National Institute for Public Health
and the Environment (RIVM)
Ministry of Health, Welfare and Sport
The Netherlands

The Dutch example:

National Air Quality Collaboration Programme and local initiatives

Guus Velders

Thanks to Joost Wesseling, Margreet van Zanten

16 Februari 2017

Dutch implementation of Air Quality directive

- Air quality limit values linked to new infrastructural projects
  - Roads, factories, stables (agriculture), etc.
  - For new projects: To be guaranteed beforehand that limit values will not be exceeded (ever)
  - Reason: To make sure limit values are met (in time)
- Combination of measurements and models
  - Requirement for local models
  - Model intercomparisons
  - Models need to be approved for official use
- Focus on limit values, not health effects
- Limit values to be met everywhere
  - Uncertainties not considered
- National air quality collaboration programme (NSL)

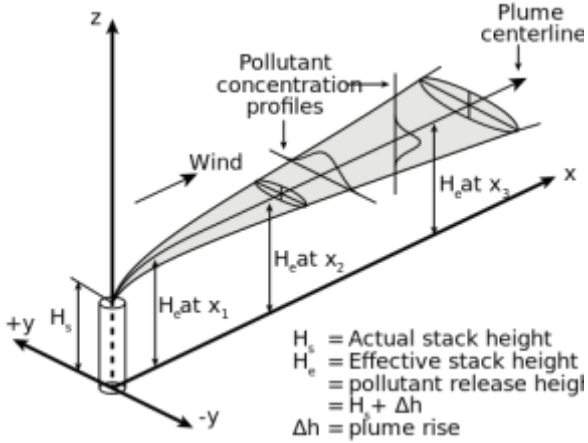
National air quality collaboration programme

- Collaboration of national government and cities
- Measures to reduce concentrations (NO_2, PM)

- Monitoring tool
  - Computer program / website
  - Calculates concentrations
  - Large scale background provided (➔ RIVM)
  - Standard tools for local AQ calculations
  - Effects of national and local measures
  - Keeping track of progress of infrastructural projects and measures
  - Annual report to parliament

Standard Calculation Models Air Quality (SRM)

- Dutch law provides 3 Standard Calculation Models Air Quality (SRM)
  - SRM-1 for streets / street canyons in an urban environment
  - SRM-2 along highways and larger other roads
  - SRM-3 near industrial facilities
- Other models are allowed if comparable to the SRMs
- Wind tunnel experiments also allowed, provided a specific protocol is followed.
- RIVM advises the minister of Infrastructure and the Environment on model approval.



Model system

+ Industry / livestock → SRM3

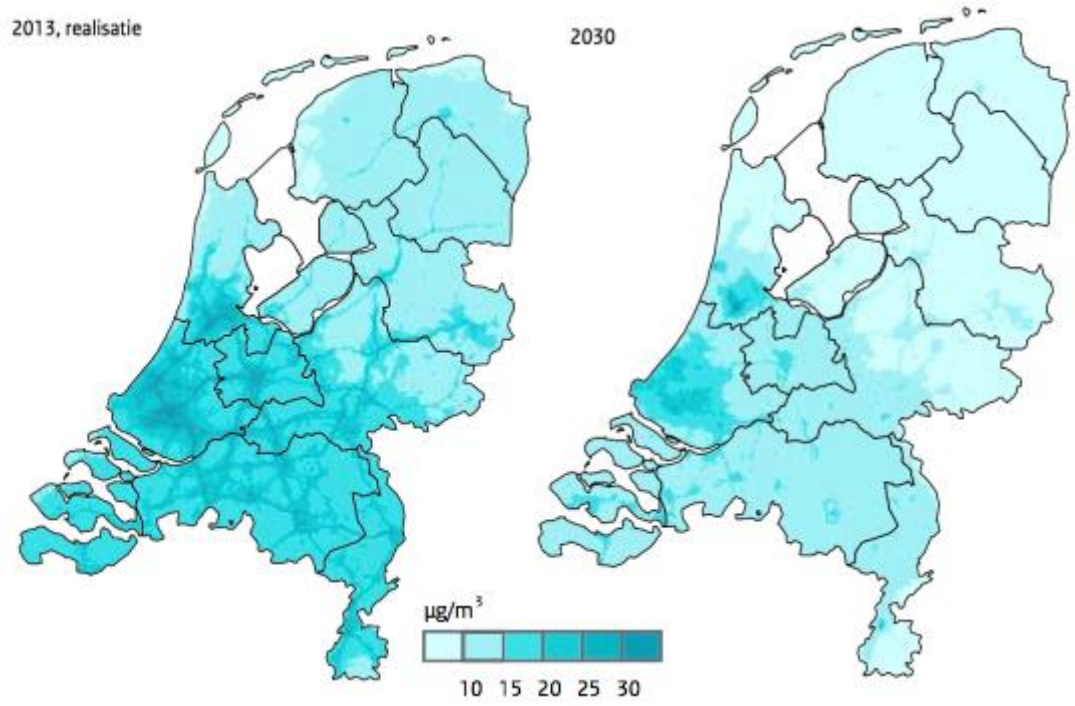
+ Highways → SRM2

+ Local streets→ SRM1

Background
(double counting)

Model system: Large-scale background conc.

