



The multi-scale character of air pollution: impact of local measures in relation to European and regional policies – a case study in Antwerp, Belgium

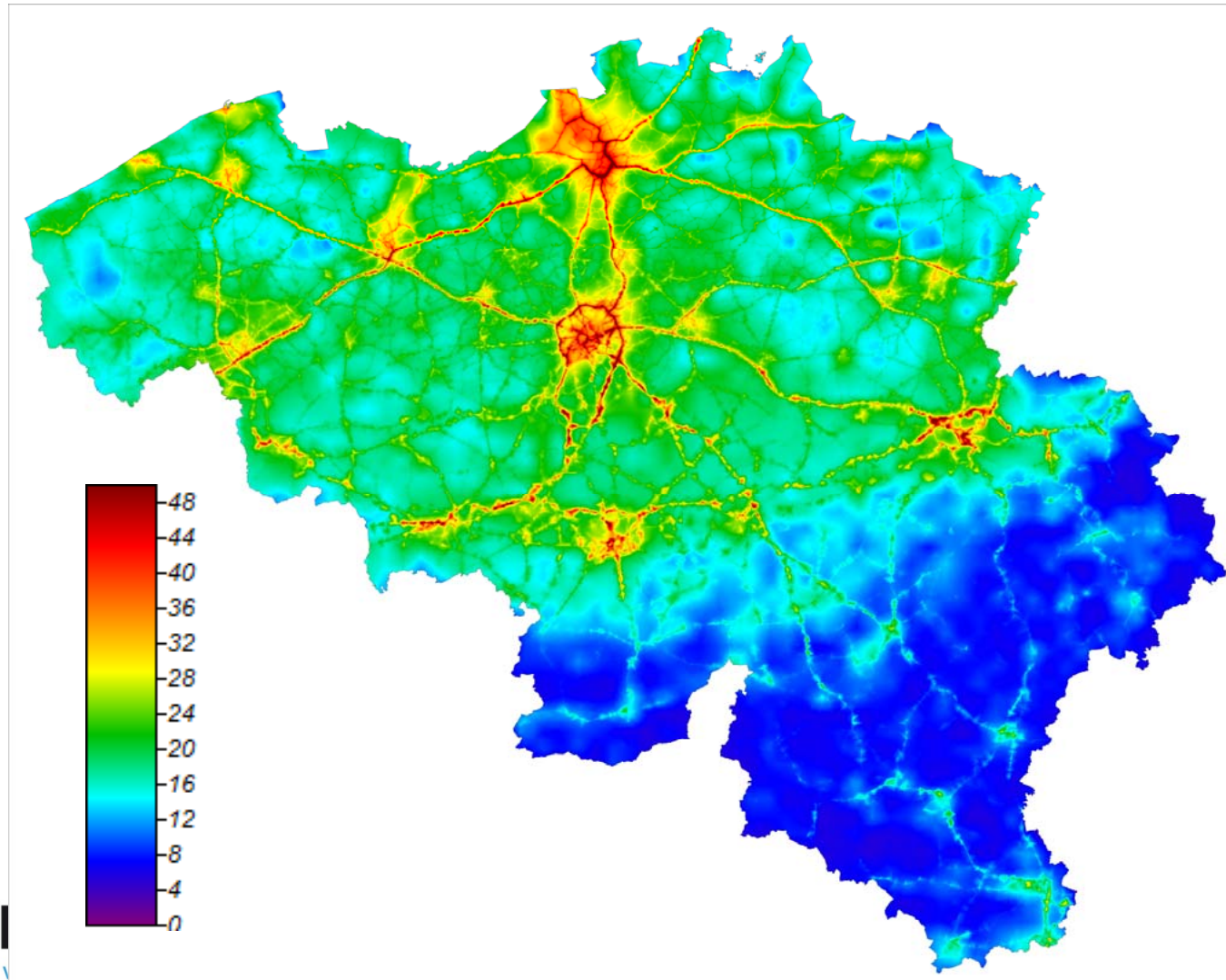
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HAMRO 15 – May 6 - 9, 2013 – Madrid, Spain

