Impacts des mesures de confinement pendant la crise sanitaire sur la qualité de l’air en Europe
Outline

- The lockdown measures to stop the spread of the COVID-19
- Reductions in air pollutants concentrations based on data: qualitative analysis
- Disentangling the meteorological effect: quantitative analysis
- Impact of the recovery: qualitative analysis
- Conclusions, lessons learned and steps forward
Lockdown measures impacted economic activities and their emissions

**Reductions** in activity and emissions from

- **Transport**: mainly road transport and aviation. To a lesser extent, international shipping
- **Industry**: especially non-critical activities

Probably **no changes** in activity and emissions from

- **Agriculture**

Probable **increase** in the emissions from

- **Residential heating**

Measures implemented around **mid-March 2020**

Measures **differed** across Europe
First indications of reductions in air pollutants concentrations
Qualitative changes in air pollutant concentrations: NO₂

Source: EEA, Air quality and COVID-19
Qualitative changes in air pollutant concentrations: Milan, NO₂

Source: EEA, Air quality and COVID-19
Impact of changes in emissions and meteorology

• Need to disentangle changes due to **emissions** from changes due to **meteorology**

• Analysis in the forthcoming *Air quality in Europe – 2020 report*, performed together with the Copernicus Atmospheric Monitoring Service (CAMS) and the European Topic Centre on Air pollution, transport, noise and industrial pollution (ECT/ATNI)

• **Satellite** derived concentrations and **machine-learning**

• **Up-to-date data** and a generalised additive model (GAM)
  – Observed 2020 concentrations minus “Business-as-usual” 2020 concentrations

• Differences in concentrations from CAMS **chemical transport models** using
  – A “lockdown” emission inventory and a “Business-as-usual” emission inventory
NO$_2$ relative change, satellite data

TROPOMI satellite 2020 observations + machine learning to simulate 2020 without lockdown (BAU)

Average percentage change in NO$_2$ concentrations (obs. – simulated BAU)

Cities > 500 000 inhabitants

15 March – 30 April 2020

General reductions in NO$_2$

Reductions in NO$_2$ concentrations of more than 45 % in
- Spain (Barcelona and Madrid),
- Italy (Milan and Turin)
- France (Marseille),
- Switzerland (Geneva) and
- Turkey (Ankara)
UTD monitoring data + generalised additive model to predict 2020 BAU concentrations (dots)

Chemical transport models with BAU emissions and lockdown emissions (colour background)

April 2020

In *general, reduction* of concentrations; with differences across countries and cities and within cities

Reductions in NO$_2$ stations (**up 70 % at traffic stations** in Spain and Italy)

Highest total reductions in Spain, France, Italy, Portugal

Reductions in background NO$_2$ concentrations of **up to 60 %** (Spain, Italy and France)
UTD data + generalised additive model

Chemical transport models with BAU emissions and lockdown emissions

April 2020

Smaller reductions in PM$_{10}$. Differences across countries, cities and within cities

Up to 35% in traffic stations, in Spain and Italy. High reductions also in France and Norway

Highest total reductions in Spain, Norway, Italy, Austria

Reductions in background PM$_{10}$ concentrations of up to 20% (Italy and France)
Post-lockdown recovery: qualitative assessment

Source: EEA, *Air quality and COVID-19*

**MILAN**
Weekly mean NO₂ concentrations, January-June (weeks 1-23), 2020

**Athens**
Weekly mean NO₂ concentrations, January-June (weeks 1-23), 2020

Average weekly mean NO₂ concentrations by period, showing relative variation compared to 2016-2019 average

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**European Environment Agency**
SOME CONCLUSIONS

- The lockdowns brought reductions in air emissions, mainly from road transport and aviation. Differences in countries
- Consequent reductions in air pollutants concentrations, with robust conclusions from different data and tools
- Differences in the changes, with reductions of NO₂ traffic levels up to 70 %
- Lower reductions in PM₁₀, with maxima in traffic levels of 35 %.
- Increases in the recovery, not always reaching pre-pandemic values

- Possible effect of air pollution on vulnerability and susceptibility to COVID-19; possible role of the air pollution in spreading the SARS-CoV-2 coronavirus, especially indoors
- Further research is needed
Lessons learned and future steps

- Immediate effect on NO$_2$. More complex mechanisms of PM
- Impact on noise levels and greenhouse gases emissions
- Increased public awareness on air pollution
- Risks of the recovery: increases start to show up after relaxation of lockdown measures
- Need of long-term measures to achieve permanent reductions in air pollutants concentrations
- Innovative solutions for mobility; promotion of safe public transport, walking and cycling; teleworking.

- Follow up of the work by EEA in 2021 to include ozone, PM$_{2.5}$ and extend to all 2020
Merci pour votre attention!!

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