CITEAIR

and the Common Air Quality Index

-

An Overview

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SUMMARY

- The CITEAIR Project – An Overview
- The Common Air Quality Index (CAQI) and the Forecast Air Quality Index
- The Common Operational Website (COW) - Delivering a Diagnostic tool
- Concluding Summary – Join Us !

CITEAIR: Common Information To European AIR

Traffic Impacts on Air Quality

Building upon the results of HEAVEN project

Pic: Michael Fresco

CITEAIR's Main Objectives

The project was conceived to :-

- ❖support Cities and Regions

in developing their responses to European Union's Air Quality Directives concerning :-

- ❖Air Quality Reporting
- ❖Air Quality Action Planning
- ❖Access to Environmental Information

and to encourage :-

- ❖the recognition of the Local Authorities roles in the forthcoming Air Quality Directive
- ❖the adoption of the CITEAIR concept

Project Cities/Regions

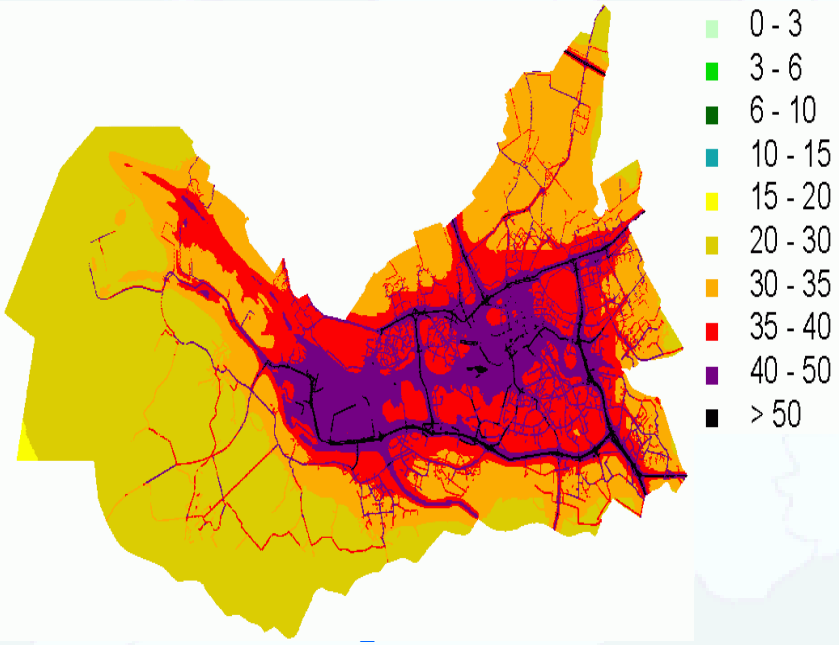
Meeting EU Directives

	PM_{10} (2005)		NO_2 (2010)		Ozone (2010)
City	Day	Annual	Hour	Annual	8h max
Bologna	✗	✗			✗
Bratislava	✓		✓		✓
Brussels	✗	✗	✓	?	✗
Coventry	✓	✓	✓	✗	✓
Leicester	✓	✓	✗	✗	?
Paris	✗	✓/✗	✓/✗	✓/✗	✗
Parma	✗	✗			✗
Prague	✓/✗	✓/✗	✓/✗	✓/✗	✓
Rome	✗	?	✗	✗	?
Rotterdam	✗	✓/✗	✓	✓/✗	✗
The Hague	✗	✗	✓	✗	✓

✓ = objective will be met ✗ = objective will not be met ✓/✗ = in general yes but hot spots remain

Impact of traffic

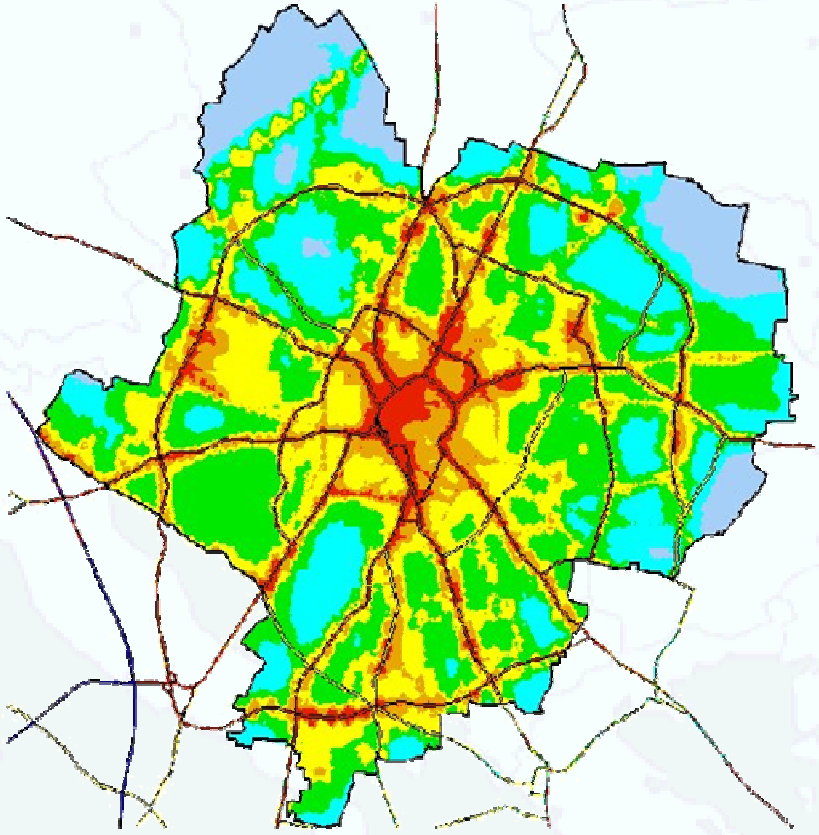
Rotterdam



NO_2 concentration

Leicester

– Predicted NO_2 concentrations



High-Level Goals of CITEAIR

- the assessment of **comparable data**
- the **impact of traffic** on air quality in urban areas
- **Signposting measures** for Air Quality Action Planning
- **Information** for: -
  - public and local authority
  - professional users

