

HelmholtzZentrum münchen

German Research Center for Environmental Health

From Air Quality Guidelines to Public Health

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HELMHOLTZ RESEARCH FOR
GRAND CHALLENGES

ERS Late Breaking: WHO 2021 Air Quality Guidelines
22nd September 2021

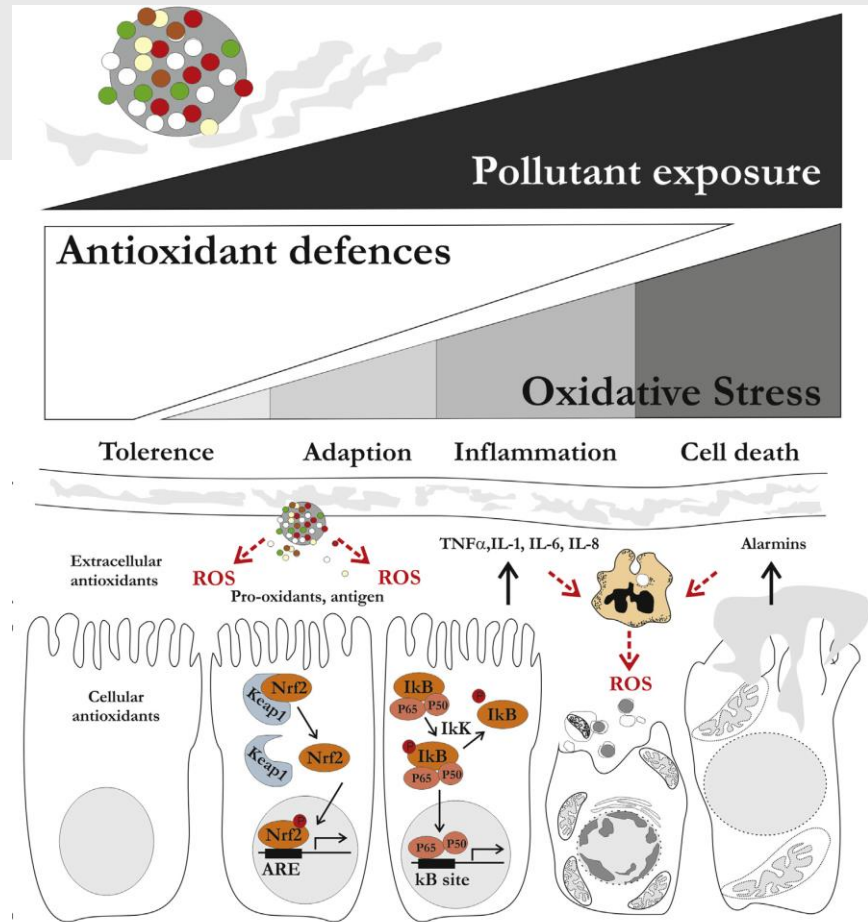
From Air Quality Guidelines to Public Health

- **Health impacts go substantially beyond the outcomes considered**
- Reducing PM, NO₂ and O₃ will reduce other unregulated pollutants
- Guideline implementation will improve health globally and support climate change mitigation



Lung – First line of defense

- All three newly regulated pollutants exhibit oxidative stress
- Air pollution impairs lung growth and functioning and contributes to lung diseases
- Lung health is essential for responding to and mitigating the health impacts of air pollutants

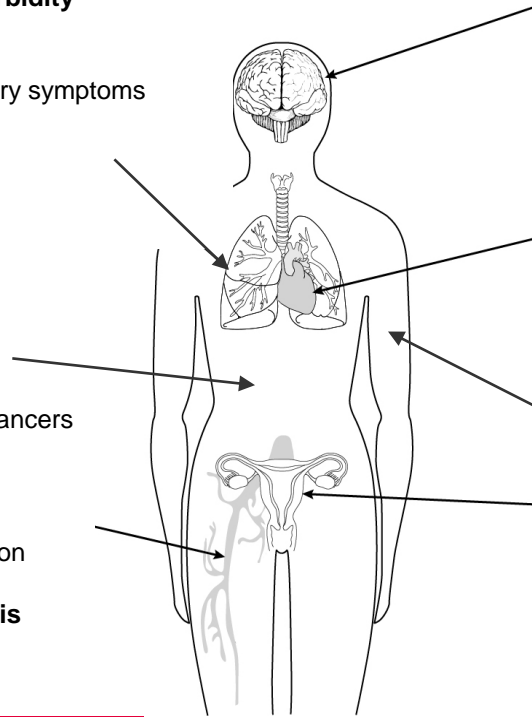


Local and Systemic Health Effects of Air Pollution

- **Respiratory Disease Mortality**
- **Respiratory Disease Morbidity**
- **Lung Cancer**
- **Pneumonia**
- Upper and lower respiratory symptoms
- Airway inflammation
- Decreased lung function
- Decreased lung growth