- RIVM prepares maps on a 1x1 km^2 resolution.
- Dispersion model
- Recent years are calibrated using measurements.
- NO_2, PM_{10}, $PM_{2.5}$, EC, SO_2, NH_3
- Projections based on
  - Economy
  - Technology
  - NL / EU
  - Timeframe 2017-2030
  - Source attribution



EU, national, and local policies

Policies to reduce concentrations

- EU
  - Emissions ceilings directive: NO_x, $PM_{2.5}$, SO_2, NH_3, VOC
  - Regulations for large combustion plants
  - Limits for the exhaust emissions of passenger cars and trucks: NO_x, PM, CO_2

- Netherlands: national
  - Additional PM_{10} emission ceilings in industry
  - Regulations for ammonia emissions in agriculture
  - Stimulation of clean cars
  - NO_x emissions trading system

- Netherlands: cities
  - Regulating traffic flows
  - Bans on ‘dirty’ cars in cities: Low emission zones
  - Promotion of public transport, biking

Model system: Local streets

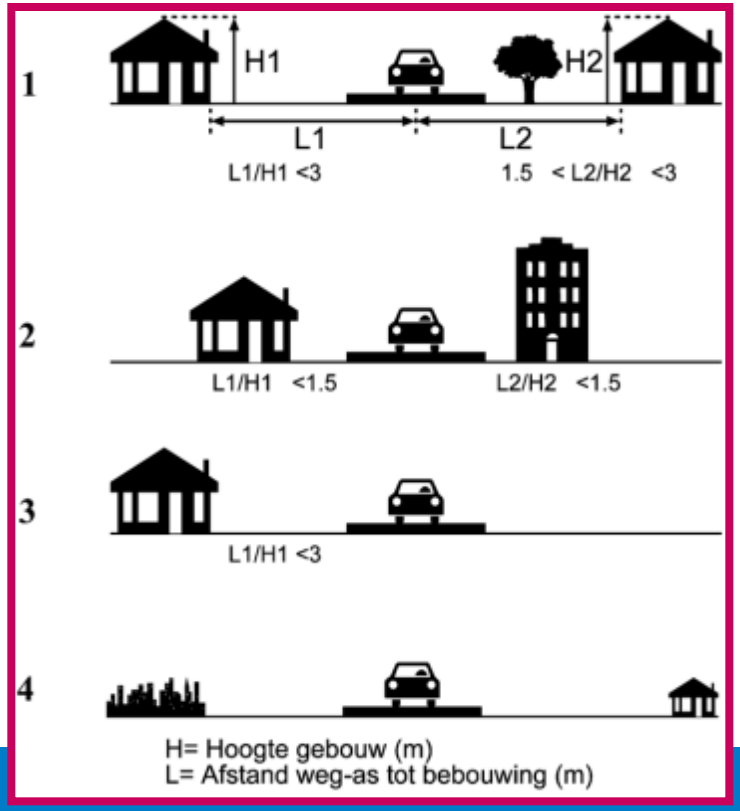
+ Industry / livestock → SRM3

+ Highways → SRM2

+ Local streets→ SRM1

Background
(double counting)

Simple empirical model, derived from wind tunnel, calibrated using field measurements



Model system: Highways

Gaussian dispersion model, yearly average values only.

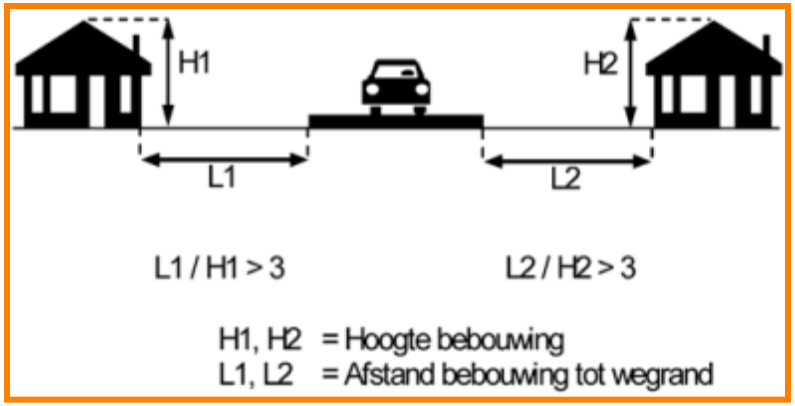
Calibrated using field measurements.

+ Industry / livestock → SRM3

+ Highways → SRM2

+ Local streets→ SRM1

Background
(double counting)

