TEXTE
05/2015

Inventory and effectiveness of measures to improve air quality

For our Environment

Umwelt Bundesamt

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Environment, Nature Conservation,
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Inventory and effectiveness of measures to improve air quality

by

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On behalf of the Federal Environment Agency (Germany)

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Abstract

This report contains a description and analysis of 242 air quality plans (AQPs) and action plans published in Germany up to 30.11.2012. These plans offer an extensive overview of the current situation in Germany regarding air quality, different methodologies of assessment and proposed measures to improve air quality.

A detailed schema for classifying the measures has been used to register and analyse all plans, which contain 2588 measures. To ensure comparability, the measures were further classified into a set of 130 standardised measures, representing all measures in German AQPs.

As plans and measures have been developed and implemented in Germany over a longer period of time, the available evaluation studies carried out after the implementation of the respective measures have been surveyed.

Additionally, the theoretical reduction potentials for two types of measures concerning road traffic were analysed and, for low emission zones (LEZs), compared with published evaluations. The feasibility and complexity of assessing the isolated effect of a measure is discussed using LEZs as an example.

Finally, an approach of the EU-Project APPRAISAL for consolidating and assessing AQPs has been applied to eleven German AQPs.

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Preliminary note

This English document is a self-contained report based on the project 'Bestandsaufnahme und Wirksamkeit von Maßnahmen der Luftreinhaltung' (IVU Umwelt, 2013), which has been compiled as FKZ 3712 43 255 on behalf of the German Environmental Protection Agency (Umweltbundesamt, UBA) and published 2014 in German as UBA-Texte 26/2014.

This report presents, in a condensed form, the contents of IVU Umwelt (2013) which comprises further analyses and clarifications as well as a more detailed documentation and additional data. In three cases, which are marked in the text, the numbers given here differ from the numbers in IVU Umwelt (2013) which had to be based on preliminary data.

This report is complemented by a section relating German Air quality planning to the EU-Project APPRAISAL.

1 Introduction

The status of air quality plans (AQPs) and action plans published in Germany up to 30.11.2012 is described and thoroughly analysed. These plans offer an extensive overview of the current situation in Germany regarding air quality, different methodologies of assessment and proposed measures to improve air quality. This report is based on the most recent update of the inventory of air quality plans in IVU Umwelt (2013). There, all plans have been analysed as documented in chapter 2.

As described in chapter 3, the detailed schema for classifying the measures developed in the previous projects was extended to the 'Schema of measures 2013'. This updated tool was used to register and classify all measures systematically. To ensure the comparability of the measures, they were classified with respect to an extended set of standardised measures. These 'Standardised measures 2013' constitute a central element of the analysis and represent all measures that are being implemented, planned or discussed in plans in Germany.

Chapter 4 focuses on the effectiveness and evaluation of measures. As plans and measures have been developed and implemented in Germany over a longer period of time, it is now possible to assess the effectiveness of measures after their implementation. Thus, the assessment can be based on more information than just the expected effects noted in the plans, which are normally based on estimations and scenario calculations. The available evaluation studies carried out after the implementation of the measures have been surveyed, focusing on the four measures 'low emission zones' (LEZs), 'environmental traffic management', 'lorry transit bans' and 'speed limits of 30 or 40 km/h on major roads'.

Furthermore, the theoretical reduction potentials for two types of measures concerning road traffic were analysed and, for LEZs, compared with published evaluations. The complexity of the task and the potential to assess the isolated effect of a measure is discussed using the measure LEZ as an example.

Finally, in chapter 5, an approach of the EU-Project APPRAISAL for reviewing and consolidating methodologies to address and assess the impact of local or regional AQPs and their health implications has been applied. Eleven German AQPs have been analysed with respect to criteria specified in APPRAISAL and entered in the project's database.

2 Air quality planning in Germany 2002 until 2012

Air quality plans (AQP) are, according to EU Directive 2008/50/EC (EU, 2008), 'plans that set out measures in order to attain the limit values or target values'. The analysis of AQPs in IVU Umwelt (2013) continues the work of IVU Umwelt (2006, 2007 and 2009)[1] with a renewed update of the inventory of AQPs. It is based on methods and results of the previous projects and aimed at analysing the plans and identifying the measures planned in the German Länder in order to meet air quality limit values.

2.1 Inventory of AQPs published in Germany

There have still been unsolved problems meeting limit values in many locations over the last years, leading to numerous new or updated plans. In particular, the German Länder notified time extensions (postponements of attainment deadlines) based on §21 of 39. BImSchV (respectively Art. 22 of Directive 2008/50/EC) which generally were accompanied by new or updated plans.

Altogether, 242 publications since 2004 were part of the analysis, thereof 231 final versions and 11 drafts. 81 plans are updates of previous plans and 41 plans have been annulled by updates. Violations of limit values were of three types: PM10 only, NO_2 only or both substances each resulted in about one third of the plans. One plan was triggered by Benzene (see Table 1).

Table 1: AQPs published in Germany up to 2012

Data set	Number of plans	Share
AQPs in Germany (up to 30.11.2012)	**242**	**100%**
Final version	231	95%
Drafts	11	5%
Updates of previous plans	81	33%
Annulled by updates	41	17%
Limit value exceedances in the AQPs		
only PM10	86	36%
only NO_2	76	31%
PM10 and NO_2	79	33%
Benzene	1	0.4%

The entire data set of the AQPs considered is listed in Table 25 in appendix 8.1 together with additional information on the plans. The references for the AQPs can be found in appendix 8.3.

[1] The four studies IVU Umwelt (2006, 2007, 2009 and 2013) have all been compiled on behalf of the German Environmental Protection Agency (Umweltbundesamt, UBA).

Figure 1 shows the development of the total number of AQPs published in Germany up to 30.11.2012. The first plans published in 2004 refer to exceedances of limit values in 2002 (see Table 3).

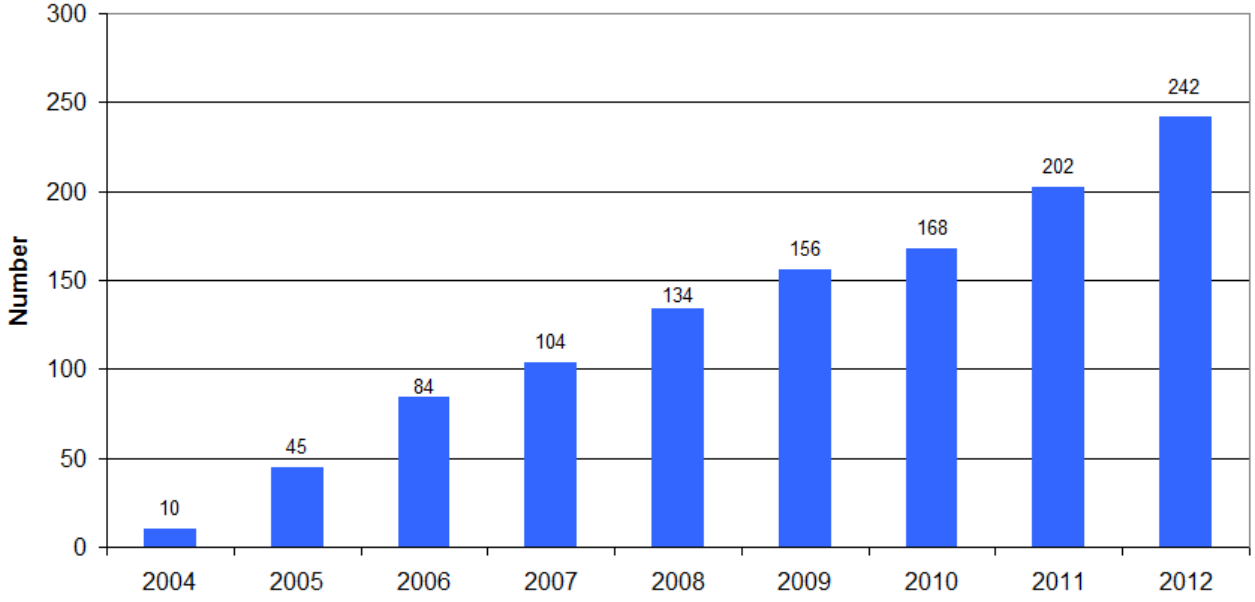

Figure 1: Total number of AQPs

The number of new plans per year is shown in Figure 2, differentiated with respect to the pollutants triggering the compilation of the respective plans. Figure 2 illustrates that the plans were drawn up to reduce PM10 from 2004 until 2007. Since 2008, NO_2 has increasingly become the focus of the plans. All plans established in 2011 seek to reduce NO_2, reflecting the dynamics due to the notifications of time extensions submitted by Germany to the European Commission in September 2011 (see BRD, 2011).

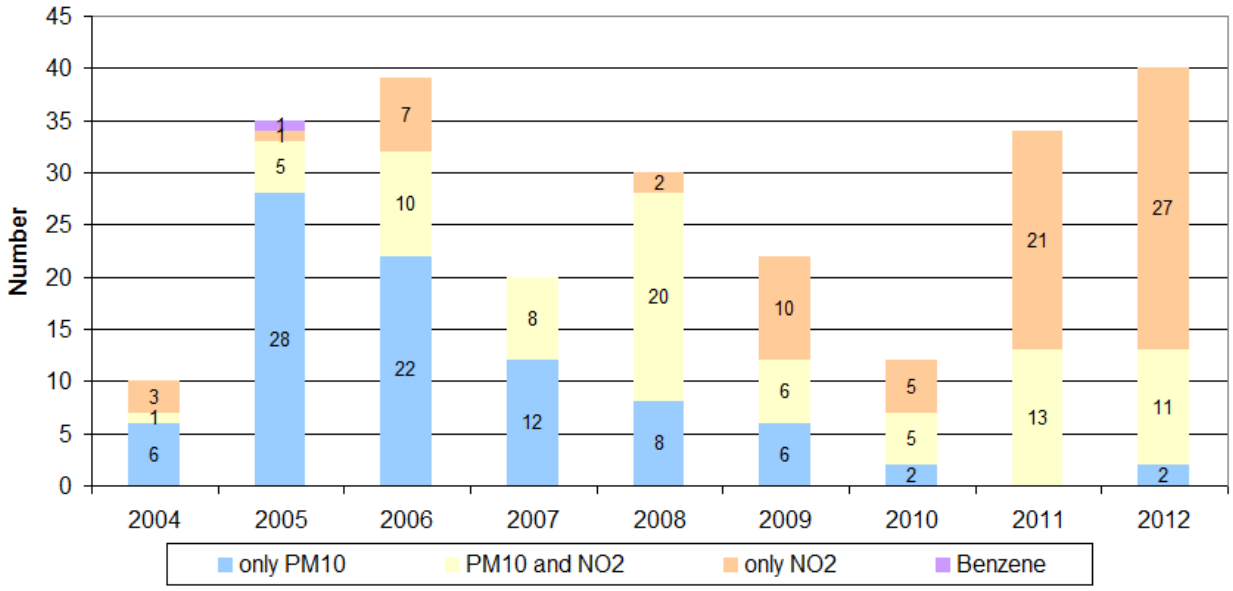

Figure 2: New or updated AQPs per year

The 81 updates of previous plans are shown in more detail in Figure 3 as total numbers and in Figure 4 as change per year. Due to the dynamics of the time extensions, these graphs show a strong increase of updates in 2011 and 2012, all covering NO_2.

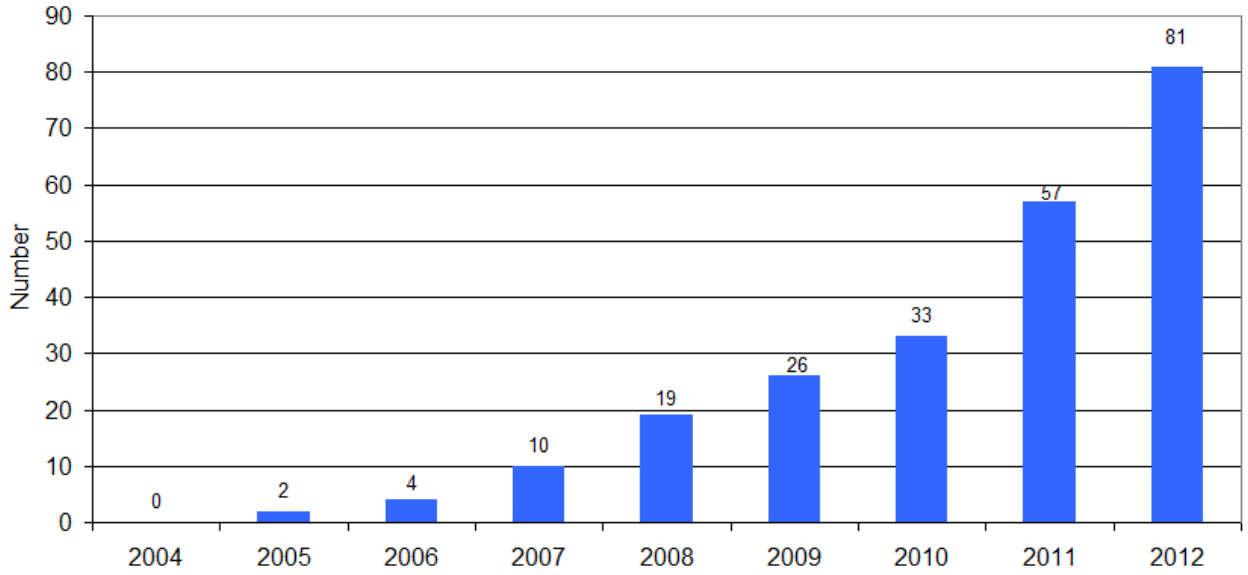

Figure 3: Total number of updated AQPs

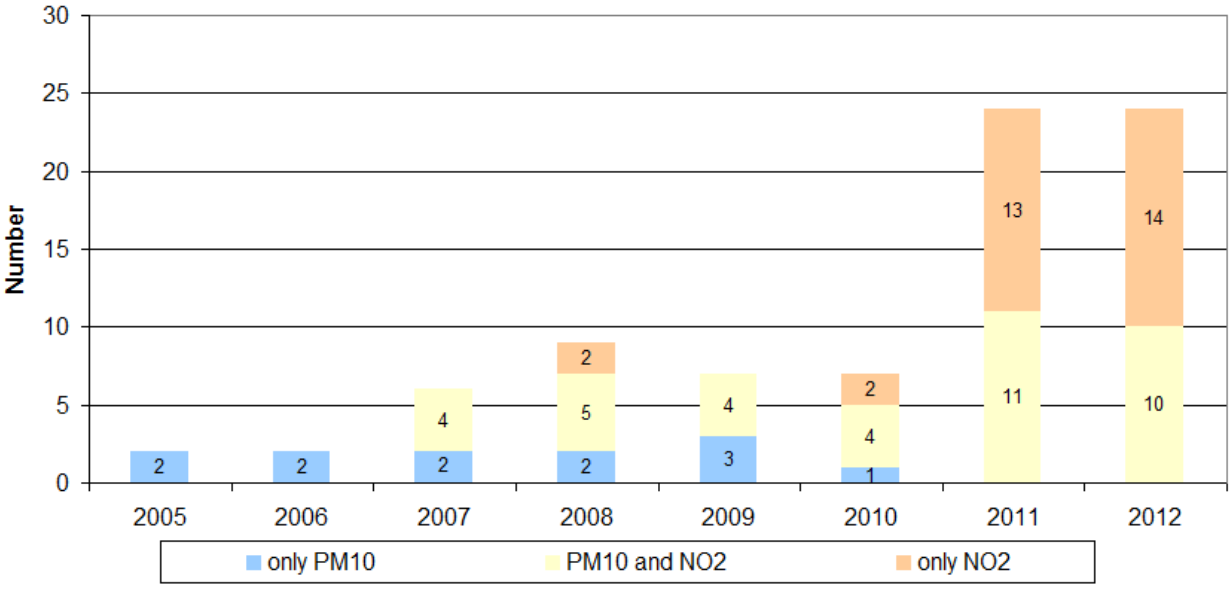

Figure 4: Updates of plans per year

41 AQPs have been annulled by updated plans. Figure 5 shows the number of annulations per year with respect to the AQP`s publication date.

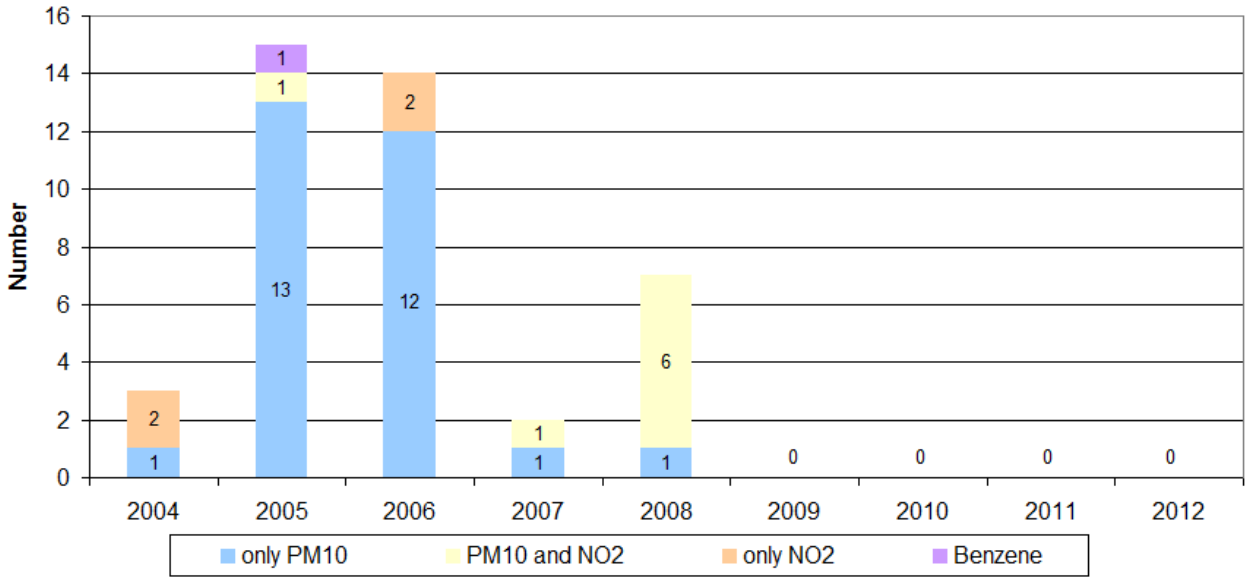

Figure 5: Plans annulled by updates per year

Municipalities with plans published between 2004 and 2012 are displayed in Figure 6, coloured and grouped by the year of the publication of the latest plan for the respective municipality. As the map shows, AQPs have been compiled all over Germany with the distribution being a little less dense in the northern regions. Figure 6 also shows that AQPs have been drawn up not only for almost all agglomerations and major cities but also for a large number of small towns.

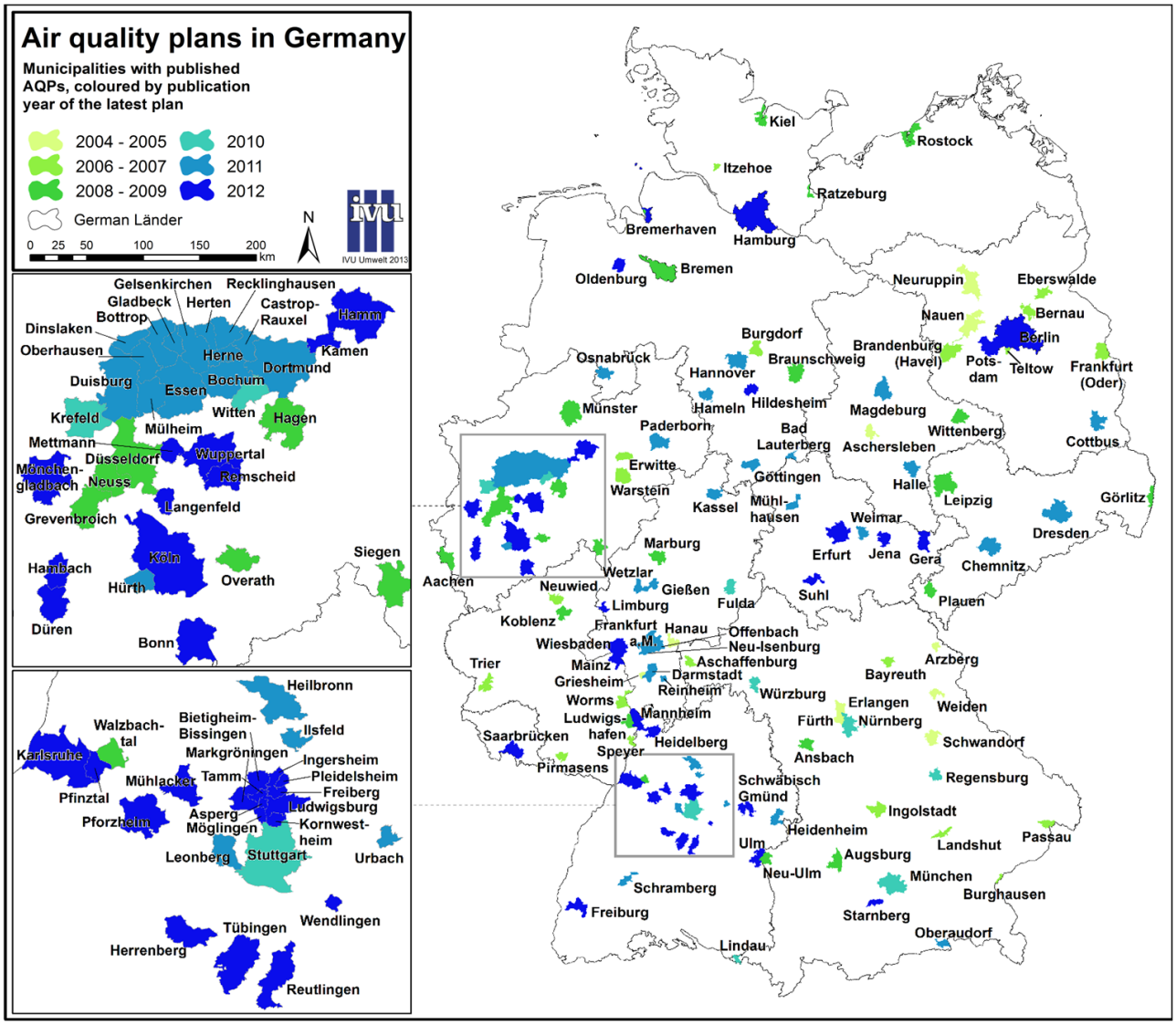

Figure 6: Municipalities with plans published between 2004 and 2012, coloured and grouped by the year of the publication of the latest plan for the respective municipality

2.2 Limit value exceedances in Germany 2002 until 2012

By bringing into force EU-Directives 96/62/EG (EU, 1996), 1999/30/EG (EU, 1999), and 2008/50/EG (EU, 2008), the European Union, inter alia, fixed mandatory limit values for NO_2 und PM10. In Germany, the transposition of the Directives into national law resulted in the 22. BImSchV and, most recently in 2010, in the 39. BImSchV. Respective European limit values and tolerance margins for NO_2, PM10 and PM2.5 from 2002 to present are listed in Table 2.

Table 2: Limit values and tolerance margins in Europe for NO_2, PM10 and PM2.5

Year	NO_2 annual mean value [µg/m³]	NO_2 hourly mean value [a] [µg/m³]	PM10 annual mean value [µg/m³]	PM10 daily mean value [b] [µg/m³]	PM2.5 annual mean value [c] [µg/m³]
2002	56	280	44.8	65	-
2003	54	270	43.2	60	
2004	52	260	41.6	55	
2005	50	250	40	50	
2006	48	240			
2007	46	230			
2008	44	220			
2009	42	210			
since 2010	40	200			25

[a] not to be exceeded more than 18 times in any calendar year
[b] not to be exceeded more than 35 times in any calendar year
[c] since 2010: target value; from 2015 on: limit value

Exceedances of limit values and tolerance margins for NO_2 and PM10 in Germany in the timeframe 2002 to 2012 are set out in Table 3 and Figure 7.