CITEAIR main products

- **CITY ANNUAL AIR QUALITY REPORTS**
  - Template for reporting and describing the city Air Quality situation
- **COMPARING URBAN AIR QUALITY ACROSS BORDERS**
  - Background and Roadside Monitored and/or modelled data
  - Hourly, daily and forecast index
- **COMMON OPERATIONAL WEBSITE (COW)**
  - Access to air quality data for professionals, public and decision makers;
  - Comparative data for European Cities Air Quality
- **AIR QUALITY MANAGEMENT**
  - Measures and tools for Air Quality Action Planning
  - Directory of Solutions; Case Studies and Signpost to relevant information
- **COMMUNICATING AIR QUALITY**
  - How to publish information addressing different users via various media
- **TRANSFERRING A TRAFFIC-ENVIRONMENTAL MODELS CHAIN**
  - Partial implementation of a decision Support System

European context

- **Public information**:
  - ⇨ **EU requirement** :EU directives and Aarhus convention
- **Dissemination of modelled or monitored air quality data :**
  - ⇨ mostly on the **internet**
  - ⇨ most widespread way: **index ranging from good to bad**
- **Information available for air quality experts** :
  - ⇨ Ozone Web (see Ozone Web, ozone.eionet.eu.int)
  - ⇨ AirBase (see airbase.eionet.eu.int)

European context

However:

- **for <u>general public</u>, comparisons are difficult to make:**
  - ⇨ Different presentations
  - ⇨ Different interpretation criteria
  - ⇨ Based on different typologies of stations, not often clearly explained
  - ⇨ Different methodology of calculation, not often detailed
  - ⇨ Which monitoring method is being used (e.g for PM 10) …?

European context

- **Advantages of air quality indices:**
  - ⇨ Simple information **more understandable** by the general public (instead of µg/m3 or ppb)
  - ⇨ **Many of them already available** in different countries / cities
    - ❖ provide an homogenous information inside of a country
    - ❖ may allow comparison of cities inside of a country

- **BUT such an AQI does not exist at the European scale**
  - ⇨ Despite EU common regulations
  - ⇨ Different AQI even sometimes inside of a same country

➲ ***CITEAIR's potential for developing a common index***

The common index: A COMPROMISE

Between a number of objectives:

- **Communication to the general public (target group)**
- **Scientifically rigorous**
  - presented in different symposiums and to experts for feedbacks
  - representativeness tested through one year data from 4 CITEAIR cities (van den Elshout et al, 2006)
- **Common agreement, at first between the CITEAIR's partners**
- **Easy to join for any cities**

The common index: A COMPROMISE

Between existing indices:

- **Developed after a review of existing indices**
  (UK, Brussels' pollumeter, South African index, Rotterdam's index, French ATMO, EPA's AQI…)

- **Resembles existing ones**
  - the Brussel's POLLUMETER,
  - the German index
  - and the French ATMO,
  (Leeuw & Mol,2005)

The common index: A COMPROMISE

Between technical issues:

CITEAIR is not intended to solve technical issues such as

- **Uniformity in PM measurements**
- **Data quality control**, e.g. site selection of monitoring stations

The common index: 3 time scales

An hourly index for D

- calculated **every hours**
- **Only concerns the cities able to provide hourly values**
  but of MAJOR INTEREST for the public, the authorities and the media

A daily index for D-1

- Based on **maximum hourly concentrations of the past day**
- Calculated **once a day**
- **Displayed at D on the CITEAIR common website**
- Concerns **all the cities taking part in this website**

➲ *the worst pollutant determines the index*

The common index: 3 time scales

Hourly and daily index

Common air quality index calculation grid

Index	Class	Main Pollutants			Additional Pollutants	
		NO2	O3	PM10	CO	SO2
Very High	> 100	> 400	> 240	> 100	> 20000	> 500
High	100	400	240	100	20000	500
	75	200	180	75	10000	300
Medium	75	200	180	75	10000	300
	50	100	120	50	7500	100
Low	50	100	120	50	7500	100
	25	50	60	25	5000	50
Very Low	25	50	60	25	5000	50
	0	0	0	0	0	0

- NO_2, O_3, SO_2: hourly value / maximum hourly value in $\mu g/m^3$
- PM10: hourly value / daily average in $\mu g/m^3$
- CO: 8 hours moving average / maximum 8 hours moving average in $\mu g/m^3$

The common index: 3 time scales

A **year average index**

- better takes into account long term exposure
- based on EU annual limit value / target values,
- Concerns **all the cities taking part in this website**

➲ *a distance to reach the EU directives*
(distance to target index
where targets are derived from the directives).