- Insulin Resistance
- **Type 2 diabetes**
- **Type 1 diabetes**
- Bone metabolism
- Liver functioning
- Liver and digestive tract cancers

- **High blood pressure**
- Endothelial dysfunction
- Increased blood coagulation
- Systemic inflammation
- **Deep Venous Thrombosis**



- **Stroke**
- Neurological development
- Mental Health
- **Neurodegenerative diseases**

- **Cardiovascular Disease Mortality**
- **Cardiovascular Disease Morbidity**
- **Myocardial Infarction**
- **Arrhythmia**
- **Congestive Heart Failure**
- Changes in Heart Rate Variability
- ST-Segment Depression

- Skin Aging

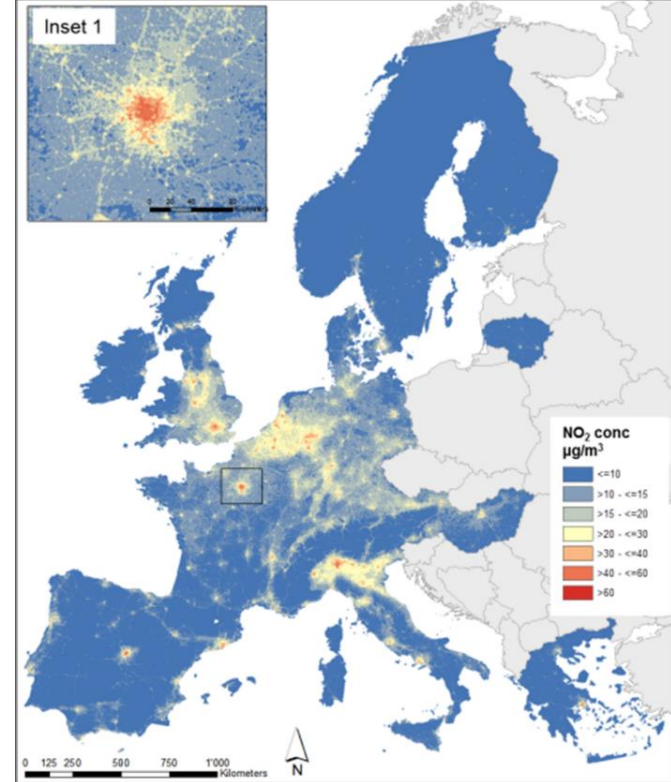
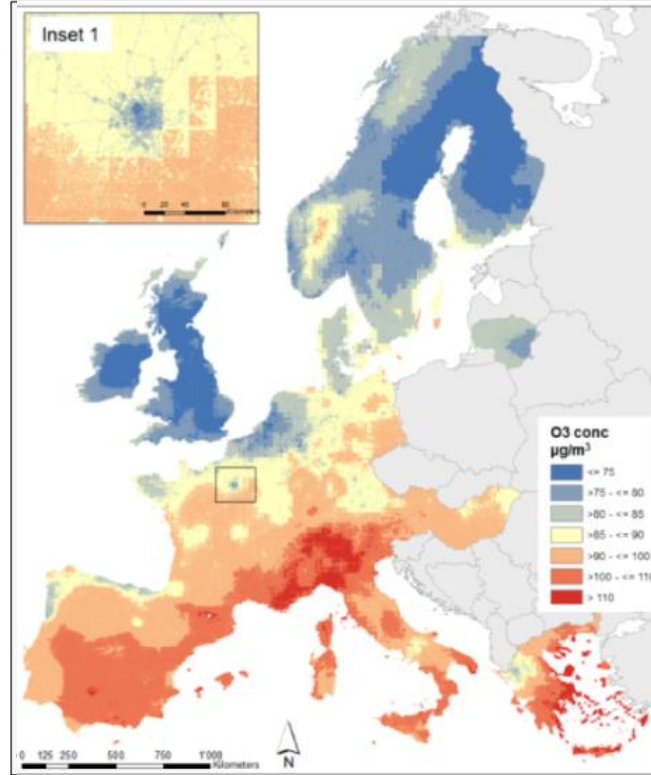
- **Premature Birth**
- **Decreased Birth Weight**
- Decreased foetal growth
- In uterine growth retardation
- Decreased sperm quality
- Preclampsia