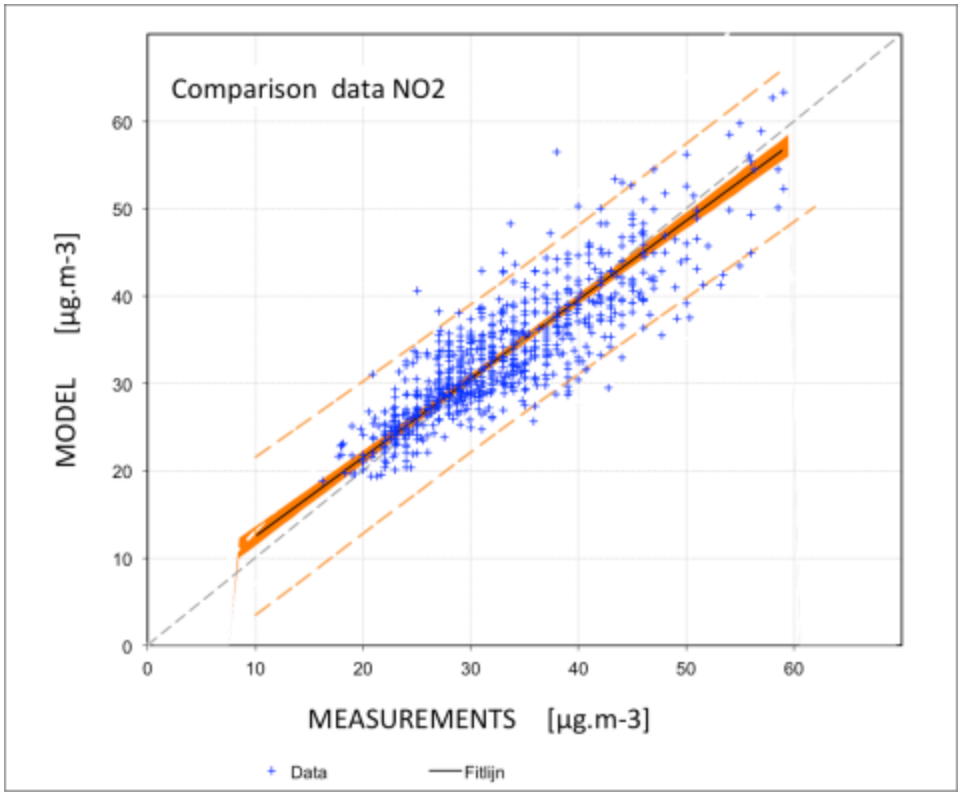


Extensive model validation

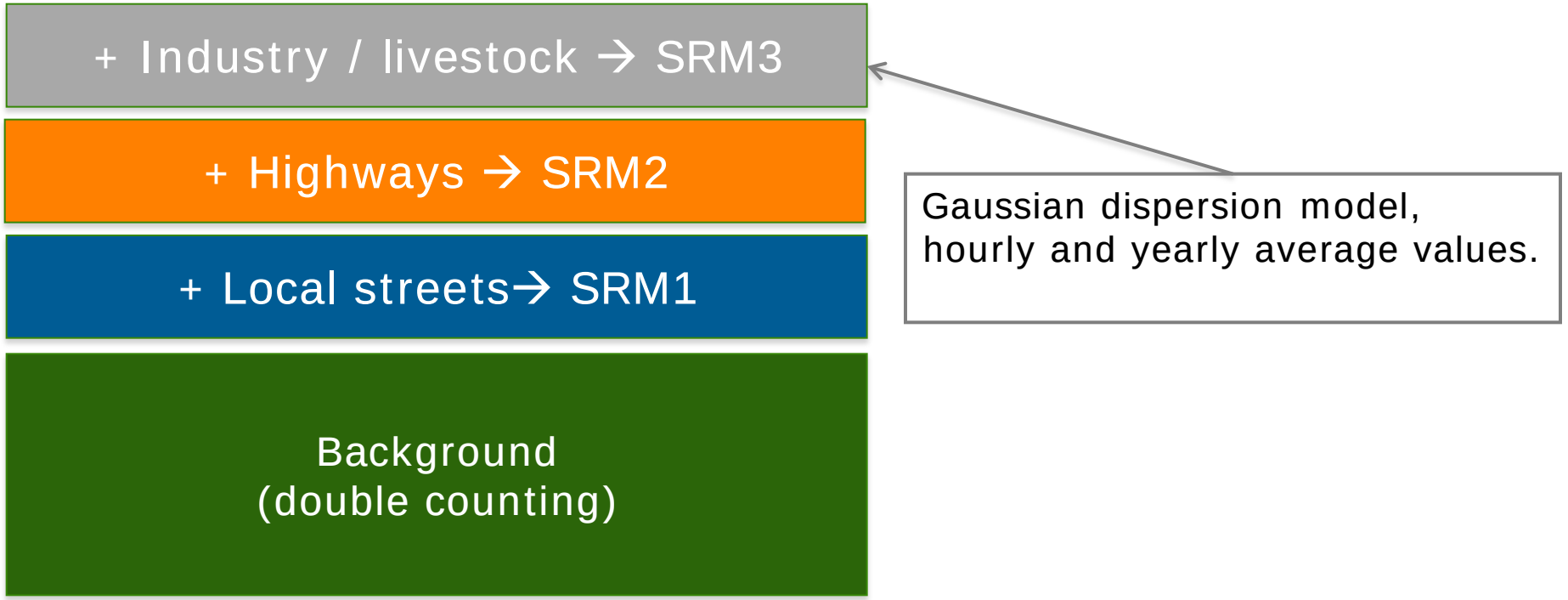
- Validation mainly for NO_2, some NO_x and PM_{10}

- NO_2 data 2010 - 2013

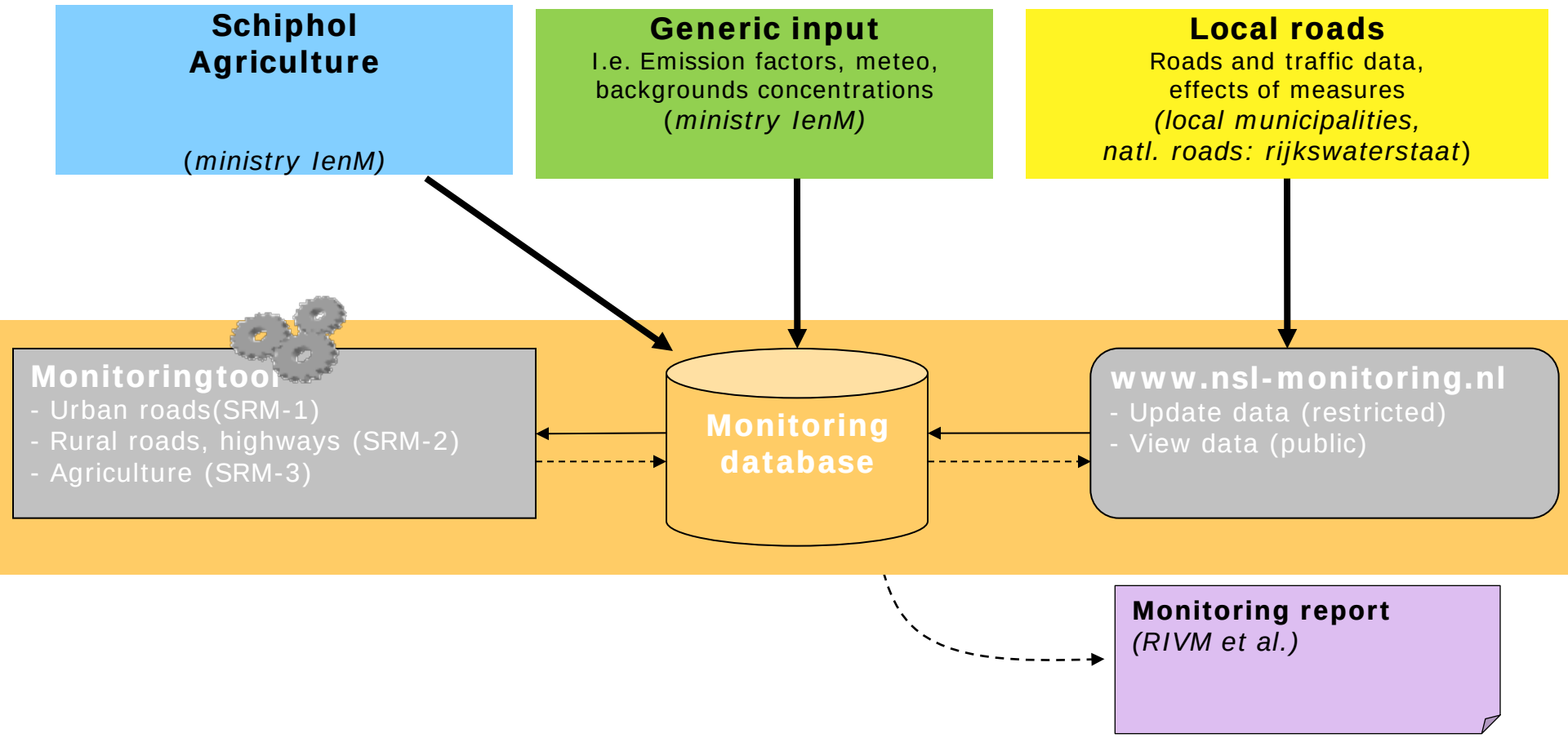
Richting/B	0.90	0.04
Offset/BI	3.5	1.2
Points	746	
F(20) / CI	21.6	0.6
F(30) / CI	30.6	0.3
F(40) / CI	39.6	0.4
F(50) / CI	48.7	0.7
diff >30%	2.8%	21
RMSE/R^2	4.1	0.73
BIAS	0.30	
MNB/ANB	0.02	0.01
MQO	0.96	0.73
>40.5	145	128