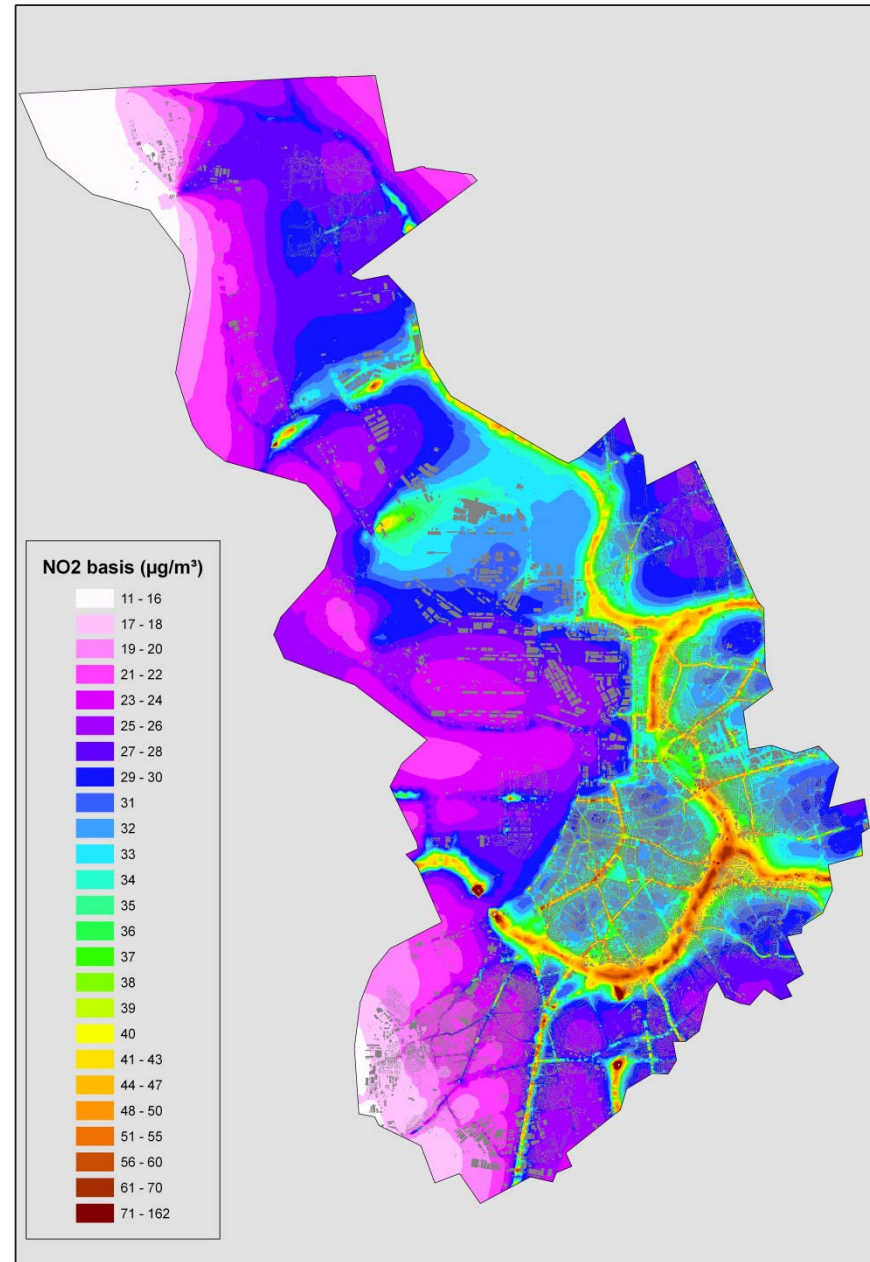
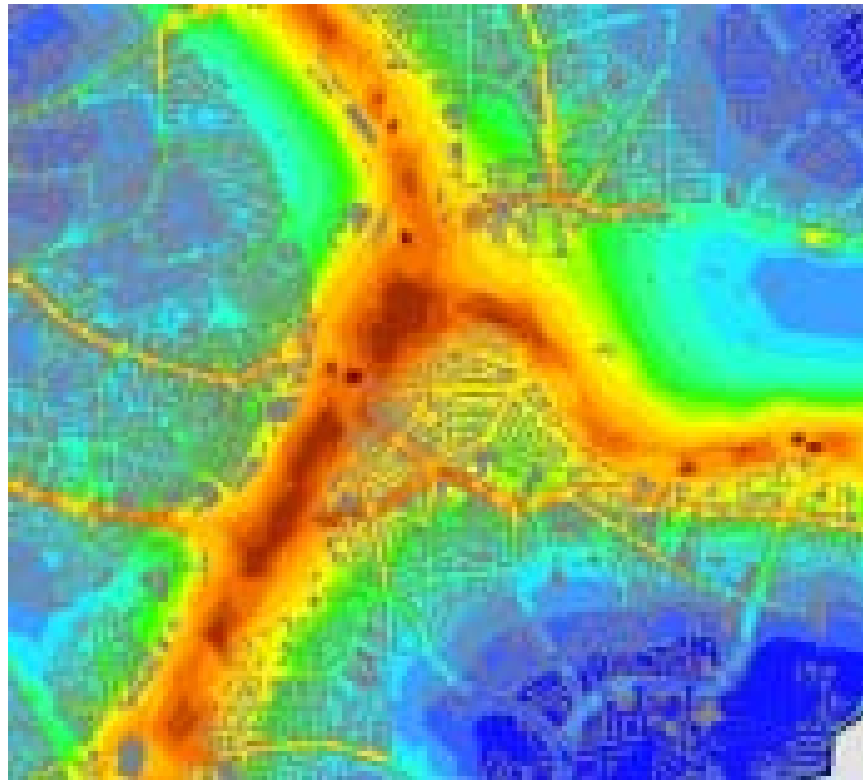
Content

- » The air pollution problem in Antwerp
- » Possible solution: covering the ring road
- » Methodology
- » Results
- » Conclusions

Air Quality map of Belgium



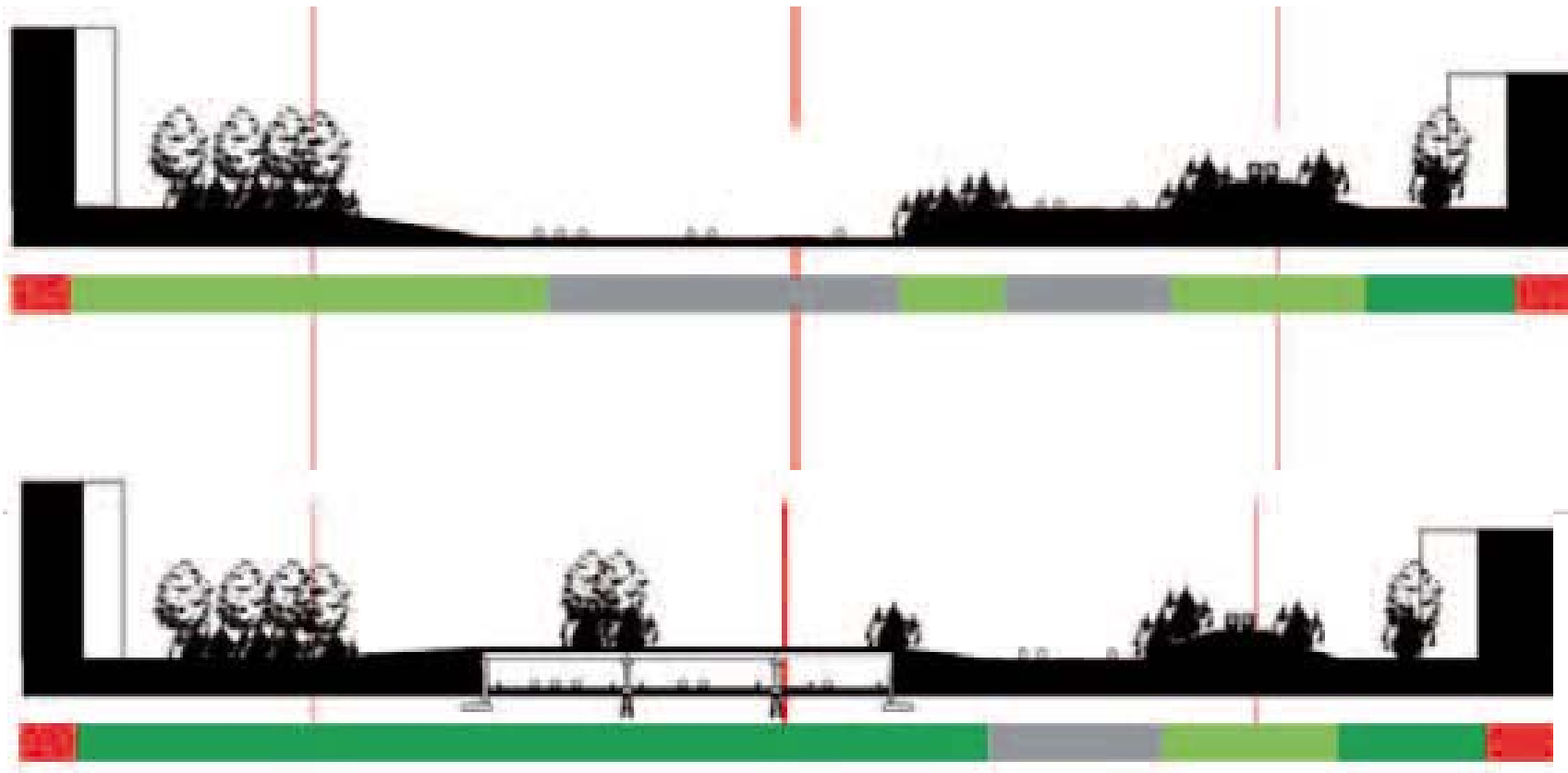
Hot spot Antwerp



Major cause of Antwerp's air pollution...