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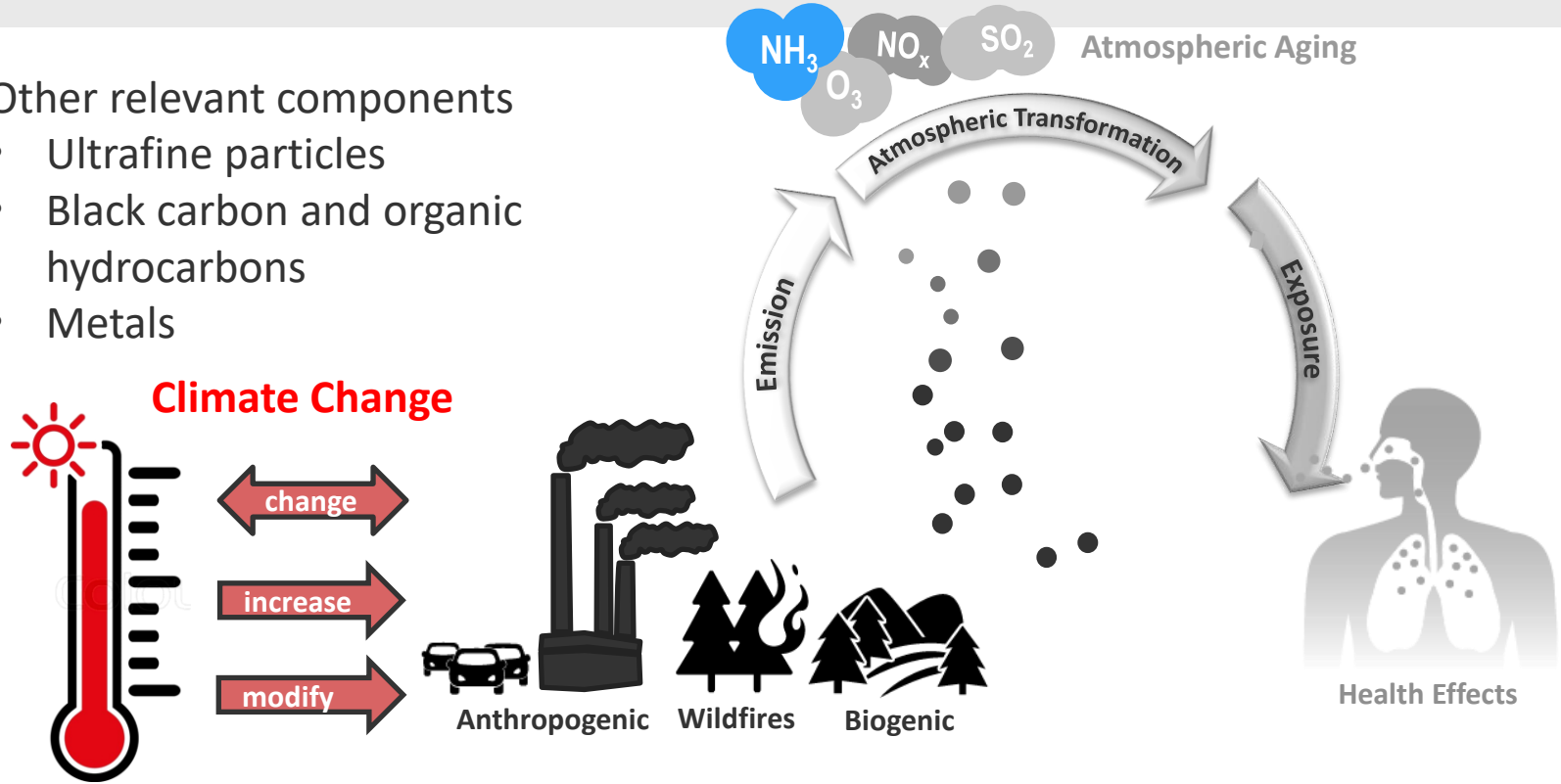
Air Pollution in Europe



