UNECE Air Convention (LRTAP)

3rd Expert Panel on Clean Air in Cities (EPCAC)

29th November 2021

Clean air in cities

Case studies on air quality measures

wood.

vito

umweltbundesamt
ENVIRONMENT AGENCY AUSTRIA

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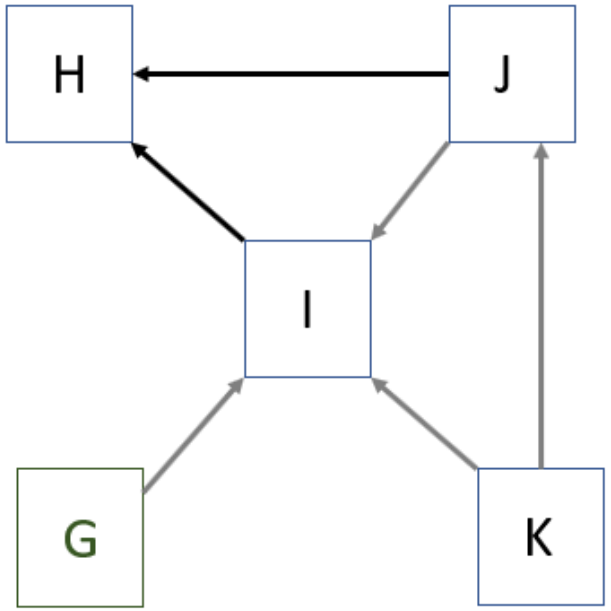
Data on air quality plans and measures

Commission Implementation Decision 2011/850/EU - framework for reporting AQ information and data

Analyses of data submitted by Member States from 2014 to 2020



B – Zones and agglomerations

C – Assessment Regime

D - Assessment Methods

E - Primary validated assessment data and primary up-to-date assessment data

F - Generated aggregated data

G - Attainment of environmental objectives

H - Air quality plans

I – Source Apportionment

J – Scenario for the attainment year

K - Measures

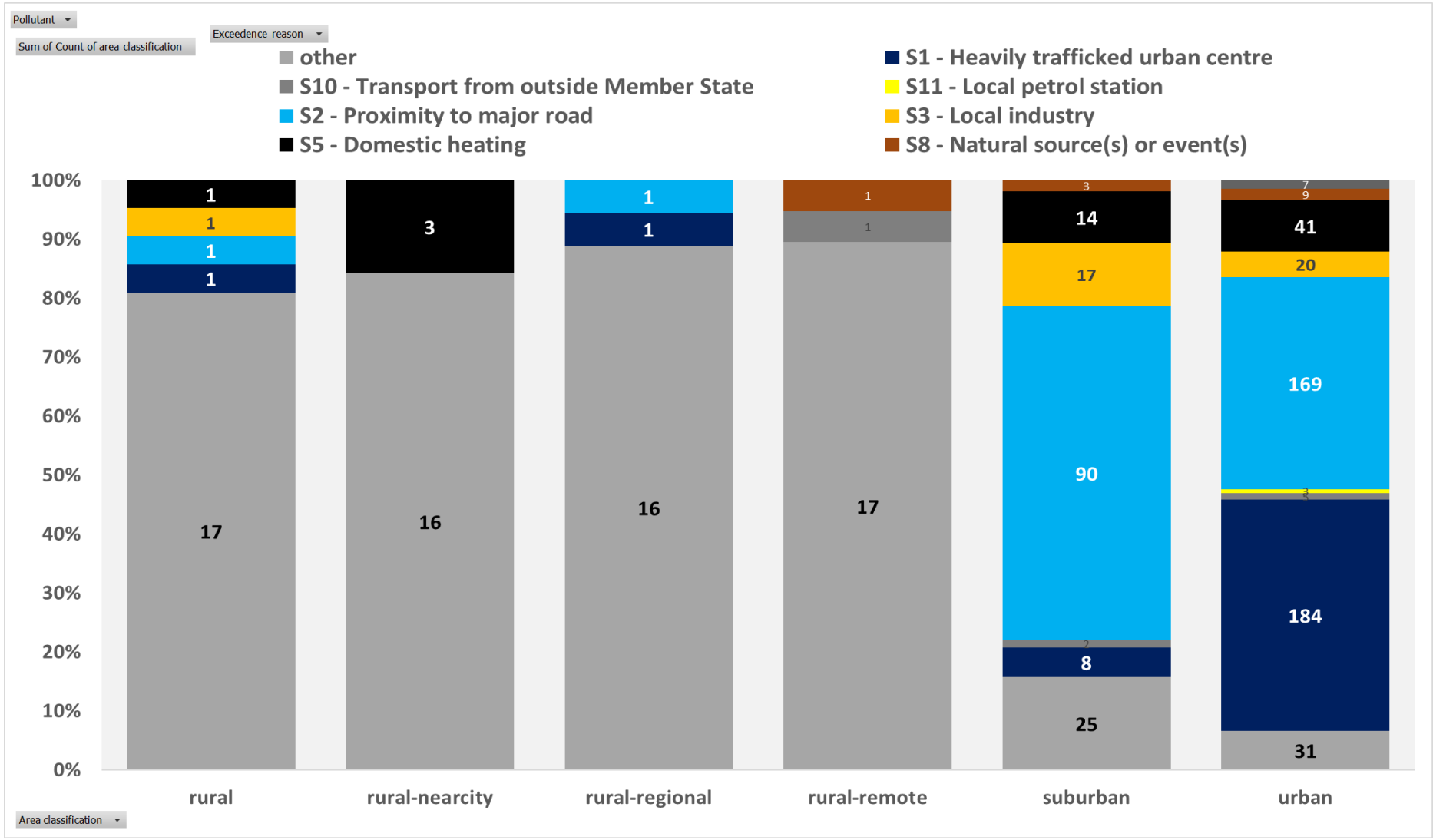
No reported data in dataflow H-K are available for Estonia, Greece, Hungary, Iceland, Ireland, Liechtenstein, Luxembourg, Malta, Switzerland, and Turkey (as of 06.11.2020)

What to expect?

- Assesment of data reported by Member States
- Organise data in a way that can be used for visualisation and better understanding of the metadata
- Complex database and reporting system – many fields are missing
- Still valuable information and **trends in exceedence reasons and responses**

Exceedence reasons

Emission sources driving exceedances in different areas for nitrogen dioxide (NO_2), particulate matter (PM_{10} and $PM_{2.5}$) and ozone (O_3) across the EU-27



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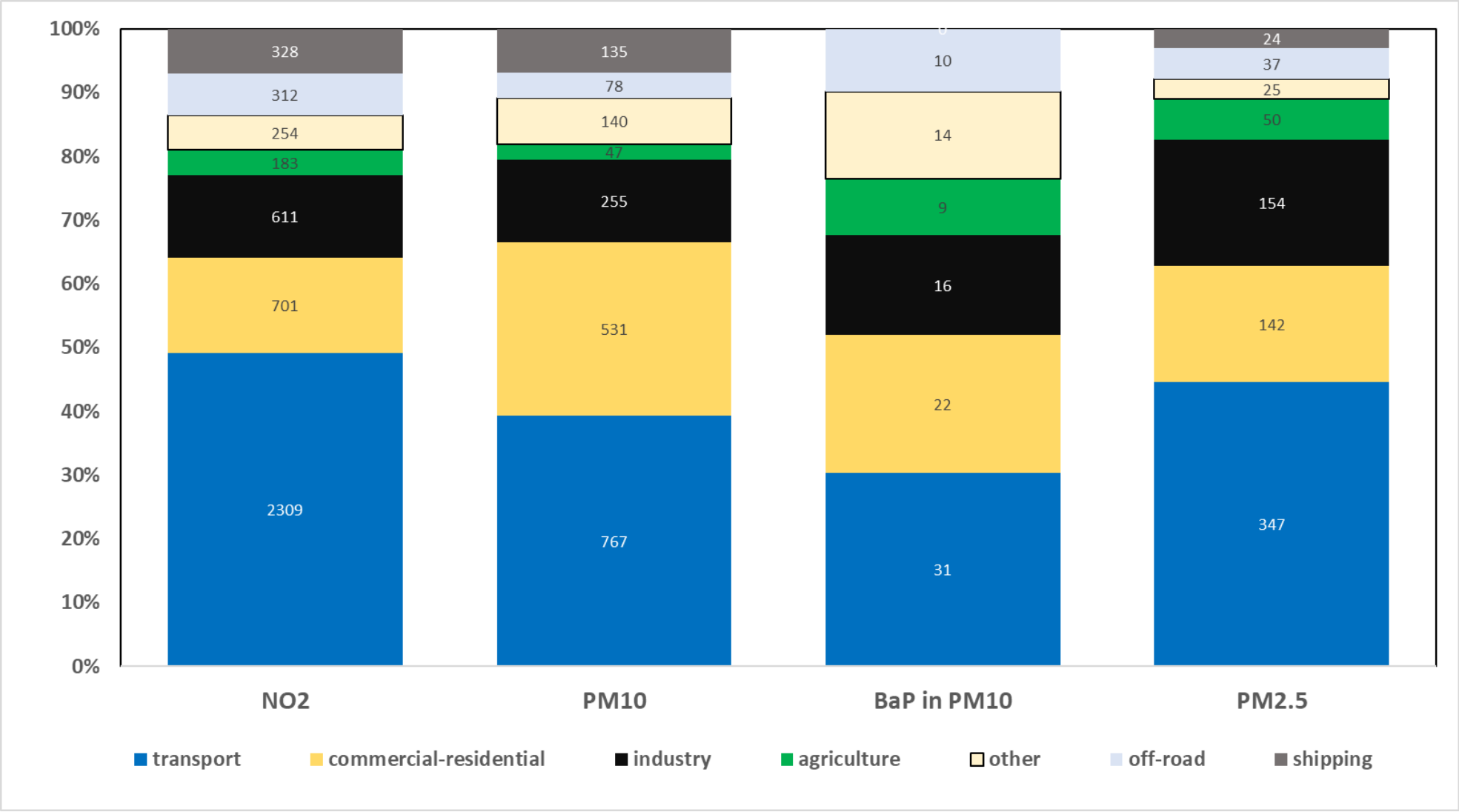
Sectors targeted

Emission sectors targeted by measures (% and number of measures) to reduce concentrations of NO_2, PM_{10}, PM2.5 and BaP



