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FINAL REPORT

Impact of the WHO Air Quality Guidelines 2021 on manufacturing companies in Austria

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On behalf of Austrian Federal Economic Chamber

Industry Division & Environment and Energy Policy Department

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1 Executive Summary

Improving air quality has long been an important issue in Europe. For this reason, limit values are defined and set in laws and regulations. If limit values are exceeded, measures must be taken. In Austria, these measures are associated with defining and installing specific redevelopment areas. Even though a decrease in pollution levels has been observed over the last few years, the limit values are still exceeded in Austria. Among other things, manufacturing companies are directly or indirectly affected by such measures. The limit values currently in force are now being evaluated and revised at EU level. Using different scenarios, the impact of air quality values, recommended by the World Health Organisation (WHO) (see Table 1), on Austrian manufacturing companies will be simulated in this study. Figure 1 compares the current EU limit with the interim targets and the AQG level (both WHO). The comparison is shown for both, yearly mean values (YMV) and daily mean values (DMV) and for each pollutant. The focus is on the estimation of the number of potentially affected business locations with regard to the three main air pollutants PM_{10}, $PM_{2.5}$ and NO_2.

target	PM10		PM2.5		NO2	
	YMV	DMV	YMV	DMV	YMV	DMV
interim target 1	-	150	35	75	40	120
interim target 2	50	100	25	50	30	50
interim target 3	30	75	15	37.5	20	-
interim target 4	20	50	10	25	-	-
AQG level	15	45	5	15	10	25
EU limit	40	50	25	-	40	

Table 1: limit and target values recommended by WHO

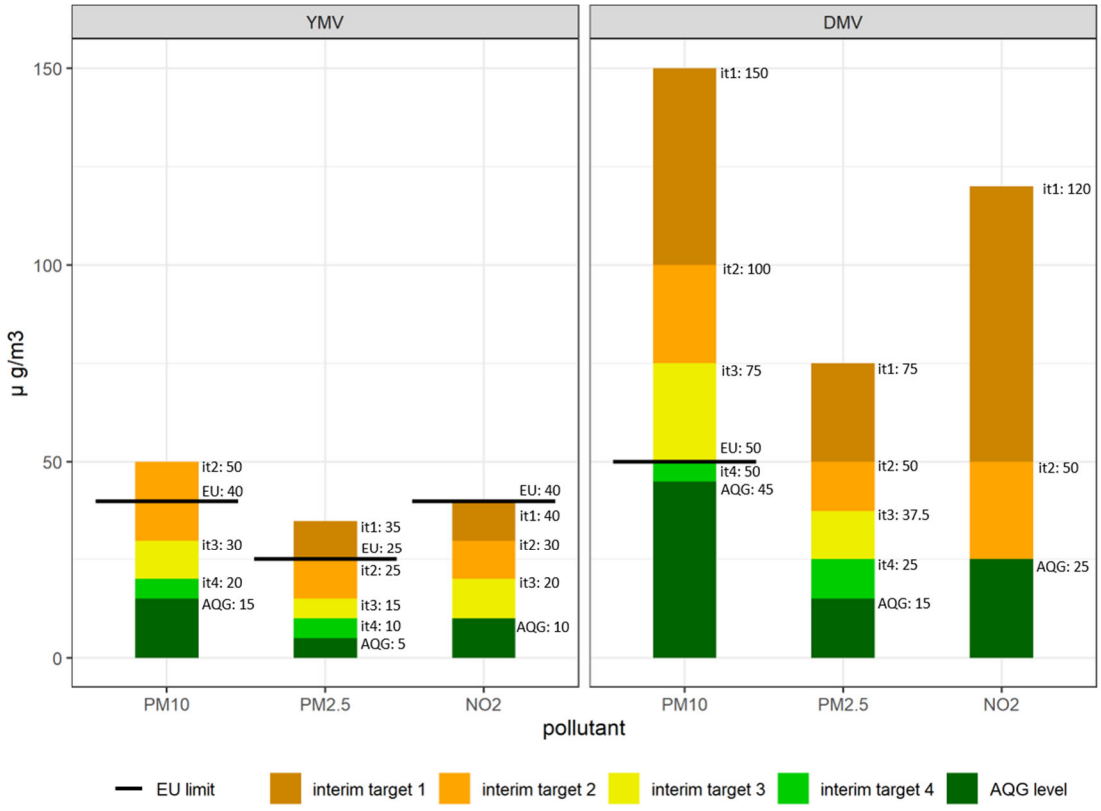

Figure 1: interim targets and AQG level in comparison with current EU limit for YMV and DMV for each pollutant

Considered scenarios

Different scenarios are calculated for each of the three air pollutants and different types of measurement statistic – yearly mean values (YMV) and daily mean values (DMV). In case of DMV two scenarios are considered: a) 3 to 4 exceedance days per year and b) not more than 35 exceedance days per year. A scenario is defined by air pollutant, type of measurement statistic, year and target or limit value. The consideration of three air pollutants (PM_{10}, $PM_{2.5}$ and NO_2), three different measurement statistics (YMV, DMV with maximal 35 exceedance days p.a., DMV with 3 to 4 exceedance days p.a.), four years (2018 – 2021) and up to six target or limit values (interim target 1 to interim target 4, AQG level and EU limit) theoretically results in 216 scenarios. The number of effectively simulated scenarios is smaller, since not all target and limit values are available for each air pollutant, see Table 1. In addition to the single year considerations, a cumulated view on exceedances over four years is presented for each air pollutant, each measurement statistic and each target or limit value. Cumulated exceedance means, if there occurs an exceedance in at least one of the four years at a sample point, then this station is marked as an exceeding station.

Comparing the measured data of the individual air pollutants - in particular, the yearly mean values (YMV) and the daily mean values (DMV) of the years 2018 to 2021 - with different target and limit values, stations that show an exceedance were identified. In order to obtain nationwide information on limit exceedances, representative zones were defined based on the measured pollutant data of the stations. This zoning takes into account topographical and climatic conditions, as well as urban and rural areas, and also similar pollutant concentrations, so that the zones are as homogeneous as possible. If exceedances occur at the measuring station within a zone, the entire zone is designated as an affected area. For multiple monitoring stations assigned to one zone, the average of the stations is used to determine exceedance of that zone. If a zone is affected by exceedance, it is concluded that all producing company sites within that zone are affected by exceedance and, as a consequence, by air pollution abatement measures.

Since some stations take only PM_{10} measurements and not $PM_{2.5}$ (i.e. 63 $PM_{2.5}$ stations versus 133 PM_{10} stations) we estimate the proportion of $PM_{2.5}$ to PM_{10} by the average proportion $PM_{2.5}/PM_{10}$ of all stations with both measurements, PM_{10} and $PM_{2.5}$. Using the estimated proportion of 0.68 (with a standard deviation of 0.049), the missing $PM_{2.5}$ concentrations are obtained by the formula $PM_{2.5} = 0.68*PM_{10}$.

General effects: exceedances more likely in the South and East and in 2018

In general, this study shows that exceedance of limit or target values of particulate matter PM_{10} and $PM_{2.5}$ is mainly observable in the East and South of Austria where unfavourable dispersion conditions, urban areas with industrial zones and also cross border emissions e.g. from Bratislava may be reasons for high concentrations of fine dust. Exceedance of NO_2 limits is generally most likely to be observed close to major traffic routes and in urban areas. Applying AQG level for each pollutant, the percentage of affected areas and affected company sites is on a high level. In general, a significantly lower percentage of affected company sites can be achieved by switching to the next (less restrictive) air quality level.

Another general effect can be observed: the year 2018 has significantly more exceedances than the subsequent three years. This fact consequently results in a higher percentage of affected company sites in 2018 than in the years 2019 to 2021. The mean concentrations with respect to YMV and both variants of DMV for each air pollutant over the four years (see Figure 2) shows a higher concentration level for 2018. But whether the decreasing effect in air pollutant concentrations over the years is due to climatic conditions and/or to lockdowns caused by Covid-19 cannot be determined based on the data framework of this study.

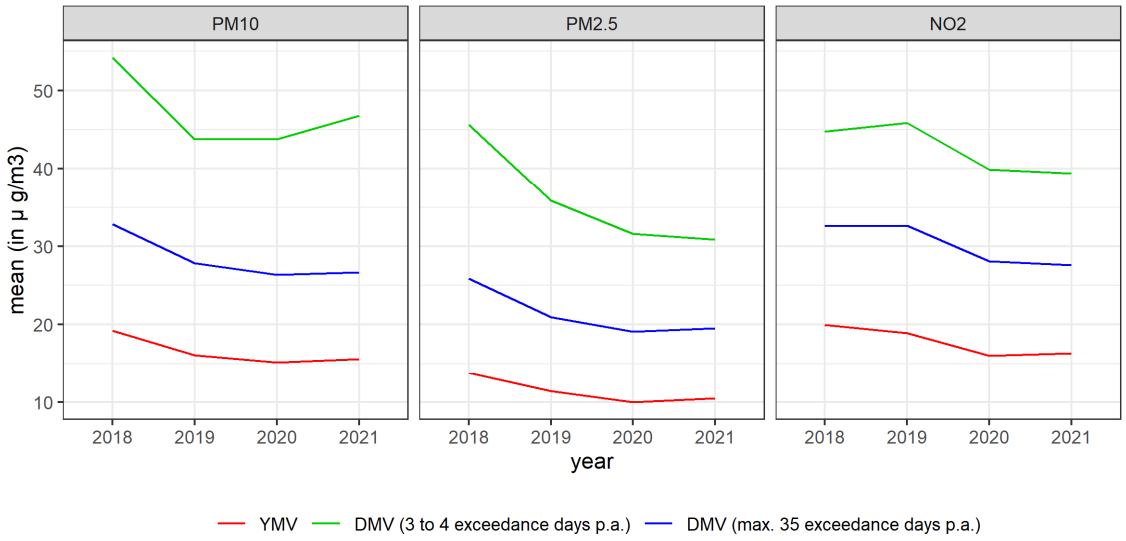

Figure 2: mean concentration over the years according to YMV and DMV (both variants) for each air pollutant

PM_{10} YMV

Regarding yearly mean values (YMV) of PM_{10}, only AQG level and interim target 4 have an effect on company sites. Applying AQG level of 15 µg/m³ results in percentages of affected company sites between 79.7% (in 2018) and 40.4% (in 2020), spread over all Austrian provinces. Switching to interim target 4 of 20 µg/m³ yields significantly lower percentages of affected company sites, that is 36.8% (in 2018) and less than 4.2% in the years 2019 to 2021.

The view on cumulated exceedances over the four years shows that the use of AQG level causes 43.7% affected areas. The comparison of AQG level and EU limit with respect to cumulated exceedances indicates a significant decrease in affected areas (no affected areas if EU limit is used), see Figure 3. The percentage of company sites situated within an affected area is 79.8% for AQG level, see Table 2. This percentage is significantly reduced to 36.8%, if interim target 4 is used instead.

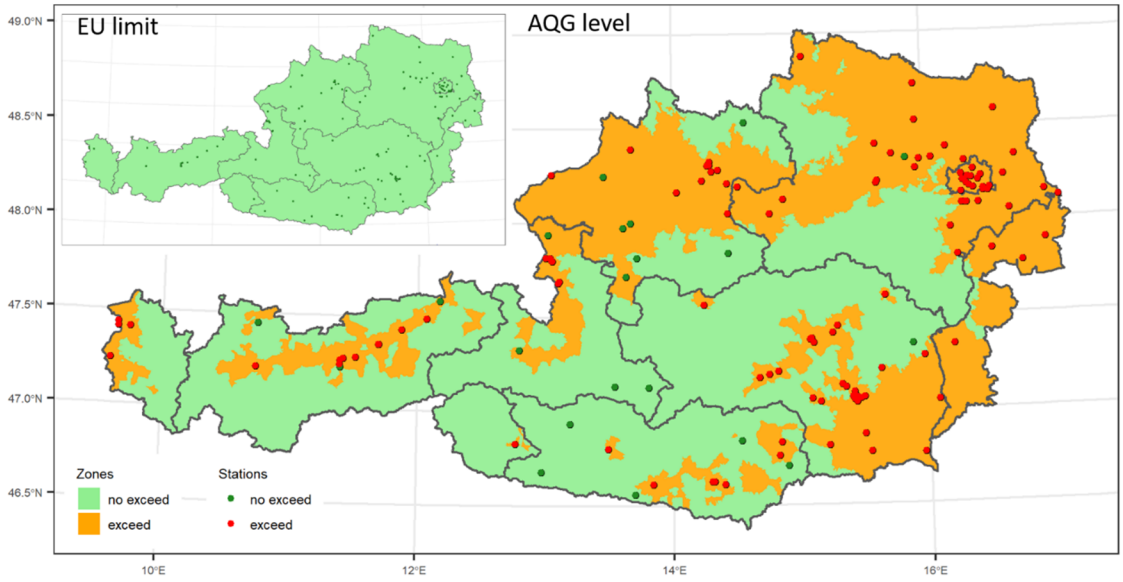

Figure 3: PM_{10} YMV 4 years – comparison of AQG level impact and EU limit impact on affected areas.

	AQG	it4	it3	EU	it2
total number of company sites	66031	66031	66031	66031	66031
number of affected company sites	52675	24279	0	0	0
percent of affected company sites	79.8%	36.8%	0.0%	0.0%	0.0%

Table 2: PM_{10} YMV 4 years – number and percentage of affected company sites

As noted previously, PM_{10} redevelopment areas are defined and installed in Austria. Currently, 35.4% of manufacturing company sites are in such PM_{10} redevelopment areas. If the AQG level is applied, 45.2% company sites would be affected by exceedances that are not currently in PM_{10} redevelopment areas. In total, with all company sites currently situated in PM_{10} redevelopment areas and company sites outside of PM_{10} redevelopment areas but within an affected area, 80.6% company sites would be affected by potential future measures, see Table 3.

PM10 YMV						
percent of company sites	AQG			it4		
	total	craft	industry	total	craft	industry
within redev. area	35.4%	34.7%	40.8%	35.4%	34.7%	40.8%
affected outside redev. areas	45.2%	45.4%	43.1%	9.2%	9.2%	9.4%
probably affected by measures	80.6%	80.1%	83.9%	44.6%	43.9%	50.2%

Table 3: PM_{10} YMV all four years – percentage of company sites within current PM_{10} redevelopment areas, affected company sites outside current PM_{10} redevelopment areas and sum of both

PM_{10} DMV

Considering PM_{10} the scenario of daily mean values (DMV) with 3 to 4 exceedance days p.a., only the application of AQG level and interim target 4 cause affected company sites. For the AQG level of 45 µg/m³ the percentage of affected company sites ranges from 71.9% (in 2018) to 36.4% (in 2020). For interim target 4 of 50 µg/m³ there are between 51.0% (in 2018) and 10.2% (in 2020) affected company sites. Considering the scenario of not more than 35 exceedance days p.a., only very few company sites are affected. In 2020 0.1% affected company sites are observed when using AQG level.

The cumulated consideration of exceedances over four years compares the scenario with 3 to 4 exceedance days p.a. and the scenario with maximum 35 exceedance days p.a.. The use of AQG level (with 3 to 4 exceedance days p.a.) results in 36.9% affected area, see Figure 4. If max. 35 exceedance days p.a. are used for the AQG level, the percentage of affected area is remarkably reduced from 36.9% to 0.1%. The current EU limit (with max. 35 exceedance days p.a.) causes no affected area.

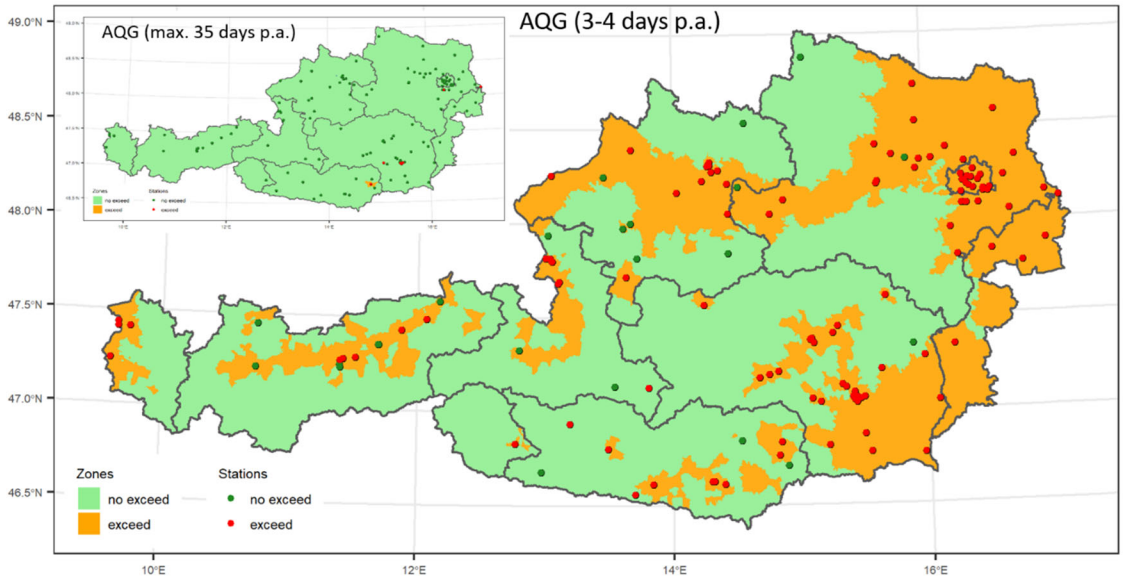

Figure 4: PM_{10} DMV 4 years – comparison of AQG level (with 3 to 4 exceedance days p.a.) impact and AQG level (max. 35 exceedance days p.a.) impact on affected areas

The use of cumulated exceedance scenarios with 3 to 4 exceeding days p.a. results in a percentage of 73.3% of company sites situated in an affected area for AQG level, while for interim target 4 (equal to the EU limit value) the percentage of affected company sites is reduced to 52.4%, see Table 4. All less restrictive targets (interim target 1 to 3) cause no affected areas.If the scenario with

max. 35 exceedance days p.a. is considered, there are only 0.2% affected company sites for AQG level. All other limit values have no impact on any company site.

	AQG	EU	it3	it2	it1
total number of company sites	66031	66031	66031	66031	66031
number of affected company sites	48383	34583	0	0	0
percent of affected company sites	73.3%	52.4%	0%	0%	0%

Table 4: PM_{10} DMV (3 to 4 exceedance days p.a).4 years – number and percentage of company sites affected by exceedances

	AQG	EU	it3	it2	it1
total number of company sites	66031	66031	66031	66031	66031
number of affected company sites	107	0	0	0	0
percent of affected company sites	0.2%	0%	0%	0%	0%

Table 5: PM_{10} DMV (max. 35 exceedance days p.a).4 years – number and percentage of company sites affected by exceedances

Regarding current PM_{10} redevelopment areas, the percentage of company sites situated in a redevelopment area and currently concerned with measures is 35.4%. This percentage may be increased to a total of 74.3%, if the percentage of company sites that are affected by an exceedance with respect to AQG level but are outside the current redevelopment area – that is 38.9% - are added (see Table 6).

PM10 DMV (3 to 4 exceedance days p.a.)						
percent of company sites	AQG			EU limit		
	total	craft	industry	total	craft	industry
within redev. area	35.4%	34.7%	40.8%	35.4%	34.7%	40.8%
affected outside redev. areas	38.9%	39.1%	37.5%	19.2%	19.4%	18.0%
probably affected by measure	74.3%	73.8%	78.3%	54.6%	54.1%	58.8%

Table 6: PM_{10} DMV (3 to 4 exceedance days p.a).4 years – percentage of company sites within redevelopment area, affected outside redevelopment area and probably concerned by future measures.

$PM_{2.5}$ YMV

In case of $PM_{2.5}$ YMV, the application of AQG level and interim target 4 results in affected company sites in all four years, whereas applying interim target 3 has only an effect in 2018. Considering the AQG level of 5 µg/m^3 yields a percentage of affected company sites of above 93% in all four years. Using interim target 4 reduces the amount of affected company sites. In this case, the percentage of affected company sites is between 82.9% (in 2018) and 46.6% (in 2021). Interim target 3 of 15 µg/m^3 causes a percentage of 24.3% affected company sites in 2018.

A cumulated consideration of exceedances over four years draws a worst case scenario, because the exceeding of a station in at least one year is already sufficient to be marked as an exceeding station. If AQG level is used, all stations have an exceedance and consequently all areas are marked as affected, see Figure 5. In comparison, the current EU limit shows not a single exceeding station and no affected areas. The use of interim target 4 reduces the percentage of affected areas to 49.9%.

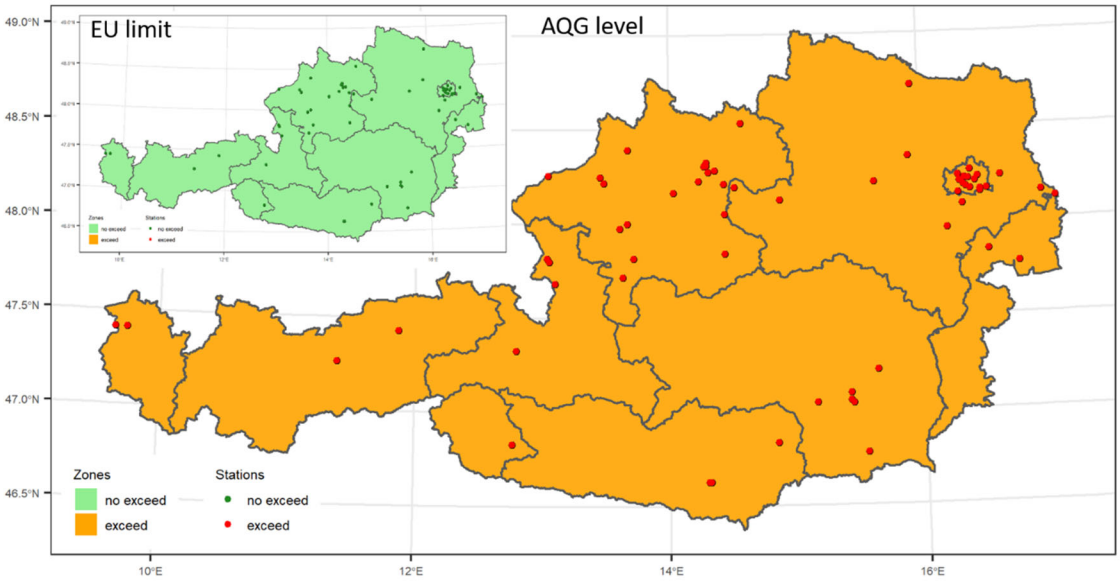

Figure 5: $PM_{2.5}$ YMV 4 years – comparison of AQG level impact and EU limit impact on affected areas.

Based on cumulated exceedances over four years, the use of AQG level results in all manufacturing company sites being situated in an affected area, see Table 7. If interim target 4 is considered, the percentage of affected company sites is reduced to 82.9%. A further significant reduction of the percentage can be achieved by the use of interim target 3 – in this case 24.3% company sites are situated in affected areas. For interim target 1 and the current EU limit, no affected company sites are identified.

	AQG	it4	it3	EU	it1
total number of company sites	66031	66031	66031	66031	66031
number of affected company sites	66031	54769	16066	0	0
percent of affected company sites	100.0%	82.9%	24.3%	0.0%	0.0%

Table 7: $PM_{2.5}$ YMV 4 years – number and percentage of affected company sites for different target and limit values

$PM_{2.5}$ DMV

There are potentially affected company sites with respect to $PM_{2.5}$ DMV (with 3 to 4 exceedance days p.a.) by using AQG level, interim target 4 and interim target 3 in all four years. Interim target 2 has only an effect in 2018. A percentage of above 93% is achieved in all four years by using AQG level of 15 µg/m³. The application of interim target 4 of 25 µg/m³ results in slightly lower percentages of affected company sites that range from 92.1% (in 2018) to 71.6% (in 2020). The use of interim target 3 of 37.5 µg/m³ causes significantly lower percentages of affected company sites, especially in the years 2019 to 2021. Whereas the percentage is 52.4% in 2018, it ranges from 15.4% in 2019 to 3.3% in 2021. With interim target 2 of 50 µg/m³ the percentage of affected company sites is 5.4% in 2018. Considering $PM_{2.5}$ DMV with max. 35 exceedance days p.a., there are affected company sites with respect to AQG level and interim target 4. The percentage of affected company sites ranges from 79.4% (in 2018) to 71.8% (in 2020) for AQG level and from 37.9% (in 2018) to 2.3% (in 2021) for interim target 4.

Comparing scenarios with 3 to 4 exceedance days p.a. and scenarios with maximum 35 exceedance days p.a. based on cumulated exceedances over four years (worst case view), the use of AQG level with 3 to 4 exceeding days p.a. results in all areas of Austria being affected, while AQG level with maximum 35 exceedance days p.a. shows 49.9% affected areas, see Figure 6. In scenarios with 3 to 4 exceedance days p.a. the percentage of affected areas decreases to 97.4% by using interim target 4, but a significant reduction to 26.9% of areas being affected can be achieved by using interim target 3 instead. The scenario with maximum 35 exceedance days p.a. shows significant lower percentages: 15.4% affected areas for interim target 4 and no affected areas for all less restrictive limit values (interim target 1 to 3).

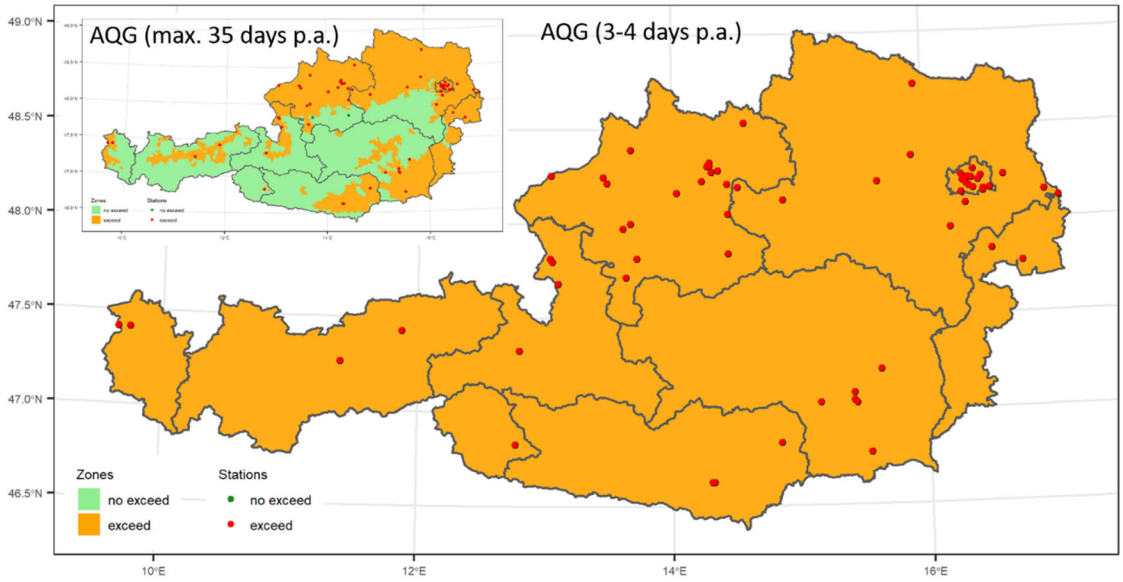

Figure 6: $PM_{2.5}$ DMV 4 years – comparison of AQG level (with 3 to 4 exceedance days p.a.) impact and AQG level (max. 35 exceedance days p.a.) impact on affected areas

The number and percentage of affected company sites with respect to the scenarios with 3 to 4 exceedance days p.a. based on cumulated exceedances over four years is presented in Table 8. For AQG level and interim target 4 the percentage of company sites situated in affected areas is very high (100% for AQG level and 96.4% for interim target 4). With interim target 3 52.5% affected company sites are obtained. The use of interim target 2 results in a percentage of 5.2%. Significantly less affected company sites are obtained, if scenarios with max. 35 exceedance days p.a. are considered, see Table 9.

	AQG	it4	it3	it2	it1
total number of company sites	66031	66031	66031	66031	66031
number of affected company sites	66031	63667	34574	3538	0
percent of affected company sites	100.0%	96.4%	52.4%	5.4%	0.0%

Table 8: $PM_{2.5}$ DMV (3 to 4 exceedance days p.a.) 4 years – number and percentage of affected company sites

	AQG	it4	it3	it2	it1
total number of company sites	66031	66031	66031	66031	66031
number of affected company sites	54769	25119	0	0	0
percent of affected company sites	82.9%	38.0%	0.0%	0.0%	0.0%

Table 9 $PM_{2.5}$ DMV (max. 35 exceedance days p.a.) 4 years – number and percentage of affected company sites

NO_2 YMV

Considering NO_2 YMV using AQG level and interim target 3 leads to affected company sites in all four years. With interim target 2 there are affected company sites only in the years 2018 and 2019. The scenarios with AQG level of 10 µg/m³ result in percentages of affected company sites between 76.4% (in 2019) and 67.8% (in 2021). Interim target 3 of 20 µg/m³ causes percentages of about 32% in all four years. Using interim target 2 of 30 µg/m³ shows 4.5% affected company sites in 2018 and 2.9% in 2019.

With the consideration of cumulated exceedances over four years a worst case scenario is simulated. Whereas 56.7% areas are affected in case of AQG level, there are no affected areas in case of EU limit, see.Figure 7. If interim target 3 is used, only areas along main transit routes and urban areas are affected (6.5% affected areas). For interim target 2 the percentage decreases to 0.6%.

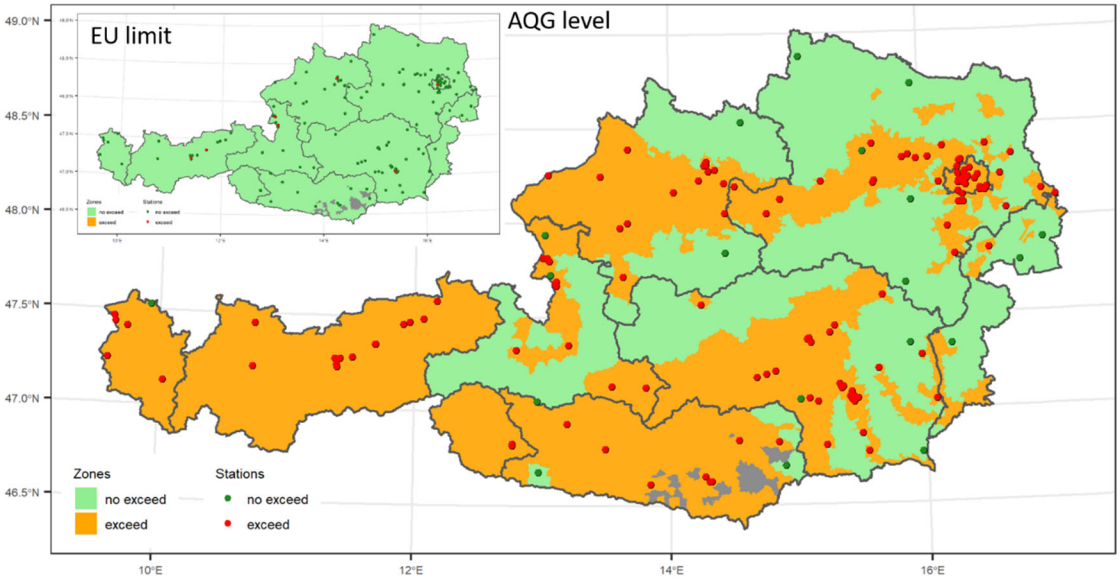

Figure 7: NO_2 YMV 4 years – comparison of AQG level impact and EU limit impact on affected areas

The number and percentage of affected company sites based on cumulated exceedances over four years is given in Table 10. While for AQG level 76.5% of the company sites are affected, there are only 32.3% affected company sites in case of interim target 3. The use of interim target 2 reduces the percentage of affected company sites to 4.5%. Finally, no company sites are affected if EU limit is used.

	AQG	it3	it2	EU
total number of company sites	66031	66031	66031	66031
number of affected company sites	50482	21304	2946	0
percent of affected company sites	76.5%	32.3%	4.5%	0.0%

Table 10: NO_2 YMV 4 years – number and percentage of affected company sites for different target and limit values

NO_2 DMV

Regarding NO_2 DMV (with 3 to 4 exceedance days p.a.), the application of AQG level and interim target 2 results in affected company sites in all four years. The percentage of affected company sites ranges from 79.3% (in 2018) to 68.0% (in 2021) by applying AQG level of 25 µg/m^3. Using interim target 2 of 50 µg/m^3 decreases significantly the percentage of affected company sites: the percentage is between 31.8% in 2019 and 14.6% in 2020. Considering the scenarios for NO_2 DMV with maximum 35 exceedance days p.a., the percentage of affected company sites ranges from 57.7% (in 2018) to 44.0% (in 2021) in case of AQG level. Application of interim target 2 causes affected company sites only in 2019 (10.6%).

The comparison of the impact of 3 to 4 exceedance days p.a. with the impact of maximum 35 exceedance days p.a. on the basis of cumulated exceedances over four years indicates that the percentage of affected areas are lower for the scenarios with maximum 35 exceedance days p.a.. The use of AQG level with 3 to 4 exceedance days p.a. causes 61.1% affected areas, the AQG level with maximum 35 exceedance days p.a. results in only 28.3% affected areas, see Figure 8. The use of interim target 2 results in 7.7% affected areas for scenario with 3 to 4 exceedance days p.a. and in 4.1% for scenario with maximum 35 exceedance days p.a.The use of interim target 1 has no impact on areas either in case of 3 to 4 exceedance days p.a. nor in case of maximum 35 exceedance days p.a.

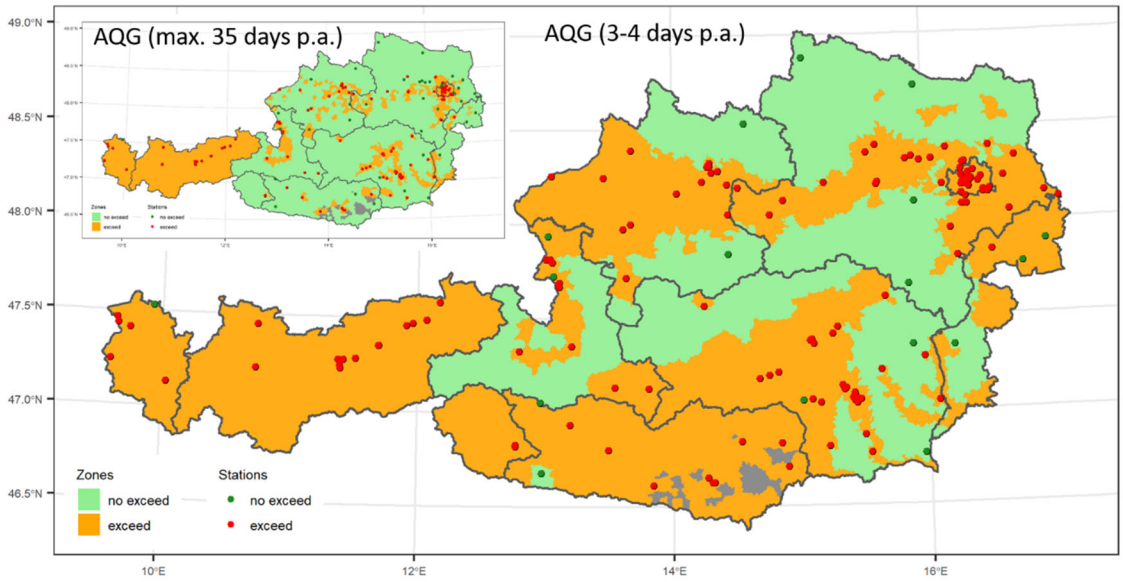

Figure 8: NO_2 DMV 4 years – comparison of AQG level (with 3 to 4 exceedance days p.a.) impact and AQG level (max. 35 exceedance days p.a.) impact on affected areas

The percentage of manufacturing company sites situated in affected areas with respect to AQG level is 79.6% for 3 to 4 exceedance days p.a. (see Table 11) and 57.7% for maximum 35 exceedance days p.a. (see Table 12) - all based on cumulated exceedances.

	AQG	it2	it1
total number of company sites	66031	66031	66031
number of affected company sites	52533	22166	0
percent of affected company sites	79.6%	33.6%	0.0%

Table 11: NO_2 DMV (3 to 4 exceedance days p.a.) 4 years – number and percentage of affected company sites

	AQG	it2	it1
total number of company sites	66031	66031	66031
number of affected company sites	38108	7032	0
percent of affected company sites	57.7%	10.6%	0.0%

Table 12: NO_2 DMV (max. 35 exceedance days p.a.) 4 years – number and percentage of affected company sites

Conclusion

In all scenarios, a high percentage of affected areas and company sites can be observed by using the most stringent AQG level. In general, by switching to the next (less restricitve) target value –

which is interim target 4 for PM_{10} and $PM_{2.5}$ and interim target 3 / interim target 2 for NO_2 – the percentage of potentially affected company sites can be significantly reduced. Considering DMV, the scenarios based on max. 35 exceedance days p.a. show either no impact or a significantly lower impact on the percentage of affected company sites than those based on 3 to 4 exceedance days p.a. In Table 13 the same target and limit values are shown as already given in Table 1, but additionally marked, if there occur exceedance areas and, in consequence, affected manufacturing company sites in at least one of the four years. Air quality values with an asterics indicate that only scenarios with 3 to 4 exceedance days p.a. have affected areas and company sites in at least one of the four years.

target	PM10		PM2.5		NO2	
	YMV	DMV	YMV	DMV	YMV	DMV
interim target 1	-	150	35	75	40	120
interim target 2	50	100	25	*50	30	50
interim target 3	30	75	15	*37.5	20	-
interim target 4	20	*50	10	25	-	-
AQG level	15	45	5	15	10	25
EU limit	40	*50	25	-	40	

*Table 13: limit and target values recommended by WHO, yellow fields indicating an impact on areas and companies based on cumulated exceedances over four years, *only for scenarios with 3 to 4 exceedance days p.a.*

2 Introduction

Since air pollution is a big health risk, the reduction of all particulate matter fractions both $PM_{2.5}$ and PM_{10} as well as nitrogen oxides is a matter of national and international interest. These pollutants are generated by transport, energy production, industrial processes, agriculture and households – to name just a few essential sources of air pollutants. Over the last years, air quality in Europe has tended to improve. This has its origin in the fact that many air pollution abatement measures have already been set. In Austria, e.g. the offices of the nine provinces are obliged under the Immission Control Act – Air (Immissionsschutzgesetz-Luft) to determine the cause of limit value exceedances and to draw up corresponding programmes of measures and regulations. At province level, redevelopment areas are defined within which these regulations and measures are then applied, aiming at reducing the load of air pollutants to such an extent that current limit values are not exceeded. Such measures are, for example, in the area of transportation, speed limit reduction on highways and main transit routes, temporary and spatial driving restrictions or reduction of traffic volume. For industrial and small manufacturing companies, measures comprise incentives to modernize production facilities, as well as restrictions or bans on operation of high-emitting machines or restrictive use of certain substances.

Nevertheless, the measured values of air quality parameters sometimes still exceed the EU standards or the stricter World Health Organisation guidelines. In order to curb air pollution, existing directives are currently being evaluated and adapted at the European level. A revision of the Ambient Air Quality Directive (AAQD 2208/50/EC) is being planned for this year, a Commission proposal is announced for end of October 2022.

The Austrian Federal Economic Chamber is interested in obtaining an assessment of the impact of a possibly revised EU Ambient Air Quality Directive on Austrian manufacturing companies. The main focus of this study is to estimate the amount of potentially affected company sites within Austria applying different target / limit values for air pollutants. For this purpose, several scenarios for particulate matter (PM_{10} and $PM_{2.5}$) as well as for Nitrogen Dioxide (NO_2) are simulated in this study. The measurement values of 2018 to 2021 of these air quality parameters are compared to different target and limit values, which are proposed by the WHO (see ‘2021 WHO global air quality guidelines, executive summary’): the current EU limit, interim targets 1 to 4, and the most stringent air quality guideline level (AQG level) for yearly mean values as well as – if available – for daily mean values. For each scenario, areas in Austria potentially affected by target / limit value exceedance are identified. The main intention is to identify manufacturing company sites which may be affected by target / limit value exceedance. These affected company sites may be confronted with new federal requirements and regulations which will have a direct or at least indirect impact on the company sites, e.g. transport of goods (supply and distribution of goods), passenger transport (commuting traffic of staff).

For each specific scenario the following evaluation procedure is applied:

1. The first step is the identification of Austrians air quality monitoring sites that show an exceedance with respect to a specific pollutant, a specific target / limit value for a specific year either on daily or on yearly mean basis.
2. The next step is the determination of affected zones / areas based on the results of the previous step.
3. In a next step, potentially affected company sites are identified, which comprise all manufacturing company sites within an affected area.
4. Finally, it is analysed how many companies – based on a stricter WHO guideline value in comparison to the current EU limit values – may be situated in new redevelopment areas in comparison to the current redevelopment areas and the companies currently being situated in them.

For each scenario the amount of station exceedances, as well as the percentage of affected area and the percentage of affected company sites are computed. The percentage of affected company sites separated by province and division (industry, small manufacturing and craft) is also reported.

3 Data Sources

This study is based on several different data sets including data of manufacturing companies of Austria, air quality measurement data between 2018 and 2021 with respect to particulate matter 10 (PM_{10}) and 2.5 ($PM_{2.5}$) and nitrogen dioxide (NO_2), the spatial polygons of actual redevelopment areas with respect to NO_2 and PM_{10}, the WHO guidelines of 2021, and some geographical and population data of Austria. A brief description of the data used as well as an indication of the data source, can be found in the following subsections.