Air Pollution is a complex mixture

Other relevant components

- Ultrafine particles
- Black carbon and organic hydrocarbons
- Metals

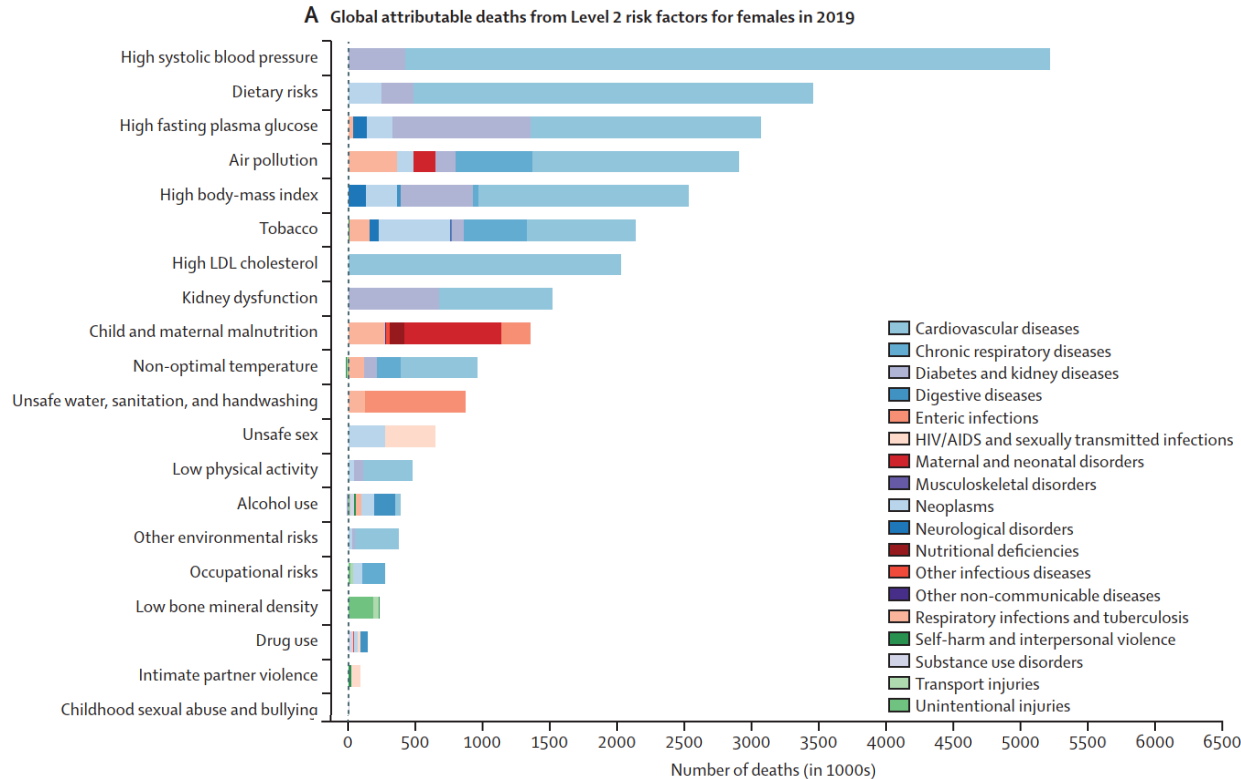


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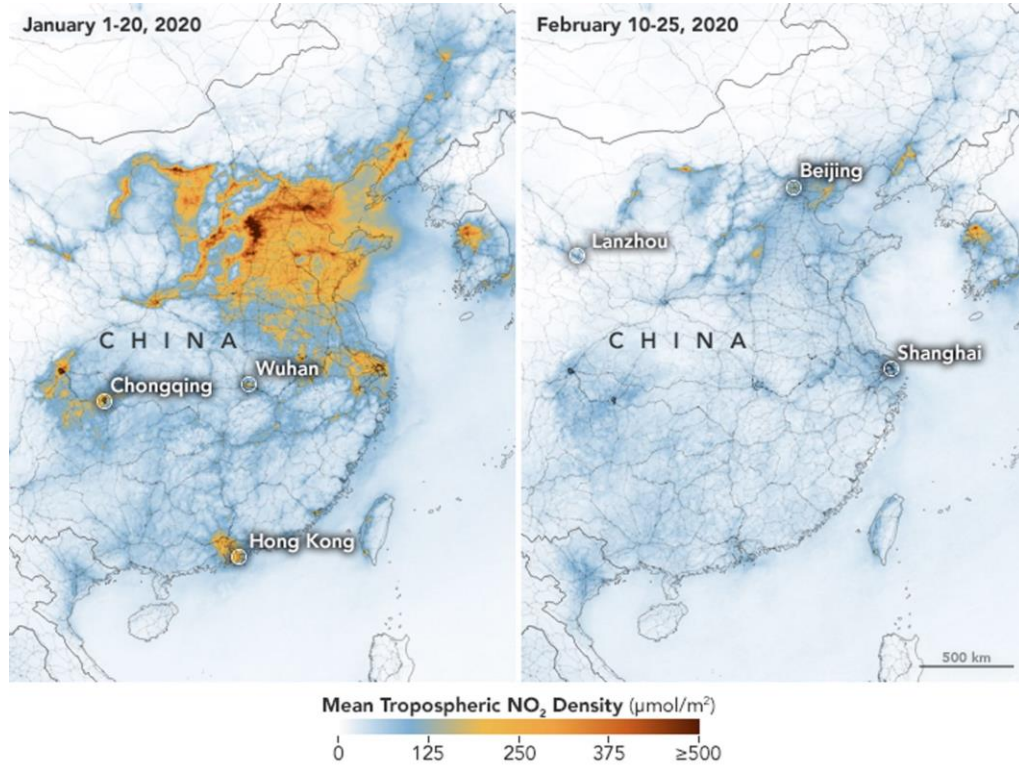
Ambient Air Pollution - 4th leading cause of death globally