Table 3: Limit value exceedances in Germany (limit values and tolerance margins) 2002 to 2012

Year	Number of violations of limit values			Data source
	NO_2 annual mean value	PM10 daily mean value	PM10 annual mean value	
2002	22	6	1	IVU Umwelt (2006)
2003	38	45	9	IVU Umwelt (2006)
2004	46	29	3	IVU Umwelt (2007)
2005	56	63	4	IVU Umwelt (2007)
2006	106	104	7	IVU Umwelt (2009)
2007	103	41	1	IVU Umwelt (2009)
2008	75	17	1	UBA (2013)
2009	160	33	1	UBA (2013)
2010	165	63	2	UBA (2013)
2011	173	80	1	UBA (2013)
2012*	171	11	0	UBA (2014)

* Different numbers in IVU Umwelt (2013) are due to preliminary data used there

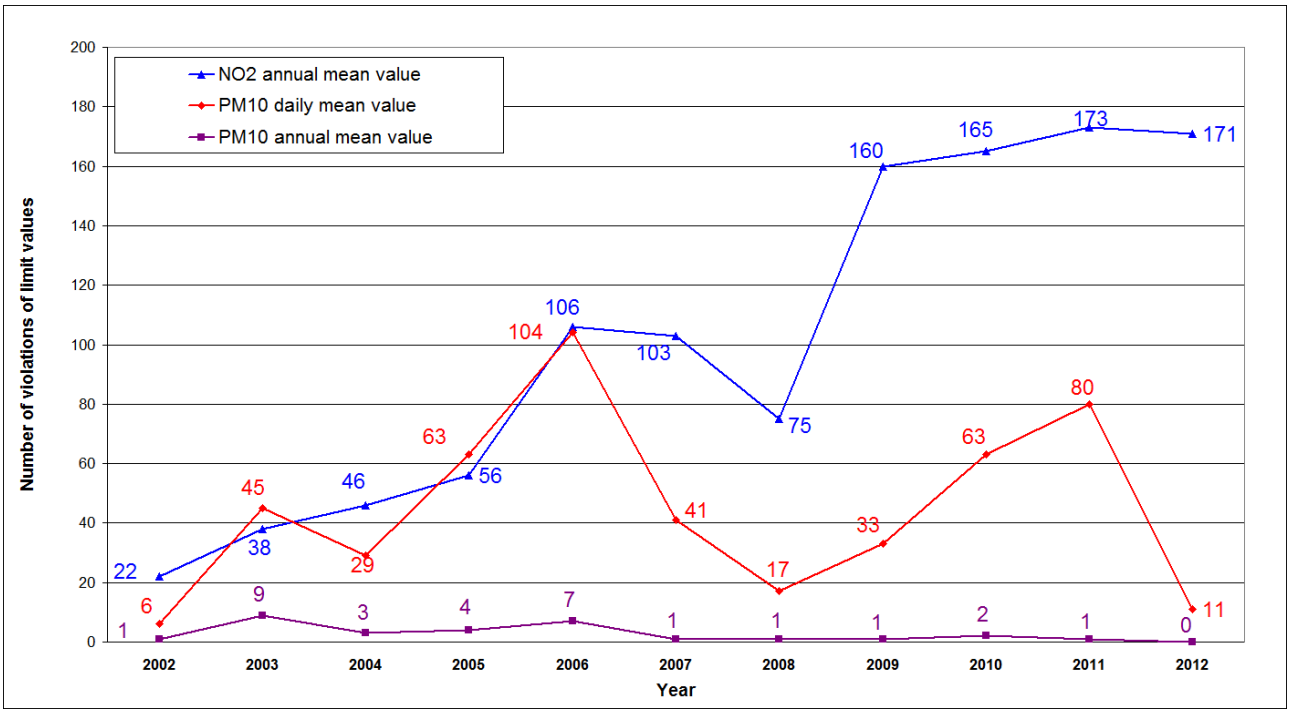

Figure 7: Limit value exceedances in Germany (limit values and tolerance margins) 2002 to 2012 (different numbers in IVU Umwelt (2013) are due to preliminary data used there)

The development of limit value exceedances shown in Table 3 and Figure 7 cannot be fully taken as an indicator of the development of air quality in Germany, as the numbers reflect several phenomena. First of all, the limit values were applied with tolerance margins for PM10 and NO_2 until the end of 2004 and 2009, respectively (see Table 2). Then, meteorological factors have a significant influence on concentrations. Exceedances of PM10 daily mean values in particular depend on the occurrence respectively absence of specific meteorological episodes. Furthermore, it has to be taken into consideration that the number of monitoring stations has not remained constant during the years. In recent years, an increasing number of monitors, particularly for NO_2, have been installed in hot spots. Lastly, it has to be noted that the data for the observation period are based on different data sets (IVU Umwelt (2006, 2007, 2009) and UBA (2013, 2014); details can be found in IVU Umwelt (2013)).

2.3 Source apportionments

Plans are expected to include source apportionments with respect to both spatial origin and different source groups.

Spatial source apportionment generally refers to the quantification of contributions of the three spatial components to the total concentration: regional background, urban background, and additional concentration due to local sources. A schematic representation of contributions to air pollution levels in a city is given in Figure 8. At traffic hot spots, the total concentration is the sum of the regional background (RB), urban background (UB) and the additional concentration (AC) due to local traffic in the respective hot spot.

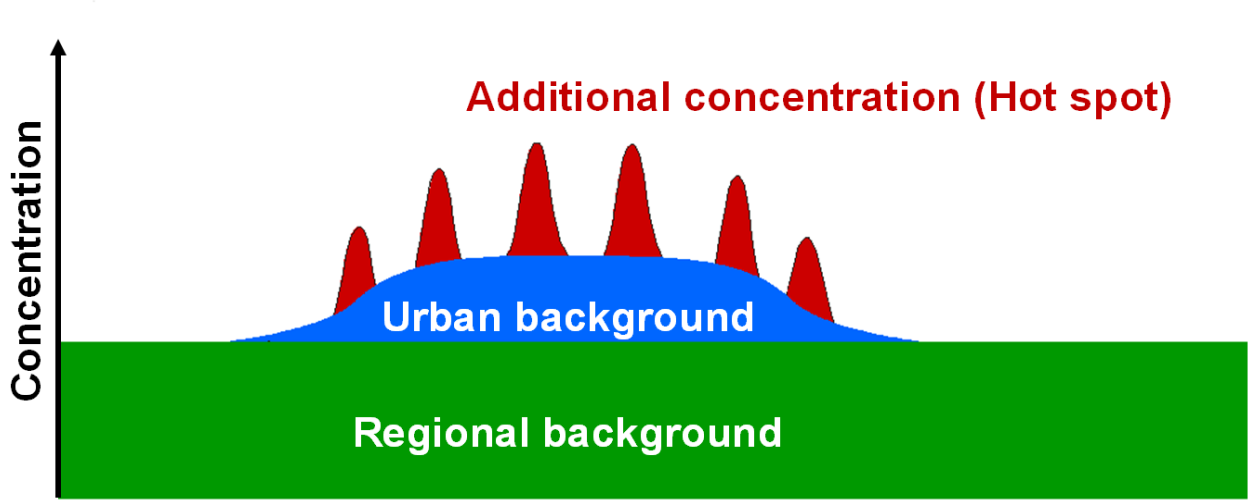

Figure 8: Schema of contributions to concentration levels at an inner-city traffic hot spot (see Lenschow et al., 2001)

Source apportionment with respect to pollution sources quantifies the contributions of various source groups, e. g. road traffic (RT), industrial sources (Ind), domestic combustion (DC), other traffic (OT), long range transport (LRT), and other sources (OS).

The analysis of source apportionments in the AQPs shows that, over the last years, more and more plans compiled due to NO_2-exceedances include source apportionments: 77 % contained spatial apportionments and 69 % contained apportionments with respect to source groups. For PM10, the fraction for spatial source apportionments has been over 80 % since the analysis in IVU Umwelt (2007). Apportionments with respect to the main source groups have risen continuously to a current figure of 57 % (see Table 4).

Table 4: Number of plans with exceedances of NO_2 or PM10 including source apportionment data

Data set	NO_2 exceedances		PM10 exceedances	
	Number	Share	Number	Share
AQPs	155	100%	165	100%
AQPs with spatial source apportionment	120	77%	133	81%
AQPs with apportionment for pollution sources	107	69%	94	57%

The full set of source apportionment data published in the AQPs can be found in IVU Umwelt (2013). The 120 new or updated AQPs published since 31.08.2008 (the deadline of the previous update in IVU Umwelt (2009)) have been analysed in more detail. For these 120 AQPs, exceedances of the limit values were identified and linked to source apportionment data as follows: if both limit value exceedance and source apportionment data are referring to the same monitoring station and reference year, the data was linked. If there were several such combinations for one location, the most recent was selected. If there was no exceedance in the reference year of the source apportionment, the apportionment data was not included.

The Source apportionment data from these selected AQPs together with limit value exceedances are compiled in appendix 8.2 in Table 26 to Table 29. For these selected plans, the mean contributions of the spatial and the pollution source analyses are compiled in Table 5 and Ta-

ble 6, respectively. Specific source apportionment data for these selected AQPs is visualised as thematic maps in Figure 9 to Figure 12.

Table 5: Spatial source analysis for NO_2 and PM10 – mean contributions (selected AQPs in Germany)

Spatial source	RB	UB	AC
NO_2	23%	30%	47%
PM10	52%	22%	26%
RB: Regional background, UB: Urban background, AC: Additional concentration			

Table 6: Pollution source analysis for NO_2 and PM10 – mean contributions (selected AQPs in Germany)

Pollution source	LRT	RT	Ind	DC
NO_2	23%	61%	4%	8%
PM10	51%	34%	6%	9%
LRT: Long range transport, RT: Road traffic, Ind: Industrial sources, DC: Domestic combustion				

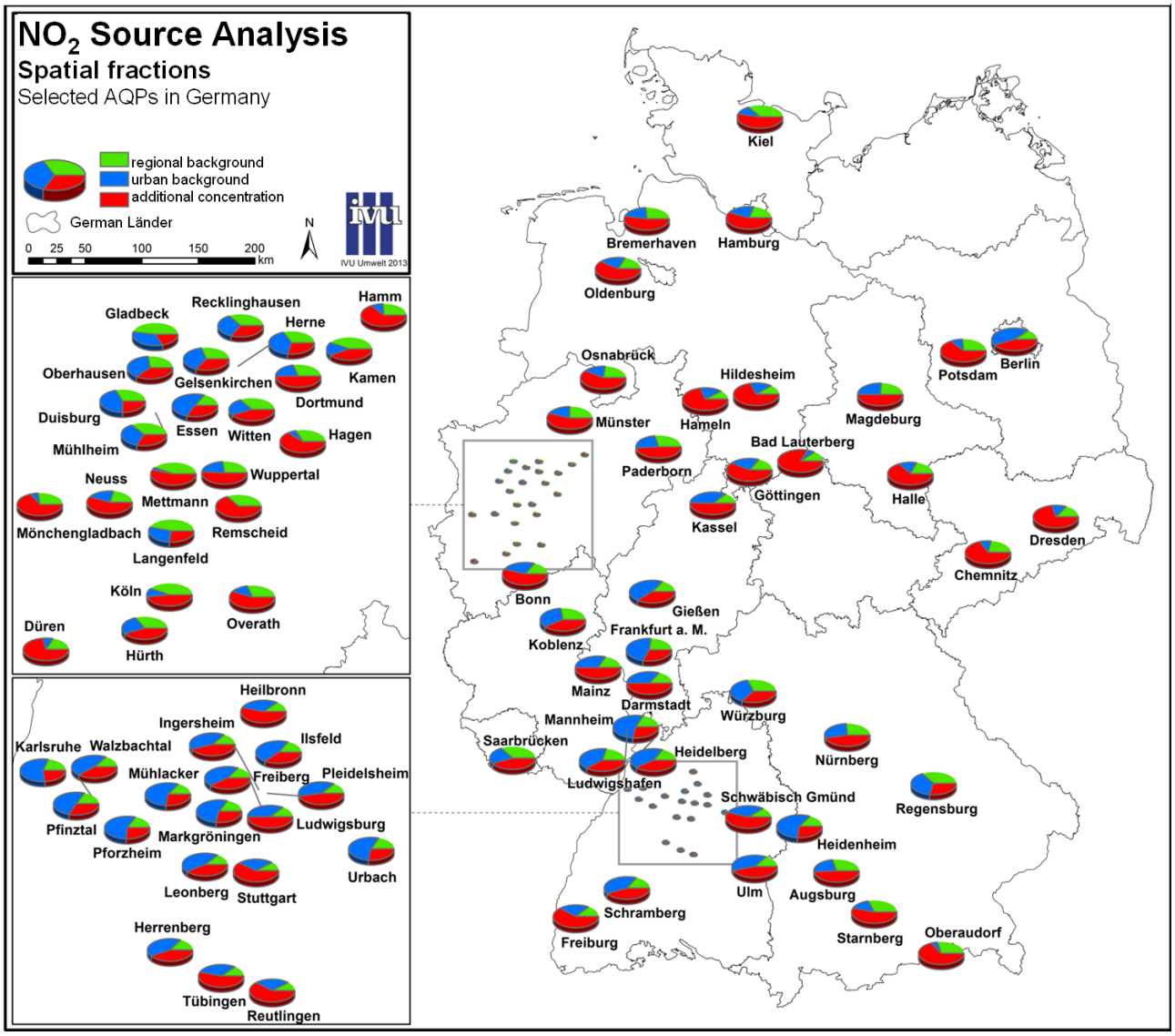

Figure 9: NO_2 Source Analysis - Spatial sources (selected AQPs in Germany)

In the spatial NO_2 source apportionments all monitoring sites are 'traffic-orientated', i. e. in each case the additional concentration is caused by local road traffic. Local road traffic is named as the biggest polluter in 68 % of the cases with 46 % having at least 50 % from this source group.

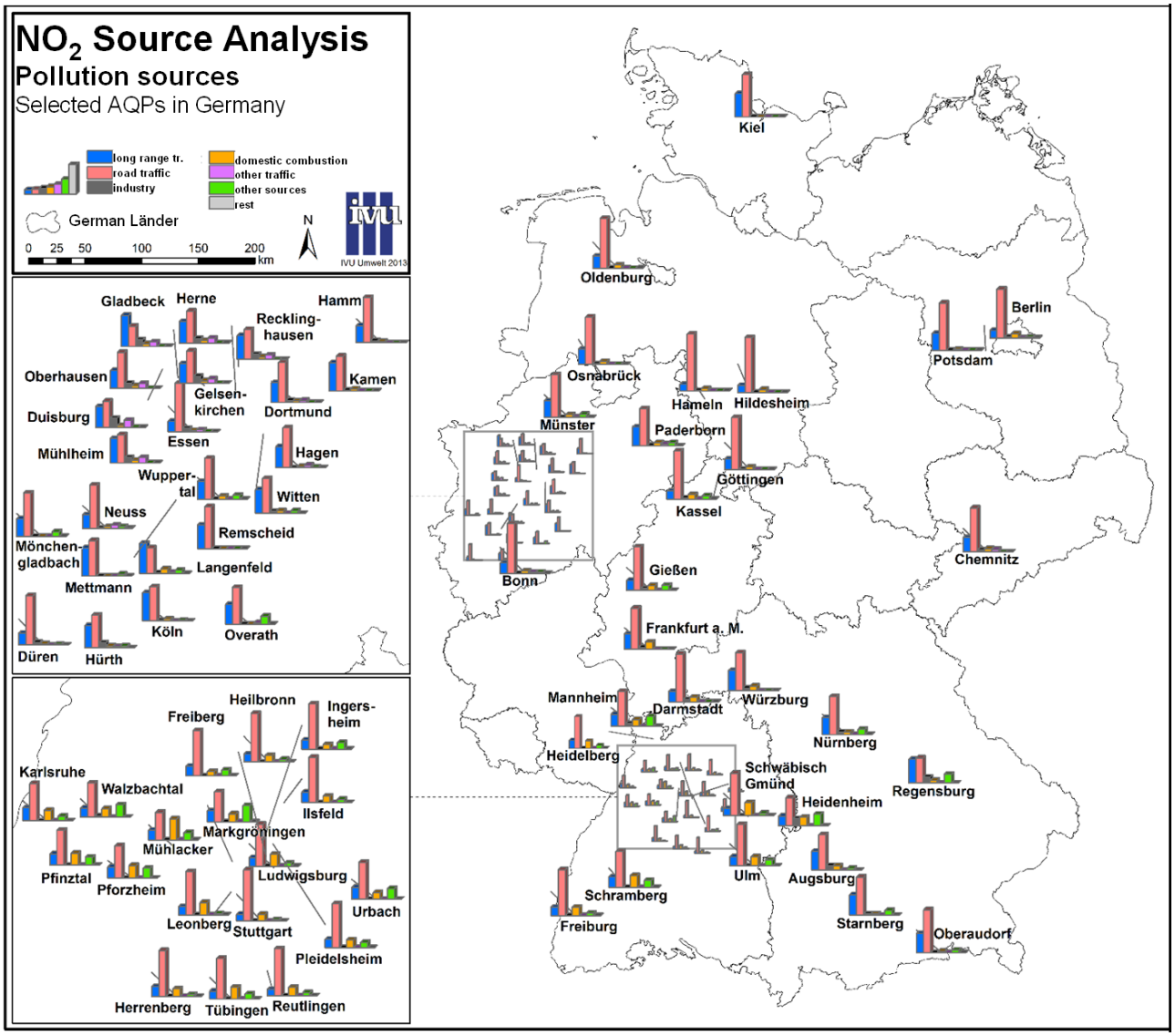

Figure 10: NO_2 Source Analysis - Pollution sources (selected AQPs in Germany)

In the apportionment of NO_2 pollution sources, all monitoring stations are 'traffic-orientated' as well and road traffic is named as the biggest contributor in 97 % of the areas.

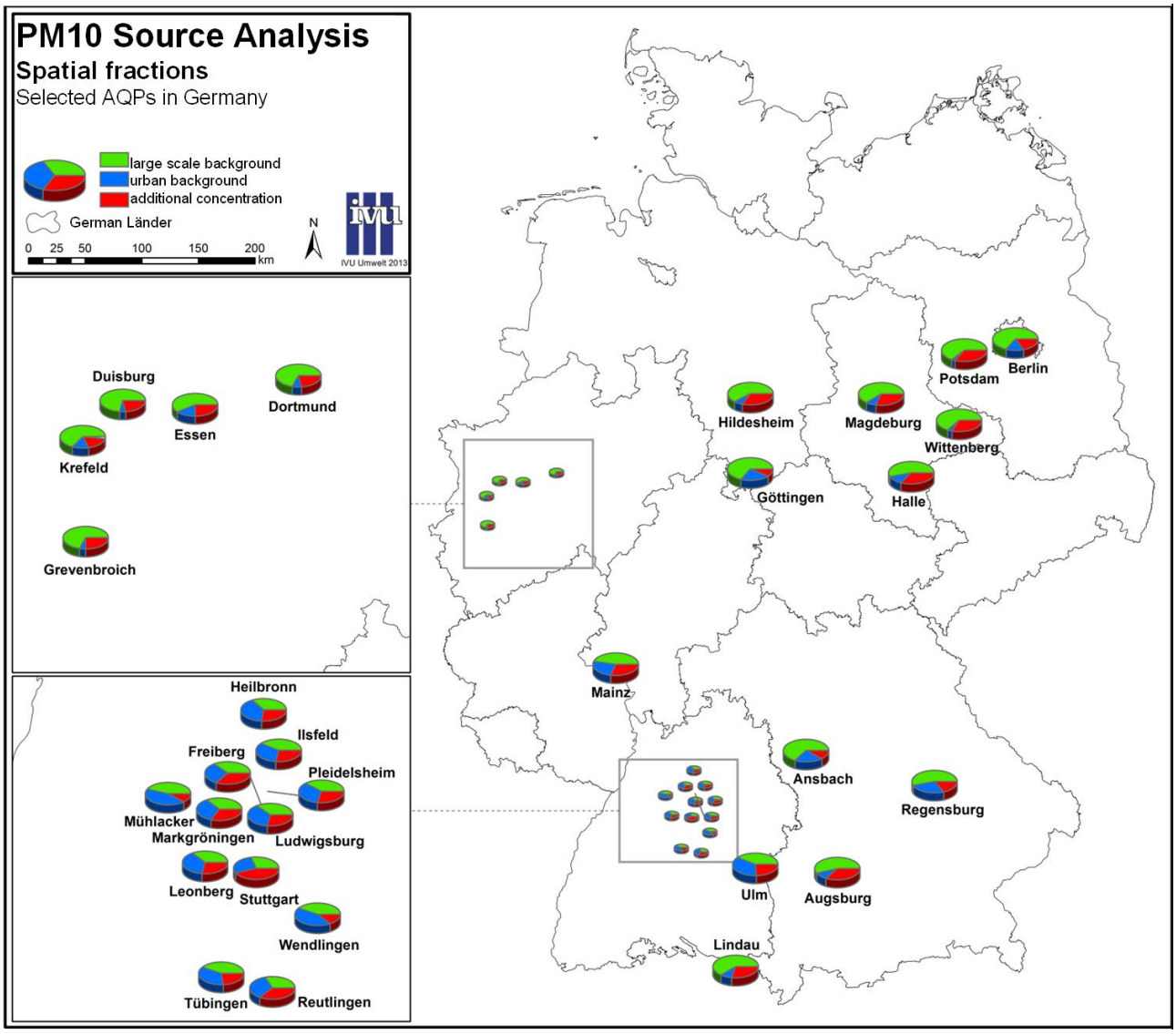

Figure 11: PM10 Source Analysis - Spatial sources (selected AQPs in Germany)

In the spatial PM10 source apportionments, the regional background is identified as the biggest contributor in 81 % of the cases with 52 % having at least 50 % from this source group. 90 % of the monitoring stations are 'traffic-orientated'. In Krefeld and Duisburg/Bruckhausen, the additional concentration is caused by local industrial processes, in Grevenbroich by open-cast mining.

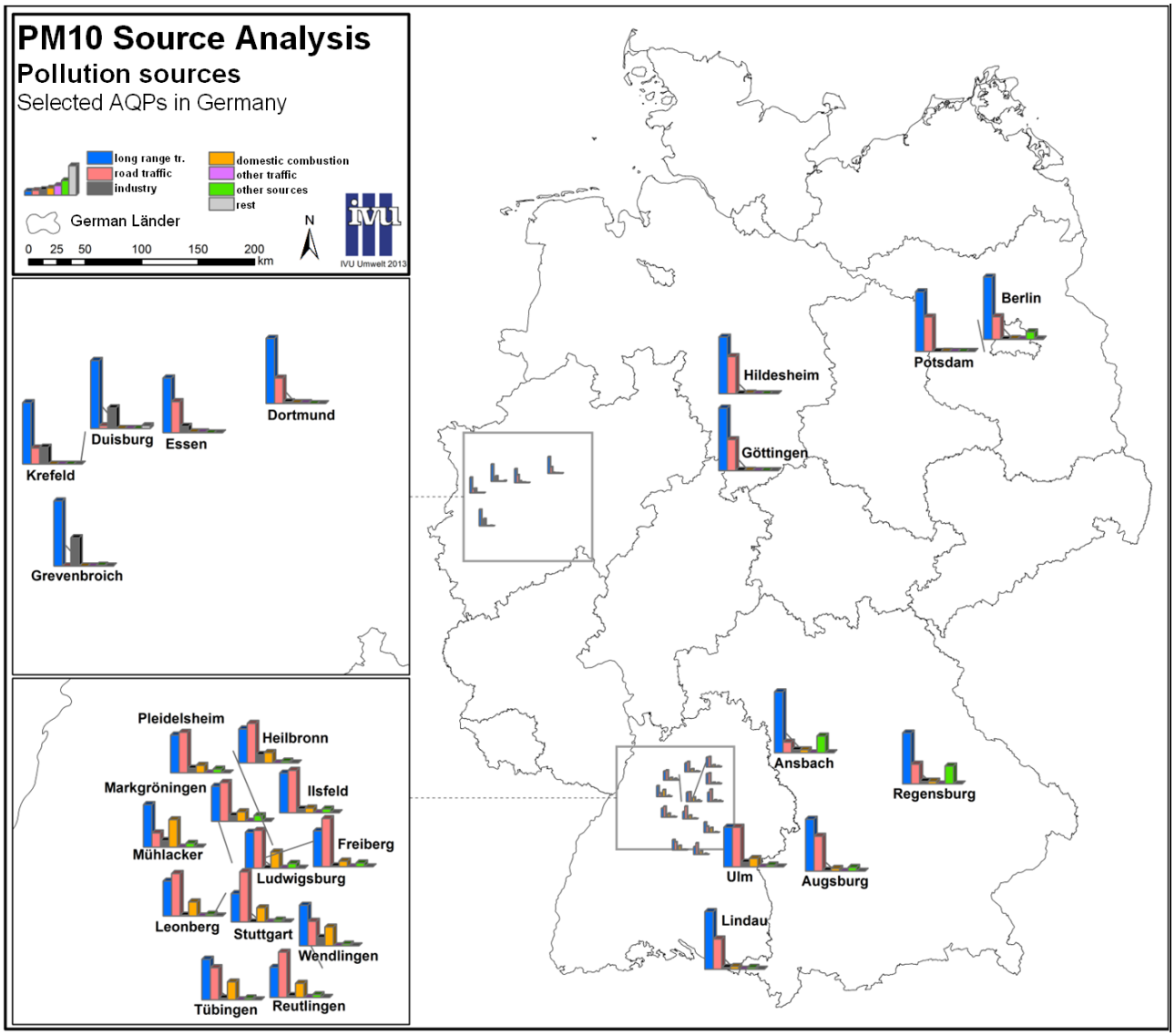

Figure 12: PM10 Source Analysis - Pollution sources (selected AQPs in Germany)

In the apportionments of PM10 pollution sources, 88 % of the monitoring stations are 'traffic-orientated'. Industry is the biggest contributor in Krefeld, Duisburg/Bruckhausen, and Grevenbroich (open-cast mining).

3 Analysis of measures with the 'Schema of measures'

In IVU Umwelt (2006, 2007 and 2009) a set of instruments – the so-called 'Schema of measures' – has been developed to research, analyse and classify the measures to reduce NO_2 and PM10 concentrations specified in the AQPs. This analysis tool was expanded and updated in IVU Umwelt (2013) to the 'Schema of measures 2013' and filled with the data and the measures of the new plans.

With the integration of new measures, the schema of measures contains 2588 measures originating from 242 plans. 2100 of these measures are in force and 488 have been suspended.

To ensure the comparability of the measures, the compilation of standardised measures developed in the previous projects was extended as well. These 'Standardised measures 2013' constitute a central element of the analysis and represent all measures that are being implemented, planned or discussed in plans presented in Germany. Currently 130 standardised measures exist, of which 15 were added in the 2013 update.

The 'Schema of measures' reflects the classification of 'Standardised measures'. For each measure included in the 'Schema of measures', both the specific measure named in the plan and the assigned 'Standardised measure' are listed.

The set of 'Standardised measures 2013' and the 'Schema of measures 2013' are annexed to IVU Umwelt (2013) as Excel files (in German). The English documentation of the 'Schema of measures 2013' can be found in section 3.1.

Five source groups and various areas of action were defined within the 'Schema of measures 2013' in order to categorise the emission sources the respective measures are aimed at (see Table 7).

Table 7: Source groups and areas of action in the Schema of measures

Source group	Area of action
Road traffic	Traffic management
	Modal split
	Urban development
	Road and tunnel construction
	Vehicle technology and fuels
	Other
Other traffic	Rail
	Water
	Air
Stationary sources	Requiring approval in accordance with air quality control laws
	Not requiring approval in accordance with air quality control laws
	Construction activity
Agriculture	Agriculture
Other sources	Other sources

3.1 Documentation **of the '**Schema of measures 2013**'**

All columns of the 'Schema of measures 2013' are described in Table 8. The columns are grouped into the categories 'Identification', 'General data', 'Source group and Measure', 'Reduction potential', 'Time-frame', and 'Costs and Additional information'.