3.1 MANUFACTURING COMPANY DATA

Data of manufacturing companies in Austria (including industry division and trade and craft division) is provided by the Austrian Federal Economic Chamber. In this study the geographic coordinates of each manufacturing company site (separated by a sector differentiation in so-called “divisions”) in Austria are taken into account. In total there are 66031 company sites, 58539 sites (88.7%) in small manufacturing and craft division and 7492 sites (11.3%) in industry division. The percentage of company sites per division and province is given in Table 14. The spatial distribution of company sites is shown in Figure 9. The blue dots represent industry company sites whereas yellow dots represent locations of small manufacturing and craft companies.

division	province									AUSTRIA
	Burgenland	Carinthia	Lower A.	Upper A.	Salzburg	Styria	Tyrol	Vorarlberg	Vienna	
craft	4.3%	8.0%	22.1%	17.7%	8.3%	14.5%	11.1%	4.7%	9.3%	100.0%
industry	2.5%	6.4%	18.7%	19.3%	5.8%	15.1%	8.1%	5.8%	18.4%	100.0%
total	4.1%	7.8%	21.7%	17.9%	8.0%	14.5%	10.8%	4.8%	10.4%	100.0%

Table 14: percentage of company sites per division and province

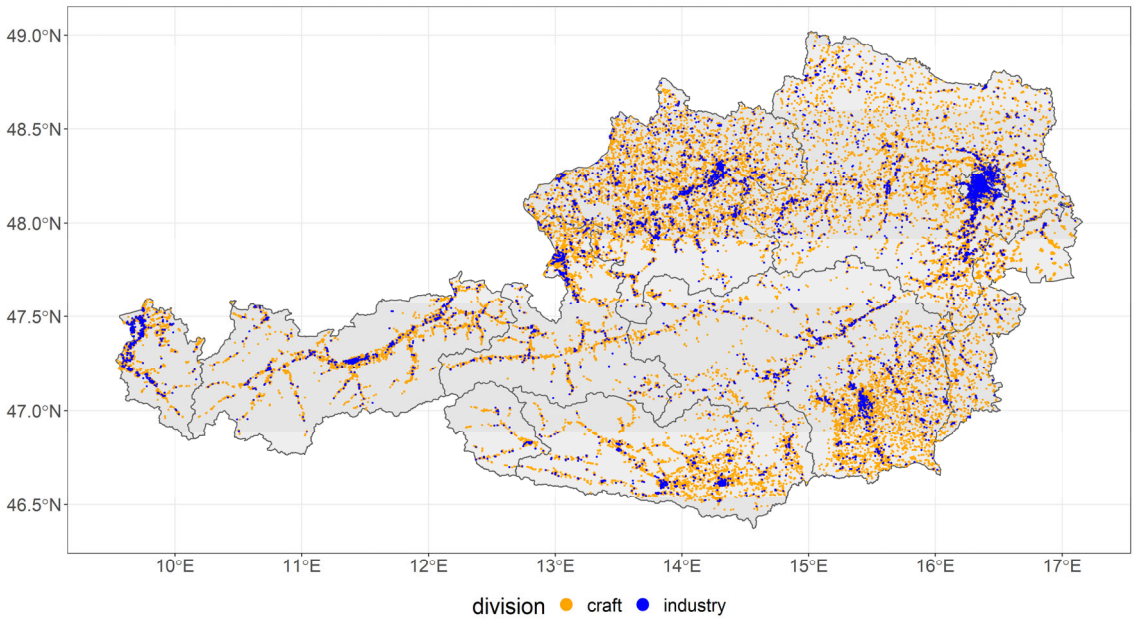

Figure 9: Spatial distribution of manufacturing company sites in Austria

3.2 AIR QUALITY MEASUREMENT STATIONS

Data of Austrian air quality measuring stations (sampling points) are provided by the Federal Environment Agency Austria and the respective offices of the provincial governments, including metadata of stations and measurement data of three different air quality parameters (PM_{10}, $PM_{2.5}$ and NO_2) from 2018 to 2021 on daily and yearly average basis. Data of 133 PM_{10} stations, 63 $PM_{2.5}$ stations and 148 NO_2 stations are available. For particulate matter (PM_{10} and $PM_{2.5}$), there exist two different measurement methods – gravimetric and continuous measurement method. If both measurement methods are available at a station, the measurements of the gravimetric method are preferred, since measurements of gravimetric method tend to be more accurate. There exist some gaps in measurement series for some stations over time of 2018 to 2021, so that some small areas of Austria for individual years (see chapter 5, grey areas in maps of respective scenarios) are missing in the simulations.

3.2.1 Metadata of Stations

Metadata of stations provide information about the location of the station classified into urban, suburban and rural location. Table 15 shows the number of rural, suburban and urban stations per air quality parameter.

	rural		suburban		urban		total	
	number	percent	number	percent	number	percent	number	percent
PM10	35	26.3%	74	55.6%	24	18.0%	133	100%
PM2.5	12	19.0%	35	55.6%	16	25.4%	63	100%
NO2	45	30.4%	77	52.0%	26	17.6%	148	100%

Table 15: categorisation of stations according to location

In addition, the stations are categorised according to the dominant source of emissions in the immediate vicinity into background, industrial and traffic station. In Table 16 the number of background, industrial and traffic stations for each air quality parameter is given.

	background		industrial		traffic		total	
	number	percent	number	percent	number	percent	number	percent
PM10	104	78.2%	8	6.0%	21	15.8%	133	100%
PM2.5	49	77.8%	5	7.9%	9	14.3%	63	100%
NO2	100	67.6%	7	4.7%	41	27.7%	148	100%

Table 16: categorisation of stations according to the dominant source of emission

The distribution of the yearly mean values (YMV) of PM_{10} within each category and year is shown in Figure 10.There is no significant difference in YMV between background and industrial stations over the four years, whereas slightly higher values may be observed at traffic stations over the four years.

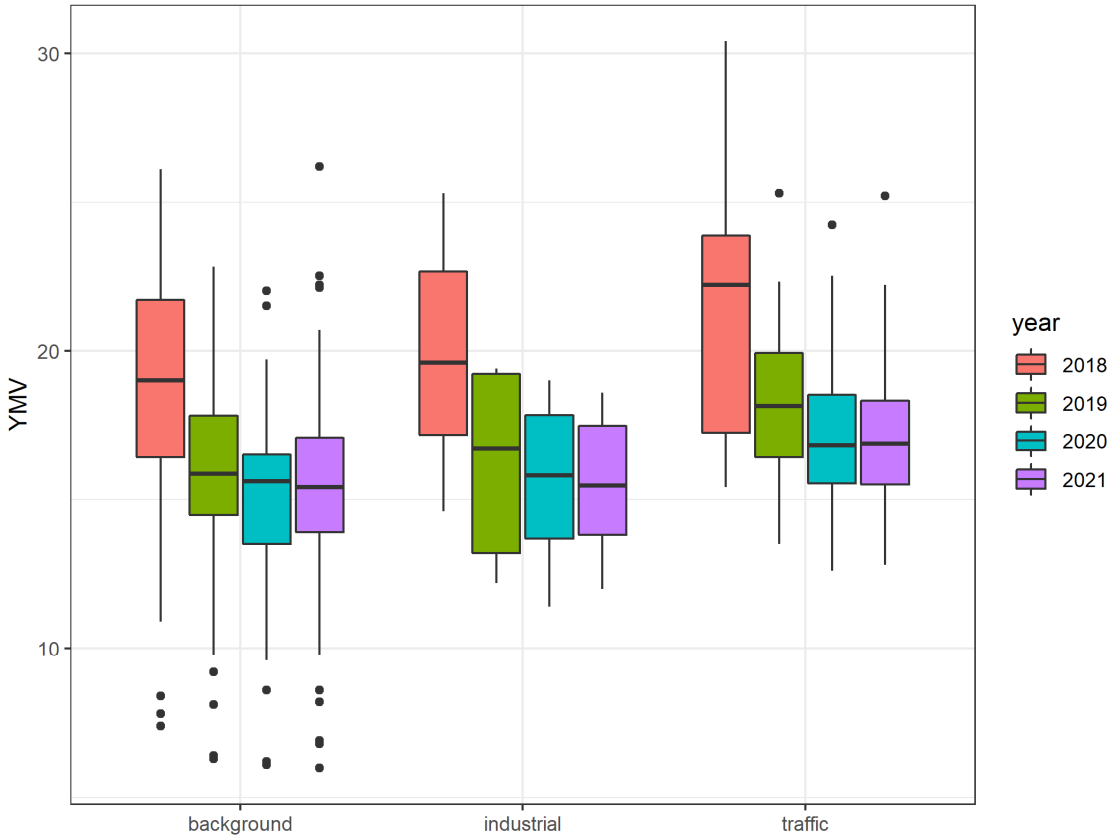

Figure 10: distribution of PM_{10} YMV within each category (background, industrial, traffic) and year

The same situation is observable for $PM_{2.5}$ stations: there are no signifficant differences in the YMV between background and industrial stations. Only traffic $PM_{2.5}$ stations tend to have slightly higher YMV than background and industrial stations (see Figure 11).

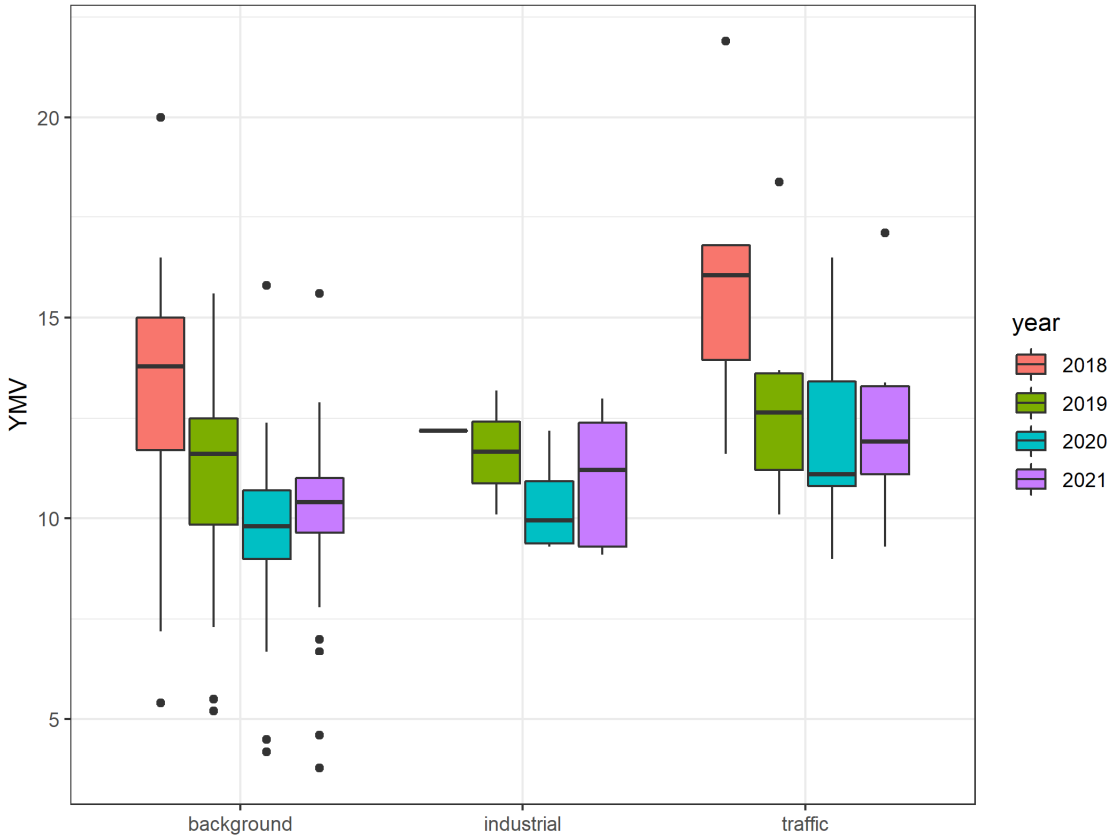

Figure 11: distribution of $PM_{2.5}$ YMV within each category (background, industrial, traffic) and year

Regarding NO_2 stations there are significantly higher YMV for traffic stations than for background or industrial stations (see Figure 12). Between background and traffic stations there are no significant differences in YMV.

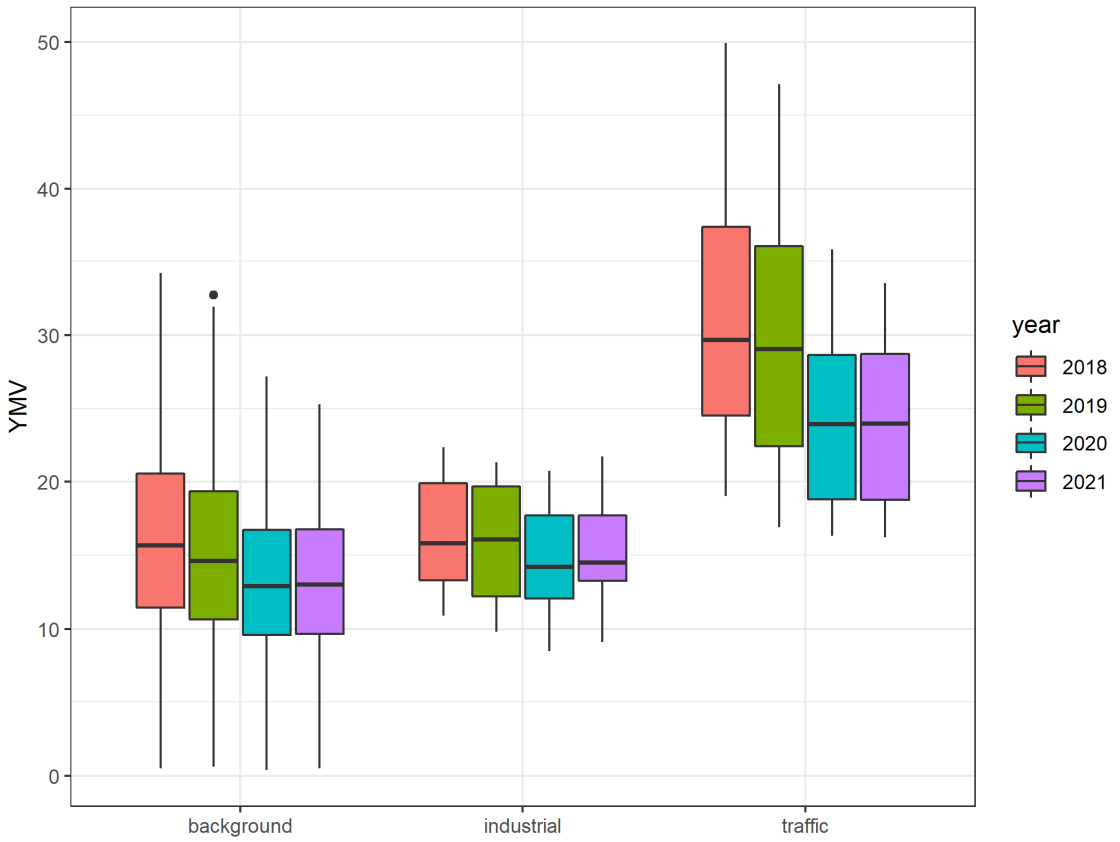

Figure 12: distribution of NO_2 YMV within each category (background, industrial and traffic) and year.

Additional metadata of the stations are obtained from European Environment Agency Data Portal (EEA). These metadata include further information about stations, e.g. distance to kerb, distance to buildings, main emission source, etc. but this information is only available for a small percentage (40% or less) of all stations of interest. Consequently, these metadata are not used in our study.

3.3 ADDITIONAL DATA

3.3.1 Current redevelopment areas

One strategy in Austria to improve air quality levels referring to particulate matter and other air pollutants is the designation of redevelopment areas. Such redevelopment areas are defined within each province by the respective offices of the provinces. Geographical polygons of current redevelopment areas with respect to PM_{10} and NO_2 are provided by Federal Environment Agency Austria. The current PM_{10} redevelopment areas include nearly the whole area of the provinces of Burgenland, Vienna, the South and East of Styria, the urban areas Klagenfurt and Linz and some parts in Lower Austria as can be seen in Figure 13. Additionally, all 133 PM_{10} stations are shown as black dots in the map. The current redevelopment area of NO_2 contains urban areas like Vienna,

Linz and Feldkirch as well as sections of highways (see Figure 14). All 148 NO_2 sampling points are marked with a black dot in this map.

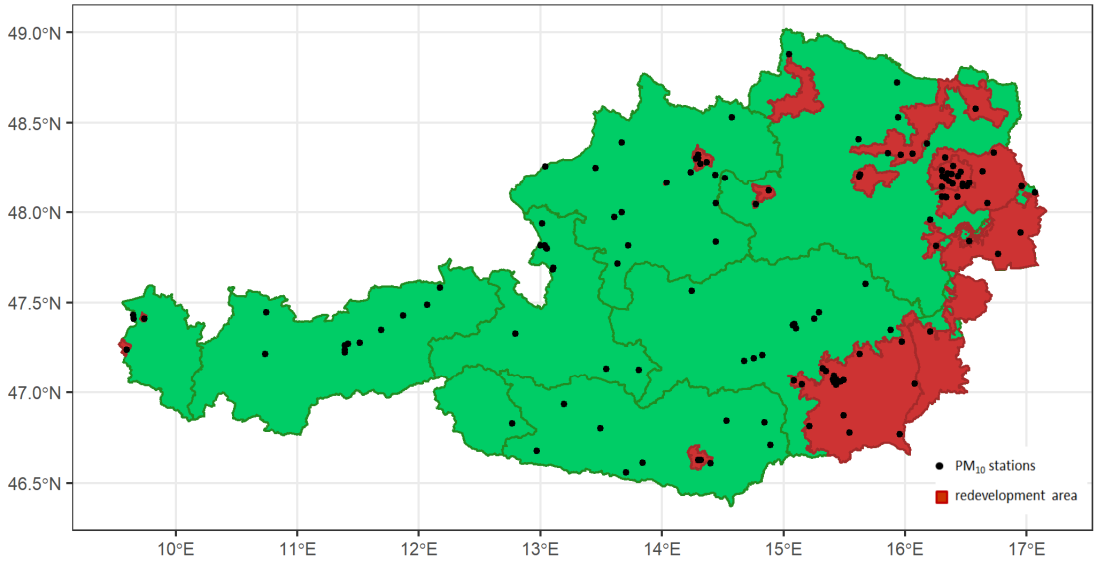

Figure 13: current PM_{10} redevelopment areas (red) with PM_{10} stations (black)

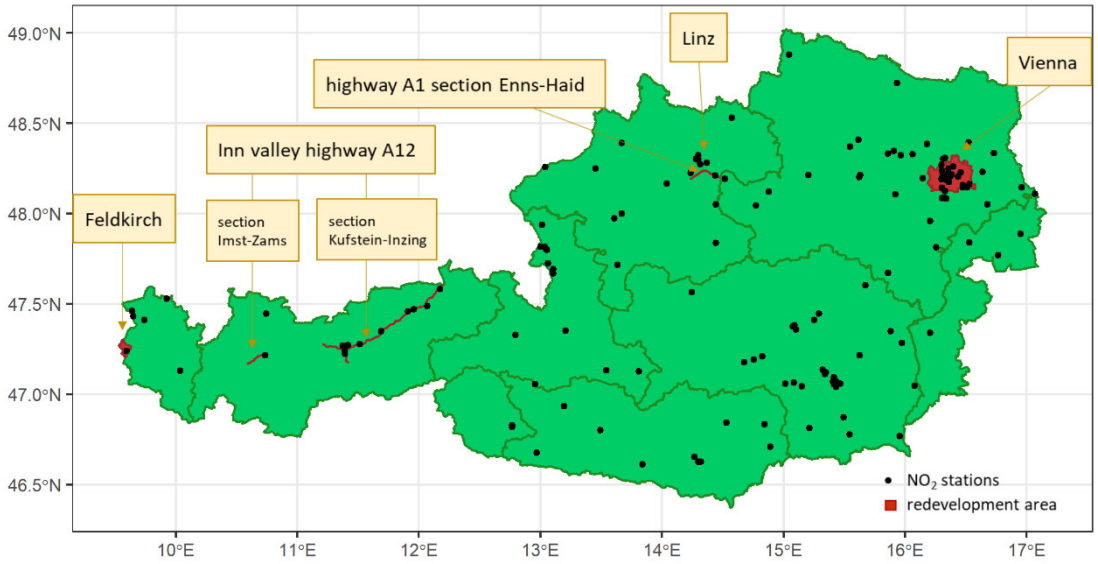

Figure 14: current NO_2 redevelopment areas (red) with NO_2 stations (black)

3.3.2 Geographical Data of Austria

All additionally required geographical information about Austria is obtained via the open data portal "Open Data Österreich" (www.data.gv.at). This includes

- digital elevation model (DEM) of Austria with a raster resolution of 100m. For our purpose the raster data are aggregated to a resolution of 1km.

- Administrative borders of Austria (including national borders, provinces' borders, district borders and municipality borders)
- Main rivers in Austria

3.3.3 Population Data of Austria

Some data regarding population are obtained from Statistik Austria: population level 2021 (data.statistik.gv.at) and the degree of urbanisation according to the European Commission (www.statistik.at/services/tools/services/regionales/regionale-gliederungen)

4 Methodology

4.1 EXCEEDING OF DAILY / YEARLY AVERAGES

The yearly and daily mean values of each station are compared to the respective target suggested by the air quality guidelines (AQGs) 2021 of the World Health Organization (WHO). The targets of yearly and daily averages of the air quality parameters PM_{10}, $PM_{2.5}$ and NO_2 are shown in Table 17.

target	PM10		PM2.5		NO2	
	DMV	YMV	DMV	YMV	DMV	YMV
interim target 1	150	-	75	35	120	40
interim target 2	100	50	50	25	50	30
interim target 3	75	30	37.5	15	-	20
interim target 4	50	20	25	10	-	-
AQG level	45	15	15	5	25	10
EU limit	50	40	-	25		40

Table 17: Targets of WHO Air Quality Guidelines 2021

In the first evaluation step, we identify individual stations which show an exceedance with respect to an individual target, year and air quality parameter. In case of yearly mean values a direct comparison between yearly mean value and target or limit value is made. In case of daily mean values we use specific scenarios of daily mean values. Where exceedances are allowed on 3 to 4 days per year, the 99th percentile is selected. The second used scenario for daily mean values is the 90.4th percentile that represents an exceedance on maximum 35 days per year. The two plots

in Figure 15 demonstrate the difference in the amount of station exceedances by (i) allowing exceedances on 3-4 days per year (upper plot) and (ii) allowing exceedances on max. 35 days per year (lower plot) with respect to the current EU limit of 50µg/m^3 (dashed red line).The black dots in Figure 15 are the 99th percentile of DMV (corresponding to 3-4 days exceedance per year) and the 90.4th percentile of DMV (corresponding to max. 35 days exceedance per year) for each station. In case of allowed exceedances on max. 35 days per year there are no stations that exceed the EU limit, whereas in case of allowed exceedances on 3-4 days per year there are 37 stations of 133 stations (28% of stations) that exceed the EU limit.

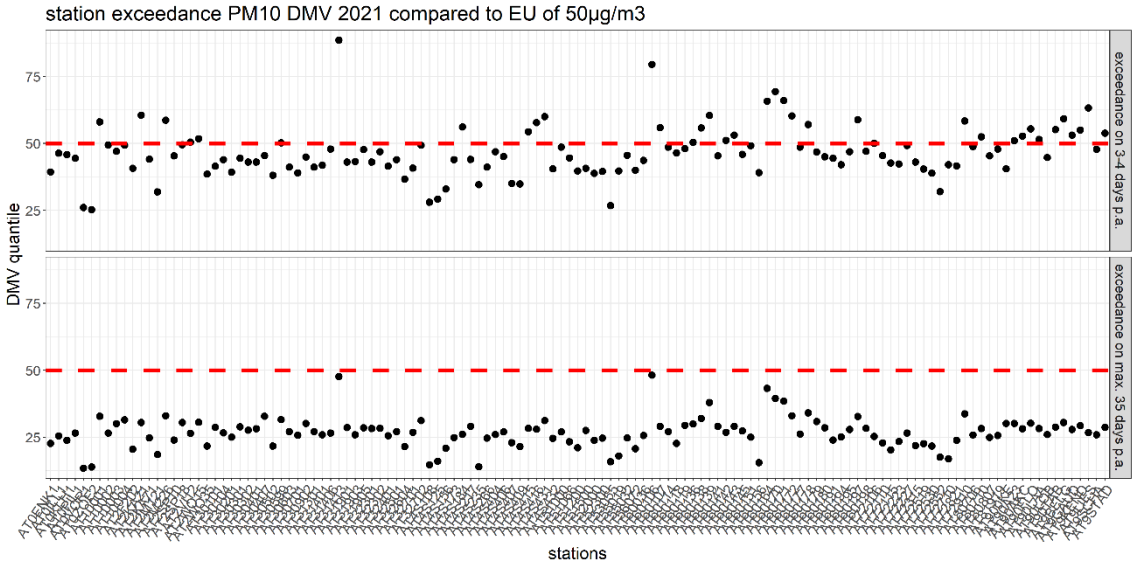

Figure 15: station exceedances of PM_{10} DMV 2021 with respect to EU limit (dashed red line) by allowing exceedance on 3-4 days per year (upper plot, 99th percentile) and by allowing exceedance on max. 35 days per year (lower plot, 90.4th percentile)

In the second evaluation step we identify areas of Austria which are affected by exceedances with respect to a specific air quality parameter, year and limit value. The scenario simulation is based on both annual mean values or on daily mean values, with the latter additionally distinguished between the stricter (using 99th percentile) and the less strict (using 90.4th percentile) scenario. In order to be able to identify zones affected by exceedances, Austria is divided into homogeneous zones based on several criteria. A detailed description of the area classification can be found in section 4.2. A zone is marked as exceedance zone with respect to an individual air quality parameter, a specific limit value and year, if the representative station within this zone shows the exceedance. If more than one station lies within a zone, the average value of the stations inside the zone is used.

After identifying affected zones, the number of affected manufacturing companies in Austria is determined. It is clear, that all companies within an affected zone are marked as affected by an exceedance. In case of PM_{10}, an additional aspect results from the consideration of the current PM_{10} redevelopment area. Explicitly, the number and percentage of “additional” company probably concerned by future measures – company sites outside current PM_{10} redevelopment areas, but situated in areas that are affected by exceedances - are calculated.

4.2 REPRESENTATIVE ZONES

A nationwide zoning is performed with respect to provide areas, as homogeneous as possible with respect to appearance and distribution of air pollution. Based on the report of Spangl and Nagl (2017) topographic-climatic regions of Austria (Figure 16) as well as the degree of urbanisation (Figure 17) are taken into account. The latter information is obtained from Statistik Austria which offers the urbanisation degree per municipality based on guidelines of the European Commission.

Additionally, the PM_{10} concentrations (yearly mean values) of the stations over the years 2018 to 2020 are considered for defining homogeneous zones. It should be mentioned that only measurement data of the three years 2018 to 2020 are used, since the validated and complete measurement data of 2021 were obtained in a very late phase of the study. The PM_{10} yearly mean values are clustered in such a way, that the air pollution concentrations within a zone show a maximum deviation of 2.5µg/m^3. Some exceptions from that deviation rule are made for urban areas like Graz, Vienna, Klagenfurt and Linz, as well as some valley regions (see Table 18) with respect to the range of PM_{10} concentrations. In urban areas it is obvious that the concentrations show a greater variation, but a further differentiation into smaller urban zones does not serve the purpose of this kind of study.

In Table 18 all zones are listed with the number of representative stations (sampling points) within each zone and the range of PM_{10} concentration within this zone. A note on the side: In Graz, one station (Lustbühel station) was not included in the analysis, since its values are significantly lower than the values of all other stations in the urban area of Graz. Nevertheless, the low concentration values at this station are plausible, since this station is located in an elevated position surrounded by natural landscape. So this station isn’t representative for the urban area.

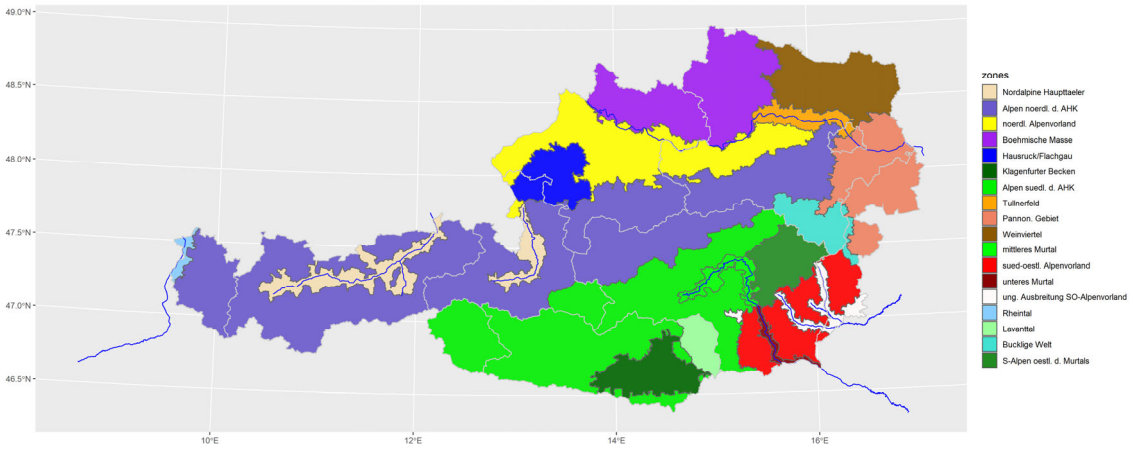

Figure 16: topographic-climatic regions of Austria

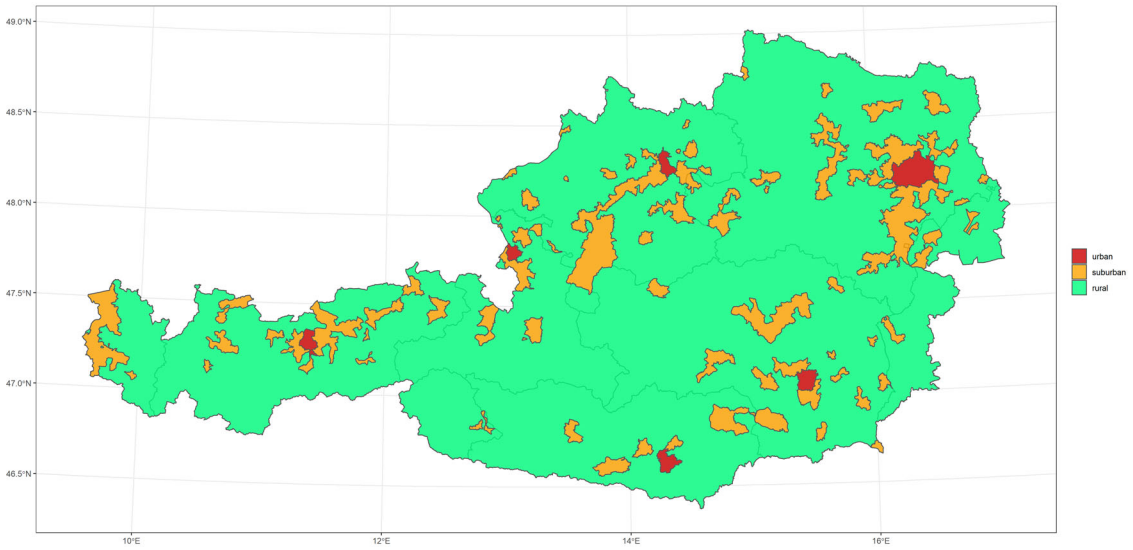

Figure 17: degree of urbanisation based on Statistik Austria

nr	zone	number of stations	PM10 range
1	Alpen noerdl. d. AHK - rural (east part)	2	within 2.5
2	Alpen noerdl. d. AHK - rural (west part (Tirol, Vorarlberg))	1	within 2.5
3	Alpen noerdl. d. AHK - suburban	3	3.1
4	Alpen noerdl. d. AHK - urban	1	within 2.5
5	Alpen suedl. d. AHK - rural	4	within 2.5
6	Alpen suedl. d. AHK - rural Kötschach-Mauthen	1	within 2.5
7	Alpen suedl. d. AHK - suburban	4	within 2.5
8	Boehmische Masse - rural (600m -)	1	within 2.5
9	Boehmische Masse - rural (600m +)	1	within 2.5
10	Bucklige Welt, S-Alpen oestl. d. Murtals	1	within 2.5
11	cross-border exposure	2	within 2.5
12	Graz	7*	6.7
13	Hausruck/Flachgau	1	within 2.5
14	Klagenfurter Becken - rural (4000 inh. -)	1	within 2.5
15	Klagenfurter Becken - rural (4000 inh. +)	1	within 2.5
16	Klagenfurter Becken - suburban	1	within 2.5
17	Klagenfurter Becken - urban	2	5
18	Lavanttal - rural (5000 inh. -)	1	within 2.5
19	Lavanttal - rural (5000 inh. +)	1	within 2.5
20	Lavanttal - suburban	1	within 2.5
21	mittleres Murtal	7	within 2.5
22	mittleres Murtal (Judendorf-Straßengel)	1	within 2.5
23	mittleres Murtal (Leoben)	1	within 2.5
24	noerdl. Alpenvorland - rural (3000 inh. -)	1	within 2.5
25	noerdl. Alpenvorland - rural (3000 inh. +)	2	within 2.5
26	noerdl. Alpenvorland - suburban	9	within 2.5
27	noerdl. Alpenvorland - suburban (6000 inh. -)	2	within 2.5
28	noerdl. Alpenvorland - suburban (Steyr)	1	within 2.5
29	noerdl. Alpenvorland (Linz)	4	3.4
30	noerdl. Alpenvorland (Salzburg)	3	within 2.5
31	Nordalpine Haupttaeler	11	4.8
32	Nordalpine Haupttaeler - urban	2	within 2.5
33	Pannon. Gebiet - rural	2	within 2.5
34	Pannon. Gebiet - suburban	10	2.7
35	Pannon. Gebiet - urban (Vienna)	10	6.7
36	Rheintal	4	within 2.5
37	S-Alpen oestl. d. Murtals	1	within 2.5
38	sued-oestl. Alpenvorland - rural	2	within 2.5
39	sued-oestl. Alpenvorland - suburban	2	within 2.5
40	Tullnerfeld - urban	2	within 2.5
41	Tullnerfeld east part	2	within 2.5
42	Tullnerfeld west part	3	within 2.5
43	ung. Ausbreitung SO-Alpenvorland	4	within 2.5
44	unteres Murtal	1	within 2.5
45	Weinviertel - rural	2	within 2.5
46	Weinviertel - suburban	1	within 2.5

*Table 18: number of stations and range of PM_{10} concentration per zone based on yearly mean values of 2018 to 2020. *without station Lustbühel*

4.3 PROPORTION OF PM_{10} AND $PM_{2.5}$

Since there are less stations with $PM_{2.5}$ measurements than PM_{10} measurements (e.g. 63 $PM_{2.5}$ stations versus 133 PM_{10} stations) the study had to cope with stations with "missing" $PM_{2.5}$ concentrations to obtain representative air quality measurement data for each zone to cover the whole area of Austria. So, the proportion of PM_{10} and $PM_{2.5}$ concentrations is considered at stations where both air quality parameters are measured. A factor of 0.68 is estimated for the mean proportion $PM_{2.5}/PM_{10}$ with a standard deviation of 0.049. At stations with available PM_{10} but without $PM_{2.5}$ measurements a $PM_{2.5}$ concentration can be obtained with the formula $PM_{2.5} = 0.68*PM_{10}$.

5 Results

In this chapter the simulation results of different scenarios for PM_{10} (section 5.1), $PM_{2.5}$ (section 5.2) and NO_2 (section 5.3) are presented. There is a subsection for each type of statistic (e.g. yearly mean values (YMV) and of daily mean values (DMV)) within each section. Each subsection is divided into two parts: the first part refers to the results considering station exceedings and the resulting affected areas (based on the zone definition of section 4.2). In the second part the simulation results are demonstrated with respect to the amount of affected manufacturing company sites.

For clarity reasons we decided to focus on results of the simulation according to scenarios of the year 2021 in this chapter. All other results (e.g. figures and tables of 2018, 2019 and 2020) can be found in the Annex of this report. Note that all scenarios concerning DMV are simulated with an exceedance of 3 to 4 days per year as well as with an exceedance of max. 35 days per year (the latter representing the current number of allowed EU exceedance days). In this chapter only the results of exceedances of 3 to 4 days per year are presented. The resulting pictures and tables of an exceedance of max. 35 days per year are summarized in the Annex.

An additional question in this study was whether Covid-19 related effects could be detected. However, since we only examined the measured values on an annual basis - i.e. YMV and two DMV statistics per year - only annual comparisons were made. We were unable to verify the assumption that a significant decrease in pollutant levels would be seen in 2020 as a result of lockdowns and/or a change in emission behavior of sectors. A significant reduction in pollutant concentrations is seen from 2018 to 2019. In contrast, the difference in pollutant levels between 2019 and 2020 is much smaller and a decrease cannot be detected in all scenarios. More detailed analysis is needed to identify possible Covid-19 related effects.

5.1 PARTICULATE MATTER 10

5.1.1 Yearly mean value

The yearly mean values (YMV) of PM_{10} are compared to the following target / limit values (in descending order with respect to strictness): AQG level (15 µg/m^3), interim target 4 (20 µg/m^3), interim target 3 (30 µg/m^3), EU limit (40 µg/m^3), interim target 2 (50 µg/m^3).

Stations and areas with exceedances

Consideration over all four years

First of all, the worst case scenario with cumulated exceedances over all four years is discussed. Therefore, a station is marked as exceedance station, if it shows an exceedance at least in one of the four years with respect to a given target or limit value. The use of AQG level show that 84.2% of the stations indicate an exceedance at least in one of the four years.The comparison of AQG level and EU limit with respect to cumulated exceedances shows a significant decrease in affected areas (no exceedance station and no affected areas if EU limit is used), see Figure 18. As noted in section 4.1, a zone is affected, if the average over all stations within this zone exceeds the respective limit value. The same comparison of affected stations and affected areas is made with interim target 4 and EU limit, see Figure 19. The use of interim target 3 causes just one single exceeding station over all four years. This has no effect on any area, since averaging over all stations within a zone weakens the impact of this single sampling point. As can be seen inTable 19, the EU limit and interim target 2 indicate no exceedance stations and affected areas.

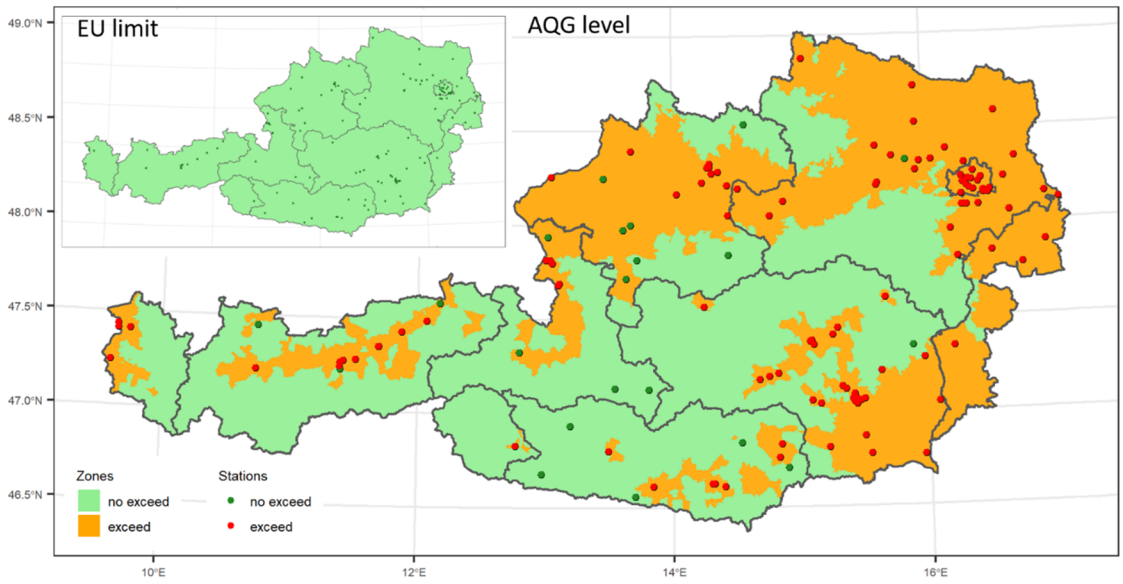

Figure 18: PM_{10} YMV 4 years AQG level vs. EU limit – exceedance stations and areas with respect to AQG level (big picture; exceedance stations: 84.2%, affected area: 43.7%) and EU limit (small picture).[1]

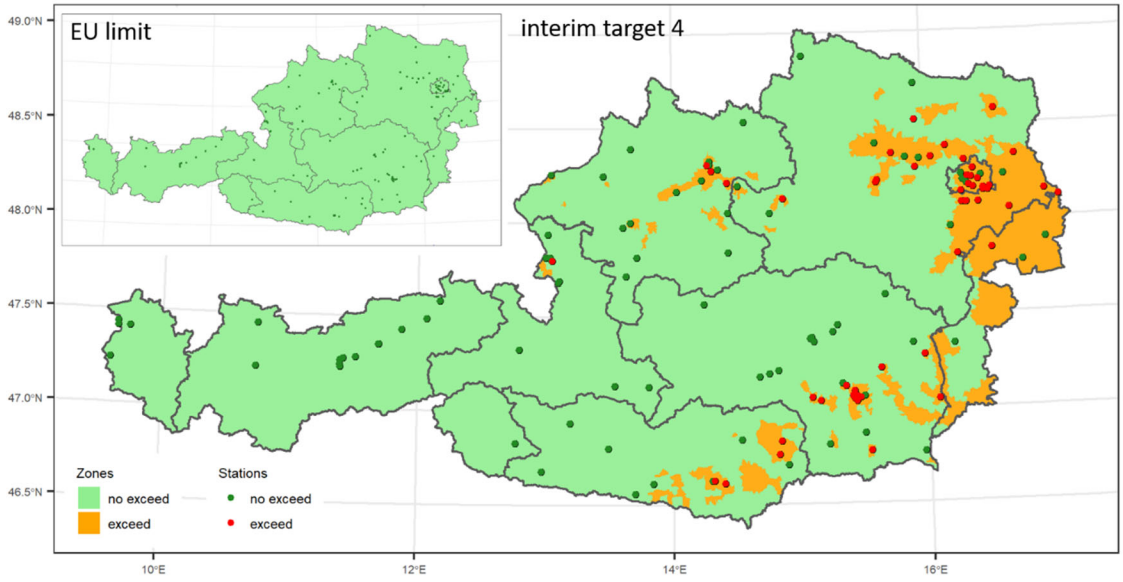

Figure 19: PM_{10} YMV 4 years interim target 4 vs. EU limit – exceedance stations and areas with respect to interim target 4 (big picture; exceedance stations: 84.2%, affected area: 43.7%) and EU limit (small picture)

[1] As noted in section 4.1, an area is marked as affected, if the station within this area indicates an exceeding. If more than one station is within a zone, the average value of the stations inside the zone is used.