➲ *the average of the main sub-indices determine the city index.*

Two different indices:
Representative of two types of exposure

- **An urban background index** 
  - ⇨ Representative of the **average background situation of the city**

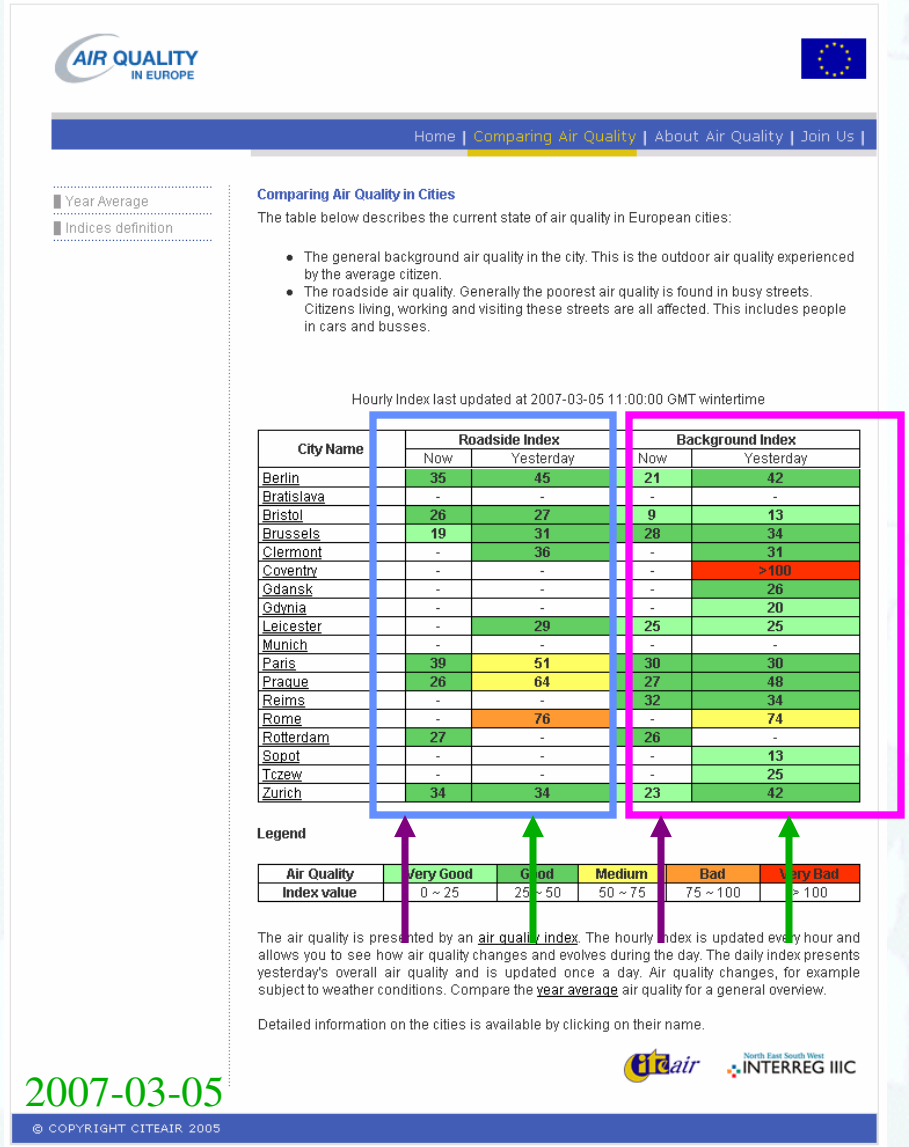
- **A traffic index** 

  Representative either
  - ⇨ of the **average traffic stations** of the city
  - ⇨ or of **one well known traffic station** (e.g. Champs Elysées in Paris)

Depending on the city's choice:
The index calculation is either based on 1 station or on an average of stations (solution to be preferred to avoid lack of data)

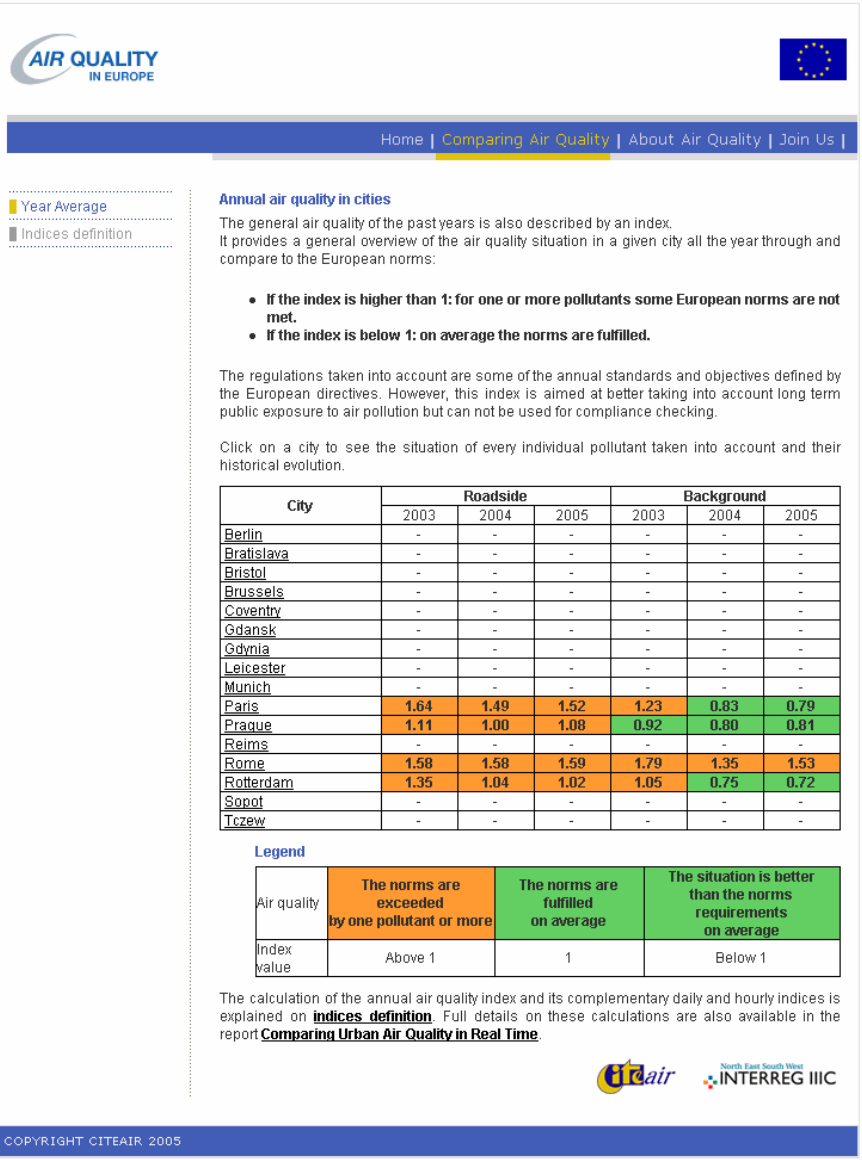
Pollutants taken into account:
pollutants of main concern