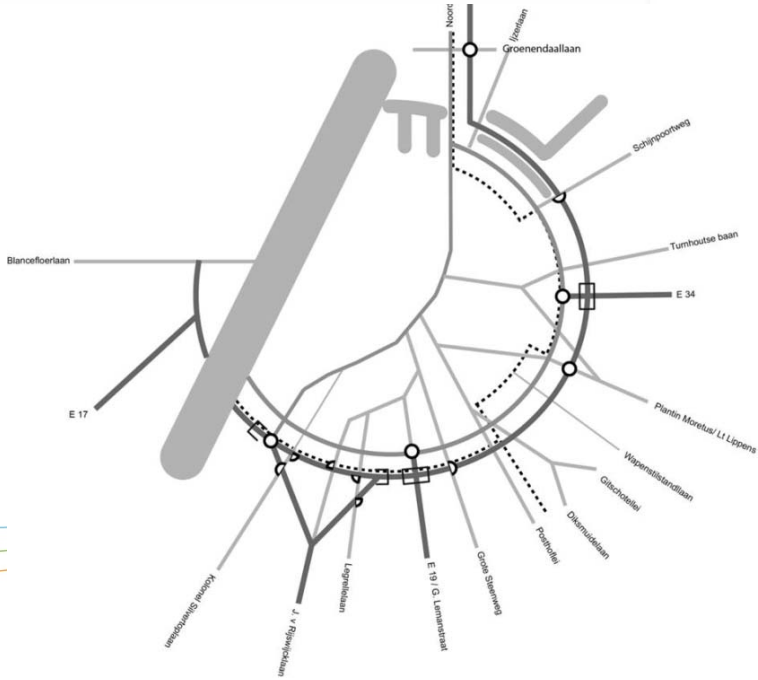
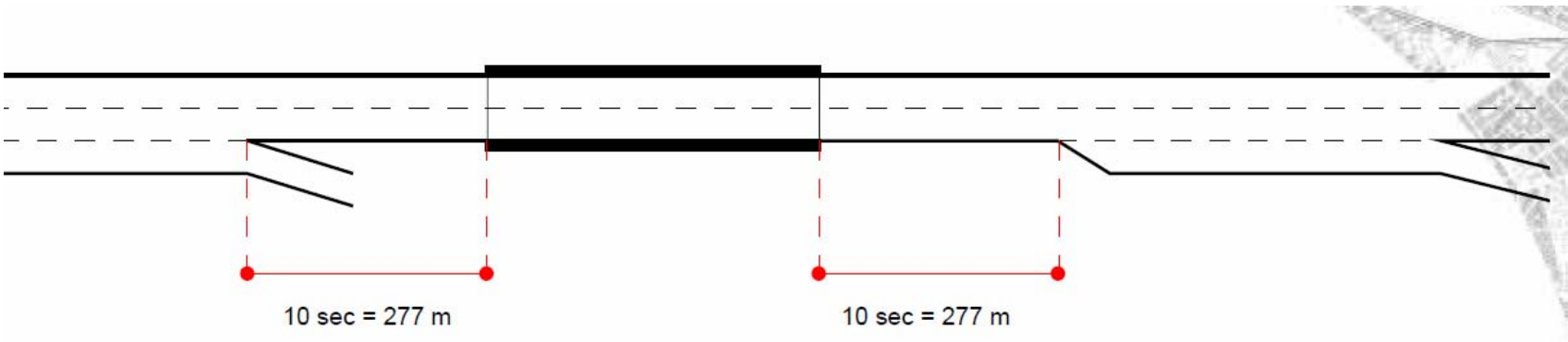
Solution: Coverage of the Ring road



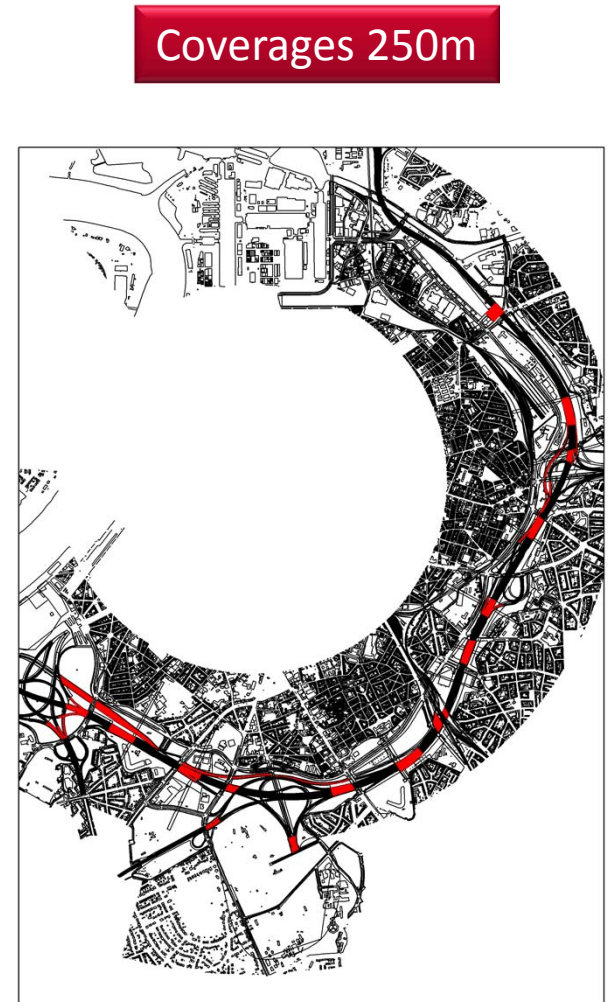
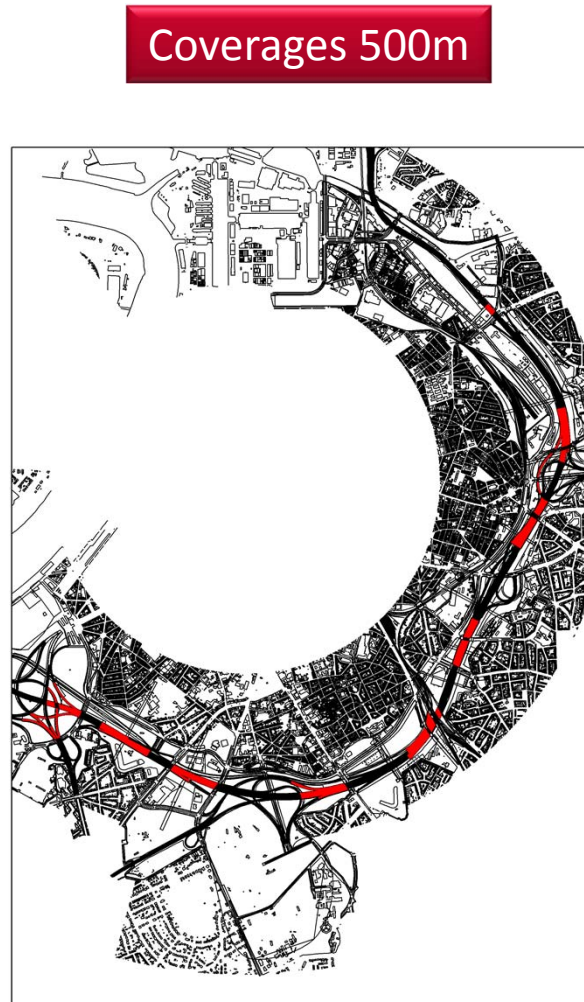
Coverage of the ring road: feasible option?