PM10 YMV (all four years)		exceedance stations number	exceedance stations %	affected area km2	affected area %
AQG	15 µg/m3	112	84.2%	36647.7	43.7%
it4	20 µg/m3	52	39.1%	9697.2	11.6%
it3	30 µg/m3	1	0.8%	0.0	0.0%
EU	40 µg/m3	0	0.0%	0.0	0.0%
it2	50 µg/m3	0	0.0%	0.0	0.0%

Table 19: PM_{10} YMV all four years – exceedance stations and affected areas

Consideration of single years

The exceedances of the stations are considered for each single year from 2018 to 2021. In Table 20 the number of exceeding stations for each single year for different targets is shown. Considering the scenario for the most recent year 2021 there are 55.6% of the PM_{10} stations (74 of 133 PM_{10} stations) with an exceedance with respect to PM_{10} YMV AQG level. The stations with an exceedance are mainly situated in urban areas as well as in areas with unfavourable propagation conditions, e.g. valleys (see red dots in Figure 20).

The number of stations with exceedances is remarkably reduced to 6% (8 of 133 stations) in 2021 if interim target 4 is taken (see Table 20, Figure 21). Finally, less restrictive targets like interim target 3, interim target 2 and the EU limit do not cause any station exceedances in all four years – except in year 2018: there is one station with an exceedance concerning interim target 3 (see Table 20). In Figure 22 there are only green points representing the PM_{10} stations without an exceedance in 2021 with respect to interim target 3.

PM10, YMV, 133 stations										
	AQG level		interim target 4		interim target 3		EU limit		interim target 2	
year	number	percent	number	percent	number	percent	number	percent	number	percent
2018	101	75.9%	52	39.1%	1	0.8%	0	0.0%	0	0.0%
2019	80	60.2%	7	5.3%	0	0.0%	0	0.0%	0	0.0%
2020	76	57.1%	4	3.0%	0	0.0%	0	0.0%	0	0.0%
2021	74	55.6%	8	6.0%	0	0.0%	0	0.0%	0	0.0%

Table 20: PM_{10} YMV - number (and percent) of exceeding stations per year for different target / limit values

Based on the station measurement values and the zone definition (see section 4.2) exceedance zones are simulated for each single year from 2018 to 2021 with respect to different target and limit values. Table 21 indicates the amount of affected areas (in km^2 and the percentage of Austria's total area) per year with respect to different target / limit values. In 2021 there are 16.3% of the area of Austria affected by exceedance with respect to AQG level of 15 µg/m^3. The affected areas are

mainly in the east of Austria (see orange areas in Figure 20). Regarding interim target 4 there is a strong reduction in the percentage of affected area (from 16.3% to 1.4%) for the year 2021 (see Table 21). The affected areas are reduced to the urban area of Graz and some areas in Styria with unfavourable distribution conditions (Feistritz-, Lafnitztal, Güssing and Voitsberg) as shown in Figure 21 for the year 2021. With lower target / limit values (e.g. interim target 3, interim target 2 and EU limit) no areas are affected (see Figure 22 for year 2021). The same is the case in the years 2018, 2019 and 2020.

	AQG		it4		it3		EU		it2	
PM_{10}, YMV	km^2	%	km^2	%	km^2	%	km^2	%	km^2	%
2018	36647.1	43.7	9697.2	11.6	0.0	0.0	0.0	0.0	0.0	0.0
2019	23414.0	27.9	127.6	0.2	0.0	0.0	0.0	0.0	0.0	0.0
2020	10177.0	12.1	127.6	0.2	0.0	0.0	0.0	0.0	0.0	0.0
2021	13667.5	16.3	1210.8	1.4	0.0	0.0	0.0	0.0	0.0	0.0

Table 21: PM_{10} YMV - affected area in km^2 (and %) per year with respect to different target / limit values

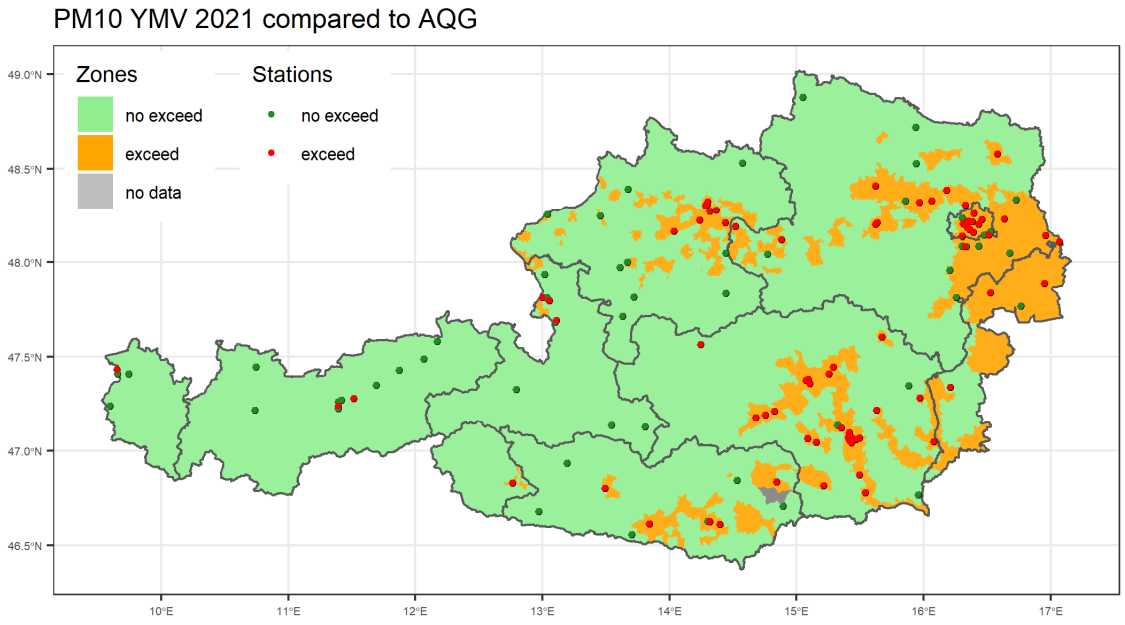

Figure 20: PM_{10} YMV 2021 AQG level - exceedance stations and areas with respect to AQG level of 15 µg/m^3 (74 stations of 133 (55.6%), affected area: 16.3%).

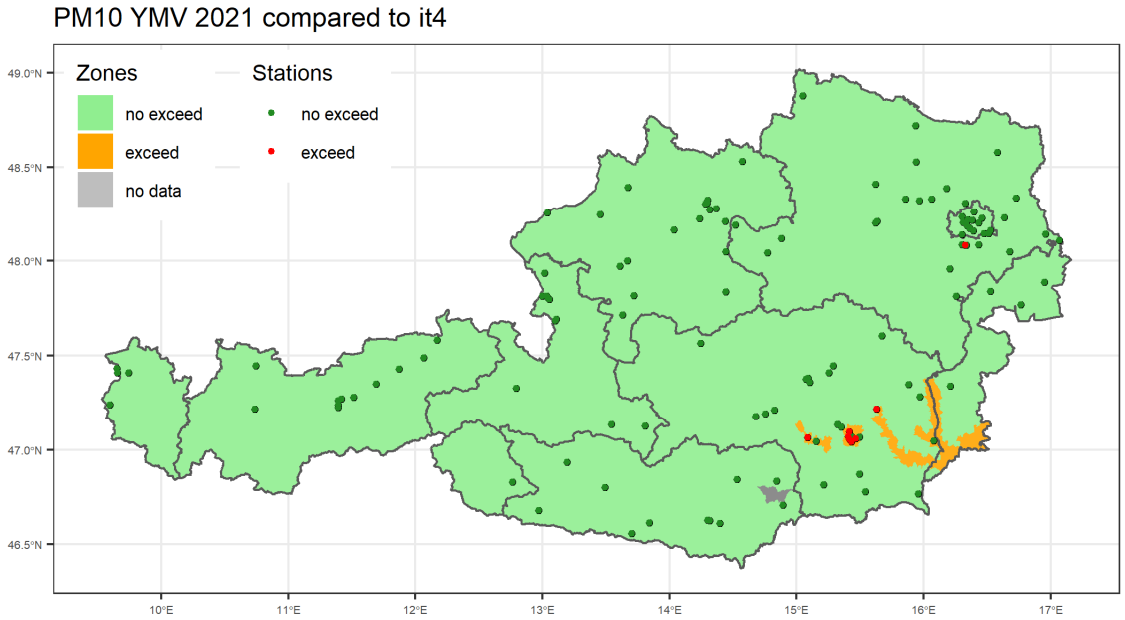

Figure 21: PM_{10} YMV 2021 interim target 4 - exceedance stations and areas with respect to interim target 4 of 20 µg/m^3 (8 stations of 133 (6%), affected area: 1.4%).

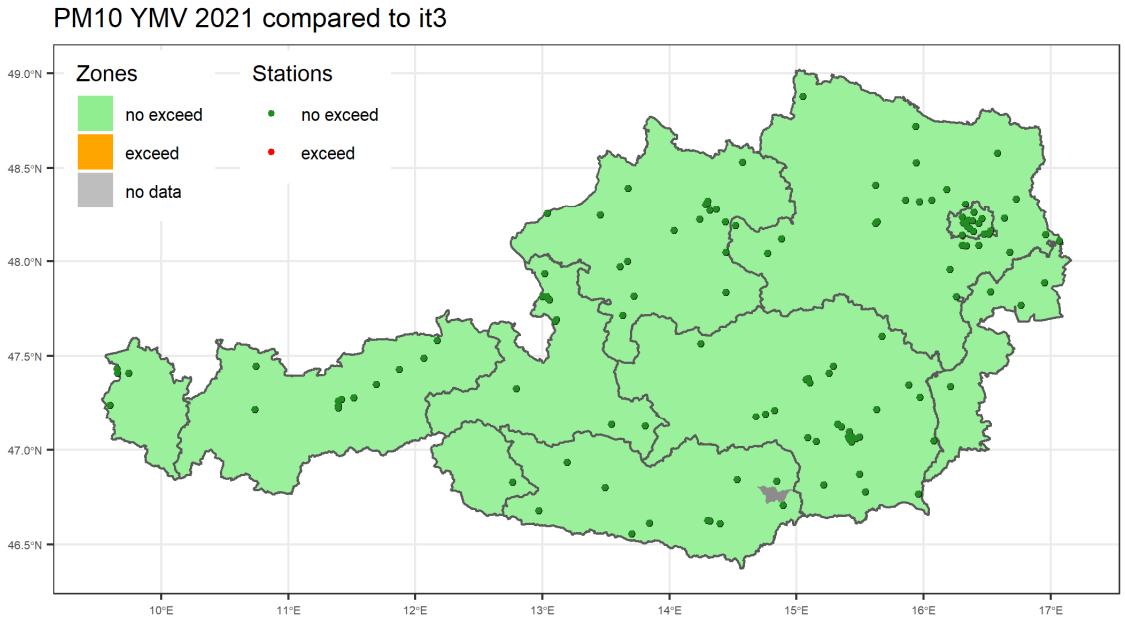

Figure 22: PM_{10} YMV 2021 interim target 3- exceedance stations and areas with respect to interim target 3 of 30 µg/m^3 (0 stations of 133 (0%), affected area: 0%).

Affected company sites

Consideration over all four years

Since cumulated exceedances over four years with respect to AQG level cause 43% affected area that mainly contains regions with a high density of company sites, there are nearly 80% of company sites affected by AQG level exceedance, see Table 22. All company sites that are located in an affected area are marked as affected. The percentage is significantly reduced to 36.8% by the use of interim target 4. The EU limit has no impact on company sites.

	AQG	it4	it3	EU	it2
total number of company sites	66031	66031	66031	66031	66031
number of affected company sites	52675	24279	0	0	0
percent of affected company sites	79.8%	36.8%	0.0%	0.0%	0.0%

Table 22: PM_{10} YMV 4 years – number and percentage of affected company sites

At present, 23,364 (35.4%) company sites are in current PM_{10} redevelopment areas. If the AQG level is applied, 29,830 (45.2%) company sites would be affected by exceedances that are not currently in PM_{10} redevelopment areas, see Table 23 and Table 24. In total, with the company sites currently in PM_{10} redevelopment areas (regardless of whether they are affected by exceedance or not) and those affected company sites outside of PM_{10} redevelopment areas, 53,194 (80.6%) company sites would be affected by potential future measures should the current PM_{10} redevelopment area be expanded.

PM10 YMV						
number of company sites	AQG			it4		
	total	craft	industry	total	craft	industry
within redev. area	23364	20308	3056	23364	20308	3056
affected outside redev. areas	29830	26599	3231	6068	5364	704
probably affected by measures	53194	46907	6287	29432	25672	3760

Table 23: PM_{10} YMV all four years – number of company sites within current PM_{10} redevelopment areas, affected company sites outside current PM_{10} redevelopment areas and sum of both

PM10 YMV						
percent of company sites	AQG			it4		
	total	craft	industry	total	craft	industry
within redev. area	35.4%	34.7%	40.8%	35.4%	34.7%	40.8%
affected outside redev. areas	45.2%	45.4%	43.1%	9.2%	9.2%	9.4%
probably affected by measures	80.6%	80.1%	83.9%	44.6%	43.9%	50.2%

Table 24: PM_{10} YMV all four years – percentage of company sites within current PM_{10} redevelopment areas, affected company sites outside current PM_{10} redevelopment areas and sum of both

Consideration of single years

Finally, the amount of potentially affected manufacturing company sites for each single year is considered. In Table 25 the number of affected manufacturing company sites (including industry company sites and small manufacturing and craft company sites) in Austria as well as the percentage of all manufacturing company sites in Austria is shown per year with respect to different target / limit values.

PM_{10} YMV										
target	AQG		it4		it3		EU		it2	
	number	percent	number	percent	number	percent	number	percent	number	percent
2018	52656	79.7%	24279	36.8%	0	0.0%	0	0.0%	0	0.0%
2019	39201	59.4%	1533	2.3%	0	0.0%	0	0.0%	0	0.0%
2020	26688	40.4%	1533	2.3%	0	0.0%	0	0.0%	0	0.0%
2021	29307	44.4%	2778	4.2%	0	0.0%	0	0.0%	0	0.0%

Table 25: PM_{10} YMV - number and percent of affected manufacturing company sites per year with respect to different target / limit values

The percentages of affected company sites per target value and year are demonstrated by the barplot of Figure 23.

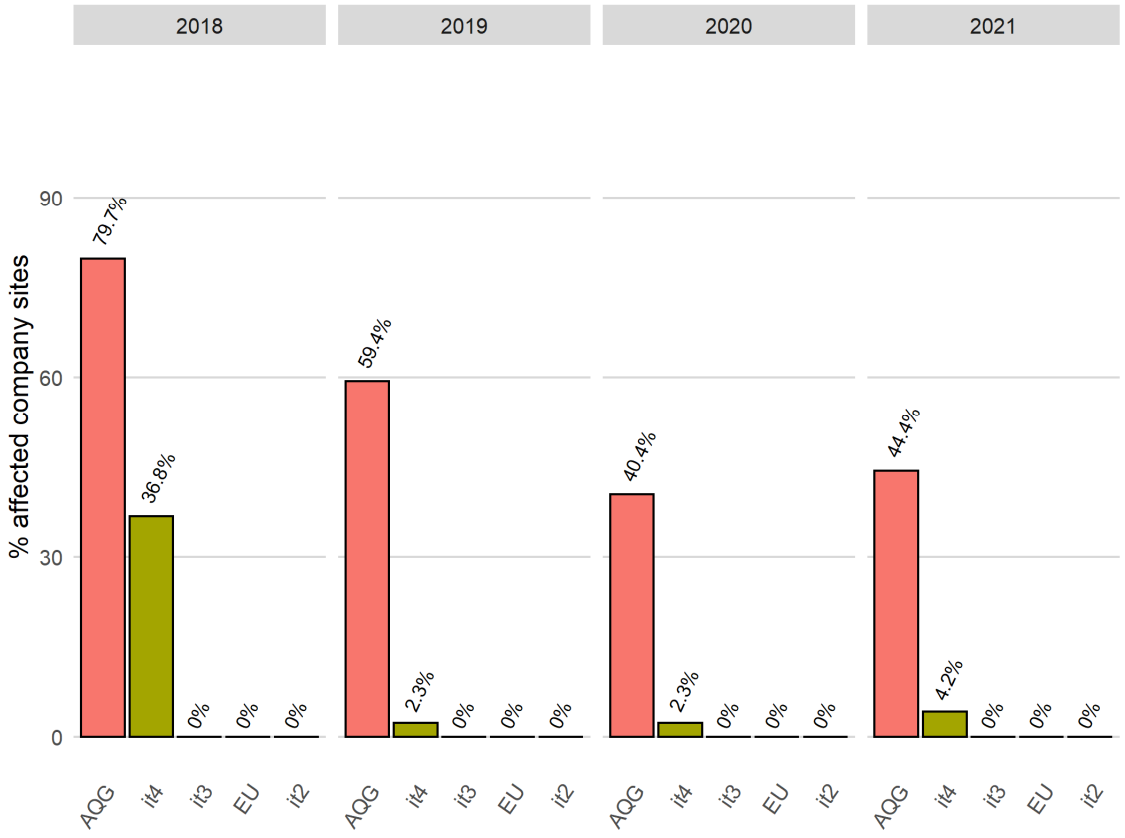

Figure 23: PM_{10} YMV - percent affected manufacturing company sites per year with respect to different target and limit values

Taking into account that 23364 (35.4%) company sites are in current PM_{10} redevelopment areas, it is of interest how many company sites outside current redevelopment areas would be affected by exceedances. In 2021 there are 10148 (15.4%) company sites that are affected by an exceedance of AQG level and situated outside current redevelopment areas. In total, 33512 (50.8%) company sites probably would be affected by future measures, see Table 26 and Table 27. Note that in some scenarios may not all company sites within a redevelopment area be affected by an exceedance. So the number of company sites probably affected by exceedances is not in every case equal to the number of company sites probably affected by future measures. In case of AQG level in 2021 there are 44.4% company sites affected by exceedance – 15.4% outside redevelopment areas and 29% within redevelopment areas, but 50.8% company sites probably be concerned by future measures – 35.4% within current redevelopment areas and 15.4% outside redevelopment areas that are affected by exceedance.

PM10 YMV 2021						
number of company sites	AQG			it4		
	total	craft	industry	total	craft	industry
within redev. area	23364	20308	3056	23364	20308	3056
affected outside redev. areas	10148	8944	1204	12	10	2
probably affected by measures	33512	29252	4260	23376	20318	3058

Table 26: PM_{10} YMV 2021 – number of company sites within current PM_{10} redevelopment areas, affected company sites outside current PM_{10} redevelopment areas and sum of both

PM10 YMV 2021						
percent of company sites	AQG			it4		
	total	craft	industry	total	craft	industry
within redev. area	35.4%	34.7%	40.8%	35.4%	34.7%	40.8%
affected outside redev. areas	15.4%	15.3%	16.1%	0.0%	0.0%	0.0%
probably affected by measures	50.8%	50.0%	56.9%	35.4%	34.7%	40.8%

Table 27: PM_{10} YMV 2021 – percentage of company sites within current PM_{10} redevelopment areas, affected company sites outside current PM_{10} redevelopment areas and sum of both

The number and percentages of affected company sites outside PM_{10} redevelopment areas and total number and percentage of company sites probably concerned by future measurements for the years 2018, 2019 and 2020 can be found in the Annex, section 8.1.4.

The consideration of the percentage of affected company sites per division and province is exclusively presented for PM_{10} in this section with graphics, tables and with accompanying text to get an insight of interpreting all the charts and tables. Note that for clarity reasons, all the tables and graphics according affected company sites per division and province for $PM_{2.5}$ and NO_2 are summarised in the Annex.

The distribution of affected company sites per division in the Austrian Federal Economic Chamber (industrial division and small manufacturing and craft division) and per province with respect to the AQG level and the year 2021 is shown in Figure 24. In all provinces (except Vorarlberg) affected company sites are to be found. For industry, the biggest percentage of affected company sites (based on all industrial company sites) is found in Vienna with 18%, followed by Lower Austria with 10.6%. For small manufacturing and craft company sites the biggest percentage of affected company sites (based on all small manufacturing and craft companies) is determined for Lower Austria with 11.9% followed by Vienna with 9.3%. Regarding all company sites without distinction of divisions the highest percentage of affected company sites (based on all company sites in Austria

(industry + small manufacturing and craft)) is in Lower Ausria with 11.7%, followed by Vienna with 10.2%.

Interim target 4 shows a significantly smaller affected area (only 1.4% area of Austria, see Table 21) and so significantly fewer company sites (2778 affected company sites = 4.2% of all company sites in Austria, see Table 25) are affected. All affected company sites are in Styria (3.7%) and Burgenland (0.5%) (see Figure 25). The percentages of affected companies in the provinces keep nearly the same if divisions are considered separately: in Styria are 3.5% and in Burgenland are 0.4% industrial company sites affected. For the small manufacturing and craft division there are 3.8% affected company sites in Styria and 0.5% in Burgenland.

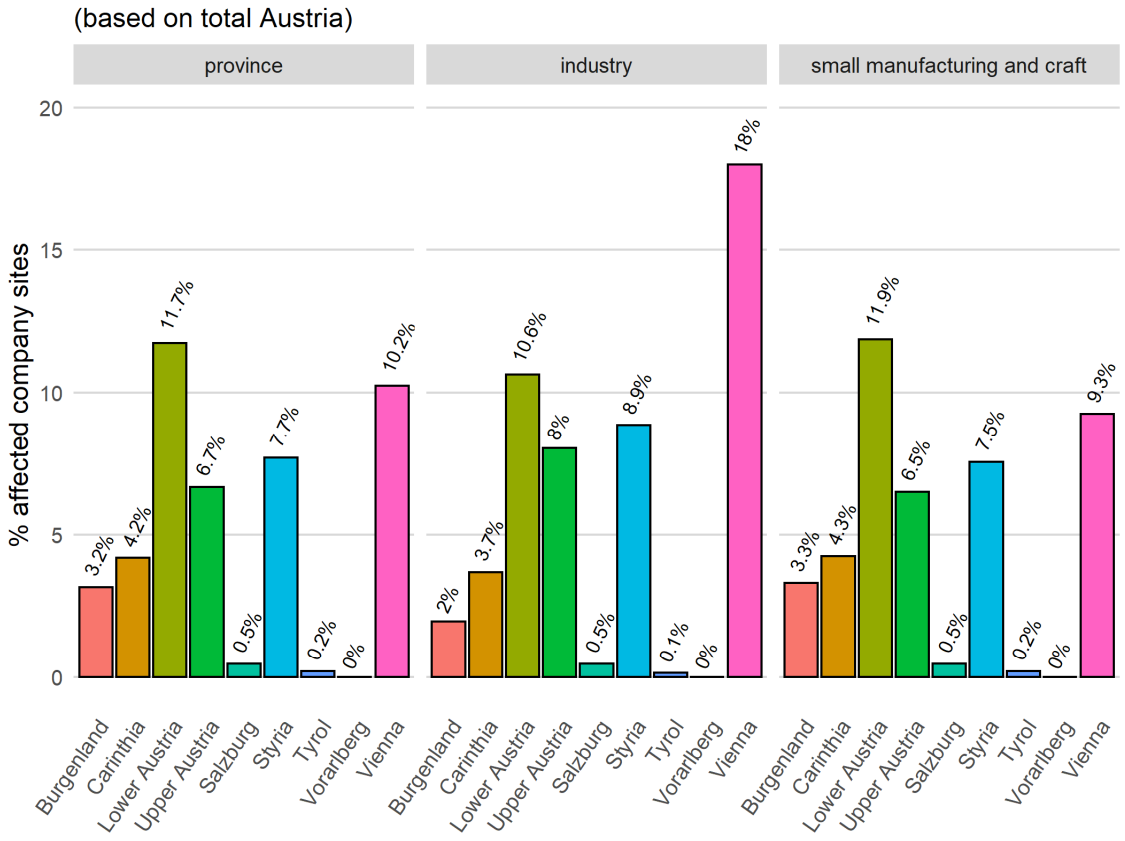

Figure 24: PM_{10} YMV 2021 AQG level - percentage affected company sites per division and province

PM10 YMV 2021 AQG												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	2087	1939	148	77.9	77.8	79.1	3.2	3.3	2.0
Carinthia	5147	4670	477	2766	2489	277	53.7	53.3	58.1	4.2	4.3	3.7
Lower A.	14361	12959	1402	7747	6951	796	53.9	53.6	56.8	11.7	11.9	10.6
Upper A.	11812	10368	1444	4407	3805	602	37.3	36.7	41.7	6.7	6.5	8.0
Salzburg	5304	4873	431	314	279	35	5.9	5.7	8.1	0.5	0.5	0.5
Styria	9601	8466	1135	5080	4416	664	52.9	52.2	58.5	7.7	7.5	8.9
Tyrol	7117	6510	607	140	129	11	2.0	2.0	1.8	0.2	0.2	0.1
Vorarlberg	3163	2730	433	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Vienna	6846	5470	1376	6766	5416	1350	98.8	99.0	98.1	10.2	9.3	18.0
total	**66031**	**58539**	**7492**	**29307**	**25424**	**3883**				**44.4**	**43.4**	**51.8**

Table 28: PM_{10} YMV 2021 AQG level – number and percentage affected company sites per division and province

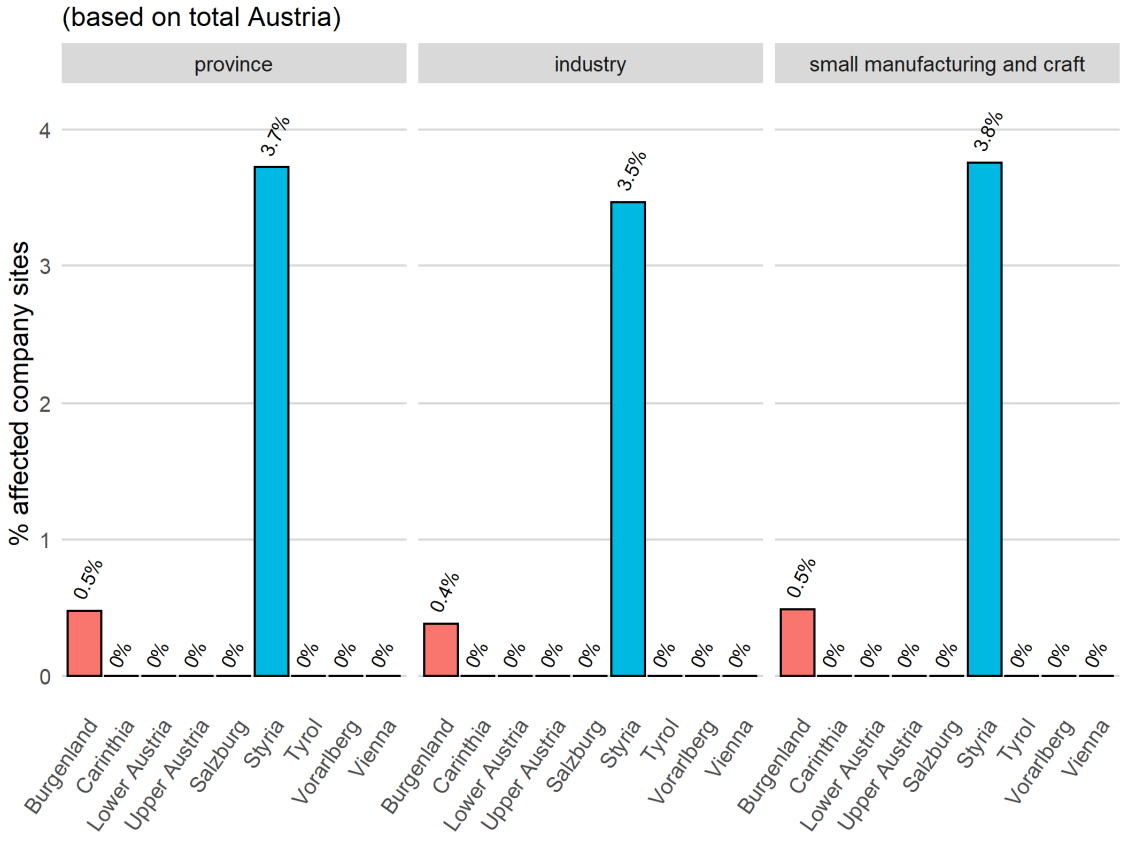

Figure 25: PM_{10} YMV 2021 interim target 4 - percentage affected company sites per division and province

PM10 YMV 2021 interim target 4												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	318	289	29	11.9	11.6	15.5	0.5	0.5	0.4
Carinthia	5147	4670	477	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Lower A.	14361	12959	1402	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Upper A.	11812	10368	1444	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Salzburg	5304	4873	431	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Styria	9601	8466	1135	2460	2200	260	25.6	26.0	22.9	3.7	3.8	3.5
Tyrol	7117	6510	607	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Vorarlberg	3163	2730	433	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Vienna	6846	5470	1376	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
total	**66031**	**58539**	**7492**	**2778**	**2489**	**289**				**4.2**	**4.3**	**3.9**

Table 29: PM_{10} YMV 2021 interim target 4 – number and percentage affected company sites per division and province

Summarising the main results for yearly mean values of PM_{10}

Applying AQG level yields exceedances mainly in the east, South-East of Austria, but also areas in Lower and Upper Austria. In 2018 wide areas are affected by exceedance. In 2019 there is a small decrease in affected areas, but in 2020 the reduction of affected area is more significant and is mainly observed in Burgenland and Lower Austria.

The exceedance areas with respect to interim target 4 are much smaller than those to AQG level. The strongest exceedance is obtained in 2018 where 11.6% of the total area of Austria is affected. In the following both years the exceedance area reduces to the urban area of Graz. In 2021 the affected area includes the urban area of Graz and the zone with unfavorable dispersion conditions in the south-east of Alpenvorland (zone “ungünstige Ausbreitungsbedingungen südöstliches Alpenvorland”).

All less restrictive targets as interim target 3, interim target 2 and EU limit cause no exceedance areas.

No results are obtained for region Flachgau / Hausruck in 2018 and 2019, since there are no PM_{10} measurements available at the representative stations for this region (see respective figures in the Annex).

No results are obtained for region Lavanttal (rural), since the representative station for this region has no measurements in 2020 and 2021.

5.1.2 Daily Mean Value

The daily mean values (DMV) of PM_{10} are compared to the following target / limit values (in descending order with respect to strictness): AQG level (45 µg/m^3), interim target 4 / EU limit (50 µg/m^3), interim target 3 (75 µg/m^3), interim target 2 (100 µg/m^3), interim target 1 (150 µg/m^3). All scenarios are simulated with an exceedance of 3 to 4 days per year as well as with an exceedance

of max. 35 days per year. In this section the results of exceedances of 3 to 4 days per year are presented with the focus on the most current year, 2021. The resulting pictures and tables of the years 2018, 2019 and 2020 as well as the results of an exceedance of max. 35 days per year are summarized in the Annex.

The cumulated consideration of exceedances over four years in this sections includes a graphical comparison between the scenario with 3 to 4 exceedance days p.a. and the scenario with maximum 35 exceedance days p.a..

Stations and areas with exceedances

A station is marked as station with exceedance if there were exceedances on 3 to 4 days per year at the station. As noted in section 4.1 an exceedance of 3-4 days per year corresponds to the 99th percentile of daily mean values.

Consideration over all four years

First, the impact of cumulated exceedances over four years on sampling points and areas is considered. The use of AQG level (with 3 to 4 exceedance days p.a.) results in 110 exceeding stations (82.7%) and 36.9% affected area, see Figure 26. In comparison, applying the current EU limit (max. 35 exceedance days p.a.) causes just one single exceeding station, but no affected area. If max. 35 exceedance days p.a. are used for the AQG level, seven stations and a very small affected area (0.1%) – see Table 31 – can be identified in Carinthia (Lavanttal), see small picture in Figure 27.

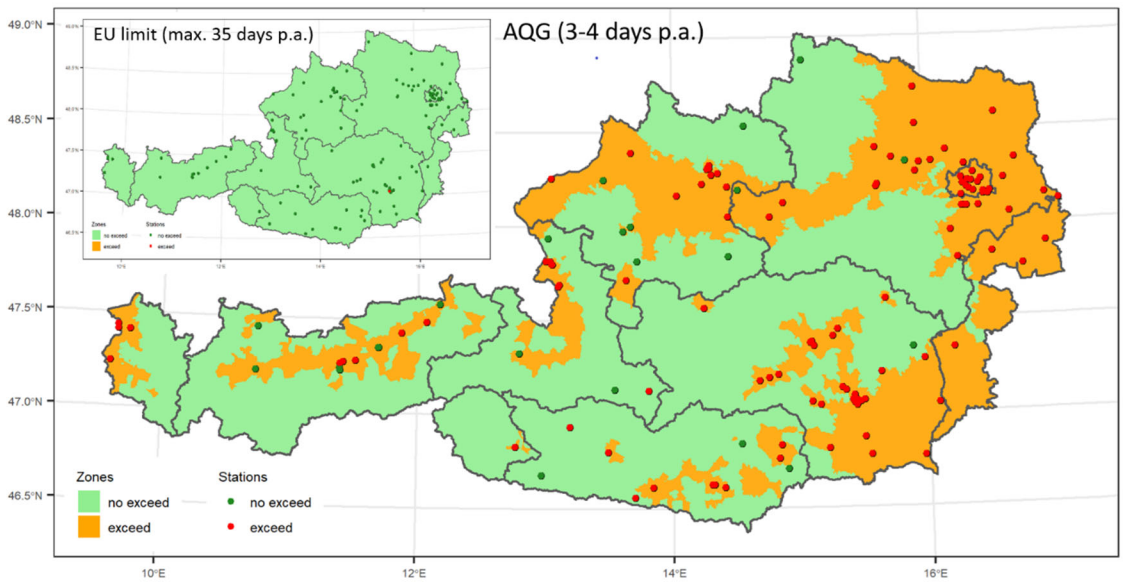

Figure 26: PM_{10} DMV 4 years AQG level (3 to 4 exceedance days p.a.) vs. EU limit (max. 35 exceedance days p.a.) – exceedance stations and areas with respect to AQG

level (big picture; exceedance stations: 82.7%, affected area: 36.9%) and EU limit (small picture; 1 exceedance station)

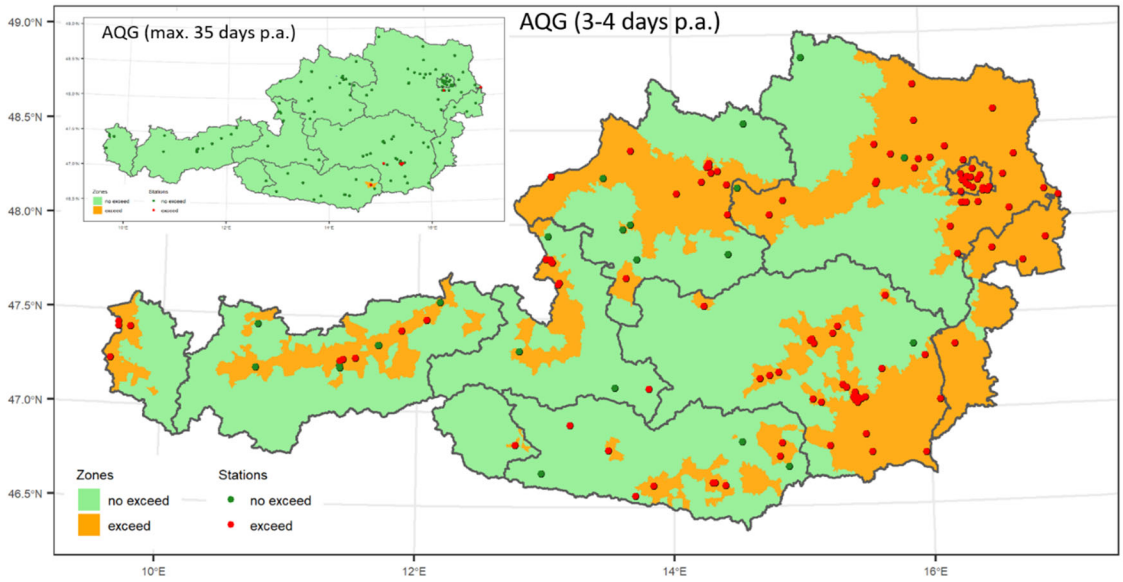

Figure 27: PM_{10} DMV 4 years AQG level (3 to 4 exceedance days p.a.) vs. AQG level (max. 35 exceedance days p.a.) – exceedance stations and areas with respect to AQG level 3 to 4 days (big picture; exceedance stations: 82.7%, affected area: 36.9%) and AQG level max 35 days (small picture; exceedance stations: 5.3%, affected area: 0.1%)

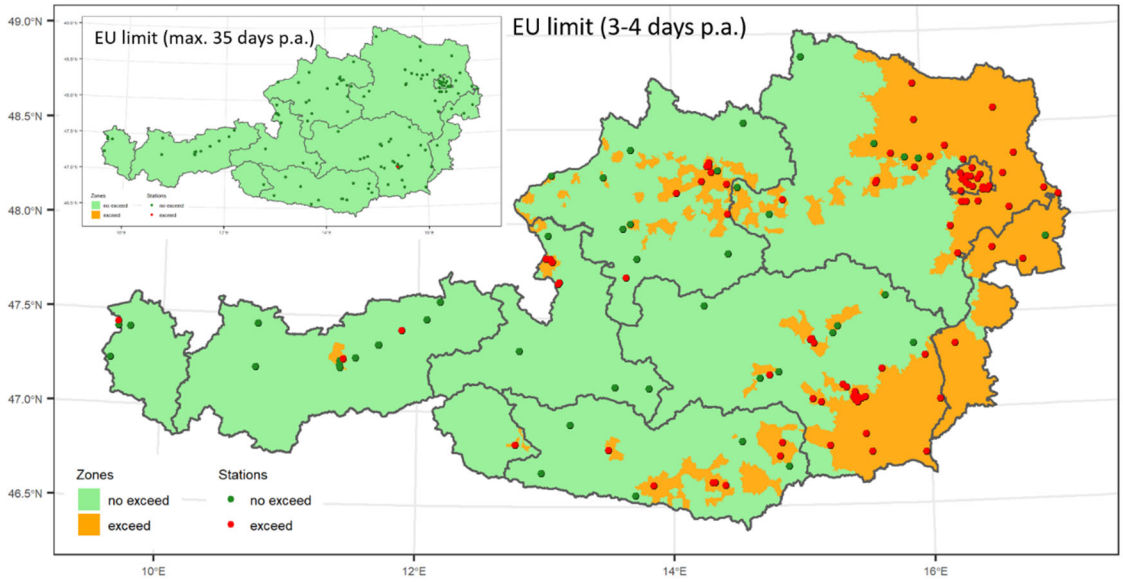

Figure 28: PM_{10} DMV 4 years EU limit (3 to 4 exceedance days p.a.) vs. EU limit (max. 35 exceedance days p.a.) – exceedance stations and areas with respect to EU limit 3 to 4 days (big picture; exceedance stations: 66.2%, affected area: 23.8%) and EU limit 35 days (small picture; 1 exceedance station)

PM10 DMV (3-4 days)		exceedance stations		affected area	
(all four years)		number	%	km^2	%
AQG	45 µg/m3	110	82.7%	30936.5	36.9%
EU	50 µg/m3	88	66.2%	20003.8	23.8%
it3	75 µg/m3	4	3.0%	0.0	0.0%
it2	100 µg/m3	0	0.0%	0.0	0.0%
it1	150 µg/m3	0	0.0%	0.0	0.0%

Table 30: PM_{10} DMV (3 to 4 exceedance days p.a.) 4 years - exceedance stations and affected areas

PM10 DMV (max 35 days)		exceedance stations		affected area	
(all four years)		number	%	km^2	%
AQG	45 µg/m3	7	5.3%	113.5	0.1%
EU	50 µg/m3	1	0.8%	0.0	0.0%
it3	75 µg/m3	0	0.0%	0.0	0.0%
it2	100 µg/m3	0	0.0%	0.0	0.0%
it1	150 µg/m3	0	0.0%	0.0	0.0%

Table 31: PM_{10} DMV (max. 35 exceedance days p.a.) 4 years - exceedance stations and affected areas

Consideration of singe years

The station exceedances are considered for each single year from 2018 to 2021. In Table 32 the number of exceeding stations per year for different targets is shown. Considering the scenario for the year 2021 there are 52.6% of the PM_{10} stations (70 of 133 PM_{10} stations) with an exceedance with respect to PM_{10} DMV AQG level. Most of the stations with an AQG level exceedance are located in urban areas as well as in areas with unfavourable propagation conditions, e.g. valleys (see red dots in Figure 29).

Applying the EU limit reduces the amount of exceedance stations to 27.8% of the stations (37 of 133 stations, see Table 32, Figure 30). For interim target 3 there are only one or two stations with an exceedance. But this few exceedance stations do not cause any affected areas. Interim target 2 and interim target 1 have no effect, e.g. there are no station exceedances in all four years. In Figure 31 there are only two red points representing the PM_{10} stations with an exceedance in 2021 with respect to interim target 3.

