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Health and Economic Benefits of Energy, Urban Planning, and Food Interventions that Lower Greenhouse Gas Emissions

EBBA MALMQVIST





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Estimated health benefits of exhaust free transport in the city of Malmö, Southern Sweden

The scenario of non-exhaust transport?



Calculated by removing exhaust emissions from transport but keeping all other emissions the same.



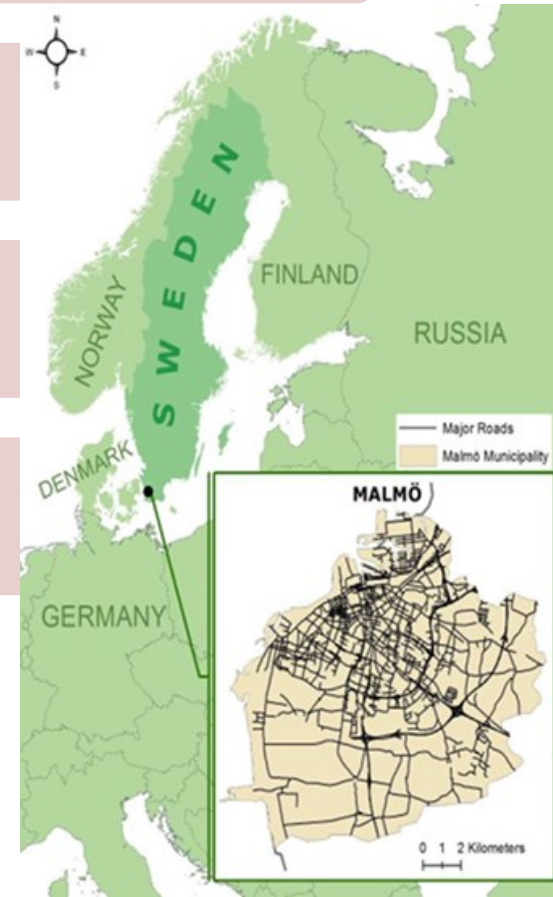
Transport by bikes or by walking



Transport by electric cars

