Presentació projecte APPRAISAL. Model per avaluació de mesures

José Mª Baldasano y Santiago Gassó
IARC: DIESEL ENGINE EXHAUST CARCINOGENIC

Lyon, France, June 12, 2012 -- After a week-long meeting of international experts, the International Agency for Research on Cancer (IARC), which is part of the World Health Organization (WHO), today classified diesel engine exhaust as carcinogenic to humans (Group 1), based on sufficient evidence that exposure is associated with an increased risk for lung cancer.
A major environmental health problem

Air pollution is already known to increase risks for a wide range of diseases, such as respiratory and heart diseases. Studies indicate that in recent years exposure levels have increased significantly in some parts of the world, particularly in rapidly industrializing countries with large populations. The most recent data indicate that in 2010, 223,000 deaths from lung cancer worldwide resulted from air pollution.

The most widespread environmental carcinogen

“The air we breathe has become polluted with a mixture of cancer-causing substances,” says Dr Kurt Straif, Head of the IARC Monographs Section. “We now know that outdoor air pollution is not only a major risk to health in general, but also a leading environmental cause of cancer deaths.”

The IARC Monographs Programme, dubbed the “encyclopaedia of carcinogens”, provides an authoritative source of scientific evidence on cancer-causing substances and exposures. In the past, the Programme evaluated many individual chemicals and specific mixtures that occur in outdoor air pollution. These included diesel engine exhaust, solvents, metals, and dusts. But this is the first time that experts have classified outdoor air pollution as a cause of cancer.

“Our task was to evaluate the air everyone breathes rather than focus on specific air pollutants,” explains Dr Dana Loomis, Deputy Head of the Monographs Section. “The results from the reviewed studies point in the same direction: the risk of developing lung cancer is significantly increased in people exposed to air pollution.”
The Challenge

THE CHALLENGE
Air quality in Europe is still facing a continued widespread of exceedances, particularly regarding PM, NOx and O3. In case of non-compliance the 2008 Air Quality Directive requests Member States (MS) to design local and regional plans and assess their impacts on air quality and human health. MS have therefore developed and applied a wide range of modelling methods to cope with these obligations. Today, with the revision of the EU air quality policy pending, there is a need to consolidate and assess the research results in the field of Air Quality and health Impact Integrated Assessment and make them accessible to policy makers.

Potential modifications of the Ambient Air Quality Directives
Project objectives

1- To perform an overall review of the AQ and health assessment methodologies

2- To analyze the limitations of the currently available assessment methods

3- To evaluate the possibility of implementing integrated assessment (IA) modelling tools

4- To communicate with key stake-holders, and in particular to policy-makers

5- To identify key areas to be addressed by research and innovation
1. To provide insight on existing IA Modelling within the EU.

2. To support the implementation of local/regional IA methodologies.

3. To assess current research findings and future research needs.

4. To support the EU Air policy review.
### Partners & Stakeholders

**Stakeholders**

- FAIRMODE
- NAM

**Partners**

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<tr>
<th>PROJECT PARTNERS</th>
<th>COUNTRY</th>
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<tr>
<td>UNIVERSITA DEGLI STUDI DI BRESCIA</td>
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<td>JRC - JOINT RESEARCH CENTRE- EUROPEAN COMMISSION</td>
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METHODOLOGY
The proposed methodology to achieve a systematic review includes the following steps:

- Defining a common and structured format/language (design of a database) in which the main characteristics as well as strengths and weaknesses of the different methodologies can be classified. This database will be organized around 4 main themes:
  - Synergies among National, regional and local approaches, including emission abatement policies;
  - Air quality assessment methodologies, (e.g. modeling, scenario assessment, cost-effective methods, source apportionment ...);
  - Health impact assessment approaches;
  - Uncertainty and robustness, including Quality Assurance / Quality Control (QAQC).
- Collecting and classifying the available information according to the defined common format (data entry).
- Generating a state-of-the-art database of Integrated Assessment systems.
- Comparing existing Integrated Assessment systems on the basis of the defined common format (systematic review) and identifying their strengths and limitations.
- Granting access to the database and consulting stakeholders and policy makers.
- Establishing direct links to EU projects related to air quality policy, exposure analysis and health impact assessment.
DPSIR as a pillar for the IAS design

- **Drivers**: e.g. Industry and Transport
- **Pressures**: e.g. Polluting Emissions
- **Impact**: e.g. Ill health, Biodiversity loss, Economic Damage
- **State**: e.g. Air, Water, Soil Quality
- **Responses**: e.g. Clean Production, Public Transport, Regulations, Taxes, Information, etc.
RESPONSES

RESPONSES (Decision Framework)
-Objective(s)
-Legislative, economic, physical constraints

TECHNIQUES
-Scenario analysis / Source Apportionment / Cost-benefit analysis / Cost-effective analysis / Multi-objective analysis

POLICY FOCUSED OUTPUT
MAIN FEATURES
-Emission and concentration maps / AQIs / Health and ecosystem exposure / Internal and External cost
-Efficient policies / Policy performances / Climate change link

"Synergies among scales" / "uncertainties" are additional dimensions of the scheme
BRING TOGETHER ALL MAJOR ACTIVITIES ON AIR QUALITY AND HEALTH ASSESSMENT

- Consolidate and assess existing capabilities and modelling tools used in the EU Member States
- Identification of relevant research activities on air pollution and its health implications
- Analysis of the limitations of the currently available assessment methods, as well as identification of key areas to be addressed