- » Multi disciplinary impact assessment
 - » Air Quality
 - » Noise
 - » Mobility
 - » Urban development & urban green
 - » Engineering
 - » Financial
 - » Legal

European Tunnel Directive



What is a tunnel?



Multi disciplinary impact assessment

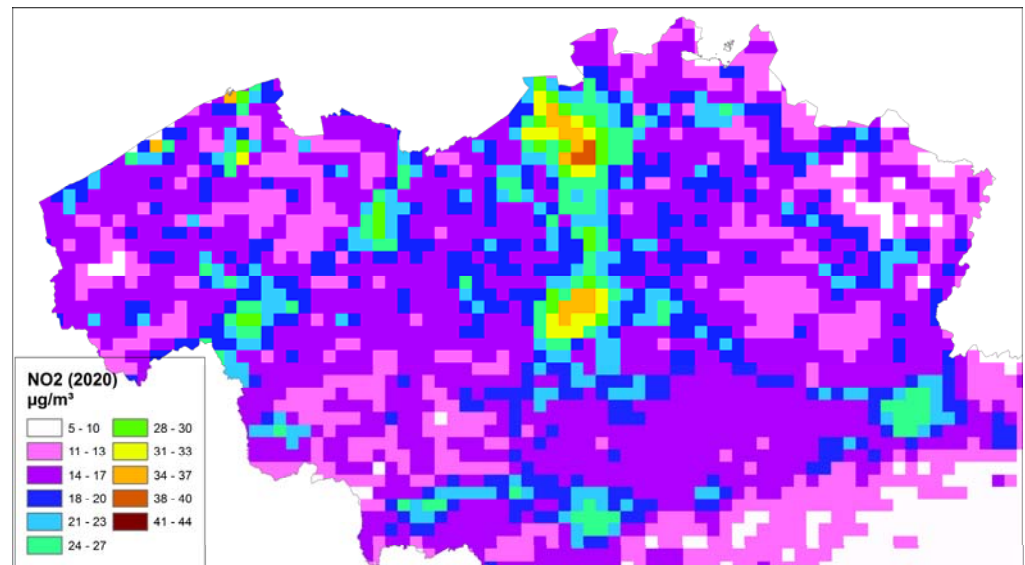
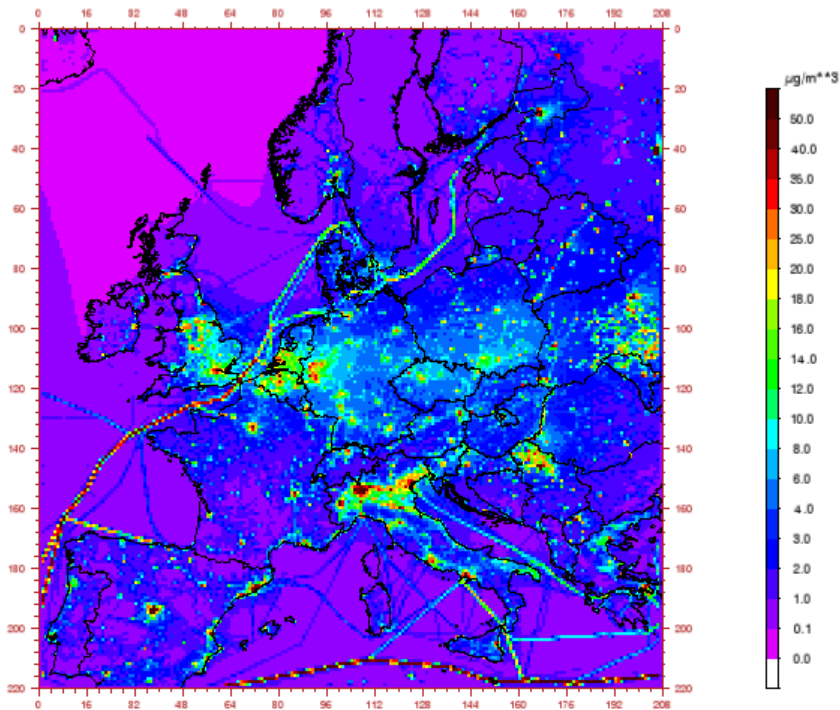
- » Air Quality
- » Noise
- » Mobility
- » Urban development & urban green
- » Engineering
- » Financial

- » Air Quality:
 - Will EU air quality standards be met in 2020?
 - Take into account all relevant policies at EU, national and regional level