Model system: Industry and livestock



Monitoring NSL: data and responsibilities



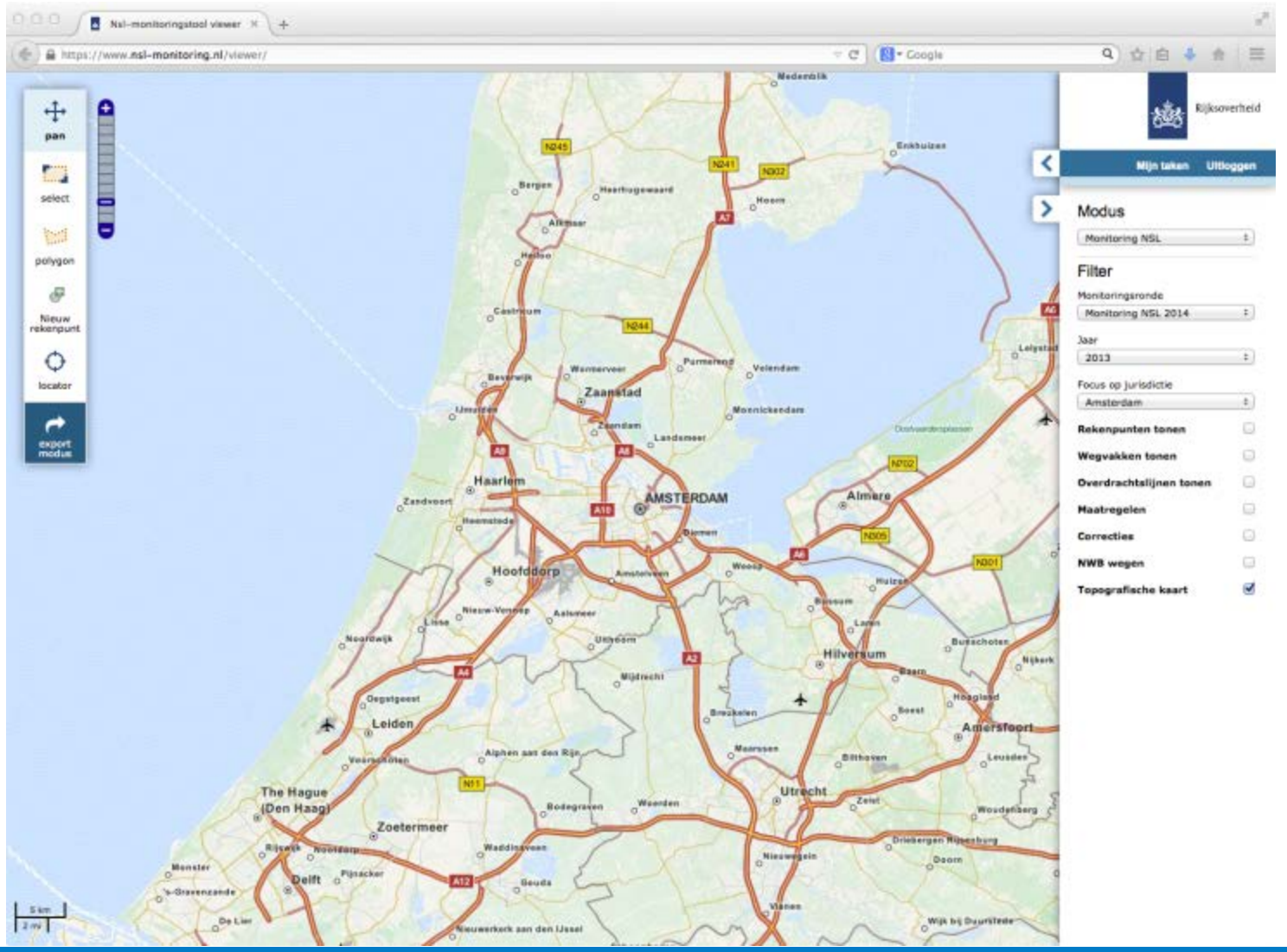
Traffic and livestock important

- For traffic the local authorities must provide
  - Exact location and height of the main roads
  - Numbers of light, medium-heavy, heavy vehicles, busses
  - Average speed and appropriate emission class
  - Average congestion and appropriate emission class
  - Location and shape of sound barriers