PM10, DMV, 133 stations										
	AQG level		EU limit		interim target 3		interim target 2		interim target 1	
year	number	percent	number	percent	number	percent	number	percent	number	percent
2018	95	71.4%	82	61.7%	1	0.8%	0	0.0%	0	0.0%
2019	53	39.8%	25	18.8%	0	0.0%	0	0.0%	0	0.0%
2020	51	38.3%	28	21.1%	1	0.8%	0	0.0%	0	0.0%
2021	70	52.6%	37	27.8%	2	1.5%	0	0.0%	0	0.0%

Table 32: PM_{10} DMV (exceedance on 3-4 days p.a.) - number (and percent) of exceeding stations per year for different target / limit values

PM10, DMV, exceedance 3 - 4 days per year										
	AQG level		EU limit		interim target 3		interim target 2		interim target 1	
year	km^2	percent	km^2	percent	km^2	percent	km^2	percent	km^2	percent
2018	30840.8	36.8%	19908.1	23.7%	0	0.0%	0	0.0%	0	0.0%
2019	15865.8	18.9%	1189.54	1.4%	0	0.0%	0	0.0%	0	0.0%
2020	10695.5	12.8%	1969.06	2.3%	0	0.0%	0	0.0%	0	0.0%
2021	13727.2	16.4%	4183.46	5.0%	0	0.0%	0	0.0%	0	0.0%

Table 33: PM_{10} DMV - affected area in km^2 (and %) per year with respect to different target / limit values

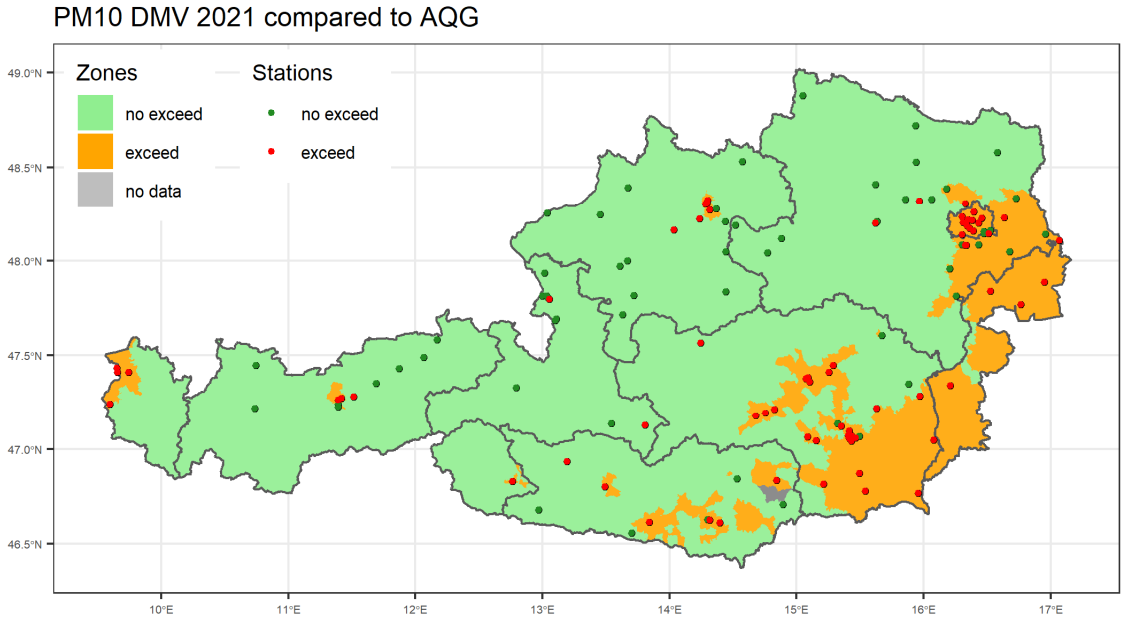

Figure 29: PM_{10} DMV 2021 AQG level (3-4 days exceedance p.a.)- exceedance stations and areas with respect to AQG level of 45 µg/m³ (70 stations of 133 (52.6%), affected area: 16.4%).

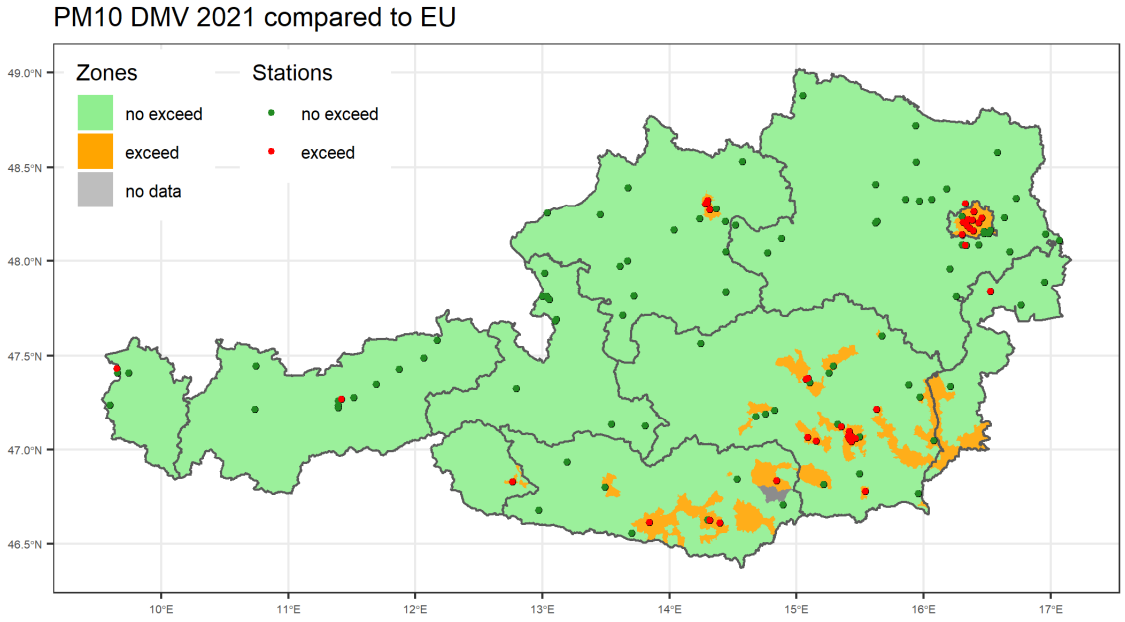

Figure 30: PM_{10} DMV 2021 EU limit (3-4 days exceedance p.a.)- exceedance stations and areas with respect to EU limit of 50 µg/m³ (37 stations of 133 (27.8%), affected area: 5%).

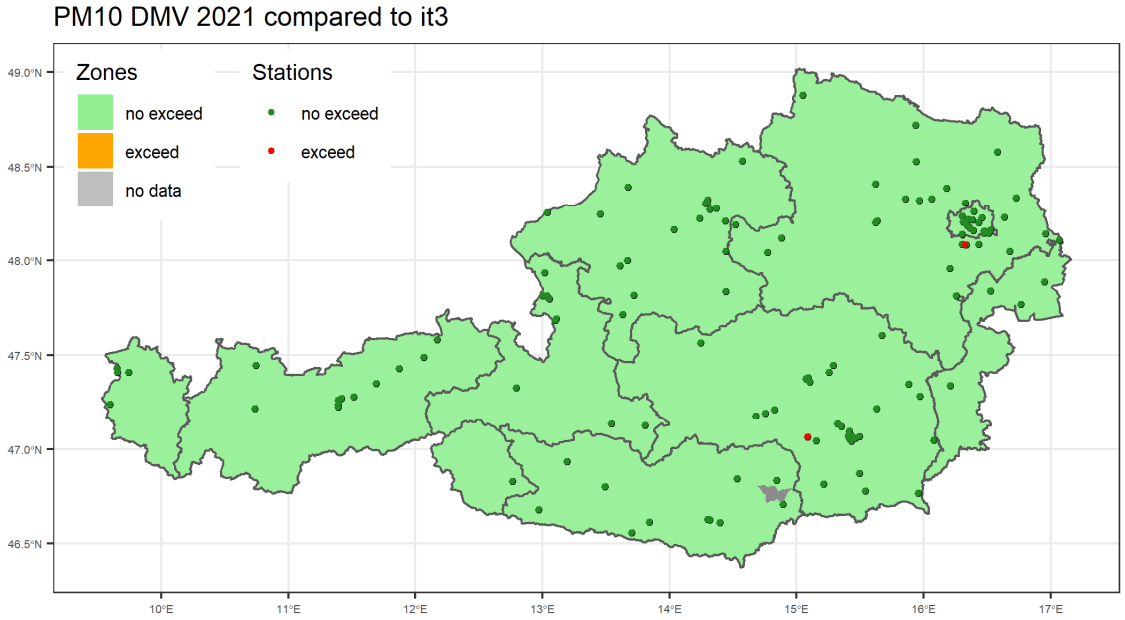

Figure 31: PM_{10} DMV 2021 interim target 3 (3-4 days exceedance p.a.)- exceedance stations and areas with respect to interim target 3 of 75 µg/m³ (2 stations of 133 (1.5%), affected area: 0%).

Affected company sites

Consideration over all four years

The amount of potentially affected manufacturing company sites is determined by all company sites located in an affected area. Since cumulated exceedances over four years with respect to AQG level cause 36.9% affected area that mainly contains regions with a high density of company sites, there are 73.3% of company sites affected by AQG level exceedance, see Table 34. The use of EU limit (with 3 to 4 exceedance days p.a.) results in a percentage of 52.4% company sites affected by an exceedance. All less restrictive targets (interim target 1 to 3) cause no affected areas and consequently no company sites are affected. The use of maximum 35 exceedance days p.a. has just an effect in case of AQG level. There are only 0.1% affected area which results in 0.2% affected company sites, see Table 35.

	AQG	EU	it3	it2	it1
total number of company sites	66031	66031	66031	66031	66031
number of affected company sites	48383	34583	0	0	0
percent of affected company sites	73.3%	52.4%	0%	0%	0%

Table 34: PM_{10} DMV (3 to 4 exceedance days p.a).4 years – number and percentage of company sites affected by exceedances

	AQG	EU	it3	it2	it1
total number of company sites	66031	66031	66031	66031	66031
number of affected company sites	107	0	0	0	0
percent of affected company sites	0.2%	0%	0%	0%	0%

Table 35: PM_{10} DMV (max. 35 exceedance days p.a).4 years – number and percentage of company sites affected by exceedances

Regarding current PM_{10} redevelopment areas, the percentage of company sites situated in a redevelopment area and currently concerned with measures is 35.4%. This percentage may be increased to 74.3%, if the percentage of company sites that are affected by an exceedance but are outside the current redevelopment area –that is 38.9% - are added, see Table 36 (number of company sites) and Table 37 (percentage of company sites).

.

PM10 DMV (3 to 4 exceedance days p.a.)						
number of company sites	AQG			EU limit		
	total	craft	industry	total	craft	industry
within redev. area	23364	20308	3056	23364	20308	3056
affected outside redev. areas	25707	22897	2810	12682	11333	1349
probably affected by measures	49071	43205	5866	36046	31641	4405

Table 36: PM_{10} DMV (3 to 4 exceedance days p.a).4 years – number of company sites within redevelopment area, affected outside redevelopment area and probably concerned by future measures.

PM10 DMV (3 to 4 exceedance days p.a.)						
percent of company sites	AQG			EU limit		
	total	craft	industry	total	craft	industry
within redev. area	35.4%	34.7%	40.8%	35.4%	34.7%	40.8%
affected outside redev. areas	38.9%	39.1%	37.5%	19.2%	19.4%	18.0%
probably affected by measures	74.3%	73.8%	78.3%	54.6%	54.1%	58.8%

Table 37: PM_{10} DMV (3 to 4 exceedance days p.a).4 years – percentage of company sites within redevelopment area, affected outside redevelopment area and probably concerned by future measures.

Consideration of singe years

In Table 38 the number of affected manufacturing company sites (industry, small manufacturing and craft company sites) in Austria as well as the percentage of all manufacturing company sites in Austria is shown for each single year with respect to different target / limit values.

PM_{10} DMV										
target	AQG		EU		it3		it2		it1	
	number	percent	number	percent	number	percent	number	percent	number	percent
2018	47465	71.9%	33665	51.0%	0	0.0%	0	0.0%	0	0.0%
2019	27556	41.7%	10405	15.8%	0	0.0%	0	0.0%	0	0.0%
2020	24006	36.4%	6750	10.2%	0	0.0%	0	0.0%	0	0.0%
2021	28071	42.5%	14713	22.3%	0	0.0%	0	0.0%	0	0.0%

Table 38: PM_{10} DMV (3 to 4 exceedance days p.a.) - number and percent of affected manufacturing company sites per year with respect to different target / limit values

The percentages from Table 38 are graphically represented as barplot in Figure 32. Whereas in 2018 there are 71.9% of company sites are affected with respect to AQG level, the percentage of affected companies is reduced to less than 43% in the following years 2019 - 2021. Considering the EU limit, there are 51% company sites affected by an exceedance in the year 2018. This percentage decreases in the subsequent three years to a value less than 23%. Since there are no exceedance areas identified for interim targets 1 to 3 no company sites are affected.

Further considerations on province level and on division distinction can be found in the Annex.

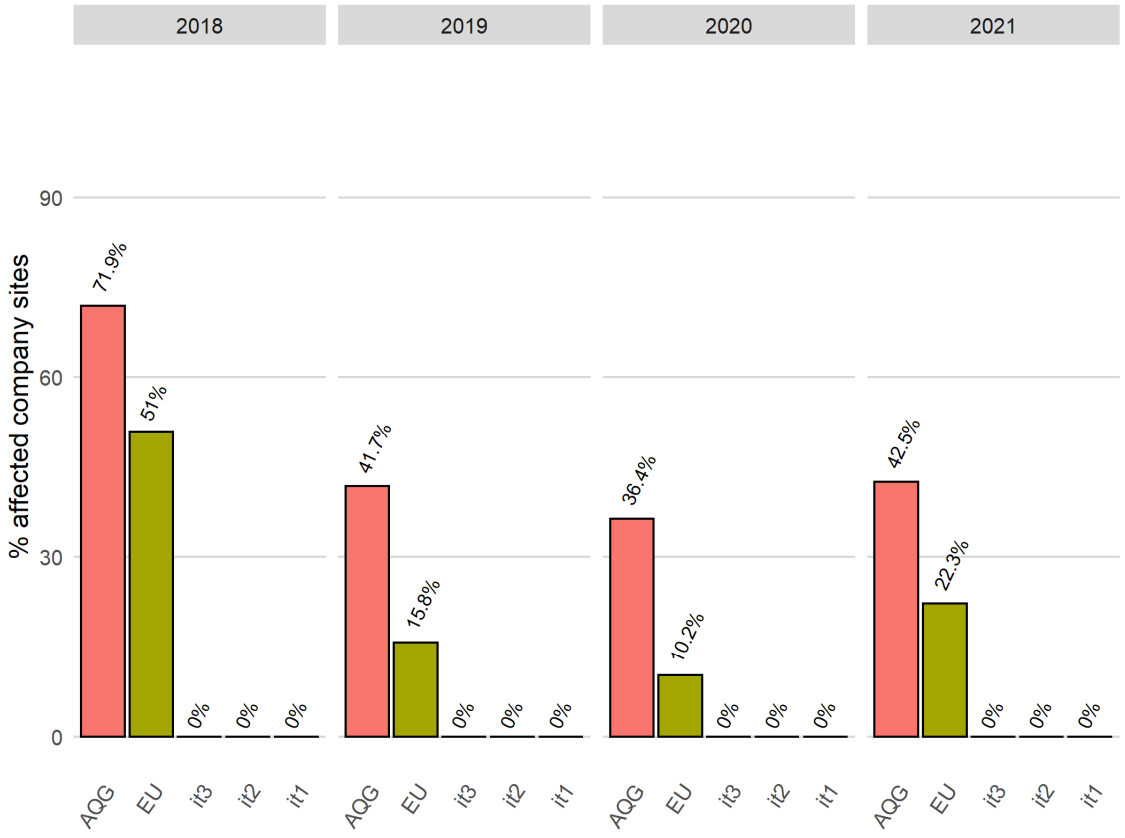

Figure 32: PM_{10} DMV - percent affected manufacturing company sites per year with respect to different target and limit values

Regarding current redevelopment areas, the percentage of company sites probably affected by future measures is increased from 35.4% company sites currently situated in redevelopment areas to 46.7% company sites by the use of AQG level in 2021, see Table 39 (number of company sites) and Table 40 (percentage of company sites).

PM10 DMV (3 to 4 exceedance days p.a.) 2021						
number of company sites	AQG			EU limit		
	total	craft	industry	total	craft	industry
within redev. area	23364	20308	3056	23364	20308	3056
affected outside redev. areas	7501	6583	918	2569	2300	269
probably affected by measures	30865	26891	3974	25933	22608	3325

Table 39: PM_{10} DMV 2021 – number of company sites within current PM_{10} redevelopment areas, affected company sites outside current PM_{10} redevelopment areas and sum of both

PM10 DMV (3 to 4 exceedance days p.a.) 2021						
percent of company sites	AQG			EU limit		
	total	craft	industry	total	craft	industry
within redev. area	35.4%	34.7%	40.8%	35.4%	34.7%	40.8%
affected outside redev. areas	11.4%	11.2%	12.3%	3.9%	3.9%	3.6%
probably affected by measures	46.7%	45.9%	53.0%	39.3%	38.6%	44.4%

Table 40: PM_{10} DMV 2021 – percentage of company sites within current PM_{10} redevelopment areas, affected company sites outside current PM_{10} redevelopment areas and sum of both

For the years 2018, 2019 and 2020 the respective tables are in the Annex, section 8.2.3.

Summarising the main results for daily mean values of PM_{10}

Affected areas with respect to AQG level are mainly found in the East and South of Austria, but additionally there are some areas of Lower and Upper Austria. In the year 2018 where the highest percentage of affected areas (36.8%) is identified, areas in the provinces of Salzburg, Tyrol and Vorarlberg are additionally affected (mainly urban areas and main traffic / transport routes). The size of affected areas reduces in the subsequent years, especially in 2019 and 2020.

The same effect can be observed for interim target 4 / EU limit where the highest number of affected areas is obtained in 2018. The affected area decreases in 2019 and 2020, and slightly increases in 2021 – as is the case for AQG level.

There are no affected regions with respect to interim target 3. One station in the urban area of Graz shows an exceedance in 2018, but averaging over all stations in the urban area of Graz yields no exceedance for this region. Interim target 2 and 1 do not cause any exceedances.

A comparison of the 3 to 4 days exceedance p.a. scenario with max. 35 days exceedance p.a. scenario shows that the scenario with 3 to 4 exceedance days is clearly more restrictive. Whereas the application of AQG level results in a percentage of affected company sites between 36.4 % and 71.9% for the scenario with 3 to 4 exceedance days, no affected company sites could be identified for the scenario with max. 35 days exceedance.

The following two figures give a view over the behaviour of the percentages of affected company sites according to PM_{10}. In Figure 33, the percentages of affected company sites according to AQG level based on YMV, DMV with 3-4 exceedance days as well as DMV with max. 35 exceedance days are considered. The DMV with max. 35 exceedance days shows no effect. The trend of percentage of affected company sites over time is the same for both, YMV and DMV (3-4 exceedance days). Both curves are decreasing from 2018 to 2020 and show a small increase in 2021. The percentages according to YMV are slightly higher than those of DMV.

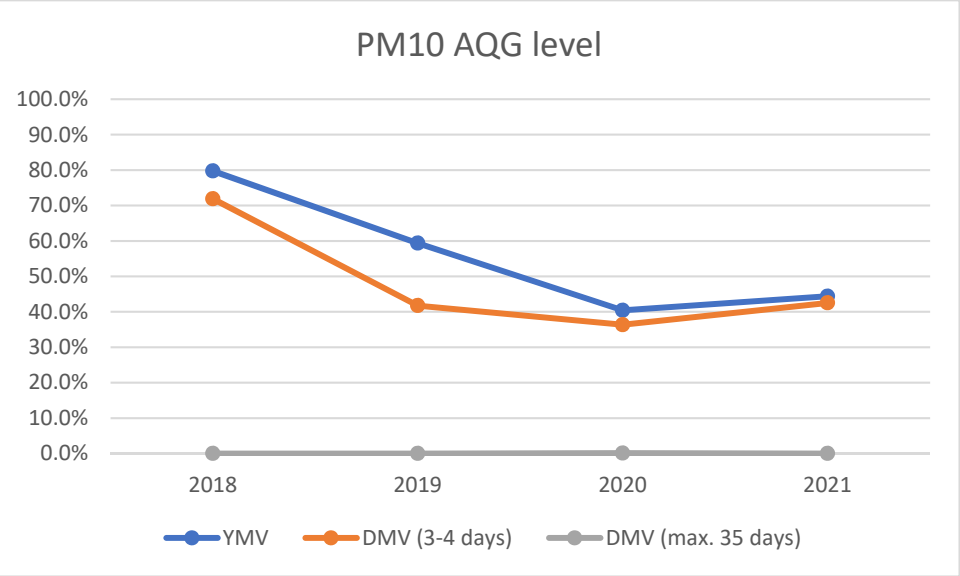

Figure 33: PM_{10} - comparing YMV and DMV percentages of affected company sites according to AQG level

Considering the resulting percentages of affected company sites according to interim target 4, the comparison of YMV and DMV (with 3-4 exceedance days p.a.) shows similar behavior, see Figure 34. In case of interim target 4, the decreasing trend of the curves from 2018 to 2020 is not as strong as is observed for AQG level. It is worth to note that in case of AQG level, the affected company percentages of YMV are higher than those of DMV (3-4 exceedance days p.a.), whereas in case of interim target 4 the reverse effect is observed, e.g. the percentages of DMV (3-4 exceedance days p.a.) are higher than those of YMV.

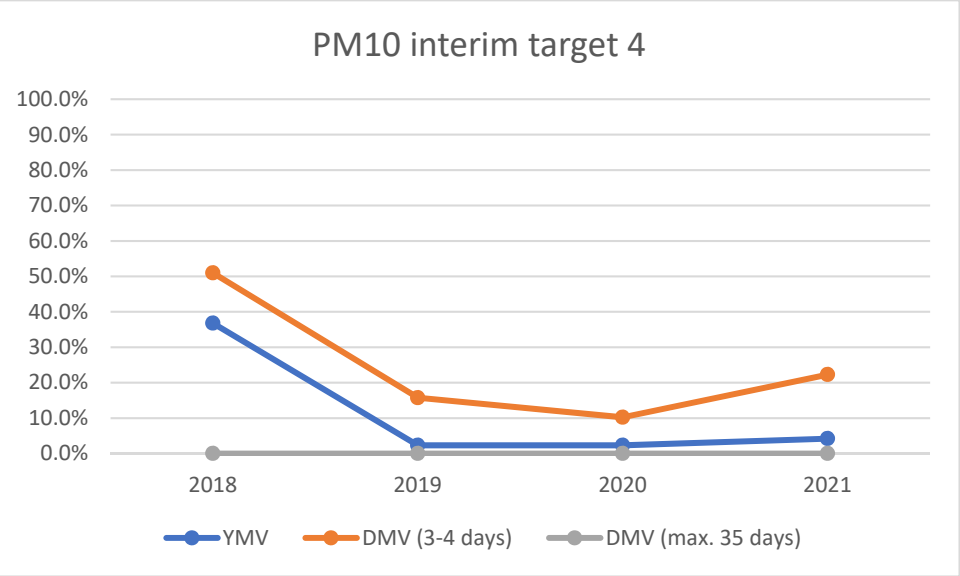

Figure 34: PM_{10} – comparing YMV and DMV percentages of affected company sites according to interim target 4

5.2 PARTICULATE MATTER 2.5

5.2.1 Yearly Mean Value

The yearly mean values (YMV) of $PM_{2.5}$ are compared to following target or limit values (in descending order with respect to strictness): AQG level (5 µg/m³), interim target 4 (10 µg/m³), interim target 3 (15 µg/m³), interim target 2 & EU limit (25 µg/m³), interim target 1 (35 µg/m³). There are 63 stations with $PM_{2.5}$ measurements.

Stations and Areas with Exceedances

Consideration over all four years

A cumulated consideration of exceedances over four years draws a worst case scenario, because the exceeding of a station in at least one year is already sufficient to be marked as an exceeding station. All stations have an exceedance and consequently all areas are marked as affected, if AQG level is used, see Figure 35. In comparison, there is not a single exceeding station – and no affected areas – by using the EU limit. The use of interim target 4 results in a percentage of 90.4% exceeding stations and 49.9% affected areas, see Figure 36. Switching to interim target 3, only 14 stations (22.2%) exceed the target value of 15 µg/m³ and 4.5% of the area of Austria remain affected, see Figure 37. In Table 41 the number and percentage of exceeding stations and affected areas are listed for different target and limit values.

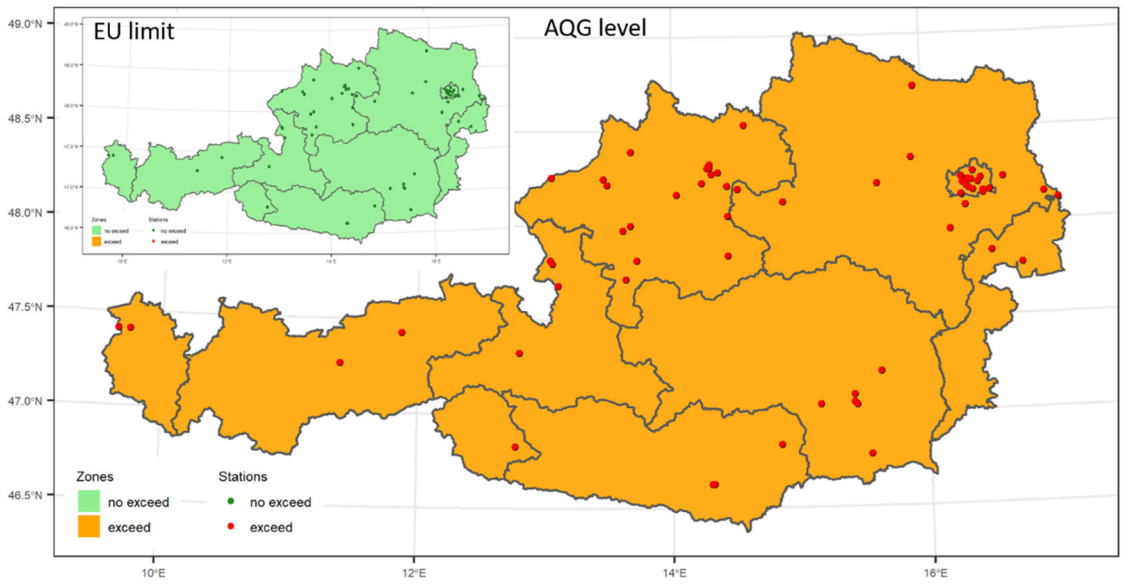

Figure 35: $PM_{2.5}$ YMV 4 years AQG level vs. EU limit - exceedance stations and areas with respect to AQG level (big picture; exceedance stations: 100%, affected area: 100%) and EU limit (small picture; no exceedance station)

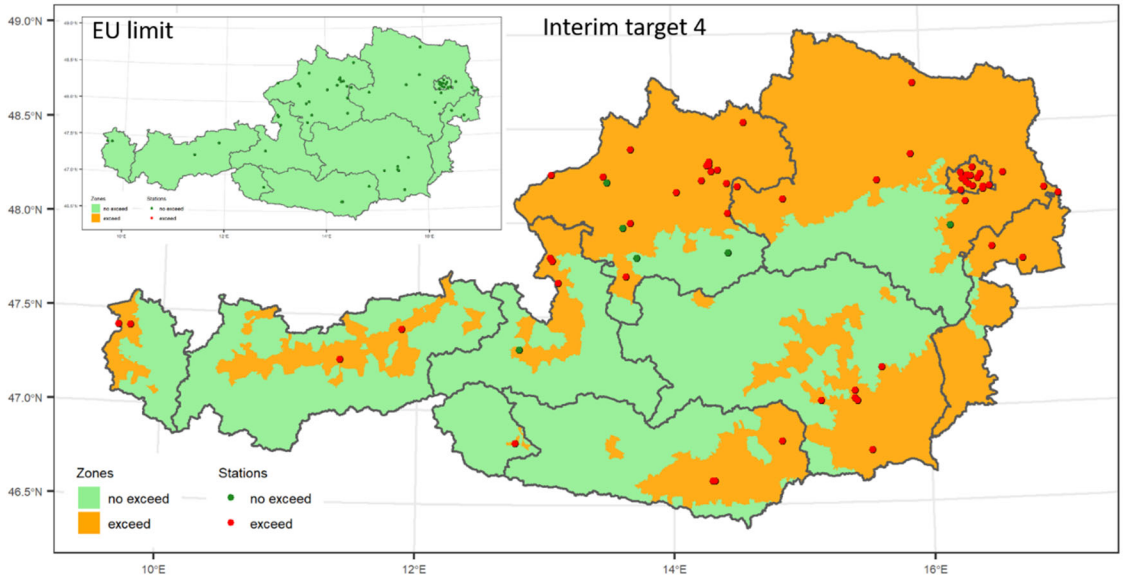

Figure 36: $PM_{2.5}$ YMV 4 years interim target 4 vs. EU limit - exceedance stations and areas with respect to interim target 4 (big picture; exceedance stations: 90.5%, affected area: 49.9%) and EU limit (small picture; no exceedance station)

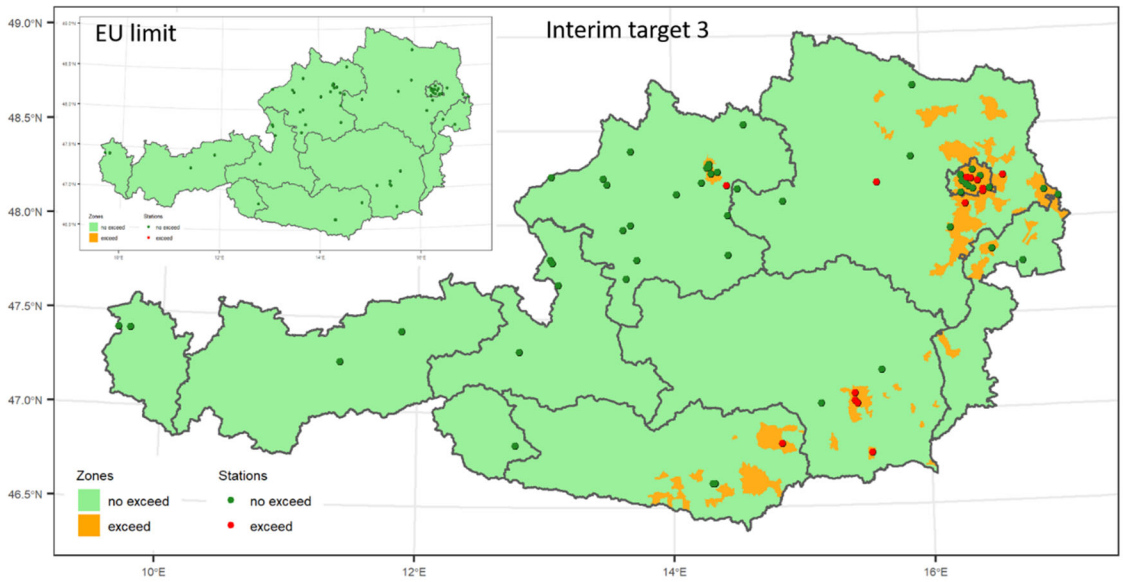

Figure 37: $PM_{2.5}$ YMV 4 years interim target 3 vs. EU limit - exceedance stations and areas with respect to interim target 3 (big picture; exceedance stations: 22.2%, affected area: 4.5%) and EU limit (small picture; no exceedance station)

PM2.5 YMV (all four years)		exceedance stations		affected area	
		number	%	km^2	%
AQG	5 µg/m3	63	100.0%	83882.9	100.0%
it4	10 µg/m3	57	90.5%	41843.4	49.9%
it3	15 µg/m3	14	22.2%	3740.9	4.5%
EU	25 µg/m3	0	0.0%	0.0	0.0%
it1	35 µg/m3	0	0.0%	0.0	0.0%

Table 41: $PM_{2.5}$ YMV all four years – exceedance stations and affected areas

Consideration of single years

Table 42 shows the number of exceeding stations for each year and for different targets. In addition, the respective percentage is given in this table. Considering the year 2021, the percentage of exceeding $PM_{2.5}$ stations is heavily reduced from 93.7% (59 of 63 stations) to 63.5% (40 of 63 stations) by applying interim target 4 instead of AQG level. If interim target 3 is used, then the percentage is reduced even further to 3.2% (2 of 63 stations).

It is obvious that the strong reduction in the percentage of exceeding stations has an effect on the affected area. Applying AQG level leads to a high percentage of affected areas, e.g. 82.6% of the area of Austria are affected in 2021, see Table 43. Using interim target 4 instead yields a significant

reduction in percentage of affected areas (from 82.6% to 20.6%) in the same year. The application of interim target 3 does not cause any affected areas, although two stations are affected by exceedances in 2021. Both exceeding stations are situated in Graz. However, since a total of 6 stations is taken as representative for the urban region of Graz but the average value of these stations is taken, the exceedance of two stations has no effect on the respective zone.

It should also be mentioned here that for areas without a representative station with $PM_{2.5}$ measurements the proportion of $PM_{2.5}$ to PM_{10} is used (see section 4.3). This explains the fact that the decrease in exceeding stations may not be in direct proportion to the decrease in affected area when using a less restrictive target value.

The three maps below (Figure 38 to Figure 40) show the exceeding stations (red dots) and the affected areas (orange regions) for AQG level, interim target 4 and interim target 3, respective. The comparison of the three images clearly shows the strong reduction of affected areas and the decreasing number of exceeding stations.

PM2.5, YMV, 63 stations										
	AQG level		interim target 4		interim target 3		EU limit		interim target 1	
year	number	percent	number	percent	number	percent	number	percent	number	percent
2018	46	73.0%	43	68.3%	14	22.2%	0	0.0%	0	0.0%
2019	49	77.8%	39	61.9%	2	3.2%	0	0.0%	0	0.0%
2020	55	87.3%	26	41.3%	2	3.2%	0	0.0%	0	0.0%
2021	59	93.7%	40	63.5%	2	3.2%	0	0.0%	0	0.0%

Table 42: $PM_{2.5}$ YMV - number (and percent) of exceeding stations per year for different target / limit values

PM2.5, YMV										
	AQG level		interim target 4		interim target 3		EU limit		interim target 1	
year	km^2	percent	km^2	percent	km^2	percent	km^2	percent	km^2	percent
2018	83882.3	100.0%	41842.8	49.9%	3740.89	4.5%	0	0.0%	0	0.0%
2019	83728.1	99.8%	23722.4	28.3%	0	0.0%	0	0.0%	0	0.0%
2020	69311.4	82.6%	13878.3	16.5%	0	0.0%	0	0.0%	0	0.0%
2021	69311.4	82.6%	17287.8	20.6%	0	0.0%	0	0.0%	0	0.0%

Table 43: $PM_{2.5}$ YMV - affected area in km^2 (and %) per year with respect to different target / limit values

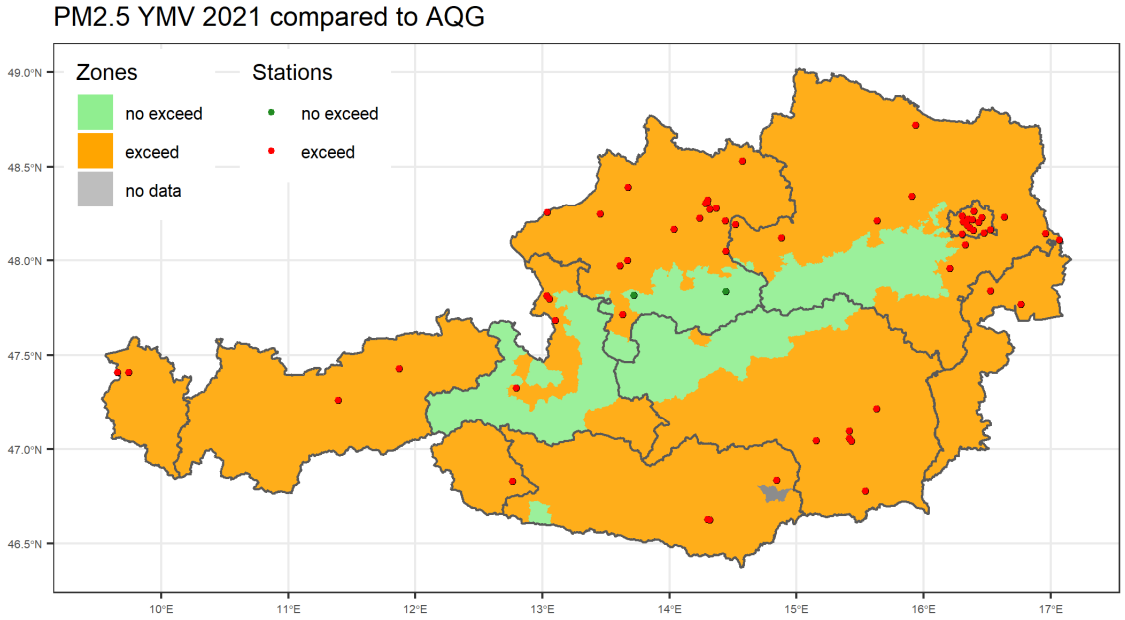

Figure 38: $PM_{2.5}$ YMV 2021 AQG level - exceedance stations and areas with respect to AQG level of 5 µg/m³ (59 stations of 63 (93.7%), affected area: 82.6%).

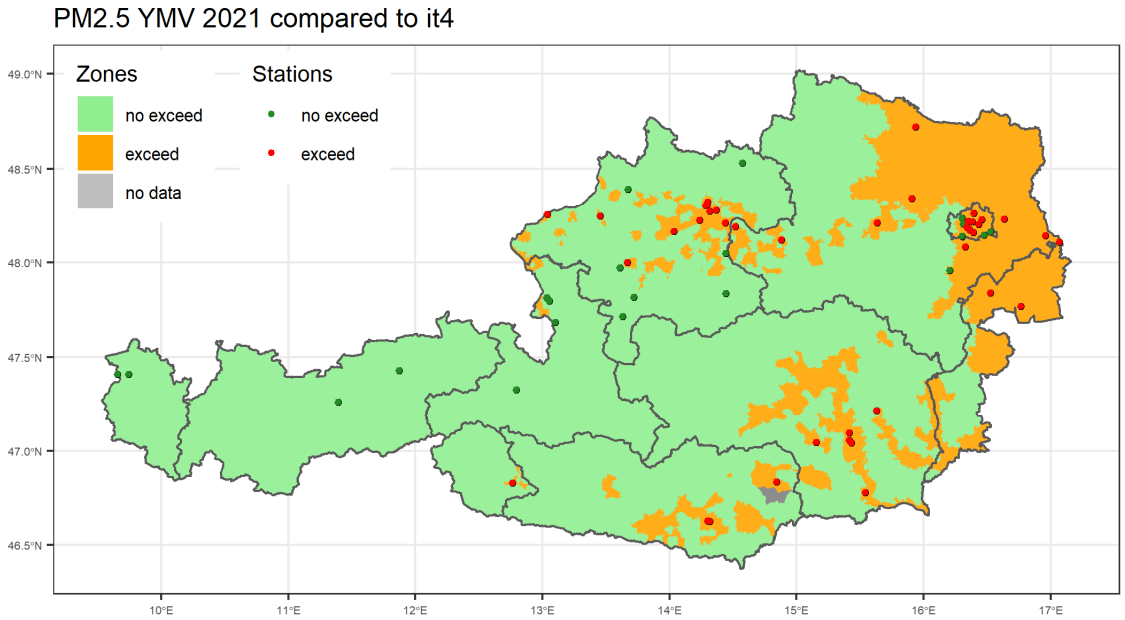

Figure 39: $PM_{2.5}$ YMV 2021 interim target 4 - exceedance stations and areas with respect to interim target 4 of 10 µg/m³ (40 stations of 63 (63.5%), affected area: 20.6%).

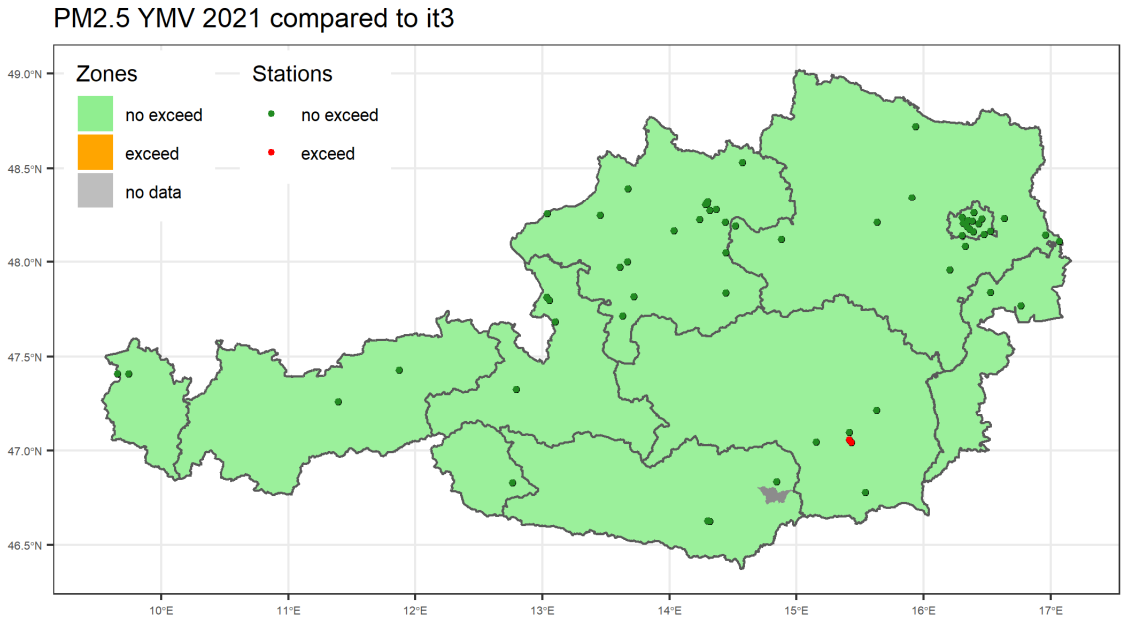

Figure 40: $PM_{2.5}$ YMV 2021 interim target 3 - exceedance stations and areas with respect to interim target 3 of 15 µg/m³ (2 stations of 63 (3.2%), affected area: 0%).

Affected company sites

Consideration over all four years

The consideration of cumulated exceedances over four years with respect to the number and percentage of affected company sites is given in Table 44. All company sites are affected if AQG level is used, since the whole area of Austria is affected (see Figure 35). For interim target 4 there are 82.9% affected company sites. This percentage significantly decreases to 24.3% if interim target 3 is used instead. The application of EU limit and interim target 1 has no effect on any company site.

	AQG	it4	it3	EU	it1
total number of company sites	66031	66031	66031	66031	66031
number of affected company sites	66031	54769	16066	0	0
percent of affected company sites	100.0%	82.9%	24.3%	0.0%	0.0%

Table 44: $PM_{2.5}$ YMV 4 years – number and percentage of affected company sites for different target and limit values

Consideration of single years

In Table 45 the number (and percentage) of affected company sites is given for each single year and different target / limit values. In 2021 there are about 93.7% company sites (61,873 of 66,031 company sites) affected if AQG level is considered. Applying interim target 4 instead the percentage

of affected company sites is reduced to 46.6% (30,739 of 66,031 company sites). Using less restrictive targets as interim target 3, EU limit and interim target 1 do not cause any affected company sites with one exception: In the year 2018 there are 24.3% company sites affected by an exceedance. The percentages of potentially affected company sites per year and for different targets / limits is graphically demonstrated in Figure 41.

The consideration of affected company sites separated by province and by divisions (industry, small manufacturing and craft) can be found in the Annex.