Table 8: Documentation of the 'Schema of measures 2013'

Identification	
ID_P	Unique identification number of AQP
ID_MN	Unique identification number of standardised measure
General data	
Federal state	Federal state (Land) where the plan was established
City	City or area for which the plan was established
Source of information	Source of information: Air quality plan: LRP, LQP; Action plan: AP
Final version / Draft	Final version or draft of the plan
Report date	Date of publication Dates are noted in parentheses if no report date is given in the plan and the date was taken from the properties of the pdf-document of the plan
Page number	Reference page number in the plan
Reference year	**Reference year of plan's data set**
Update	Plan is an update of previous plan
Validity	**Plan or measure is 'in force' or 'annulled'**
Source group and Measure	
PM10	Measure to reduce PM10
NO2	Measure to reduce NO_2
Benzene	Measure to reduce Benzene
Source group	Five source groups: • Road traffic • Other traffic (rail, water, air) • Stationary sources (industrial sources, power plants, domestic combustion, small businesses, construction activity, diffuse emission sources) • Agriculture • Other sources (non-road mobile machinery, e. g. tractors, fork lifts; off-road traffic)
Area of action	Classification in groups of measures, i. e.: • Source group Road traffic: six areas of action: traffic management, modal split, urban development, road and tunnel construction, vehicle technology and fuels, other • Source group Other traffic: three areas of action: rail, water, air • Source group Stationary sources: three areas of action: requiring approval in accordance with air quality control laws, not requiring approval in accordance with air quality control laws, construction activity • Source groups Agriculture and Other sources: one area of action per source group
Measure	Classification by a 'Standardised measure'
Type	Eight types of measures: Control/Management, Speed limit, Ban/Restriction, Parking management, Facilitation/Promotion, Law/Regulation, Information, Technical improvement
Target	Nine targets of measures: All vehicles, Lorries, Public transport and/or municipal vehicles, Pedestrians, Bicycle traffic, Motorised private transport; Plants/Facilities, Noise, Not specified
Authority responsible	Five acting authorities: • Company operating a facility • Administrative institution: City, Federal state, German Government, EU
Spatial scale	Six scopes of effects of measures: hot spot, local, urban, regional, national, international

Occurrence of measure	Measure • **has already been listed in the previous projects: 'bis 08/2008'** • is **new and has not been covered in the previous projects: 'neu'** • is an **extension or accentuation of an existing measure: 'Erw.'**
Details of measure	Specific measure as noted in the plan
Staged approach	Measure is part of a staged approach
Temporary measure	Temporary measure, i. e. scope of measure is limited in time
Reduction potential	
Potential for reduction of emissions	
NO_X absolute [t/a]	Potential for absolute reduction of NO_X-emissions, if mentioned in plan
NO_X relative [%]	Potential for relative reduction of NO_X-emissions, if mentioned in plan
rel QG/abs NO_X	QG= relative NO_X-reduction in relation to the source group the measure is targeting at ges = relative NO_X-reduction in relation to total emissions
Page NO_X	Reference page number in the plan
PM10 absolute [t/a]	Potential for absolute reduction of PM10-emissions, if mentioned in plan
PM10 relative [%]	Potential for relative reduction of PM10-emissions, if mentioned in plan
rel QG/ges PM10	QG= relative PM10-reduction in relation to the source group the measure is targeting at ges = relative PM10-reduction in relation to total emissions
Page PM10	Reference page number in the plan
Potential for reduction of concentrations	
NO_2 absolute [µg/m³]	Potential for absolute reduction of NO_X-concentrations, if mentioned in plan If noted explicitly for NO_X, then rem**ark in column 'Ang. in NO_X'**
NO_2 relative [%]	Potential for relative reduction of NO_X-concentrations, if mentioned in plan If noted explicitly for NO_X**, then remark in column 'Ang. in NO_X'**
rel ZB/GB NO_2	ZB = relative NO_2-reduction in relation to the additional concentration caused by the source group the measure is targeting at GB = relative NO_2-reduction in relation to the total concentration
Noted for NO_X	Reduction is noted explicitly for NO_X in the plan
Page NO_2	Reference page number in the plan
PM10 absolute [µg/m³]	Potential for absolute reduction of PM10-concentrations, if mentioned in plan
PM10 relative [%]	Potential for relative reduction of PM10-concentrations, if mentioned in plan
rel ZB/GB PM10	ZB = relative PM10-reduction in relation to the additional concentration caused by the source group the measure is targeting at GB = relative PM10-reduction in relation to the total concentration
Page PM10	Reference page number in the plan
Annotation	Remarks by IVU Umwelt on the registered potentials
Time-frame	
Status	Status of a measure: ongoing, planned, enacted, completed , study, annulled, in discussion
Start of implementation	Presumed date of implementation of the measure
Cost and additional information	
Estimated cost (in Euro)	Estimated cost of measure in Euro
PM 2.5	Measure is regarded as effective with respect to reduce PM2.5 in the plan
Comments	Further comments

3.2 Statistical analyses

Statistical analyses based on the 'Schema of measures 2013' show, e. g., that – in accordance with the results of the source apportionment – 80 % of the measures are aimed at road traffic. Industrial processes are targeted by 16 % of the measures (see Table 9).

Table 9: Source groups – Share of measures

Source group	Road traffic	Other traffic	Stationary sources	Agriculture	Other sources
Share	80.0%	1.5%	15.9%	0.4%	2.2%

As 80 % of the measures analysed are referring to the source group road traffic, this group was looked at more closely. As described in Table 7, in order to classify measures, areas of actions were defined for different source groups. Table 10 shows the share of measures assigned to each area of action of the source group road traffic.

Table 10: Areas of action - Source group road traffic – Share of measures

Area of action	Traffic management	Modal split	Urban development	Road and tunnel construction	Vehicle technology and fuels	Other
Share	35%	23%	8%	8%	13%	12%

More than a third of the measures aimed at the source group road traffic focus on traffic management. Thus, this area of action was analysed in further detail (see Table 11).

Table 11: Traffic management – Share of measures

Traffic management	Control/ Management all vehicles	Control/ Management lorries	Speed limit all vehicles	Speed limit lorries	Ban on transit all vehicles *	Ban on transit lorries	Parking management
Share	37.1%	11.6%	11.6%	0.3%	14.3%	13.8%	11.1%
* inter alia depending on vehicle emission standards							

23 % of the measures for the source group road traffic focus on Modal split, thus this area of action is differentiated further in Table 12.

Table 12: Modal split – Share of measures

Modal split	Public transport	Pedestrians	Bicycle traffic	Motorised private transport
Share	43.3%	10.4%	25.4%	20.9%

16 % of the measures are aimed at the source group Stationary sources. They are broken down to the respective areas of action in Table 13.

Table 13: Source group Stationary sources – Share of measures

Stationary sources	Requiring approval in accordance with air quality control laws	Not requiring approval in accordance with air quality control laws	Construction activity
Share	22.5%	54.4%	23.1%

The authority responsible for a measure is the administrative institution that can enact the respective measure or the company operating a facility. For more than 90 % of the measures, city administrations are responsible for implementation (see Table 14).

Table 14: Authority responsible – Share of measures

Authority responsible	City	Federal state	German Government	EU	Company
Share	91.0%	0.1%	5.4%	1.5%	2.0%

The spatial scale of a measure describes the scope of its effects. Nearly 60 % of the measures are supposed to improve air quality in the entire city, and more than 30 % in a smaller local area (see Table 15).

Table 15: Spatial scale – Share of measures

Spatial scale	Hot spot	Local	Urban	Regional	National	International
Share	1.4%	32.6%	59.6%	2.0%	2.8%	1.6%

The status of a measure reflects its specific state of implementation as summarised in Table 16. More than one third of the measures have been implemented and are still ongoing. Another third of the measures is still in discussion, i. e., they are mentioned in a plan's draft or the specific implementation is not discernible in the plan. Another 22 % of the measures have been enacted but not implemented, and 11 % are merely planned.

Table 16: Status of implementation – Share of measures

Status of implementation	Ongoing	Planned	Enacted	Completed	Study	In discussion
Share	32.7%	11.2%	21.6%	0.3%	1.3%	33.0%

Table 17 contains a ranking of the occurrence of 'Standardised measures' in descending order for all 63 standardised measures that appear in at least ten plans. Annulled measures were not considered and, therefore, the fractions given are with respect to a total of 2100 measures. The listed 63 'Standardised measures' correspond to 1889 specific measures in the plans representing 90 % of all measures.

Table 17: Occurrence of standardised measures – Measures appearing in at least 10 AQP

Number	Share	ID_MN	Standardised measures	Source group
124	5.9%	57	Low emission engine types in public transport and municipal vehicles	Road traffic
106	5.0%	8	Optimisation of traffic flow	Road traffic
104	5.0%	36	Public transport, increase of attractiveness	Road traffic
97	4.6%	2	Cycling, increase of attractiveness	Road traffic
64	3.0%	92	Regulations for construction sites / particle reduction plans	Stationary sources
63	3.0%	53	Construction of ring road, arterial road, or bypass road	Road traffic
58	2.8%	74	Public relations concerning air quality	Road traffic
57	2.7%	30	Lorry transit ban	Road traffic
54	2.6%	28	Low emission zone (LEZ) with different stages	Road traffic
41	2.0%	1	Pedestrian traffic, increase of attractiveness	Road traffic
41	2.0%	44	Mobility advisory services	Road traffic
39	1.9%	46	Increasing vegetation in cities	Road traffic
39	1.9%	85	District heating / Local heat distribution, expansion of networks-	Stationary sources
38	1.8%	37	Public transport, expansion of networks	Road traffic
37	1.8%	16	Concepts for routeing of lorry traffic	Road traffic
37	1.8%	84	Energy saving	Stationary sources

Num-ber	Share	ID_ MN	Standardised measures	Source group
35	1.7%	33	Parking fees	Road traffic
35	1.7%	49	Urban planning, air quality control	Road traffic
35	1.7%	89	Switch to renewable or low emission energy sources	Stationary sources
34	1.6%	79	Renovation of plants/facilities - Best available techniques (BAT)	Stationary sources
31	1.5%	18	Speed limits of 30 km/h	Road traffic
28	1.3%	35	Public transport, reduction of travel times	Road traffic
28	1.3%	78	Combustion of solid fuels / regulations	Stationary sources
27	1.3%	48	Linking of climate protection and air quality management	Road traffic
26	1.2%	6	Tangential routeing of transit traffic	Road traffic
26	1.2%	50	Transport development plan	Road traffic
25	1.2%	11	Traffic management, dynamic	Road traffic
24	1.1%	61	Natural gas-vehicles	Road traffic
22	1.0%	34	Management of parking space	Road traffic
21	1.0%	40	Car sharing	Road traffic
21	1.0%	62	Road surface, renovation	Road traffic
21	1.0%	109	Combustion of solid fuels / public relations	Stationary sources
21	1.0%	88	Ban of combustion of garden waste	Other sources
19	0.9%	80	Lobbying for stricter emission limit values, EU	Stationary sources
19	0.9%	76	Non road mobile machinery, low emission technologies	Other sources
18	0.9%	67	Lobbying for stricter emission limit values, EU	Road traffic
18	0.9%	75	Wet street cleaning	Road traffic
18	0.9%	97	Street cleaning	Road traffic
17	0.8%	41	Car-pooling / Website for commuters	Road traffic
16	0.8%	3	Roundabouts instead of traffic lights	Road traffic
16	0.8%	27	Low emission zone (LEZ) without different stages	Road traffic
16	0.8%	31	Road tolls for lorries on sections of federal and regional roads	Road traffic
16	0.8%	118	Electro mobility	Road traffic
16	0.8%	59	Low emission engine types in public transport and municipal vehicles: use in highly affected areas	Road traffic
16	0.8%	72	Waste removal / street cleaning in off-peak periods	Road traffic
16	0.8%	86	Diffuse sources, reduction of dust emission	Stationary sources
15	0.7%	17	Speed reduction	Road traffic
15	0.7%	128	Obligation to report implementation status of measures	Road traffic
14	0.7%	13	Urban logistics concepts	Road traffic
14	0.7%	65	Particle filter and deNOx-systems for diesel engines	Road traffic
13	0.6%	121	Low emission engine types – Rapid modernization of vehicle fleet	Road traffic
13	0.6%	125	Company car taxation based on CO_2 emissions	Road traffic
12	0.6%	5	Redistribution / rearrangement of road spaces	Road traffic
12	0.6%	130	Speed limits of 30 or 40 km/h on major roads	Road traffic
12	0.6%	56	Tunnel construction	Road traffic
12	0.6%	64	Fuels, low emission	Road traffic
12	0.6%	104	Ship engines, low emission	Other traffic
11	0.5%	7	Traffic calming	Road traffic
11	0.5%	9	Traffic management system, static	Road traffic
11	0.5%	14	Freight transport by rail or water	Road traffic
11	0.5%	47	Integrative planning for city and region	Road traffic
11	0.5%	66	Driving, energy-saving and environmentally friendly	Road traffic
10	0.5%	93	Construction activities, low emission technologies for mobile machinery	Stationary sources
1889	**90%**		**Measures with at least 10 references**	
2100	**100%**		**Total number of measures**	
ID_MN: Unique identification number of a standardised measure				

Further statistical analysis and ranking of all ‘Standardised measures' can be found in IVU Umwelt (2013). There are eight measures listed with no occurrence. These measures were either discussed in a plan’s draft without being adopted in the final version or they have been annulled by a plan’s update. These measures are included in the set of ‘Standardised measures' in order to both to keep its spectrum as wide as possible and to reflect the status of the discussion.

4 Effectiveness and evaluation of measures implemented in Germany

As plans and measures have been developed and implemented in Germany over a longer period of time, the effectiveness of measures can now be assessed after their implementation using comparative studies. Thus, the assessment can be based on more information than just the expected effects noted in the plans, which are normally based on estimations and scenario calculations.

To do so, the available evaluation studies carried out after the adoption of the plans and the implementation of the measures were searched, analysed and documented. This report presents an overview of the results compiled for 'low emission zones' (LEZs), 'environmental traffic management', 'lorry transit bans' and 'speed limits of 30 or 40 km/h on major roads' in IVU Umwelt (2013).

Theoretical reduction potentials for two types of measures concerning road traffic (LEZs and 'lorry transit bans') were assessed based on the 'Handbook emission factors for road transport' (INFRAS, 2010) and studies for the air quality plans of Berlin.

4.1 Low emission zone

'Low emission zones' (LEZs) are roads or areas in cities where vehicles are restricted from entering based on their emission standard. With this measure, highly polluting vehicles are banned from areas with high levels of pollutant concentrations. As illustrated in Table 18, in Germany access restrictions are regulated at the national level by stickers according to the German vehicle classification regulation ('Kennzeichnungsverordnung' - 35. BImSchV (2007)) based on European vehicle emissions standards. An example of LEZ implementation in English is published on Berlin's internet site (Senate Berlin, 2014).

Table 18: LEZ classification – The four different emission groups in Germany according to the German vehicle classification regulation ('Kennzeichnungsverordnung' - 35. BImSchV (2007))

Group	**1**	**2**	**3**	**4**
Stickers	none			
Requirements for **Diesel**	Euro 1 or worse	Euro 2 or Euro 1 + particle trap	Euro 3 or Euro 2 + particle-trap	Euro 4 or Euro 3 + particle-trap
Requirements for **Petrol**	no catalytic converter			Euro 1

In Germany, the first LEZs were introduced in Berlin, Hannover and Köln (Cologne) on 01.01.2008 (see Table 19). The first LEZs requiring green stickers with the highest level of restriction were established on 01.01.2010 (see Table 20).

Table 19: First LEZs in Germany

City	LEZ established	Stages
Berlin	01.01.2008	since 01.01.2008: Ban for emission group 1, at least red to enter since 01.01.2010: Ban for emission group 1 to 3, green to enter
Hannover	01.01.2008	since 01.01.2008: Ban for emission group 1, at least red to enter since 01.01.2009: Ban for emission group 1 and 2, at least yellow to enter since 01.01.2010: Ban for emission group 1 to 3, green to enter
Köln (Cologne)	01.01.2008	since 01.01.2008: Ban for emission group 1, at least red to enter since 01.01.2013: Ban for emission group 1 and 2, at least yellow to enter since 01.07.2014: Ban for emission group 1 to 3, green to enter

Table 20: First LEZs with highest level of restriction in Germany

City	LEZ established	Stages
Berlin	01.01.2010	since 01.01.2008, Ban for emission group 1, at least red to enter since 01.01.2010, Ban for emission group 1 to 3, green to enter
Hannover	01.01.2010	since 01.01.2008: Ban for emission group 1, at least red to enter since 01.01.2009: Ban for emission group 1 and 2, at least yellow to enter since 01.01.2010: Ban for emission group 1 to 3, green to enter
Leipzig	01.03.2011	since 01.03.2011: Ban for emission group 1 to 3, green to enter

Research on evidence of the effectiveness of measures implemented in Germany shows that there are relatively few such studies. A comparatively wide spectrum of evaluations does exist for LEZs, however about half of these studies do not give specific figures on reductions of concentrations. The remaining studies give reduction potentials for the single measure LEZ of up to 10 % for NO_2, 7 % for PM10 and 10 % for PM2.5. A high reduction potential of up to 19 % for soot (black carbon) is particularly mentioned. More detailed results are available in IVU Umwelt (2013).

Theoretical reduction potentials of LEZs in this study were assessed based on the 'Handbook emission factors for road transport' (INFRAS, 2010) and studies for the air quality plans of Berlin and Kassel (Senat Berlin, 2013) and Kassel (HMUELV, 2011). The LEZs' potential to reduce concentration levels generally decreases with increasing reference years as the fraction of the vehicle fleet that is banned decreases due to the general modernization of the vehicle fleet (see Table 21).

The LEZ's effectiveness also depends on local conditions as it is illustrated by the comparison of the different potentials for Berlin and Kassel in Table 21.

With an extension of the German vehicle classification regulation ('Kennzeichnungsverordnung') to include restrictions for gasoline vehicles with catalytic converters, the assessments of theoretical reduction potentials additionally predict, e. g., a significant increase of the NO_2 reduction potential of a LEZ to up to 7 % in 2015 (see 'Group 3plus' in Table 21).

Higher reduction potentials can only be reached by intensified penetration of Euro-6/VI vehicles in the fleet. A LEZ's reduction potential for PM10 always remains below 10 % and declines significantly the later the LEZ is put into force. For NO_2, calculated reduction potentials are significantly higher. In the scenarios, a replacement of 50 % of the vehicle fleet by Euro-6/VI vehicles in 2015 (2015 E6 50 in Table 21) would lower annual mean values of the total NO_2-

concentration by 20%. A complete replacement with Euro-6/VI would lead to a respective reduction of 39% in Berlin and 37% in Kassel.

Table 21: Theoretical reduction potentials of LEZs (see text)

Year of Implementation and type	NO_2		PM10	
	Berlin	Kassel	Berlin	Kassel
2007 Group 1	-1.8%	-1.0%	-1.9%	-3.1%
2007 Group 2	-0.9%	0.6%	-3.7%	-6.2%
2007 Group 3	-7.7%	-4.1%	-5.9%	-9.3%
2007 Group 3plus	-17.1%	-11.6%	-5.9%	-9.7%
2010 Group 1	-1.1%	-0.8%	-1.2%	-1.9%
2010 Group 2	-1.4%	-0.6%	-2.5%	-3.9%
2010 Group 3	-6.3%	-4.1%	-4.0%	-6.6%
2010 Group 3plus	-11.5%	-8.1%	-4.0%	-6.9%
2013 Group 1	-0.9%	-0.8%	-0.6%	-1.2%
2013 Group 2	-1.4%	-1.0%	-1.5%	-2.7%
2013 Group 3	-4.7%	-3.5%	-3.1%	-5.0%
2013 Group 3plus	-7.2%	-5.5%	-3.1%	-5.0%
2013 E6 25%	-14.6%	-12.8%	-3.4%	-5.8%
2013 E6 50%	-22.3%	-20.3%	-3.7%	-6.2%
2013 E6 75%	-30.2%	-28.0%	-4.0%	-6.9%
2013 E6 100%	-38.5%	-36.6%	-5.9%	-8.9%
2015 Group 1	-0.9%	-0.8%	-0.6%	-1.2%
2015 Group 2	-1.6%	-1.2%	-1.2%	-2.3%
2015 Group 3	-4.7%	-3.7%	-2.5%	-3.9%
2015 Group 3plus	-6.5%	-4.9%	-2.5%	-4.2%
2015 E6 25%	-14.4%	-12.4%	-3.1%	-4.6%
2015 E6 50%	-22.5%	-20.1%	-3.4%	-5.4%
2015 E6 75%	-30.9%	-28.0%	-4.0%	-6.2%
2015 E6 100%	-39.4%	-36.4%	-4.6%	-6.9%

A comparison of theoretical reduction potentials with published evaluations shows good agreement with most publications (see Table 22).

Table 22: Comparison of theoretical reduction potentials with published evaluations

Type	NO_2			PM10		
	Berlin	Kassel	Evaluation (publication and reduction)	Berlin	Kassel	Evaluation (publication and reduction)
2007 SG1	-1.8%	-1.0%	LANUV (2009): -1.5 Senat Berlin (2009): -7% up to -10% GAA Hildesheim (2010): 0% Bruckmann et al. (2011a/b) : -2%	-1.9%	-3.1%	Cyrys et al. (2009): -9.8% up to -12.3% LANUV (2009): -7% Senat Berlin (2009): -3% GAA Hildesheim (2010): -4% Bruckmann et al. (2011a/b): -7% Morfeld et al. (2013a): -0.5% Morfeld et al. (2013b): ca. -5%
2010 SG2	-1.4%	-0.6%	GAA Hildesheim (2010): -6%	-2.5%	-3.9%	GAA Hildesheim (2010): -3%
2010 SG3	-6.3%	-4.1%	Rauterberg-Wulff et al. (2011): -5%	-4.0%	-6.6%	Rauterberg-Wulff et al. (2011): -7%

4.2 Environmental Traffic Management

As shown in the statistical analysis (see section 3.2), the measures to reduce concentrations due to road traffic focus on the area of action 'Traffic management'. These also include technical control and management measures which are, to a large extent, implemented permanently. Thus, especially local, small-scale measures are also active in time periods when the concentration levels would not necessarily require an action. This is addressed by temporary measures, particularly dynamic temporary measures, which are tailored to the local pollution levels with respect to both spatial and temporal aspects.

NO_2- and PM10-concentrations vary significantly with time. For PM10, for example in winter there are episodes of several days with high concentrations whereas on other days, in spite of a comparable level of local emissions, concentrations are much lower. With NO_2-concentrations there is a strong diurnal variation that is highly correlated to traffic volume. This high correlation notwithstanding, there are days with comparable traffic situations that differ significantly in concentration levels. This high variability independent of traffic situations is caused by the respective meteorological conditions. In order to consider this strong temporal variation, the plans note measures that can be covered by the term 'Environmental Traffic Management' (ETM).

The reduction potentials of ETM strongly depend on the activation rate of the respective measure. The impacts on total concentrations range from a few percentage points to 15 % or 10 exceedance days (PM10) in specific designs. Thus, reduction potentials of ETM are in the same range as reduction potentials of LEZs, sometimes significantly higher. More detailed results are available in IVU Umwelt (2013).

4.3 Lorry transit bans

In the AQPs, 'lorry transit ban' is a measure frequently named. With 57 examples of this measure, it represents a share of 2.7 % (see Table 17).

Evaluations of this measure's effectiveness are rarely found in literature and most studies are based on prognoses. Maximum reduction potentials are given as 20 % for NO_x, 10 % for NO_2, 10 % for PM10 and 7 % for soot. More detailed results are available in IVU Umwelt (2013).

The reduction potential of a lorry transit ban strongly depends on the fraction of lorries and the expected compliance rate. As lorries have a higher reduction potential for non-exhaust emissions of particulate matter due to resuspension and abrasion, reductions of the PM10 annual mean value by several percentage points can be expected even with lower lorry fractions. The theoretical NO_2 reduction potential is always higher than the one for PM10 and can reach more than 10 % if lorry fraction and compliance rate are suitably high (see Table 23).

Table 23: Lorry transit bans - Theoretical reduction potentials

Type	NO_2		PM10	
(Ban of x% of lorries)	Berlin*	Kassel	Berlin*	Kassel
2007 40%	-6.3%	-2.0%	-2.8%	-1.5%
2007 60%	-9.7%	-3.3%	-4.0%	-2.3%
2007 80%	-13.1%	-4.1%	-5.2%	-3.1%
2007 100%	-16.7%	-5.3%	-6.8%	-3.9%
2010 40%	-6.1%	-2.0%	-2.5%	-1.2%
2010 60%	-9.2%	-3.0%	-4.0%	-2.3%
2010 80%	-12.6%	-3.9%	-5.2%	-2.7%
2010 100%	-16.0%	-5.1%	-6.8%	-3.9%
2013 40%	-5.9%	-1.8%	-2.8%	-1.5%
2013 60%	-9.0%	-3.0%	-4.0%	-2.3%
2013 80%	-12.2%	-3.9%	-5.6%	-3.1%
2013 100%	-15.5%	-4.9%	-7.1%	-3.9%
2015 40%	-5.2%	-1.6%	-2.8%	-1.5%
2015 60%	-8.1%	-2.6%	-4.3%	-2.3%
2015 80%	-10.8%	-3.5%	-5.9%	-3.1%
2015 100%	-13.7%	-4.3%	-7.1%	-3.9%
*: Fraction of lorries in Berlin was estimated to be 6 %				

4.4 Speed limits of 30 or 40 km/h on major roads

In twelve plans, the measure 'speed limits of 30 or 40 km/h on major roads' is included, representing a share of 0.6 % of measures (see Table 17). Berlin, for example has implemented for many years the 'successful strategy of speed levels adequate for urban environments at 30 km/h' on selected major roads (Senat Berlin, 2012; own translation), and has accompanied this with measurements.

There are only a few quantifications of effects on concentrations of 'speed limits of 30 or 40 km/h on major roads' to be found. For the additional concentration caused by road traffic, reduction potentials of 18 % for NO_x, 15 % for NO_2 und 30 % for PM10 are given. More detailed results are available in IVU Umwelt (2013).

4.5 Methods of evaluation of measures

The analysis of evidence of effectiveness clearly shows that it is inherently difficult to determine the isolated effect of a measure by measurement data. Such an evaluation has to refer to the problem of meeting the limit value but should also consider the general aim of improving air quality. For example, exhaust emissions contribute only to a relatively small part to the PM10 pollution at the hot spot. Thus, a measure influencing only this fraction can effect only a small relative reduction of the PM10 annual mean value. Yet the same measure is generating a much larger relative reduction for black carbon.