- **Main pollutants** (data mandatory):
  - For traffic stations: PM10 and NO2 
  - For background stations: O3 ozone is added 
- **Additional pollutants** (only if data available):
  - Traffic stations: CO 
  - Background stations: SO2 
- **Future development**: PM2.5 to be included



Comparisons possible

- **2 types of exposure:**
  - Background
  - vs traffic
- **Different time scales:**
  - Yesterday
  - vs today



AIR QUALITY IN EUROPE

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Year Average
Indices definition

Annual air quality in cities

The general air quality of the past years is also described by an index.
It provides a general overview of the air quality situation in a given city all the year through and compare to the European norms:

- **If the index is higher than 1: for one or more pollutants some European norms are not met.**
- **If the index is below 1: on average the norms are fulfilled.**

The regulations taken into account are some of the annual standards and objectives defined by the European directives. However, this index is aimed at better taking into account long term public exposure to air pollution but can not be used for compliance checking.

Click on a city to see the situation of every individual pollutant taken into account and their historical evolution.

City	Roadside			Background		
	2003	2004	2005	2003	2004	2005
Berlin	-	-	-	-	-	-
Bratislava	-	-	-	-	-	-
Bristol	-	-	-	-	-	-
Brussels	-	-	-	-	-	-
Coventry	-	-	-	-	-	-
Gdansk	-	-	-	-	-	-
Gdynia	-	-	-	-	-	-
Leicester	-	-	-	-	-	-
Munich	-	-	-	-	-	-
Paris	1.64	1.49	1.52	1.23	0.83	0.79
Prague	1.11	1.00	1.08	0.92	0.80	0.81
Reims	-	-	-	-	-	-
Rome	1.58	1.58	1.59	1.79	1.35	1.53
Rotterdam	1.35	1.04	1.02	1.05	0.75	0.72
Sopot	-	-	-	-	-	-
Tczew	-	-	-	-	-	-

Legend

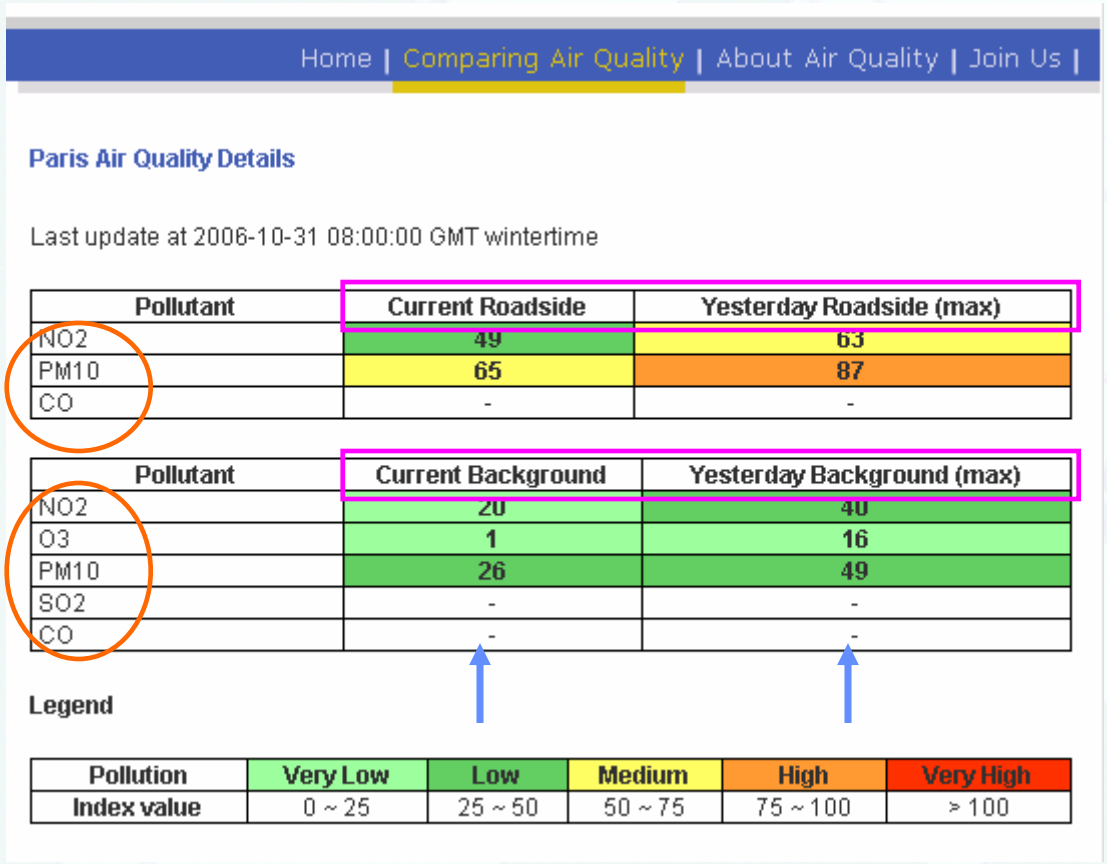
Air quality	The norms are exceeded by one pollutant or more	The norms are fulfilled on average	The situation is better than the norms requirements on average
Index value	Above 1	1	Below 1

The calculation of the annual air quality index and its complementary daily and hourly indices is explained on **indices definition**. Full details on these calculations are also available in the report **Comparing Urban Air Quality in Real Time**.

