

Impact of EU legislation on global air quality

Introduction: Several European/international air quality directives and conventions have been introduced in the last 40 years.

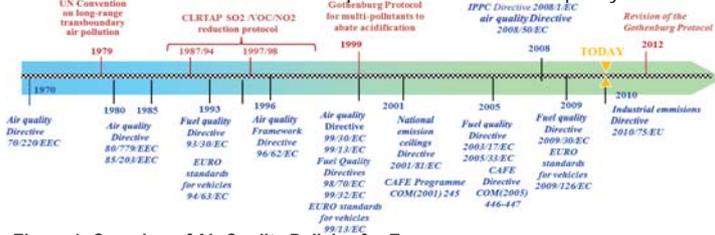


Figure 1- Overview of Air Quality Policies for Europe

Objectives:

- Assess the effectiveness of EU legislation on today's emission levels
- Corresponding impacts as concentrations and life expectancy

Methods: retrospective scenarios

- 1) EDGAR REFERENCE emission data from 1970 to 2010
- 2) STAG_TECH: stagnation of technologies and EU abatement measures as in 1970 but today's consumption (highest emission scenario)

Impact of European legislation on road transport

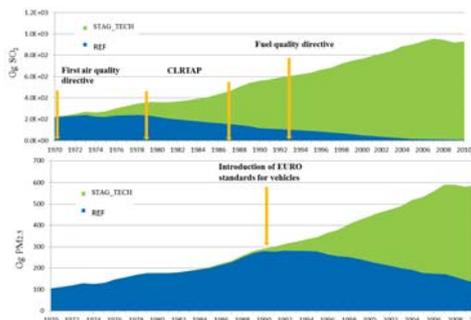


Figure 2 - Effectiveness of fuel quality directives and EURO standards on SO₂ and PM_{2.5} emissions in EU.

Low-S fuels for vehicles, strengthened by fuel quality directives, strongly reduced SO₂ emissions; however, only in the nineties with the introduction of EURO standards, PM emissions were abated.

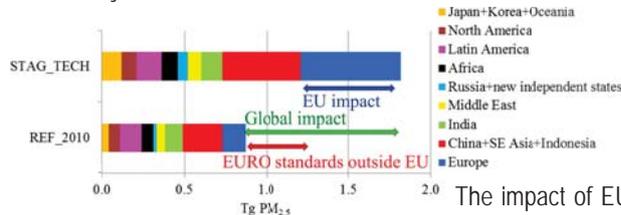
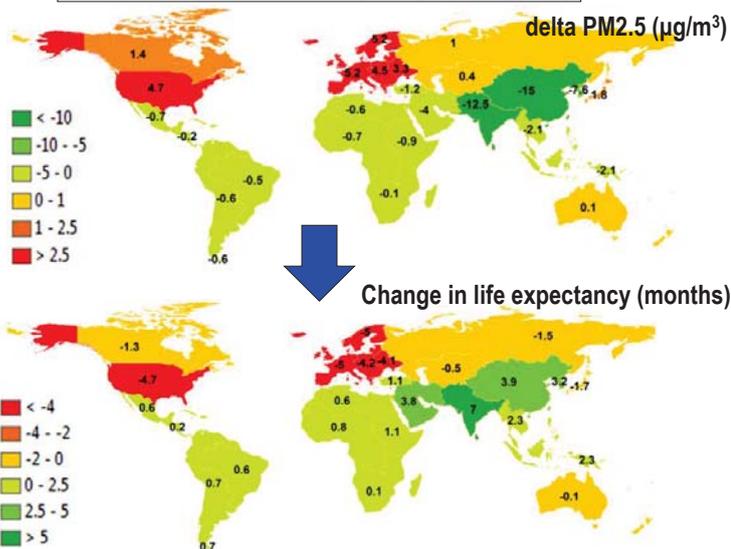


Figure 3- Impact of EURO standards on PM_{2.5} emissions also outside Europe.

The impact of EU legislation can be observed also globally, where the decrease in 2010 PM_{2.5} emissions is equally due to the deployment of EURO standards in Europe and outside EU (Fig.3).

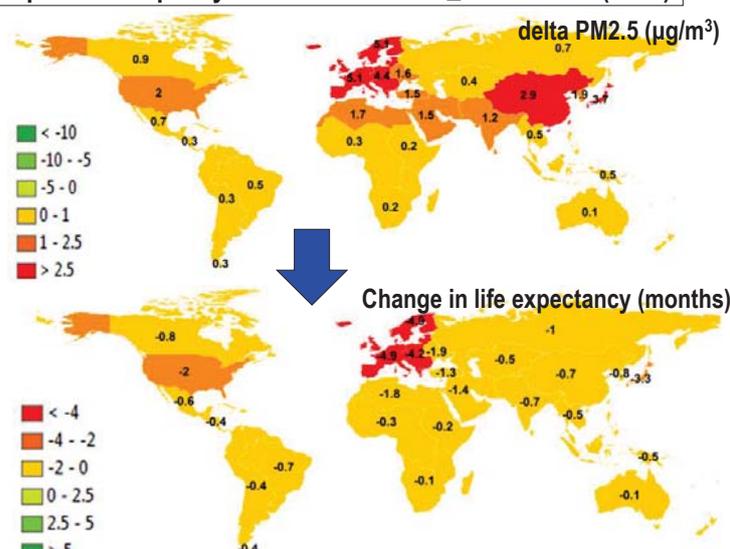
Impacts on air quality and health (TM5-FASST model)

Historical evolution : REF(1970) – REF(2010)



Comparing REF(1970) with REF(2010), a loss in average life expectancy is observed mainly for North America and Europe, while increased life expectancy is found for developing countries (e.g. Asia).

Impact of air quality abatements: STAG_TECH – REF(2010)



- The EURO norms, and fuel quality directives (sulfur), were among the most influential policies impacting air quality globally (e.g. 88% reduction of SO₂ and 50% reduction of PM_{2.5} from road transport exhaust emissions)
- Health Impacts: EU policies increased life expectancy of people in Europe, Japan, USA with several months (e.g. 5 months in Europe, 3.5 months in Japan)

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References: Crippa, M., Janssens-Maenhout, G., Dentener, F., Guizzardi, D., Sindelarova, K., Muntean, M., Van Dingenen, R., and Granier, C.: Forty years of improvements in European air quality: regional policy-industry interactions with global impacts, Atmos. Chem. Phys., 16, 3825-3841, 2016.

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