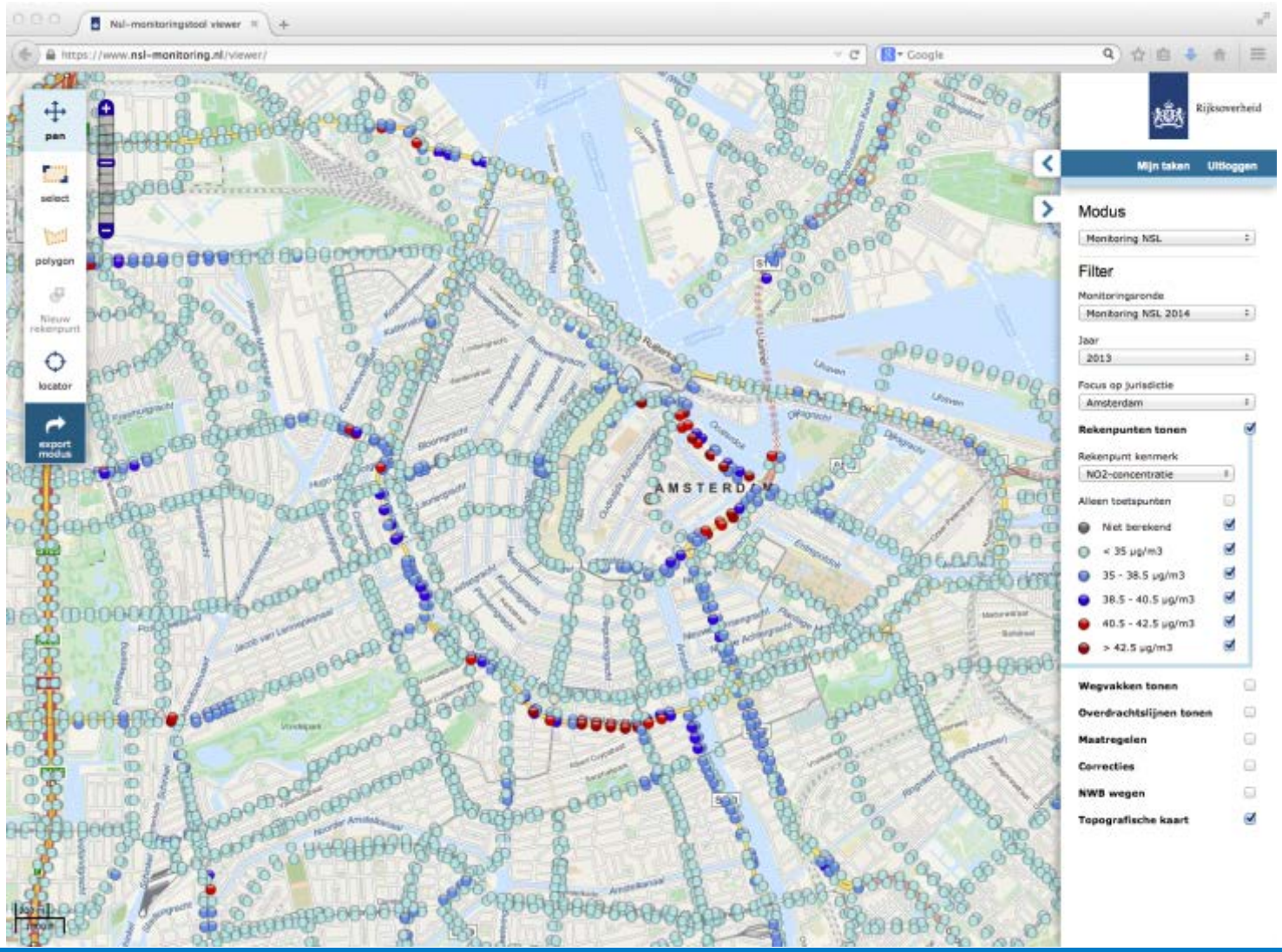
- For livestock the local authorities must provide
  - Numbers of animals
  - Type of housing
  - Exact location