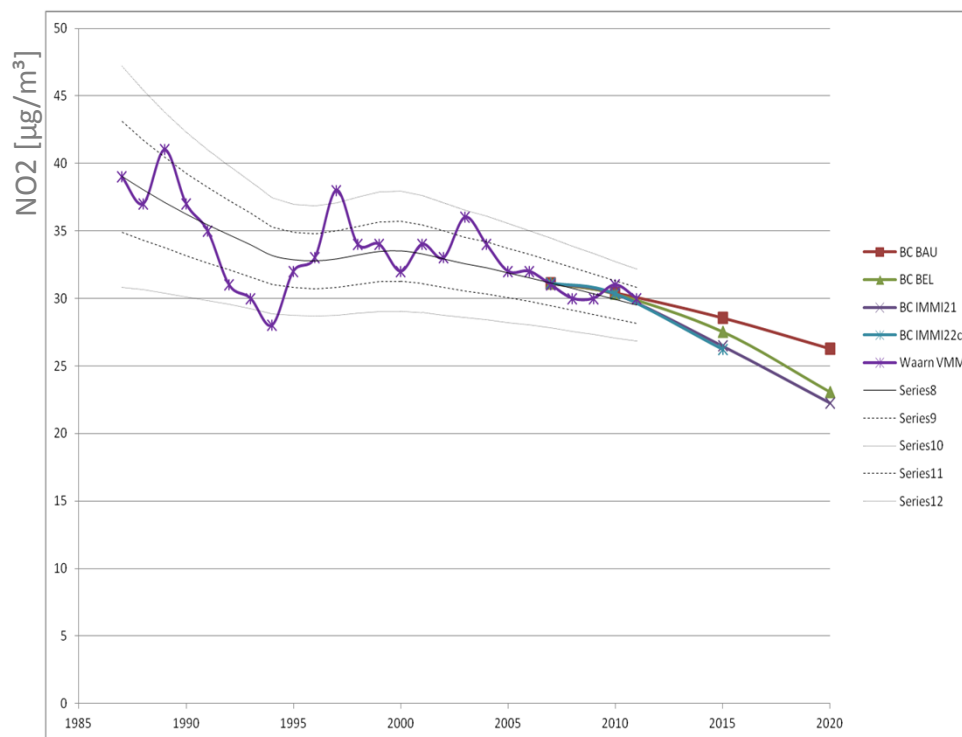
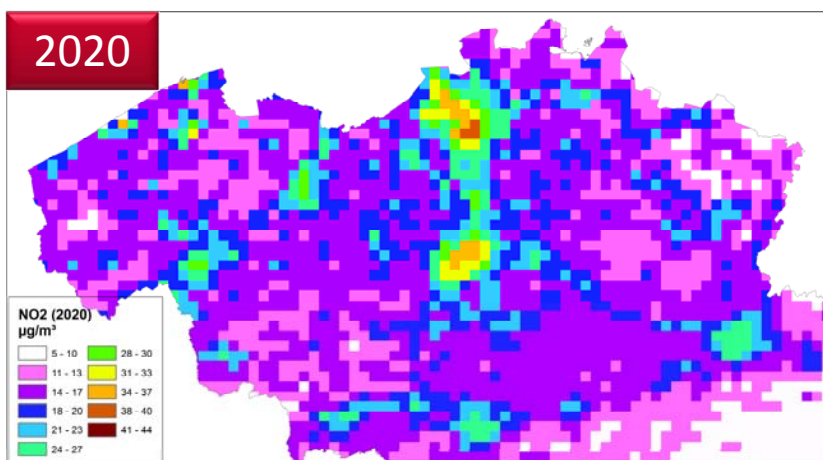
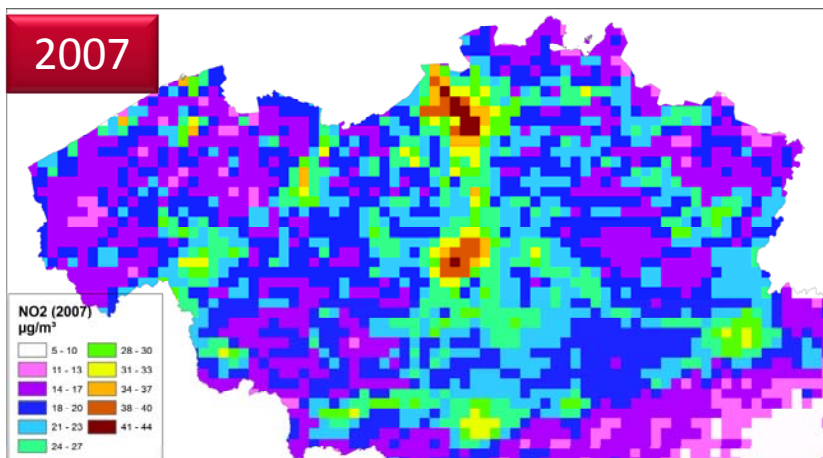
Air Quality in 2020...

