-HOLDING

UIC FERROVIE DELLO STATO ITALIANE

Presentation

Air quality in indoor public areas (eg stations)

No European legislation

- Good practice and E-norm on the ventilation of buildings

Ambient (outdoor) air quality

European legislation:

- 1996:“Management & quality of ambient air”
- 2008: “Pure air for Europe”

“Management & quality of ambient air”

Council Directive 96/62/EC of 27 September 1996 on ambient air quality assessment and management (repealed by Directive 2008/50/EC)

4 Daughter Directives:

- Council Directive **1999/30/EC** of 22 April 1999 relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air (**repealed**) ;
- Directive **2000/69/EC** of the European Parliament and of the Council of 16 November 2000 relating to limit values for benzene and carbon monoxide in ambient air (**repealed**) ;
- Directive **2002/3/EC** of the European Parliament and of the Council of 12 February 2002 relating to ozone in ambient air (**repealed**) ;

- Directive 2004/107/EC of the European Parliament and of the Council of 15 December 2004 relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air (**still valid**).

Directive 2004/107/EC (a)

Directive 2004/107/EC of the European Parliament and of the Council of 15 December 2004 relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons (PAH) in ambient air (to be implemented by 15/02/2007)

As, Cd, Hg, Ni, PAH:

- pollutants posing a risk to human health (**human carcinogens**) ;
- **no identifiable threshold** below which they do not pose a risk to human health:
  - principle of **lowest possible exposure** is applied ;
  - **no** limit values for PAH, **but** benzo(a)pyrene is used as a marker (a target value is set) ;
  - **no** limit values for Hg (**total gaseous mercury**; measurement of particulate and gaseous divalent mercury is also recommended).

Directive 2004/107/EC (b)

Target values for As, Cd, Ni and benzo(a)pyrene	
Pollutant	**Target value (1)**
Arsenic	6 ng/m^3
Cadmium	5 ng/m^3
Nickel	20 ng/m^3
Benzo(a)pyrene	1 ng/m^3

(1) For the total content in the PM_{10} fraction averaged over a calendar year.

Target value: level fixed with the aim of avoiding, preventing or reducing harmful effects on human health and/or the environment as a whole, to be attained where possible over a given period.

All **details** (sampling points, requirements, reference methods) are mentioned in the Directive's annexes.

Adequate **information** is obtained and made available to the **public**.

“Pure air for Europe”

Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe (to be implemented by 11/06/2010(*)).

This Directive revises European legislation relating to ambient air quality with the aim of **reducing pollution** to levels which **minimize** the harmful effects on human health and on the environment and **improving information to the public** on the risks involved.

This Directive **repeals** Council Directive 96/62/EC **and** its first 3 Daughter Directives (1999/30/EC, 2000/69/EC, 2002/3/EC).

(*) : for $PM_{2.5}$, a sufficient number of urban background measurement stations is established **by 01/01/2009**.

Directive 2008/50/EC (a)

Member States shall establish **zones and agglomerations** throughout their territory where air quality assessment/management shall be carried out.

Definitions	
zone	part of the territory of a Member State, as delimited by that Member State for the purposes of air quality/management
agglomeration	zone that is a conurbation with a population in excess of 250,000 inhabitants or, where the population is 250,000 inhabitants or less, with a given population density per km² to be established by the Member States

this Directive **does not** mention **indoor** air quality **in public areas!**

Directive 2008/50/EC (b)

Key terms	
Long-term objective (LTO)	a level to be attained in the long term, save where not achievable through proportionate measures, with the aim of providing effective protection of human health and the environment
Target value	a level fixed with the aim of avoiding, preventing or reducing harmful effects on human health and/or the environment as a whole, to be attained where possible over a given period
Limit value	a level fixed on the basis of scientific knowledge, with the aim of avoiding, preventing or reducing harmful effects on human health and/or the environment as a whole, to be attained within a given period and not to be exceeded once attained
Information threshold	a level beyond which there is a risk to human health from brief exposure for particularly sensitive sections of the population and for which immediate and appropriate information is necessary
Alert threshold	a level beyond which there is a risk to human health from brief exposure for the population as a whole and at which immediate steps are to be taken by the Member States

Directive 2008/50/EC (c)

1) Assessment of ambient air quality – 2 sections:

- in relation to SO_2, NO_2 and NO_x, particulate matter (PM_{10} and $PM_{2.5}$), Pb, benzene and CO ;
- in relation to ozone (O_3).

2) General management rules are as follows:

- Respect **limit values**: if not, establish an air quality plan ;
- If **information threshold** is reached, the public at risk (elderly,…) must know ;
- If **alert threshold** is reached, inform general public + take necessary measures.