- Emission factors are provided (prescribed) by the Dutch government

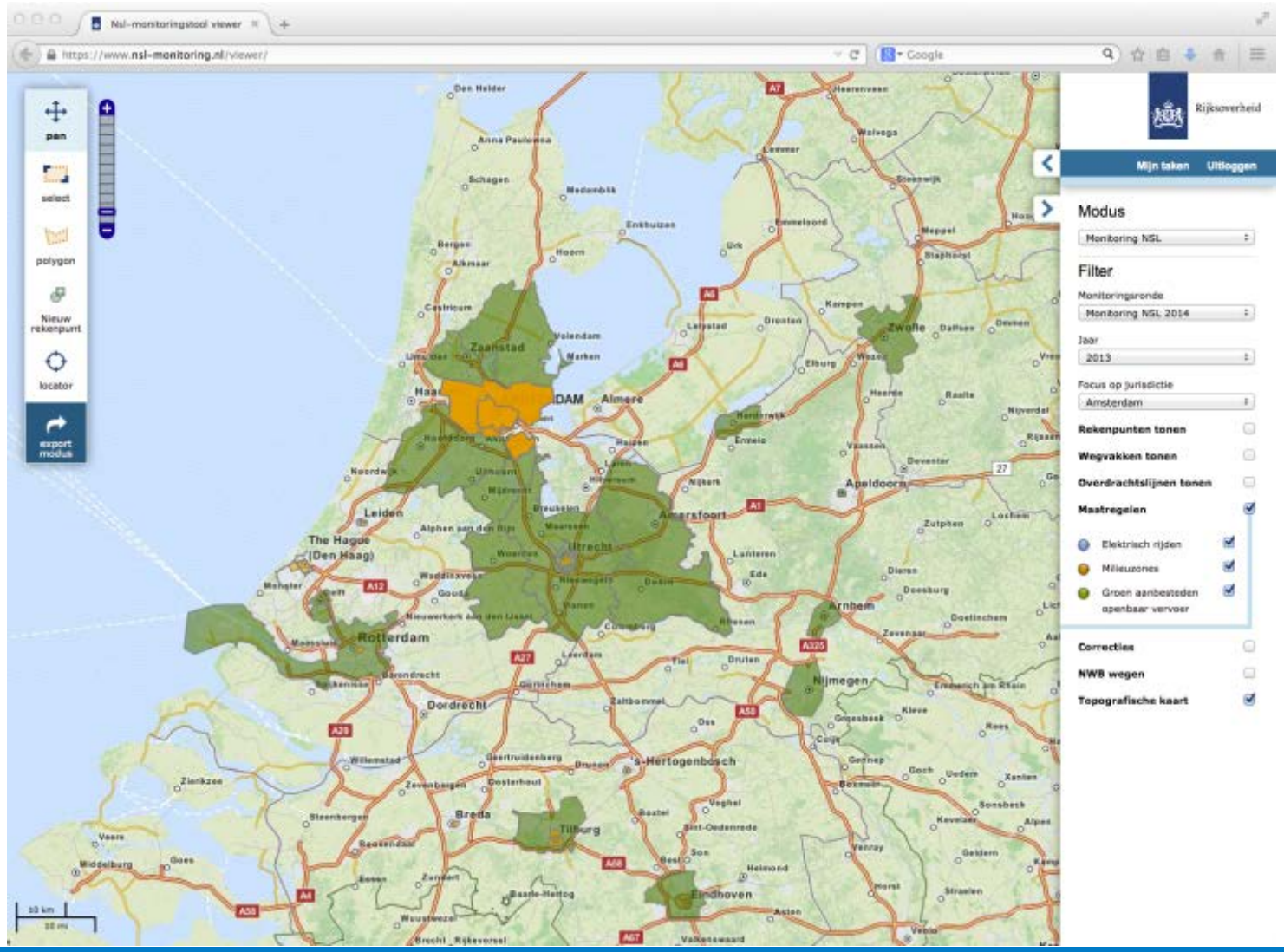
Monitoring tool



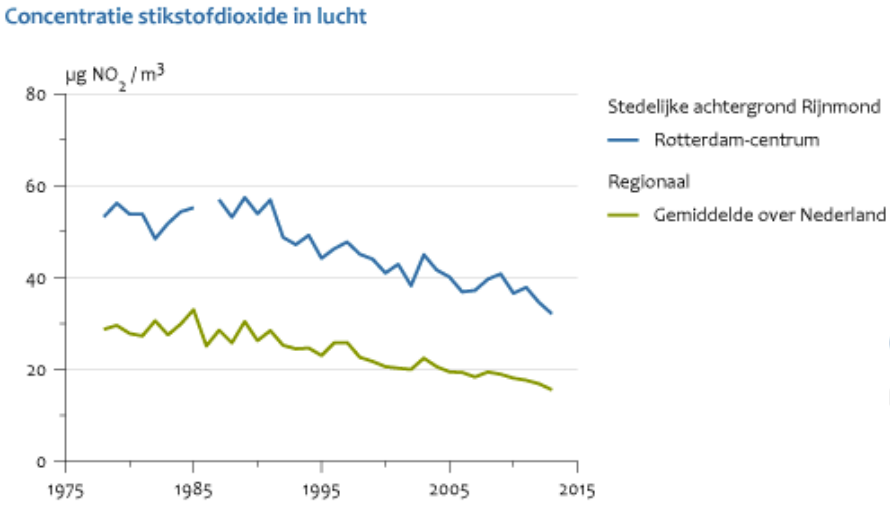
Monitoring tool: Concentrations Amsterdam