EU policies

National and regional policies

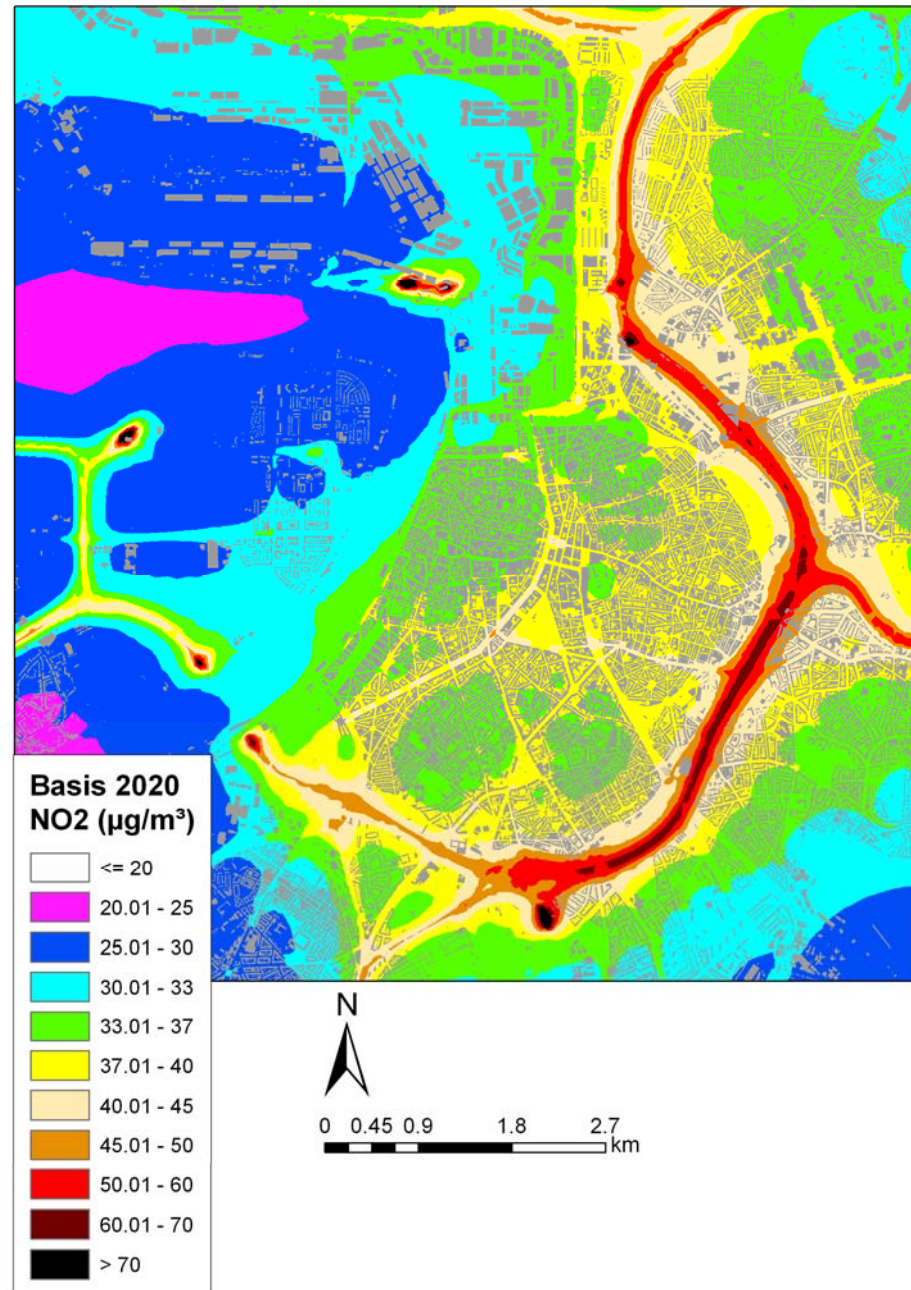


Calibration of the regional NO₂ trends

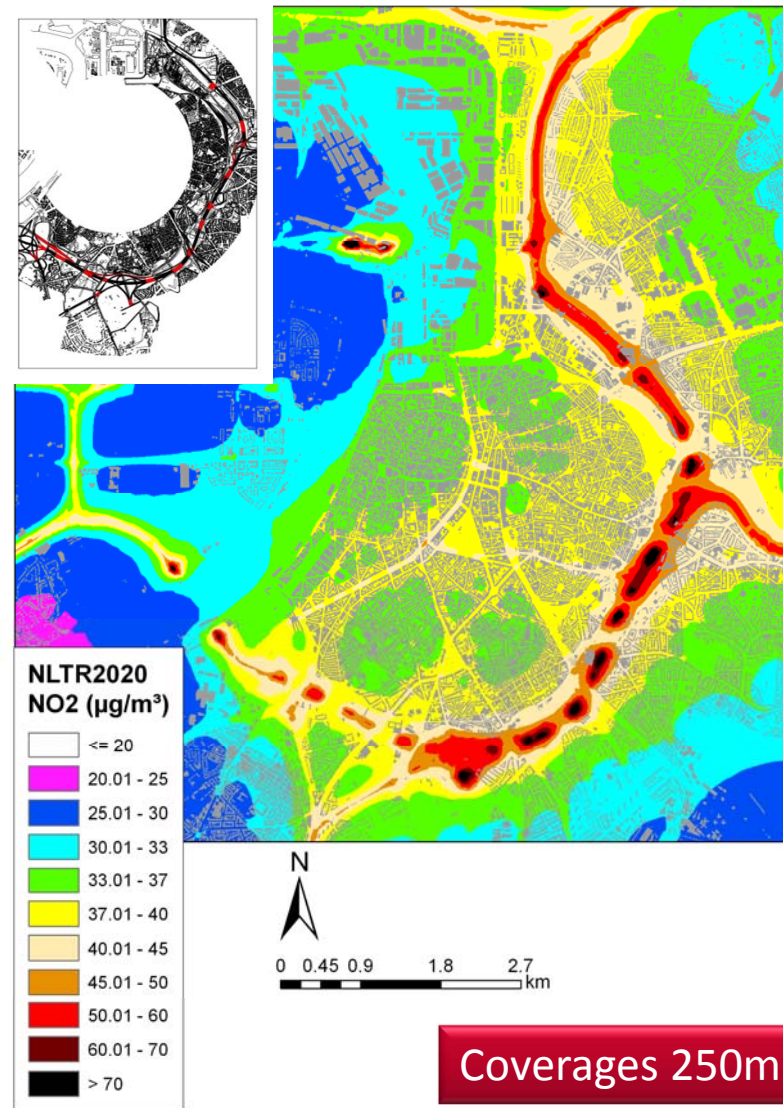
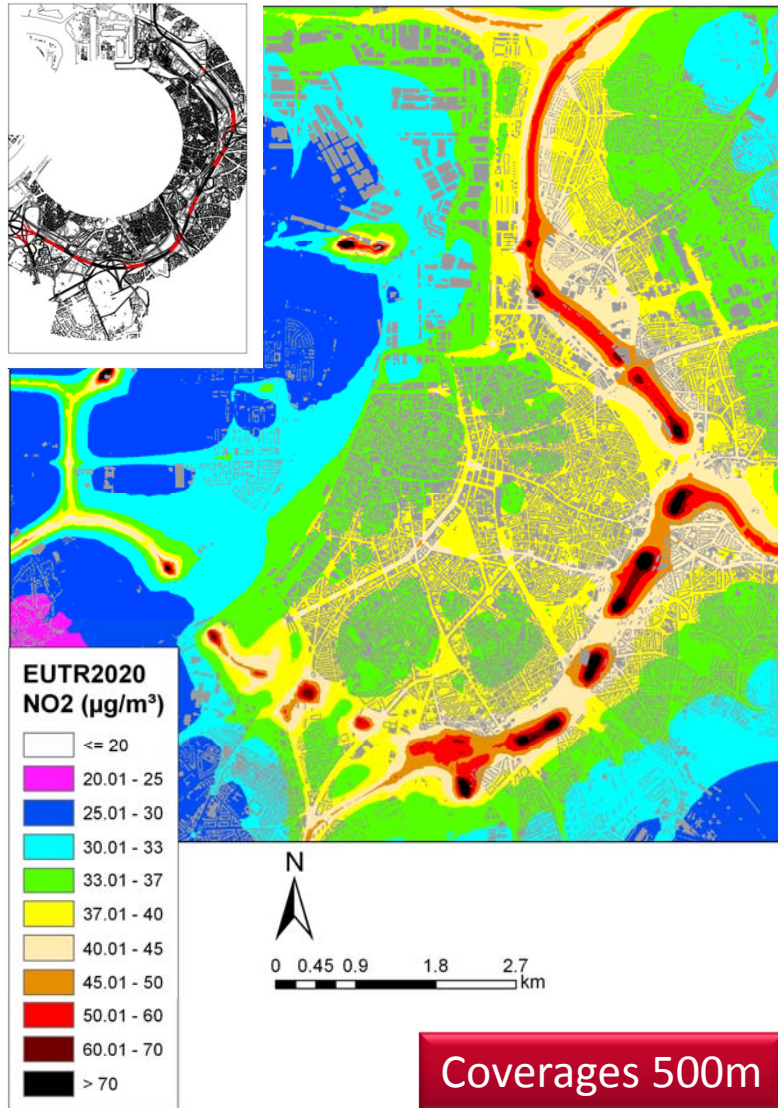