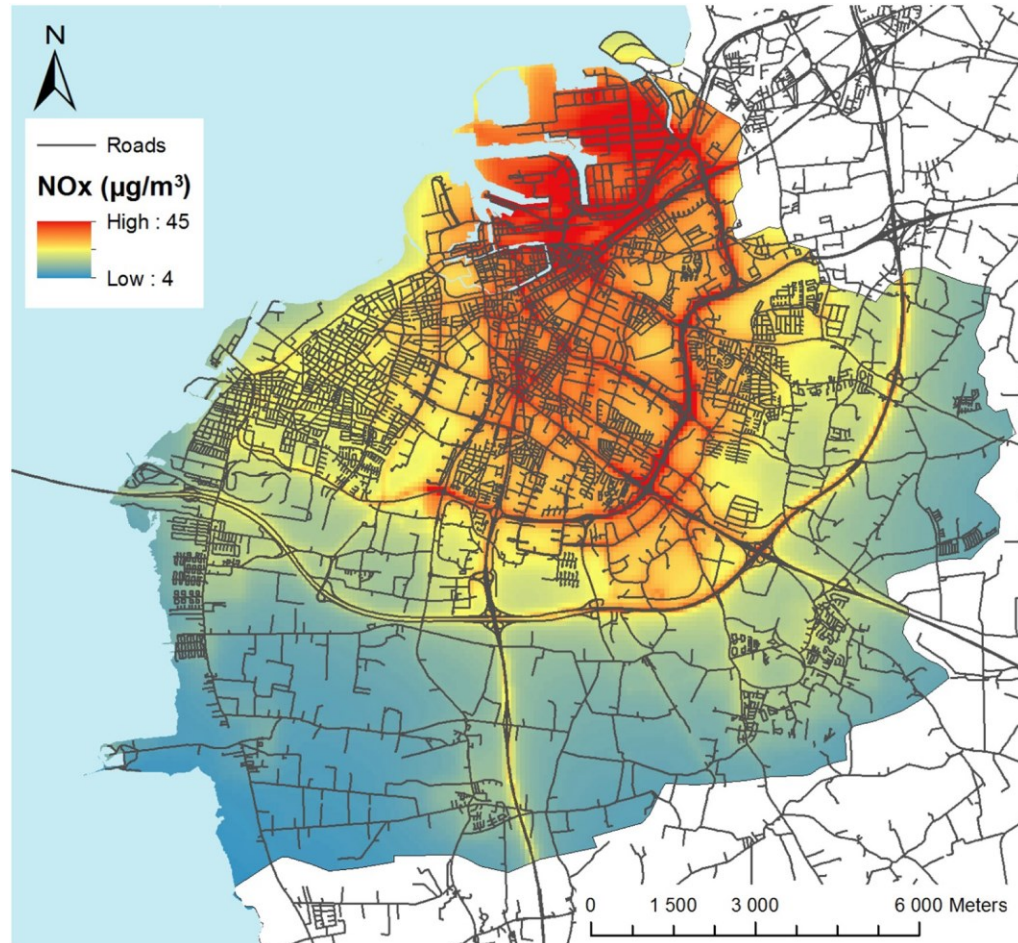


Transport by electric buses



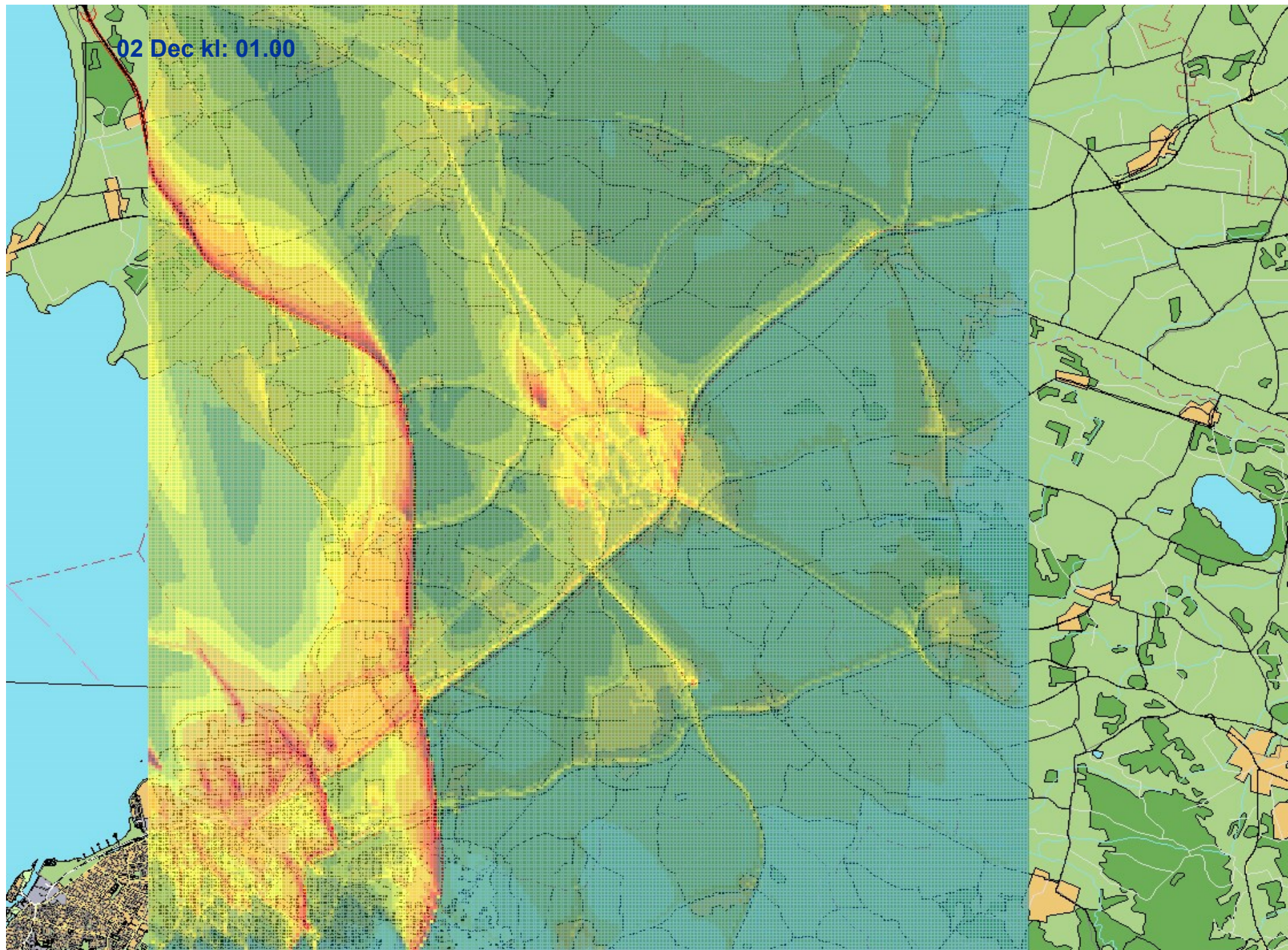
Dispersion model

Emission database for NO_x

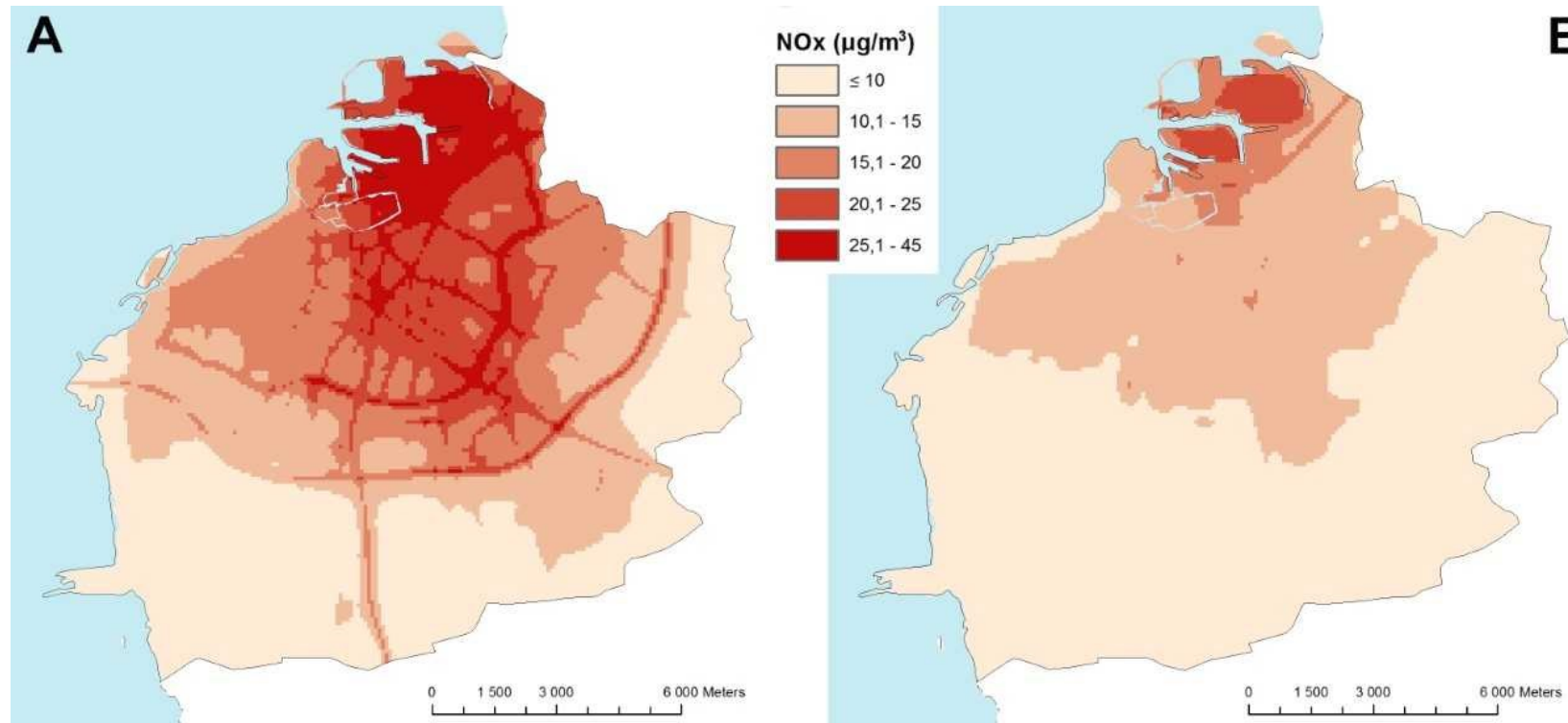


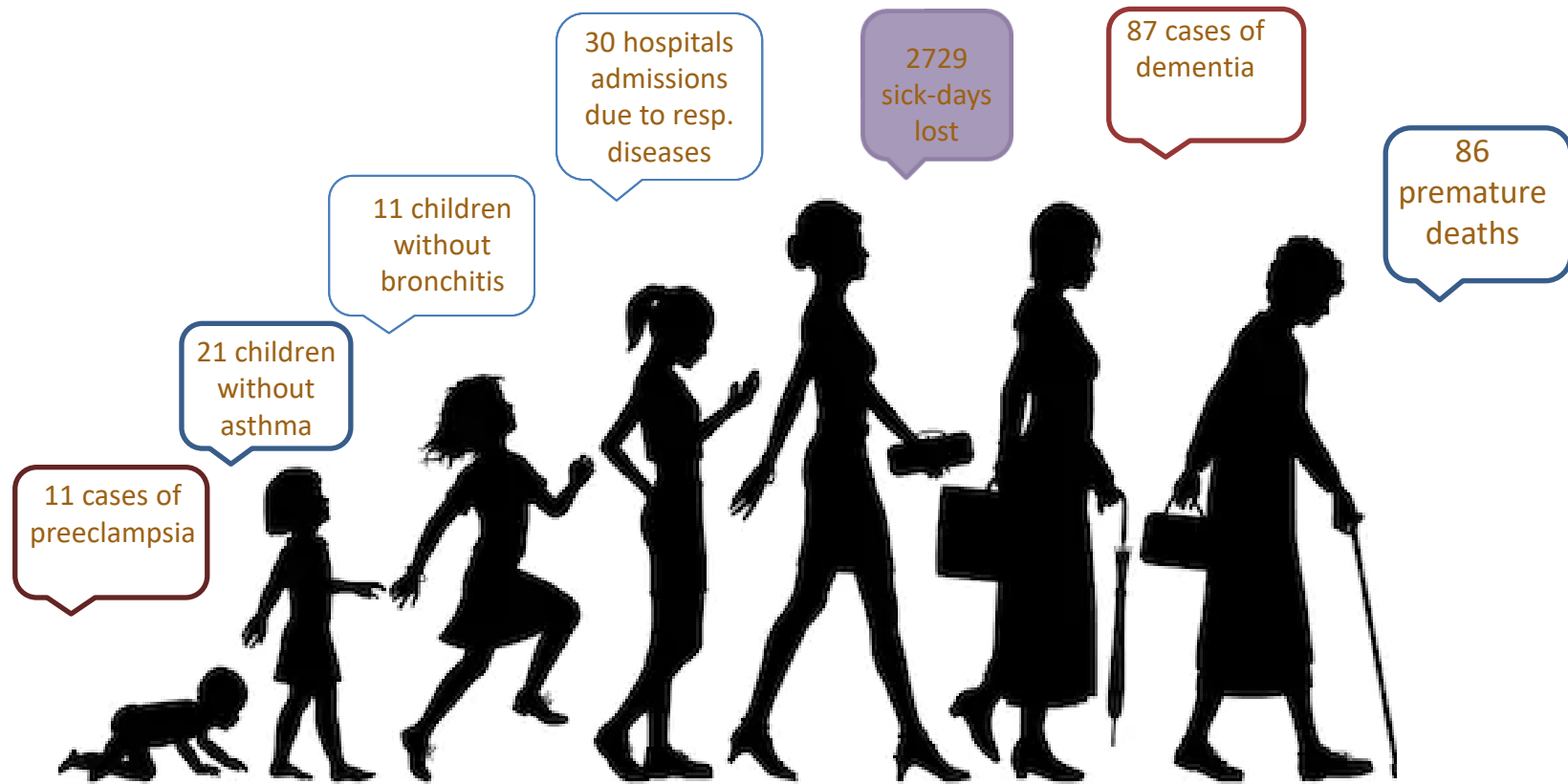
- Based on 24 000 sources
Roadtraffic, ships, aviation, railroad, industries, power plants, small scale heating and working machines
- Even emissions from outside Scania
- Meteorological data.
- Dispersion calculations AERMOD
- Resolution:
Spatial 100x100m
Temporal hourly
- Validated against monitored data