Comparisons possible

- **2 types of exposure:**
  - Background vs traffic
- **Different time scales:**
  - Yesterday vs today
  - **now also on an annual basis** (annual index since 2003)

Detailed information for each city



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Paris Air Quality Details

Last update at 2006-10-31 08:00:00 GMT wintertime

Pollutant	Current Roadside	Yesterday Roadside (max)
NO2	49	63
PM10	65	87
CO	-	-

Pollutant	Current Background	Yesterday Background (max)
NO2	20	40
O3	1	16
PM10	26	49
SO2	-	-
CO	-	-

Legend

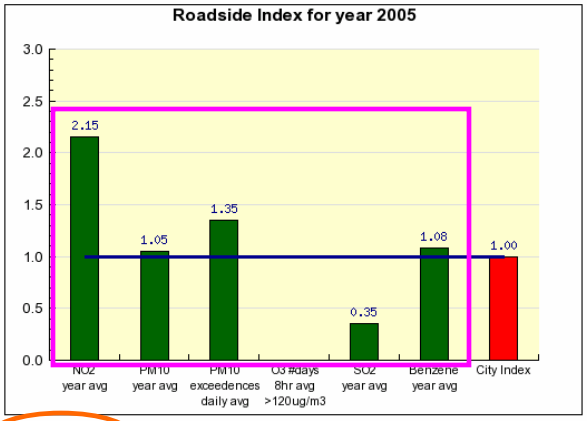
Pollution	Very Low	Low	Medium	High	Very High
Index value	0 ~ 25	25 ~ 50	50 ~ 75	75 ~ 100	> 100

- **Details of its indices**
  - sub index per pollutant
  - and for each index traffic and background
  - for today and yesterday

Paris Yearly Air Quality Index

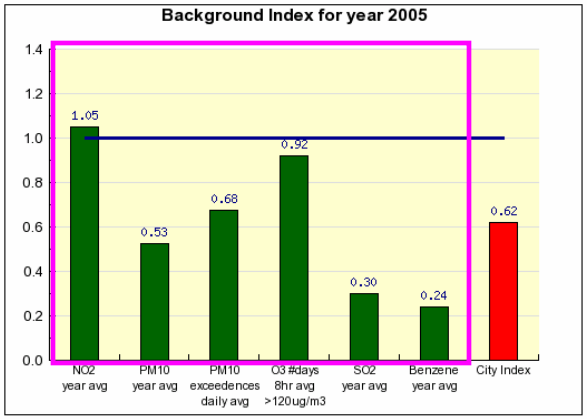
Roadside Index

Year	NO2, year average	PM10, year average	PM10, exceedences daily average	O3, number of days with 8-hour average >= 120 µg/m3	SO2, year average	Benzene, year average	City Index
2003	2.28	1.15	1.48	-	0.80	1.52	1.64
2004	2.12	1.02	1.32	-	0.55	1.26	1.49
2005	2.15	1.05	1.35	-	0.35	1.08	1.52



Background Index

Year	NO2, year average	PM10, year average	PM10, exceedences daily average	O3, number of days with 8-hour average >= 120 µg/m3	SO2, year average	Benzene, year average	City Index
2003	1.20	0.65	0.84	2.24	0.45	0.34	1.23
2004	1.05	0.55	0.71	1.00	0.35	0.26	0.83
2005	1.05	0.52	0.68	0.92	0.30	0.24	0.79



Detailed information for each city

- **Details of the annual index**
  - for background and traffic conditions
  - and for each pollutant

Detailed information for each city

- **City information page :**
  air quality issues with a comparable format
  - background information (geography)
  - environmental situation towards air quality
  - air quality improvements
    (action plans implemented)
  - related links

Undergoing developments

- **Further developments of its ergonomics**
  - improvement of the **home page map**,
  - **graphs**,
  - **historical data …**

Developments in the coming year

- **Workshops**
  - **Baltic States, Iberian Peninsula and South East Europe**
- **Common air quality indices**
  - Integration of **PM2.5** once the new directive issued
- **A forecast**
  - **Tomorrow's** common air quality index
- **Promoted and displayed by the media**
  - **Negotiating with Radio , CableTV and Weekly/Local News**

Attractiveness of a common index and web site

- **A common index linked to people's preoccupations:**
  - "what is the **air quality where I am living** compared to **where I am traveling?**"
  - **exposure** caused by the traffic vs background conditions
  - class borders related as much as possible to **EU limit values and alert thresholds** : main concern for sensitive people
  - **long term exposure** will be taken into account through an annual index based on distance to the target set by the EU annual limit values (linked to WHO recommendations and health protection)

Attractiveness of a common index

- **Value added of a new common index**:

  A simple, comparable and up to date AQ information
  - from different cities across Europe
  - for the pollutants of main concern
  - which relies on EU alert regulations

CITEAIRS' common index **makes comparisons possible**

but **will not replace the existing and more detailed local information**

- people are used to their own index,
- local indices are adjusted to local situations

- **An index technically innovative**:
  - Traffic and urban background are presented separately
    Currently only exists for Brussels
  - 3 time scales for a better understanding : hourly, daily and annual

Attractiveness of a common index

- **A dynamic index to entice repeated visits**
  - Hourly index, hourly updates for the current day

    Further development foreseen: tomorrow's forecast
  - Class borders chosen to allow for changing pollutants determining the index.