$PM_{2.5}$ YMV										
target	AQG		it4		it3		EU		it2	
	number	percent	number	percent	number	percent	number	percent	number	percent
2018	66012	100.0%	54750	82.9%	16066	24.3%	0	0.0%	0	0.0%
2019	65964	99.9%	40018	60.6%	0	0.0%	0	0.0%	0	0.0%
2020	61873	93.7%	31067	47.0%	0	0.0%	0	0.0%	0	0.0%
2021	61873	93.7%	30739	46.6%	0	0.0%	0	0.0%	0	0.0%

Table 45: $PM_{2.5}$ YMV - number and percent of affected manufacturing company sites per year with respect to different target / limit values

Figure 41: $PM_{2.5}$ YMV - percent affected manufacturing company sites per year with respect to different target and limit values

Summarising the main results for yearly mean values of $PM_{2.5}$

In 2018 and 2019 (nearly) the whole area of Austria is affected by exceedances regarding AQG level. In 2020 and 2021 only alpine areas are not affected (with the exception of Tyrol, since the representative station for alpine regions in Vorarlberg and Tyrol exceeds AQG level. The percentage of affected company sites is 93.7% or higher for all four years.

Applying interim target 4 leads to a reduction in the percentage of affected stations and consequently of affected areas and affected company sites. Note that in case of $PM_{2.5}$ the change in the percentage of exceeding stations is not in direct relation to the change in percentage of affected areas, since the estimation of proportion $PM_{2.5}/PM_{10}$ is used for areas with missing $PM_{2.5}$ measurements. A reduction of affected areas of about 50% or more is obtained by applying interim target 4 instead of AQG level. This results in a reduction of affected company sites of at least 40%, with exception of the year 2018, where the reduction of affected company sites is only about 17% (from 100% to 82.9%)

Considering interim target 3 leads to no affected areas, but in 2018 there are 4.5% affected area and 24.3% affected company sites.

5.2.2 Daily Mean Value

The daily mean values (DMV) of $PM_{2.5}$ are compared to following target / limit values (in descending order with respect to strictness): AQG level (15 µg/m^3), interim target 4 (25 µg/m^3), interim target 3 (37.5 µg/m^3), interim target 2 (50 µg/m^3), interim target 1 (75 µg/m^3). Currently, there is no EU limit value or target value on $PM_{2.5}$ DMV. As in the case of PM_{10} DMV, all scenarios are simulated with 3 to 4 exceedance days per year as well as with max. 35 exceedance days per year for $PM_{2.5}$ DMV. Only the simulation results of 3-4 exceedance days p.a. of 2021 are given in this section, whereas the simulation results of all other years and of scenarios with 35 exceedance days can be found in the Annex.

For a cumulated consideration of exceedances over four years a graphical comparison between the scenario with 3 to 4 exceedance days p.a. and the scenario with maximum 35 exceedance days p.a. is presented in this section.

Stations and Areas with Exceedances

Consideration over all four years

Starting with a cumulated view on the exceedances over four years, the following maps show the stations with exceedings at least in one year and the resulting affected areas. The use of AQG level with 3 to 4 exceeding days p.a. results in all areas of Austria being affected (see Figure 42), while AQG level with maximum 35 exceedance days p.a. shows 49.9% affected areas. Interim target 4 indicates a percentage of 97.4% affected areas, if the scenario with 3 to 4 exceedance days p.a. is considered, see Figure 43. The use of interim target 4 in the scenario with maximum 35 exceedance days p.a. results in a significant lower percentage of 15.4%. The use of less restrictive targets as interim target 3 and 2 shows no affected areas in case of maximum 35 exceedance days p.a.. In case of scenario with 3 to 4 exceedance days, the use of interim target 3 indicates a percentage of 26.9% affected areas (see Figure 44) and the use of interim target 2 results in a percentage of 1.8% (see Figure 45).The number and percentage of exceeding stations and affected areas are presented in Table 46 with respect to 3 to 4 exceeding days p.a. and in Table 47 with respect to maximum 35 exceedance days p.a..

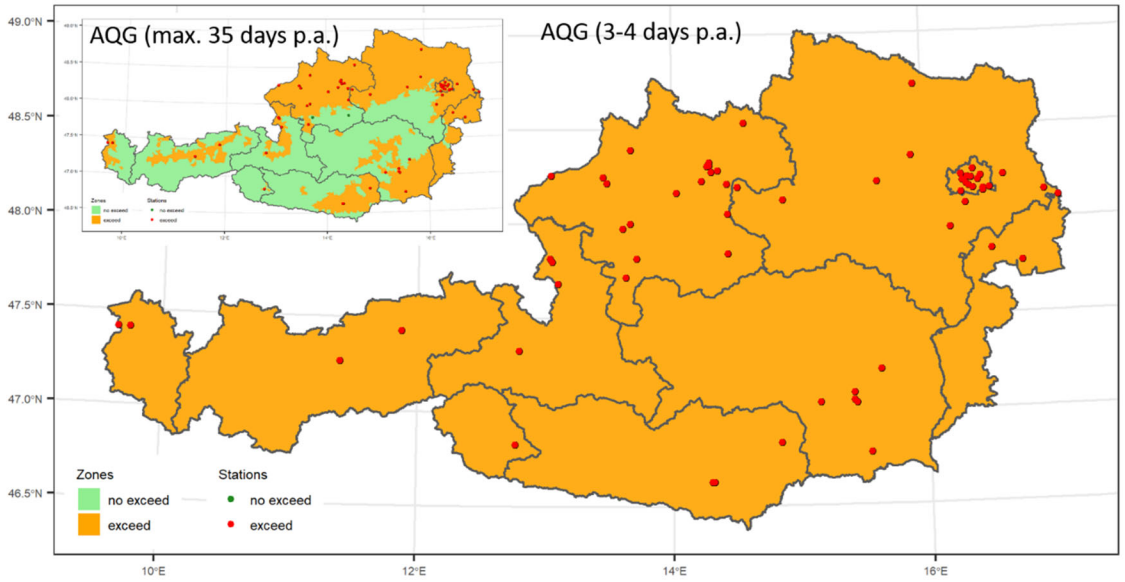

Figure 42: $PM_{2.5}$ DMV 4 years AQG level (3 to 4 exceedance days p.a.) vs. AQG level (max. 35 exceedance days p.a.) – exceedance stations and areas with respect to AQG level 3 to 4 days (big picture; exceedance stations: 100%, affected area: 100%) and AQG level max 35 days (small picture; exceedance stations: 96.8%, affected area: 49.9%)

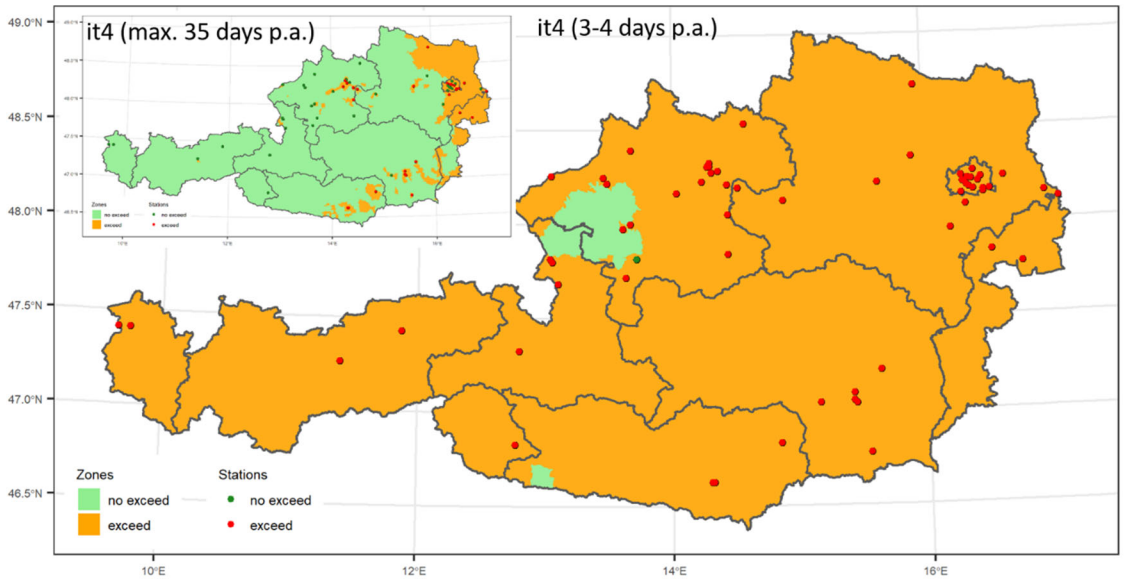

Figure 43: $PM_{2.5}$ DMV 4 years interim target 4 (3 to 4 exceedance days p.a.) vs. interim target 4 (max. 35 exceedance days p.a.) – exceedance stations and areas with respect to interim target 4, 3 to 4 days (big picture; exceedance stations: 98.4%, affected area: 97.4%) and interim target 4 max 35 days (small picture; exceedance stations: 44.4%, affected area: 15.4%)

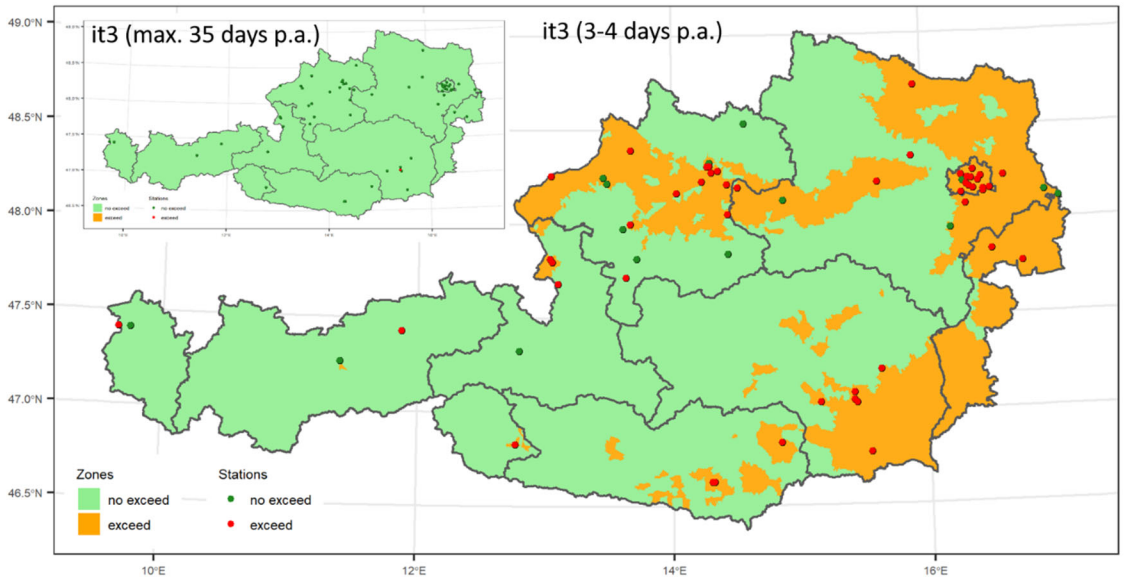

Figure 44: $PM_{2.5}$ DMV 4 years interim target 3 (3 to 4 exceedance days p.a.) vs. interim target 3 (max. 35 exceedance days p.a.) – exceedance stations and areas with respect to interim target 3, 3 to 4 days (big picture; exceedance stations: 76.2%, affected area: 26.9%) and interim target 3 max 35 days (small picture; exceedance stations: 1.6%, affected area: 0.0%)

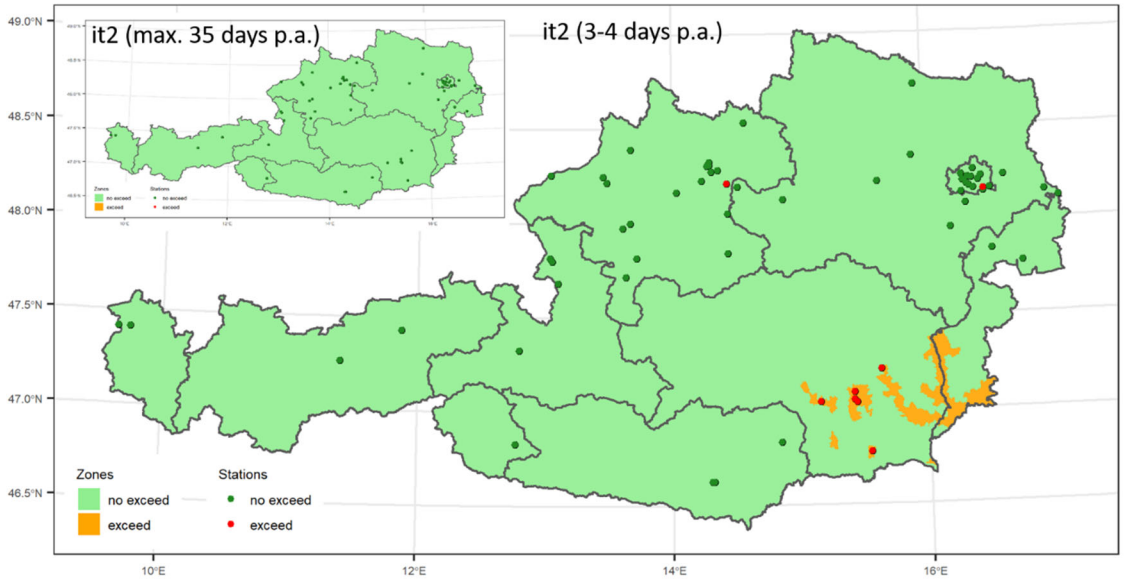

Figure 45: $PM_{2.5}$ DMV 4 years interim target 2 (3 to 4 exceedance days p.a.) vs. interim target 2 (max. 35 exceedance days p.a.) – exceedance stations and areas with respect to interim target 2, 3 to 4 days (big picture; exceedance stations: 12.7%, affected area: 1.8%) and interim target 2 max 35 days (small picture; exceedance stations: 0%, affected area: 0.0%)

PM2.5 DMV (3-4 days) (all four years)		exceedance stations number	exceedance stations %	affected area km²	affected area %
AQG	15 µg/m3	63	100.0%	83882.9	100.0%
it4	25 µg/m3	62	98.4%	81686.9	97.4%
it3	37.5 µg/m3	48	76.2%	22556.8	26.9%
it2	50 µg/m3	8	12.7%	1519.1	1.8%
it1	75 µg/m3	0	0.0%	0.0	0.0%

Table 46: $PM_{2.5}$ DMV all four years (3 to 4 exceedance days p.a.) – exceedance stations and affected areas

PM2.5 DMV (max 35 days) (all four years)		exceedance stations number	exceedance stations %	affected area km²	affected area %
AQG	15 µg/m3	61	96.8%	41843.4	49.9%
it4	25 µg/m3	28	44.4%	12649.3	15.1%
it3	37.5 µg/m3	1	1.6%	0.0	0.0%
it2	50 µg/m3	0	0.0%	0.0	0.0%
it1	75 µg/m3	0	0.0%	0.0	0.0%

Table 47: $PM_{2.5}$ DMV all four years (max. 35 exceedance days p.a.) – exceedance stations and affected areas

Consideration of single years

The number and percentage of exceeding stations per year and for different target / limit values is given in Table 48. In 2021 there are 95.2% (60 of 63 stations) exceeding $PM_{2.5}$ stations with respect to AQG level. Using interim target 4 instead of AQG level reduces the percentage of exceeding stations to 79.4% (50 of 63 stations) in 2021. Switching to interim target 3 results in a strong decrease of exceedance stations to only 11.1% (7 of 63 stations) in 2021. Such a strong decrease in exceedance stations by switching from interim target 4 to interim target 3 is observable in all years except 2018. Finally, using interim target 2 shows exceedance stations in the year 2018, only.

The amount and percentage of affected areas per year and for different target / limit values is shown in Table 49. Considering the affected areas per year and for different target / limit values, there is also a strong reduction in the percentage of affected areas by switching from interim target 4 to interim target 3. It has to be mentioned here that the amount of decrease in the percentage of exceedance stations and in the percentage of affected areas is not in direct relation, since the proportion of $PM_{2.5}$ to PM_{10} is used for all areas without $PM_{2.5}$ stations.

In the year 2021 the percentage of affected area is 82.2% if AGQ level is applied, see Table 49 and Figure 46 (orange regions). This percentage decreases to 71.3% by using interim target 4 (see

Figure 47). The affected area nearly vanishes by applying interim target 3 (see Figure 48). Only 0.9% affected area remains, mainly urban areas in Styria and Carinthia.

PM2.5, DMV, 63 stations										
	AQG level		interim target 4		interim target 3		interim target 2		interim target 1	
year	number	percent	number	percent	number	percent	number	percent	number	percent
2018	47	74.6%	46	73.0%	41	65.1%	8	12.7%	0	0.0%
2019	56	88.9%	51	81.0%	19	30.2%	0	0.0%	0	0.0%
2020	59	93.7%	50	79.4%	12	19.0%	0	0.0%	0	0.0%
2021	60	95.2%	50	79.4%	7	11.1%	0	0.0%	0	0.0%

Table 48: $PM_{2.5}$ DMV (exceedance on 3-4 days p.a.) - number (and percent) of exceeding stations per year for different target / limit values

PM2.5, DMV, exceedance 3 - 4 days per year										
	AQG level		interim target 4		interim target 3		interim target 2		interim target 1	
year	km^2	percent	km^2	percent	km^2	percent	km^2	percent	km^2	percent
2018	81841	97.6%	71766.2	85.6%	22556.8	26.9%	1519.06	1.8%	0	0.0%
2019	81686.9	97.4%	30791.1	36.7%	767.709	0.9%	0	0.0%	0	0.0%
2020	83728.7	99.8%	30725.5	36.6%	645.266	0.8%	0	0.0%	0	0.0%
2021	69465.5	82.8%	59823.3	71.3%	748.164	0.9%	0	0.0%	0	0.0%

Table 49: $PM_{2.5}$ DMV - affected area in km^2 (and %) per year with respect to different target / limit values

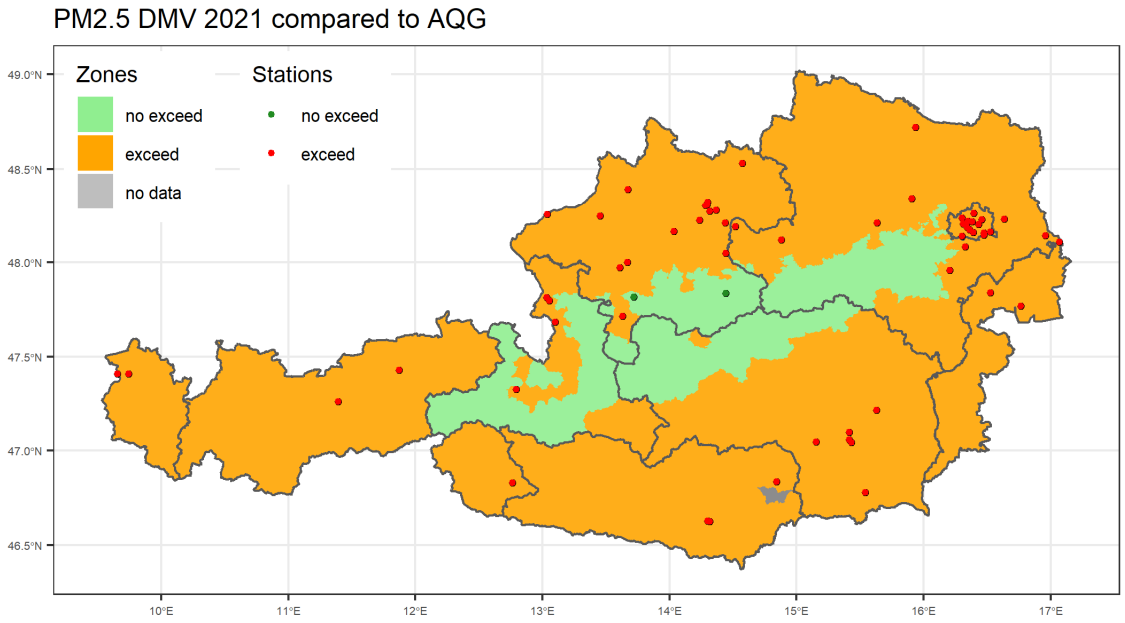

Figure 46: $PM_{2.5}$ DMV 2021 AQG level (3-4 days exceedance p.a.) - exceedance stations and areas with respect to AQG level of 15 µg/m³ (60 stations of 63 (95.2%), affected area: 82.8%).

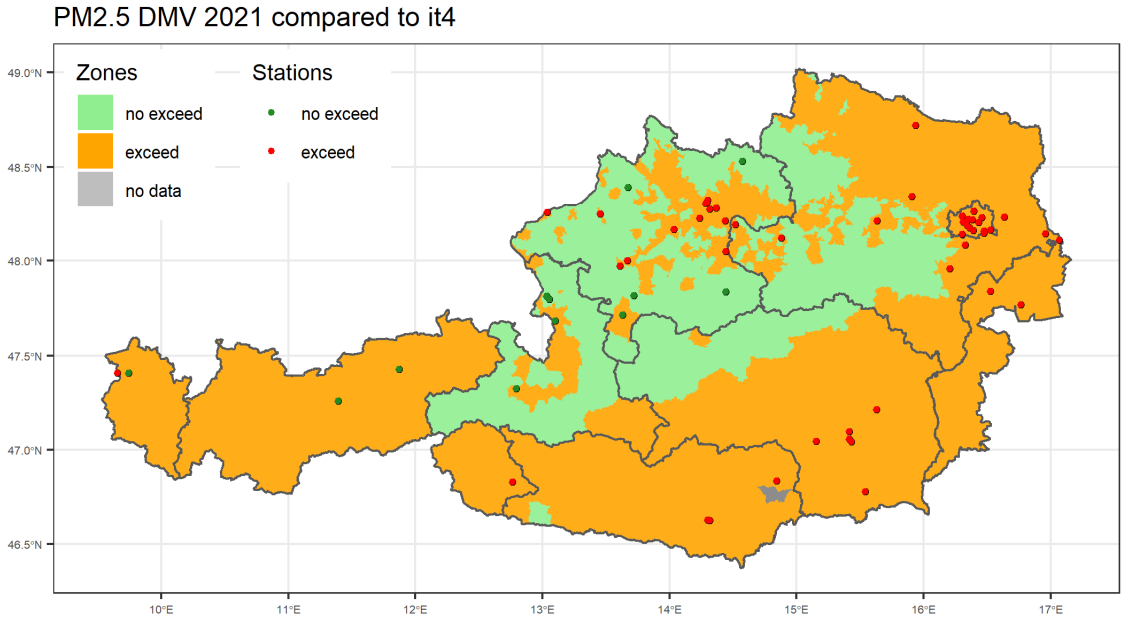

Figure 47: $PM_{2.5}$ DMV 2021 interim target 4 (3-4 days exceedance p.a.) - exceedance stations and areas with respect to interim target 4 of 25 µg/m³ (50 stations of 63 (79.4%), affected area: 71.3%).

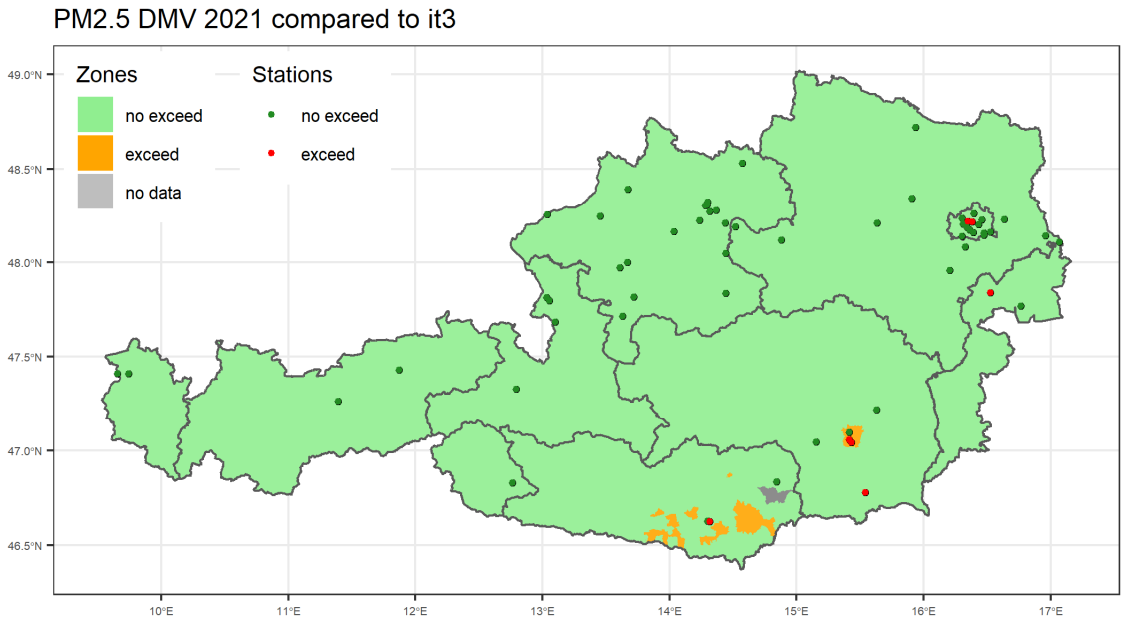

Figure 48: $PM_{2.5}$ DMV 2021 interim target 3 (3-4 days exceedance p.a.) - exceedance stations and areas with respect to interim target 3 of 37.5 µg/m³ (7 stations of 63 (11.1%), affected area: 0.9%).

Affected company sites

Consideration over all four years

The number and percentage of affected company sites with respect to the scenarios of cumulated exceedances over four years is presented in Table 50. Significantly fewer affected company sites are obtained, if scenarios with max. 35 exceedance days p.a. are considered, see Table 51.

	AQG	it4	it3	it2	it1
total number of company sites	66031	66031	66031	66031	66031
number of affected company sites	66031	63667	34574	3538	0
percent of affected company sites	100.0%	96.4%	52.4%	5.4%	0.0%

Table 50: $PM_{2.5}$ DMV (3 to 4 exceedance days p.a.) 4 years – number and percentage of affected company sites

	AQG	it4	it3	it2	it1
total number of company sites	66031	66031	66031	66031	66031
number of affected company sites	54769	25119	0	0	0
percent of affected company sites	82.9%	38.0%	0.0%	0.0%	0.0%

Table 51 $PM_{2.5}$ DMV (max. 35 exceedance days p.a.) 4 years – number and percentage of affected company sites

Consideration of single years

The number (and percentage) of potentially affected company sites with respect to different target / limit values for each sinlge year from 2018 to 2021 is directly related to the amount (percentage) of affected areas and is given in Table 52. Whereas the percentage of affected company sites with respect to AQG level is more than 93% in all four years, it decreases by 10% to 82.4% or less by switching to interim target 4 (except in the year 2018). Considering interim target 3 instead the percentage of potentially affected company sites is significantly reduced, especially in the years 2019 – 2021. For less restrictive targets – e.g. interim target 2 and interim target 1 – there are no affected company sites, but in the year 2018 with respect to interim target 2. The strong reduction in the percentage of affected company sites by switching to less restrictive targets in each single year is demonstrated graphically in Figure 49.

The consideration of affected company sites separated by division and province can be found in the Annex.

PM2.5 DMV (exceedance 3-4 days p.a.)										
target	AQG		it4		it3		it2		it1	
	number	percent	number	percent	number	percent	number	percent	number	percent
2018	63715	96.5%	60810	92.1%	34574	52.4%	3538	5.4%	0	0.0%
2019	63667	96.4%	48260	73.1%	10201	15.4%	0	0.0%	0	0.0%
2020	65983	99.9%	47271	71.6%	3419	5.2%	0	0.0%	0	0.0%
2021	61921	93.8%	54388	82.4%	2194	3.3%	0	0.0%	0	0.0%

Table 52: $PM_{2.5}$ DMV - number and percent of affected manufacturing company sites per year with respect to different target / limit values

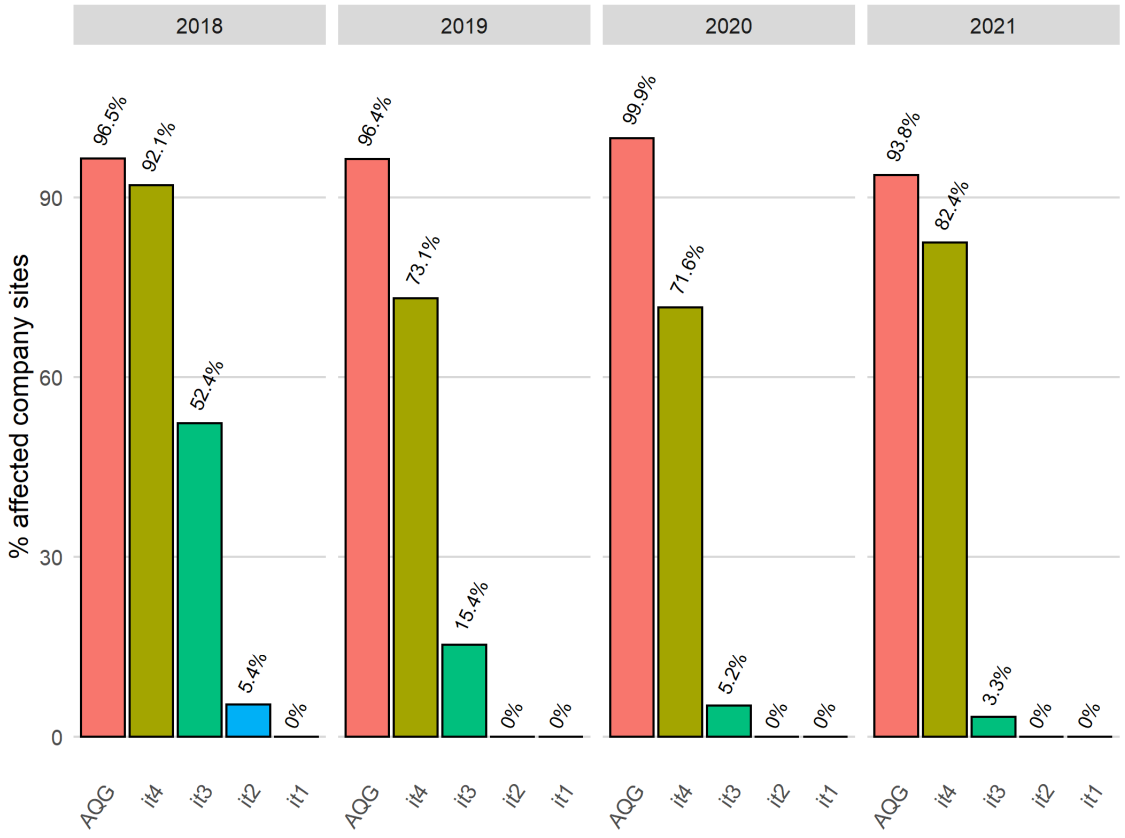

Figure 49: $PM_{2.5}$ DMV - percent affected manufacturing company sites per year with respect to different target and limit values

Summarising the main results for daily mean values of $PM_{2.5}$

The whole area of Austria is affected by exceedance with respect to AQG level from 2018 to 2020. In 2021 only alpine areas are not affected (with exception of Tyrol, since the representative station for alpine regions in Vorarlberg and Tyrol exceeds AQG level.)

For interim target 4 the affected areas and consequently the percentage of affected company sites are smaller in all years from 2018 to 2021 compared to AQG level. Whereas a reduction of about 10 % can be achieved in affected company sites, the reduction is smaller for 2018 (reduction of about 4%). In 2018, nearly all provinces are affected with respect to interim target 4, either the whole area or only parts. In 2019 and 2020 the affected areas are found in the East and South of Austria as well as in urban areas and main transit routes. In 2021 there is an increase in affected areas and in the percentage of affected company sites if compared with both years 2019 and 2020, especially in the South and West of Austria.

Considering interim target 3 the percentage of affected company sites is less than 16% in all four years. In 2018 regions of Lower and Upper Austria, Burgenland, Styria and Carinthia are affected by exceedances with respect to interim target 3. The affected areas are reduced to urban areas

(like Vienna, Graz, Linz, Klagenfurt) in 2019. In 2020 and 2021 there is a small change in affected regions (e.g. urban area of Vienna is not affected anymore).

For interim target 2 there are affected areas only in 2018. For interim target 1 there are no affected areas and consequently no affected company sites.

The scenario with max. 35 exceedance days p.a. with respect to AQG level shows similar results – e.g. similar amount of affected areas and affected company sites – as the scenario for YMV with max. 35 exceedance days and with respect to interim target 4.

The scenario with max. 35 exceedance days p.a. with respect to interim target 4 results in affected regions mainly in 2018 - in the urban area of Upper Austria, in the East of Lower Austria, in North of Burgenland, in valley areas in the South of Styria and in the area of Lavanttal and Klagenfurt in Carinthia. From 2019 to 2021 the affected areas are reduced to very few urban areas (mainly Graz).

There are no further exceedances in scenarios with max. 35 exceedance days p.a. with respect to less strict targets (from interim target 3 to interim target 1).

In the following two figures the percentages of affected company sites with respect to $PM_{2.5}$ are summarised. In Figure 50 the YMV and DMV percentages according to AQG level are compared. Whereas the percentage of YMV and DMV (3-4 exceedance days p.a.) keep constant and very high (above 90%) over all four years, the percentage of DMV with max. 35 exceedance days p.a. is significantly lower and is within a range of 70% to 80%.

In Figure 51 the percentages of affected company sites with respect to interim target 4 are demonstrated. A decreasing trend from 2018 to 2020 is observable only in case of YMV. The percentages of YMV are smaller than those of DMV with 3-4 exceedance days.

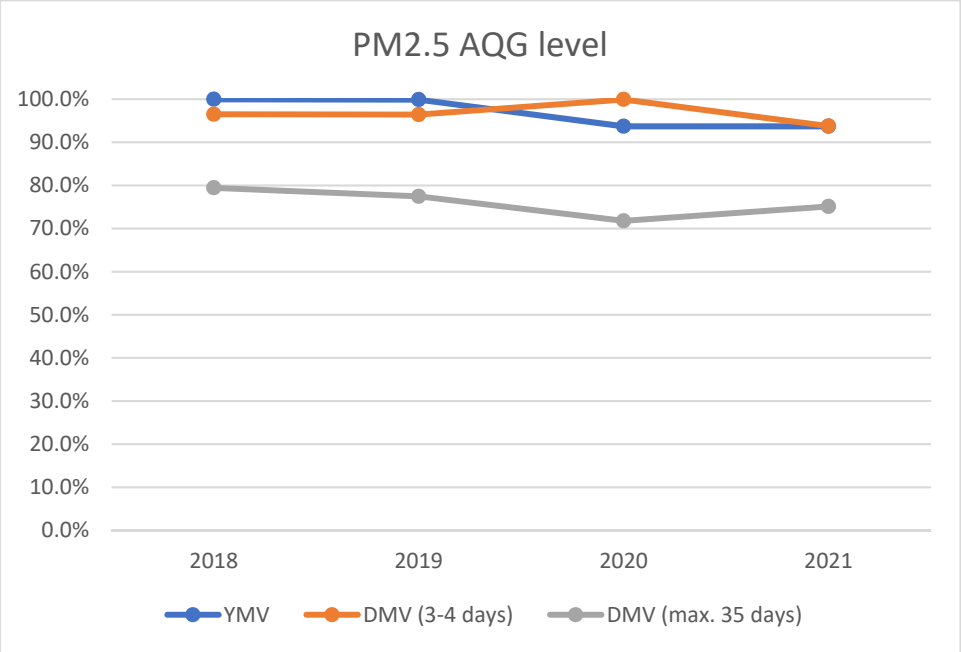

Figure 50: $PM_{2.5}$ – comparing YMV and DMV percentages of affected company sites according to AQG level

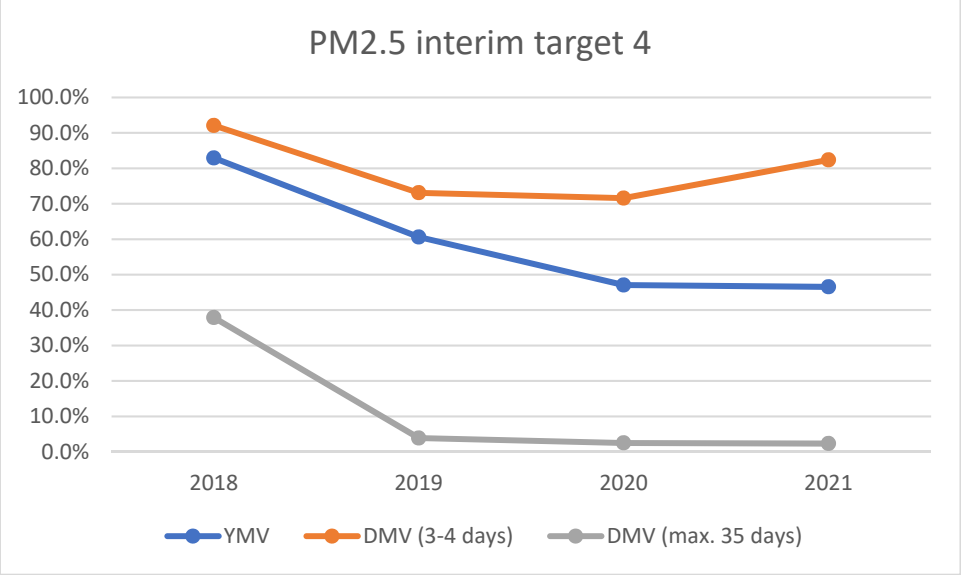

Figure 51: $PM_{2.5}$ – comparing YMV and DMV percentages of affected company sites according to interim target 4

5.3 NITROGEN DIOXIDE (NO_2)

5.3.1 Yearly Mean Value

The yearly mean values (YMV) of NO_2 are compared to the following target / limit values (in descending order with respect to stictness): AQG level (10 µg/m^3), interim target 3 (20 µg/m^3), interim target 2 (30 µg/m^3), interim target 1 / EU (40 µg/m^3).

Stations and Areas with Exceedances

Consideration over all four years

Cumulated exceedances over four years are considered for NO_2 in the same manner as is done for particulate matter. The impact of AQG level and EU limit is graphically compared in Figure 52. Whereas 56.7% areas are affected in case of AQG level, there are no affected areas in case of EU limit. For interim target 3 only areas along main transit routes and urban areas are affected. The percentage of affected area is 6.5% for interim target 3, see Figure 53. For interim target 2 there remain very small affected areas (0.6%), see Figure 54. In Table 53 the number and percentage of exceeding stations as well as the amount in km^2 and the percentage of affected area is listed,

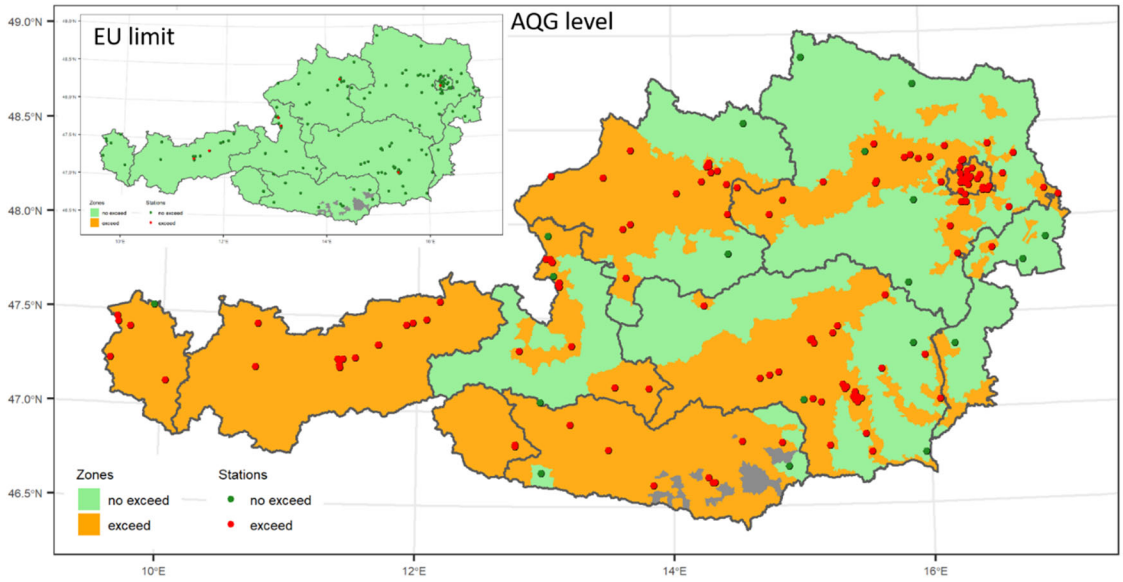

Figure 52: NO_2 YMV 4 years AQG level vs. EU limit - exceedance stations and areas with respect to AQG level (big picture; exceedance stations: 87.2%, affected area: 56.7%) and EU limit (small picture; exceedance stations: 4.7%, no affected area)

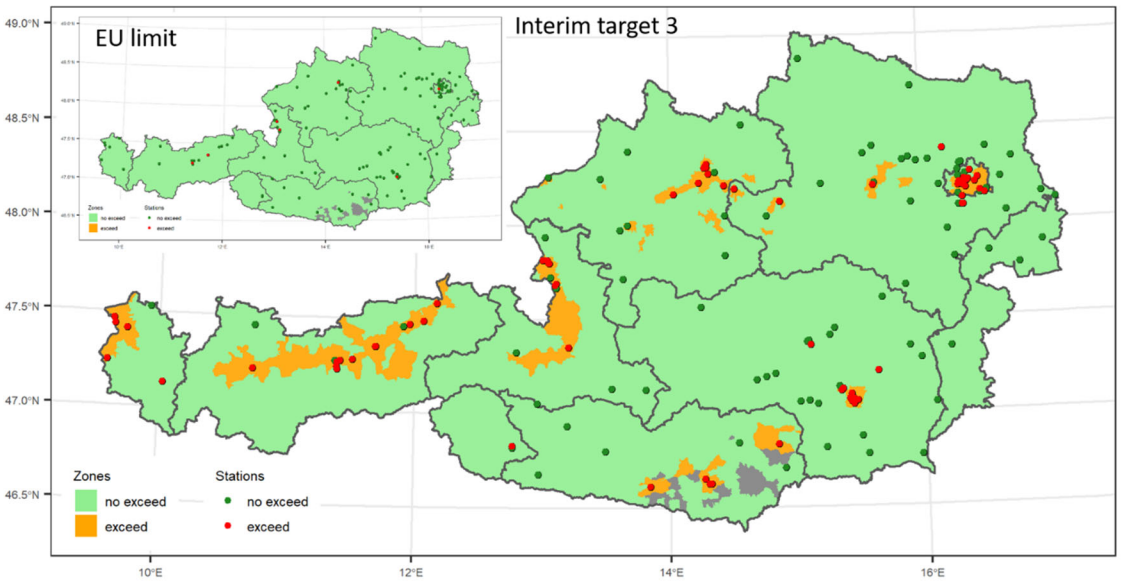

Figure 53: NO_2 YMV 4 years interim target 3 vs. EU limit - exceedance stations and areas with respect to interim target 3 (big picture; exceedance stations: 44.6%, affected area: 6.5%) and EU limit (small picture; exceedance stations: 4.7%, no affected area)

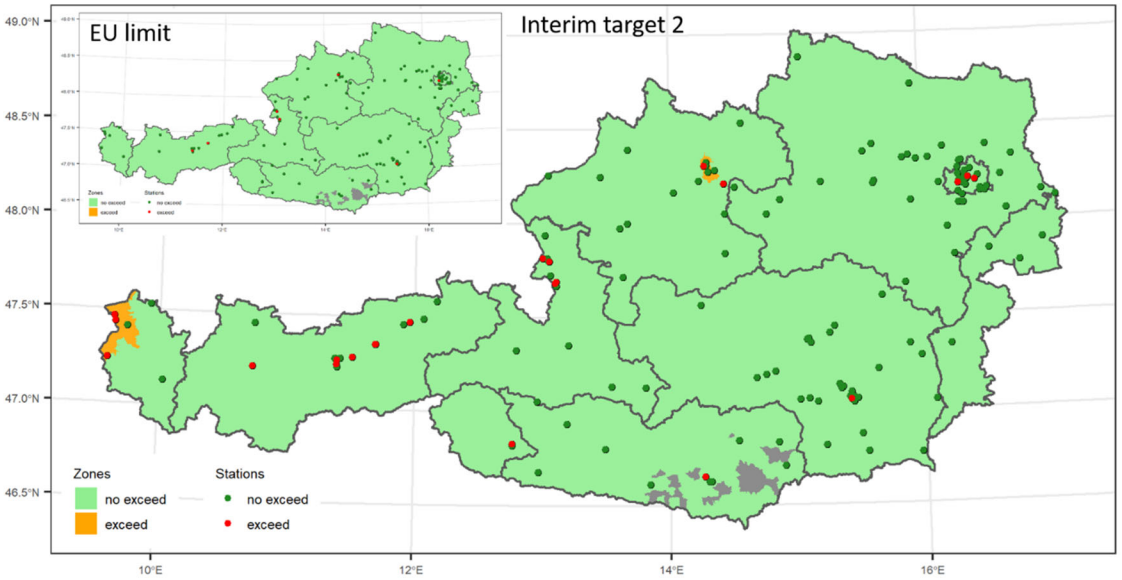

Figure 54: NO_2 YMV 4 years interim target 2 vs. EU limit - exceedance stations and areas with respect to interim target 2 (big picture; exceedance stations: 14.9%, affected area: 0.6%) and EU limit (small picture; exceedance stations: 4.7%, no affected area)

NO2 YMV (all four years)		exceedance stations number	exceedance stations %	affected area km²	affected area %
AQG	10 µg/m3	129	87.2%	47572.6	56.7%
it3	20 µg/m3	66	44.6%	5461.2	6.5%
it2	30 µg/m3	22	14.9%	499.8	0.6%
EU	40 µg/m3	7	4.7%	0.0	0.0%

Table 53: NO_2 YMV all four years – exceedance stations and affected areas

Consideration of single years

The number and percentage of exceeding stations for each single year with respect to different target / limit values is shown in Table 54. It can be seen that scenarios using AQG level always results in a high percentage of exceedance stations – e.g. from 76.4% exceeding stations (113 of 148 stations) in 2020 to 82.4% % exceeding stations (122 of148 stations) in 2018. Switching to interim target 3 yields a significant reduction – e.g. from 82.4% to 42.6% in the year 2018 or from 79.1% to 26.4% in the year 2021. Considering interim target 2 shows 13.5% exceeding stations or less for all four years. Applying the EU limit causes only a few exceeding stations in 2018 and 2019.

