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Reducing carbon dioxide emissions from urban road traffic requires both technological and local measures

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About the research

Urban road traffic contributes about 10% of all European carbon dioxide (CO_2) emissions. Within the European-funded project *Urban Reduction of Greenhouse Gas Emissions in China and Europe (URGENCHE)*, a study was conducted on the impact on air quality of CO_2 reduction measures in urban road traffic.

Case studies included: the introduction of biofuels in Kuopio (Finland); extending the metro system in Thessaloniki (Greece) and Xi'an (China) to increase the level of public transport; a 10% reduction of private cars and the introduction of 50% electric-powered private cars in Rotterdam (the Netherlands), Basel (Switzerland), Xi'an and Suzhou (both China); and a combination of these traffic measures in Stuttgart (Germany).

The potential effects in 2020 from these scenarios on CO_2 emissions from road traffic and on air quality were compared to a "business-as-usual" scenario in 2020. This was examined in reference to 2010 figures, enabling health impact assessments to be produced for each city in 2010 and 2020.

This research examines the contribution of road traffic to CO_2 emissions in 2010 and 2020 in five European and two Chinese cities and the impact of CO_2-reduction measures on air quality and health.

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Policy implications

- **The implementation of more stringent national CO_2 emission standards (zero-emission) for road traffic is the most effective measure to reduce CO_2 emissions from urban road traffic. This is beyond the control of local authorities and requires action at the level of the European Union and the central Chinese Government.**
- **The most effective local policy to reduce CO_2 emissions and improve air quality, health and well-being is to facilitate and stimulate physical (cycling, walking) and public transport. Such measures and policies are within the control of local authorities.**

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Key findings

- Compared to 2010, traffic-related CO_2 emissions will stabilise in the European cities and will increase by approximately 40% in the Chinese cities in 2020.
- Air pollution of soot, nitrogen dioxide (NO_2) and particulate matter ($PM_{2.5}$ and PM_{10}) concentrations in the Chinese cities are a factor 3 to 5 higher than in the European cities in 2010 and 2020.
- Over the period 2010-2020 air pollution emissions will reduce due to cleaner technology in all sectors, both in China and Europe. In Europe, this will result in lower concentrations of all pollutants. In China, pollutant concentrations are likely to remain constant for particulate matter ($PM_{2.5}$ and PM_{10}), to decrease for soot (elemental carbon) and to increase for nitrogen dioxide (NO_2) as a result of economic growth (see 'further information' for an explanation of the pollutants).
- Stringent national emission standards (zero CO_2 emissions) are more effective than local measures in Europe and China.

Further information

In this study, the annual average concentrations of nitrogen dioxide (NO_2), particulate matter ($PM_{2.5}$ and PM_{10}) and soot (elemental carbon) were modelled in all cities for 2010 and 2020. The air pollutants NO_2, $PM_{2.5}$ and PM_{10} are regulatory components in Europe and China, while elemental carbon is a sensitive indicator for exhaust emission from road traffic. The population-weighted average for each pollutant was derived per city and used for health impact assessment in 2010 and 2020.

This urban road traffic-focused study forms part of the *Urban Reduction of Greenhouse Gas Emissions in China and Europe (URGENCHE)* project. Other studies have covered themes: housing and energy; and cities: five in Europe and two in China.

You can visit the project website: urgenche.eu

For further reading on this topic please see: Keuken M.P., Jonkers S., Verhagen H.L.M., Perez L., Trüeb S., W.-J. Okkerse, Liu J., Pan X.C., Zheng L., Wang H., Xu R., Sabel C. (2014) "Impact on air quality of measures to reduce CO_2 emissions from road traffic in Basel, Rotterdam, Xián and Suzhou." Atmospheric Environment 98:434-489

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