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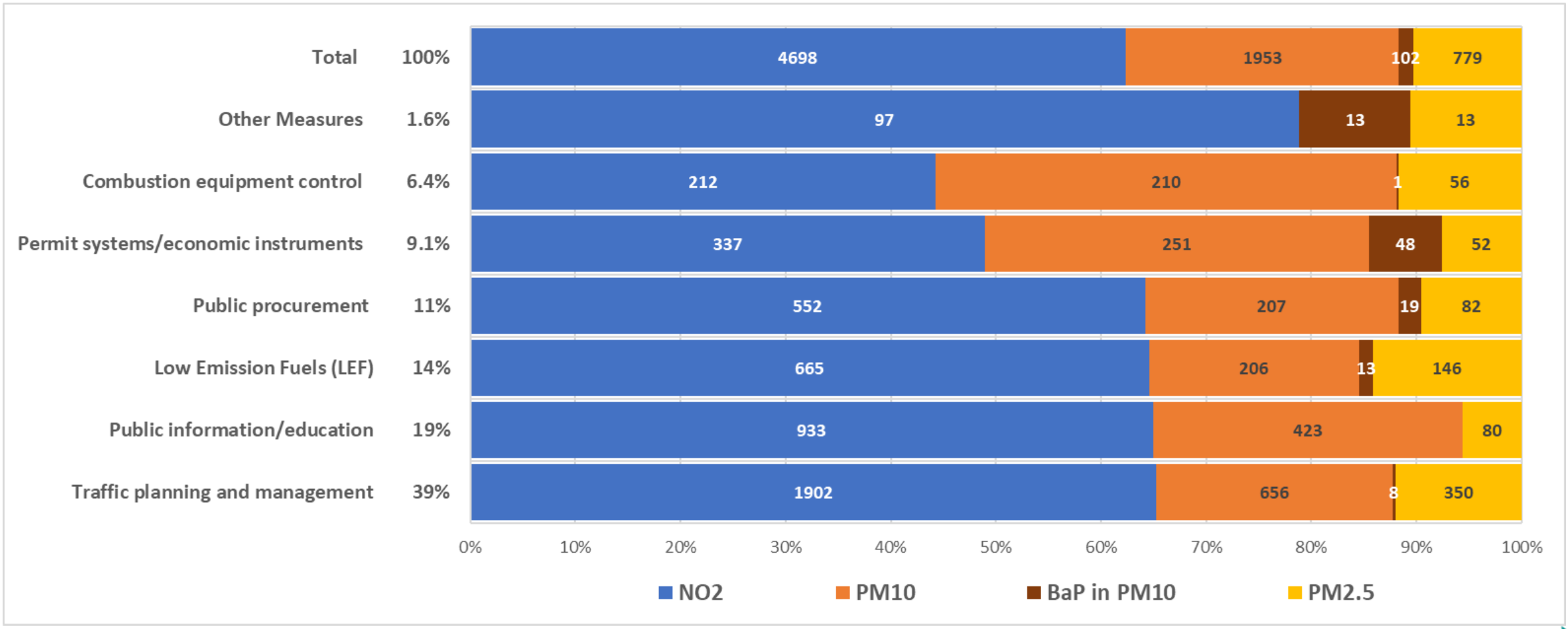
Measures adopted

The most common measures adopted to reduce emissions of NO_2, PM_{10}, $PM_{2.5}$, and BaP



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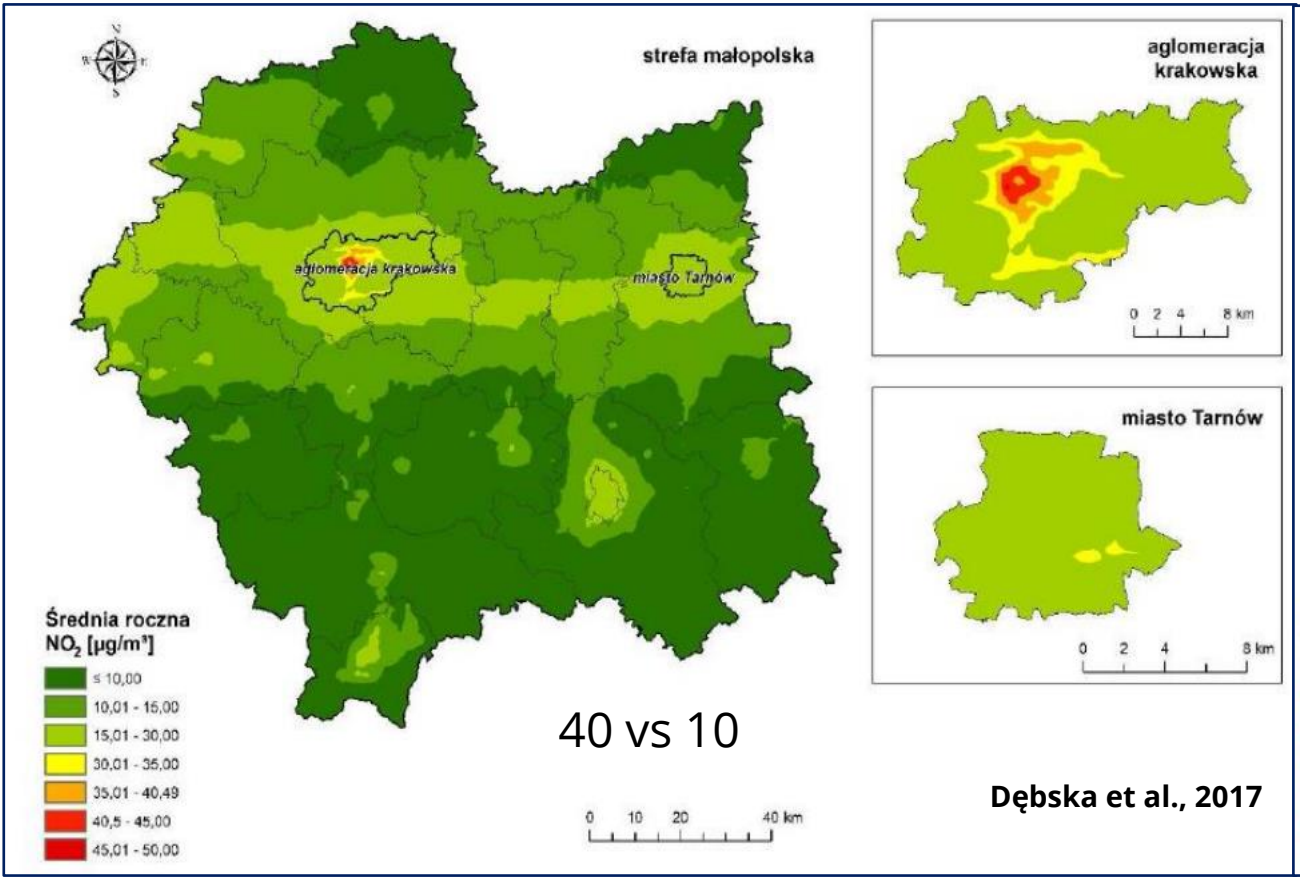
EU standards – WHO guidelines

		EU Air Quality Directives			WHO Air Quality Guidelines					
Pollutant	Averaging period	Objective	Concentration	Comments	Concentration					Comments
					Interim targets				AQG level	
					1.	2.	3.	4.		
$PM_{2.5}$	24-hour	Target value			75	50	37,5	25	15 µg/m³	99th percentile (i.e. 3–4 exc. Days/year)
$PM_{2.5}$	Annual	Limit value	25 µg/m³		35	25	15	10	5 µg/m³	
$PM_{2.5}$	Annual	Indicative limit value	20 µg/m³							
PM_{10}	24-hour	Limit value	50 µg/m³	Not to be exceeded on more than 35 days/year	150	100	75	50	45 µg/m³	99th percentile (i.e. 3–4 exc. Days/year)
PM_{10}	Annual	Limit value	40 µg/m³		70	50	30	20	15 µg/m³	
O_3	Max. daily 8-hour mean	Target value	120 µg/m³	Not to be exceeded on more than 25 days/year (averaged over 3 years)						
O_3	Max. daily 8-hour mean	Long-term objective	120 µg/m3							
O_3	8-hour	Target value			160	120	–	–	100 µg/m³	99th percentile (i.e. 3–4 exc. Days/year)
O_3	Peak season [a]	Target value			100	70	–	–	60 µg/m³	
NO_2	Hourly	Limit value	200 µg/m³	Not to be exceeded on more than 18 hours/year					200 µg/m³	
NO_2	Annual	Limit value	40 µg/m³		40	30	20	–	10 µg/m³	
NO_2	24-hour	Target value			120	50	–	–	25 µg/m³	99th percentile (i.e. 3–4 exc. Days/year)
SO_2	Hourly	Limit value	350 µg/m³	Not to be exceeded on more than 24 hours/year						
SO_2	24-hour	Limit value	125 µg/m³	Not to be exceeded on more than 3 days/year	125	50	–	–	40 µg/m³	99th percentile (i.e. 3–4 exc. Days/year)
CO	Max. daily 8-hour mean	Limit value	10 mg/m³						10 mg/m³	
CO	24-hour	Target value			7	–	–	–	4 mg/m³	99th percentile (i.e. 3–4 exc. Days/year)
C_6H_6	Annual	Limit value	5 µg/m³						1,7 µg/m³	Reference level
BaP	Annual	Target value	1 ng/m³	Measured as content in PM_{10}						
Pb	Annual	Limit value	0,5 µg/m³	Measured as content in PM_{10}					0,5 µg/m³	
As	Annual	Target value	6 ng/m³	Measured as content in PM_{10}					6,6 ng/m³	Reference level
Cd	Annual	Target value	5 ng/m³	Measured as content in PM_{10}					5 ng/m³	
Ni	Annual	Target value	20 ng/m³	Measured as content in PM_{10}					25 ng/m³	Reference level

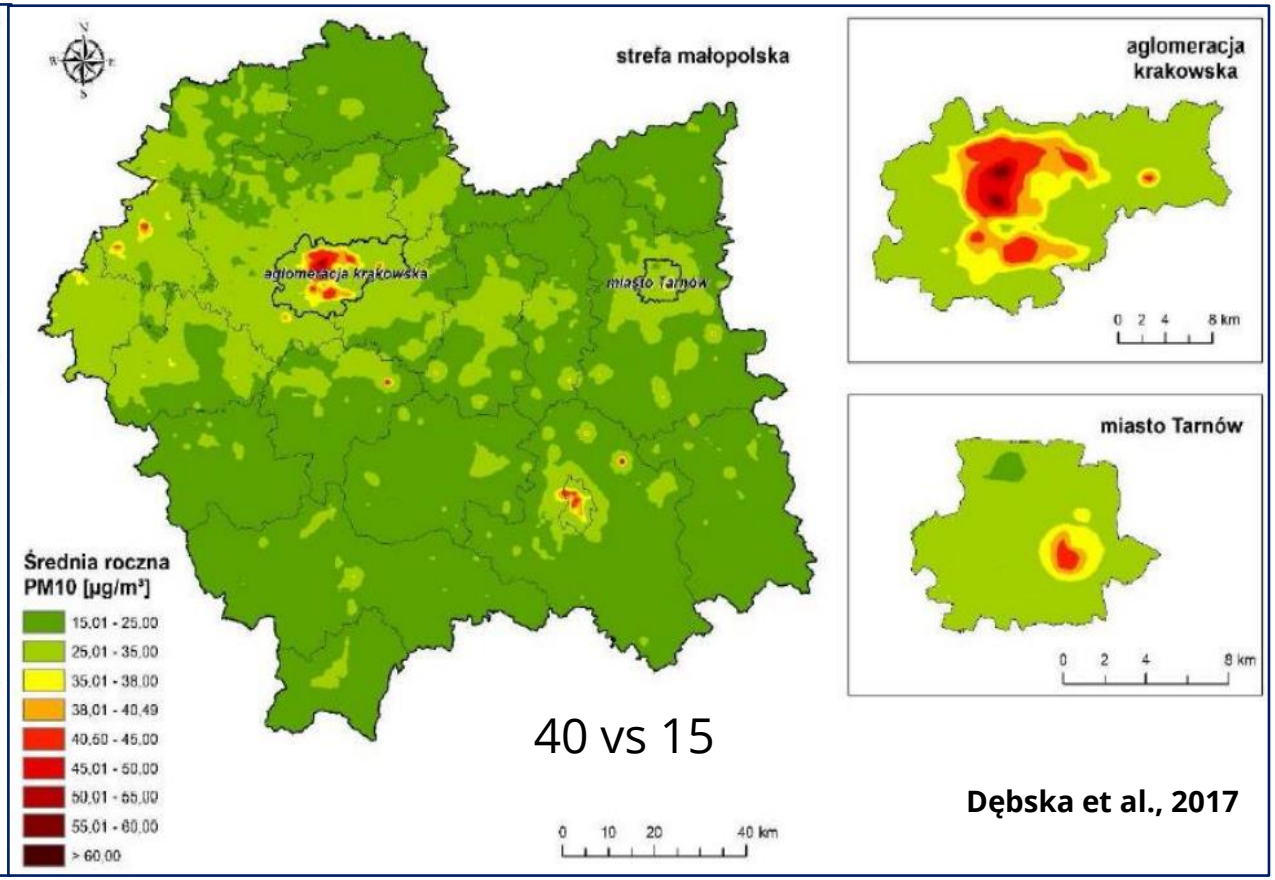
Anti-smog resolutions in Poland's Małopolska region