But **class borders are not linked with short term health effects** to avoid an index

- always low and not dynamic enough
- Which would be confusing when the local communication is made on hot spot and exceedences of the EU regulations

The Common Air Quality Index has been made easy for the cities to join in

- **An hourly index** when possible
- **To avoid a restrict participation** : A daily and a yearly index have been developed

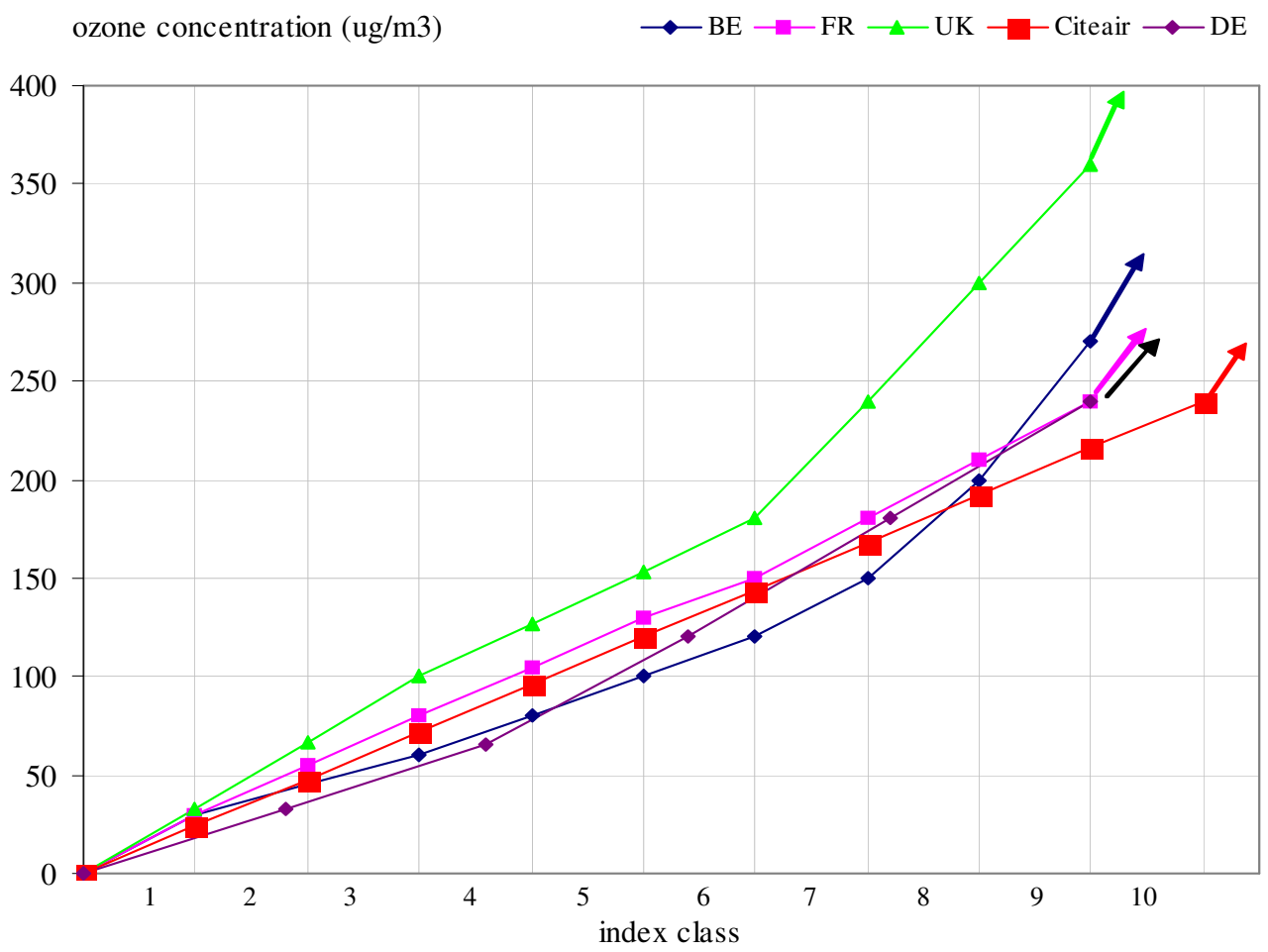
  unable cities tight with particular monitoring devices or validation procedures used to join in
- **Data from one station or from several ones** (to be prefered)

  can be used
- **Data transfer is automated and the procedure is easy to use**
- **Index calculation is automatically made** by the common web site
- **A link to the local monitoring network is provided**
  for detailed information on the local air quality conditions