In IVU Umwelt (2013) the example 'low emission zone' is used for a detailed discussion of the complexity of the task and the possibility to assess the isolated effect of this measure. This discussion is summarised here.

A major part of the studies on effectiveness is based on measurement data of concentration levels. The studies compare data for the same sites gathered before and after the implementation of the measure ('before-after') or simultaneous measurements within and outside the LEZ

('with-without'). By comparison, a combination of both approaches offers the theoretical possibility to eliminate effects on concentration levels that occur both within and outside the LEZ without the effects of the LEZ.

Modelling is often applied as an alternative or supplemental approach to evaluate effectiveness. This approach attempts to model the causalities leading to air pollution as realistically as possible. Here it is important to not only comprehensively model the causalities but also to consider the 'correct' share of the total concentration caused by sources affected by the measure.

Depending on the methods and the data available, a number of problems are associated with the evaluation of the measures' effectiveness:

- 'Filtering' of the effectiveness in the general 'variability': effects of almost all measures are small with respect to the total concentration which itself shows a strong variability independent of the measure.
- Meteorological effects: as a special case of the filtering issue, concentration levels are highly dependent on meteorological conditions. Due to the complexity of meteorological conditions, it is a very difficult task to quantify those effects and distinguish them from the measures' effects.
- Large scale effects: notably PM10 levels are strongly influenced by large scale effects (long range transport). As most measures have only local or urban effects, the determination of 'correct' background concentrations is crucial in comparisons 'before-after'.
- Lack of information on the situation before the implementation of a measure: continuous and detailed monitoring of concentration data and other relevant parameters (e. g. traffic data) is often not available for the situation before the implementation, thus, challenging the 'correct' definition of the reference case.
- Lack of accuracy on vehicle emission data: notably effects on NO_2-concentrations have often been overestimated in older studies, showing that emission levels in real world urban environments have been assessed incorrectly. Although new data bases (e. g. Handbook emission factors for road transport HBEFA 3.1, see INFRAS (2010)) have improved the situation, data on vehicles with new emission standards (Euro 5/6) is still uncertain.
- Assessment parameters are complex: NO_2 is a reactive substance influenced by a complex chemical equilibrium process; PM10 and PM2.5 are not only emitted directly but also formed as secondary particles and not all their sources are well understood; Exceedances of PM10 daily limit values highly depend on episodes.
- Availability of emission data: notably for modelling, complete, detailed and up-to-date emission inventories are important input data that often is not available in adequate quality or even lacks important sources.

Especially with LEZs, there are additional factors that further complicate an assessment:

- accuracy of emission factors of sub-groups of the fleet is even more important
- fraction and fleet composition of banned vehicles with respect to mileage is very difficult to determine

- changes in traffic volume due to the LEZ are difficult to establish
- degree of compliance with the LEZ-regulation is an important factor for the effectiveness of a LEZ but very difficult to quantify
- changes in fleet composition due to an LEZ might occur even outside the LEZ, possibly questioning the approach of comparisons 'with-without'
- difficulty to differentiate between changes in fleet composition caused by LEZs versus general trends in vehicle fleet modernization

4.6 Evaluation with continuous modelling

To evaluate the effect of the 'environmental traffic management' (ETM) (see section 4.2), established in Potsdam in April 2012, the effectiveness was analysed based on continuous real-time modelling and monitoring data. Within this ETM, measures influencing road traffic to improve the traffic situation are activated in critical areas when high pollutant concentrations are detected.

This evaluation's result was published by the city of Potsdam in a press release (Potsdam, 2013): The improved traffic quality results in a reduction of the concentration caused by road traffic by approx. 2.2 % for nitrogen oxides (NO_x) and approx. 4.4 % for PM10 compared with the reference period 2010. Thus, the management of approaching traffic and the harmonisation of traffic flow contribute significantly to the reduction of traffic-related air pollution in this highly affected hot spot.

The main advantage of continuous modelling is the possibility to create an artificial reference case. Using this reference case in models allows for an isolated evaluation of the effect of the measure. In addition to the requirements of section 4.5, the models used in such an evaluation system have to meet respective quality requirements.

4.7 Requirements on measures to meet the NO_2 limit value

Depending on the level of exceedance of the respective limit value, the affected areas require different reductions in order to attain the limit values. In Figure 13, the frequency distribution of NO_2 annual mean exceedances in 2012 is presented, grouped by concentration intervals. 58 % out of the 171 exceedances are more than 20 % above the threshold (> 48 µg/m³)[2]. In 15 % of the cases the NO_2 annual mean values exceed the limit value by more than 50 % (> 60 µg/m³).

[2] Different numbers in IVU Umwelt (2013) are due to preliminary data used there.

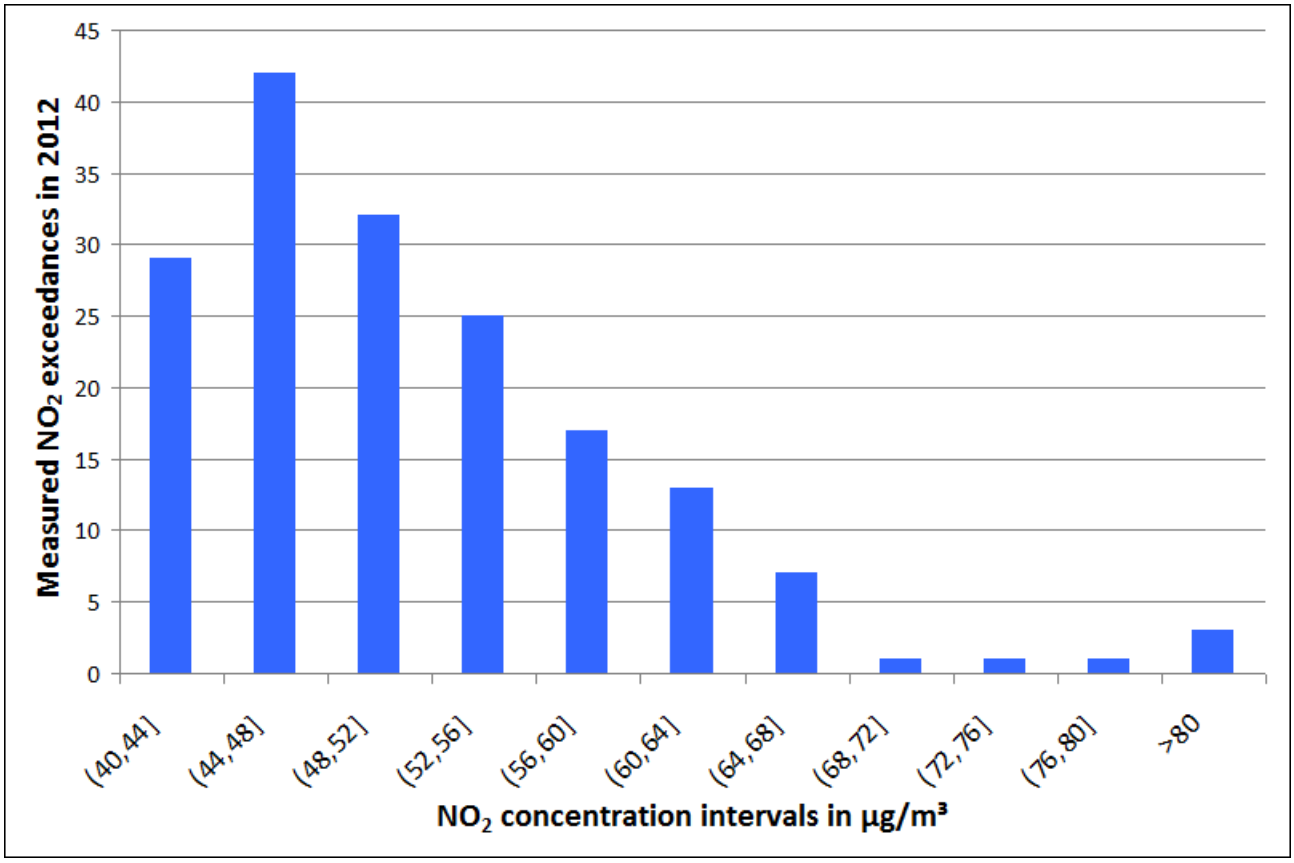

Figure 13: Frequency distribution of NO_2 annual mean values above the limit value in 2012 (different numbers in IVU Umwelt (2013) are due to preliminary data used there)

An analysis of data published in the air quality plan's source apportionments in combination with NO_2 measurements for the corresponding limit value exceedances shows that in more than 60 % of the cases a local measure has to reduce the additional concentration by more than 50 % to allow for the possibility to comply with the air quality limit value. In three of the 80 cases analysed, a complete reduction of the additional concentration is not sufficient to comply with the air quality limit value (Figure 14).

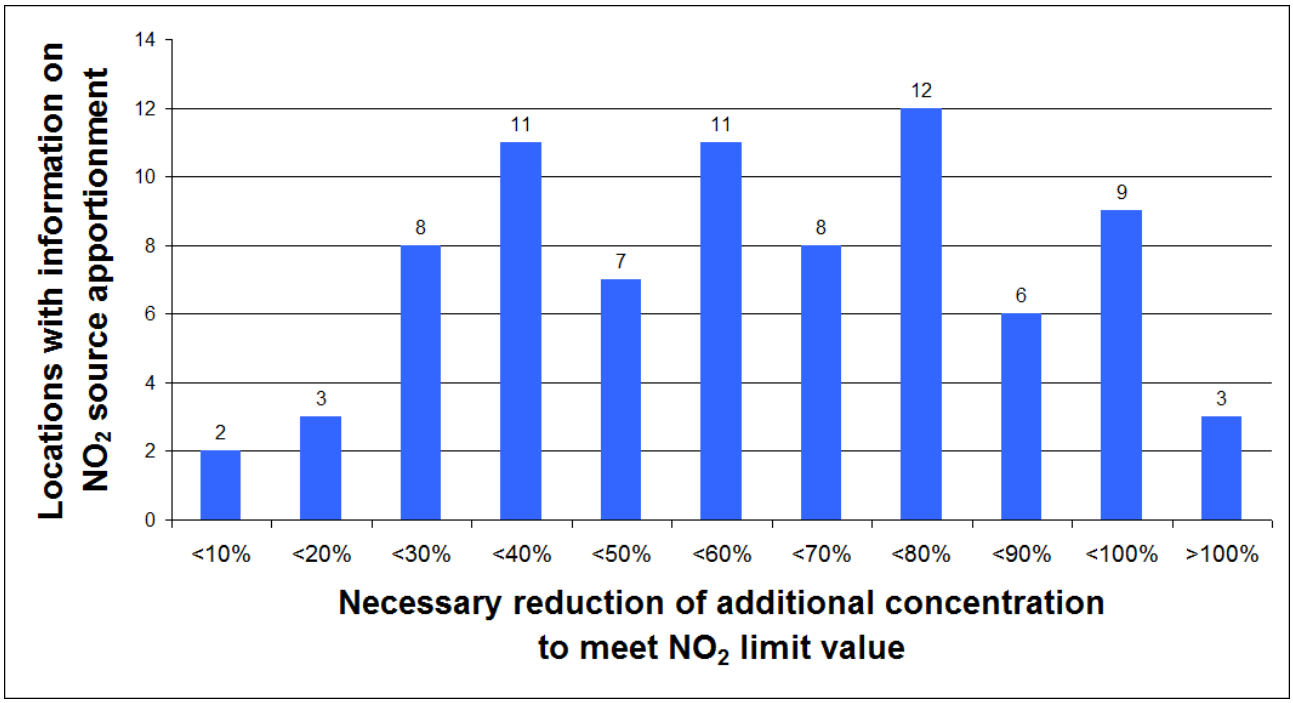

Figure 14: Frequency distribution of required reductions of additional concentrations in order to attain the NO_2-limit value in municipalities with source apportionments

5 Evaluation with respect to the EU-Project APPRAISAL

Exceedances of air quality limit values for NO_2 and PM10 in urban areas in Europe remain widespread. As a remedy, many cities and regions have implemented AQPs with measures to improve air quality and developed methodologies to assess their effects. To bring together the results of the efforts taken in air quality planning all over Europe, the EU-FP7-Project APPRAISAL (Air Pollution Policies foR Assessment of Integrated Strategies At regional and Local scales) has been initiated.

5.1 Objectives of the EU-Project APPRAISAL

The focus of APPRAISAL is the integrated assessment of air pollution supporting the revision of air quality legislation. Quoting the summary of APPRAISAL (2014a), the project is aimed at 'assessing the strengths and weaknesses of the various methodologies used within the European Member States for the assessment and monitoring of Air Quality. APPRAISAL intends to propose possible ways to improve these methodologies through guidance and to provide clear insight on the way local and regional measures are implemented, but also on the way their efficiency is measured. APPRAISAL will provide scientific and technical support to policy makers in the framework of the revision of the European Air Quality Policy'.

The main objectives, according to APPRAISAL (2014a), are to

- perform an overall review of the air quality and health assessment methodologies,
- analyse the limitations of the currently available assessment methods,
- evaluate the possibility of implementing integrated assessment modelling tools,
- communicate with key stake-holders, and in particular to policy-makers, and
- identify key areas to be addressed by research and innovation.

5.2 EU air quality plans and the APPRAISAL database

As stated in APPRAISAL (2014a), the project 'focuses on answering the following questions:

- What approaches are currently used to design and assess regional/local air quality plans?
- What are their strengths and weaknesses?
- What are the future research needs to improve these approaches?'

Thus, a database for reviewing and consolidating methodologies to address and assess the impact of local or regional AQPs and their health implications was implemented within APPRAISAL. In a common format, information on the different assessment methodologies used in European Member States are collected with the purpose to find answers to the abovementioned questions.

Based on the information contained in the database, an Integrated Assessment Modelling (IAM) framework and guidelines will be outlined. 'The IAM framework and the guidelines will only be useful if they reflect the whole range of methodologies applied in the different member states. The more information included in the database the more useful the IAM and the guide-

lines become to all potential users. The resulting documents from the analysis of the database will support the revision of the EU air quality policies' (APPRAISAL, 2014b).

5.3 Selected German air quality plans in the APPRAISAL database

Air quality plans out of the inventory of AQPs published in Germany (see section 2.1 and Table 25) have been analysed regarding criteria specified in the APPRAISAL database. Eleven plans were selected in consultation with the German Environmental Protection Agency (Umweltbundesamt, UBA) in order to represent the spectrum of the different methodologies currently applied in Germany. Criteria for the selection were, inter alia, recent publication dates and reference areas in different German federal states. The latter criterion was established since there can be seen partly regional patterns in the methodologies used to compile the plans. Updates of plans were considered only if the methodologies used were described within the document of the plan's update. The results of the analyses of the eleven selected AQP, as listed in Table 24, have been entered in the APPRAISAL database http://servizi.appraisal-fp7.eu/appraisal/.

Table 24: Selected AQPs published in Germany in the APPRAISAL database

ID_P	AQP	Federal state	Year of pub.	Update
232	Teilplan **Wendlingen** am Neckar. Luftreinhalteplan für den Regierungsbezirk Stuttgart. Aufstellung eins Luftreinhalteplanes zur Minderung der PM10-Belastungen. Published by Regierungspräsidium Stuttgart	Baden-Württemberg	2012	
172	Luftreinhalteplan für die Inntalautobahn - Streckenabschnitt **Oberaudorf**. Published by Bayerisches Staatsministerium für Umwelt und Gesundheit. Drawn up by Regierung von Oberbayern	Bavaria	2011	
217	Luftreinhalteplan 2011 bis 2017 für **Berlin**. Entwurf. Published by Senatsverwaltung für Stadtentwicklung und Umwelt Berlin	Berlin	2012	x
186	Luftreinhalte- und Qualitätsplan für die Landeshauptstadt **Potsdam**. Fortschreibung 2010-2015. Published by Landeshauptstadt Potsdam. Contracting authority: Ministerium für Umwelt, Gesundheit und Verbraucherschutz des Landes Brandenburg.	Brandenburg	2012	x
184	Luftreinhalteplan für das Gebiet **Lahn-Dill**. Gießen / Wetzlar. 1. Fortschreibung. Published by Hessisches Ministerium für Umwelt, Energie, Landwirtschaft und Verbraucherschutz	Hesse	2011	x
224	Luftreinhalteplan für die Stadt **Oldenburg.** Published by Stadt Oldenburg	Lower Saxony	2012	
-	Luftreinhalteplan Stadt **Halle** / Westfalen. Published by Bezirksregierung Detmold.	North Rhine-Westphalia	2013	
177	Luftreinhalteplan für die Stadt **Chemnitz**. 1. Fortschreibung 2011. Published by Stadt Chemnitz	Saxony	2011	x
170	Luftreinhalteplan für den Ballungsraum **Halle** 2011 Published by Ministerium für Landwirtschaft und Umwelt Sachsen-Anhalt	Saxony-Anhalt	2011	x
137	Luftreinhalteplan **Kiel**. Published by Ministerium für Landwirtschaft, Umwelt und ländliche Räume des Landes Schleswig-Holstein	Schleswig-Holstein	2009	
188	Luftreinhalteplan für die Landeshauptstadt **Erfurt** zur Reduzierung der Luftschadstoffbelastung durch Feinstaub und Stickoxide. 1. Fortschreibung. Published by Thüringer Landesverwaltungsamt	Thuringia	2012	x
ID_P: Unique identification number of AQP Year of pub.: Year of publication Update: Plan is an update of previous plan				

With this analysis and data integration, an important component has been provided in order to adequately consider German air quality planning while pursuing the goals laid out in the APPRAISAL-project (see above). The analysis of the eleven plans also shows, that the topics 'Exposure' (in the sense of a detailed assessment of how many people are exposed to which concentration levels) and 'Health assessment' are not at the forefront of German air quality planning. From IVU Umwelt (2013), no clear picture of the situation in Germany with respect to these topics can be derived as analyses with this respect have not been part of the project.

6 Summary

The status of air quality plans and action plans published in Germany up to 30.11.2012 has been described and thoroughly analysed. These plans offer an extensive overview of the current situation in Germany regarding air quality, different methodologies of assessment and proposed measures to improve air quality. Methods and results of previous projects have been extended to identify measures planned in the German Länder in order to meet air quality limit values.

There have still been unsolved problems meeting limit values in many locations over the last years, leading to numerous new or updated plans. In particular, the German Länder notified time extensions (postponements of attainment deadlines) which generally were accompanied by new or updated plans with additional measures. Altogether, 242 publications since 2004 were part of the analysis, thereof 81 updates of previous plans.

Plans are expected to include source apportionments with respect to both spatial origin and different source groups. The analysis of source apportionments shows that more and more plans compiled due to NO_2-exceedances include source apportionments (77 % spatial and 69 % pollution sources). For PM10 the fraction of spatial source apportionments has been over 80 % for many years. Apportionments with respect to pollution sources have risen continuously to a current figure of 57 %. The new or updated plans published since 31.08.2008 have been analysed in more detail. For NO_2 local road traffic is named as the biggest polluter in 68 % of the cases with 46 % having at least 50 % from this source group. For PM10 the regional background is identified as the biggest contributor in 81 % of the cases with 52 % having at least 50 % from this source group.

To ensure the comparability of the measures, the compilation of standardised measures developed in previous projects was extended. These 'Standardised measures 2013' constitute a central element of the analysis and represent all measures that are being implemented, planned or discussed in plans presented in Germany. Currently 130 standardised measures exist, of which 15 were added in the 2013 update.

The detailed schema for classifying the measures (e. g. with respect to source groups, areas of action and targets) was extended to the 'Schema of measures 2013'. With this analysis tool all plans, updates and drafts were registered and analysed systematically. With the integration of the new measures, the schema of measures contains 2588 measures originating from 242 plans. 2100 of these measures are in force and 488 have been suspended. Statistical analyses based on the 'Schema of measures 2013' e. g. show that, in accordance with the results of the source apportionment, 80 % of the measures are aimed at road traffic. Industrial processes are targeted by 16 % of these measures.

As plans and measures have been developed and implemented in Germany over a longer period of time, it is now possible to assess the effectiveness of measures after their implementation. Thus, the assessment can be based on more information than just the expected effects noted in the plans, which are normally based on estimations and scenario calculations. The available evaluation studies carried out after the implementation of the measures have been surveyed, focusing on the four measures 'low emission zones' (LEZs), 'environmental traffic management', 'lorry transit bans' and 'speed limits of 30 or 40 km/h on major roads'. Research on evidence of the effectiveness of measures implemented in Germany shows that there are relatively few such

studies. A comparatively wide spectrum of evaluations does exist for LEZs, however about half of these studies do not give specific figures on reductions of concentrations. The remaining studies give reduction potentials for the single measure LEZ of up to 10 % for NO_2, 7 % for PM10 and 10 % for PM2.5. A high reduction potential of up to 19 % for soot (black carbon) is particularly mentioned.

Theoretical reduction potentials for two types of measures concerning road traffic were assessed based on the 'Handbook emission factors for road transport' and studies for the air quality plans of Berlin and Kassel. These assessments predict, e. g., for an extension of the German vehicle classification regulation ('Kennzeichnungsverordnung') to include restrictions for gasoline vehicles with catalytic converters a significant increase of the NO_2 reduction potential of a LEZ to up to 7 % in 2015. Higher reduction potentials can only be reached by intensified penetration of Euro-6/VI vehicles in the fleet. A LEZ's reduction potential for PM10 always remains below 10 % and declines significantly the later the LEZ is put into force. A comparison of theoretical reduction potentials with published evaluations shows good agreement with most publications.

The reduction potential of a 'lorry transit ban' strongly depends on the fraction of lorries and the expected compliance rate. As lorries have a higher reduction potential for non-exhaust emissions of particulate matter due to resuspension and abrasion, reductions of the PM10 annual mean value by several percentage points can be expected even with lower lorry fractions. The NO_2 reduction potential is always higher than the one for PM10 and can reach more than 10 % if lorry fraction and compliance rate are suitably high.

The analysis of evidence of effectiveness clearly shows that it is inherently difficult to determine the isolated effect of a measure by measurement data. Such an evaluation has to refer to the problem of meeting the limit value but should also consider the general aim of improving air quality. For example, exhaust emissions contribute only to a relatively small part to the PM10 pollution at the hot spot. Thus, a measure influencing only this fraction can effect only a small relative reduction of the PM10 annual mean value. Yet the same measure is generating a much larger relative reduction for black carbon. Using the example 'low emission zone', the complexity of the task and the potential to assess the isolated effect of a measure was discussed. Additionally, continuous modelling was described as an extended evaluation method. However, there is need of further research with respect to quality assured evaluation methods that provide comparable results.

An analysis of data published in the AQPs' source apportionment analyses in combination with NO_2 measurements for the corresponding limit value exceedances shows that in more than 60 % of the cases a local measure has to reduce the additional concentration by more than 50 % to allow for the possibility to comply with the air quality limit value. In three of the 80 cases analysed, a complete reduction of the additional concentration is not sufficient to comply with the air quality limit value.

Finally, an approach of EU-Project APPRAISAL for reviewing and consolidating methodologies to address and assess the impact of local or regional AQPs and their health implications has been applied. Eleven German air quality plans have been analysed with respect to criteria specified in APPRAISAL and entered in the project's database.

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8 Appendices

8.1 Data set of AQPs published in Germany up to 2012

Each plan has been assigned a unique identification number (ID_P). If a final version replaces a draft, the ID_P remains unchanged. An update of a previous plan is registered with a new ID_P. If a plan is not explicitly labelled as 'Draft' by the author, it is considered as the 'Final version'. In the column 'Report date', the date of publication given in the plan was noted. Dates are noted in parentheses if no report date is given in the plan and the date was taken from the properties of the plan's pdf-document.

The AQPs data set considered is listed in Table 25, grouped by federal state and area. There, additional information on the plans can be found, e. g. pollutants triggering the compilation of the plan (NO_2, PM10 or Benzene), type of plan (air quality plan: LRP, LQP; action plan: AP), differentiation in final version or draft, reference year of plan's data set and date of plan's publication (Report date). Furthermore, it is noted whether a plan is an update of previous plan or a plan has been annulled by an update.