PM_{10} $PM_{2.5}$ BaP



40 vs 10

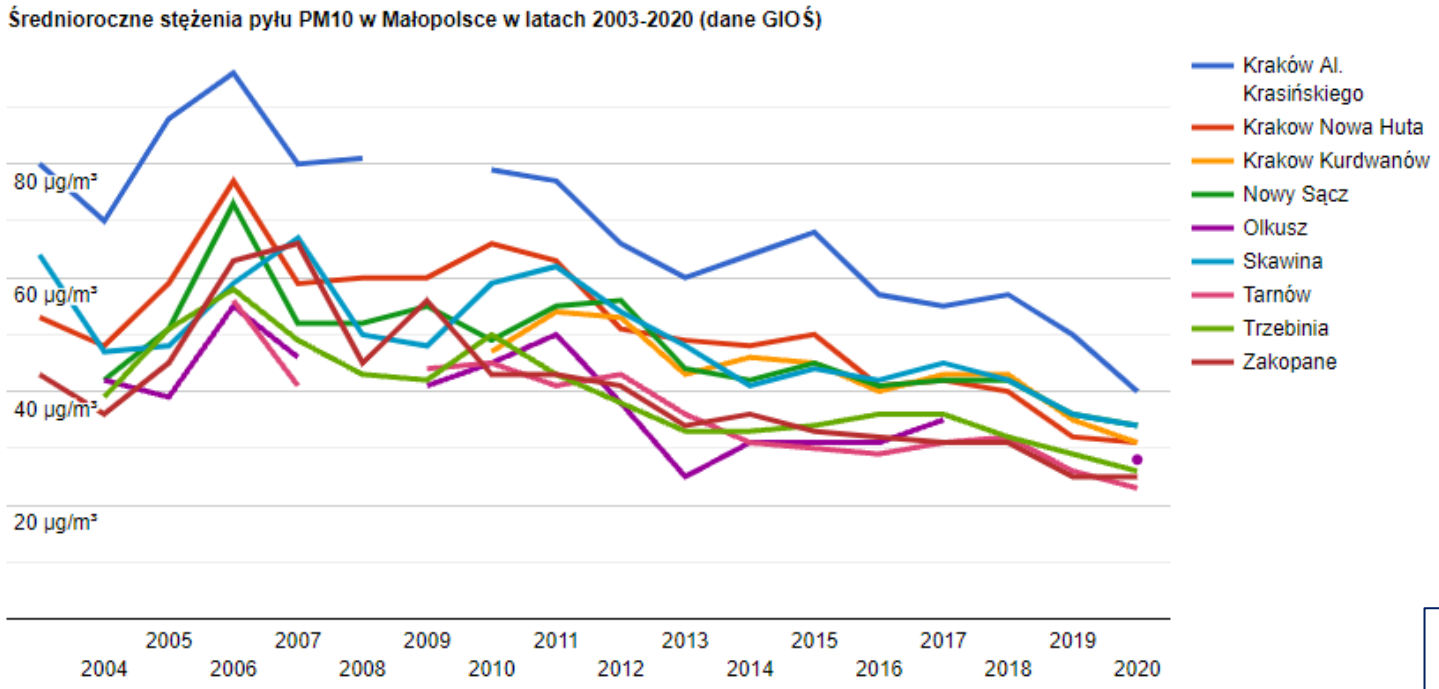
Dębska et al., 2017

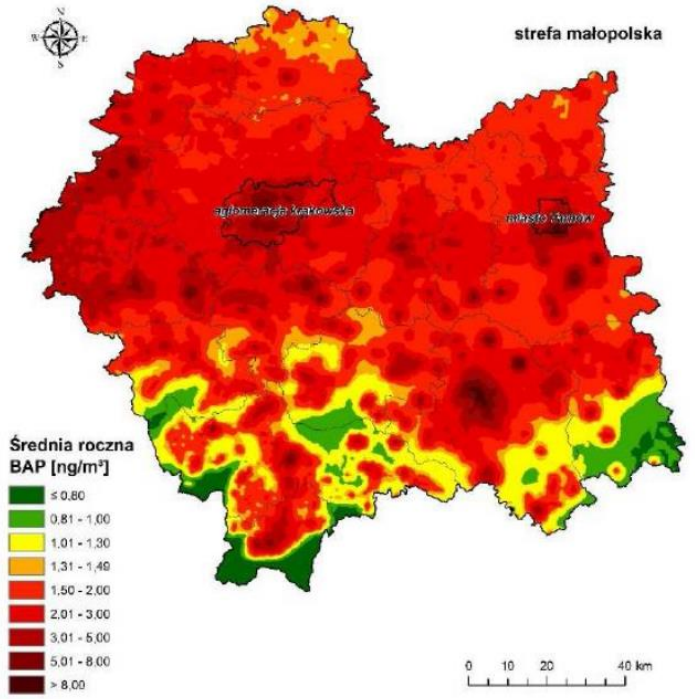


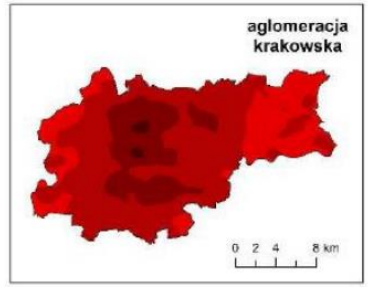
40 vs 15

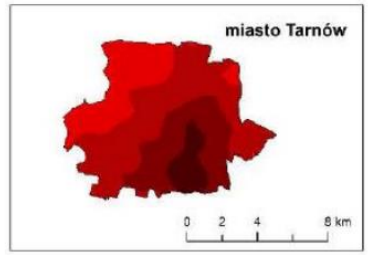
Dębska et al., 2017

Results of anti-smog resolution









Dębska et al., 2017

Anti-smog resolutions **avoids** more than **1,400** deaths, **662** hospitalizations of **cardiovascular** causes and **451** hospitalizations of **respiratory** causes **per year**

During 2012 – 2019, **25 182** coal and wood devices were liquidated

and replaced by gas boilers, district heating, electric heating, heat pumps and oil boilers

- Air quality plan for Malopolska in 2009
- Analysis of the impact of domestic combustion in Krakow in 2010
- Air quality plan updated with the **ban on solid fuels** in 2013
- Analysis of the appropriate solution for reducing emissions from solid fuel devices was carried out in 2016 as part of the work on the air quality plan
- Initiation of a LIFE Integrated Project in 2015
- Adoption of the anti-smog resolution for Krakow in 2016
- Introduction of the solid fuel ban In September 2019

Total financial benefit € **350 000 000** annually

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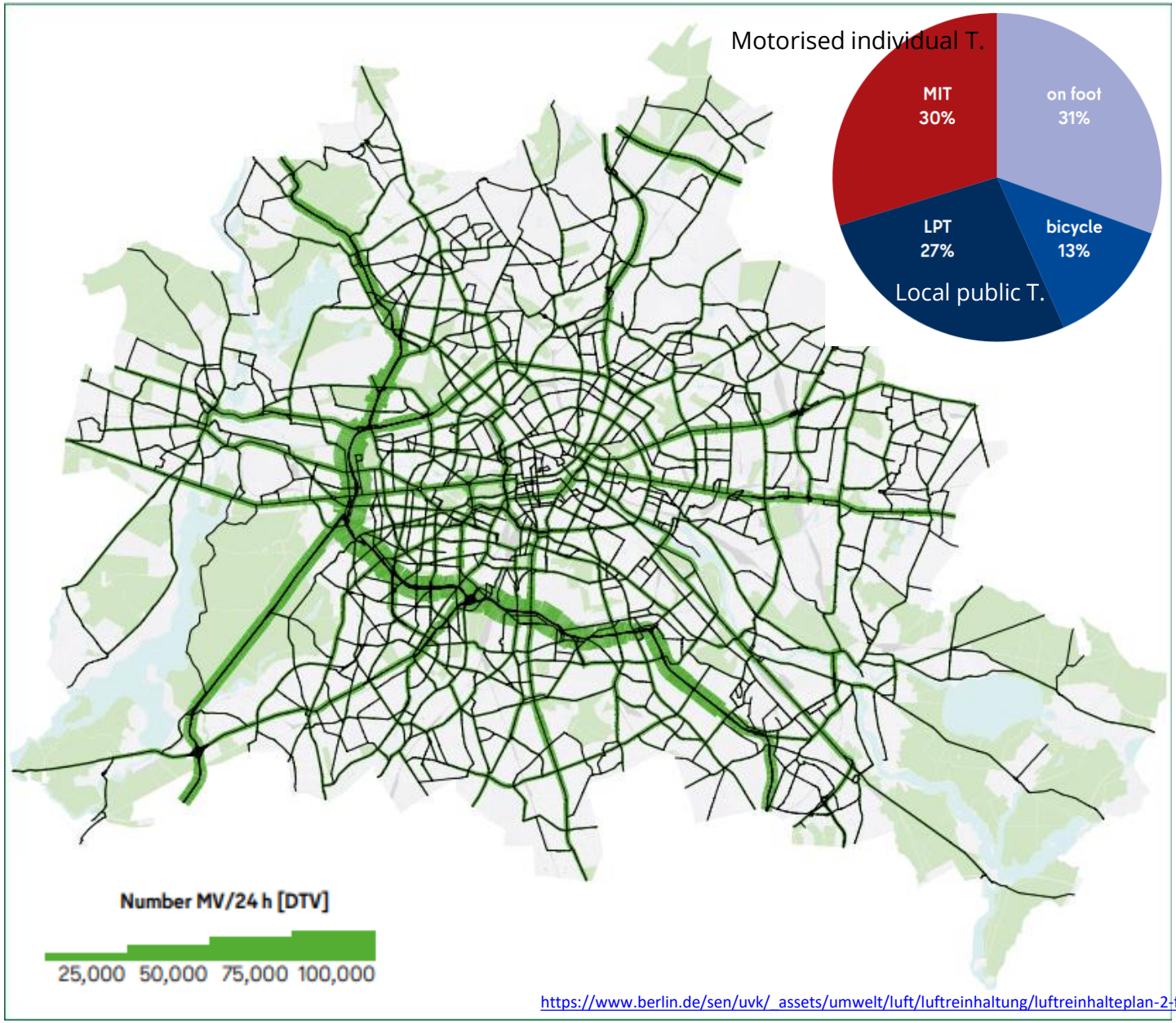
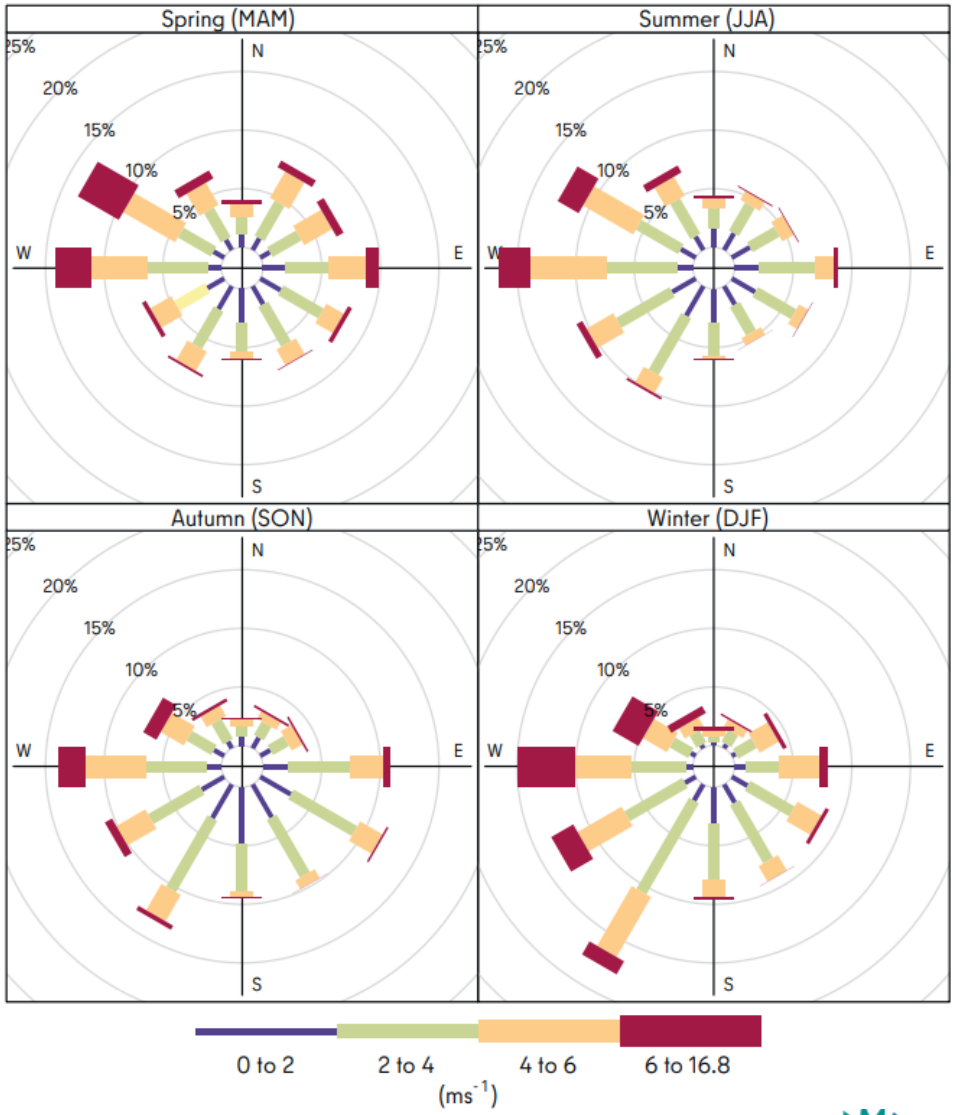
Berlin – problem definition