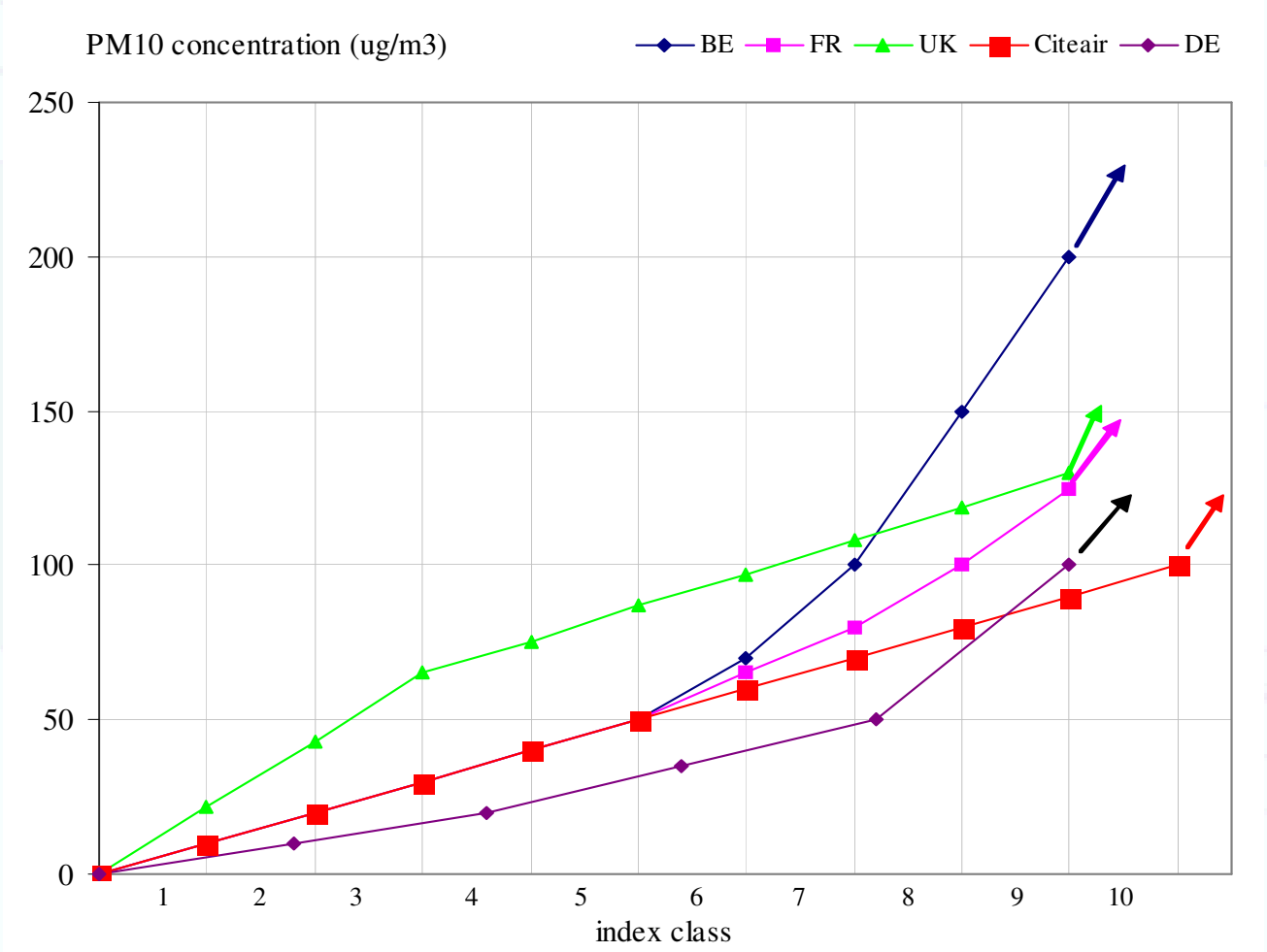
Proposed calculation grid :
Principles

- Defined after a **review of existing indices**
  (UK, Brussels' pollumeter, South African index, Rotterdam, French ATMO, EPA's AQI…)
  - ⇨ Such a **common index does not exist**
  - ⇨ The CAQI is **not aimed at replacing the existing local indices**
  - ⇨ Main interest: **comparison at the European scale**
  - ⇨ The **link between the index and health effects** will be difficult to make
  - ⇨ Key issue: dynamic website and **attractiveness for the public**