3) Inform the *ad hoc* public & report

4) Plan + appropriate measures

Directive 2008/50/EC (d)

References (1):

	NO_2	SO_2	O_3
LTO	40 µg/m³ (yr)	50 µg/m³ (yr)	120 µg/m³ (max/dy, 8hrs average, over yr)
Limit value	200 µg/m³ (hr) 40 µg/m³ (yr)	350 µg/m³ (hr) 125 µg/m³ (dy, max 3x/yr)	-
Target value	-	-	120 µg/m³ (max/dy, 8hrs average, max 25 dy, over yr)
Info threshold	200 µg/m³ (hr)	300 µg/m³ (hr)	180 µg/m³ (hr)
Alert threshold	400 µg/m³ (hr, 3 consecutive hrs)	500 µg/m³ (hr, 3 consecutive hrs)	240 µg/m³ (hr) 240-300-360 µg/m³ (3-limits emergency procedure)

Directive 2008/50/EC (e)

References (2):

	CO	Benzene	Pb	PM_{10}	$PM_{2.5}$
LTO	-	2 µg/m³ (yr)	0.25 µg/m³ (yr)	30 µg/m³ (yr)	-
Limit value	10 mg/m³ (day)	5 µg/m³ (yr)	0.5 µg/m³ (yr)	40 µg/m³ (yr) 50 µg/m³ (max: 35x/yr)	25 µg/m³ (yr, stage 1) 20 µg/m³ (yr, stage 2)
Target value	-	-	-	-	25 µg/m³ (yr)
Info threshold	-	-	-	-	-
Alert threshold	-	-	-	-	-

Ventilation of non-residential buildings (a)

Currently, **no** directive on indoor air quality in public areas is available. However, a 2007 European norm (**EN 13779**) on the ventilation of non-residential buildings contains some relevant information.

This norm tackles various issues to consider when a new building is to be constructed: CO_2 levels, air renewal rate,…*and* ***pollutants concentrations in fresh air***.

	CO_2 (ppm)	CO (µg/m³)	NO_2 (µg/m³)	SO_2 (µg/m³)	Total PM(*) (µg/m³)	PM_{10} (**) (µg/m³)
Rural	350	<1000	5-35	<5	<100	<20
Poorly urbanized	375	1000-3000	15-40	5-15	100-300	10-30
Highly urbanized	400	2000-6000	30-80	10-50	200-1000	20-50

(*): total particle number in the air (all diameters)
(**): particles with an aerodynamic diameter ≤10µm

Ventilation of non-residential buildings (b)

Within SNCB Group, the **EN 13779** norm, EPB Directive and the Regulations on Labor Protection (RLP) are applied.

The norm mentions 4 categories for air quality. Architects make sure that values for **acceptable air quality** (category IDA3) are respected within buildings such as offices, underground stations and parking lots.

Parking lots: aired by ventilators; CO, NO_2 and LPG levels are monitored.

Underground stations: diesel trains cannot access some stations (if not, NO_2 monitoring); tunnel openings and train circulation usually ensure a sufficient air renewal rate (if not, ventilation).

Offices: RLP demands 30 m^3/hr; IDA3 not always met (number of persons/office)

Ventilation rate (no smoking office) per person for IDA3 category (m^3/hr)

Typical value	Standard value
22-36	29

Towards a directive on indoor air quality? (1)

On average, we spend well over **80%** of our time indoors…yet, no directive on indoor air quality in public areas

All **aspects** of indoor air environment need to be considered:

- thermal comfort,
- pollution sources,
- quality/quantity of chemical & biological pollutants,
- energy use & the ventilation processes.

New challenges and technics in order to match an increase in energy efficiency with an increase in air quality?

To limit the sources of indoor pollutants, new building materials and furniture also need to be chosen adequately. Some Member States created a voluntary/mandatory **labeling system** for building materials.

Towards a directive on indoor air quality?(2)

Some Member States (e.g. **Belgium**) speak in favor of a standardized EU **framework** : policy & technical guidelines to improve indoor air quality and link up this issue to other relevant policies (health, industry, environment, research).

It is a **work in progress**: European Collaborative Action on Urban Air, Indoor Environment and Human Exposure (ECA), background document of the Belgian Directorate General for Environment...

Others (e.g. **France**) took it a step further by making it **mandatory to monitor** indoor air quality for certain public buildings *("loi Grenelle 2")* but the necessary implementation decree has yet to be published for stations.

However, RATP & SNCF are already measuring air quality in underground stations on a regularly basis (**presentation by A. Kaddouri, SNCF**).