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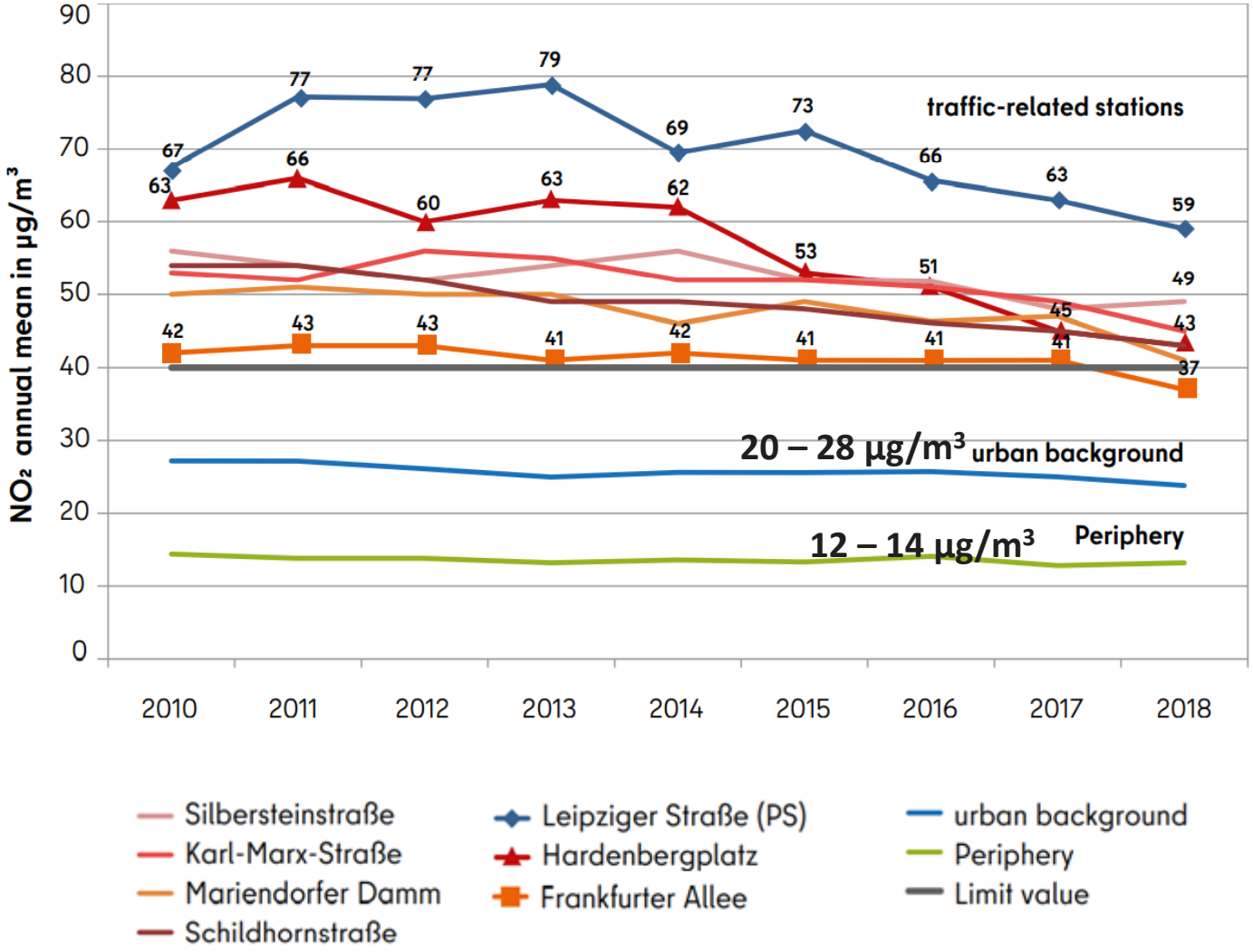
https://www.berlin.de/sen/uvk/_assets/umwelt/luft/luftreinhaltung/luftreinhalteplan-2-fortschreibung/luftreinhalteplan_2019_en.pdf

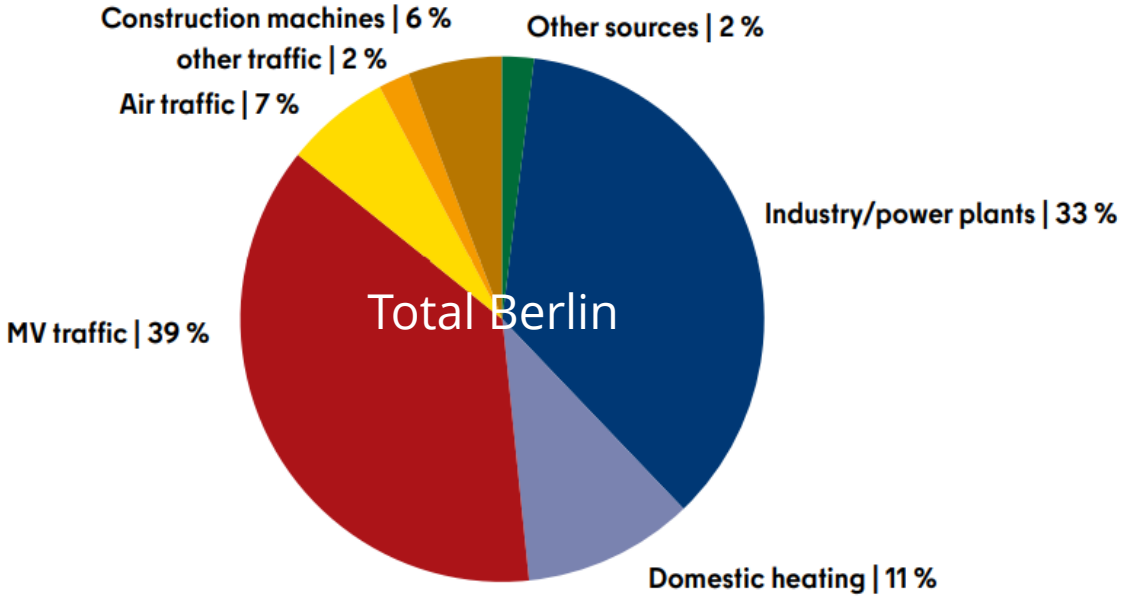
Berlin – NO_2 concentrations and sources



41 – 49 µg/m³

37 – 59 µg/m³

highest value in **Leipziger Straße**, between Friedrichstraße and Charlottenstraße)