Table 55 shows the amount and percentage of affected areas with respect to different target / limit values for each single year. Whereas there are about 40% to 57% affected areas over all four years with respect to AQG level, the percentage of affected areas is remarkably reduced by switching to interim target 3 where only about 6.5% affected area is observed. Using interim target 2 leads to very small affected areas in 2018 and 2019 but not in 2020 and 2021, although there are some few exceeding stations. Averaging the YMV over all stations within a zone may lead to unaffected areas although some of the stations within this area show exceedance. The EU limit does not cause any affected areas at all.

In Figure 55 it can be seen that the whole area of the provinces of Vorarlberg and Tyrol and mainly southern areas of Austria as well as all urban areas are affected with respect to AQG level for the year 2021. The affected areas in 2021 with respect to interim target 3 are demonstrated in the map of Figure 56. Only some urban areas and main traffic routes are affected by using interim target 3. No areas are affected by applying interim target 2 in 2021 as demonstrated in Figure 57.For the years 2018 and 2019 only small areas are affected – e.g. the urban area of Linz (only 2018) and the urban area of Bregenz / Dornbirn (see maps in the Annex).

NO2, YMV, 148 stations								
	AQG level		interim target 3		interim target 2		EU limit	
year	number	percent	number	percent	number	percent	number	percent
2018	122	82.4%	63	42.6%	20	13.5%	5	3.4%
2019	119	80.4%	60	40.5%	20	13.5%	2	1.4%
2020	113	76.4%	38	25.7%	5	3.4%	0	0.0%
2021	117	79.1%	39	26.4%	8	5.4%	0	0.0%

Table 54: NO_2 YMV - number (and percent) of exceeding stations per year for different target / limit values

NO2, YMV								
	AQG level		interim target 3		interim target 2		EU limit	
year	km^2	percent	km^2	percent	km^2	percent	km^2	percent
2018	33489.2	39.9%	5461.17	6.5%	499.758	0.6%	0	0.0%
2019	47572	56.7%	5461.17	6.5%	403.769	0.5%	0	0.0%
2020	41458.1	49.4%	5172.24	6.2%	0	0.0%	0	0.0%
2021	41048.6	48.9%	5182.86	6.2%	0	0.0%	0	0.0%

Table 55: NO_2 YMV - affected area in km^2 (and %) per year with respect to different target / limit values

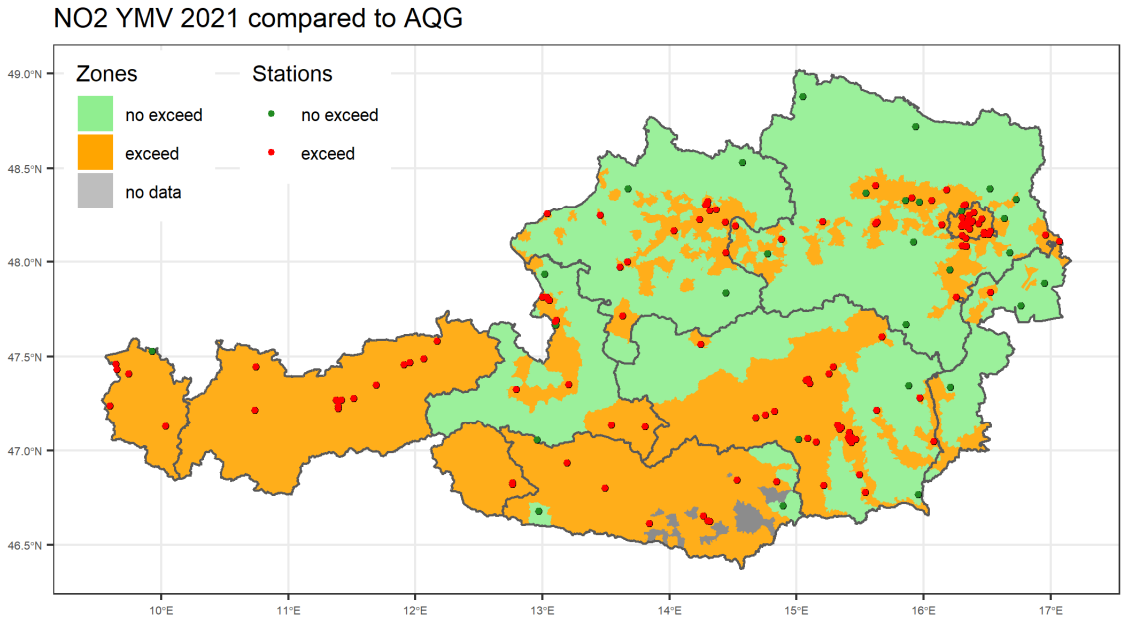

Figure 55: NO_2 YMV 2021 AQG level - exceedance stations and areas with respect to AQG level of 10 µg/m³ (117 stations of 148 (79.1%), affected area: 48.9%).

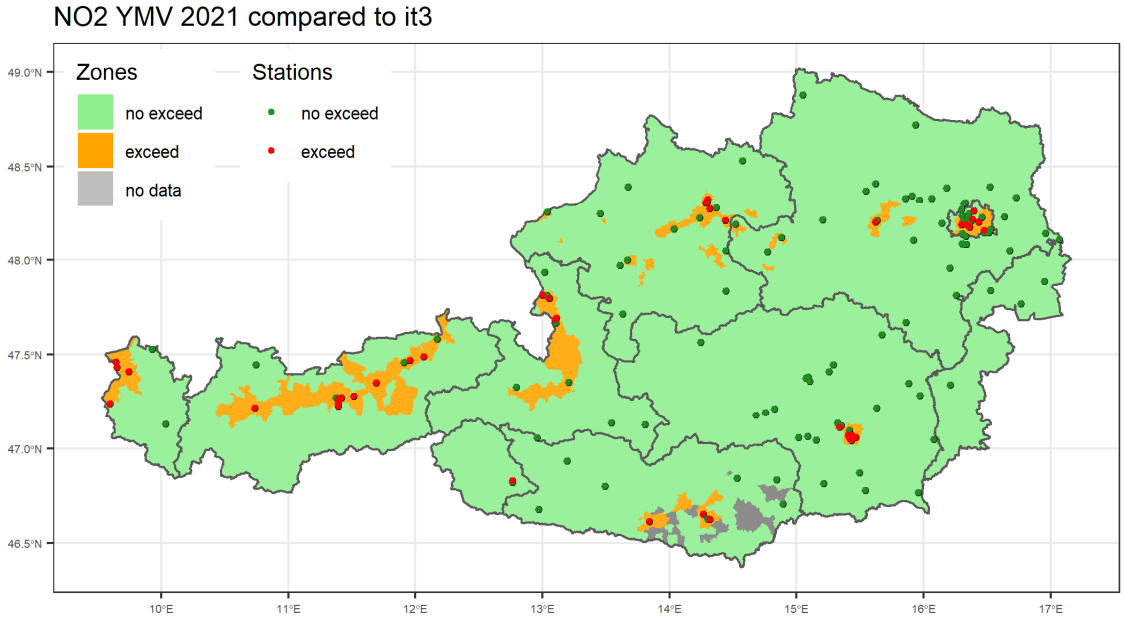

Figure 56: NO_2 YMV 2021 interim target 3 - exceedance stations and areas with respect to interim target 3 of 20 µg/m³ (39 stations of 148 (26.4%), affected area: 6.2%).

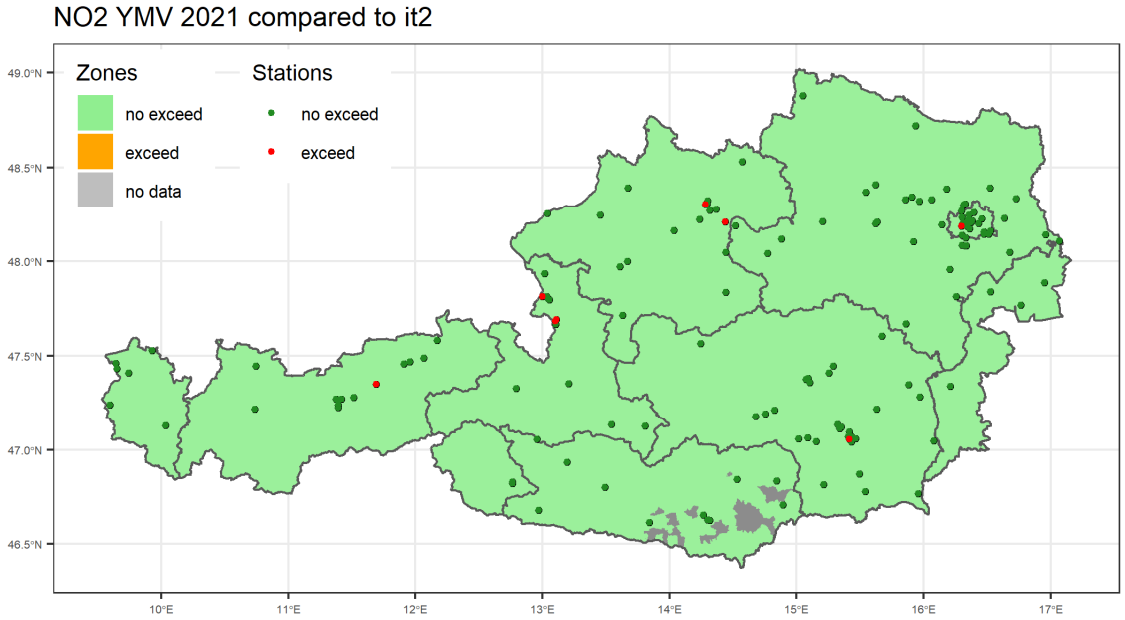

Figure 57: NO_2 YMV 2021 interim target 2 - exceedance stations and areas with respect to interim target 2 of 30 µg/m³ (8 stations of 148 (5.4%), affected area: 0.0%).

Affected company sites

Consideration over all four years

The number and percentage of affected company sites based on cumulated exceedances over four years is given in Table 56. While for AQG level 76.5% of the company sites are affected, there are only 32.3% affected company sites in case of interim target 3. The use of interim target 2 reduces the percentage of affected company sites to 4.5%. Finally, no company sites are affected if EU limit is used.

	AQG	it3	it2	EU
total number of company sites	66031	66031	66031	66031
number of affected company sites	50482	21304	2946	0
percent of affected company sites	76.5%	32.3%	4.5%	0.0%

Table 56: NO_2 YMV 4 years – number and percentage of affected company sites for different target and limit values

Consideration of single years

The number and percentage of affected company sites for each single year with respect to different target / limit values is shown in Table 57. For AQG level there is a high percentage of affected company sites from 76.4% in 2019 to 67.8% in 2021. By switching to interim target 3 a significant reduction in perentage of affected company sites is achieved, e.g. a percentage about 32%. For interim target 2 only a small amount of company sites is affected: 4.5% in 2018 and 2.9% in 2019. In Figure 58 the percentage of affected company sites per year for different target / limit values is demonstrated graphically by barplots.

NO_2 YMV								
target	AQG		it3		it2		EU	
	number	percent	number	percent	number	percent	number	percent
2018	47774	72.4%	21304	32.3%	2946	4.5%	0	0.0%
2019	50463	76.4%	21304	32.3%	1927	2.9%	0	0.0%
2020	45140	68.4%	21028	31.8%	0	0.0%	0	0.0%
2021	44743	67.8%	21063	31.9%	0	0.0%	0	0.0%

Table 57: NO_2 YMV - number and percent of affected manufacturing company sites per year with respect to different target / limit values

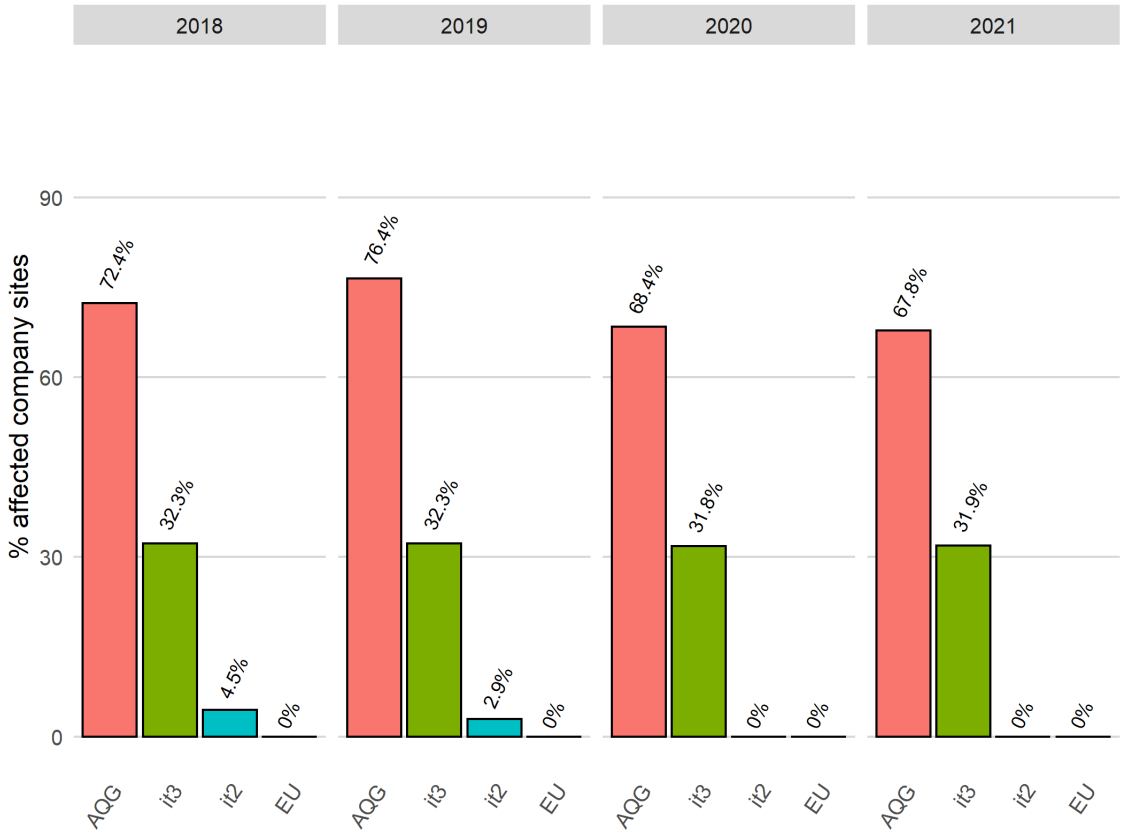

Figure 58: NO_2 YMV - percent affected manufacturing company sites per year with respect to different target and limit values

Summarising the main results for yearly mean values of NO_2

There is a high percentage of exceeding stations (76.4% - 82.4%), affected areas (56.7% - 39.9%) and affected company sites (67.8% - 76.4%) per year with respect to AQG level. The amount of affected areas and affected company sites significantly decreases by using interim target 3 instead of AQG level. Applying interim target 2 shows affected areas and affected company sites only in the years 2018 and 2019. Exceedance areas are found in the area of Bregenz / Dornbirn (2018 and 2019) and the urban area of Linz (only 2018). Some stations show exceedances with respect to interim target 2 in the years 2020 and 2021, but no zone is affected (since averaging of station values weakens the effect).

There are mainly urban areas and areas with transit routes (highways) which are affected by exceedances with respect to NO_2.

5.3.2 Daily Mean Value

The daily mean values (DMV) of NO_2 are compared to following target / limit values (in descending order with respect to strictness): AQG level (25 µg/m^3), interim target 2 (50 µg/m^3), interim target 1 (120 µg/m^3). All scenarios are simulated with max. 35 exceedance days per year and with 3 to 4 exceedance days per year, but only results of single year simulation with 3 to 4 exceedance days p.a. are shown in this section. The simulation results of single year scenarios with max. 35 exceedance days p.a. can be found in the Annex.

A cumulated consideration over all four years is given in this section including a comparison between 3 to 4 exceedance days p.a. scenarios and maximum 35 exceedance days p.a. scenarios.

Stations and Areas with Exceedances

Consideration over all four years

Comparing the impact of 3 to 4 exceedance days p.a. with the impact of maximum 35 exceedance days p.a. on the basis of cumulated exceedances over four years, the percentage of exceeding stations and affected areas are lower for the latter. In Figure 59 the comparison with respect to AQG level is shown. The use of AQG level with 3 to 4 exceedance days p.a. causes 61.1% affected areas, the AQG level with maximum 35 exceedance days p.a. results in only 28.3% affected areas. Switching to interim target 2, there are just small percentages of affected areas left, e.g. for 3 to 4 exceedance days p.a. there are 7.7% affected areas and for maximum 35 exceedance days p.a. 4.1% affected areas, see Figure 60. The use of interim target 1 has no impact on areas either in case of 3 to 4 exceedance days p.a. nor in case of maximum 35 exceedance days p.a., see Table 58 and Table 59.

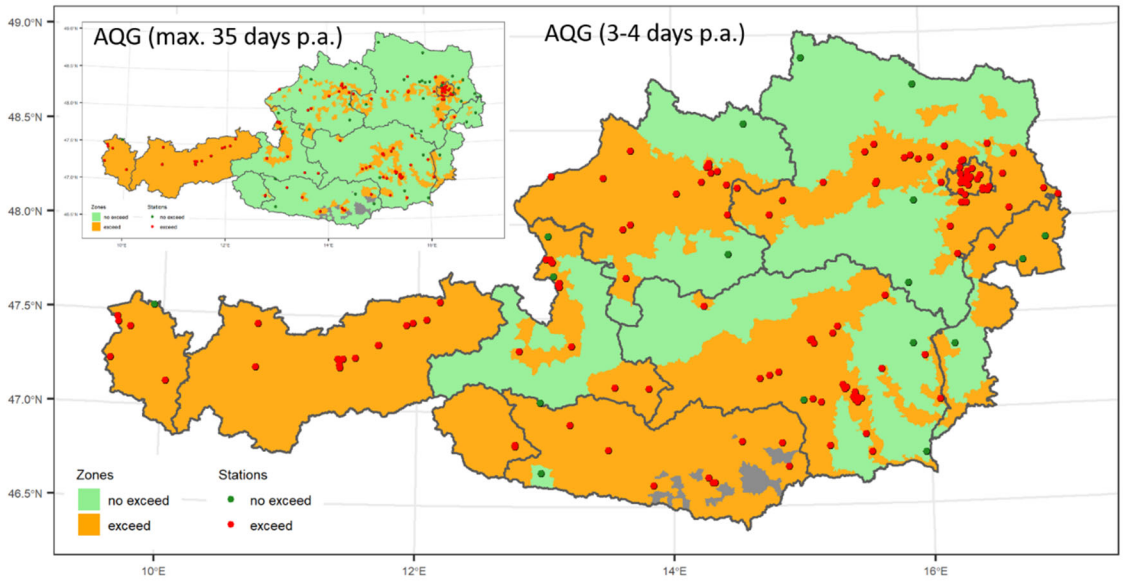

Figure 59: NO_2 DMV 4 years AQG level (3 to 4 exceedance days p.a.) vs. AQG level (max. 35 exceedance days p.a.) – exceedance stations and areas with respect to AQG level, 3 to 4 days (big picture; exceedance stations: 88.5%, affected area: 61.1%) and AQG level max 35 days (small picture; exceedance stations: 73.0%, affected area: 28.3%)

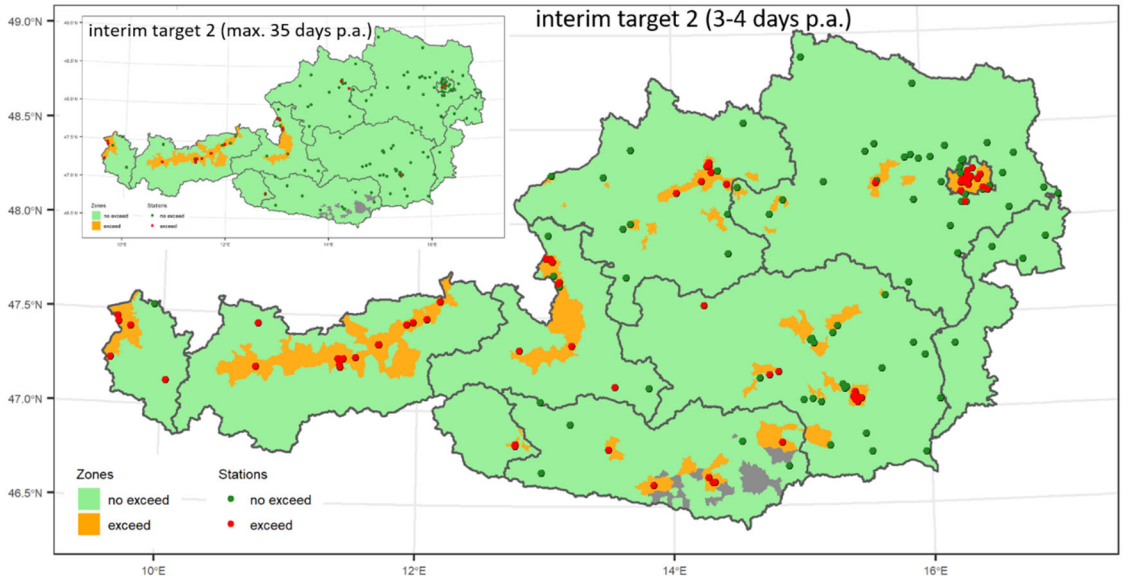

Figure 60: NO_2 DMV 4 years interim target 2 (3 to 4 exceedance days p.a.) vs. Interim target 2 (max. 35 exceedance days p.a.) - exceedance stations and areas with respect to interim target 2, 3 to 4 days (big picture; exceedance stations: 46.6%, affected area: 7.7%) and interim target 2 max 35 days (small picture; exceedance stations: 14.9%, affected area: 4.1%)

NO2 DMV (3-4 days) (all four years)		exceedance stations number	exceedance stations %	affected area km²	affected area %
AQG	25 µg/m3	131	88.5%	51217.7	61.1%
it2	50 µg/m3	69	46.6%	6432.3	7.7%
it1	120 µg/m3	0	0.0%	0.0	0.0%

Table 58: NO_2 DMV all four years (3 to 4 exceedance days p.a.) – exceedance stations and affected areas

NO2 DMV (max 35 days) (all four years)		exceedance stations number	exceedance stations %	affected area km²	affected area %
AQG	25 µg/m3	108	73.0%	23767.1	28.3%
it2	50 µg/m3	22	14.9%	3402.5	4.1%
it1	120 µg/m3	0	0.0%	0.0	0.0%

Table 59: NO_2 DMV all four years (max. 35 exceedance days p.a.) – exceedance stations and affected areas

Consideration of single years

The number and percentage of exceedance stations for each year is given in Table 60. Using AQG level causes a high amount of exceeding stations (120 - 126 of 148 stations, about 81.1% - 85.1% by considering single year percentages), whereas applying interim target 2 the percentage of exceeding stations is about 21.6% - 41.9%. Interim target 1 does not cause any exceeding station at all.

The affected area is about 49.6% (in 2021) – 60.4% (in 2018) by using AQG level. For the year 2021 the map in Figure 61 shows the affected areas with respect to AQG level. A strong reduction in affected areas is achieved by using interim target 2 instead of AQG level. The percentage of affected areas ranges from 4.4% (in 2020) to 6.2% (in 2019). Figure 62 is a map with the affected areas in 2021 with respect to interim target 2. Applying interim target 1 results in no affected areas, see Figure 62.

NO2, DMV, 148 stations						
	AQG level		interim target 2		interim target 1	
year	number	percent	number	percent	number	percent
2018	124	83.8%	48	32.4%	0	0.0%
2019	126	85.1%	62	41.9%	0	0.0%
2020	123	83.1%	32	21.6%	0	0.0%
2021	120	81.1%	41	27.7%	0	0.0%

Table 60: NO_2 DMV (exceedance on 3-4 days p.a.) - number (and percent) of exceeding stations per year for different target / limit values

NO2, DMV, exceedance 3 - 4 days per year						
	AQG level		interim target 2		interim target 1	
year	km²	percent	km²	percent	km²	percent
2018	50635.9	60.4%	4624.51	5.5%	0	0.0%
2019	47572.6	56.7%	5172.24	6.2%	0	0.0%
2020	45121.3	53.8%	3661.73	4.4%	0	0.0%
2021	41630.5	49.6%	4926.33	5.9%	0	0.0%

Table 61: NO_2 DMV - affected area in km^2 (and %) per year with respect to different target / limit values

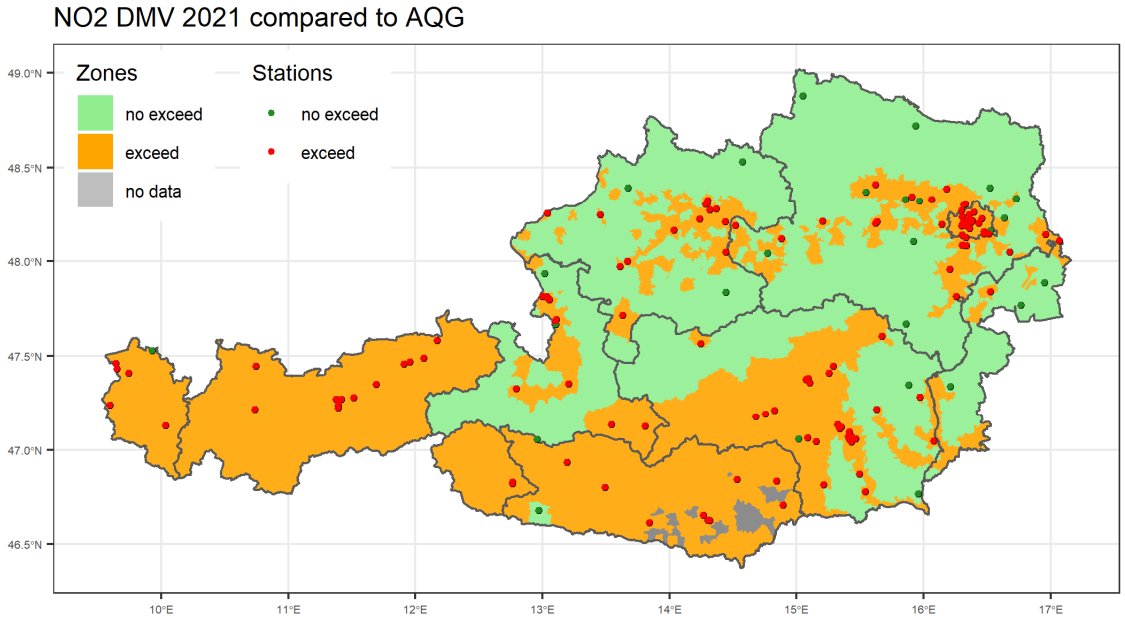

Figure 61: NO_2 DMV 2021 AQG level (3-4 days exceedance p.a.) - exceedance stations and areas with respect to AQG level of 25 µg/m³ (120 stations of 148 (81.1%), affected area: 49.6%).

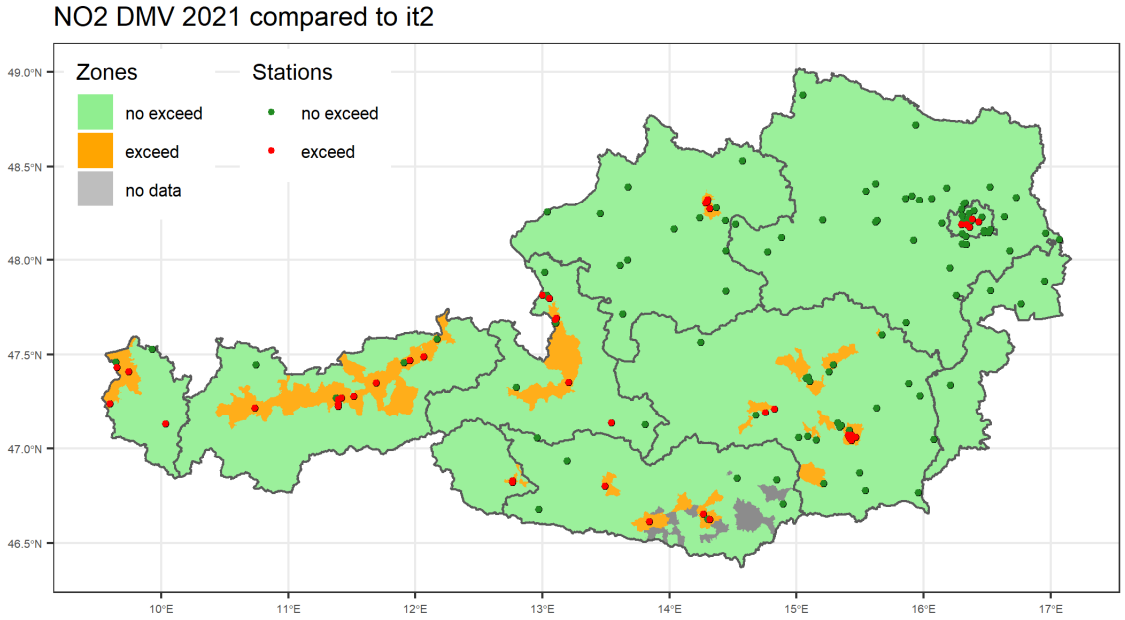

Figure 62: NO_2 DMV 2021 interim target 2 (3-4 days exceedance p.a.) - exceedance stations and areas with respect to interim target 2 of 50 µg/m³ (41 stations of 148 (27.7%), affected area: 5.9%).

Affected company sites

Consideration over all four years

The impact of cumulated exceedances over four years on the number and percentage of affected company sites is shown in Table 62 for the scenario with 3 to 4 exceedance days p.a. and in Table 63 for the scenario with maximum 35 exceedance days p.a.

	AQG	it2	it1
total number of company sites	66031	66031	66031
number of affected company sites	52533	22166	0
percent of affected company sites	79.6%	33.6%	0.0%

Table 62: NO_2 DMV (3 to 4 exceedance days p.a.) 4 years – number and percentage of affected company sites

	AQG	it2	it1
total number of company sites	66031	66031	66031
number of affected company sites	38108	7032	0
percent of affected company sites	57.7%	10.6%	0.0%

Table 63: NO_2 DMV (max. 35 exceedance days p.a.) 4 years – number and percentage of affected company sites

Consideration of single years

The number and percentage of affected company sites for each single year and for different target / limit values are listed in Table 64. Applying AQG level leads to 68% affected company sites in 2021. The highest percentage of affected company sites is resulting in the scenario of 2018 using AQG level with 79.3%. The percentage of affected company sites is significantly lower (31.8% (in 2019) to 14.6% in 2020) with respect to interim target 2. Using interim target 1 causes no affected company sites. In Figure 63 the percentages of affected company sites per year for different target / limit values is shown graphically with barplots.

NO2 DMV (exceedance 3-4 days p.a.)						
target	AQG		it2		it1	
	number	percent	number	percent	number	percent
2018	52379	79.3%	17963	27.2%	0	0.0%
2019	50482	76.5%	21028	31.8%	0	0.0%
2020	47769	72.3%	9651	14.6%	0	0.0%
2021	44897	68.0%	12018	18.2%	0	0.0%

Table 64: NO_2 DMV - number and percent of affected manufacturing company sites per year with respect to different target / limit values

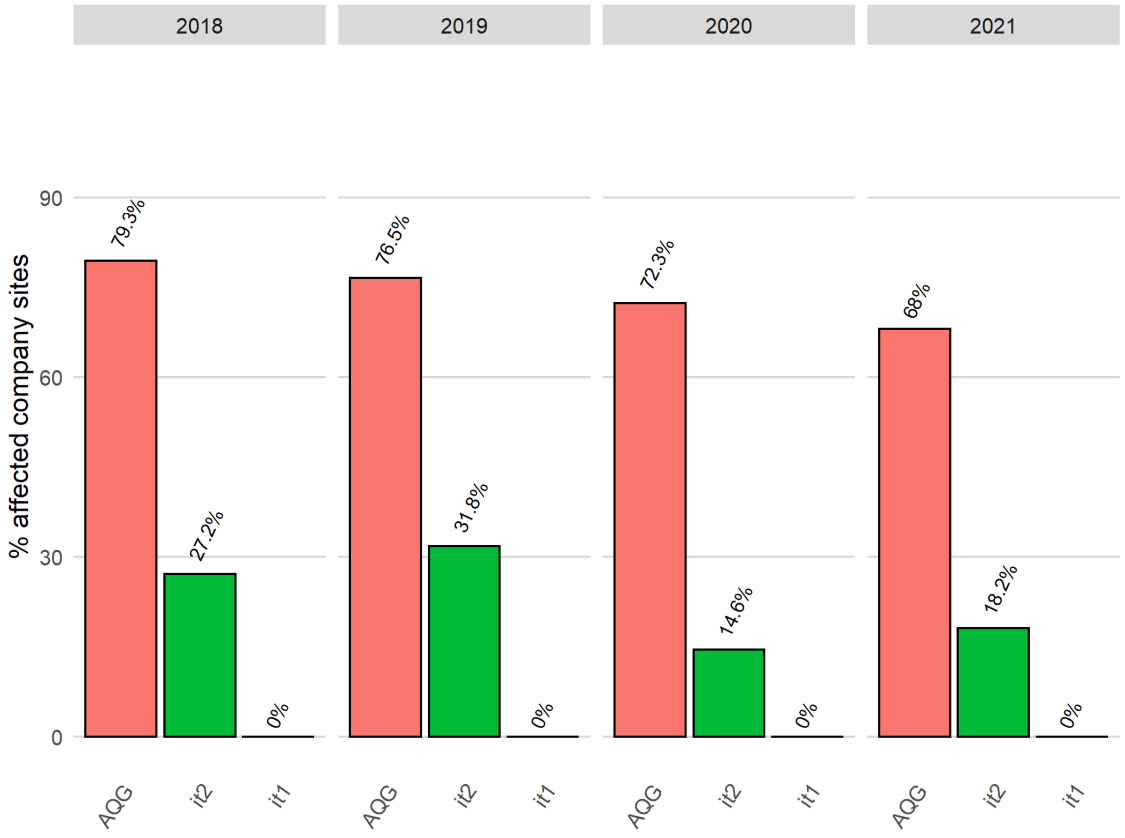

Figure 63: NO_2 DMV - percent affected manufacturing company sites per year with respect to different target and limit values

Summarising the main results for daily mean values of NO_2

The percentage of exceeding stations ranges from 81.1% to 85.1% by using AQG level. Consequently exceeding zones are identified with respect to AQG level, the percentage is within a range of 49.6% to 60.4%. In 2021, the percentage of affected company sites is 68%, whereas it has a value of 79.3% in 2018.

Considering interim target 2, the percentage of affected stations, areas and company sites significantly decreases. The percentage of exceeding stations ranges from 21.6% to 41.9% by using interim target 2. There is 4.4% to 6.2% affected area, where only urban areas and main transit routes (highways) are affected. The percentage of affected company sites with respect to interim target 2 ranges from 14.6% to 31.8%. Using interim target 1 doesn't show any effect, e.g. there are no exceeding stations, affected areas and affected company sites.

The scenarios based on max. 35 exceedance days per year show significantly lower amounts of affected areas and company sites. Exceeding zones with respect to AQG level in 2021 are mainly urban areas and highways – as it is the case for interim target 2 in scenarios with 3 to 4 exceedance

days per year. In 2020 and 2021 no exceeding zones are identified with respect to interim target 2 (even though some stations are affected by exceedances (averaging effect)). The respective tables and figures for the results of max. 35 exceedance days per year are in Annex.

The two subsequent figures summarize the percentages of affected company sites according to AQG level and interim target 3 (in case of YMV) and interim target 2 (in case of DMV). The percentages of DMV (with 3-4 exceedance days p.a.) and YMV according to AQG level are similar – with marginally smaller percentages for YMV – and are in a range of 68% to 80%, as shown in Figure 64. The percentages according to DMV with max. 35 exceedance days p.a. are significantly lower and range from 44% to 58%. Considering interim target 3 in Figure 65 shows nearly constant percentages about 32% for YMV. The percentages of DMV (with 3-4 exceedance days p.a., interim target 2) are slightly lower in 2018 and 2019, whereas they are significantly lower in 2020 and 2021. DMV with max. 35 exceedance days p.a. show only an effect in 2019.

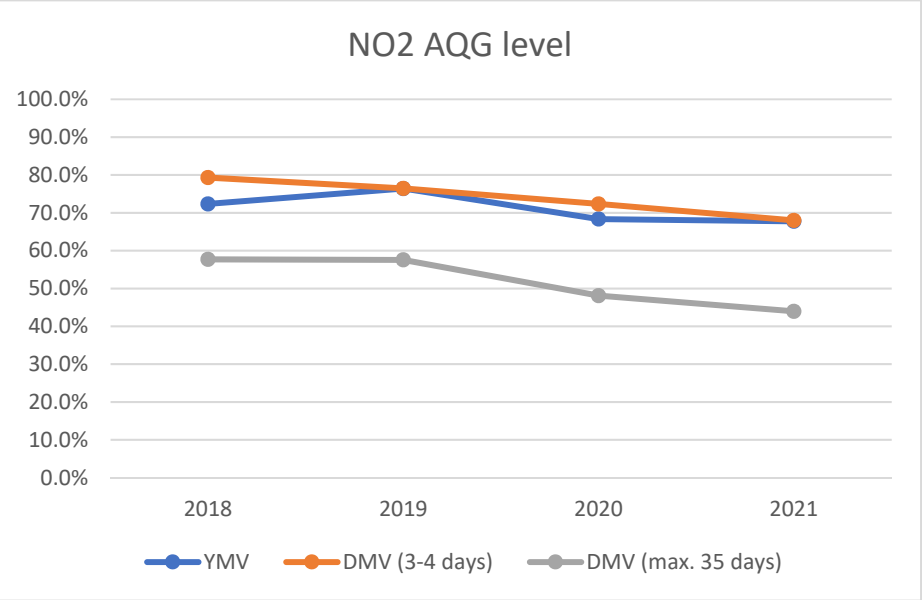

Figure 64: NO_2 – comparing YMV and DMV percentages of affected company sites according to AQG level

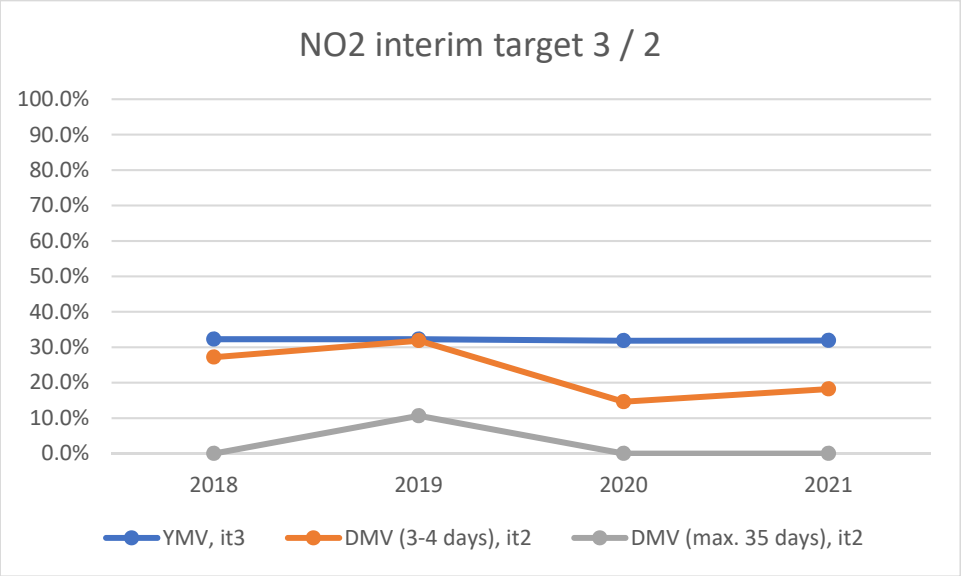

Figure 65: NO_2 – comparing YMV and DMV percentages of affected company sites according to interim target 3 (YMV) / interim target 2 (DMV)I

6 Conclusions

For simulating the impact of different limit and target values for PM_{10}, $PM_{2.5}$ and NO_2 - YMV as well as DMV - recommended by the WHO on Austrian manufacturing companies, several scenarios are defined. The amount of exceeding stations, affected area and affected company sites is estimated for each scenario.