Table 25: Data set of the AQPs published in Germany up to 30.11.2012 grouped by federal state and area (see end of table for abbreviations)

ID_P	Area	Exc. NO_2 AMV	Exc. PM10 AMV	Exc. PM10 DMV	Air quality plan: LQP, LRP; Action plan: AP		Final version / Draft	Reference year	Report date	Number of pages	Additional information	Up-date	An-nul.
Baden-Württemberg													
1	Freiburg	x				LRP		Final	2003; 2004	March 06	103	Annulled August 2009 by LRP/AP Freiburg #124		x
124	Freiburg	x		x		LRP	AP	Final	2004-2007	5.8.09	119		x	
207	Freiburg	x				LRP		Final	2008-2010	Oct 12	67	Update	x	
92	Heidelberg			x			AP	Draft	2006	28.11.06	68			
2	Heidelberg	x				LRP	AP	Final	2002-2004	March 06	105			
209	Heidelberg	x				LRP		Final	2007-2010	Jan 12	21	Update	x	
199	Heidenheim a. d. B.	x				LRP		Final	2007-2010	Nov 11	45			
111	Heilbronn	x		x		LRP	AP	Final	2004-2007	Apr 08	70			
178	Heilbronn	x		x		LRP		Final	2008-2010	Aug 11	31	Update	x	
110	Herrenberg	x		x		LRP	AP	Final	2006; 2007	June 08	58			
200	Herrenberg	x				LRP		Final	2008-2010	Apr 12	26	Update	x	
3	Ilsfeld	x		x		LRP	AP	Final	2004	March 06	45			
201	Ilsfeld	x		x		LRP		Final	2006-2009	Oct 11	31	Update	x	
91	Karlsruhe			x			AP	Final	2006	Jan 08	65			
4	Karlsruhe	x				LRP	AP	Final	2002-2004	March 06	97			
210	Karlsruhe	x				LRP		Final	2007-2010	Jan 12	21	Update	x	
5	Leonberg	x		x		LRP	AP	Final	2004-2006	Aug 06	64			
202	Leonberg	x		x		LRP		Final	2007-2010	Nov 11	37	Update	x	
6	Ludwigsburg	x		x		LRP	AP	Final	2004	May 06	66			
219	Ludwigsburg	x		x		LRP		Final	2005-2011	Oct 12	32	Update	x	
7	Mannheim	x		x		LRP	AP	Final	2002-2004	March 06	112			
128	Mannheim	x		x		LRP	AP	Final	2002-2004	Jan 08	1	Modified LEZ	x	
214	Mannheim	x				LRP		Final	2007-2010	Jan 12	21	Update	x	
162	Markgröningen	x		x		LRP		Final	2007-2009	Oct 10	65			
88	Mühlacker			x			AP	Final	2006	Sep 08	62			
8	Mühlacker	x				LRP	AP	Final	2002-2003	March 06	76			
211	Mühlacker	x		x		LRP		Final	2007-2010	Jan 12	21	Update	x	
112	Pfinztal	x		x		LRP	AP	Final	2006	Nov 08	80			
212	Pfinztal	x				LRP		Final	2007-2010	Jan 12	21	Update	x	
90	Pforzheim			x			AP	Final	2006	June 08	66			

ID_P	Area	Exc. NO_2 AMV	Exc. PM10 AMV	Exc. PM10 DMV	Air quality plan: LQP, LRP; Action plan: AP		Final version / Draft	Reference year	Report date	Number of pages	Additional information	Up-date	An-nul.
Baden-Württemberg (continued)													
9	Pforzheim	x				LRP	AP	Final	2002-2004	March 06	87			
213	Pforzheim	x				LRP		Final	2007-2010	Jan 12	21	Update	x	
10	Pleidelsheim	x		x		LRP	AP	Final	2004	Feb 06	57			
203	Pleidelsheim / Ingers-heim / Freiberg a. N.	x		x		LRP		Final	2008-2010	Nov 11	86		(x)[3]	
185	Reutlingen	x		x		LRP		Final	2007-2011	March 12	43	2nd Update	x	
208	Schramberg	x				LRP		Draft	2007-2010	July 11	58			
11	Schwäbisch Gmünd	x		x		LRP	AP	Final	2004	May 06	53			
204	Schwäbisch Gmünd	x				LRP		Final	2009-2011	Oct 12	26	Update	x	
12	Stuttgart	x		x		LRP	AP	Final	2004; 2005	Dec 05	95			
155	Stuttgart	x		x		LRP	AP	Final	2006-2009	Feb 10	48	Update	x	
13	Tübingen / Reutlingen	x				LRP	AP	Final	2002-2004	Dec 05	180			
93	Tübingen / Reutlingen	x		x		LRP	AP	Final	2006	Nov 07	13	Update Reutlingen	x	
206	Tübingen	x		x		LRP		Final	2005-2011	March 12	75	Update	x	
80	Ulm	x		x		LRP	AP	Final	2006; 2007	May 08	120			
216	Ulm	x		x		LRP		Final	2008-2011	Nov 12	57	Update	x	
205	Urbach	x				LRP		Final	2008-2010	Nov 11	58			
152	Walzbachtal	x				LRP	AP	Final	2007	Oct 09	67			
232	Wendlingen a. N.			x		LRP		Final	2010	Nov 12	42			
Bavaria														
14	Ansbach			x		LRP		Final	2003	22.10.04	86			
144	Ansbach			x		LRP	AP	Final	2004; 2006	May 09	56	Update	x	
15	Arzberg			x		LRP		Final	2003	(24.3.05)	38			
127	Aschaffenburg	x		x		LRP		Final	2005	July 06	94	Voluntary 'Plan of measures' according to an AQP		
16	Augsburg	x	x	x		LRP		Final	2003	(24.3.05)	102			
140	Augsburg	x		x		LRP	AP	Final	2004-2008	March 09	108	Update with inclusion of surrounding municipali-ties		
86	Bayreuth	x		x		LRP	AP	Final	2005	March 07	78			

[3] Update for Pleidelsheim: The AQPs Pleidelsheim was integrated in the new AQPs Pleidelsheim - Ingersheim - Freiberg a.N (#203, S. 4)

ID_P	Area	Exc. NO_2 AMV	Exc. PM10 AMV	Exc. PM10 DMV	Air quality plan: LQP, LRP; Action plan: AP		Final version / Draft	Reference year	Report date	Number of pages	Additional information	Up-date	An-nul.
Bavaria (continued)													
103	Burghausen			x		LRP	AP	Final	2006	Dec 07	72			
104	Ingolstadt			x		LRP	AP	Final	2006	Oct 07	67			
105	Landshut			x		LRP	AP	Final	2005; 2006	31.10.07	147			
17	Lindau			x		LRP	AP	Final	2003	Dec 05	73			
165	Lindau			x		LRP		Final	2006	Dec 10	65	Update	x	
19	München	x	x	x		LRP		Final	2002; 2003	Sep 04	118			
18	München	x	x	x		LRP	AP	Final	2004-2006	Oct 07	75	Update	x	
122	München	x		x		LRP	AP	Final	2007	Aug 08	70	2nd Update	x	
159	München	x				LRP		Final	2006; 2007	Apr 12	124	3rd Update with participation of surrounding municipalities. With AQPs City of Starnberg.	x	
160	München	x		x		LRP		Final	2008; 2009	Sep 10	68	4th Update	x	
84	Neu-Ulm			x		LRP	AP	Final	2006	June 09	90			
21	Nürnberg / Fürth / Erlangen		x	x		LRP		Final	2003	Oct 04	200			
20	Nürnberg			x		LRP	AP	Final	n.s.	11.10.06	8	Update. Annulled 7.2.2007 by #106.	x	x
106	Nürnberg			x		LRP	AP	Final	n.s.	7.2.07	5	2nd Update	x	
164	Nürnberg	x				LRP		Final	2007-2009	Dec 10	118	Update	x	
172	Oberaudorf / Inntal-autobahn	x				LRP		Final	2008-2010	Dec 11	65	Inntal motorway - Section Oberaudorf		
22	Passau		x	x		LRP		Final	2002; 2003	(21.12.04)	76			
87	Passau			x		LRP	AP	Final	2004-2006	Dec 06	147	Update 2006	x	
23	Regensburg			x		LRP		Final	2002; 2003	(25.1.05)	72			
89	Regensburg			x		LRP		Final	n.s.	March 08	33	Update City of Regensburg's 'Set of measures'	x	
163	Regensburg	x		x		LRP		Final	2004-2006; 2009	Dec 10	86	Update	x	
24	Schwandorf			x		LRP		Final	2002; 2003	(25.1.05)	70			
25	Weiden			x		LRP		Final	2002; 2003	(25.1.05)	67			
26	Würzburg			x		LRP		Final	2003	(21.12.04)	92			
158	Würzburg	x				LRP		Final	2008	Dec 10	122	Update	x	
Berlin														
27	Berlin	x		x		LRP	AP	Final	2002	Aug 05	35	2005 - 2010		
114	Berlin	x		x		LRP	AP	Final	2002	20.3. 07	4	Modified LEZ	x	

ID_P	Area	Exc. NO_2 AMV	Exc. PM10 AMV	Exc. PM10 DMV	Air quality plan: LQP, LRP; Action plan: AP			Final version / Draft	Reference year	Report date	Number of pages	Additional information	Up-date	An-nul.
Berlin (continued)														
217	Berlin	x		x		LRP		Draft	2005-2010	(25.4.12)	202	2011 - 2017	x	
Brandenburg														
85	Bernau			x		LRP		Final	2003	(10.7.07)	60			
94	Brandenburg / Havel			x			AP	Final	2005	Jan 07	82			
75	Cottbus			x		LRP	AP	Final	2003; 2005	Aug 06	79			
196	Cottbus	x		x		LRP		Final	2005-2010	20.10.11	68	Update 2011	x	
95	Eberswalde	x		x		LRP	AP	Final	2006	21.12.06	63			
78	Frankfurt / Oder			x		LRP	AP	Final	2003	Sep 06	111			
28	Nauen			x		LRP		Final	2001-2003	27.7.04	50			
29	Neuruppin			x		LRP		Final	2005	Aug 05	33	Combination of AQPs and plan for noise reduction		
102	Potsdam			x		LRP	AP	Final	2005	9.11.07	66			
186	Potsdam	x		x	LQP	LRP		Final	2006-2010	June 12	108	Update 2010-2015	x	
132	Teltow			x		LRP		Final	2005	Feb 06	139	Combination of AQPs and plan for noise reduction		
Bremen														
63	Bremen - Dobbenweg / Bismarckstr.			x			AP	Final	2005	13.10.05	7			
30	Bremen - Neuenlander Str.			x			AP	Final	2004; 2005	(16.11.05)	8			
31	Bremen	x		x		LRP	AP	Final	2005	14.8.06	135			
115	Bremen	x		x		LRP	AP	Final	2005	17.6.08	2	Implementation LEZ	x	
238	Bremerhaven	x				LRP	AP	Final	2007-2010	Feb. 12	28			
Hamburg														
64	Hamburg - Habichtstr.			x			AP	Final	2005	Dec 05	39			
32	Hamburg	x				LRP		Final	2002	Oct 04	51			
218	Hamburg	x		x		LRP		Draft	2003-2011	28.9.12	208	Update	x	
Hesse														
33	Darmstadt			x			AP	Final	2005	Nov 05	48	Annulled 28.2.2011 by #171.		x
100	Darmstadt			x			AP	Final	2005	Nov 07	46	Annulled 28.2.2011 by #17Update AP	x	x
171	Darmstadt	x				LRP		Final	2010	Feb 11	92	Update. Part of LRP Rhein-Main	x	
34	Frankfurt / Main			x			AP	Final	2005	Oct 05	46	Annulled 1.10.2008 by #130		x
130	Frankfurt / Main			x			AP	Final	2006	Aug 08	81	Annulled 14.11.2011 by #173rd Update AP.	x	x
173	Frankfurt / Main	x				LRP		Final	2010	Oct 11	126	Update. Part of LRP Rhein-Main	x	

ID_P	Area	Exc. NO_2 AMV	Exc. PM10 AMV	Exc. PM10 DMV	Air quality plan: LQP, LRP; Action plan: AP		Final version / Draft	Reference year	Report date	Number of pages	Additional information	Up-date	An-nul.
Hesse (continued)													
157	Fulda	x				LRP		Final	2007	(07.07.10)	92		
68	Kassel			x		LRP	AP	Final	2003; 2005	(4.7.06)	107	Annulled 22.8.2011 by #179. Agglomeration Kassel with Baunatal, Fuldabrück, Fuldatal, Kassel, Kaufungen, Lohfelden, Niestetal and Vellmar		x
179	Kassel	x				LRP		Final	2010	Aug 11	92	Update. Agglomeration Kassel with Baunatal, Fuldabrück, Fuldatal, Kassel, Kaufungen, Lohfelden, Niestetal and Vellmar	x	
99	Lahn-Dill	x		x		LRP		Final	2003; 2006	Nov 07	150	Annulled 17.10.2011 by #184. With Wetzlar and Gießen		x
184	Lahn-Dill	x		x		LRP		Final	2010	Oct 11	106	Update. With Wetzlar and Gießen	x	
195	Limburg	x				LRP		Final	2009; 2011	March 12	96			
129	Marburg	x				LRP		Final	2006	Feb 09	86			
180	Neu-Isenburg	x				LRP		Final	2010	Aug 11	80	Update. Part of LRP Rhein-Main	x	
193	Offenbach	x				LRP		Draft	2010	Aug 11	86	Update. Part of LRP Rhein-Man	x	
176	Reinheim	x				LRP		Final	2009	March 11	82			
35	Rhein-Main	x		x		LRP		Final	2002	(3.5.05)	88	Agglomeration Rhein-Main with Frankfurt, Darmstadt, Wiesbaden, Offenbach, Hanau, Griesheim and Neu-Isenburg		(x)[4]
194	Wiesbaden	x				LRP		Final	2011	Nov 12	96	Update. Part of LRP Rhein-Main	x	
Mecklenburg-Western Pomerania														
121	Rostock	x		x		LRP	AP	Final	2006	Oct 08	67			
Lower Saxony														
153	Bad Lauterberg	x				LRP	AP	Final	2007	30.10.09	20			
242	Bad Lauterberg	x				LRP		Final	2008-2010	May 11	23	Update	x	
36	Braunschweig	x	x	x		LRP	AP	Final	2003	May 07	59			
101	Braunschweig	x		x		LRP		Draft	2004	15.6.07	37	Update LRP	x	
241	Braunschweig	x				LRP		Final	n.s.	21.1.08	5	Accelerated implementation of some measures	x	
79	Burgdorf	x		x			AP	Final	2005; 2006	Dec 06	20			
134	Göttingen	x		x		LRP		Final	2006	Dec 08	87			

[4] Parts of the AQPs for the Agglomeration Rhein-Main (Cities Darmstadt, Frankfurt a. Main and Neu-Isenburg) have been by updates.

ID_P	Area	Exc. NO_2 AMV	Exc. PM10 AMV	Exc. PM10 DMV	Air quality plan: LQP, LRP; Action plan: AP			Final version / Draft	Reference year	Report date	Number of pages	Additional information	Up-date	An-nul.
Lower Saxony (continued)														
220	Göttingen	x				LRP		Final	2010	June 11	78	Update 2011	x	
156	Hameln	x				LRP		Final	2007	Sep 10	104			
221	Hameln	x				LRP		Final	2010	May 11	50	Update 2011	x	
37	Hannover	x		x		LRP	AP	Final	2005	12.7.07	36			
222	Hannover	x			LQP			Final	2006-2010	30.5.11	28	Update 2011	x	
139	Hildesheim	x		x		LRP		Final	2004; 2005	27.11.08	55			
223	Hildesheim	x				LRP		Final	2010	Apr 12	42	Update	x	
224	Oldenburg	x				LRP		Final	2010; 2011	Sep 12	57			
123	Osnabrück	x		x		LRP	AP	Final	2006	9.12.08	112			
225	Osnabrück	x				LRP		Final	2010	May 11	66	Amendment 2011	x	
North Rhine-Westphalia														
141	Aachen	x		x		LRP	AP	Final	2006; 2007	1.1.09	127			
150	Bonn	x				LRP		Final	2006	1.10.09	130			
228	Bonn	x				LRP		Final	2007-2011	June 12	58	Update	x	
38	Castrop-Rauxel					LRP		Final	2003	(16.11.05)	58	Annulled 4.8.2008 by LRP Ruhrgebiet Nord #120. Exceedence of AMV for Benzene 2003		x
166	Dinslaken	x				LRP		Final	2008; 2009	30.6.11	164			
39	Dortmund - Brackeler Str.		x	x			AP	Final	2004	June 05	34	Annulled 4.8.2008 by LRP Ruhrgebiet Ost #119		x
65	Dortmund - Steinstr.			x			AP	Final	2004	May 06	29	Annulled 4.8.2008 by LRP Ruhrgebiet Ost #119		x
107	Dortmund	x	x	x		LRP		Final	2004; 2006	Jan 08	67	Annulled 4.8.2008 by LRP Ruhrgebiet Ost #119		x
239	Düren	x				LRP		Draft	2009-2011	Aug 12	120			
40	Düsseldorf – Luden-berger Straße			x			AP	Final	2004	21.10.05	21	Annulled 1.11.2008 by LRP Düsseldorf #125		x
41	Düsseldorf - Südl. In-nenstadt			x			AP	Final	2004; 2005	1.6.05	16	Annulled 1.11.2008 by LRP Düsseldorf #125		x
42	Düsseldorf - Südl. In-nenstadt	x				LRP		Final	2002	11.10.04	63	Annulled 1.11.2008 by LRP Düsseldorf #125		x
43	Düsseldorf - Südl. In-nenstadt		x	x		LRP		Final	2003	21.10.05	67	Update; Annulled 1.11.2008 by LRP Düsseldorf #125	x	x
125	Düsseldorf	x		x		LRP		Final	2005	1.11.08	173	City of Düsseldorf	x	
44	Duisburg - Nord		x	x			AP	Final	2003-2005	1.8.05	21	Annulled 4.8.2008 by LRP Ruhrgebiet West #118; Bruckhausen and Marxloh		x

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North Rhine-Westphalia (continued)														
45	Duisburg - Nord		x	x		LRP		Final	2002	(9.11.04)	64	Annulled 4.8.2008 by LRP Ruhrgebiet West #118; Duisburg-Bruckhausen		x
46	Duisburg - Nord II			x		LRP		Final	2003	(27.1.06)	68	Annulled 4.8.2008 by LRP Ruhrgebiet West #118; Duisburg-Marxloh		x
108	Erwitte - Soester Str.			x			AP	Final	2006	July 07	26			
47	Essen - Gladbecker Str.			x			AP	Final	2004	16.6.05	29	Annulled 4.8.2008 by LRP Ruhrgebiet West #118		x
66	Essen - Hombrucher Str.			x			AP	Final	2004	22.11.05	29	Annulled 4.8.2008 by LRP Ruhrgebiet West #118		x
82	Grevenbroich			x			AP	Final	2006	15.10.06	30	Annulled 1.4.2009 by LRP Grevenbroich #147		x
147	Grevenbroich			x		LRP		Final	2006	1.4.09	120	Open-cast mining	x	
48	Hagen - Innenstadt	x				LRP		Final	2002	(22.10.04)	40	Annulled 31.1.2009 by LRP Hagen #136		x
49	Hagen - Innenstadt			x		LRP	AP	Final	2003-2005	Oct 05	45	Annulled 31.1.2009 by LRP Hagen #136; Update LRP/AP	x	x
136	Hagen	x		x		LRP		Final	2006	Jan 09	95	City of Hagen	x	
52	Hambach			x			AP	Final	2004	29.9.05	26			
237	Hambach			x		LRP		Draft	2010; 2011	Oct 12	120			
226	Hamm	x				LRP		Final	2009-2011	Oct 12	84			
197	Hürth	x				LRP		Final	2008-2010	1.10.11	125			
233	Kamen	x				LRP		Draft	2009-2011	(13.9.12)	82			x
81	Köln	x				LRP		Final	2003	(30.10.06)	115	Annulled 1.4.2012 by LRP Köln Update #215		
215	Köln	x				LRP		Final	2008-2010	Apr 12	202	Update	x	
50	Krefeld - Hafen		x	x			AP	Final	2003-2005	(29.8.05)	25	Annulled 1.10.2010 by LRP Krefeld #161		x
51	Krefeld - Hafen		x	x		LRP		Final	2003	(27.1.06)	55	Annulled 1.10.2010 by LRP Krefeld #161		x
161	Krefeld	x		x		LRP		Final	2008; 2009	30.9.10	193		x	
234	Langenfeld	x				LRP		Final	2008-2011	24.8.12	148			
236	Mettmann	x				LRP		Final	2009-2011	30.11.12	129			
227	Mönchengladbach	x		x		LRP		Final	2009-2011	19.7.12	167			
74	Mülheim / Ruhr - Aktienstr.			x			AP	Final	2005; 2006	31.7.06	43	Annulled 4.8.2008 by LRP Ruhrgebiet West #118		x
146	Münster	x		x	LQP			Final	2006-2008	(31.3.09)	186			
83	Neuss - Friedrichstr.			x			AP	Final	2005; 2006	1.10.06	50	Annulled 1.12.2009 by LRP Neuss #154		x
154	Neuss	x				LRP		Final	2006	30.11.09	183			

ID_P	Area	Exc. NO_2 AMV	Exc. PM10 AMV	Exc. PM10 DMV	Air quality plan: LQP, LRP; Action plan: AP			Final version / Draft	Reference year	Report date	Number of pages	Additional information	Up-date	An-nul.
North Rhine-Westphalia (continued)														
70	Oberhausen - Mülheimer Str.			x			AP	Final	2005	5.4.06	42	Annulled 4.8.2008 by LRP Ruhrgebiet West #118		x
133	Overath	x				LRP		Final	2006	1.3.09	74			
175	Paderborn	x				LRP		Final	2006-2009	(28.06.11)	115			
235	Remscheid	x				LRP		Final	2009-2011	20.9.12	134			
120	Ruhrgebiet Nord	x		x		LRP		Final	2006; 2007	(25.7.08)	240	Annulled 15.10.2011 by Update LRP Ruhrgebiet Nord #181; with Bottrop, Castrop-Rauxel, Gelsen-kirchen, Gladbeck, Herten and Recklinghausen		x
181	Ruhrgebiet Nord	x		x		LRP		Final	2009; 2010	(10.10.11)	214	Update. With Bottrop, Castrop-Rauxel, Gelsenkir-chen, Gladbeck, Herten and Recklinghausen	x	
119	Ruhrgebiet Ost	x		x		LRP		Final	2006; 2007	(1.8.08)	224	Annulled 15.10.2011 by Update LRP Ruhrgebiet Ost #182; with Bochum, Dortmund and Herne		x
182	Ruhrgebiet Ost	x		x		LRP		Final	2009; 2010	(21.9.11)	192	Update. With Bochum, Dortmund and Herne	x	
118	Ruhrgebiet West	x		x		LRP		Final	2006	(31.7.08)	237	Annulled 15.10.2011 by Update LRP Ruhrgebiet West #183; with Duisburg, Essen, Mülheim a. d. Ruhr and Oberhausen		x
183	Ruhrgebiet West	x		x		LRP		Final	2009; 2010	15.10.11	216	Update. With Duisburg, Essen, Mülheim a. d. Ruhr and Oberhausen	x	
143	Siegen	x				LRP		Final	2006	Jan 09	95			
109	Warstein - Rangetrift-weg			x			AP	Final	2006	May 07	40			
174	Witten	x				LRP		Final	2008; 2009	Dec 10	92			
53	Wuppertal - Barmen Steinweg			x			AP	Final	2005	5.7.05	27	Annulled 1.10.2008 by LRP Wuppertal #126		x
126	Wuppertal	x		x		LRP		Final	2006	1.11.08	190	Annulled 1.1.2013 by LRP Wuppertal Update #240		
240	Wuppertal	x				LRP		Draft	2010;2011	8.11.12	163	Update 2013	x	
Rhineland-Palatinate														
145	Koblenz	x			LQP			Final	2006; 2007	May 09	57			
54	Ludwigshafen - Hei-nigstr.			x		LRP		Final	2003-2005	Aug 05	64			
142	Ludwigshafen	x				LRP	AP	Final	2006; 2007	Oct 08	70	Update 2007-2015	x	
55	Mainz - Parcusstr.			x		LRP	AP	Final	2003-2005	Sep 05	52			
113	Mainz	x		x		LRP	AP	Final	2005-2007	Apr 08	46	Update 2005-2010	x	

ID_P	Area	Exc. NO_2 AMV	Exc. PM10 AMV	Exc. PM10 DMV	Air quality plan: LQP, LRP; Action plan: AP			Final version / Draft	Reference year	Report date	Number of pages	Additional information	Up-date	An-nul.
Rhineland-Palatinate (continued)														
198	Mainz	x				LRP		Final	2008-2010	Dec 11	84	Update 2011-2015	x	
230	Mainz	x		x		LRP		Final	2011	Oct 12	108	Update 2011-2015. Modification PM10	x	
72	Neuwied			x			AP	Final	2005	June 06	25			
131	Pirmasens			x			AP	Final	2006	Jan 07	26			
77	Speyer			x			AP	Final	2006	Dec 06	36			
76	Trier			x			AP	Final	2005	June06	24			
73	Worms			x			AP	Final	2005	July 06	24			
Saarland														
231	Saarbrücken	x				LRP		Draft	2009; 2010	May 12	83			
Saxony														
67	Chemnitz			x			AP	Final	2005	Jan 06	34	Annulled 18.5.2011 by Update LRP Chemnitz 2011 #177		x
116	Chemnitz	x		x		LRP		Final	2005	June 08	136	Annulled 18.5.2011 by Update LRP Chemnitz 2011 #177		x
177	Chemnitz	x				LRP		Final	2006-2010	29.4.11	91	Update	x	
96	Dresden	x		x		LRP	AP	Final	2005	May 08	163	Annulled 26.5.2011 by LRP Dresden 2011 #169		x
169	Dresden	x		x		LRP		Final	2006-2009	17.5.11	188	LRP 2011	x	
117	Görlitz			x		LRP		Final	2005	Apr 08	121			
56	Leipzig			x			AP	Final	2005	(30.6.05)	18	Annulled 19.12.2009 by Update LRP Leipzig 2009 #151		x
57	Leipzig	x		x		LRP		Final	2003	15.9.05	110	Annulled 19.12.2009 by Update LRP Leipzig 2009 #151		x
151	Leipzig	x		x		LRP		Final	2006-2008	18.12.09	174	Update	x	
149	Plauen			x		LRP		Final	2006	24.9.09	103			
Saxony-Anhalt														
58	Aschersleben			x		LRP	AP	Final	2003; 2004	June 05	87			
59	Halle			x		LRP	AP	Final	2003-2005	March 06	102	Annulled 1.9.2011 by LRP Halle 2011 #170		x
170	Halle	x		x		LRP		Final	2006-2010	1.6.11	103	LRP 2011	x	
71	Magdeburg			x			AP	Final	2006	Dec 06	86	Annulled 1.8.2011 by LRP Magdeburg 2011 #168		x
168	Magdeburg	x		x		LRP		Final	2009; 2010	12.4.11	65	LRP 2011		
69	Wittenberg			x			AP	Final	2005	June 06	91	Action plan 2006		
229	Wittenberg			x			AP	Final	2005; 2006	Apr 09	90	Action plan 2008	x	

ID_P	Area	Exc. NO_2 AMV	Exc. PM10 AMV	Exc. PM10 DMV	Air quality plan: LQP, LRP; Action plan: AP			Final version / Draft	Reference year	Report date	Number of pages	Additional information	Up-date	An-nul.
Schleswig-Holstein														
60	Itzehoe	x				LRP		Final	2003	July 06	89			
137	Kiel	x				LRP		Final	2006	March 09	68			
97	Ratzeburg	x				LRP		Final	2006	Jan 09	61			
Thuringia														
61	Erfurt			x			AP	Final	2005	Nov 05	20			
62	Erfurt			x		LRP		Final	2002	(20.7.05)	88			
188	Erfurt	x		x		LRP		Final	2009; 2010	Jan 12	84	Update	x	
138	Gera			x			AP	Final	2006	March 09	36			
187	Gera	x				LRP		Final	2010	Feb 12	42			
135	Jena			x			AP	Final	2006	Nov 08	48			
189	Jena	x				LRP		Final	2010	Feb 12	43			
167	Mühlhausen			x		LRP		Final	2009	Dec 10	42			
190	Mühlhausen	x		x		LRP		Final	2010	Nov 11	41	Update	x	
191	Suhl	x				LRP		Final	2010	Aug 12	46			
98	Weimar			x			AP	Final	2006	July 07	53			
148	Weimar			x	LQP			Final	2006; 2007	Dec 08	72			
192	Weimar	x		x		LRP		Final	2008-2010	Sep 11	59	Update	x	

ID_P: Unique identification number of AQP
Exc.: Exceedance of
AMV: Annual mean value; DMV: Daily mean value
LQP, LRP: Air quality plan; AP: Action plan
Report date: Dates are noted in parentheses if no report date is given in the plan and the date was taken from the properties of the pdf-document of the plan
Update: Plan is an update of a previous plan
Annul.: Plan is annulled by an update
n.s.: not specified

8.2 Source analysis – Data tables of selected AQP

As described in section 2.3, the 120 new or updated plans have been analysed in more detail. For these 120 AQP, exceedances of the limit values were identified and linked to source apportionment data as follows: if limit value exceedance and source apportionment data refer to the same monitoring station and reference year, the data was linked. If there were several such combinations for one location, the most recent was selected. If there was no exceedance in the reference year of the source apportionment, the apportionment data was not included. The Source apportionment data from these selected AQPs together with limit value exceedances are compiled in Table 26 to Table 29.