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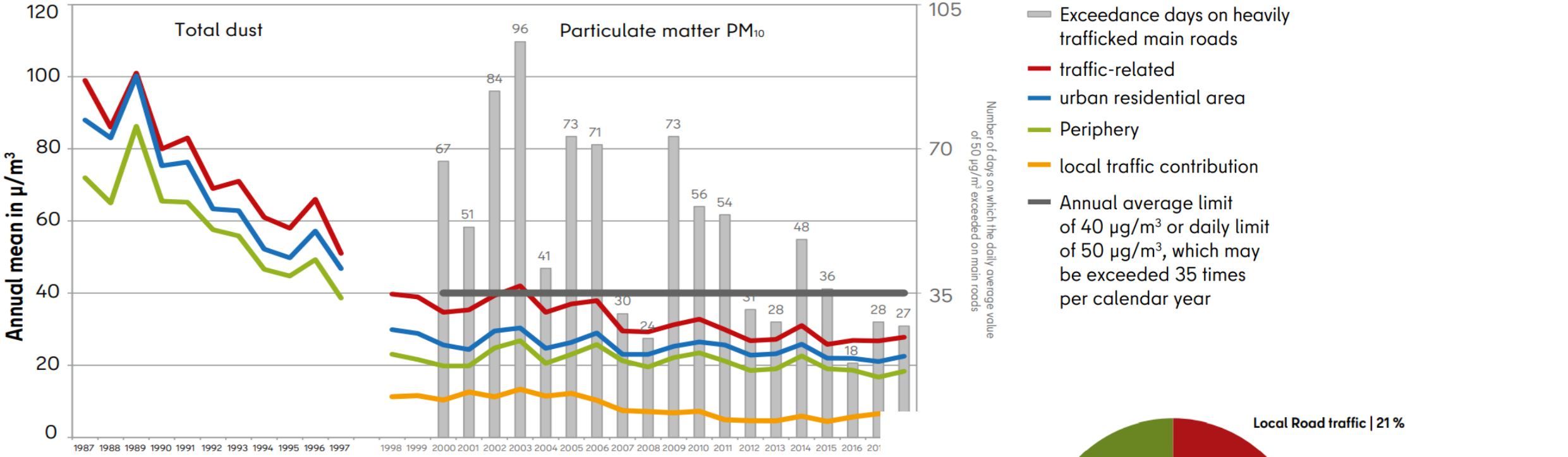
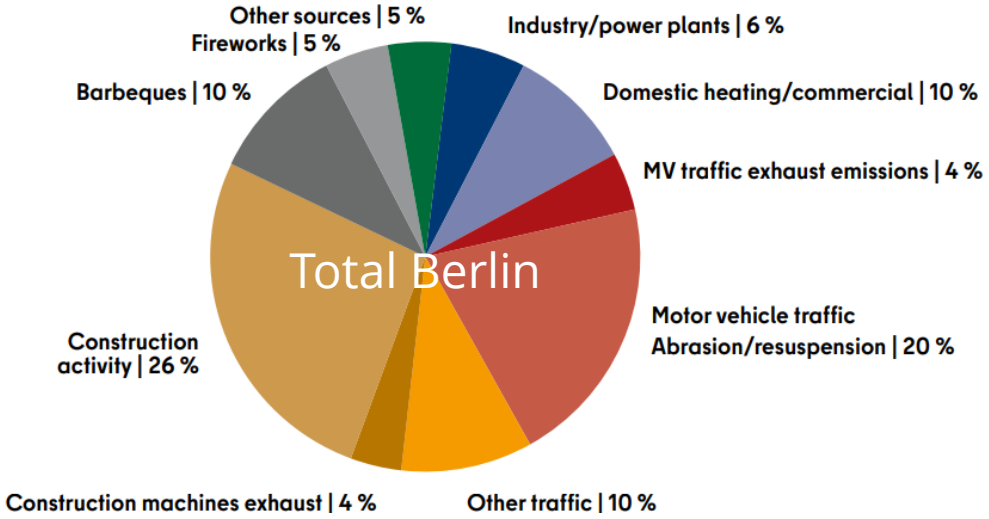
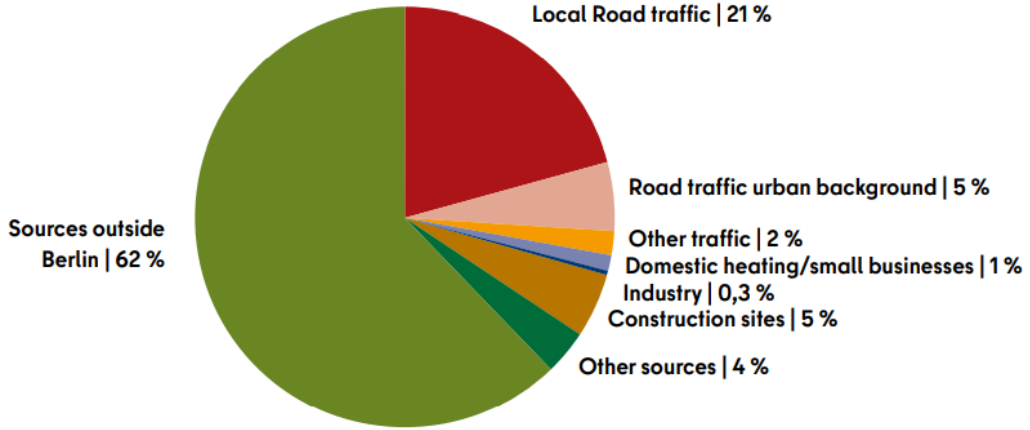
Berlin – PM concentrations and sources







Contribution to Roads

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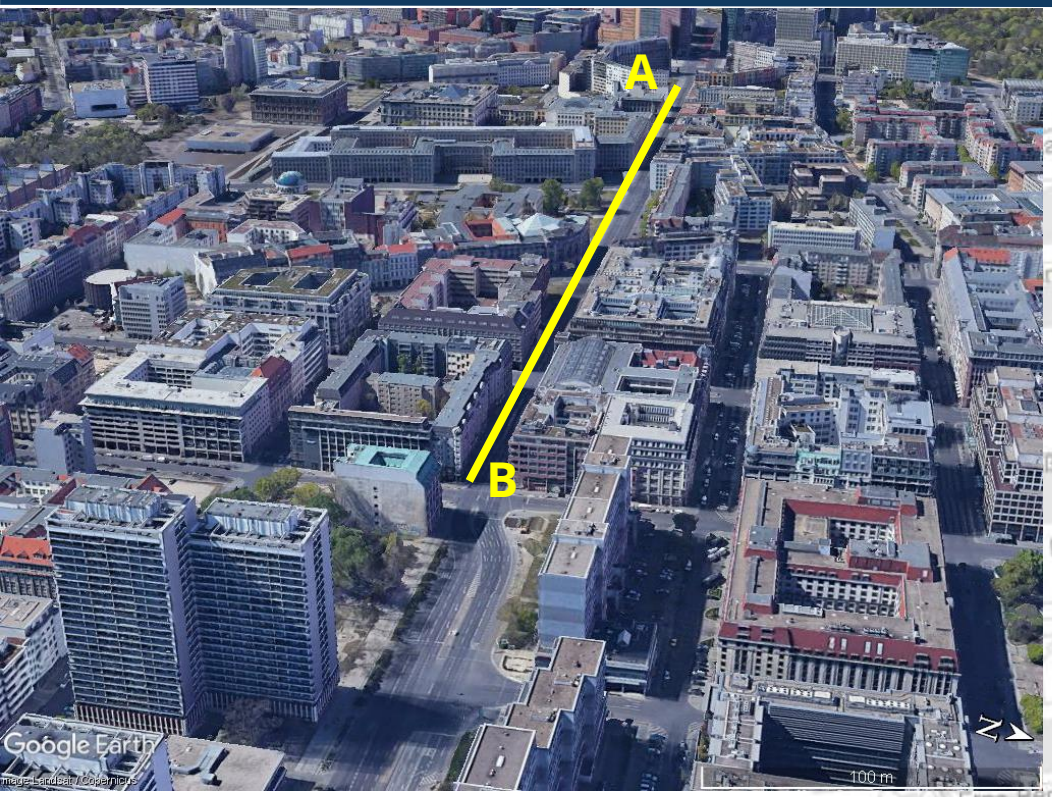
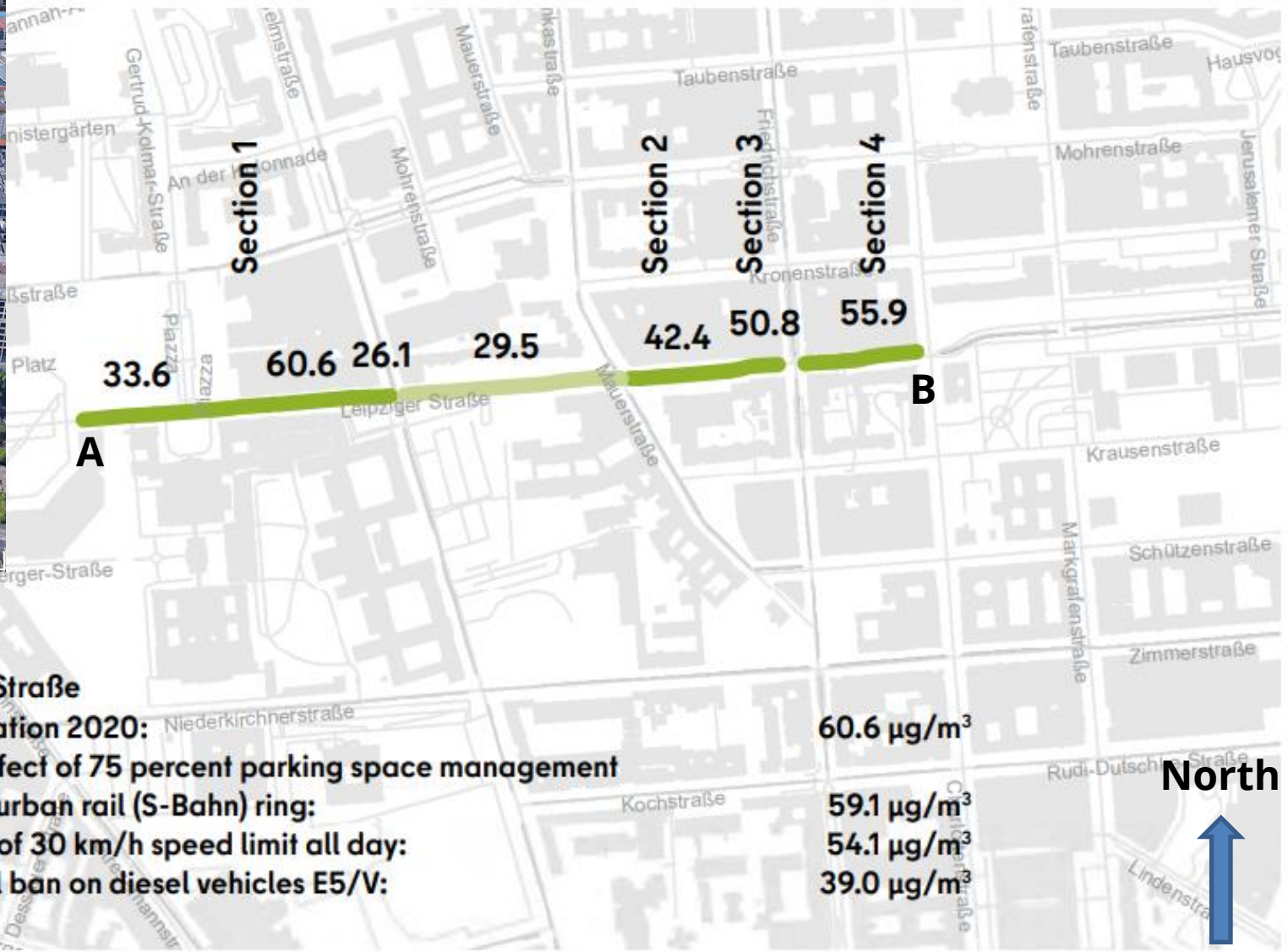
Berlin – traffic management



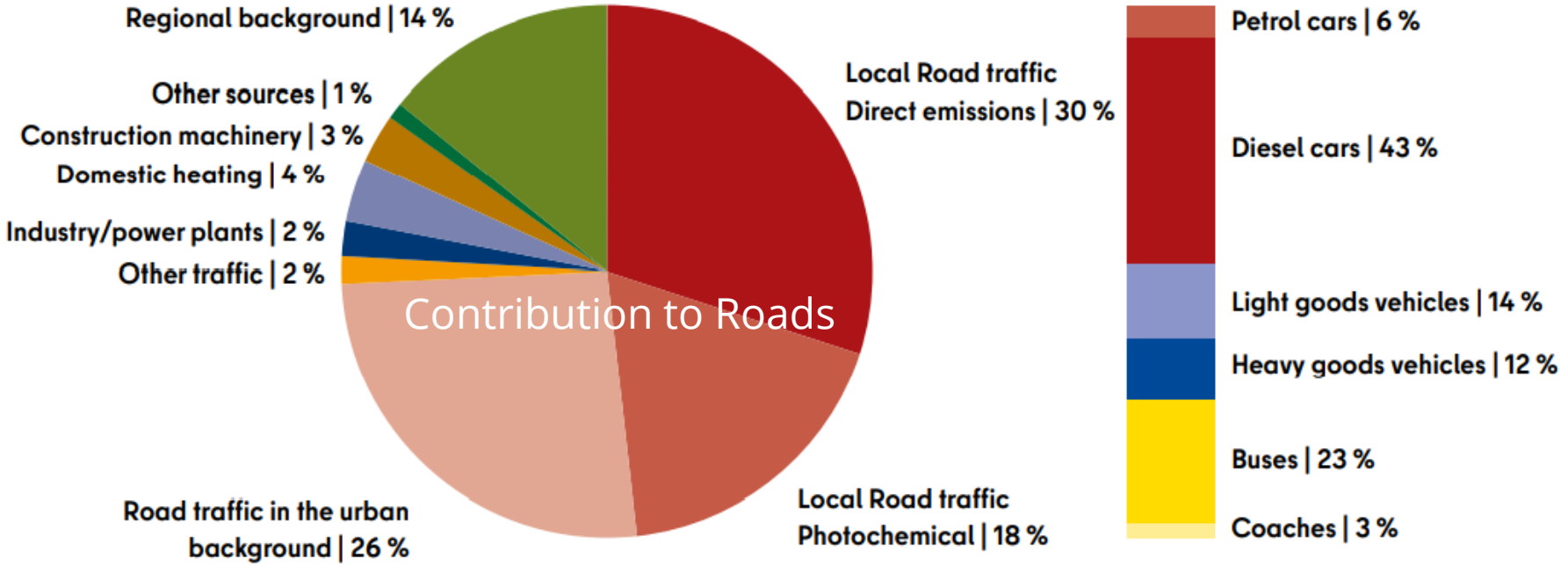


With the **30 km/h** speed limit a **5 µg/m³** of reduction is assumed for annual mean **NO_2** concentrations

Berlin - Summary and justification

A total of 325 kilometres of main roads, 164 of which are full-day

- data at Schildhornstraße and Beusselstraße
- speed limit has been 30 km/h since the end of 2005
- positive effect on air quality
- NO_2 load can be reduced by 10 to 15%.