02 Dec kl: 01.00



Hypothetical reduction of NO_x by implementing exhaust-free transports






Based on morbidity/mortality for one year and the cases/death that would have been avoided if the current air pollution levels reduced due to implementation of non-exhaust transport.





The true health costs of diesel trucks also include the impact of extracting and refining



Real-life scenario in Stockholm


Original Research Article | Environment And Air Pollution  Free

Associations of improved air quality with lung function growth from childhood to adulthood: the BAMSE study

Zhebin Yu | Simon Kebede Merid | Tom Bellander | Anna Bergström | Kristina Eneroth | Antonios Georgelis | Jenny Hallberg | Inger Kull | Petter Ljungman | Susanna Klevebro | Massimo Stafoggia  | Gang Wang | Göran Pershagen | Olena Gruzieva  | Erik Melén  [See Less](#) 

European Respiratory Journal 2023 61(5): 2201783; DOI: <https://doi.org/10.1183/13993003.01783-2022>

- Air pollution has improved over the last 20 years in Stockholm, but not equally
- Lung function improved the most in areas where air pollution has improved the most

► Environ Epidemiol. 2025 Jul 1;9(4):e404. doi: [10.1097/EE9.0000000000000404](https://doi.org/10.1097/EE9.0000000000000404) 

Health and economic benefits of energy, urban planning, and food interventions that lower greenhouse gas emissions

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Method

In this commentary, we selected 11 illustrative examples from seven different countries to illustrate how public health improvements can motivate climate actions.

Pathfinder Initiative Climate & Health Evidence Bank, searched published literature on air quality interventions and health benefits, and engaged with a network of subject-matter experts to solicit relevant insights.

We document the benefits by assessing the health impacts of these interventions.

Economic and financial assessment of these interventions that evaluates and compares the overall costs, savings, and benefits is reported when possible to demonstrate overall cost-effectiveness and net benefits.

Shenango Coke Works plant closure

1. Local emission reduction due to the closure of steel industry coking plant used in Pittsburgh, PA—In 2016, the Shenango Coke Works plant was closed, eliminating an estimated 1.3 million tons/yr of CO₂ emissions⁹⁻¹¹ and improving air quality for the surrounding community.

The community pressure and the decline of the domestic steel industry hastened the shutdown.¹²

Health improvements:

Over the 3 years after the shutdown:

- 6,744 fewer cardiovascular emergency department visits.
- 724 fewer cardiovascular hospitalizations¹³ in the local community.

Mortality avoided: not reported.

Health improvements:

Over the 3 years after the shutdown:

- US\$7,830,000 emergency room medical cost savings¹⁴
- US\$12,249,000 hospitalization medical cost savings plus productivity gains¹⁴ in the local community.

Mortality avoided: not reported.