...to support the coming revision of EU air quality policy
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<tr>
<th>Partner</th>
<th>Stakeholder</th>
<th>Pilot experiment</th>
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**5 stakeholders + 4 partners: the pilot experiment involved 10 activities**
General info

- How many questionnaires did you collect?
  - 1
- Which Stakeholders did you interview?
  - **Government Agency**: Directorate General of Environmental Quality. Ministry of Territory and Sustainability. Generalitat de Catalunya (Government of Catalonia)
### Activity information

<table>
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<th>Type</th>
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<td>Q2</td>
<td>AQ planning: improvement air quality (2011-2015)</td>
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<td>Q3</td>
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<td>Q4</td>
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Reference: [http://www20.gencat.cat/portal/site/mediambient/menuitem.8f64ca3109a92b904e9cac3bb0c0e1a0/?vgnextoid=e82448d456e63310VgnVCM1000008d0c1e0aRCRD&vgnextchannel=e82448d456e63310VgnVCM1000008d0c1e0aRCRD&vgnextfmt=default](http://www20.gencat.cat/portal/site/mediambient/menuitem.8f64ca3109a92b904e9cac3bb0c0e1a0/?vgnextoid=e82448d456e63310VgnVCM1000008d0c1e0aRCRD&vgnextchannel=e82448d456e63310VgnVCM1000008d0c1e0aRCRD&vgnextfmt=default)
CALIOPE Air Quality Forecasting System (www.bsc.es/caliope)
Spain: 4 km (399x399 grid cells), Europe: 12 km (480x400 grid cells)

**Modules**

**Meteorology:** WRF-ARW
- Version 3.5
- IBC: GFS (NCEP)
- SST: SST MODEL (NCEP)
- 38 sigma levels
- Top of the atmosphere 50 hPa

**Emissions:** HERMES v2

**Chemistry:** CMAQ-CTM
- Version 5.0
- Carbon Bond V
- Cloud chem. (aqu.)
- Aerosol module (AEROS5)
- BC: NCAR MOZART4 model
- 15 sigma levels

**Mineral dust:** BSC-DREAM8b v2

**Post-processes by Kalman filter**

**Evaluation:**
- NRT-ground level observations
- Satellite
- Ozone sounds

**METEOROLOGICAL FORECAST**
- Global simulations
  - Initial and boundary conditions

**EMISSION MODELLING**
- HERMES v2 developed at BSC-CNS
  - Disaggregation from other sources 12x12 km

**AIR QUALITY FORECAST**
- CMAQ
  - NCAR MOZART4 boundary conditions
  - European air quality forecast (12 km)
  - High resolution (4 km)

**SAHARAN DUST OUTBREAKS**
- Dust Regional Atmospheric Model (BSC-DREAM8b v2)

**AQFS EVALUATION**
- Meteorological observations
  - Dynamics and model evaluation
- Satellite observations
  - Surveillance and model verification
- Gas and particle matter observations
  - Dynamics and model evaluation
Evaluación del Pronóstico

Nivel de polución: Excelente

Los datos de calidad del aire utilizados en esta página son provisionales y que no han sido verificados y podrían cambiar en su revisión (visite los anteriores sitios web para obtener más información).
Avaluació del Pronóstic -- CALIOPE
Full de Avaluació i seguiment CALIOPE
Objetivo: Mejora calidad del aire en las ciudades

→ TRÁFICO

- Medidas de movilidad
  - Vehículos más eficientes y menos contaminantes
  - Vehículo eléctrico
  - Híbrido

- Medidas generales
  - Limitación emisiones (Euro) → mejoras tecnológica
  - Combustibles alternativos

- Gestión
  - Gestión de la velocidad
  - Gestión de la movilidad

Trabajos BSC-CNS

→ Soret et al., (2011)
Gestión de movilidad y renovación parque vehicular (actualización Euro)

→ Gonçalves et al., (2009a y 2009b)
Introducción de GN como combustible alternativo

→ Gonçalves et al., (2011)
Introducción de vehículos híbridos

→ Soret et al. (2013)
Vehículo eléctrico en Barcelona y en Madrid

→ Baldasano et al., (2010)
→ Gonçalves et al., (2008)
Introducción de la limitación de velocidad a 80km/h en las vías de acceso a Barcelona

→ Soret et al., (2011)
Gestión de movilidad en Barcelona y renovación parque vehicular (actualización Euro)
Projects: Air Quality Planning studies

Introduction of NG as a fuel for vehicles in the cities of Barcelona and Madrid

Air quality planning for the metropolitan area of Barcelona for 2015

Assessment of the measure of 80 km/h in the Metropolitan Area of Barcelona

Assessment of air pollution in the city of Santa Cruz de Tenerife
Conclusions

✓ The response to the emissions abatement strategies depend on the location, due to:

1) The specific vehicle fleet composition
   - The percentage of heavy duty vehicles, cars or mopeds affects the design of strategies to the abatement of emissions.

2) The different contribution of activity sectors to total emissions
   - While on-road transport is the main emitter of air pollutants in urban areas, additional sources can not always be neglected (e.g. power plant, industrial shaped cities, harbours or airports)

3) The topography, meteorological conditions and the atmospheric transport
   - The concentration of pollutants at surface level are directly affected by the mixing volume, the PBL evolution, the local topography, etc.

4) The chemical regime (different NOx-VOCs ratio that directly affects O₃, secondary aerosol formation → production response to emissions abatement strategies)
   - Equivalent reductions on NOₓ emissions provide different responses on local O₃ concentrations depending on the chemical sensitivity regime

✓ Each strategy must be assessed for the specific area of application, not being possible the extrapolation of results
Gracias por su atención

¿Cuestiones?