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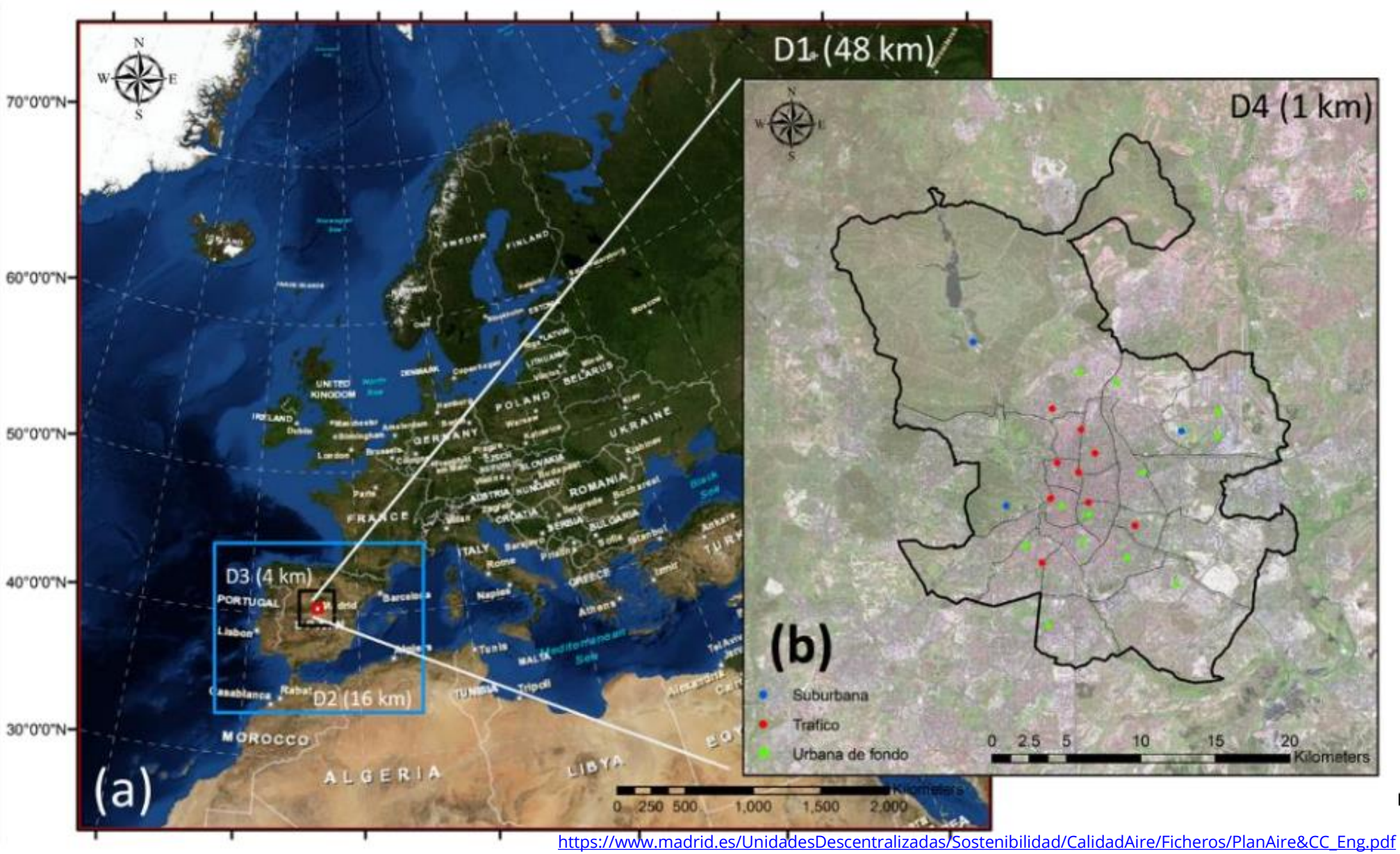
Madrid – sustainable mobiolity plan



https://www.madrid.es/UnidadesDescentralizadas/Sostenibilidad/CalidadAire/Ficheros/PlanAire&CC_Eng.pdf

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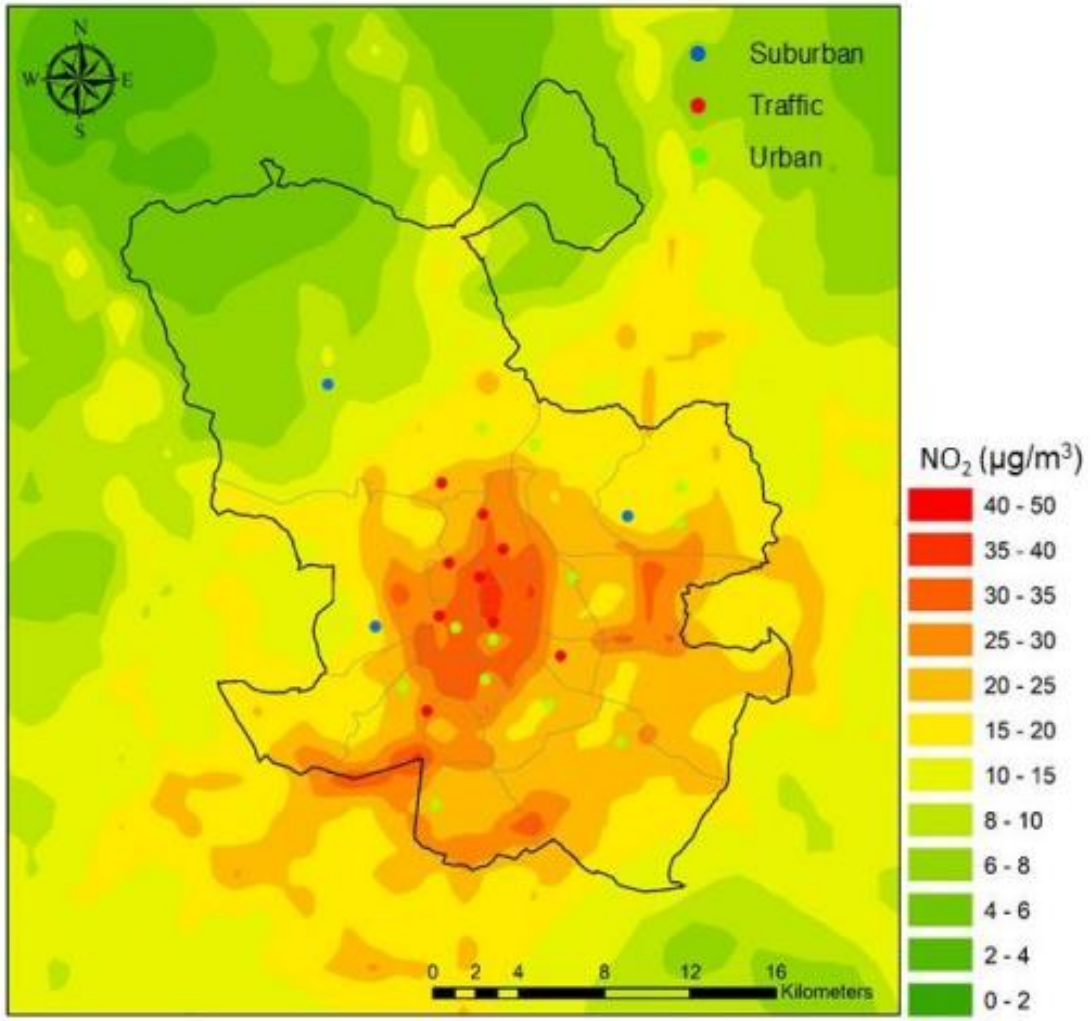
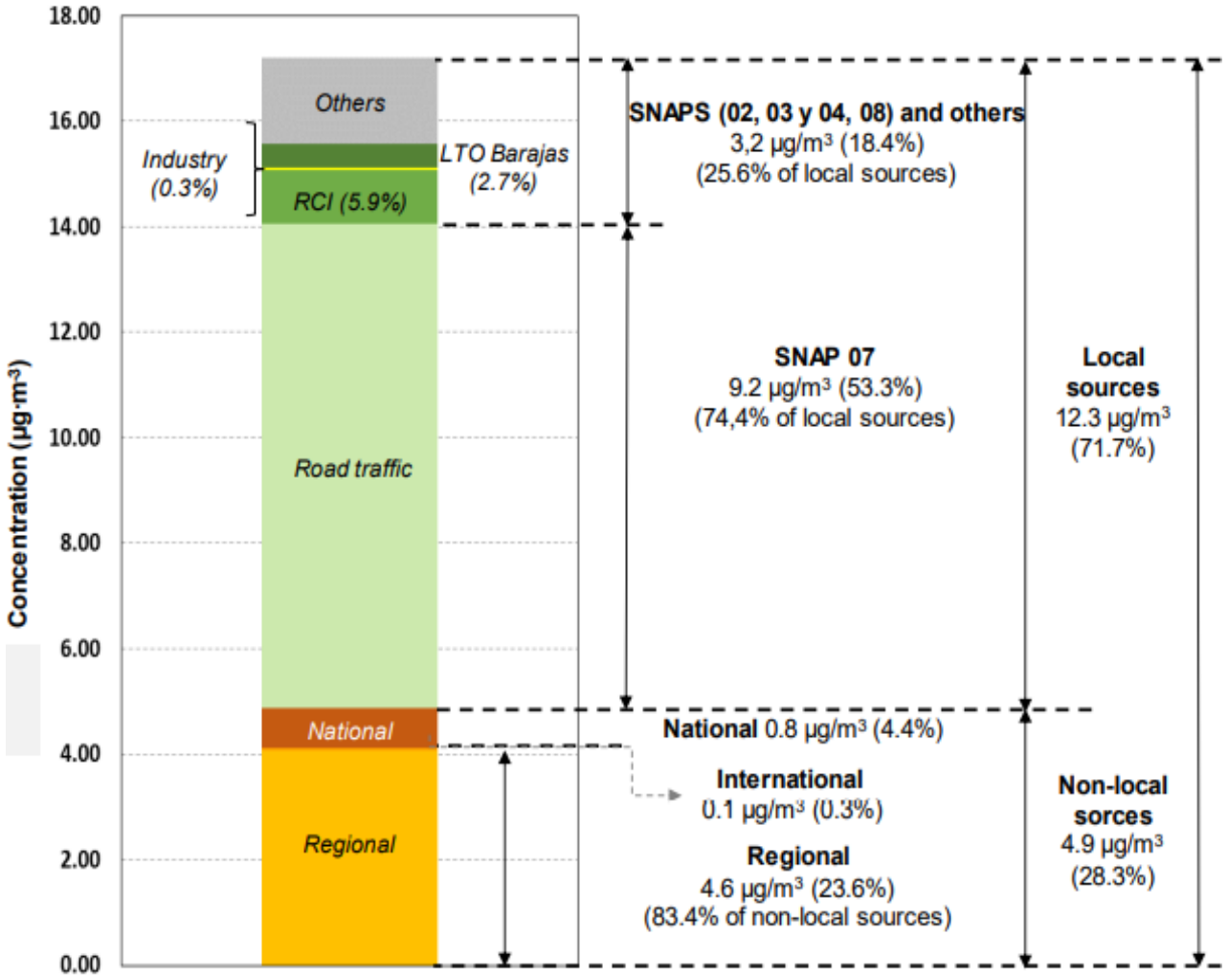
Madrid – NO_2 concentrations





