THE ECONOMIC CONSEQUENCES OF AIR POLLUTION AND CLIMATE

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OECD WORK ON THE ECONOMIC CONSEQUENCES OF AIR POLLUTION AND CLIMATE

I. VALUATION OF NON-MARKET IMPACTS OF AIR POLLUTION
II. MACRO-ECONOMIC CONSEQUENCES OF AIR POLLUTION
III. AIR POLLUTION AND CLIMATE CHANGE INTERACTIONS
IV. BLACK CARBON EMISSION REDUCTIONS IN THE ARCTIC
V. OTHER ONGOING WORK (EUROPE AND E. ASIA)
I. Valuation of mortality risk of air pollution


- **The Cost of Air Pollution** (2014):
  - Combines estimates of mortality caused by air pollution with VSL figures.
  - Economic costs: **USD 1.6 trillion** in 2010 for OECD countries alone.
II. Modelling the Macro-Economic Consequences of Outdoor Air Pollution (2016)

- **Objective:** quantify how changes in outdoor air quality affect the economy, and prospects for long-term growth

- Regional and sectoral quantitative **approach**, coupled with more general insights where needed
  - **Market impacts:** production function approach
  - **Non-market impacts:** valuation approach

- **Scope:** global assessment to 2060
Methodological steps

- **Economic activity**
  - ENV-Linkages model

- **Emissions**
  - ENV-Linkages model (GHGs)
  - Emission coefficients of air pollutants from IIASA’s GAINS model
  - Projections for SO2, NOx, BC, OC, CO, VOCs, NH3

- **Concentrations**
  - EC-JRC’s TM5-FASST model for PM2.5 and O3

- **Biophysical impacts**
  - Impacts on crop yields with TM5-FASST model
  - Health impacts using functions based on Global Burden of Disease

- **Economic costs**
  - Economic feedbacks using ENV-Linkages model
  - Non-market costs calculated based on results of valuation studies
Concentrations of air pollutants: PM2.5

Annual average total anthropogenic PM2.5 (µg/m³)

Source: OECD (2016), The Economic Consequences of Outdoor Air Pollution
## Regional market costs

Change in regional GDP from combined market impacts

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<th>Country/Region</th>
<th>Interaction Effects</th>
<th>Agriculture</th>
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Source: OECD (2016), The economic consequences of outdoor air pollution
Global welfare costs of outdoor air pollution
Evolution over time

Billions of USD (2010 PPP exchange rates)

Source: OECD (2016), The Economic Consequences of Outdoor Air Pollution
III. Joint economic analysis of climate change, air pollution and their interactions

- Economic activities
  - Economic activity
    - Economic damages of air pollution
    - Economic damages of climate change
    - Emission of GHGs
    - Emission of air pollutants

- Biophysical impacts
  - Biophysical impacts of climate change
  - Biophysical impacts of air pollution

- Damages
  - Economic damages of air pollution
  - Economic damages of climate change

- Emissions
  - GHG concentrations & temp. change
  - Concentrations of ozone & PM
Radiative forcing from air pollutants

- Aerosols (Sulfates)
- Organic carbon
- Nitrates
- Black carbon
- Total air pollution forcing
Economic interactions: Effects on GDP

Percentage change wrt no-feedback baseline, 2060

-3.5%  -3.0%  -2.5%  -2.0%  -1.5%  -1.0%  -0.5%  0.0%  0.5%

2010  2015  2020  2025  2030  2035  2040  2045  2050  2055  2060

Climate change  Air pollution  Interaction effect  Combined effect
Economic interactions: effects on regional GDP

Percentage change wrt no-feedback baseline, 2060

OECD America
OECD Europe
OECD Pacific
Rest of Europe and Asia
Latin America
M. East & N. Afr.
South and South-East Asia
Sub-Sah. Africa
World

Climate change
Air pollution
Interaction
Findings

• Feedback effects through changes in emissions are limited
• Radiative forcing effects are significant, but net effect is relatively small

• **Biophysical feedbacks** are unclear due to **lack of scientific information**

• **Economic feedbacks** limited at global level, but there are some interesting effects
  – Trade
  – Economic adaptation
  – Exacerbation of single effects of sensitive regions

More significant interactions through **reactions to policies** can be expected
Black carbon (BC) is a crucial component of PM, with impacts on
- Health
- Crop yields and ecosystems
- Leisure and tourism, buildings and heritage, visibility

Strong linkages with climate change: climate forcing + albedo effect

Objective: study the economic consequences of the Arctic Council Member countries’ emission reduction target (25-33% by 2025)

Time horizon: 2025 and 2050
Non-market impacts
Welfare costs from mortality due to outdoor air pollution in Arctic countries

Billion USD (2010 PPP exchange rate)

Source: OECD (2016), The Economic Consequences of Outdoor Air Pollution
Policy scenarios to be examined

- **Black carbon reduction target in Artic Council’s Member countries:**
  - Emission reduction of 25-33% by 2025, as compared to 2013 levels

- **Broader geographical engagement:** BC emission reductions also in Artic Council Observer countries and at the global level

- **Additional policies:** BC reduction combined with additional policies, such as climate mitigation policies, aimed at reducing GHG emissions
V. Other ongoing work

- **Empirical assessment** of costs of air pollution in Europe

- **Regulatory co-operation** to address air pollution in East Asia
Thank you

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www.oecd.org/environment