8.2.1 NO_2 - Spatial source analysis - Selected AQPs in Germany

Table 26: Spatial source contributions for NO_2, measurement data and reference years for the selection of new plans

ID_P	FS	Area	NO_2 AMV [µg/m³]	Ref. year	RB in %	UB in %	AC in %	Q	T	Monitoring station
207	BW	Freiburg	70	2010	13	27	60	2	V	Schwarzwaldstr.
209	BW	Heidelberg	56	2010	16	43	41	2	V	Mittermaierstr.
199	BW	Heidenheim/Brenz	53	2008	15	58	27	2	V	Wilhelmstr.
178	BW	Heilbronn	73	2010	12	34	54	2	V	Weinsberger Str. Ost
200	BW	Herrenberg	62	2010	15	42	43	2	V	Hindenburgstr.
201	BW	Ilsfeld	50	2008	16	46	38	2	V	König-Wilhelm-Str.
210	BW	Karlsruhe	45	2010	20	57	23	2	V	Karlsruhe-Straße
202	BW	Leonberg	70	2010	13	45	42	2	V	Grabenstr.
219	BW	Ludwigsburg	69	2010	13	37	50	2	V	Friedrichstr.
214	BW	Mannheim	50	2010	18	54	28	2	V	Mannheim-Straße
162	BW	Markgröningen	47	2008	17	55	28	2	V	Grabenstr.
211	BW	Mühlacker	62	2010	15	58	27	2	V	Stuttgarter Str.
212	BW	Pfinztal	52	2010	17	51	32	2	V	Pfinztal-Berghausen, Karlsruher Str.
213	BW	Pforzheim	52	2010	17	57	26	2	V	Jahnstr.
203-P	BW	Pleidelsheim	64	2008	13	40	47	2	V	Beihinger Str.
203-I	BW	Ingersheim	59	2008	14	41	45	2	V	Tiefengasse
203-F	BW	Freiberg/Neckar	54	2008	15	44	41	2	V	Benninger Str.
185	BW	Reutlingen	88	2010	10	30	60	2	V	Lederstr. Ost1.
208	BW	Schramberg	50	2008	16	40	44	2	V	Oberndorfer Str.
204	BW	Schwäbisch Gmünd	80	2010	11	34	55	2	V	Remsstr.
155	BW	Stuttgart	94	2010	10	31	59	2	V	Am Neckartor
206	BW	Tübingen	78	2010	12	34	54	2	V	Mühlstr.
216	BW	Ulm	60	2010	14	40	46	2	V	Zinglerstr.
205	BW	Urbach	45	2008	18	54	28	2	V	Hauptstr.
152	BW	Walzbachtal	58	2007	14	46	40	2	V	Walzbachtal-Jöhlingen, Bahnhofstr.
140	BY	Augsburg	59	2005	29	22	49	2	V	Karlstr.
159-S	BY	Starnberg	55	2007	31	15	54	2	V	Starnberg, Hauptstr.
164	BY	Nürnberg	53	2007	26	27	47	2	V	Von-der-Tann-Str.
172	BY	Oberaudorf (Inntalau-tobahn)	48	2008	29	6	65	2	V	Oberaudorf-Inntalautobahn
163	BY	Regensburg	45	2009	36	35	29	2	V	Rathaus
158	BY	Würzburg	45	2008	31	33	36	2	V	Stadtring Süd
217	BE	Berlin	56	2009	12	44	44	2	V	Silbersteinstr.
186	BB	Potsdam	46	2010	26	11	63	2	V	Zeppelinstr.
238	HB	Bremerhaven	47	2010	26	21	53	2	V	Cherbourger Str.
218	HH	Hamburg	66	2010	20	24	56	2	V	Stresemannstr.
171	HE	Darmstadt	75	2005	16	34	50	2	V	Hügelstr.
173	HE	Frankfurt/Main	63	2005	23	46	31	2	V	Friedberger Landstr.
179	HE	Kassel	54	2008	13	37	51	2	V	Fünffensterstr.
184-G	HE	Gießen	48	2008	15	46	39	2	V	Westanlage
242	NI	Bad Lauterberg	45	2010	12	6	82	X	V	Barbiser Str.
220	NI	Göttingen	41	2010	16	26	58	X	V	Bürgerstr.
221	NI	Hameln	49	2010	10	20	70	X	V	Deisterstr.
223	NI	Hildesheim	52	2010	11	20	69	X	V	Schuhstr.
224	NI	Oldenburg	41	2010	18	23	58	X	V	Nadorster Str.
225	NI	Osnabrück	50	2010	23	19	58	X	V	Schlosswall
150	NW	Bonn	66	2006	16	29	55	X	V	Reuterstr.

ID_P	FS	Area	NO_2 AMV [µg/m³]	Ref. year	RB in %	UB in %	AC in %	Q	T	Monitoring station
239	NW	Düren	74	2009	18	10	72	X	V	Euskirchener Str.
136	NW	Hagen	58	2002	32	7	61	2	V	Graf-von-Galen-Ring
226	NW	Hamm	47	2009	26	11	63	X	V	Münsterstr. 24
197	NW	Hürth	53	2008	34	22	44	X	V	Luxemburger Str.
233	NW	Kamen	48	2009	43	14	43	X	V	Bahnhofstr. 18
215	NW	Köln	66	2008	43	9	48	X	V	Clevischer Ring
234	NW	Langenfeld	48	2008	46	27	27	X	V	Schneiderstr.
236	NW	Mettmann	51	2009	43	3	54	X	V	Breite Str.
227	NW	Mönchengladbach	50	2009	27	7	66	X	V	Aachener Str.
146	NW	Münster	73	2006	25	20	55	2	V	Weseler Str.
154	NW	Neuss	52	2006	21	23	56	X	V	Friedrichstr. 40
133	NW	Overath	51	2006	30	14	56	2	V	Hauptstr. 55
175	NW	Paderborn	53	2006	29	22	49	X	V	Bahnhofstr. 11
235	NW	Remscheid	47	2009	36	0	64	X	V	Freiheitstr.
181-Ge	NW	Gelsenkirchen (Ruhrgebiet Nord)	51	2009	30	35	35	X	V	Kurt-Schumacher-Str.
181-Gl	NW	Gladbeck (Ruhrgebiet Nord)	48	2009	48	35	18	X	V	Grabenstr.
181-R	NW	Recklinghausen (Ruhrgebiet Nord)	48	2009	36	29	34	X	V	Bochumer Str.
182-D	NW	Dortmund (Ruhrgebiet Ost)	63	2009	30	20	50	X	V	Brackeler Str.
182-H	NW	Herne (Ruhrgebiet Ost)	55	2009	33	38	29	X	V	Recklinghauser Str.
183-D	NW	Duisburg (Ruhrgebiet West)	46	2009	32	43	25	X	V	Friedrich-Ebert-Str.
183-E	NW	Essen (Ruhrgebiet West)	58	2009	16	51	33	X	V	Hombrucher Str.
183-M	NW	Mühlheim (Ruhrgebiet West)	52	2009	37	31	32	X	V	Aktienstr.
183-O	NW	Oberhausen (Ruhrgebiet West)	57	2009	27	35	38	X	V	Mülheimer Str.
174	NW	Witten	46	2008	36	20	44	X	V	Ruhrstr.
240	NW	Wuppertal	57	2010	27	22	51	X	V	Gathe/Wilhelmstr.
145	RP	Koblenz	48	2007	27	31	42	2	V	Hohenfelderstr.
142	RP	Ludwigshafen	50	2007	21	39	40	2	V	Heinigstr.
230	RP	Mainz	56	2011	18	32	50	2	V	Parcusstr.
231	SL	Saarbrücken	44	2010	36	20	44	2	V	Saarbrücken-Verkehr
177	SN	Chemnitz	45	2010	22	11	67	X	V	Leipziger Str.
169	SN	Dresden	54	2009	15	14	71	X	V	Bergstr.
170	ST	Halle	58	2010	19	17	64	2	V	Paracelsusstr.
168	ST	Magdeburg	46	2010	24	26	50	2	V	Damaschkeplatz
137	SH	Kiel	62	2006	36	11	53	2	V	Bahnhofstr.
		Mean value	56		23	30	47			
		Max	94		48	58	82			
		Min	41		10	0	18			

FS: Federal state; AMV: Annual mean value; Ref. year: Reference year
RB: Regional background, UB: Urban background, AC: Additional concentration
Q: Source analysis: 2 – is based on NO_2, X – is based on NO_X
T: Type of monitoring station (V – Traffic-orientated site, I – industrial site)
Listed are AQPs published after 31.08.2008 where limit value exceedance and source apportionment data refer to the same monitoring station and reference year

8.2.2 NO_2 - Source groups analysis - Selected AQPs in Germany

Table 27: Contributions of pollution sources for NO_2, measurement data and reference years for the selection of new plans

ID_P	FS	Area	NO_2 JMW [µg/m³]	Ref. year	LRT in %	RT in %	Ind in %	DC in %	OT in %	OS in %	Rest in %	Q	T	Measuring station
207	BW	Freiburg	70	2010	13	70		13		4		2	V	Schwarzwaldstr.
209	BW	Heidelberg	56	2010	16	63		15		6		2	V	Mittermaierstr..
199	BW	Heidenheim/ Brenz	53	2008	15	43	11	13		18		2	V	Wilhelmstr.
178	BW	Heilbronn	73	2010	12	74		10		4		2	V	Weinsberger Str. Ost
200	BW	Herrenberg	62	2010	15	70		12		3		2	V	Hindenburgstr.
201	BW	Ilsfeld	50	2008	16	69		10		5		2	V	König-Wilhelm-Str.
210	BW	Karlsruhe	45	2010	20	57		16		7		2	V	Karlsruhe-Straße
202	BW	Leonberg	70	2010	13	66		19		2		2	V	Grabenstr.
219	BW	Ludwigsburg	69	2010	13	64		18		5		2	V	Friedrichstr.
214	BW	Mannheim	50	2010	18	53	4	10		15		2	V	Mannheim-Straße
162	BW	Markgröningen	47	2008	17	46		12		25		2	V	Grabenstr.
211	BW	Mühlacker	62	2010	15	42		32		11		2	V	Stuttgarter Str.
212	BW	Pfinztal	52	2010	17	53		18		12		2	V	Pfinztal-Berghausen, Karlsruher Str.
213	BW	Pforzheim	52	2010	17	49		19		15		2	V	Jahnstr.
203-P	BW	Pleidelsheim	64	2008	13	67		12		8		2	V	Beihinger Str.
203-I	BW	Ingersheim	59	2008	14	69		7		10		2	V	Tiefengasse
203-F	BW	Freiberg/Neckar	54	2008	15	69		7		9		2	V	Benninger Str.
185	BW	Reutlingen	88	2010	10	72		13		5		2	V	Lederstr. Ost.
208	BW	Schramberg	50	2008	16	55		18		11		2	V	Oberndorfer Str.
204	BW	Schwäbisch Gmünd	80	2010	11	65		20		4		2	V	Remsstr..
155	BW	Stuttgart	94	2010	10	78		10		2		2	V	Am Neckartor.
206	BW	Tübingen	78	2010	12	62		18		8		2	V	Mühlstr.
216	BW	Ulm	60	2010	14	63		14		9		2	V	Zinglerstr.
205	BW	Urbach	45	2008	18	56		10		16		2	V	Hauptstr.
152	BW	Walzbachtal	58	2007	14	52	2	13		19		2	V	Walzbachtal-Jöhlingen, Bahnhofstr.
140	BY	Augsburg	59	2005	29	54	7	7		3		2	V	Karlstr.
159-S	BY	Starnberg	55	2007	31	58	2	2		7		2	V	Starnberg, Hauptstr.
164	BY	Nürnberg	53	2007	26	58	4	4		8		2	V	Von-der-Tann-Str.
172	BY	Oberaudorf (Inntalautobahn)	48	2008	29	65	0	2		4		2	V	Oberaudorf-Inntal-autobahn
163	BY	Regensburg	45	2009	36	38	9	4		13		2	V	Rathaus
158	BY	Würzburg	45	2008	31	58	4	7				2	V	Stadtring Süd
217	BE	Berlin	56	2009	12	75	2	7	1	2	1	2	V	Silbersteinstr.
186	BB	Potsdam	46	2010	25.9	72	0.1	2				2	V	Zeppelinstr.
171	HE	Darmstadt	75	2005	16	73	3.6	7.3			0.1	2	V	Hügelstr.
173	HE	Frankfurt/Main	63	2005	23.3	62.6	2.9	11.2				2	V	Friedberger Landstr.
179	HE	Kassel	54	2008	12.6	73.5	1.9	6.9		5.2	-0.1	2	V	Fünffensterstr.
184-G	HE	Gießen	48	2008	15.1	66.5	3.2	7.5		7.6	0.1	2	V	Westanlage
220	NI	Göttingen	41	2010	16	79.4	0.8	3.9			-0.1	X	V	Bürgerstr.
221	NI	Hameln	49	2010	10	86.4	0.4	3.2				X	V	Deisterstr.
223	NI	Hildesheim	52	2010	11	83.8	0.4	4.8				X	V	Schuhstr.

ID_P	FS	Area	NO_2 JMW [µg/m³]	Ref. year	LRT in %	RT in %	Ind in %	DC in %	OT in %	OS in %	Rest in %	Q	T	Measuring station
224	NI	Oldenburg	41	2010	18.4	75.9	0.1	5.2	0.2		0.2	X	V	Nadorster Str.
225	NI	Osnabrück	50	2010	23	72	0.6	4.4				X	V	Schlosswall
150	NW	Bonn	66	2006	16	76		4	2	2		X	V	Reuterstr.
239	NW	Düren	74	2009	18	75	4	2		1		X	V	Euskirchener Str.
136	NW	Hagen	58	2002	32	61		2	4	1		2	V	Graf-von-Galen-Ring
226	NW	Hamm	47	2009	26	69	3	2				X	V	Münsterstr. 24
197	NW	Hürth	53	2008	34	50	8	3	2	3		X	V	Luxemburger Str.
233	NW	Kamen	48	2009	43	53	1	3				X	V	Bahnhofstr. 18
215	NW	Köln	66	2008	43	52	1	3		1		X	V	Clevischer Ring
234	NW	Langenfeld	48	2008	46	39	1	7	2	5		X	V	Schneiderstr.
236	NW	Mettmann	51	2009	43	54				3		X	V	Breite Str.
227	NW	Mönchengladbach	50	2009	27	66				7		X	V	Aachener Str.
146	NW	Münster	73	2006	25	65		4	1	5		2	V	Weseler Str.
154	NW	Neuss	52	2006	21	66	1	3	5	3	1	X	V	Friedrichstr. 40
133	NW	Overath	51	2006	30	56			2	12		2	V	Hauptstr. 55
175	NW	Paderborn	53	2006	29	57	1	5	3	5		X	V	Bahnhofstr. 11
235	NW	Remscheid	47	2009	36	64						X	V	Freiheitstr.
181-Ge	NW	Gelsenkirchen (Ruhrgebiet Nord)	51	2009	30	49	10.6	3.7	6.7			X	V	Kurt-Schumacher-Str.
181-Gl	NW	Gladbeck (Ruhrgebiet Nord)	48	2009	47.5	30.9	10.4	4.3	6.9			X	V	Grabenstr.
181-R	NW	Recklinghausen (Ruhrgebiet Nord)	48	2009	36.3	45.5	7.6	3.9	6.7			X	V	Bochumer Str.
182-D	NW	Dortmund (Ruhrgebiet Ost)	63	2009	30.3	61.1	3	2.4	3.2			X	V	Brackeler Str.
182-H	NW	Herne (Ruhrgebiet Ost)	55	2009	33	48.6	6.9	3.8	7.6		0.1	X	V	Recklinghauser Str.
183-D	NW	Duisburg (Ruhrgebiet West)	46	2009	32	40	14	3	11			X	V	Friedrich-Ebert-Str.
183-E	NW	Essen (Ruhrgebiet West)	58	2009	16	74	5	2	3			X	V	Hombrucher Str.
183-M	NW	Mühlheim (Ruhrgebiet West)	52	2009	37	43	8	4	8			X	V	Aktienstr.
183-O	NW	Oberhausen (Ruhrgebiet West)	57	2009	27	54.6	7.6	3.7	7.1			X	V	Mülheimer Str.
174	NW	Witten	46	2008	36	53	3	4		4		X	V	Ruhrstr.
240	NW	Wuppertal	57	2010	27	62		5		6		X	V	Gathe/Wilhelmstr.
177	SN	Chemnitz	45	2010	22	67	3	5	4		-1	X	V	Leipziger Str.
137	SH	Kiel	62	2006	35.5	64.5						2	V	Bahnhofstr.
		Mean value	56		23	61	4	8						
		Max	94		48	86	14	32						
		Min	41		10	31	0	2						

FS: Federal state; AMV: Annual mean value; Ref. year: Reference year
LRT: Long range transport, RT: Road traffic, Ind: Industrial sources, DC: Domestic combustion, OT: Other traffic (rail, water, air)
OS: Other Sources, Rest: Difference to 100%
Q: Source analysis: 2 – is based on NO_2, X – is based on NO_X
T: Type of monitoring station (V – Traffic-orientated site, I – industrial site)
Listed are AQPs published after 31.08.2008 where limit value exceedance and source apportionment data refer to the same monitoring station and reference year

8.2.3 PM10 - Spatial source analysis - Selected AQPs in Germany

Table 28: Spatial source contributions for PM10, measurement data and reference years for the selection of new plans

ID_P	FS	Area	# days > PM10 DMW	Ref. year	RB in %	UB in %	AC in %	T	Monitoring station
178	BW	Heilbronn	63	2010	36	37	27	V	Weinsberger Str. Ost
201	BW	Ilsfeld	43	2007	42	30	28	V	König-Wilhelm-Str.
202	BW	Leonberg	55	2010	37	35	28	V	Grabenstr.
219	BW	Ludwigsburg	52	2010	38	34	28	V	Friedrichstr.
162	BW	Markgröningen	43	2008	37	30	33	V	Grabenstr.
211	BW	Mühlacker	38	2010	45	45	10	V	Stuttgarter Str.
203-P	BW	Pleidelsheim	41	2008	40	31	29	V	Pleidelsheim, Beihinger Str.
203-F	BW	Freiberg/Neckar	55	2008	38	26	36	V	Freiberg a. N., Benninger Str.
185	BW	Reutlingen	82	2010	32	31	37	V	Lederstr. Ost
155	BW	Stuttgart	102	2010	30	25	45	V	Am Neckartor
206	BW	Tübingen	44	2010	43	34	23	V	Mühlstr.
216	BW	Ulm	44	2010	42	34	24	V	Zinglerstr.
232	BW	Wendlingen/Neckar	41	2010	43	44	13	V	Stuttgarter Str.
144	BY	Ansbach	41	2006	65	26	10	V	Residenzstr.
140	BY	Augsburg	61	2005	55	9	36	V	Karlstr.
165	BY	Lindau	43	2006	61	10	29	V	Holdereggenstr.
163	BY	Regensburg	61	2006	54	30	16	V	Rathaus
217	BE	Berlin	39	2009	66	17	17	V	Frankfurter Allee
196	BB	Cottbus	45	2010			32	V	Bahnhofstr.
186	BB	Potsdam	45	2010	63	3	34	V	Zeppelinstr.
134	NI	Göttingen	48	2006	66	26	8	V	Bürgerstr.
139	NI	Hildesheim	39	2005	60	7	33	V	Schuhstr.
147	NW	Grevenbroich	46	2006	69	6	25	I	Gustorf/Gindorf (GRGG)
161	NW	Krefeld	68	2008	65	16	17	I	Krefelder Hafen (KRHA)
182-D	NW	Dortmund (Ruhrgebiet Ost)	42	2009	69	9	22	V	Brackeler Str.
183-D	NW	Duisburg (Ruhrgebiet West)	42	2009	72	6	22	I	Bruckhausen, Kaiser-Wilhelm-Str.
183-E	NW	Essen (Ruhrgebiet West)	47	2009	58	17	25	V	Gladbecker Str.
230	RP	Mainz	37	2011	47	23	30	V	Parcusstr.
170	ST	Halle	57	2010	54	11	35	V	Paracelsusstr.
168	ST	Magdeburg	46	2010	61	9	30	V	Ernst-Reuter-Allee
229	ST	Wittenberg	67	2003	64	4	32	V	Dessauer Str.
		Mean value	51		52	22	26		
		Max	102		72	45	45		
		Min	37		30	3	8		

FS: Federal state;
days > PM10 DMW: Number of days with PM10-daily mean value > 50 µg/m³
Ref. year: Reference year
RB: Regional background, UB: Urban background, AC: Additional concentration
T: Type of monitoring station (V – Traffic-orientated site, I – industrial site)
Listed are AQPs published after 31.08.2008 where limit value exceedance and source apportionment data refer to the same monitoring station and reference year

8.2.4 PM10 - Source groups analysis - Selected AQPs in Germany

Table 29: Contributions of pollution sources for PM10, measurement data and reference years for the selection of new plans

ID_P	FS	Area	# days > PM10 DMW	Ref. year	LRT in %	RT in %	Ind in %	DC in %	OS in %	Son in %	Rest in %	T	Measuring station
178	BW	Heilbronn	63	2010	36	42	9	11		2		V	Weinsberger Str. Ost
201	BW	Ilsfeld	43	2007	42	45	4	5		4		V	König-Wilhelm-Str.
202	BW	Leonberg	55	2010	37	45	1	15		2		V	Grabenstr.
219	BW	Ludwigsburg	52	2010	38	40		17		5		V	Friedrichstr.
162	BW	Markgröningen	43	2008	37	41	6	10		6		V	Grabenstr.
211	BW	Mühlacker	38	2010	45	15	7	29		4		V	Stuttgarter Str.
203-P	BW	Pleidelsheim	41	2008	40	43	5	8		4		V	Pleidelsheim, Beihinger Str.
203-F	BW	Freiberg/Neckar	55	2008	38	51	1	6		4		V	Freiberg a. N., Benninger Str.
185	BW	Reutlingen	82	2010	32	48	2	15		3		V	Lederstr. Ost.
155	BW	Stuttgart	102	2010	30	53		15		2		V	Am Neckartor
206	BW	Tübingen	44	2010	43	34	2	19		2		V	Mühlstr.
216	BW	Ulm	44	2010	42	42	5	9		2		V	Zinglerstr.
232	BW	Wendlingen/ Neckar	41	2010	43	26	9	20		2		V	Stuttgarter Str.
144	BY	Ansbach	41	2006	64.5	11.3	3.2	3.2		17.7	0.1	V	Residenzstr.
140	BY	Augsburg	61	2005	55	37	1	3		4		V	Karlstr.
165	BY	Lindau	43	2006	61	32	2	3		2		V	Holdereggenstr.
163	BY	Regensburg	61	2006	54	21	3	3		19		V	Rathaus
217	BE	Berlin	39	2009	66	24	0.3	1	0.3	8	0.4	V	Frankfurter Allee
186	BB	Potsdam	45	2010	63.2	36.5	0.02	0.3			-0.02	V	Zeppelinstr.
134	NI	Göttingen	48	2006	66.3	32.9	0.4	0.4				V	Bürgerstr.
139	NI	Hildesheim	39	2005	59.9	39.3	0.1	0.7				V	Schuhstr.
147	NW	Grevenbroich	46	2006	69		30			1		I	Gustorf/Gindorf (GRGG)
161	NW	Krefeld	68	2008	65	17	18					I	Krefelder Hafen (KRHA)
182-D	NW	Dortmund (Ruhrgebiet Ost)	42	2009	69	27	2	1	1			V	Brackeler Str.
183-D	NW	Duisburg (Ruhrgebiet West)	42	2009	72	3	22				3	I	Bruckhausen, Kaiser-Wilhelm-Str.
183-E	NW	Essen (Ruhrgebiet West)	47	2009	58	33	7	1	1			V	Gladbecker Str.
		Mean value	51		51	34	6	9	1				
		Max	102		72	53	30	29	1				
		Min	38		30	3	0.02	0.3	0.3				

FS: Federal state;
days > PM10 DMW: Number of days with PM10-daily mean value > 50 µg/m³
Ref. year: Reference year
LRT: Long range transport, RT: Road traffic, Ind: Industrial sources, DC: Domestic combustion, OT: Other traffic (rail, water, air)
OS: Other Sources, Rest: Difference to 100%
T: Type of monitoring station (V – Traffic-orientated site, I – industrial site)
Listed are AQPs published after 31.08.2008 where limit value exceedance and source apportionment data refer to the same monitoring station and reference year

8.3 Bibliography of AQPs published in Germany up to 2012

Dates are noted in parentheses if no report date is given in the plan and the date was taken from the properties of the plan's pdf-document.

8.3.1 Baden-Württemberg

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RP Karlsruhe (2006): Teilplan Karlsruhe. Aktionsplan. Luftreinhalte- / Aktionsplan für den Regierungsbezirk Karlsruhe. Regierungspräsidium Karlsruhe. Stand: Januar 2008.