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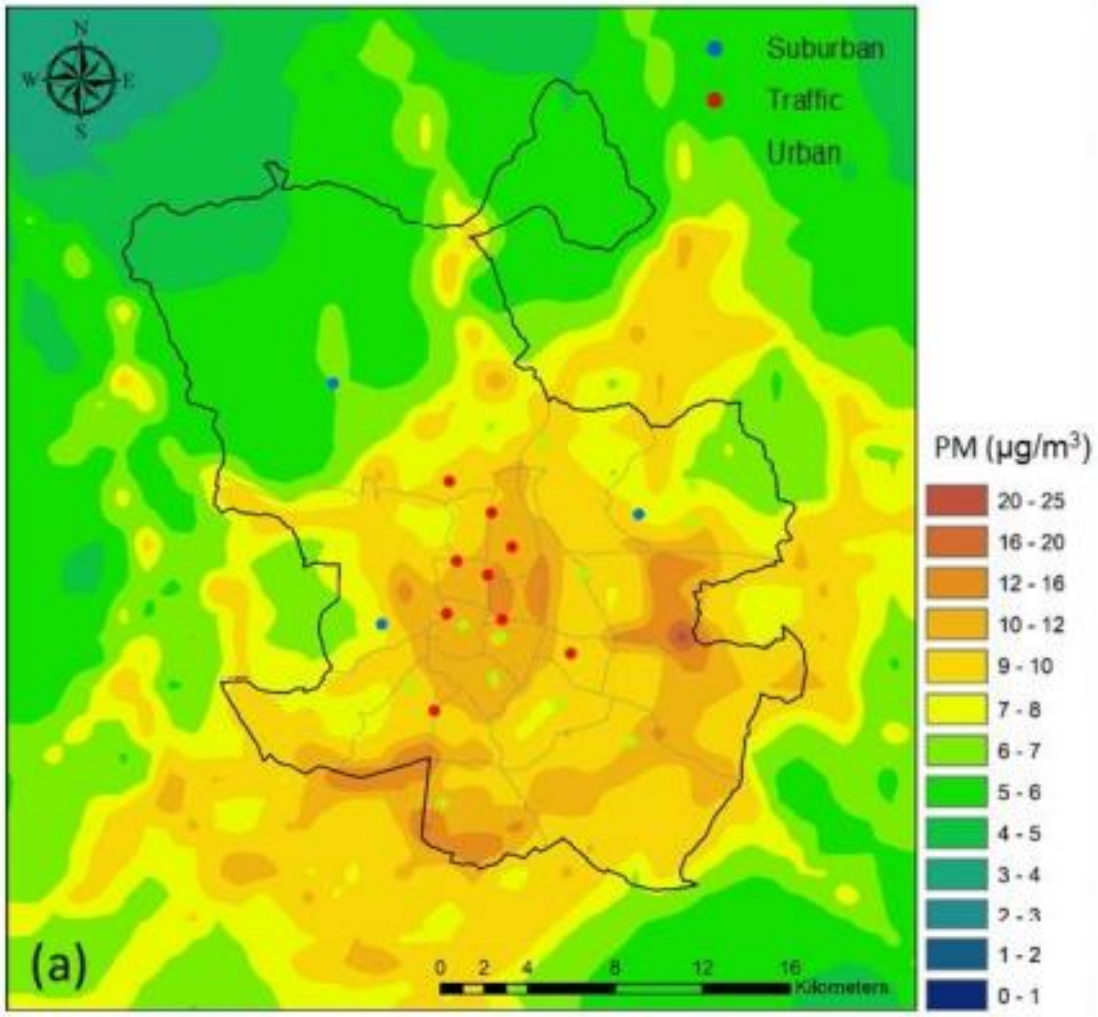
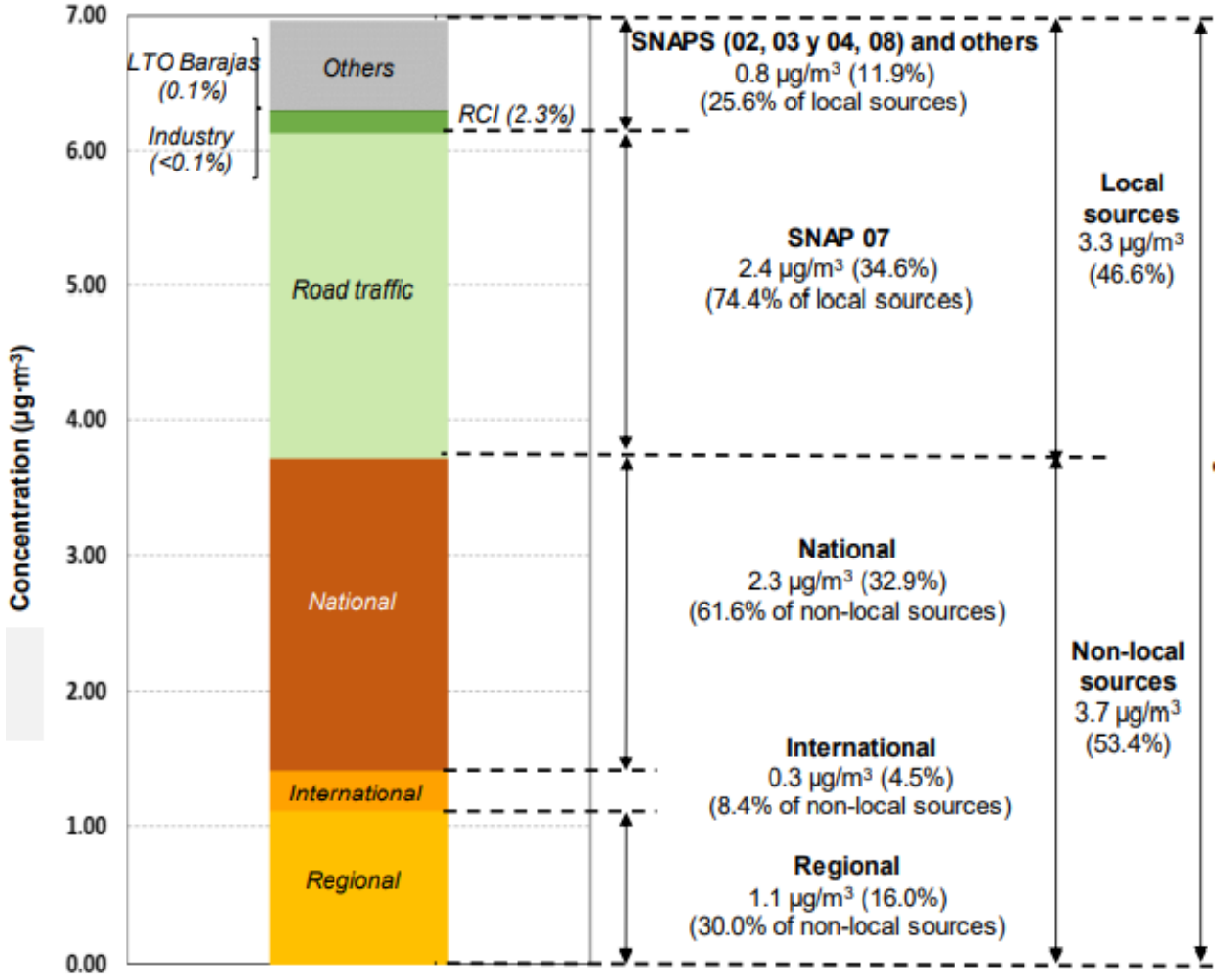
Madrid – PM concentrations