The simulation of scenarios with different target / limit values for each pollutant per year shows following results: Exceedings according to particulate matter PM_{10} and $PM_{2.5}$ are more likely to appear in eastern and southern regions of Austria, probably because of unfavourable dispersion conditions and some urban areas with industrial zones. In the province Burgenland, there may be transnational effects which cause a higher pollutant concentration. Exceedances of NO_2 tend to occur in regions with main transit routes and big urban areas, e.g. Vienna, Linz.

In all scenarios, a high percentage of affected areas and company sites can be observed by using the most stringent AQG level. In general, by switching to the next (less restricitve) target value – which is interim target 4 for PM_{10} and $PM_{2.5}$ and interim target 3 / interim target 2 for NO_2 – the percentage of potentially affected company sites can be significantly reduced.

Considering DMV, the scenarios based on max. 35 exceedance days p.a. show either no impact or a significantly lower impact on the percentage of affected company sites than those based on 3 to 4 exceedance days p.a..

In general, the year 2018 shows more limit exceedances than the subsequent three year. This decrease can probably be attributed to climatic conditions. Consequently, a higher percentage of affected company sites is obtained in 2018 than in the years 2019 to 2021. In some scenarios, a decreasing trend for the percentage of affected company sites can be observed from 2018 to 2020, but whether this effect is due to climatic conditions and/or to lockdowns caused by Covid-19 cannot be determined based on the data framework of this study.

In Figure 66 the AQG level and the interim targets, recommended by the WHO, are visually compared to the EU limit for YMV and DMV for each pollutant. If there is an exceeding of the limit value in at least one of the four years from 2018 to 2021 - which results in affected areas and consequently in affected company sites – the limit value is colored red in Figure 66.

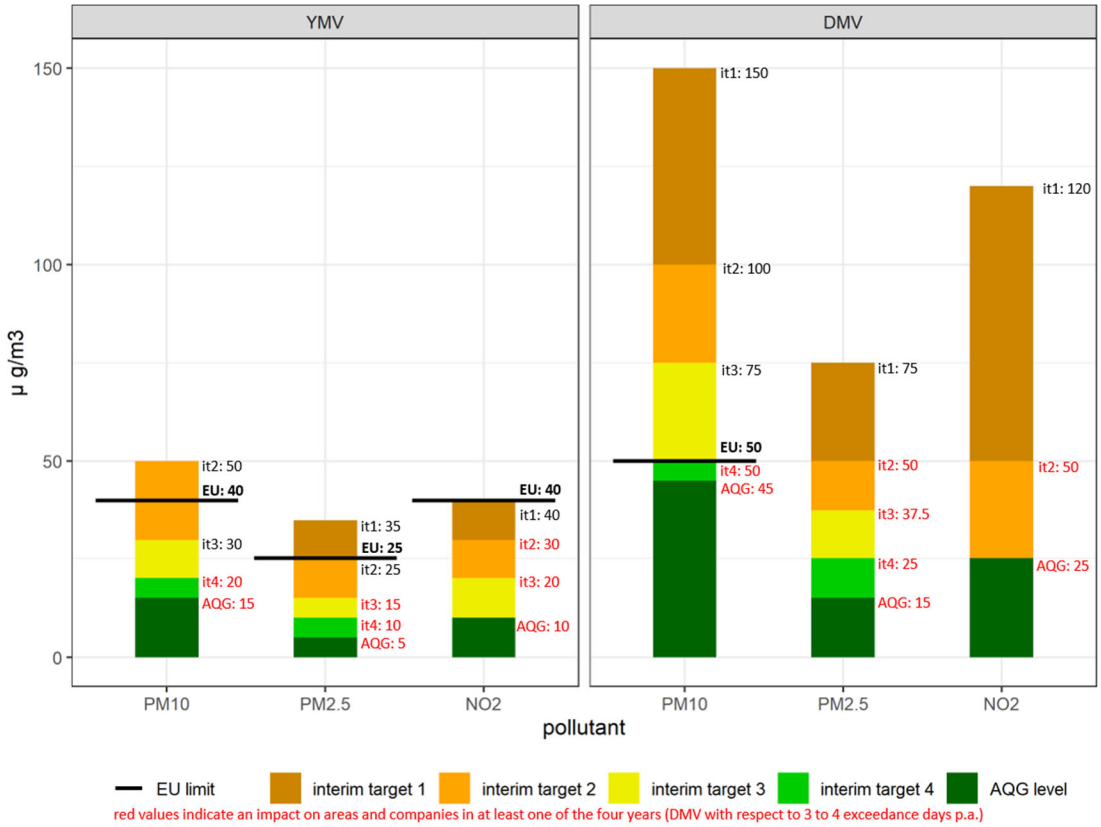

Figure 66: interim targets and AQG level in comparison with current EU limit for YMV and DMV for each pollutant with red values indicating an impact on areas and companies.

7 Bibliography

Spangl, W., Nagl, C. (2017): PM10- und PM2.5-Exposition der Bevölkerung in Österreich, Wien, Umweltbundesamt Bericht, Band 0634, ISBN: 978-3-99004-451-3 https://www.umweltbundesamt.at/studien-reports/publikationsdetail?pub_id=2235&cHash=42df7df33251c0a67d0a6df95f9e08f0

8 Annex

In this section the figures and tables of the years 2018 to 2020 are offered as well as the barplots of affected company sites separated by province and division for each year from 2018 to 2021. Additionally, all pictures and tables of the scenarios based on max. 35 exceedance days per year are shown in this section.

8.1 PM_{10} YMV

8.1.1 AQG LEVEL

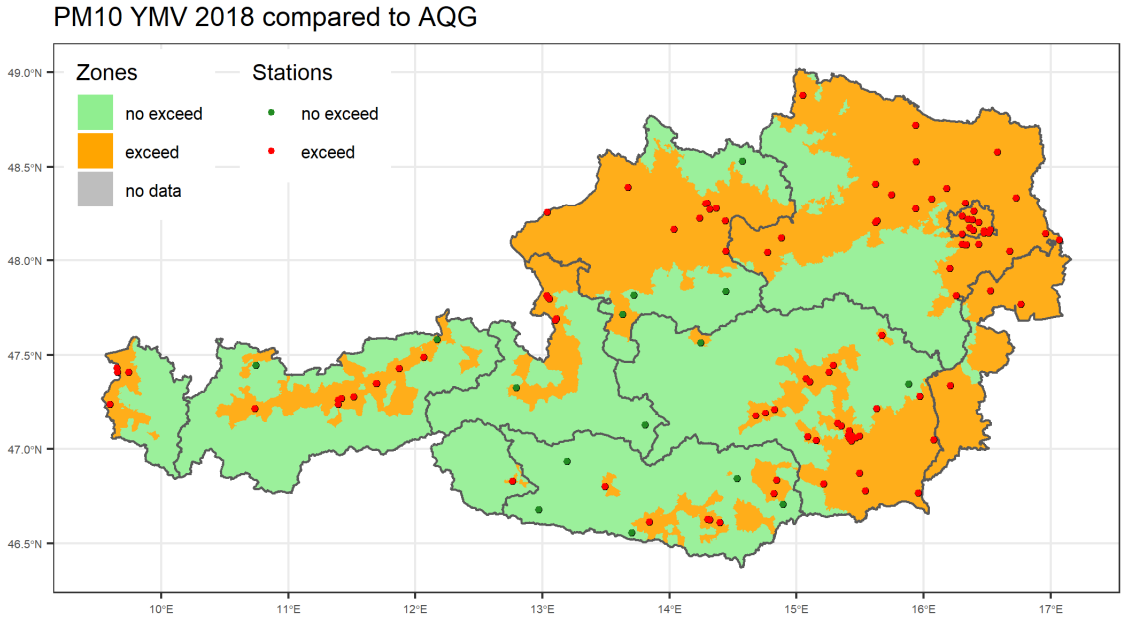

Figure 67: PM_{10} YMV 2018 AQG level - exceedance stations and areas with respect to AQG level of 15 µg/m³ (101 stations of 133 (75.9%), affected area: 43.7%).

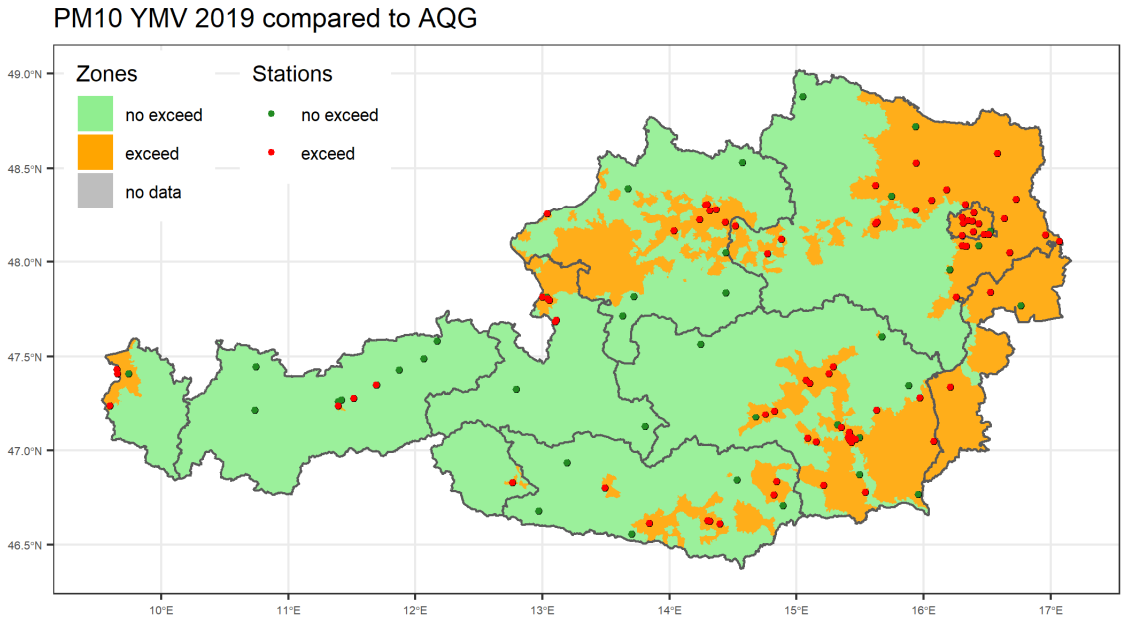

Figure 68: PM_{10} YMV 2019 AQG level - exceedance stations and areas with respect to AQG level of 15 µg/m³ (80 stations of 133 (60.2%), affected area: 27.9%).

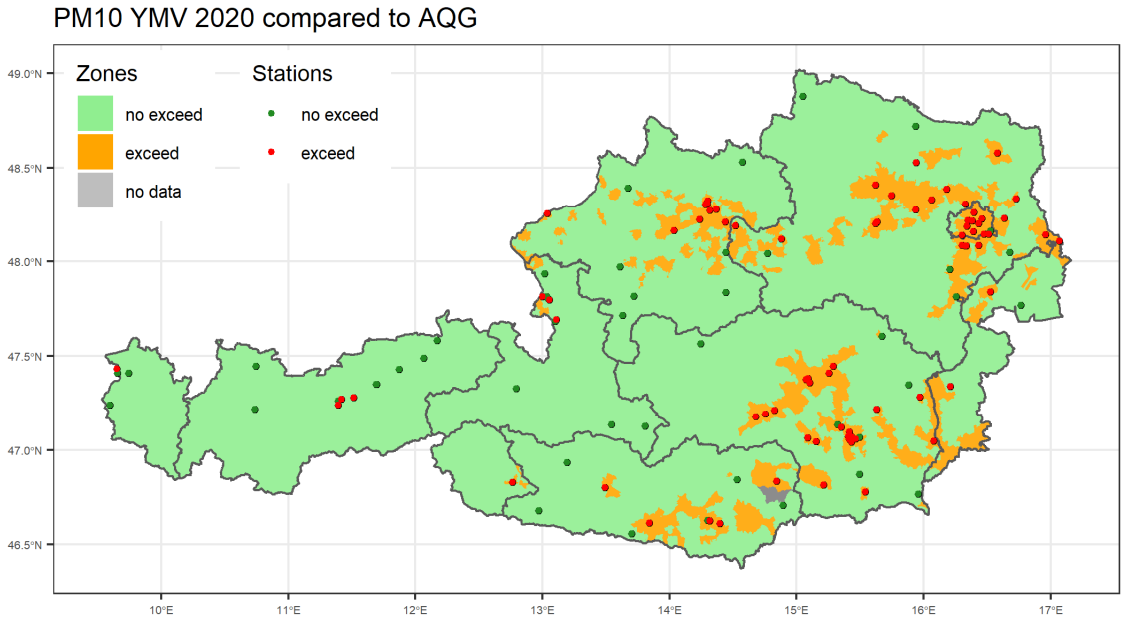

Figure 69: PM_{10} YMV 2020 AQG level - exceedance stations and areas with respect to AQG level of 15 µg/m³ (76 stations of 133 (57.1%), affected area: 12.1%).

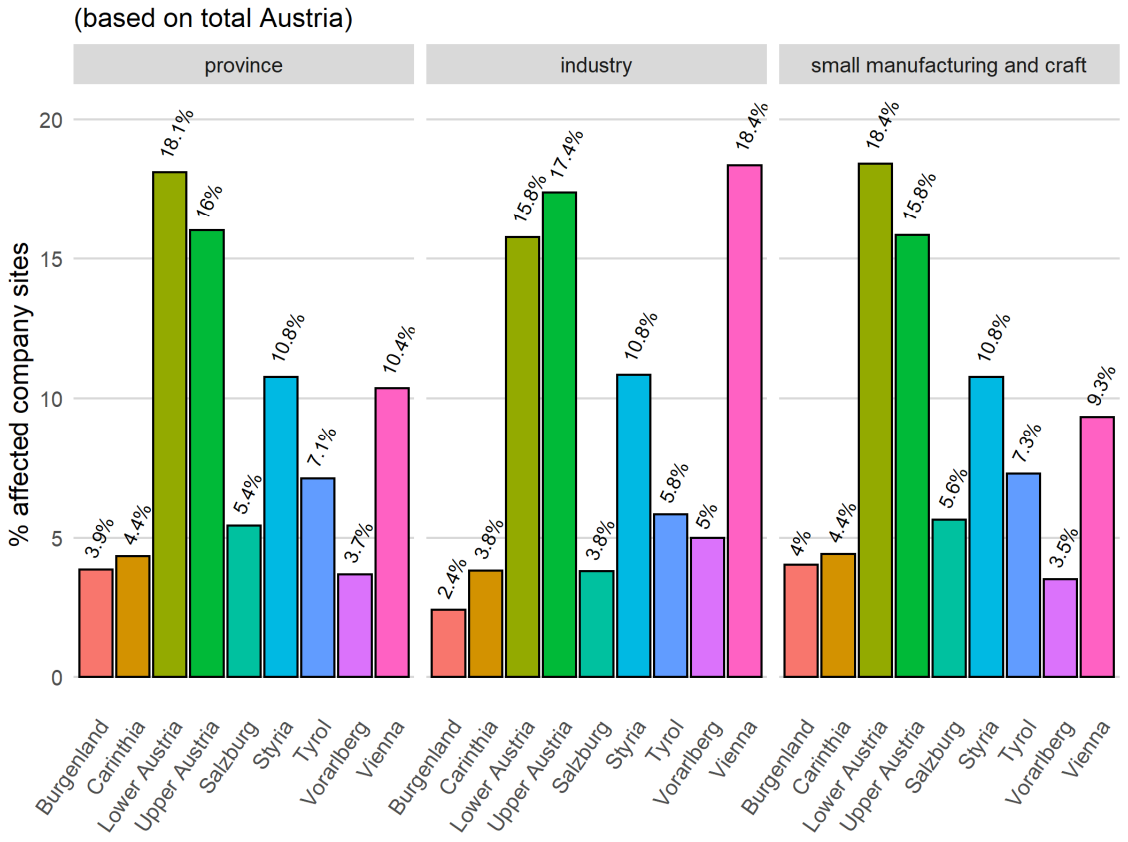

Figure 70: PM_{10} YMV 2018 AQG level – percentage of affected company sites separated by province and division

PM10 YMV 2018 AQG												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	2550	2367	183	95.1	94.9	97.9	3.9	4.0	2.4
Carinthia	5147	4670	477	2873	2586	287	55.8	55.4	60.2	4.4	4.4	3.8
Lower A.	14361	12959	1402	11963	10782	1181	83.3	83.2	84.2	18.1	18.4	15.8
Upper A.	11812	10368	1444	10577	9275	1302	89.5	89.5	90.2	16.0	15.8	17.4
Salzburg	5304	4873	431	3591	3306	285	67.7	67.8	66.1	5.4	5.6	3.8
Styria	9601	8466	1135	7118	6306	812	74.1	74.5	71.5	10.8	10.8	10.8
Tyrol	7117	6510	607	4701	4263	438	66.1	65.5	72.2	7.1	7.3	5.8
Vorarlberg	3163	2730	433	2437	2062	375	77.0	75.5	86.6	3.7	3.5	5.0
Vienna	6846	5470	1376	6846	5470	1376	100.0	100.0	100.0	10.4	9.3	18.4
total	**66031**	**58539**	**7492**	**52656**	**46417**	**6239**				**79.7**	**79.3**	**83.3**

Table 65: PM_{10} YMV 2018 AQG level – number and percentage of affected company sites separated by province and division

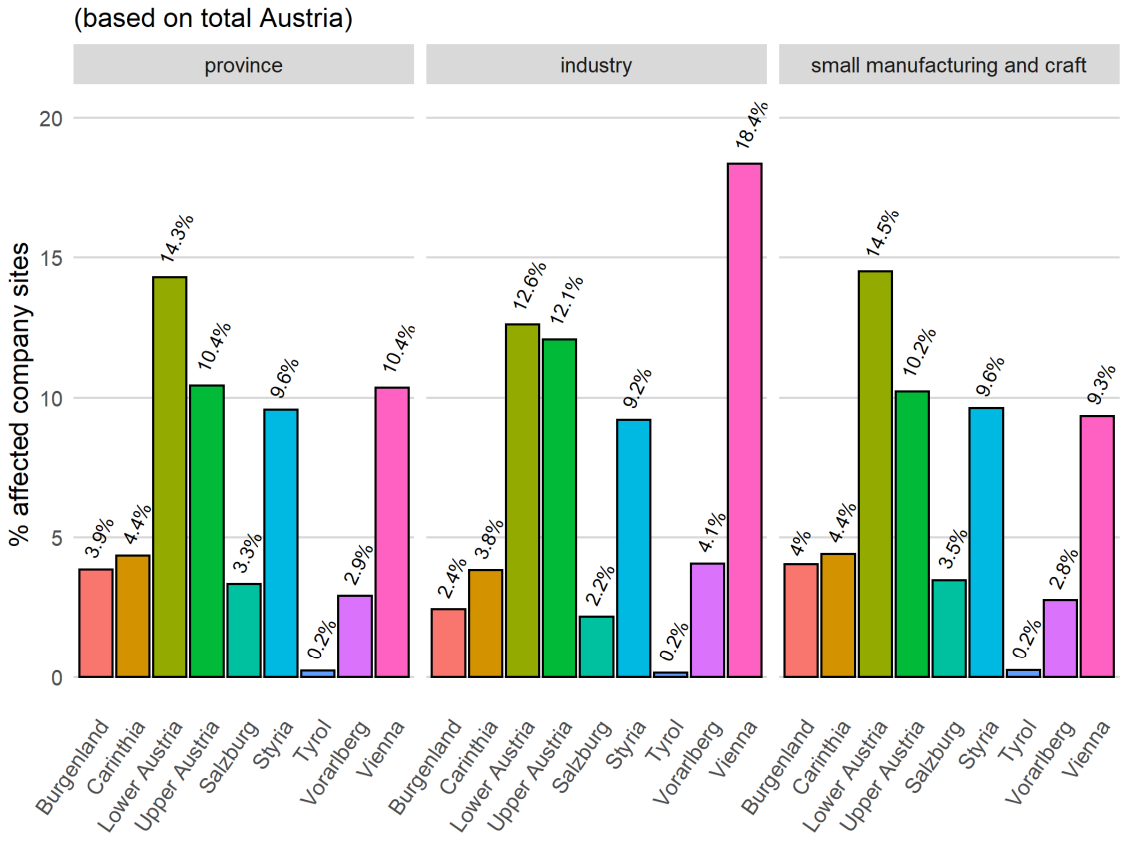

Figure 71: PM_{10} YMV 2019 AQG level – percentage of affected company sites separated by province and division

federal state	PM10 YMV 2019 AQG											
	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	2550	2367	183	95.1	94.9	97.9	3.9	4.0	2.4
Carinthia	5147	4670	477	2873	2586	287	55.8	55.4	60.2	4.4	4.4	3.8
Lower A.	14361	12959	1402	9428	8484	944	65.7	65.5	67.3	14.3	14.5	12.6
Upper A.	11812	10368	1444	6891	5986	905	58.3	57.7	62.7	10.4	10.2	12.1
Salzburg	5304	4873	431	2201	2037	164	41.5	41.8	38.1	3.3	3.5	2.2
Styria	9601	8466	1135	6328	5637	691	65.9	66.6	60.9	9.6	9.6	9.2
Tyrol	7117	6510	607	157	145	12	2.2	2.2	2.0	0.2	0.2	0.2
Vorarlberg	3163	2730	433	1927	1622	305	60.9	59.4	70.4	2.9	2.8	4.1
Vienna	6846	5470	1376	6846	5470	1376	100.0	100.0	100.0	10.4	9.3	18.4
total	**66031**	**58539**	**7492**	**39201**	**34334**	**4867**				**59.4**	**58.7**	**65.0**

Table 66: PM_{10} YMV 2019 AQG level – number and percentage of affected company sites separated by province and division

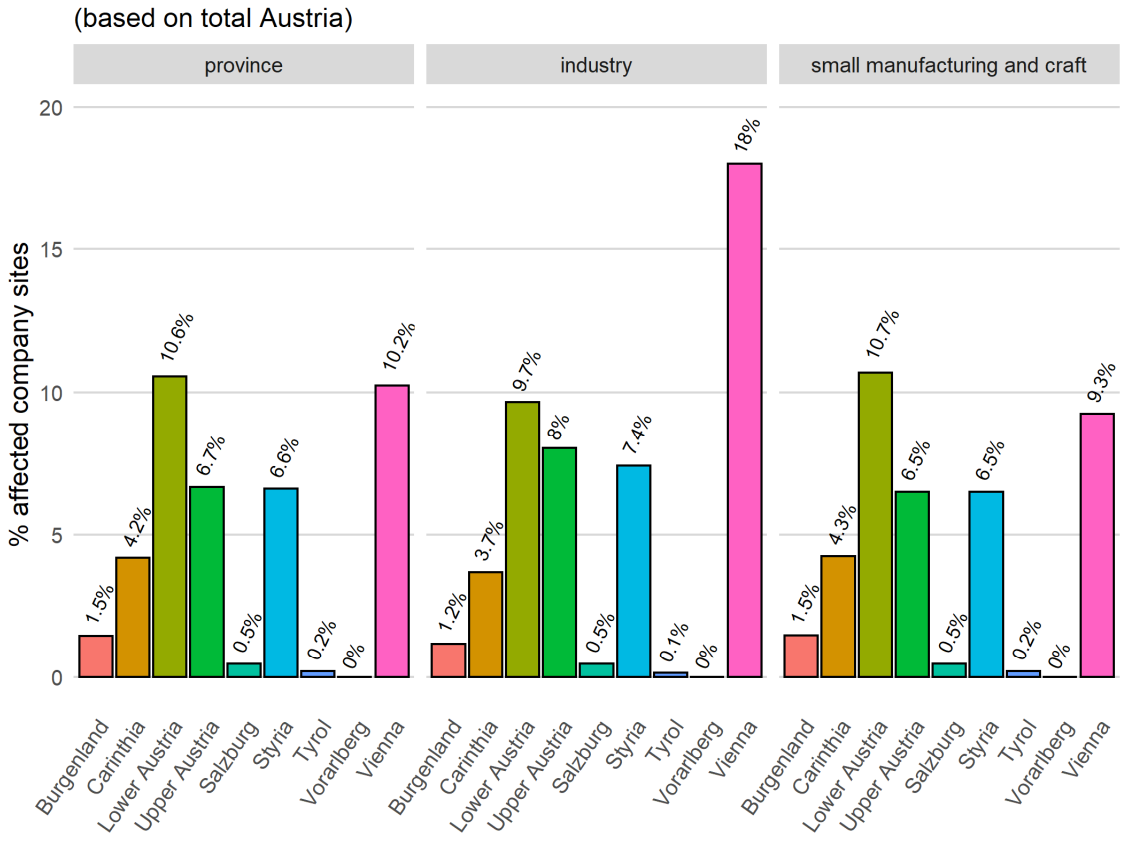

Figure 72: PM_{10} YMV 2020 AQG level – percentage of affected company sites separated by province and division

federal state	PM10 YMV 2020 AQG											
	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	963	874	89	35.9	35.1	47.6	1.5	1.5	1.2
Carinthia	5147	4670	477	2766	2489	277	53.7	53.3	58.1	4.2	4.3	3.7
Lower A.	14361	12959	1402	6974	6251	723	48.6	48.2	51.6	10.6	10.7	9.7
Upper A.	11812	10368	1444	4407	3805	602	37.3	36.7	41.7	6.7	6.5	8.0
Salzburg	5304	4873	431	314	279	35	5.9	5.7	8.1	0.5	0.5	0.5
Styria	9601	8466	1135	4358	3803	555	45.4	44.9	48.9	6.6	6.5	7.4
Tyrol	7117	6510	607	140	129	11	2.0	2.0	1.8	0.2	0.2	0.1
Vorarlberg	3163	2730	433	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Vienna	6846	5470	1376	6766	5416	1350	98.8	99.0	98.1	10.2	9.3	18.0
total	**66031**	**58539**	**7492**	**26688**	**23046**	**3642**				**40.4**	**39.4**	**48.6**

Table 67: PM_{10} YMV 2020 AQG level – number and percentage of affected company sites separated by province and division

8.1.2 INTERIM TARGET 4

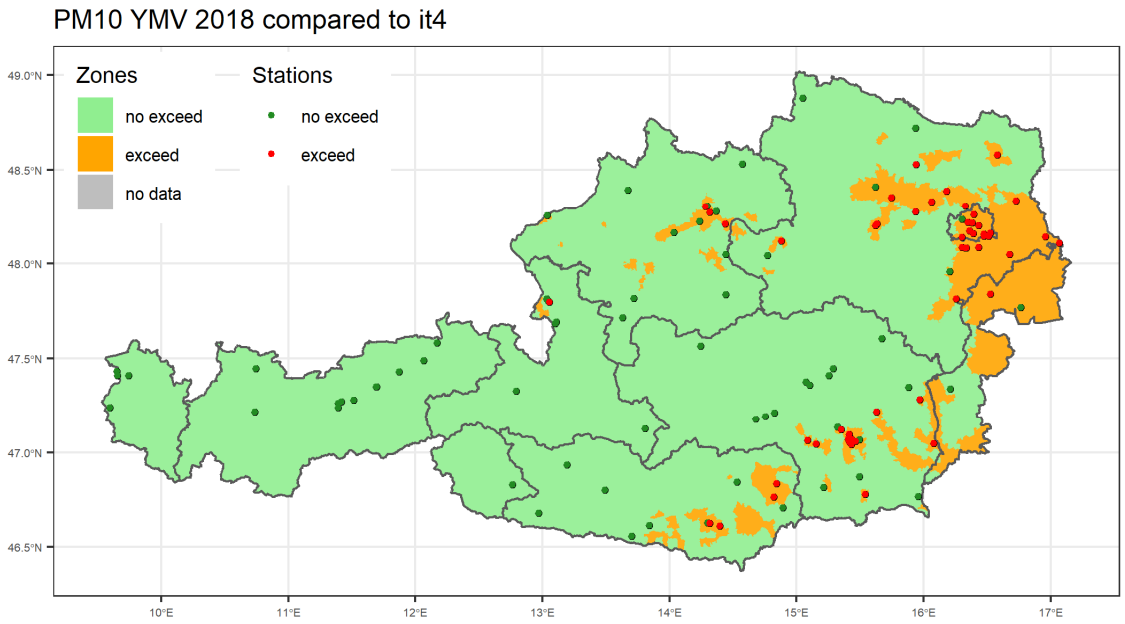

Figure 73: PM_{10} YMV 2018 interim target 4 - exceedance stations and areas with respect to interim target 4 of 20 µg/m³ (52 stations of 133 (39.1%), affected area: 11.6%).

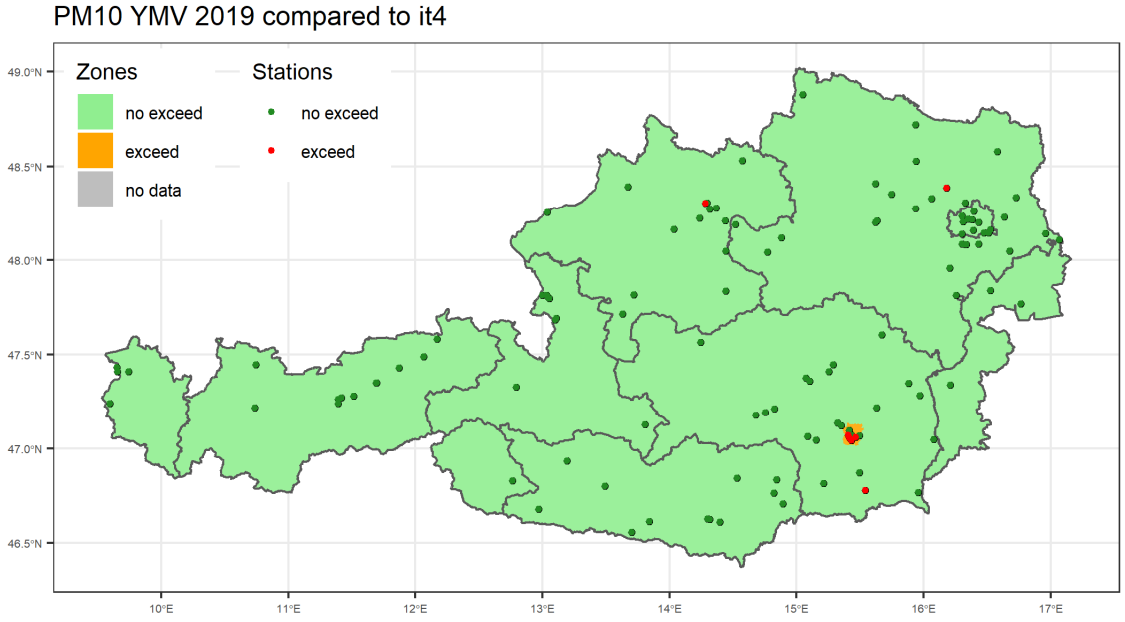

Figure 74: PM_{10} YMV 2019 interim target 4 - exceedance stations and areas with respect to interim target 4 of 20 µg/m³ (7 stations of 133 (5.3%), affected area: 0.2%).

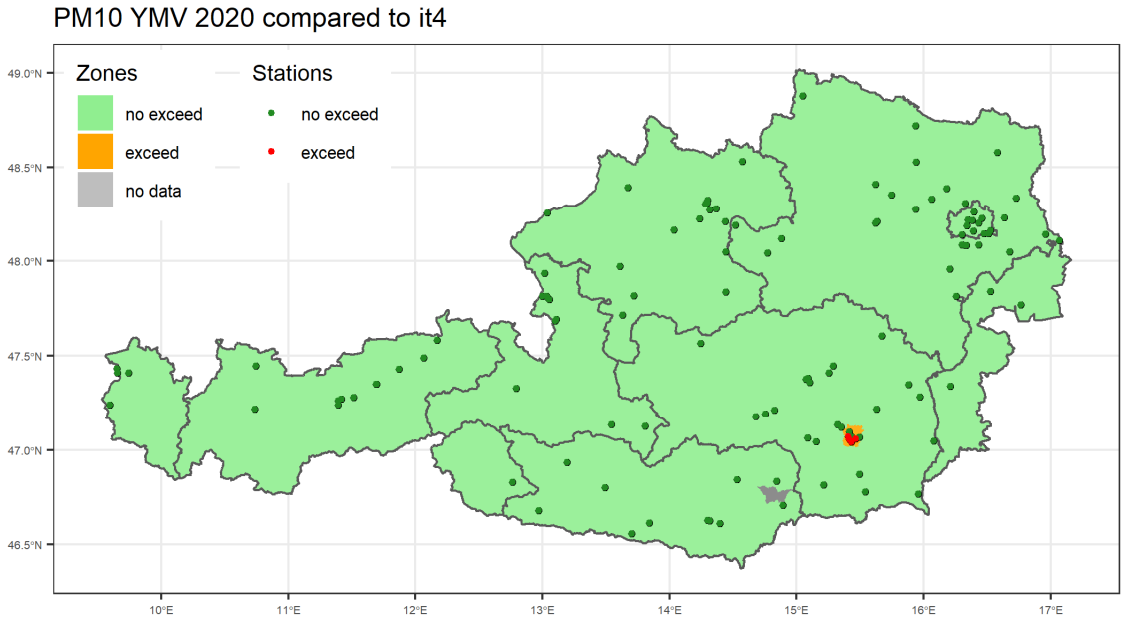

Figure 75: PM_{10} YMV 2020 interim target 4 - exceedance stations and areas with respect to interim target 4 of 20 µg/m³ (4 stations of 133 (3.0%), affected area: 0.2%).

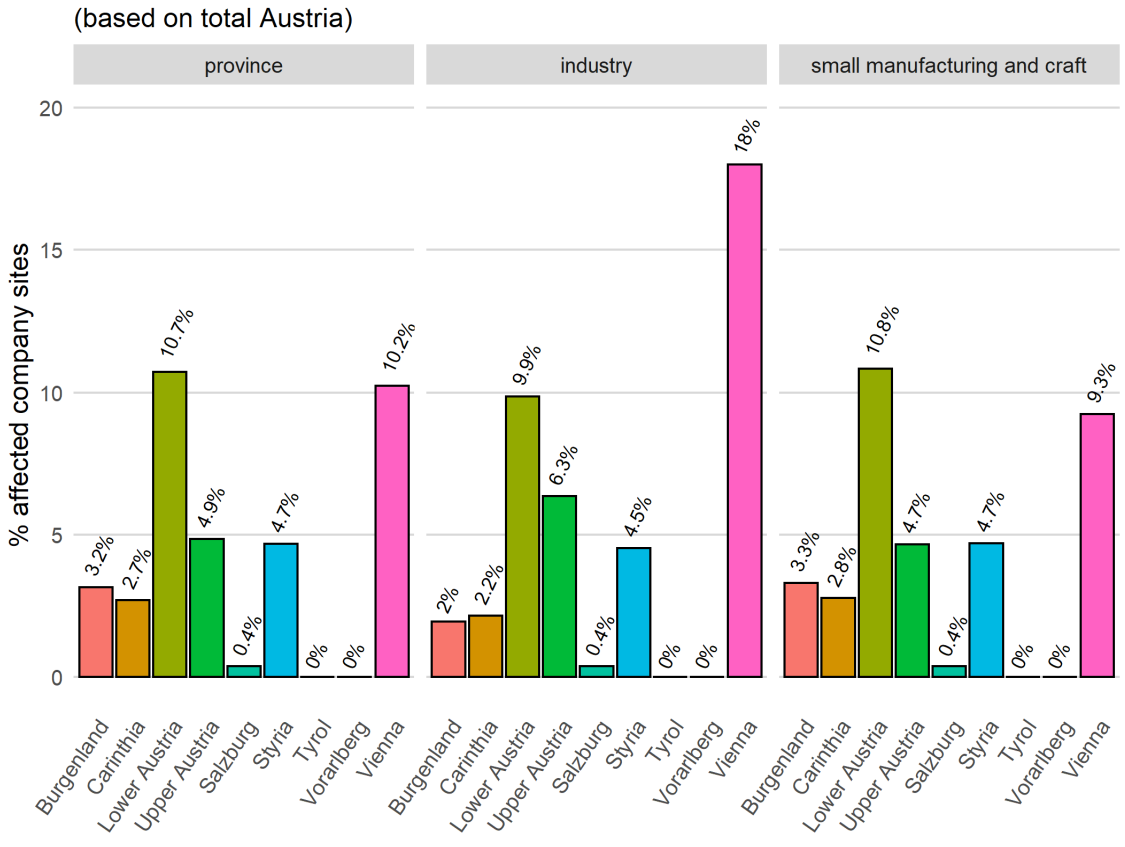

Figure 76: PM_{10} YMV 2018 interim target 4 – percentage of affected company sites separated by province and division

PM10 YMV 2018 interim target 4												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	2087	1939	148	77.9	77.8	79.1	3.2	3.3	2.0
Carinthia	5147	4670	477	1795	1632	163	34.9	34.9	34.2	2.7	2.8	2.2
Lower A.	14361	12959	1402	7086	6347	739	49.3	49.0	52.7	10.7	10.8	9.9
Upper A.	11812	10368	1444	3203	2728	475	27.1	26.3	32.9	4.9	4.7	6.3
Salzburg	5304	4873	431	247	218	29	4.7	4.5	6.7	0.4	0.4	0.4
Styria	9601	8466	1135	3095	2755	340	32.2	32.5	30.0	4.7	4.7	4.5
Tyrol	7117	6510	607	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Vorarlberg	3163	2730	433	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Vienna	6846	5470	1376	6766	5416	1350	98.8	99.0	98.1	10.2	9.3	18.0
total	**66031**	**58539**	**7492**	**24279**	**21035**	**3244**				**36.8**	**35.9**	**43.3**

Table 68: PM_{10} YMV 2018 interim target 4 – number and percentage of affected company sites separated by province and division

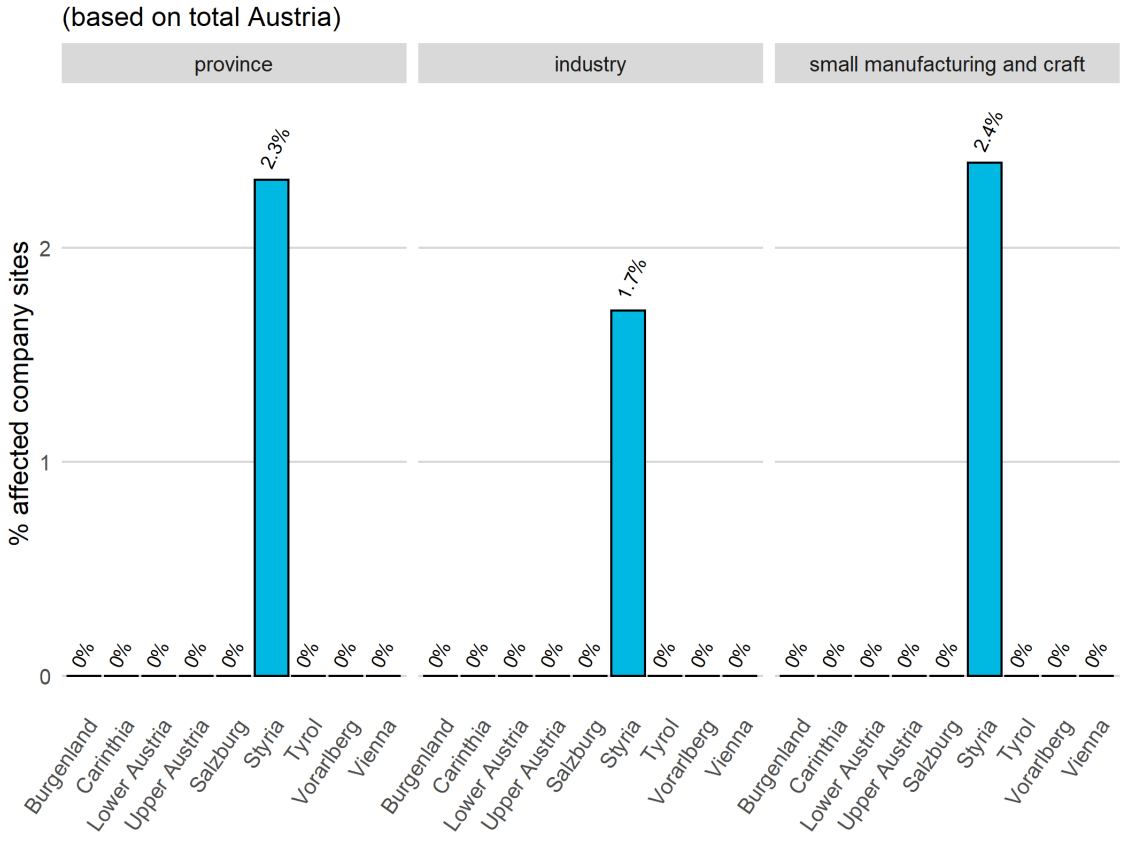

Figure 77: PM_{10} YMV 2019 interim target 4 – percentage of affected company sites separated by province and division

PM10 YMV 2019 interim target 4												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Carinthia	5147	4670	477	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Lower A.	14361	12959	1402	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Upper A.	11812	10368	1444	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Salzburg	5304	4873	431	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Styria	9601	8466	1135	1533	1405	128	16.0	16.6	11.3	2.3	2.4	1.7
Tyrol	7117	6510	607	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Vorarlberg	3163	2730	433	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Vienna	6846	5470	1376	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
total	66031	58539	7492	1533	1405	128				2.3	2.4	1.7

Table 69: PM_{10} YMV 2019 interim target 4 – number and percentage of affected company sites separated by province and division

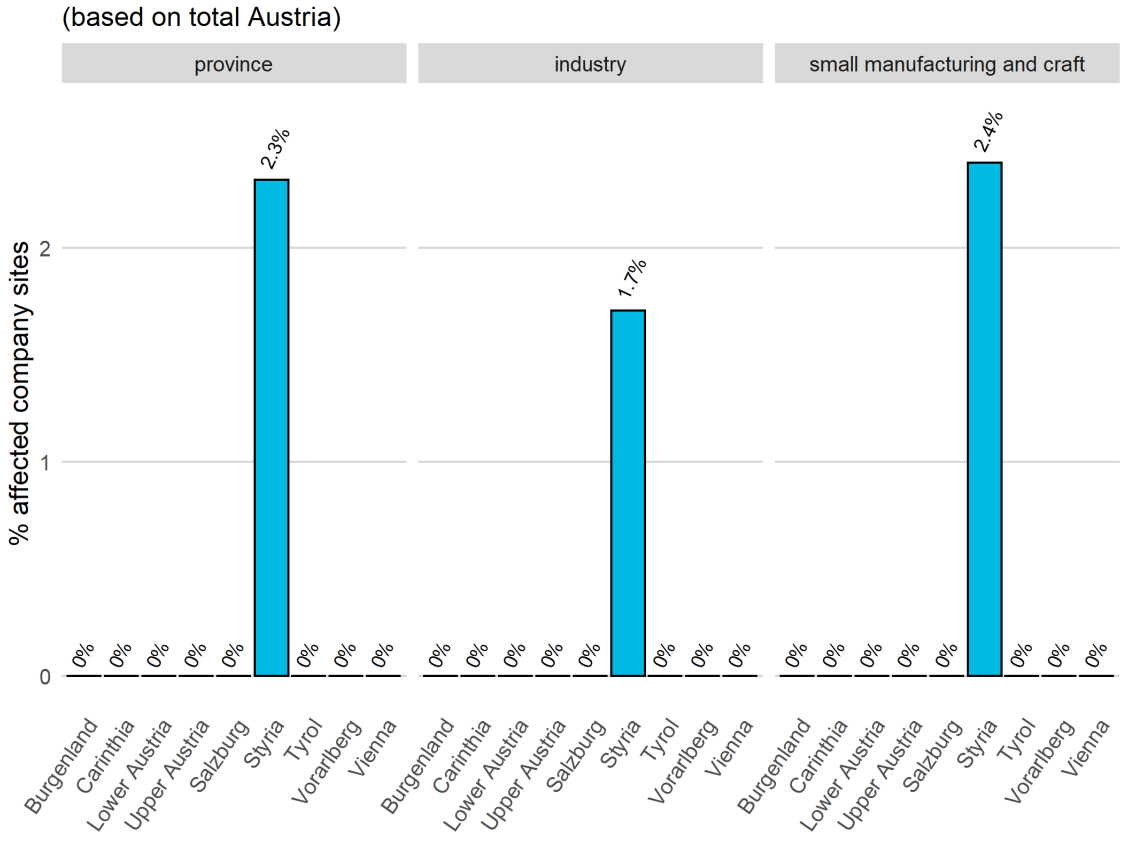

Figure 78: PM_{10} YMV 2020 interim target 4 – percentage of affected company sites separated by province and division

PM10 YMV 2020 interim target 4												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Carinthia	5147	4670	477	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Lower A.	14361	12959	1402	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Upper A.	11812	10368	1444	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Salzburg	5304	4873	431	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Styria	9601	8466	1135	1533	1405	128	16.0	16.6	11.3	2.3	2.4	1.7
Tyrol	7117	6510	607	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Vorarlberg	3163	2730	433	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Vienna	6846	5470	1376	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
total	**66031**	**58539**	**7492**	**1533**	**1405**	**128**				**2.3**	**2.4**	**1.7**

Table 70: PM_{10} YMV 2020 interim target 4 – number and percentage of affected company sites separated by province and division

8.1.3 INTERIM TARGET 3

Only in 2018 there is one exceeding station, but this doesn't cause any affected area and consequently no company sites are affected.