NO₂ map @ city level

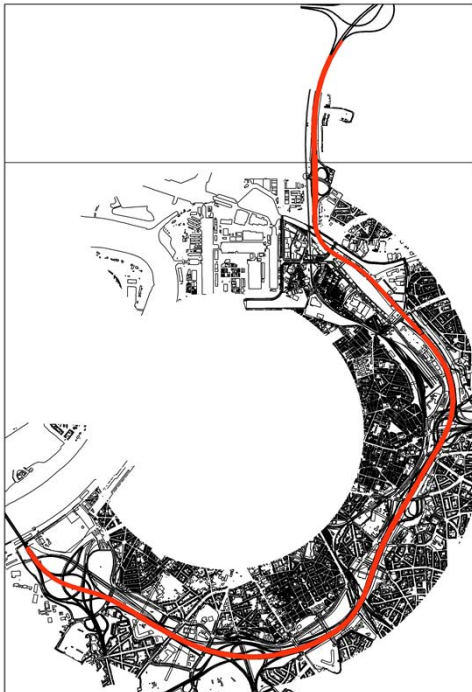
- » Dispersion model: IFDM (no street canyons)
- » Significant exceedances in vicinity of the ring road



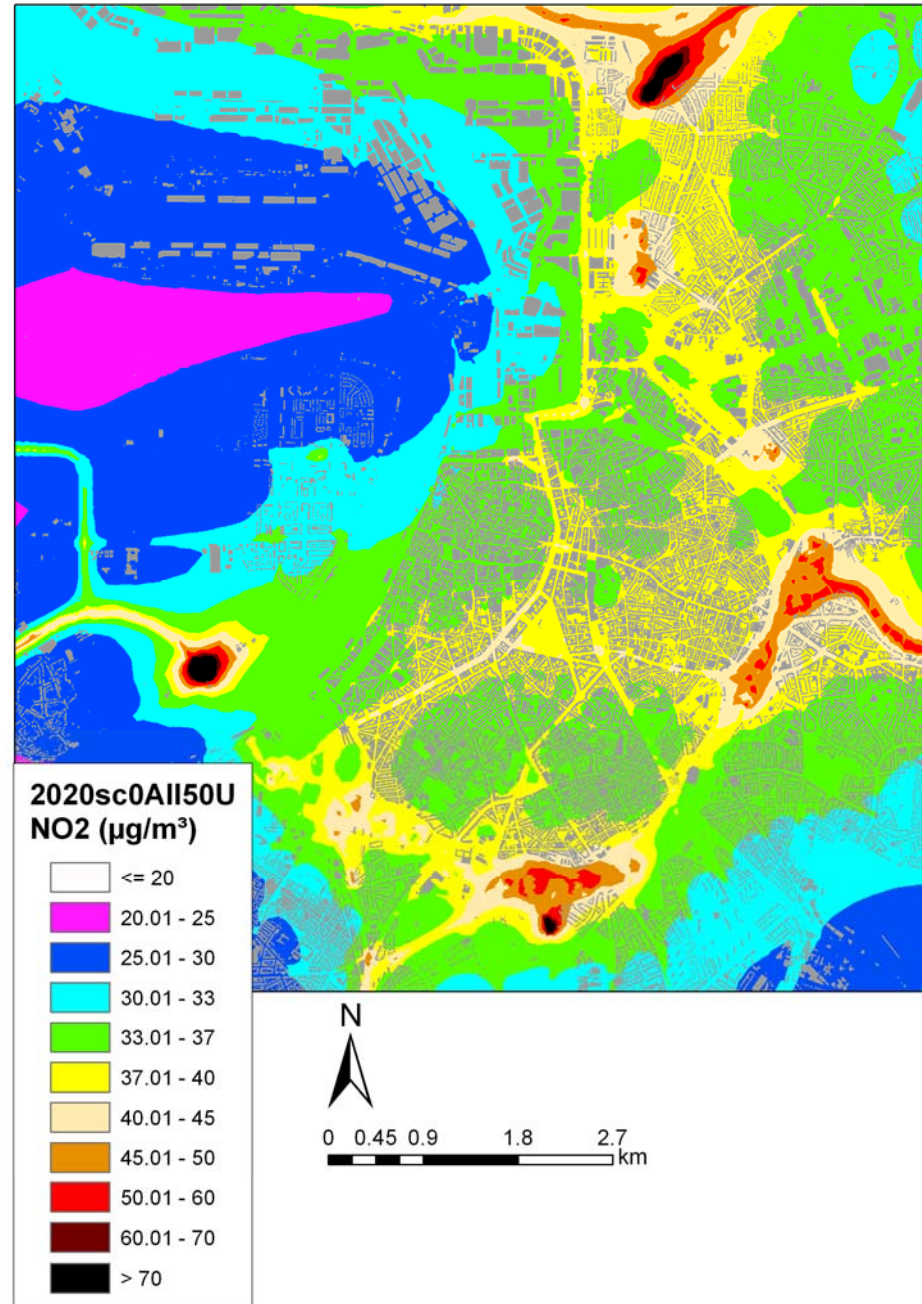
Impact of short coverages on air pollution



Full tunnel variant...