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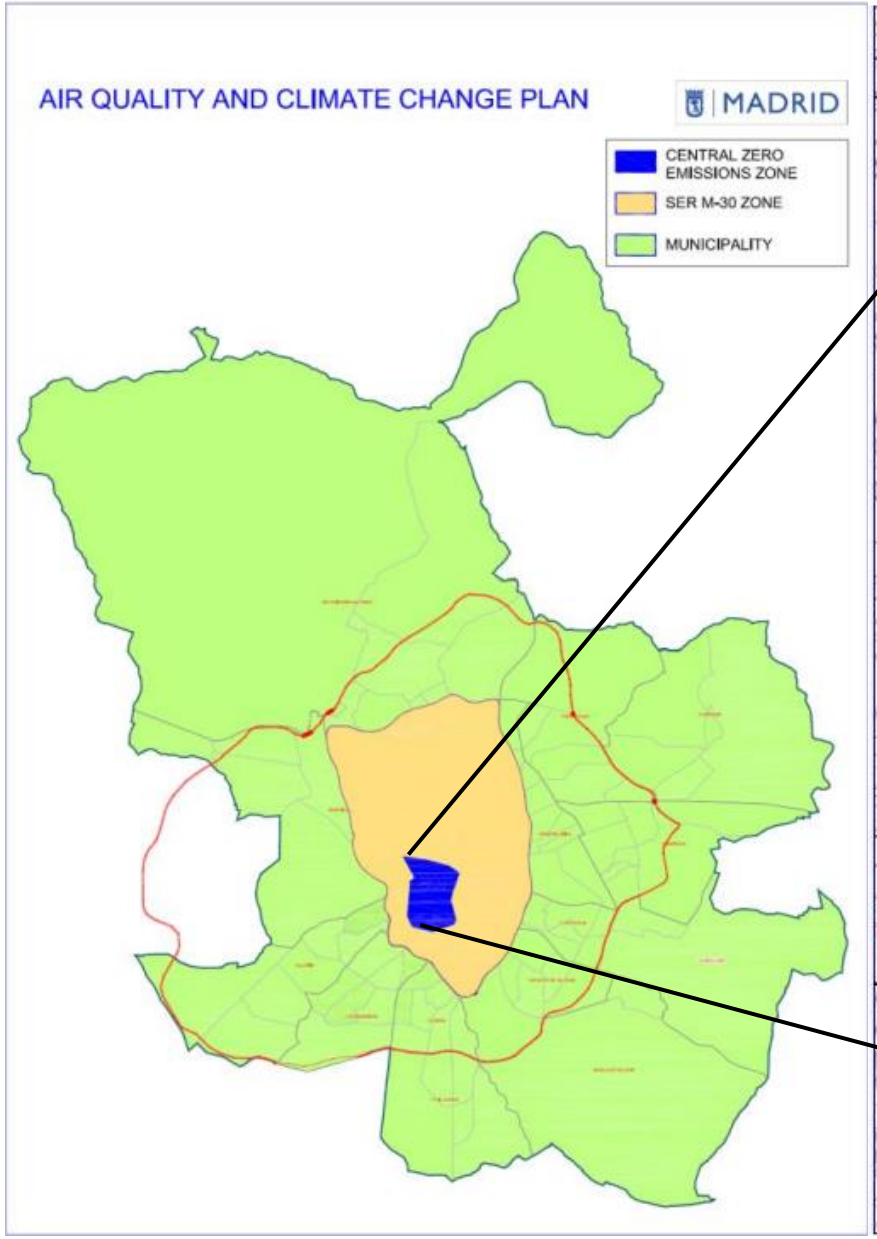
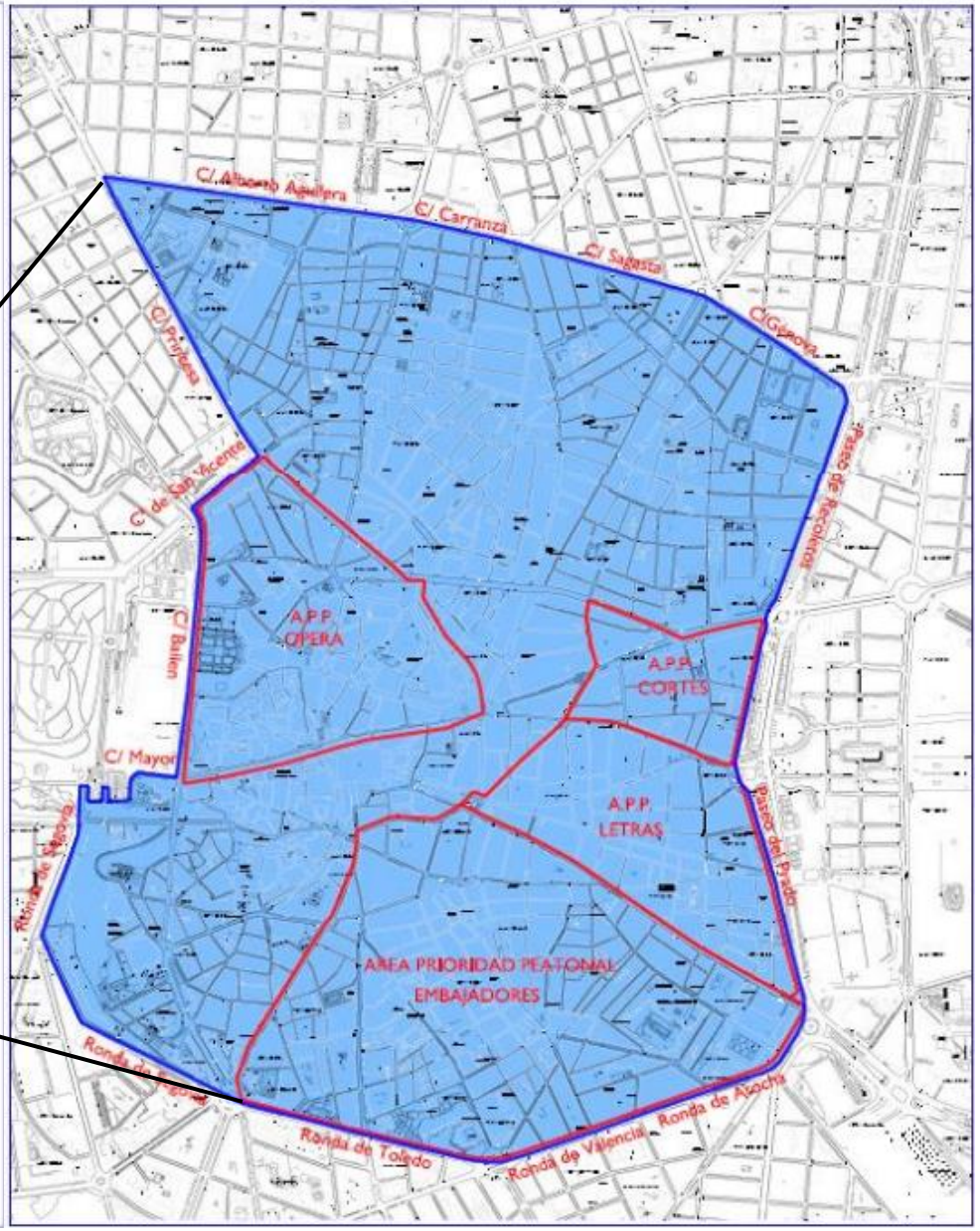
Madrid – traffic management





Central Zero Emissions Zone

Redesign of the main traffic distribution channels and periphery-centre connections

Prioritization of pedestrian mobility

Improvement and extension of the cycle network and cycling mobility

Extension of the public bicycle system and coordination with the Madrid Regional Transport Consortium

Regulation of car parking using air quality criteria

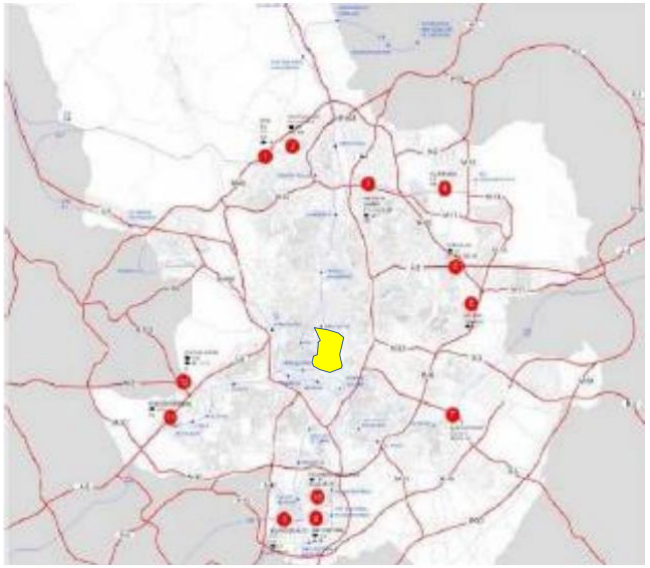
Madrid – solutions

Speed limits on metropolitan accesses and the M-30

Network of intermodal car parks in the metropolitan ring

Priority roads and traffic light priority for electric buses

Infrastructures reserved for public transport



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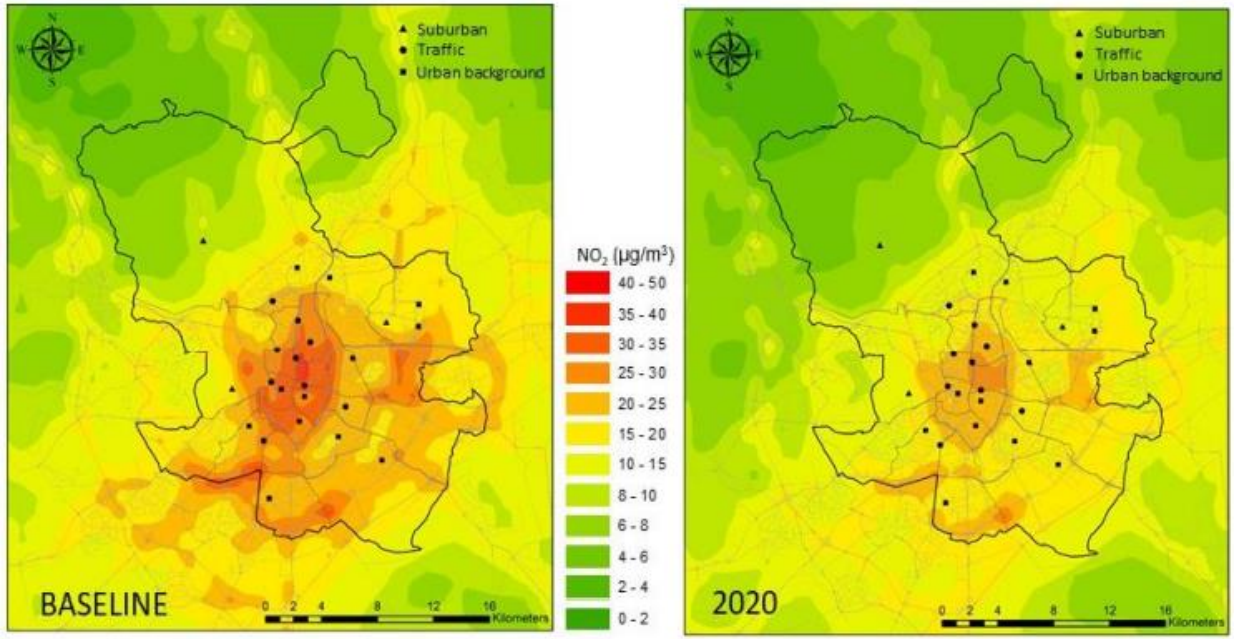
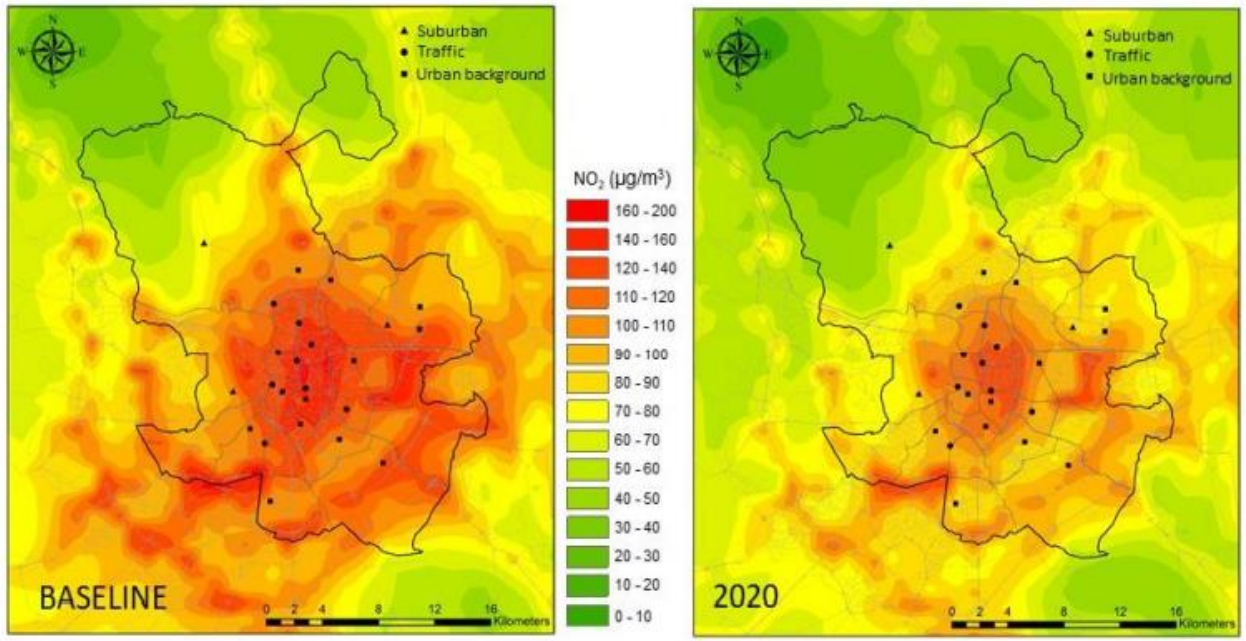
Madrid – modeled scenario

Annual concentration of NO_2 baseline = 2012



Hourly concentration of NO_2 baseline = 2012



POLLUTANTS AND AVERAGE PERIODS		REDUCTION (%) (µg/m³)		
		In the Municipality	Inside Calle-30	Central zero emissions zone
NO_2	Annual average	23%/4.0	26%/7.3	30%/9.6
	Percentile 99.8	20%/1.8	18%/24.7	20%/27.9
PM_{10}	Annual average	8%/0.7	14%/1.5	24%/2.5
	Percentile 90.4	9%/1.7	15%/3.6	24%/5.7
$PM_{2.5}$	Annual average	9%/0.6	16%/1.4	24%/2.2

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Thank you for your attention

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