Coal power plants' closure in Chicago

2. Local emissions reductions due to the closure of three coal-fired power plants in Chicago, USA—In 2012, these closures resulted in health and economic benefits for neighboring communities, in particular for children under the age of 4.

Local community members had long been concerned about the pollution and health risks. ¹⁵

Health improvements:
In the 5 years after the closure, on an annual basis:

- 406 fewer asthma emergency room visits (children under age 4) per year. ¹⁶
- 363 fewer school absence days per year. ¹⁷

Mortality avoided:

- A study of retired US coal-fired plants (1999–2013) found 1.7% lower monthly mortality rate (age >65) and 3.6% lower age-adjusted mortality per closure relative to control counties. ¹⁸

Health improvements:

In the 5 years after the closure, on an annual basis:

- US\$217,000 emergency room medical cost savings per year.
- US\$431,000 parental productivity gains and improved learning per year. ¹⁹

Mortality avoided: not reported.



London Low Emission Zones

London Low Emission Zones—In 2003, London implemented a low-emission zone (LEZ) and a Congestion Charging Scheme (CCS) to reduce congestion and air pollution in urban areas. A Low Emission Zone covers most of Greater London, with the Ultra Low Emission Zone (ULEZ) implemented in 2019 and expanded from 2021 onwards. ULEZ has reduced road traffic and has reduced NO₂ by 12.4% and PM₁₀ by 27% since 2019.³¹

The LEZ initially faced resistance, with only 39% of residents supporting it before its implementation in 2003. However, public support rose to 59% within months, due to reduced traffic and livability.³²

Health improvements:

- ~1.1 million air pollution-related hospitalizations avoided by 2050.³³
- 8% reduction in asthma and bronchitis.
- 12 cases per 10,000 persons reduction in respiratory admissions.³⁴
- 6.5% reduction in anxiety.³¹
- 18% reduction in sick leave.³¹

Mortality avoided:

- 183 years of life per 100,000 population.
- 1888 years of life were gained.³⁵

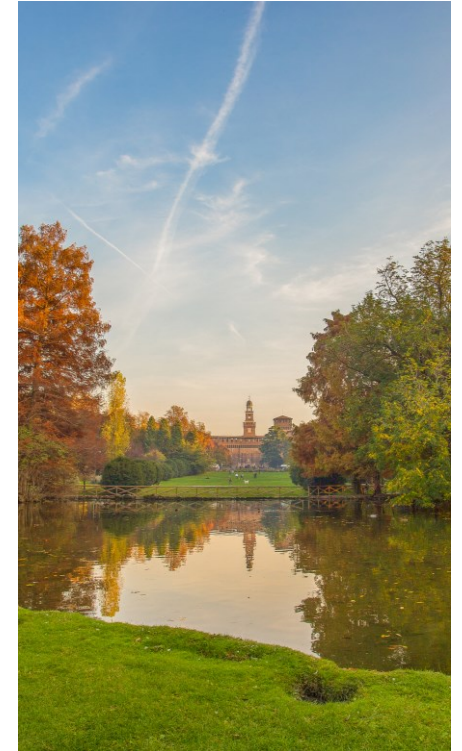
Health improvements:

- ~UK£15 billion in savings by 2050 for reduced hospitalizations.³³
- UK£480 million in yearly savings for COPD.
- UK£15.5 million in yearly savings for sick leave.³⁴
- After accounting for costs and revenues, the net benefit is ~>UK£963 million in Greater London.³⁴

Conclusions

- Many of these case studies underestimate the value of the health benefits because they did not consider the value that individual members of the public place on averting these health effects, including avoiding associated pain and suffering. Indeed, reducing asthma incidence may be valued by people at 10 times more than the averted medical costs and productivity losses alone.[57](#)
- Further replication of such public policy interventions as we present here can lead to improved health and economic outcomes that will, in turn, help us learn from the success of others, inspiring still more such actions.

Now is the time to showcase how and why we cannot wait and to enable government and policymakers to improve the lives of their constituents, while also protecting our planet, the only home future generations will have.





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