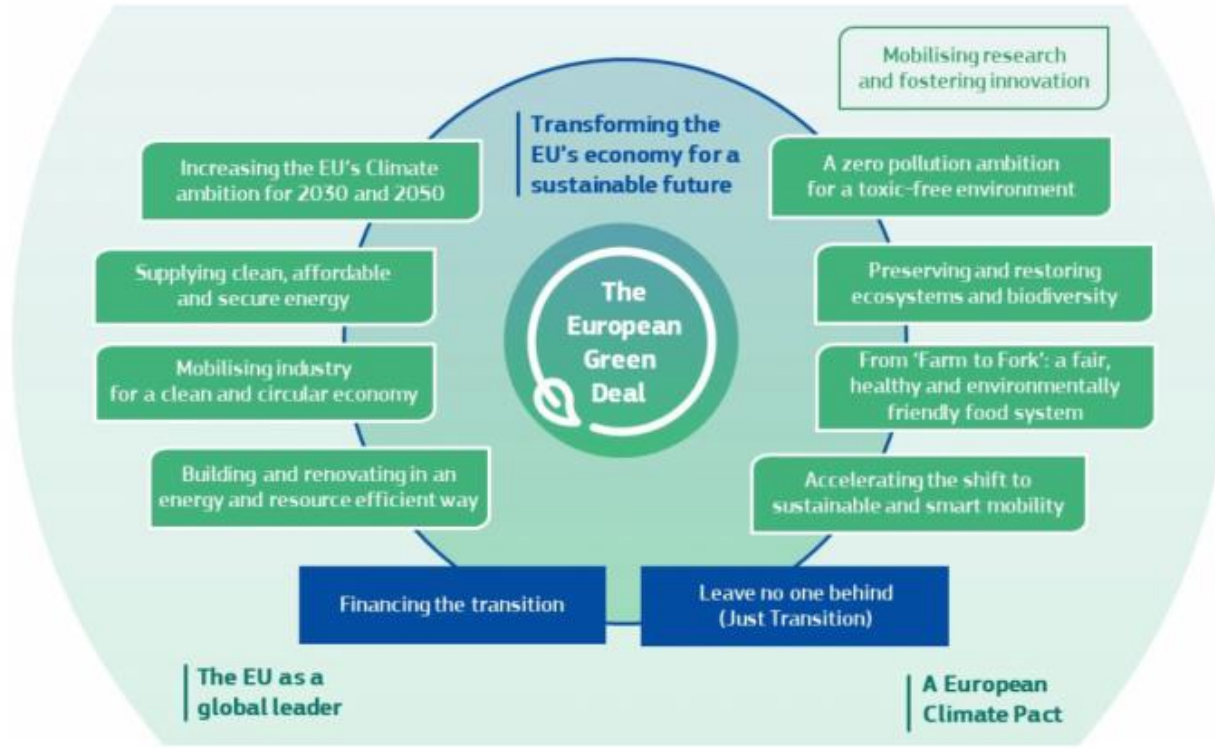
It is time to act in Europe

		WHO 2005 Air Quality Guidelines	WHO 2021 Air Quality Guidelines	EU Air Quality Directives – Limit Values
PM_{2.5}	Annual	10 µg/m ³	5 µg/m ³	25 µg/m ³
PM_{2.5}	Daily (24-hour)	25 µg/m ³	15 µg/m ³	-
PM₁₀	Annual	20 µg/m ³	15 µg/m ³	40 µg/m ³
PM₁₀	Daily (24-hour)	50 µg/m ³	45 µg/m ³	50 µg/m ³
NO₂	Annual	40 µg/m ³	10 µg/m ³	40 µg/m ³
NO₂	Daily (24-hour)	-	25 µg/m ³	50 µg/m ³

Reduced Air Pollution during the Corona Epidemic



Improve Public Health through Air Pollution Mitigation



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