RP Karlsruhe (2006): Teilplan Karlsruhe. Luftreinhalte- / Aktionsplan für den Regierungsbezirk Karlsruhe. Regierungspräsidium Karlsruhe. Stand: March 2006.

RP Karlsruhe (2006): Teilplan Mannheim. Luftreinhalte- / Aktionsplan für den Regierungsbezirk Karlsruhe. Regierungspräsidium Karlsruhe. Stand: March 2006.

RP Karlsruhe (2006): Teilplan Mühlacker. Luftreinhalte- / Aktionsplan für den Regierungsbezirk Karlsruhe. Regierungspräsidium Karlsruhe. Stand: March 2006.

RP Karlsruhe (2006): Teilplan Pforzheim. Luftreinhalte- / Aktionsplan für den Regierungsbezirk Karlsruhe. Regierungspräsidium Karlsruhe. Stand: March 2006.

RP Karlsruhe (2008): Teilplan Mannheim. Geänderte Umweltzone. Luftreinhalte- / Aktionsplan für den Regierungsbezirk Karlsruhe. Regierungspräsidium Karlsruhe. Stand: Januar 2008.

RP Karlsruhe (2008): Teilplan Mühlacker. Aktionsplan. Luftreinhalte- / Aktionsplan für den Regierungsbezirk Karlsruhe. Regierungspräsidium Karlsruhe. Stand: September 2008.

RP Karlsruhe (2008): Teilplan Pfinztal. Luftreinhalte- / Aktionsplan für den Regierungsbezirk Karlsruhe. Regierungspräsidium Karlsruhe. Stand: November 2008.

RP Karlsruhe (2008): Teilplan Pforzheim. Aktionsplan. Luftreinhalte- / Aktionsplan für den Regierungsbezirk Karlsruhe. Regierungspräsidium Karlsruhe. Stand: Juni 2008.

RP Karlsruhe (2009): Teilplan Walzbachtal. Luftreinhalte- / Aktionsplan für den Regierungsbezirk Karlsruhe. Regierungspräsidium Karlsruhe. Stand: Oktober 2009.

RP Karlsruhe (2012): Fortschreibung Teilplan Heidelberg. Luftreinhalteplan für den Regierungsbezirk Karlsruhe. Regierungspräsidium Karlsruhe. Stand: Januar 2012.

RP Karlsruhe (2012): Fortschreibung Teilplan Karlsruhe. Luftreinhalteplan für den Regierungsbezirk Karlsruhe. Regierungspräsidium Karlsruhe. Stand: Januar 2012.

RP Karlsruhe (2012): Fortschreibung Teilplan Mannheim. Luftreinhalteplan für den Regierungsbezirk Karlsruhe. Regierungspräsidium Karlsruhe. Stand: Januar 2012.

RP Karlsruhe (2012): Fortschreibung Teilplan Mühlacker. Luftreinhalteplan für den Regierungsbezirk Karlsruhe. Regierungspräsidium Karlsruhe. Stand: Januar 2012.

RP Karlsruhe (2012): Fortschreibung Teilplan Pfinztal. Luftreinhalteplan für den Regierungsbezirk Karlsruhe. Regierungspräsidium Karlsruhe. Stand: Januar 2012.

RP Karlsruhe (2012): Fortschreibung Teilplan Pforzheim. Luftreinhalteplan für den Regierungsbezirk Karlsruhe. Regierungspräsidium Karlsruhe. Stand: Januar 2012.

RP Stuttgart (2005): Teilplan Landeshauptstadt Stuttgart. Luftreinhalte- / Aktionsplan für den Regierungsbezirk Stuttgart. Regierungspräsidium Stuttgart. Stand: Dezember 2005.

RP Stuttgart (2005): Teilplan Ludwigsburg. Luftreinhalte- / Aktionsplan für den Regierungsbezirk Stuttgart. Regierungspräsidium Stuttgart. Stand: Mai 2006.

RP Stuttgart (2005): Teilplan Pleidelsheim. Luftreinhalte- / Aktionsplan für den Regierungsbezirk Stuttgart. Regierungspräsidium Stuttgart. Stand: Februar 2006.

RP Stuttgart (2006): Teilplan Ilsfeld. Luftreinhalte- / Aktionsplan für den Regierungsbezirk Stuttgart. Regierungspräsidium Stuttgart. Stand: March 2006.

RP Stuttgart (2006): Teilplan Leonberg. Luftreinhalte- / Aktionsplan für den Regierungsbezirk Stuttgart. Regierungspräsidium Stuttgart. Stand: August 2006.

RP Stuttgart (2006): Teilplan Schwäbisch Gmünd. Luftreinhalte- / Aktionsplan für den Regierungsbezirk Stuttgart. Regierungspräsidium Stuttgart. Stand: Mai 2006.

RP Stuttgart (2008): Teilplan Heilbronn. Maßnahmenplan zur Minderung der PM10- und NO_2-Belastungen. Luftreinhalte- / Aktionsplan für den Regierungsbezirk Stuttgart. Regierungspräsidium Stuttgart. Stand: April 2008.

RP Stuttgart (2008): Teilplan Herrenberg. Maßnahmenplan zur Minderung der PM10- und NO_2-Belastungen. Luftreinhalte- / Aktionsplan für den Regierungsbezirk Stuttgart. Regierungspräsidium Stuttgart. Stand: Juni 2008.

RP Stuttgart (2010): Teilplan Landeshauptstadt Stuttgart. Fortschreibung des Aktionsplanes zur Minderung der PM10- und NO_2-Belastungen. Luftreinhalte- / Aktionsplan für den Regierungsbezirk Stuttgart. Regierungspräsidium Stuttgart. Stand: Februar 2010.

RP Stuttgart (2010): Teilplan Markgröningen. Maßnahmenplan zur Minderung der PM10- und NO_2-Belastungen. Luftreinhalteplan für den Regierungsbezirk Stuttgart. Regierungspräsidium Stuttgart. Stand: Oktober 2010.

RP Stuttgart (2011): Teilplan Heidenheim an der Brenz. Luftreinhalteplan für den Regierungsbezirk Stuttgart. Maßnahmenplan zur Minderung der NO_2-Belastung. Regierungspräsidium Stuttgart. Stand: November 2011.

RP Stuttgart (2011): Teilplan Heilbronn. Fortschreibung des Luftreinhalteplanes zur Minderung der PM10- und NO_2-Belastungen. Luftreinhalteplan für den Regierungsbezirk Stuttgart. Regierungspräsidium Stuttgart. Stand: August 2011.

RP Stuttgart (2011): Teilplan Ilsfeld. Fortschreibung des Luftreinhalteplanes zur Minderung der PM10- und NO_2-Belastungen. Luftreinhalteplan für den Regierungsbezirk Stuttgart. Regierungspräsidium Stuttgart. Stand: Oktober 2011.

RP Stuttgart (2011): Teilplan Leonberg. Fortschreibung des Luftreinhalteplanes zur Minderung der PM10- und NO_2-Belastungen. Luftreinhalteplan für den Regierungsbezirk Stuttgart. Regierungspräsidium Stuttgart. Stand: November 2011.

RP Stuttgart (2011): Teilplan Pleidelsheim - Ingersheim - Freiberg am Neckar. Maßnahmenplan zur Minderung der PM10- und NO_2-Belastungen. Luftreinhalteplan für den Regierungsbezirk Stuttgart. Regierungspräsidium Stuttgart. Stand: November 2011.

RP Stuttgart (2011): Teilplan Urbach. Luftreinhalteplan für den Regierungsbezirk Stuttgart. Maßnahmenplan zur Minderung der NO_2-Belastung. Regierungspräsidium Stuttgart. Stand: November 2011.

RP Stuttgart (2012): Teilplan Herrenberg. Fortschreibung des Luftreinhalteplanes zur Minderung der NO_2-Belastungen. Luftreinhalteplan für den Regierungsbezirk Stuttgart. Regierungspräsidium Stuttgart. Stand: April 2012.

RP Stuttgart (2012): Teilplan Ludwigsburg. Fortschreibung des Luftreinhalteplanes zur Minderung der PM10- und NO_2-Belastungen. Luftreinhalteplan für den Regierungsbezirk Stuttgart. Regierungspräsidium Stuttgart. Stand: Oktober 2012.

RP Stuttgart (2012): Teilplan Schwäbisch Gmünd. Fortschreibung des Luftreinhalteplanes zur Minderung der NO_2-Belastungen. Luftreinhalteplan für den Regierungsbezirk Stuttgart. Regierungspräsidium Stuttgart. Stand: Oktober 2012.

RP Stuttgart (2012): Teilplan Wendlingen am Neckar. Luftreinhalteplan für den Regierungsbezirk Stuttgart. Aufstellung eins Luftreinhalteplanes zur Minderung der PM10-Belastungen. Regierungspräsidium Stuttgart. Stand: November 2012.

RP Tübingen (2005): Städte Reutlingen und Tübingen. Luftreinhalteplan / Aktionsplan für den Regierungsbezirk Tübingen. Regierungspräsidium Tübingen. Stand: Dezember 2005.

RP Tübingen (2007): Städte Reutlingen und Tübingen. Planänderung Reutlingen. Luftreinhalteplan / Aktionsplan für den Regierungsbezirk Tübingen. Regierungspräsidium Tübingen. Stand: November 2007.

RP Tübingen (2008): Stadt Ulm. Grundlagenteil und Maßnahmenteil. Luftreinhalteplan / Aktionsplan für den Regierungsbezirk Tübingen. Regierungspräsidium Tübingen. Stand: Mai 2008.

RP Tübingen (2012): 1. Fortschreibung Teilplan Stadt Tübingen. Luftreinhalteplan für den Regierungsbezirk Tübingen. Regierungspräsidium Tübingen. Stand: March 2012.

RP Tübingen (2012): 2. Fortschreibung Teilplan Stadt Reutlingen. Luftreinhalteplan für den Regierungsbezirk Tübingen. Regierungspräsidium Tübingen. Stand: March 2012.

RP Tübingen (2012): Teilplan Stadt Ulm. 1. Fortschreibung. Luftreinhalteplan für den Regierungsbezirk Tübingen. Regierungspräsidium Tübingen. Stand: November 2012.

8.3.2 Bavaria

Nürnberg (2006): Einführung von Fahrverboten in der Umweltzone Nürnberg. 1. Maßnahmenfortschreibung der Stadt Nürnberg. Stadtrat Nürnberg. Stand: 11.10.2006.

Nürnberg (2007): Aussetzung Umweltzone Nürnberg. 2. Maßnahmenfortschreibung der Stadt Nürnberg. Stadtrat Nürnberg, Umweltausschuss. Stand: 07.02.2007.

Reg Niederbayern (2006): Fortschreibung 2006. Luftreinhalte- / Aktionsplan Passau. Erarbeitet von der Regierung von Niederbayern in Zusammenarbeit mit der Stadt Passau. Stand: Dezember 2006.

Reg Unterfranken (2006): Maßnahmenplan zur langfristigen Einhaltung der Immissionsgrenzwerte der 22. BImSchV in der Stadt Aschaffenburg. Erarbeitet von der Regierung von Unterfranken in Zusammenarbeit mit der Stadt Aschaffenburg. Stand: Juli 2006.

Regensburg (2008): Maßnahmenkatalog der Stadt Regensburg vom March 2008 für den Luftreinhalte-/ Aktionsplan (LRP). Luftreinhalte-/Aktionsplan für das Gebiet der Stadt Regensburg. Stadt Regensburg. Stand: March 2008.

STMUG Bayern (2009): 1. Fortschreibung des Luftreinhalte- / Aktionsplanes für die Stadt Ansbach. Bayerisches Staatsministerium für Umwelt und Gesundheit. Erarbeitet von der Regierung von Mittelfranken; Umweltamt Stadt Ansbach. Stand: Mai 2009.

STMUG Bayern (2009): Luftreinhalte- / Aktionsplan für die Stadt Neu-Ulm. Bayerisches Staatsministerium für Umwelt und Gesundheit. Erarbeitet von der Regierung von Schwaben. Stand: Juni 2009.

STMUG Bayern (2009): Luftreinhalte-/Aktionsplan für die Stadt Augsburg mit Einbeziehung der Umlandgemeinden. 1. Fortschreibung. Bayerisches Staatsministerium für Umwelt und Gesundheit. Erarbeitet von der Regierung von Schwaben. Stand: March 2009.

STMUG Bayern (2010): 1. Fortschreibung des Luftreinhalteplans für den Ballungsraum Nürnberg - Fürth - Erlangen für das Stadtgebiet der Stadt Nürnberg. Bayerisches Staatsministerium für Umwelt und Gesundheit. Erarbeitet von der Regierung von Mittelfranken. Stand: Dezember 2010.

STMUG Bayern (2010): 1. Fortschreibung. Luftreinhalteplan für das Gebiet der Stadt Regensburg. Bayerisches Staatsministerium für Umwelt und Gesundheit. Erarbeitet von der Regierung der Oberpfalz. Stand: Dezember 2010.

STMUG Bayern (2010): 1. Fortschreibung. Luftreinhalteplan für die Stadt Würzburg. Bayerisches Staatsministerium für Umwelt und Gesundheit. Erarbeitet von der Regierung von Unterfranken. Stand: Dezember 2010.

STMUG Bayern (2010): 1. Fortschreibung. Luftreinhalteplan für die Stadt Lindau (Bodensee). Bayerisches Staatsministerium für Umwelt und Gesundheit. Erarbeitet von der Regierung von Schwaben. Stand: Dezember 2010.

STMUG Bayern (2010): 4. Fortschreibung. Luftreinhalteplan für die Stadt München. Bayerisches Staatsministerium für Umwelt und Gesundheit. Erarbeitet von der Regierung von Oberbayern. Stand: September 2010.

STMUG Bayern (2011): Luftreinhalteplan für die Inntalautobahn - Streckenabschnitt Oberaudorf. Bayerisches Staatsministerium für Umwelt und Gesundheit. Erarbeitet von der Regierung von Oberbayern. Stand: Dezember 2011.

STMUG Bayern (2012): 3. Fortschreibung - Kooperation für gute Luft. Luftreinhalteplan für die Stadt München unter Beteiligung des Umlandes. Bayerisches Staatsministerium für Umwelt und Gesundheit. Erarbeitet von der Regierung von Oberbayern. Stand: April 2012.

STMUGV Bayern (2004): Luftreinhalteplan für den Ballungsraum Nürnberg - Fürth - Erlangen. Vollzug der 22. BImSchV. Bayerisches Staatsministerium für Umwelt, Gesundheit und Verbraucherschutz. Erarbeitet von der Regierung von Mittelfranken. Stand: Oktober 2004.

STMUGV Bayern (2004): Luftreinhalteplan für die Stadt Ansbach. Vollzug der 22. BImSchV. Bayerisches Staatsministerium für Umwelt, Gesundheit und Verbraucherschutz. Erarbeitet von der Regierung von Mittelfranken. Stand: 22.10.2004.

STMUGV Bayern (2004): Luftreinhalteplan für die Stadt München. Bayerisches Staatsministerium für Umwelt, Gesundheit und Verbraucherschutz. Erarbeitet von der Regierung von Oberbayern. Stand: September 2004.

STMUGV Bayern (2004): Luftreinhalteplan für die Stadt Passau. Bayerisches Staatsministerium für Umwelt, Gesundheit und Verbraucherschutz. Erarbeitet von der Regierung von Niederbayern. Stand: (21.12.2004).

STMUGV Bayern (2004): Luftreinhalteplan für die Stadt Würzburg. Bayerisches Staatsministerium für Umwelt, Gesundheit und Verbraucherschutz. Erarbeitet von der Regierung von Unterfranken. Stand: (21.12.2004).

STMUGV Bayern (2005): Luftreinhalte- / Aktionsplan für die Stadt Lindau (Bodensee). Bayerisches Staatsministerium für Umwelt, Gesundheit und Verbraucherschutz. Erarbeitet von der Regierung von Schwaben. Stand: Dezember 2005.

STMUGV Bayern (2005): Luftreinhalteplan für die Stadt Arzberg. Bayerisches Staatsministerium für Umwelt, Gesundheit und Verbraucherschutz. Erarbeitet von der Regierung von Oberfranken. Stand: (24.03.2005).

STMUGV Bayern (2005): Luftreinhalteplan für die Stadt Augsburg. Bayerisches Staatsministerium für Umwelt, Gesundheit und Verbraucherschutz. Erarbeitet von der Regierung von Schwaben. Stand: (24.03.2005).

STMUGV Bayern (2005): Luftreinhalteplan für die Stadt Regensburg. Bayerisches Staatsministerium für Umwelt, Gesundheit und Verbraucherschutz. Erarbeitet von der Regierung der Oberpfalz. Stand: (25.01.2005).

STMUGV Bayern (2005): Luftreinhalteplan für die Stadt Schwandorf. Bayerisches Staatsministerium für Umwelt, Gesundheit und Verbraucherschutz. Erarbeitet von der Regierung der Oberpfalz. Stand: (25.01.2005).

STMUGV Bayern (2005): Luftreinhalteplan für die Stadt Weiden in der Oberpfalz. Bayerisches Staatsministerium für Umwelt, Gesundheit und Verbraucherschutz. Erarbeitet von der Regierung von der Oberpfalz. Stand: (25.01.2005).

STMUGV Bayern (2007): 1. Fortschreibung Luftreinhalte- / Aktionsplan für die Stadt München. Bayerisches Staatsministerium für Umwelt, Gesundheit und Verbraucherschutz. Erarbeitet von der Regierung von Oberbayern. Stand: Oktober 2007.

STMUGV Bayern (2007): Luftreinhalte- / Aktionsplan für die Stadt Burghausen. Bayerisches Staatsministerium für Umwelt, Gesundheit und Verbraucherschutz. Erarbeitet von der Regierung von Oberbayern. Stand: Dezember 2007.

STMUGV Bayern (2007): Luftreinhalte- / Aktionsplan für die Stadt Ingolstadt. Bayerisches Staatsministerium für Umwelt, Gesundheit und Verbraucherschutz. Erarbeitet von der Regierung von Oberbayern. Stand: Oktober 2007.

STMUGV Bayern (2007): Luftreinhalte- / Aktionsplan für die Stadt Bayreuth. Bayerisches Staatsministerium für Umwelt, Gesundheit und Verbraucherschutz. Erarbeitet von der Regierung von Oberfranken. Stand: March 2007.

STMUGV Bayern (2007): Luftreinhalte- / Aktionsplan Landshut. Bayerisches Staatsministerium für Umwelt, Gesundheit und Verbraucherschutz. Erarbeitet von der Regierung von Niederbayern. Stand: 31.10.2007.

STMUGV Bayern (2008): 2. Fortschreibung Luftreinhalte- / Aktionsplan für die Stadt München. Bayerisches Staatsministerium für Umwelt, Gesundheit und Verbraucherschutz. Erarbeitet von der Regierung von Oberbayern. Stand: August 2008.

8.3.3 Berlin

Senat Berlin (2005): Luftreinhalte- und Aktionsplan für Berlin 2005 - 2010. Senatsverwaltung für Stadtentwicklung Berlin. Stand: August 2005.

Senat Berlin (2007): Anpassung des Aktionsplanes Berlin an die 35. Verordnung zur Durchführung des Bundes-Immissionsschutzgesetzes zur Einführung einer Umweltzone in Berlin gemäß Beschluss des Berliner Senats vom 20.03.2007. Senatsverwaltung für Stadtentwicklung Berlin. Stand: 20.03.2007.

Senat Berlin (2012): Luftreinhalteplan 2011 bis 2017 für Berlin. Entwurf. Senatsverwaltung für Stadtentwicklung und Umwelt Berlin. Stand: (25.04.2012).

8.3.4 Brandenburg

MLUR Brandenburg (2004): Luftreinhalteplan für die Stadt Nauen. Auftraggeber: Ministerium für Landwirtschaft, Umweltschutz und Raumordnung des Landes Brandenburg. Erarbeitet durch das Landesumweltamt Brandenburg. Stand: 27.07.2004.

MLUV Brandenburg (2005): Modellprojekt Fontanestadt Neuruppin. Kombinierte Lärmminderungs- / Luftreinhalteplanung im Land Brandenburg. Ministerium für Ländliche Entwicklung, Umwelt und Verbraucherschutz (MLUV) des Landes Brandenburg. Stand: August 2005.

MLUV Brandenburg (2006): Luftreinhalte- und Aktionsplan für die Stadt Cottbus gem. § 47 Abs. 1 BImSchG und 22. BImSchV. Ministerium für Ländliche Entwicklung, Umwelt und Verbraucherschutz (MLUV) des Landes Brandenburg. Stand: August 2006.

MLUV Brandenburg (2006): Luftreinhalteplan / Aktionsplan für die Stadt Eberswalde. Ministerium für Ländliche Entwicklung, Umwelt und Verbraucherschutz (MLUV) des Landes Brandenburg. Stand: 21.12.2006.

MLUV Brandenburg (2006): Luftreinhalteplan Frankfurt (Oder). Ministerium für Ländliche Entwicklung, Umwelt und Verbraucherschutz (MLUV) des Landes Brandenburg. Stand: September 2006.

MLUV Brandenburg (2007): Aktionsplan zur Luftreinhaltung Brandenburg an der Havel. Ministerium für Ländliche Entwicklung, Umwelt und Verbraucherschutz (MLUV) des Landes Brandenburg. Stand: Januar 2007.

MLUV Brandenburg (2007): Luftreinhalte- und Aktionsplan für die Landeshauptstadt Potsdam nach § 47 BImSchG. Stadt- und verkehrsplanerische Lösungen, immissionsschutzseitige Beurteilung und Vorbereitung von Maßnahmen. Ministerium für Ländliche Entwicklung, Umwelt und Verbraucherschutz (MLUV) des Landes Brandenburg. Stand: 09.11.2007.

MLUV Brandenburg (2007): Luftreinhalteplan für die Stadt Bernau bei Berlin. Auftraggeber: Ministerium für Ländliche Entwicklung, Umwelt und Verbraucherschutz (MLUV) des Landes Brandenburg. Stand: (10.07.2007).

MUGV Brandenburg (2011): Luftreinhalteplan Cottbus Fortschreibung 2011. Ministerium für Umwelt, Gesundheit und Verbraucherschutz (MUGV) des Landes Brandenburg. Stand: 20.10.2011.

Potsdam (2012): Luftreinhalte- und Qualitätsplan für die Landeshauptstadt Potsdam. Fortschreibung 2010-2015. Hrsg.: Landeshauptstadt Potsdam. Auftraggeber: Ministerium für Umwelt, Gesundheit und Verbraucherschutz (MUGV) des Landes Brandenburg. Stand: Juni 2012.

Teltow (2006): Lärmminderungs- und Luftreinhalteplanung Teltow. Auftraggeber: Stadt Teltow. Stand: Februar 2006.

8.3.5 Bremen

Senat Bremen (2005): Aktionsplan zur Verminderung der Feinstaubbelastung für den Bereich Dobbenweg / Bismarckstraße. Senator für Bau, Umwelt und Verkehr Bremen. Stand: 13.10.2005.

Senat Bremen (2005): Aktionsplan zur Verminderung der Feinstaubbelastung für den Bereich der Neuenlander Straße. Senator für Bau, Umwelt und Verkehr Bremen. Stand: (16.11.2005).

Senat Bremen (2006): Luftreinhalte- und Aktionsplan Bremen. Senator für Bau, Umwelt und Verkehr Bremen. Stand: 14.08.2006.

Senat Bremen (2008): Einrichtung einer Umweltzone. Senatsbeschluss vom 17.06.08. Senat der Freien Hansestadt Bremen. Stand: 17.06.2008.

Stadt Bremerhaven (2012): Luftreinhalte- und Aktionsplan Bremerhaven entsprechend § 47 BImSchG. Magistrat der Stadt Bremerhaven. Stand: Februar 2012.

8.3.6 Hamburg

Hamburg (2004): Luftreinhalteplan für die Freie und Hansestadt Hamburg. Freie und Hansestadt Hamburg, Behörde für Stadtentwicklung und Umwelt. Stand: Oktober 2004.

Hamburg (2005): Aktionsplan gegen Belastungen durch Feinstaub Hamburg / Habichtstraße. Freie und Hansestadt Hamburg, Behörde für Stadtentwicklung und Umwelt. Stand: Dezember 2005.

Hamburg (2012): Luftreinhalteplan für Hamburg. 1. Fortschreibung 2012. Entwurf. Freie und Hansestadt Hamburg, Behörde für Stadtentwicklung und Umwelt. Stand: 28.09.2012.

8.3.7 Hesse

HMUELV (2009): Luftreinhalteplan Marburg. Hessisches Ministerium für Umwelt, Energie, Landwirtschaft und Verbraucherschutz (HMUELV). Stand: Februar 2009.

HMUELV (2010): Luftreinhalteplan Fulda. Hessisches Ministerium für Umwelt, Energie, Landwirtschaft und Verbraucherschutz (HMUELV). Stand: (07.07.2010).

HMUELV (2011): 1. Fortschreibung. Luftreinhalteplan für das Gebiet Lahn-Dill. Gießen / Wetzlar. Hessisches Ministerium für Umwelt, Energie, Landwirtschaft und Verbraucherschutz (HMUELV). Stand: Oktober 2011.

HMUELV (2011): 1. Fortschreibung. Luftreinhalteplan für den Ballungsraum Rhein-Main. Teilplan Darmstadt. Hessisches Ministerium für Umwelt, Energie, Landwirtschaft und Verbraucherschutz (HMUELV). Stand: Februar 2011.

HMUELV (2011): 1. Fortschreibung. Luftreinhalteplan für den Ballungsraum Rhein-Main. Teilplan Frankfurt am Main. Hessisches Ministerium für Umwelt, Energie, Landwirtschaft und Verbraucherschutz (HMUELV). Stand: Oktober 2011.

HMUELV (2011): 1. Fortschreibung. Luftreinhalteplan für den Ballungsraum Kassel. Hessisches Ministerium für Umwelt, Energie, Landwirtschaft und Verbraucherschutz (HMUELV). Stand: August 2011.

HMUELV (2011): 1. Fortschreibung. Luftreinhalteplan für den Ballungsraum Rhein-Main. Teilplan Neu-Isenburg. Hessisches Ministerium für Umwelt, Energie, Landwirtschaft und Verbraucherschutz (HMUELV). Stand: August 2011.