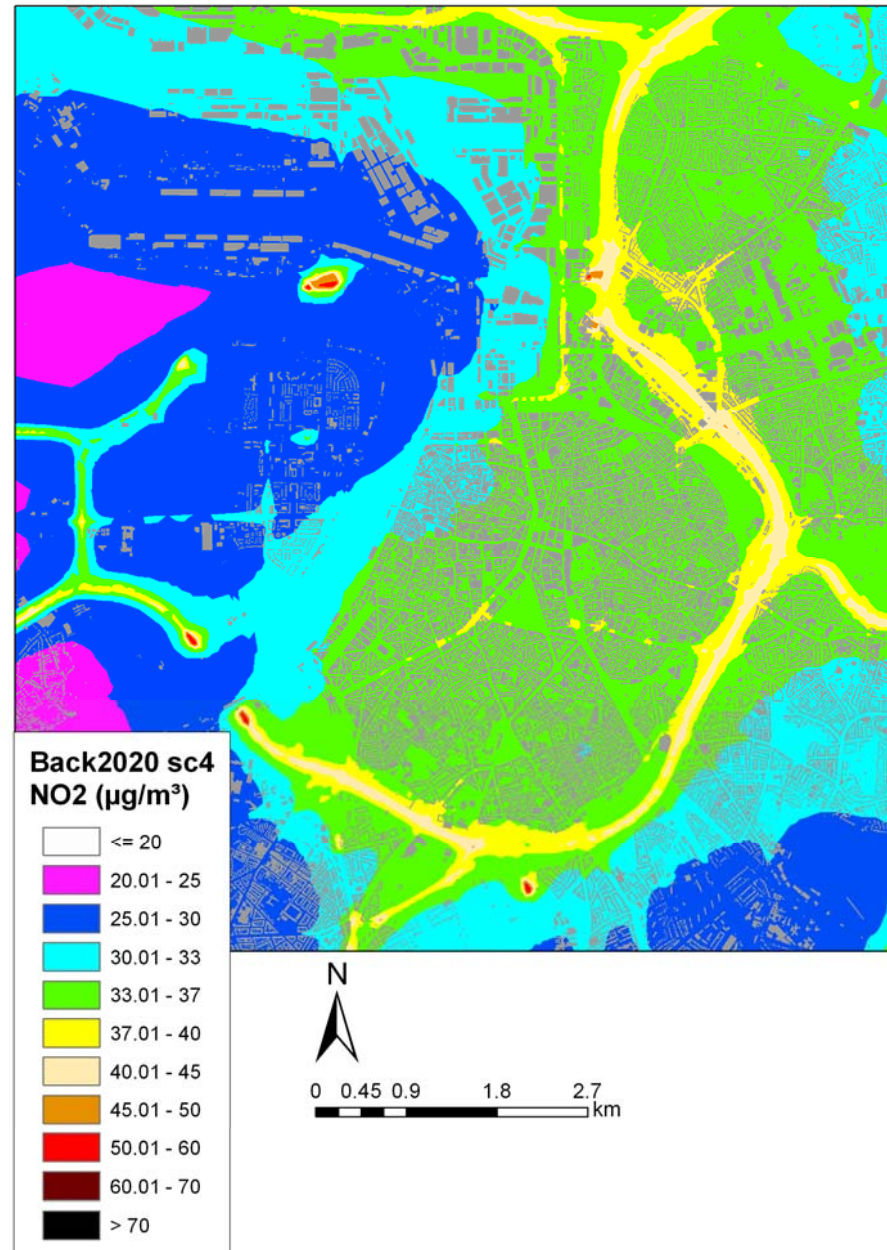
» Still problems at radial highway connections



Backcasting...

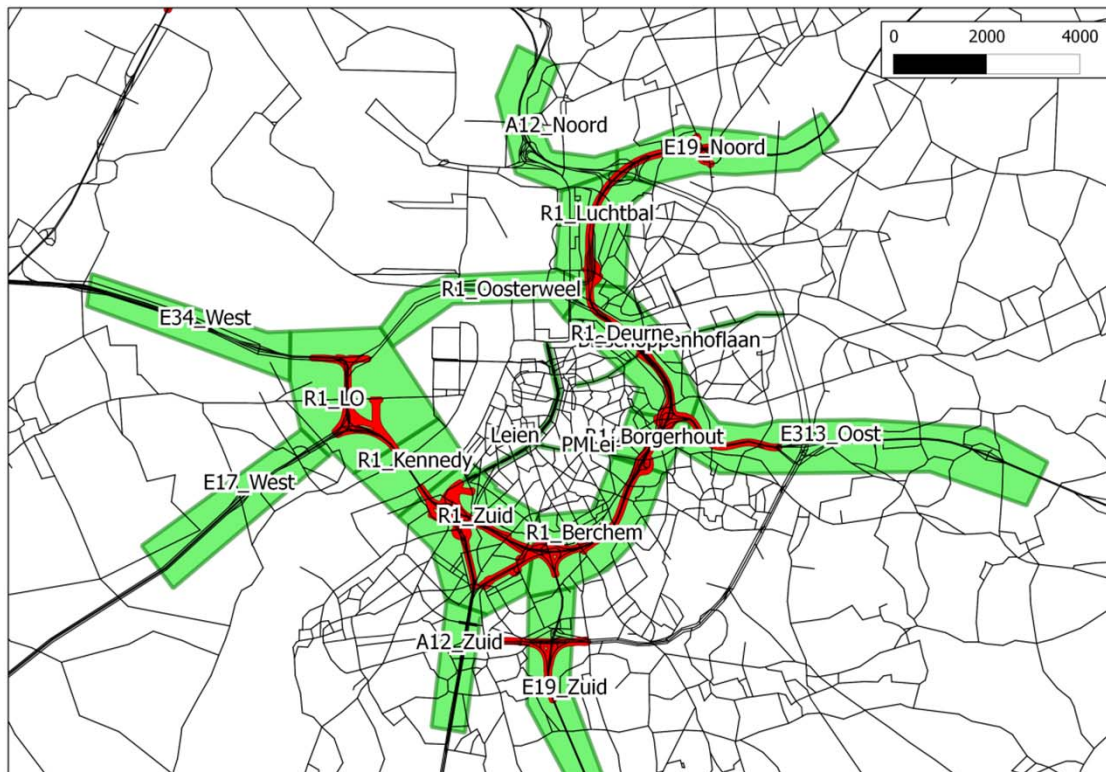
- » What should be emission reductions to meet EU standards everywhere*?

*more than 30m from highway



Backcasting scenario

» Specific emission reduction factors per zone



Zone	Emission reduction
R1_Zuid	-7%
R1_Oosterweel	0%
R1_Luchtbal	-59%
R1_LO	0%
R1_Kennedy	-22%
R1_Deurne	-65%
R1_Borgerhout	-76%
R1_Berchem	-67%
PMLei	-20%
Leien	-26%
E34_West	0%
E313_Oost	-42%
E19_Zuid	-36%
E19_Noord	-38%
E17_West	0%
Bisschoppenhoflaan	-44%
A12_Zuid	-5%
A12_Noord	-56%

Conclusions

- » Air quality in hot spot regions remains a challenging task
- » Tunnels might offer a solutions in densely populated areas
- » European Tunnel Directive complicates the implementation
- » Short coverages (< 500m) can offer a local solution but tunnel exits remain problematic
- » Backcasting scenario show that significant reduction (up to more that 50%) of traffic is only option to meet EU standard everywhere (> 30m from highway)

Profile along ring road: local improvements, local increases