Monitoring tool: Areas with measures

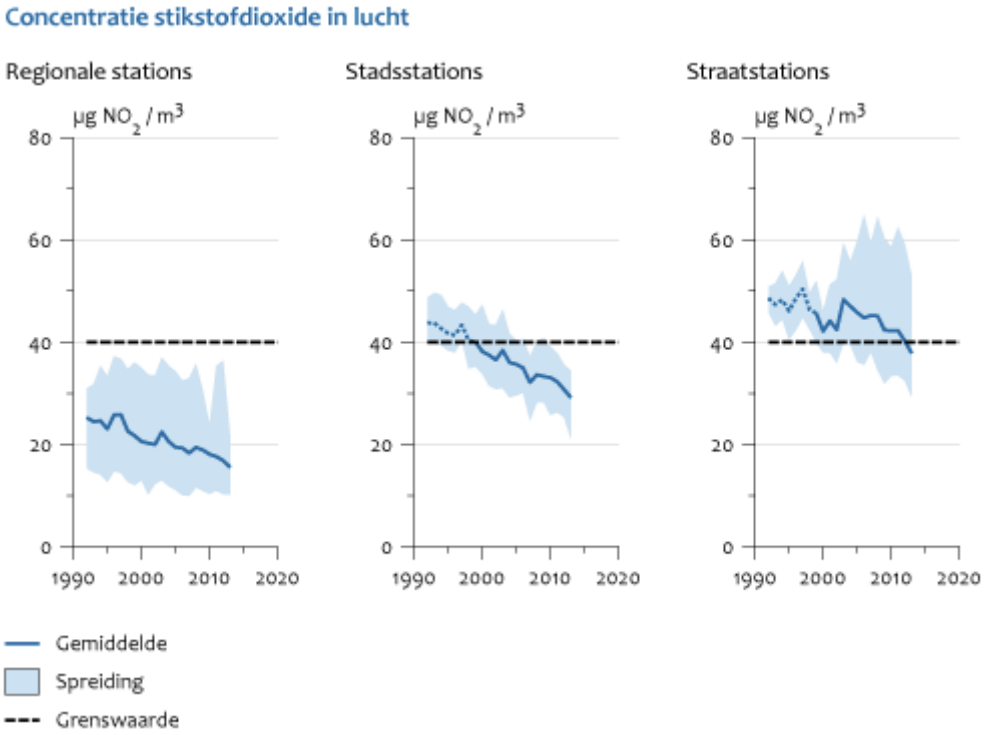


Air quality trends: NO_2



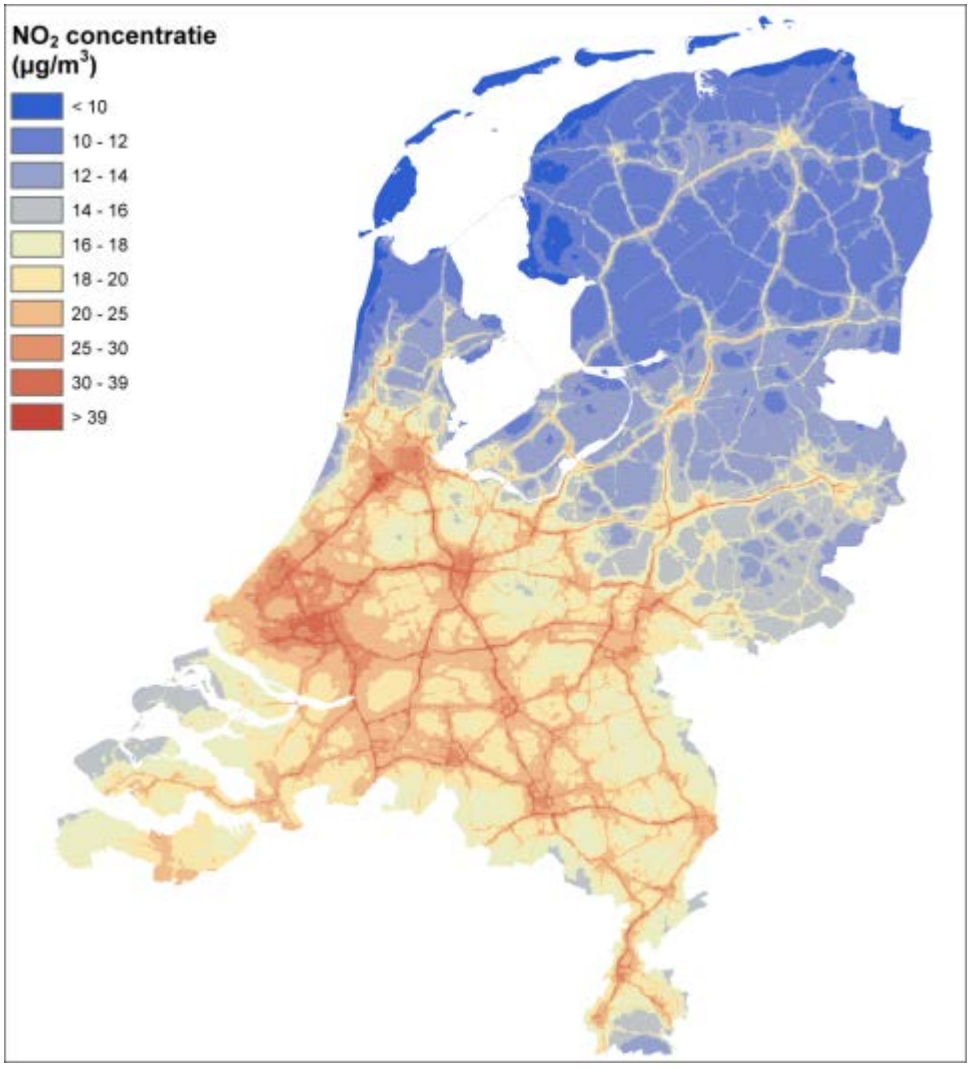
National network

NO_2, trend

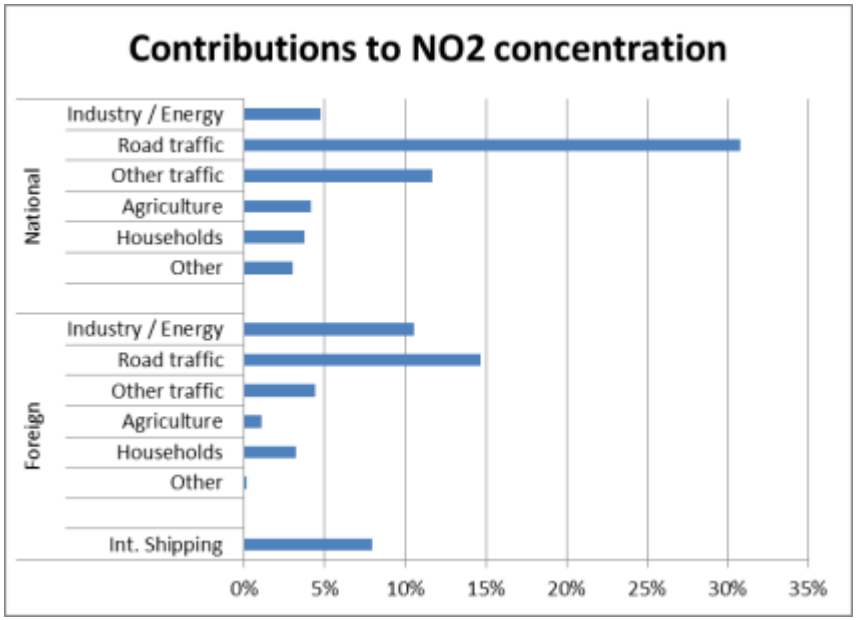


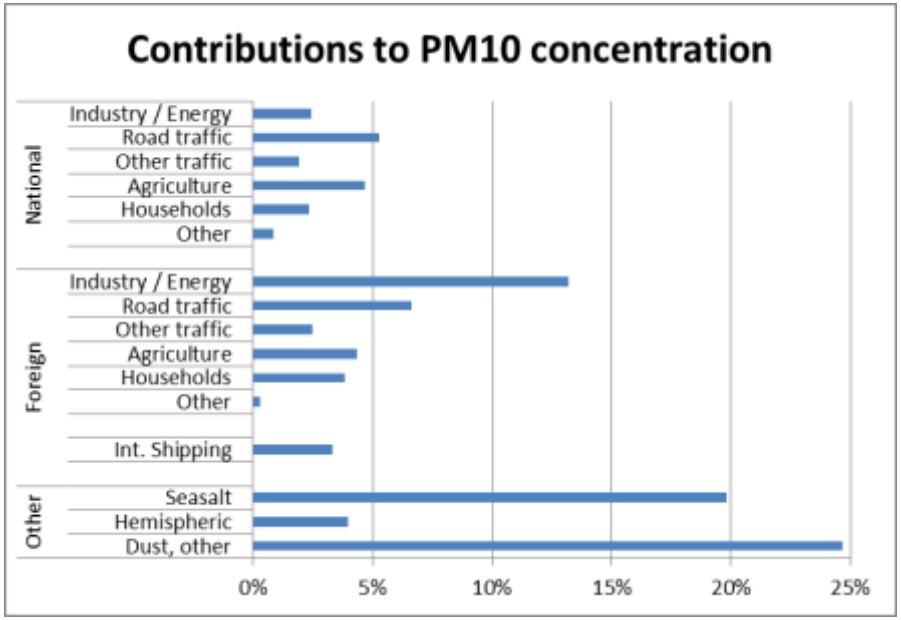
NO_2 concentration 2013

- Also concentration for PM_{10}, $PM_{2.5}$, EC
- Also projections for 2020, 2030



Analyzing contributions from different sectors





- Ex-ante or ex-post evaluations of control measures
- Input for local authorities for taking measures

- Used for cost benefit analyses
- Input for studies on health effects

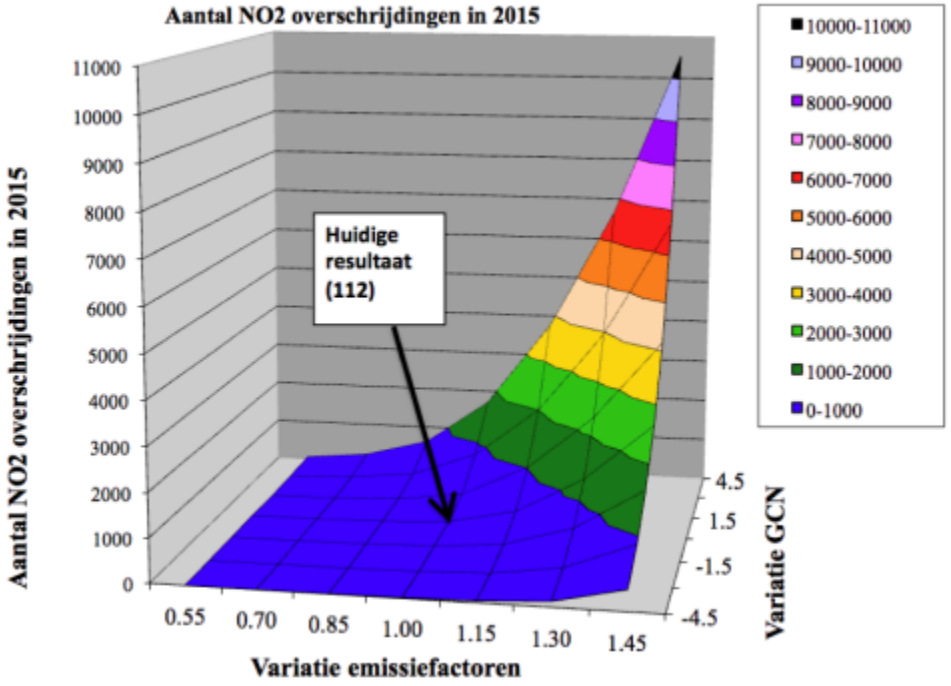
Effect systematic uncertainties

- Types of uncertainties:
  - Systematic: general basis assumptions regarding backgrounds, emission factors
  - Random: uncertainties in specific individual location

- Projections have an uncertainty of 20-30%

- Many concentrations are just below limit values

- Small changes in de projections can have a significant effect on number of exceedances



More information on Dutch Air quality assessments

- Websites: http://www.rivm.nl/gcn
  http://www.nsl-monitoring.nl
  http://www.lml.rivm.nl