HMUELV (2011): 1. Fortschreibung. Luftreinhalteplan für den Ballungsraum Rhein-Main. Teilplan Offenbach. Entwurf. Hessisches Ministerium für Umwelt, Energie, Landwirtschaft und Verbraucherschutz (HMUELV). Stand: August 2011.

HMUELV (2011): Luftreinhalteplan Reinheim. Hessisches Ministerium für Umwelt, Energie, Landwirtschaft und Verbraucherschutz (HMUELV). Stand: March 2011.

HMUELV (2012): 1. Fortschreibung. Luftreinhalteplan für den Ballungsraum Rhein-Main. Teilplan Wiesbaden. Hessisches Ministerium für Umwelt, Energie, Landwirtschaft und Verbraucherschutz (HMUELV). Stand: November 2012.

HMUELV (2012): Luftreinhalteplan Limburg. Hessisches Ministerium für Umwelt, Energie, Landwirtschaft und Verbraucherschutz (HMUELV). Stand: March 2012.

HMULV (2005): Aktionsplan Darmstadt 2005. Hessisches Ministerium für Umwelt, ländlichen Raum und Verbraucherschutz. Stand: November 2005.

HMULV (2005): Aktionsplan Frankfurt am Main 2005. Hessisches Ministerium für Umwelt, ländlichen Raum und Verbraucherschutz. Stand: Oktober 2005.

HMULV (2005): Luftreinhalteplan für den Ballungsraum Rhein-Main. Hessisches Ministerium für Umwelt, ländlichen Raum und Verbraucherschutz. Stand: (03.05.2005).

HMULV (2006): Luftreinhalte- und Aktionsplan für den Ballungsraum Kassel. Hessisches Ministerium für Umwelt, ländlichen Raum und Verbraucherschutz (HMULV). Stand: (04.07.2006).

HMULV (2007): Aktionsplan Darmstadt 2007. Hessisches Ministerium für Umwelt, ländlichen Raum und Verbraucherschutz. Stand: November 2007.

HMULV (2007): Luftreinhalteplan für das Gebiet Lahn-Dill. Hessisches Ministerium für Umwelt, ländlichen Raum und Verbraucherschutz. Stand: November 2007.

HMULV (2008): Aktionsplan Frankfurt am Main 2008. Hessisches Ministerium für Umwelt, ländlichen Raum und Verbraucherschutz. Stand: August 2008.

8.3.8 Lower Saxony

Braunschweig (2007): Fortschreibung. Luftreinhalteplan Braunschweig. Entwurf. Stadt Braunschweig. Stand: 15.06.07.

Braunschweig (2007): Luftreinhalte- und Aktionsplan Braunschweig. Stadt Braunschweig. Erarbeitet durch das Niedersächsische Umweltministerium. Stand: Mai 2007.

Braunschweig (2008): Vorgezogene Umsetzung von Einzelmaßnahmen - Fortschreibung Luftreinhalteplan. Stadt Braunschweig. Stand: 21.01.2008.

Göttingen (2008): Luftreinhalteplan Stadt Göttingen. Stadt Göttingen. Stand: Dezember 2008.

Göttingen (2011): Aktualisierung 2011. Stadt Göttingen - Luftreinhalteplan 2008. Stadt Göttingen. Stand: Juni 2011.

Hameln (2010): Luftreinhalteplan Stadt Hameln. Stand: September 2010.

Hameln (2011): Aktualisierung 2011. Luftreinhalteplan Stadt Hameln. Stadt Hameln. Stand: Mai 2011.

Hannover (2007): Luftreinhalte-Aktionsplan Hannover. Ratsbeschluss vom 12. Juli 2007. Stadt Hannover. Stand: 12.07.2007.

Hannover (2011): Luftqualitätsplan Hannover. Ergänzende Informationen zum Luftreinhalte-Aktionsplan vom 12. Juli 2007 und zum Antrag auf Fristverlängerung. Stadt Hannover. Stand: 30. Mai 2011.

Hildesheim (2008): Luftreinhalteplan für das Stadtgebiet Hildesheim. Stadt Hildesheim. Stand: 27.11.2008.

Hildesheim (2012): 1. Fortschreibung. Luftreinhalteplan Stadt Hildesheim. Stadt Hildesheim. Stand: April 2012.

Landkreis Osterode (2009): Luftreinhalte- und Aktionsplan Bad Lauterberg - Ortsteile Barbis und Osterhagen. Auftraggeber: Landkreis Osterode. Stand: 30.10.2009.

Landkreis Osterode (2011): 1. Fortschreibung des Luftreinhalteplanes für die Ortsteile Barbis und Osterhagen der Stadt Bad Lauterberg im Harz. Erarbeitet durch den Landkreis Osterode am Harz. Stand: Mai 2011.

Oldenburg (2012): Luftreinhalteplan für die Stadt Oldenburg. Stadt Oldenburg. Stand: September 2012.

Osnabrück (2008): Luftreinhalte- und Aktionsplan Stadt Osnabrück. Auftraggeber: Stadt Osnabrück. Stand: 09.12.2008.

Osnabrück (2011): Ergänzung 2011. Luftreinhalte- und Aktionsplan Stadt Osnabrück 2008. Stadt Osnabrück. Stand: Mai 2011.

UM Niedersachsen (2006): Aktionsplan gemäß § 47 Abs. 2 Bundes-Immissionsschutzgesetz zur Reduzierung der Feinstaubbelastung in der Stadt Burgdorf. Niedersächsisches Umweltministerium. Stand: Dezember 2006.

8.3.9 Mecklenburg-Western Pomerania

MWAT MV (2008): Luftreinhalte- und Aktionsplan für die Hansestadt Rostock. Ministerium für Wirtschaft, Arbeit und Tourismus Mecklenburg-Vorpommern. Stand: Oktober 2008.

8.3.10 North Rhine-Westphalia

BezReg Arnsberg (2004): Luftreinhalteplan für den Bereich Hagen Innenstadt. Bezirksregierung Arnsberg. Stand: (22.10.2004).

BezReg Arnsberg (2005): Aktionsplan Dortmund Brackeler Straße. Bezirksregierung Arnsberg. Stand: Juni 2005.

BezReg Arnsberg (2005): Luftreinhalteplan Hagen Innenstadt. 1. Fortschreibung und Aktionsplan Innenstadtring. Bezirksregierung Arnsberg. Stand: Oktober 2005.

BezReg Arnsberg (2006): Aktionsplan Dortmund Steinstraße. Bezirksregierung Arnsberg. Stand: Mai 2006.

BezReg Arnsberg (2007): Aktionsplan Erwitte - Soester Straße. Bezirksregierung Arnsberg. Stand: Juli 2007.

BezReg Arnsberg (2007): Aktionsplan Warstein 2006 - Rangetriftweg. Bezirksregierung Arnsberg. Stand: Mai 2007.

BezReg Arnsberg (2008): Luftreinhalteplan Dortmund 2006. Bezirksregierung Arnsberg. Stand: Januar 2008.

BezReg Arnsberg (2008): Teilplan "Ruhrgebiet Ost". Luftreinhalteplan Ruhrgebiet. Bezirksregierung Arnsberg. Stand: (01.08.2008).

BezReg Arnsberg (2009): Luftreinhalteplan Hagen 2008. Bezirksregierung Arnsberg. Stand: Januar 2009.

BezReg Arnsberg (2009): Luftreinhalteplan Siegen 2008. Bezirksregierung Arnsberg. Stand: Januar 2009.

BezReg Arnsberg (2010): Luftreinhalteplan Witten 2010. Bezirksregierung Arnsberg. Stand: Dezember 2010.

BezReg Arnsberg (2011): Teilplan "Ruhrgebiet Ost". Fortschreibung Luftreinhalteplan Ruhrgebiet. Bezirksregierung Arnsberg. Stand: (21.09.2011).

BezReg Arnsberg (2012): Luftreinhalteplan Hamm 2012. Bezirksregierung Arnsberg. Stand: Oktober 2012.

BezReg Arnsberg (2012): Luftreinhalteplan Kamen 2012. Entwurf. Bezirksregierung Arnsberg. Stand: (13.09.2012).

BezReg Detmold (2011): Luftreinhalteplan für das Gebiet der Stadt Paderborn. Bezirksregierung Detmold. Stand: (28.06.2011).

BezReg Düsseldorf (2004): Luftreinhalteplan Duisburg - Nord. Bezirksregierung Düsseldorf. Stand: (09.11.2004).

BezReg Düsseldorf (2004): Luftreinhalteplan Düsseldorf - Südliche Innenstadt. Bezirksregierung Düsseldorf. Stand: 11.10.2004.

BezReg Düsseldorf (2005): Aktionsplan Duisburg - Nord. Bezirksregierung Düsseldorf. Stand: 01.08.2005.

BezReg Düsseldorf (2005): Aktionsplan Düsseldorf - Ludenberger Straße. Bezirksregierung Düsseldorf. Stand: 21.10.2005.

BezReg Düsseldorf (2005): Aktionsplan Düsseldorf - Südliche Innenstadt. Bezirksregierung Düsseldorf. Stand: 01.06.2005.

BezReg Düsseldorf (2005): Aktionsplan Essen - Gladbecker Straße. Bezirksregierung Düsseldorf. Stand: 16.06.2005.

BezReg Düsseldorf (2005): Aktionsplan Essen - Hombrucher Straße. Bezirksregierung Düsseldorf. Stand: 22.11.2005.

BezReg Düsseldorf (2005): Aktionsplan Krefeld - Hafen. Bezirksregierung Düsseldorf. Stand: (29.08.2005).

BezReg Düsseldorf (2005): Aktionsplan Wuppertal - Barmen Steinweg. Bezirksregierung Düsseldorf. Stand: 05.07.2005.

BezReg Düsseldorf (2005): Fortschreibung des Luftreinhalteplanes Düsseldorf - Südliche Innenstadt. Bezirksregierung Düsseldorf. Stand: 21.10.2005.

BezReg Düsseldorf (2006): Aktionsplan Grevenbroich. Bezirksregierung Düsseldorf. Stand: 15.10.2006.

BezReg Düsseldorf (2006): Aktionsplan Mülheim Aktienstraße. Bezirksregierung Düsseldorf. Stand: 31.07.2006.

BezReg Düsseldorf (2006): Aktionsplan Neuss - Friedrichstraße. Bezirksregierung Düsseldorf. Stand: 01.10.2006.

BezReg Düsseldorf (2006): Aktionsplan Oberhausen - Mülheimer Straße. Bezirksregierung Düsseldorf. Stand: 05.04.2006.

BezReg Düsseldorf (2006): Luftreinhalteplan der Bezirksregierung Düsseldorf für Duisburg – Nord II. Bezirksregierung Düsseldorf. Stand: (27.01.2006).

BezReg Düsseldorf (2006): Luftreinhalteplan der Bezirksregierung Düsseldorf für Krefeld Hafen. Bezirksregierung Düsseldorf. Stand: (27.01.2006).

BezReg Düsseldorf (2008): Luftreinhalteplan Düsseldorf. Bezirksregierung Düsseldorf. Stand: 01.11.2008.

BezReg Düsseldorf (2008): Luftreinhalteplan Wuppertal. Bezirksregierung Düsseldorf. Stand: 01.11.2008.

BezReg Düsseldorf (2008): Teilplan "Ruhrgebiet West". Luftreinhalteplan Ruhrgebiet. Bezirksregierung Düsseldorf. Stand: (31.07.2008).

BezReg Düsseldorf (2009): Luftreinhalteplan Grevenbroich. Bezirksregierung Düsseldorf. Stand: 01.04.2009.

BezReg Düsseldorf (2009): Luftreinhalteplan Neuss. Bezirksregierung Düsseldorf. Stand: 30.11.2009.

BezReg Düsseldorf (2010): Luftreinhalteplan Krefeld. Bezirksregierung Düsseldorf. Stand: 30.09.2010.

BezReg Düsseldorf (2011): Luftreinhalteplan Dinslaken. Bezirksregierung Düsseldorf. Stand: 30.06.2011.

BezReg Düsseldorf (2011): Teilplan "Ruhrgebiet West". Fortschreibung Luftreinhalteplan Ruhrgebiet. Bezirksregierung Düsseldorf. Stand: 15.10.2011.

BezReg Düsseldorf (2012): Luftreinhalteplan Langenfeld. Bezirksregierung Düsseldorf. Stand: 24.08.2012.

BezReg Düsseldorf (2012): Luftreinhalteplan Mettmann. Bezirksregierung Düsseldorf. Stand: 30.11.2012.

BezReg Düsseldorf (2012): Luftreinhalteplan Mönchengladbach. Bezirksregierung Düsseldorf. Stand: 19.07.2012.

BezReg Düsseldorf (2012): Luftreinhalteplan Remscheid. Bezirksregierung Düsseldorf. Stand: 20.09.2012.

BezReg Düsseldorf (2012): Luftreinhalteplan Wuppertal 2013. Entwurf. Bezirksregierung Düsseldorf. Stand: 08.11.2012.

BezReg Köln (2005): Aktionsplan in der Umgebung des Tagebaus Hambach. Bezirksregierung Köln. Stand: 29.09.2005.

BezReg Köln (2006): Luftreinhalteplan der Bezirksregierung Köln für das Stadtgebiet Köln. Bezirksregierung Köln. Stand: (30.10.2006).

BezReg Köln (2008): Integrierter Luftreinhalte- und Aktionsplan der Bezirksregierung Köln für das Stadtgebiet Aachen vom 01.01.2009. Bezirksregierung Köln. Stand: 01.01.2009.

BezReg Köln (2009): Luftreinhalteplan der Bezirksregierung Köln für die Stadt Overath. Bezirksregierung Köln. Stand: 01.03.2009.

BezReg Köln (2009): Luftreinhalteplan für das Stadtgebiet Bonn. Bezirksregierung Köln. Stand: 01.10.2009.

BezReg Köln (2011): Luftreinhalteplan für das Stadtgebiet Hürth. Bezirksregierung Köln. Stand: 01.10.2011.

BezReg Köln (2012): Luftreinhalteplan für das Stadtgebiet Düren. Entwurf. Bezirksregierung Köln. Stand: August 2012.

BezReg Köln (2012): Luftreinhalteplan für das Stadtgebiet Köln. Erste Fortschreibung 2012. Bezirksregierung Köln. Stand: April 2012.

BezReg Köln (2012): Luftreinhalteplan Hambach. Entwurf. Bezirksregierung Köln. Stand: Oktober 2012.

BezReg Köln (2012): Stand der Umsetzung und Fortschreibung 2012. Luftreinhalteplan für das Stadtgebiet Bonn. Anlage zum Luftreinhalteplan Bonn 2009. Bezirksregierung Köln. Stand: Juni 2012.

BezReg Münster (2005): Luftreinhalteplan Castrop-Rauxel 2005 für die Gemengelage aus Wohn- und Industrienutzung im Bereich der Wartburg-/Juliusstraße im Stadtteil Rauxel der Stadt Castrop-Rauxel. Bezirksregierung Münster. Stand: (16.11.2005).

BezReg Münster (2008): Teilplan ''Ruhrgebiet Nord''. Luftreinhalteplan Ruhrgebiet. Bezirksregierung Münster. Stand: (25.07.2008).

BezReg Münster (2009): Luftqualitätsplan für das Stadtgebiet Münster. Endfassung nach Öffentlichkeitsbeteiligung. Bezirksregierung Münster. Stand: (31.03.2009).

BezReg Münster (2011): Teilplan ''Ruhrgebiet Nord''. Fortschreibung Luftreinhalteplan Ruhrgebiet. Bezirksregierung Münster. Stand: (10.10.2011).

8.3.11 Rhineland-Palatinate

LUWG (2005): Luftreinhalte- und Aktionsplan Ludwigshafen - Heinigstraße 2003 bis 2005. Feinstaubbelastung. Landesamt für Umwelt, Wasserwirtschaft und Gewerbeaufsicht (LUWG) Rheinland-Pfalz. Stand: August 2005.

LUWG (2005): Luftreinhalte- und Aktionsplan Mainz - Parcusstraße 2003 bis 2005. Feinstaubbelastung. Landesamt für Umwelt, Wasserwirtschaft und Gewerbeaufsicht (LUWG) Rheinland-Pfalz. Stand: September 2005.

LUWG (2006): Aktionsplan Neuwied. Reduzierung der Feinstaubbelastung. Landesamt für Umwelt, Wasserwirtschaft und Gewerbeaufsicht (LUWG) Rheinland-Pfalz. Stand: Juni 2006.

LUWG (2006): Aktionsplan Speyer. Reduzierung der Feinstaubbelastung. Landesamt für Umwelt, Wasserwirtschaft und Gewerbeaufsicht (LUWG) Rheinland-Pfalz. Stand: Dezember 2006.

LUWG (2006): Aktionsplan Trier. Reduzierung der Feinstaubbelastung. Landesamt für Umwelt, Wasserwirtschaft und Gewerbeaufsicht (LUWG) Rheinland-Pfalz. Stand: Juni 2006.

LUWG (2006): Aktionsplan Worms. Reduzierung der Feinstaubbelastung. Landesamt für Umwelt, Wasserwirtschaft und Gewerbeaufsicht (LUWG) Rheinland-Pfalz. Stand: Juli 2006.

LUWG (2007): Aktionsplan Pirmasens. Reduzierung der Feinstaubbelastung. Landesamt für Umwelt, Wasserwirtschaft und Gewerbeaufsicht (LUWG) Rheinland-Pfalz. Stand: Januar 2007.

LUWG (2008): Luftreinhalte- und Aktionsplan Ludwigshafen. Fortschreibung 2007-2015. Luftreinhalte- und Aktionsplan gemäß § 47 Abs. 1 und 2 Bundes-Immissionsschutzgesetz. Landesamt für Umwelt, Wasserwirtschaft und Gewerbeaufsicht (LUWG) Rheinland-Pfalz. Stand: Oktober 2008.

LUWG (2008): Luftreinhalte- und Aktionsplan Mainz. Fortschreibung 2005-2010. Luftreinhalte- und Aktionsplan gemäß § 47 Abs. 1 und 2 Bundes-Immissionsschutzgesetz. Landesamt für Umwelt, Wasserwirtschaft und Gewerbeaufsicht (LUWG) Rheinland-Pfalz. Stand: April 2008.

LUWG (2009): Luftqualitätsplan Koblenz 2008-2015. Reduzierung der Luftbelastung durch Stickstoffdioxid (NO_2) und Feinstaub. Landesamt für Umwelt, Wasserwirtschaft und Gewerbeaufsicht (LUWG) Rheinland-Pfalz. Stand: Mai 2009.

LUWG (2011): Luftreinhalteplan Mainz. Fortschreibung 2011-2015. LUWG-Bericht 4/2011. Landesamt für Umwelt, Wasserwirtschaft und Gewerbeaufsicht (LUWG) Rheinland-Pfalz. Stand: Dezember 2011.

Mainz (2012): Luftreinhalteplan Mainz. Fortschreibung 2011-2015. Anpassung PM10-Feinstaub. Stadt Mainz. Stand: Oktober 2012.

8.3.12 Saarland

MUV Saarland (2012): Luftreinhalteplan Saarbrücken. Stickstoffdioxid NO2. Entwurf. Ministerium für Umwelt und Verbraucherschutz des Saarlandes. Stand: Mai 2012.

8.3.13 Saxony

Chemnitz (2011): Luftreinhalteplan für die Stadt Chemnitz. 1. Fortschreibung 2011. Stadt Chemnitz. Stand: 29.04.2011.

Dresden (2011): Luftreinhalteplan für die Landeshauptstadt Dresden 2011. Stadt Dresden. Stand: 17.05.2011.

Leipzig (2009): Fortschreibung Luftreinhalteplan für die Stadt Leipzig. Stadt Leipzig, Amt für Umweltschutz. Stand: 18.12.2009.

LfUG Sachsen (2005): Luftreinhalteplan für die Stadt Leipzig. Sächsisches Landesamt für Umwelt und Geologie (LfUG). Stand: 15.09.2005.

LfULG Sachsen (2009): Luftreinhalteplan für die Stadt Plauen. Redaktion: Sächsisches Landesamt für Umwelt, Landwirtschaft und Geologie (LfULG). Herausgeber: Landratsamt Vogtlandkreis. Stand: 24.09.2009.

RP Chemnitz (2006): Aktionsplan für die Stadt Chemnitz. Regierungspräsidium Chemnitz. Stand: Januar 2006.

RP Chemnitz (2008): Luftreinhalteplan für die Stadt Chemnitz. Regierungspräsidium Chemnitz. Stand: Juni 2008.

RP Dresden (2008): Luftreinhalte- und Aktionsplan für die Stadt Dresden. Regierungspräsidium Dresden. Stand: Mai 2008.

RP Dresden (2008): Luftreinhalteplan für die Stadt Görlitz. Regierungspräsidium Dresden. Stand: April 2008.

RP Leipzig (2005): Aktionsplan zur Luftreinhaltung für die Stadt Leipzig. Regierungspräsidium Leipzig. Stand: (30.06.2005).

8.3.14 Saxony-Anhalt

MLU Sachsen-Anhalt (2005): Luftreinhalte- und Aktionsplan für die Stadt Aschersleben 2005. Ministerium für Landwirtschaft und Umwelt (MLU) Sachsen-Anhalt. Stand: Juni 2005.

MLU Sachsen-Anhalt (2006): Aktionsplan 2006. Luftreinhaltung für den Ballungsraum Magdeburg. Ministerium für Landwirtschaft und Umwelt (MLU) Sachsen-Anhalt. Stand: Dezember 2006.

MLU Sachsen-Anhalt (2006): Aktionsplan 2006. Luftreinhaltung in der Lutherstadt Wittenberg. Ministerium für Landwirtschaft und Umwelt (MLU) Sachsen-Anhalt. Stand: Juni 2006.

MLU Sachsen-Anhalt (2006): Luftreinhalte- und Aktionsplan für den Ballungsraum Halle 2005. Ministerium für Landwirtschaft und Umwelt (MLU) Sachsen-Anhalt. Stand: March 2006.

MLU Sachsen-Anhalt (2009): Aktionsplan 2008. Luftreinhaltung in der Lutherstadt Wittenberg. Ministerium für Landwirtschaft und Umwelt (MLU) Sachsen-Anhalt. Stand: April 2009.

MLU Sachsen-Anhalt (2011): Luftreinhalteplan für den Ballungsraum Magdeburg 2011. Ministerium für Landwirtschaft und Umwelt (MLU) Sachsen-Anhalt. Stand: 12.04.2011.

MLU Sachsen-Anhalt (2011): Luftreinhalteplan für den Ballungsraum Halle 2011. Ministerium für Landwirtschaft und Umwelt (MLU) Sachsen-Anhalt. Stand: 01.06.2011.

8.3.15 Schleswig-Holstein

MLUR Schleswig-Holstein (2006): Luftreinhalteplan Itzehoe. Ministerium für Landwirtschaft, Umwelt und ländliche Räume des Landes Schleswig-Holstein. Stand: Juli 2006.

MLUR Schleswig-Holstein (2009): Luftreinhalteplan Kiel. Ministerium für Landwirtschaft, Umwelt und ländliche Räume des Landes Schleswig-Holstein. Stand: March 2009.

MLUR Schleswig-Holstein (2009): Luftreinhalteplan Ratzeburg. Ministerium für Landwirtschaft, Umwelt und ländliche Räume des Landes Schleswig-Holstein. Stand: Januar 2009.

8.3.16 Thuringia

TLVwA (2005): Aktionsplan Erfurt 2005. Aktionsplan gemäß § 47 Abs. 2 Bundes-Immissionsschutzgesetz. Thüringer Landesverwaltungsamt (TLVwA). Stand: November 2005.

TLVwA (2005): Luftreinhalteplan Erfurt. Gebietsbeschreibung – Ursprung der PM10- und NO_2-Emissionen – Lageanalyse – Maßnahmenkatalog. Luftreinhalteplan gemäß § 47 Abs. 1 Bundes-Immissionsschutzgesetz. Thüringer Landesverwaltungsamt (TLVwA). Stand: (20.07.2005).

TLVwA (2007): Aktionsplan zur Reduzierung der Feinstaubbelastung für die Stadt Weimar. Thüringer Landesverwaltungsamt (TLVwA). Stand: Juli 2007.

TLVwA (2008): Aktionsplan zur Reduzierung der Luftschadstoffbelastung in der Stadt Jena. Thüringer Landesverwaltungsamt (TLVwA). Stand: November 2008.

TLVwA (2008): Luftqualitätsplan zur Reduzierung der Feinstaubbelastung für die Stadt Weimar. Thüringer Landesverwaltungsamt (TLVwA). Stand: Dezember 2008.

TLVwA (2009): Aktionsplan zur Reduzierung der Feinstaubbelastung für die Stadt Gera. Thüringer Landesverwaltungsamt (TLVwA). Stand: March 2009.

TLVwA (2010): Luftreinhalteplan zur Reduzierung der Feinstaubbelastung für die Stadt Mühlhausen. Thüringer Landesverwaltungsamt (TLVwA). Stand: Dezember 2010.

TLVwA (2011): Luftreinhalteplan für die Stadt Mühlhausen zur Reduzierung der Luftschadstoffbelastung durch PM10 und NO_2. 1. Fortschreibung. Thüringer Landesverwaltungsamt (TLVwA). Stand: November 2011.

TLVwA (2011): Luftreinhalteplan für die Stadt Weimar. 1. Fortschreibung. Thüringer Landesverwaltungsamt (TLVwA). Stand: September 2011.

TLVwA (2012): Luftreinhalteplan für die Landeshauptstadt Erfurt zur Reduzierung der Luftschadstoffbelastung durch Feinstaub und Stickoxide. 1. Fortschreibung. Thüringer Landesverwaltungsamt (TLVwA). Stand: Januar 2012.

TLVwA (2012): Luftreinhalteplan zur Reduzierung der Stickstoffdioxidbelastung für die Stadt Gera. Thüringer Landesverwaltungsamt (TLVwA). Stand: Februar 2012.

TLVwA (2012): Luftreinhalteplan zur Reduzierung der Stickstoffdioxidbelastung für die Stadt Jena. Thüringer Landesverwaltungsamt (TLVwA). Stand: Februar 2012.

TLVwA (2012): Luftreinhalteplan zur Reduzierung der Stickstoffdioxidbelastung für die Stadt Suhl. Thüringer Landesverwaltungsamt (TLVwA). Stand: August 2012.