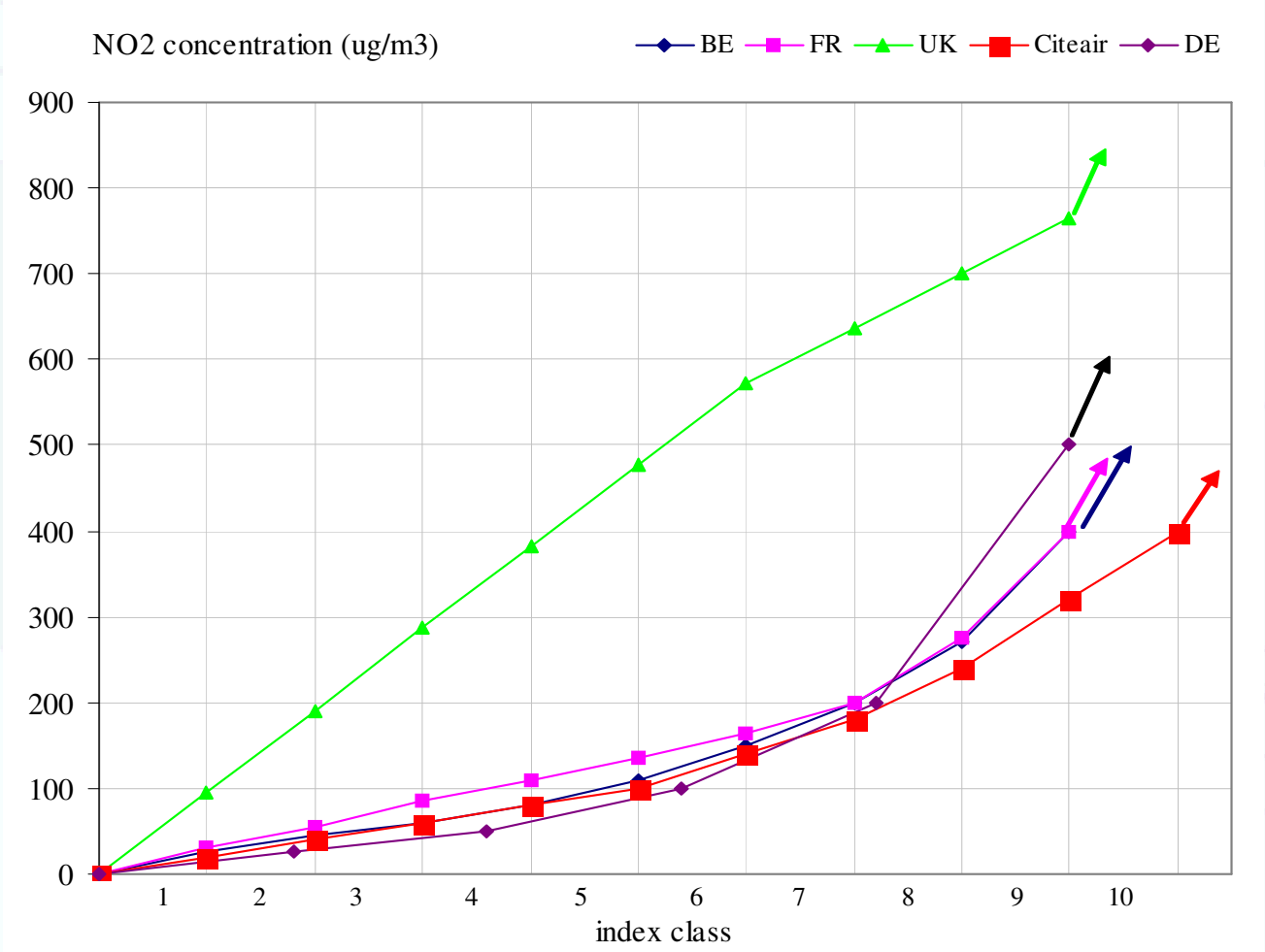
Class boundaries ozone



Class boundaries PM10



Class boundaries NO2



CITEAIR and other intiatives

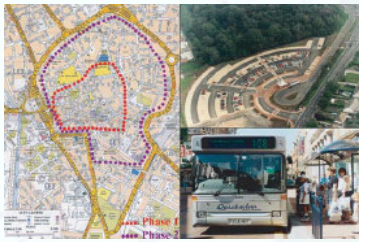
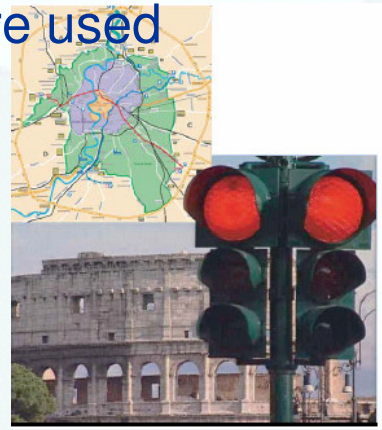
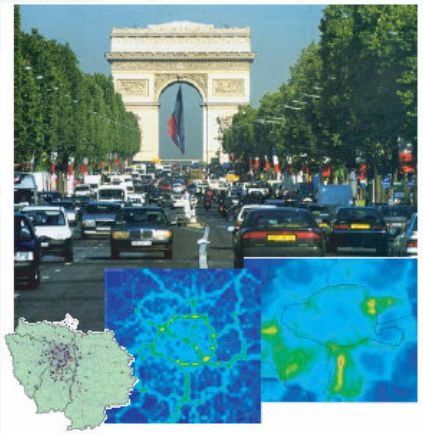
- ❖Neighbourhood Project
  - EEA OzoneNet
  - Developing network of AQMS's
  - Ozone specific for professional users
- ❖EIONET/AIRBASE
  - EU Statutory AQ Reporting
  - Member States reporting to the EU
  - Extensive network of AQMS's
  - Archive data for scientists
- ❖CITEAIR – COW
  - City based - Urban level near real-time data
  - Common Air Quality Index (1st EU Index)
  - Background and Roadside
  - Access to City AQ Information
  - Aimed at the public

Conclusion

- **Would make the cities comparable across Europe**
- **Take into account 2 types of exposure**
  traffic and background
- **Made attractive for the public and the media**
  hourly updated
- **Hourly, daily and annual comparisons possible**
- **Easily usable by any cities**
  independently of the monitoring devices
  and the validation procedure used

But: will not solve
existing technical issues




Participating cities

- **Currently 18 participating cities**
  - Berlin,
  - Bratislava,
  - Bristol,
  - Bruxelles,
  - Reims,
  - Rome,
  - Rotterdam
  - Sopot,
  - Tczew,
  - Leicester,
  - Paris,
  - Prague,
  - Munich
  - Coventry,
  - Clermont
  - Gdansk,
  - Gdynia,
  - Zurich,

Long process
(data ownership, data producers ….)

- **Only 7 cities six months ago**

Participating cities

- **Possible additional cities:**
  - Amsterdam, Utrecht in NL
  - London, Leeds, Sheffield in UK,
  - Cork in Ireland,
  - Strasbourg, Lille , Rances and Toulouse in France,
  - Vienna in Austria,
  - Katowice in Poland
  - Stuttgart in Germany …
  - Padua, Venice in Italy

Contacts with Oslo, Barcelona, Milan, and Madrid …

Additional city welcomed to join!

CITEAIR and the Future

Promote :-

- Seminar for Members of the European Parliament with Local Politicians and Air Quality Policy Makers – EC Environment, Public Health and Food Safety Committee meeting 27th June 2007

Encourage :-

- Members of the European Parliament,
- Department Generale Environment
- European Environment Agency

To strengthen the role of the Cities and Regions within the Management of European Air Quality

To consider embedding the CITEAIR concept within the European Air Quality Management mechanisms.

Contact to CITEAIR

Visit our websites:

http://citeair.rec.org

www.airqualitynow.eu

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