  http://www.rivm.nl/ops
- Publications


Atmospheric Environment 43 (2009) 3060–3069

Contents lists available at ScienceDirect

Atmospheric Environment

journal homepage: www.elsevier.com/locate/atmosenv

Likelihood of meeting the EU limit values for NO_2 and PM_{10} concentrations in the Netherlands

Guus J.M. Velders*, Hub S.M.A. Diederen


Atmospheric Environment 43 (2009) 3858–3866

Contents lists available at ScienceDirect

Atmospheric Environment

journal homepage: www.elsevier.com/locate/atmosenv

Meteorological variability in NO_2 and PM_{10} concentrations in the Netherlands and its relation with EU limit values

Guus J.M. Velders*, Jan Matthijsen


Atmospheric Environment 45 (2011) 3025–3033

Contents lists available at ScienceDirect

Atmospheric Environment

journal homepage: www.elsevier.com/locate/atmosenv

Higher than expected NO_x emission from trucks may affect attainability of NO_2 limit values in the Netherlands

Guus J.M. Velders [a,*], Gerben P. Geilenkirchen [b], Ronald de Lange [c]

Questions?

Dank u wel

Thank you

Gracias

Danke

Merci

Diolch yn fawr

Спасибо

شكرا

谢谢

धन्यवाद

σας ευχαριστώ

תודה

terima kasih

teşekkür ederim

köszönöm

நன்றி