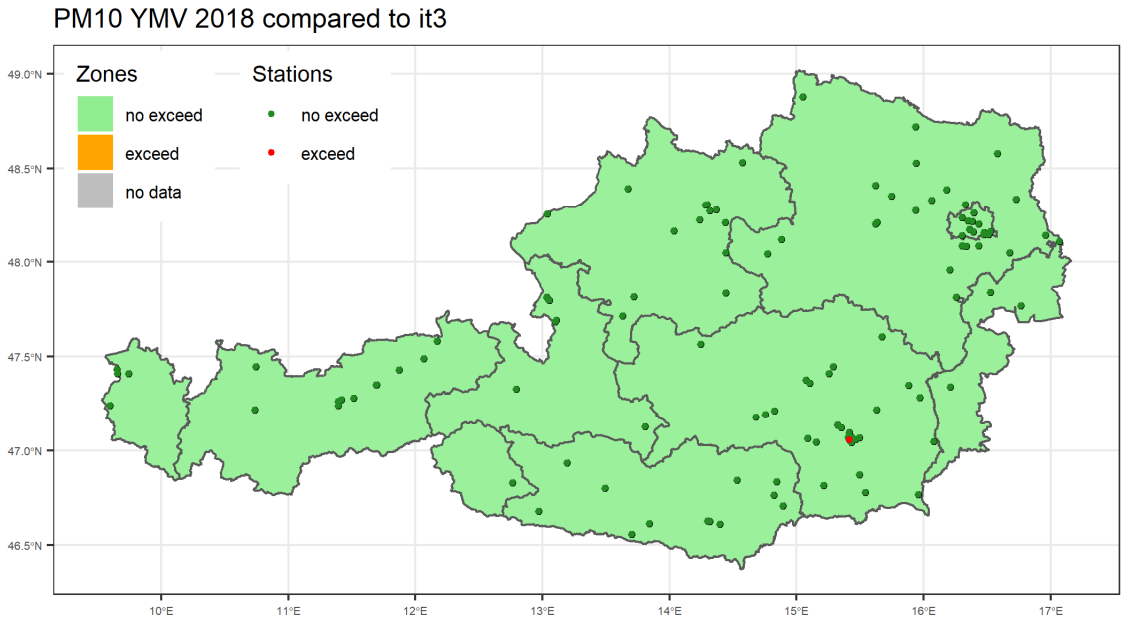

Figure 79: PM_{10} YMV 2018 interim target 3 - exceedance stations and areas with respect to interim target 3 of 30 µg/m³ (1 station of 133 (0.8.%), affected area: 0.0%).

8.1.4 PM_{10} REDEVELOPMENT AREAS AND AFFECTED COMPANY SITES

PM10 YMV 2018						
number of company sites	AQG			it4		
	total	craft	industry	total	craft	industry
within redev. area	23364	20308	3056	23364	20308	3056
affected outside redev. areas	29811	26584	3227	6068	5364	704
probably affected by measures	53175	46892	6283	29432	25672	3760

Table 71: PM_{10} YMV 2018 – number of company sites within current PM_{10} redevelopment areas, affected company sites outside current PM_{10} redevelopment areas and sum of both

PM10 YMV 2018						
percent of company sites	AQG			it4		
	total	craft	industry	total	craft	industry
within redev. area	35.4%	34.7%	40.8%	35.4%	34.7%	40.8%
affected outside redev. areas	45.1%	45.4%	43.1%	9.2%	9.2%	9.4%
probably affected by measures	80.5%	80.1%	83.9%	44.6%	43.9%	50.2%

Table 72: PM_{10} YMV 2018 – percentage of company sites within current PM_{10} redevelopment areas, affected company sites outside current PM_{10} redevelopment areas and sum of both

PM10 YMV 2019						
number of company sites	AQG			it4		
	total	craft	industry	total	craft	industry
within redev. area	23364	20308	3056	23364	20308	3056
affected outside redev. areas	17307	15341	1966	0	0	0
probably affected by measures	40671	35649	5022	23364	20308	3056

Table 73: PM_{10} YMV 2019 – number of company sites within current PM_{10} redevelopment areas, affected company sites outside current PM_{10} redevelopment areas and sum of both

PM10 YMV 2019						
percent of company sites	AQG			it4		
	total	craft	industry	total	craft	industry
within redev. area	35.4%	34.7%	40.8%	35.4%	34.7%	40.8%
affected outside redev. areas	26.2%	26.2%	26.2%	0.0%	0.0%	0.0%
probably affected by measures	61.6%	60.9%	67.0%	35.4%	34.7%	40.8%

Table 74: PM_{10} YMV 2019 – percentage of company sites within current PM_{10} redevelopment areas, affected company sites outside current PM_{10} redevelopment areas and sum of both

PM10 YMV 2020						
number of company sites	AQG			it4		
	total	craft	industry	total	craft	industry
within redev. area	23364	20308	3056	23364	20308	3056
affected outside redev. areas	9743	8603	1140	0	0	0
probably affected by measures	33107	28911	4196	23364	20308	3056

Table 75: PM_{10} YMV 2020 – number of company sites within current PM_{10} redevelopment areas, affected company sites outside current PM_{10} redevelopment areas and sum of both

PM10 YMV 2020						
percent of company sites	AQG			it4		
	total	craft	industry	total	craft	industry
within redev. area	35.4%	34.7%	40.8%	35.4%	34.7%	40.8%
affected outside redev. areas	14.8%	14.7%	15.2%	0.0%	0.0%	0.0%
probably affected by measures	50.1%	49.4%	56.0%	35.4%	34.7%	40.8%

Table 76: PM_{10} YMV 2020 – percentage of company sites within current PM_{10} redevelopment areas, affected company sites outside current PM_{10} redevelopment areas and sum of both

8.2 PM_{10} DMV (WITH 3 TO 4 EXCEEDING DAYS P.A.)

8.2.1 AQG LEVEL

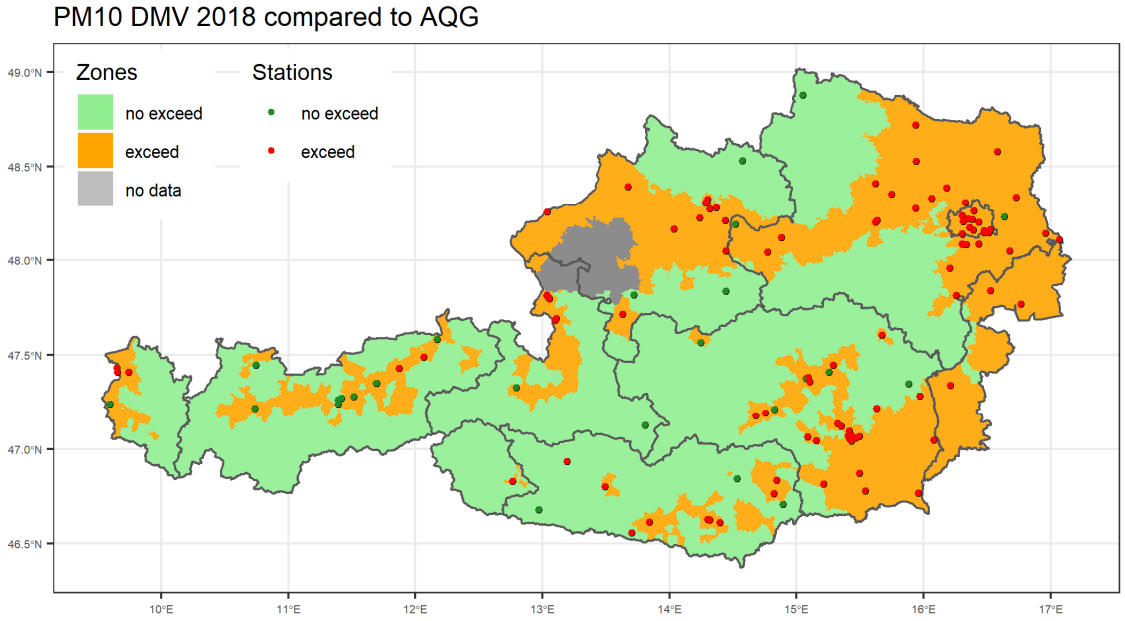

Figure 80: PM_{10} DMV 2018 AQG level (3-4 days exceedance p.a.) – exceedance stations and areas with respect to AQG level of 45 µg/m³ (95 station of 133 (71.4%), affected area: 36.8%).

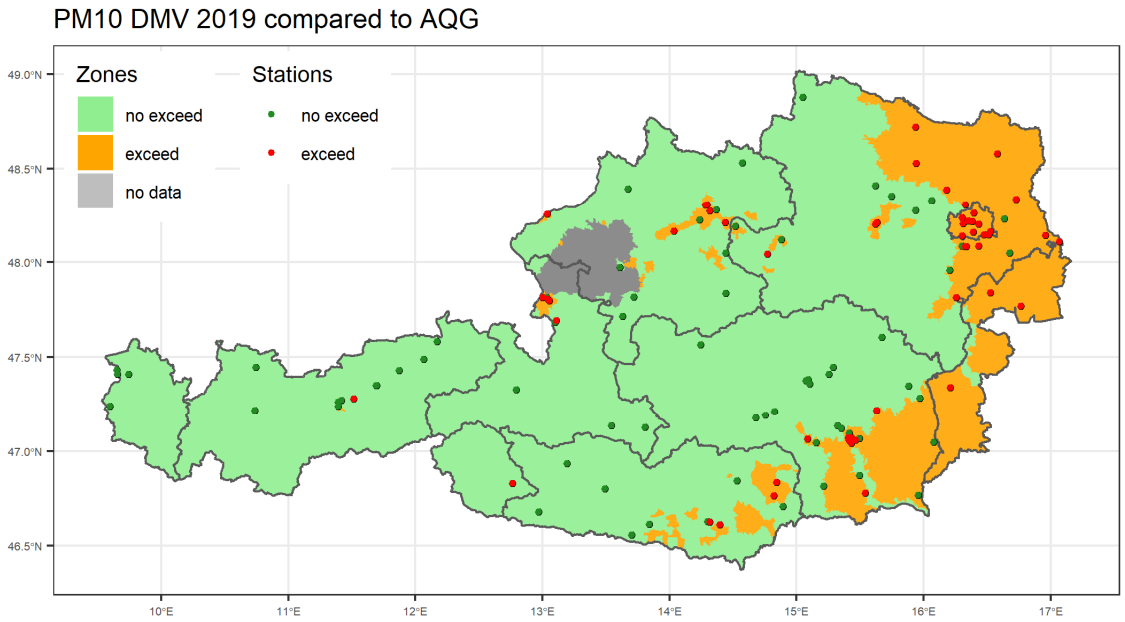

Figure 81: PM_{10} DMV 2019 AQG level (3-4 days exceedance p.a.) – exceedance stations and areas with respect to AQG level of 45 µg/m³ (53 station of 133 (39.8%), affected area: 18.9%).

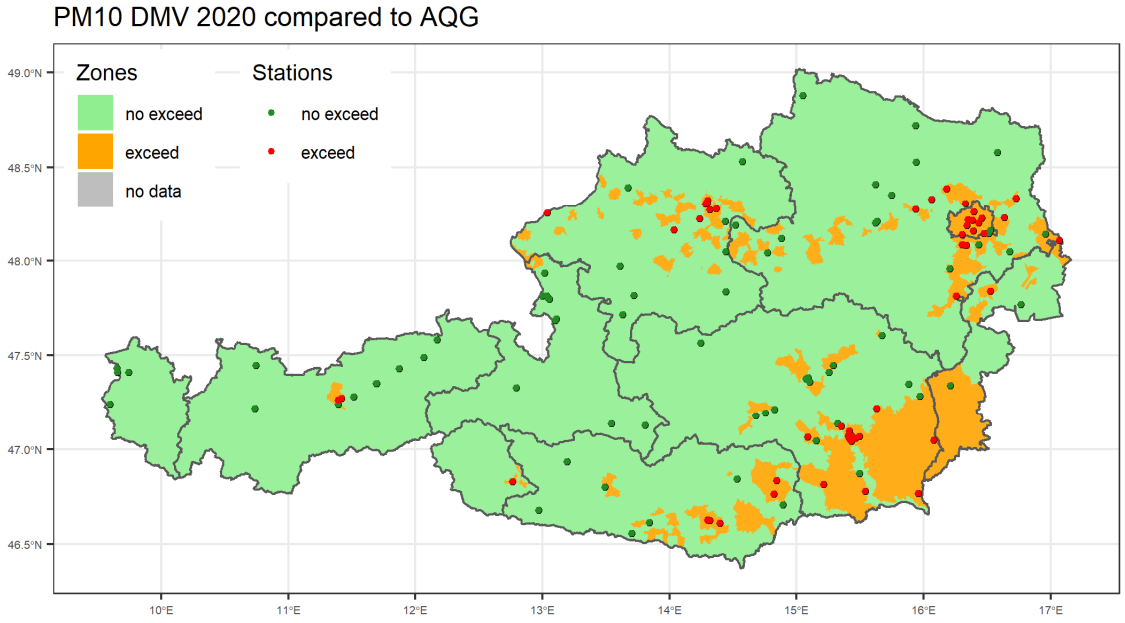

Figure 82: PM_{10} DMV 2020 AQG level (3-4 days exceedance p.a.) – exceedance stations and areas with respect to AQG level of 45 µg/m³ (51 station of 133 (38.3%), affected area: 12.8%).

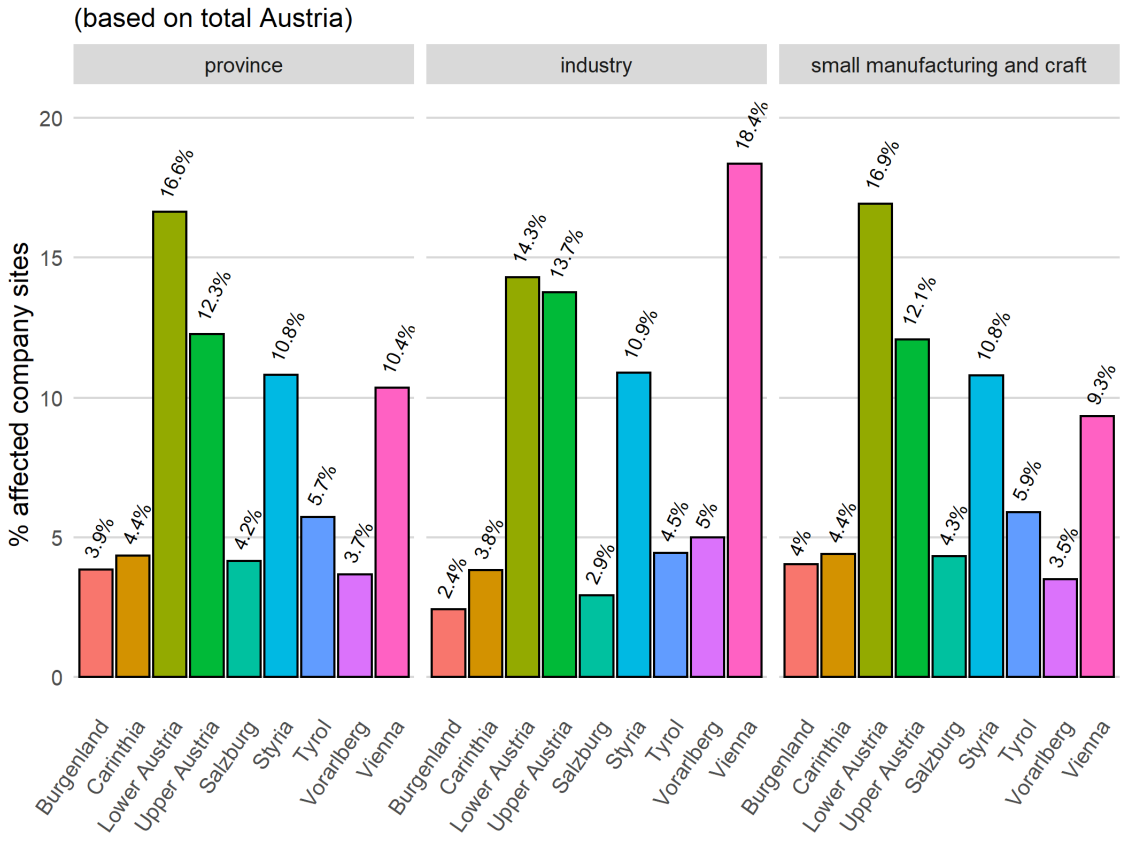

Figure 83: PM_{10} DMV 2018 AQG level (3-4 days exceedance p.a.) – percentage of affected company sites separated by province and division

PM10 DMV 2018 AQG												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	2550	2367	183	95.1	94.9	97.9	3.9	4.0	2.4
Carinthia	5147	4670	477	2873	2586	287	55.8	55.4	60.2	4.4	4.4	3.8
Lower A.	14361	12959	1402	10989	9918	1071	76.5	76.5	76.4	16.6	16.9	14.3
Upper A.	11812	10368	1444	8097	7067	1030	68.5	68.2	71.3	12.3	12.1	13.7
Salzburg	5304	4873	431	2753	2532	221	51.9	52.0	51.3	4.2	4.3	2.9
Styria	9601	8466	1135	7137	6321	816	74.3	74.7	71.9	10.8	10.8	10.9
Tyrol	7117	6510	607	3783	3449	334	53.2	53.0	55.0	5.7	5.9	4.5
Vorarlberg	3163	2730	433	2437	2062	375	77.0	75.5	86.6	3.7	3.5	5.0
Vienna	6846	5470	1376	6846	5470	1376	100.0	100.0	100.0	10.4	9.3	18.4
total	**66031**	**58539**	**7492**	**47465**	**41772**	**5693**				**71.9**	**71.4**	**76.0**

Table 77: PM_{10} DMV 2018 AQG level (3-4 days exceedance p.a.) – number and percentage of affected company sites separated by province and division

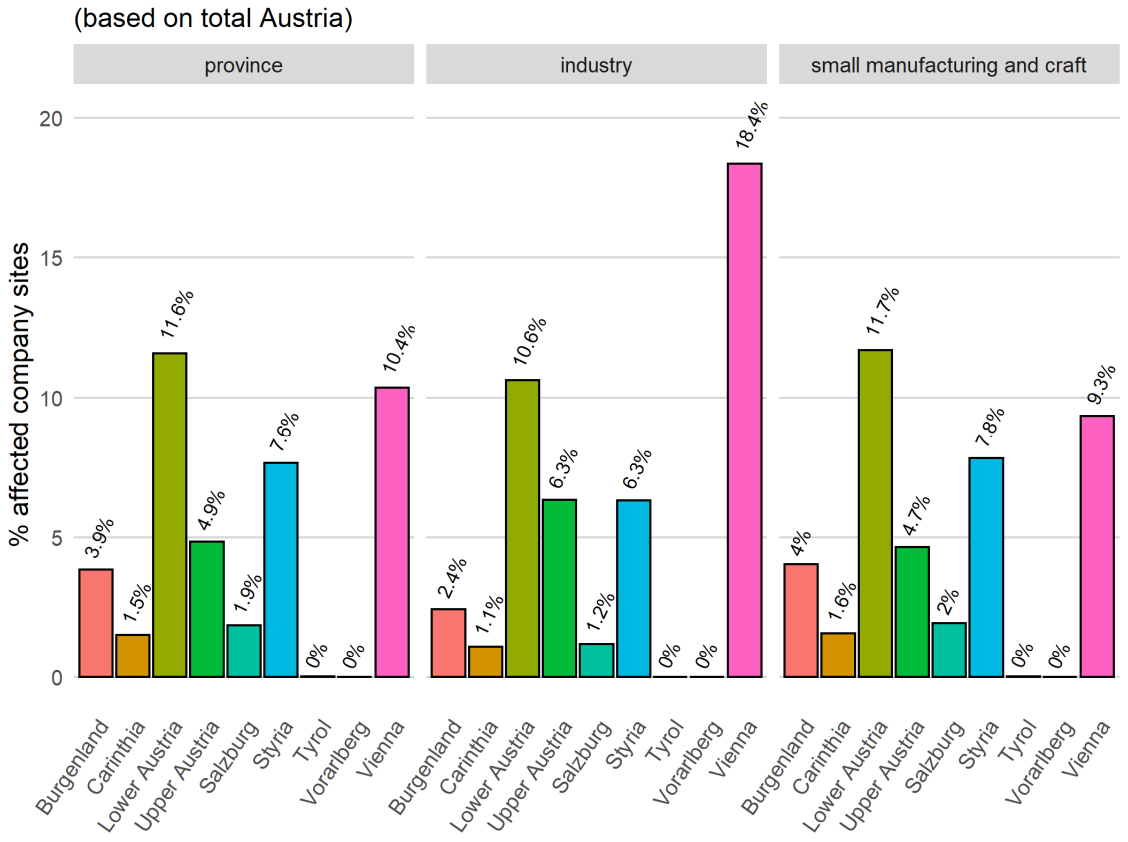

Figure 84: PM_{10} DMV 2019 AQG level (3-4 days exceedance p.a.) – percentage of affected company sites separated by province and division

PM10 DMV 2019 AQG												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	2550	2367	183	95.1	94.9	97.9	3.9	4.0	2.4
Carinthia	5147	4670	477	1009	926	83	19.6	19.8	17.4	1.5	1.6	1.1
Lower A.	14361	12959	1402	7646	6850	796	53.2	52.9	56.8	11.6	11.7	10.6
Upper A.	11812	10368	1444	3203	2728	475	27.1	26.3	32.9	4.9	4.7	6.3
Salzburg	5304	4873	431	1236	1146	90	23.3	23.5	20.9	1.9	2.0	1.2
Styria	9601	8466	1135	5049	4576	473	52.6	54.1	41.7	7.6	7.8	6.3
Tyrol	7117	6510	607	17	16	1	0.2	0.2	0.2	0.0	0.0	0.0
Vorarlberg	3163	2730	433	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Vienna	6846	5470	1376	6846	5470	1376	100.0	100.0	100.0	10.4	9.3	18.4
total	**66031**	**58539**	**7492**	**27556**	**24079**	**3477**				**41.7**	**41.1**	**46.4**

Table 78: PM_{10} DMV 2019 AQG level (3-4 days exceedance p.a.) – number and percentage of affected company sites separated by province and division

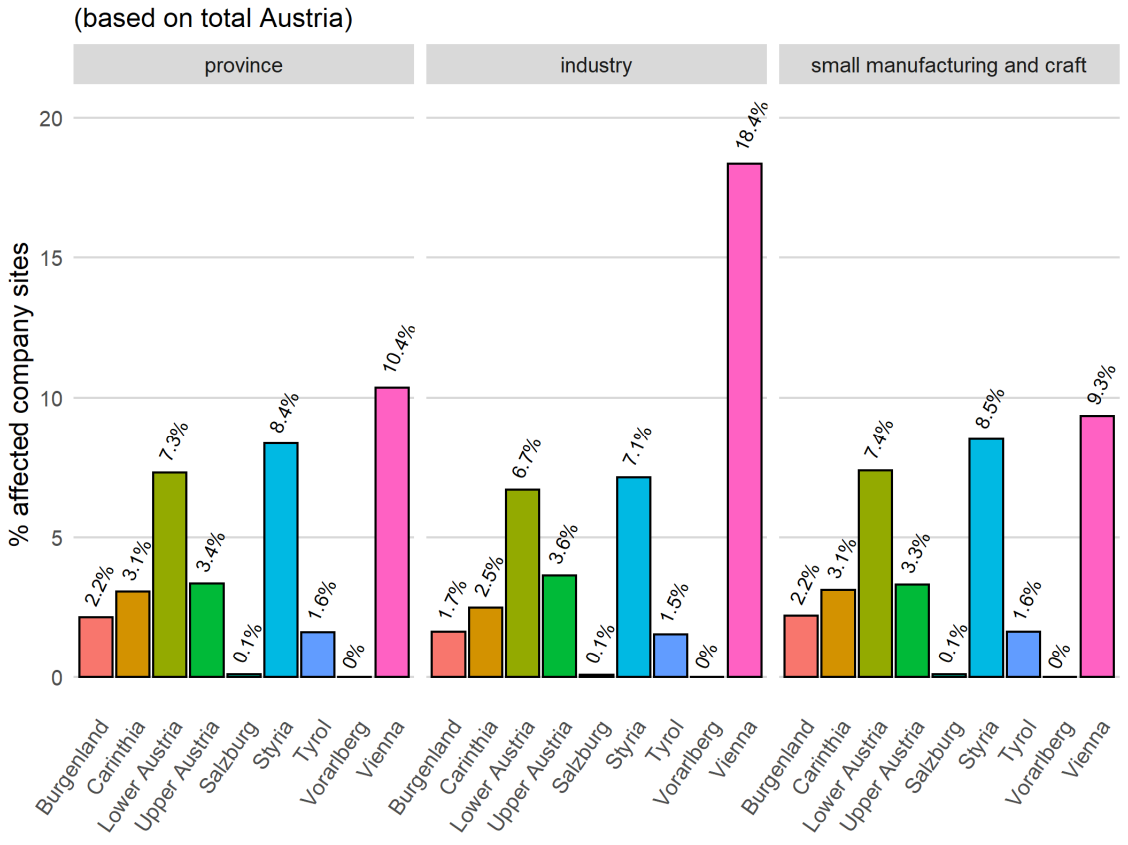

Figure 85: PM_{10} DMV 2020 AQG level (3-4 days exceedance p.a.) – percentage of affected company sites separated by province and division

PM10 DMV 2020 AQG												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	1426	1302	124	53.2	52.2	66.3	2.2	2.2	1.7
Carinthia	5147	4670	477	2025	1837	188	39.3	39.3	39.4	3.1	3.1	2.5
Lower A.	14361	12959	1402	4830	4328	502	33.6	33.4	35.8	7.3	7.4	6.7
Upper A.	11812	10368	1444	2223	1950	273	18.8	18.8	18.9	3.4	3.3	3.6
Salzburg	5304	4873	431	67	61	6	1.3	1.3	1.4	0.1	0.1	0.1
Styria	9601	8466	1135	5514	4979	535	57.4	58.8	47.1	8.4	8.5	7.1
Tyrol	7117	6510	607	1075	959	116	15.1	14.7	19.1	1.6	1.6	1.5
Vorarlberg	3163	2730	433	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Vienna	6846	5470	1376	6846	5470	1376	100.0	100.0	100.0	10.4	9.3	18.4
total	**66031**	**58539**	**7492**	**24006**	**20886**	**3120**				**36.4**	**35.7**	**41.6**

Table 79: PM_{10} DMV 2020 AQG level (3-4 days exceedance p.a.) – number and percentage of affected company sites separated by province and division

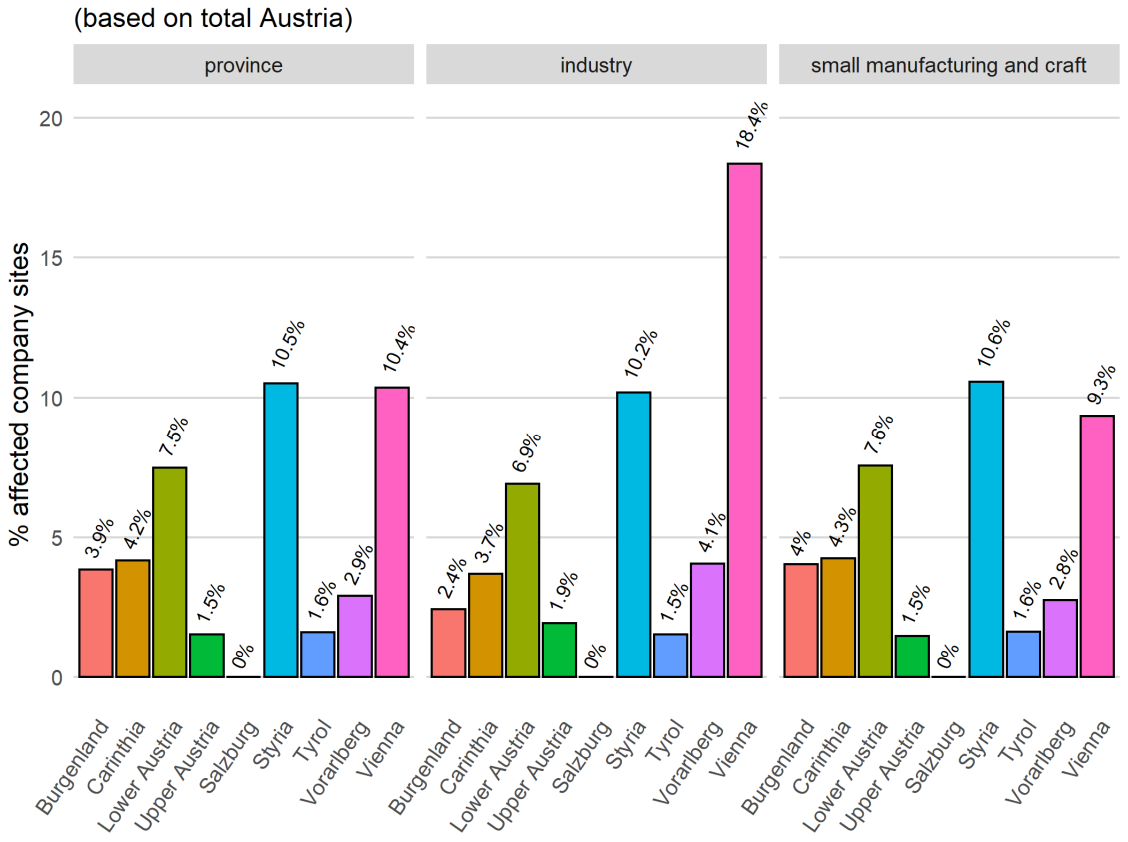

Figure 86: PM_{10} DMV 2021 AQG level (3-4 days exceedance p.a.) – percentage of affected company sites separated by province and division

federal state	PM10 DMV 2021 AQG											
	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	2550	2367	183	95.1	94.9	97.9	3.9	4.0	2.4
Carinthia	5147	4670	477	2766	2489	277	53.7	53.3	58.1	4.2	4.3	3.7
Lower A.	14361	12959	1402	4942	4424	518	34.4	34.1	36.9	7.5	7.6	6.9
Upper A.	11812	10368	1444	1019	873	146	8.6	8.4	10.1	1.5	1.5	1.9
Salzburg	5304	4873	431	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Styria	9601	8466	1135	6946	6183	763	72.3	73.0	67.2	10.5	10.6	10.2
Tyrol	7117	6510	607	1075	959	116	15.1	14.7	19.1	1.6	1.6	1.5
Vorarlberg	3163	2730	433	1927	1622	305	60.9	59.4	70.4	2.9	2.8	4.1
Vienna	6846	5470	1376	6846	5470	1376	100.0	100.0	100.0	10.4	9.3	18.4
total	**66031**	**58539**	**7492**	**28071**	**24387**	**3684**				**42.5**	**41.7**	**49.2**

Table 80: PM_{10} DMV 2021 AQG level (3-4 days exceedance p.a.) – number and percentage of affected company sites separated by province and division

8.2.2 EU LIMIT (INTERIM TARGET 4)

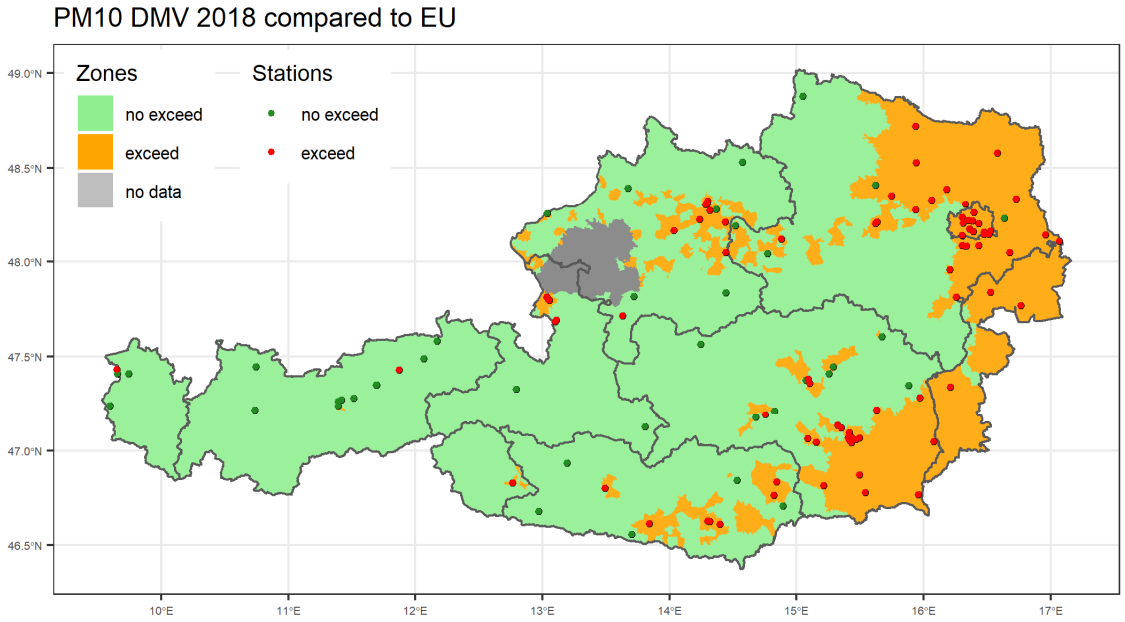

Figure 87: PM_{10} DMV 2018 EU limit (3-4 days exceedance p.a.) – exceedance stations and areas with respect to EU limit of 50 µg/m³ (82 station of 133 (61.7%), affected area: 23.7%).

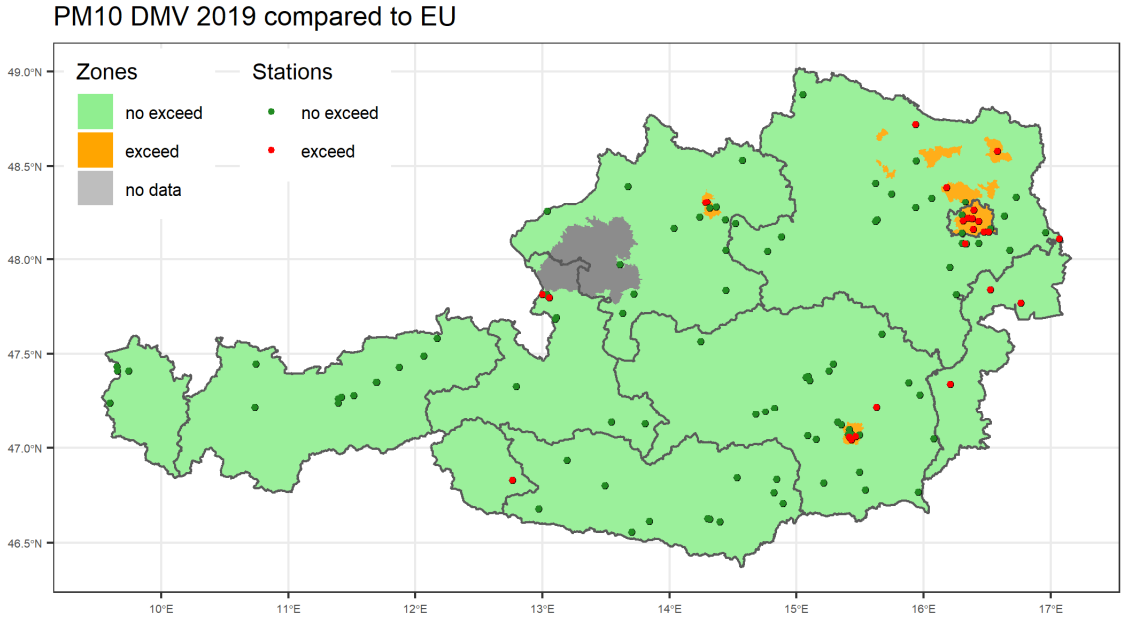

Figure 88: PM_{10} DMV 2019 EU limit (3-4 days exceedance p.a.) – exceedance stations and areas with respect to EU limit of 50 µg/m³ (25 station of 133 (18.8%), affected area: 1.4%).

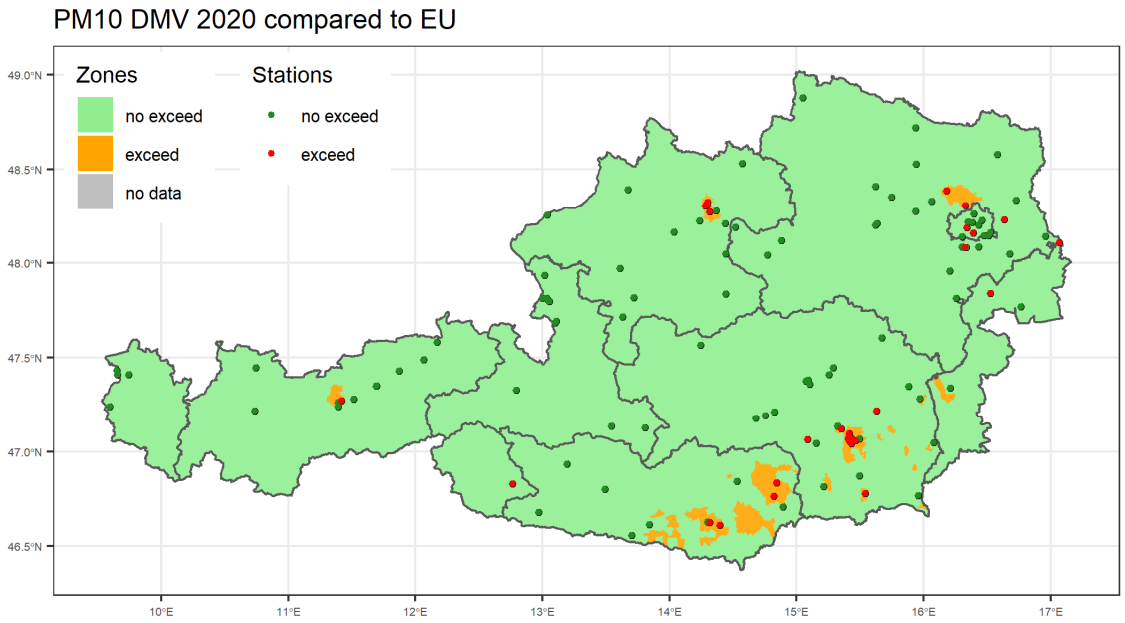

Figure 89: PM_{10} DMV 2020 EU limit (3-4 days exceedance p.a.) – exceedance stations and areas with respect to EU limit of 50 µg/m³ (28 station of 133 (21.1%), affected area: 2.3%).

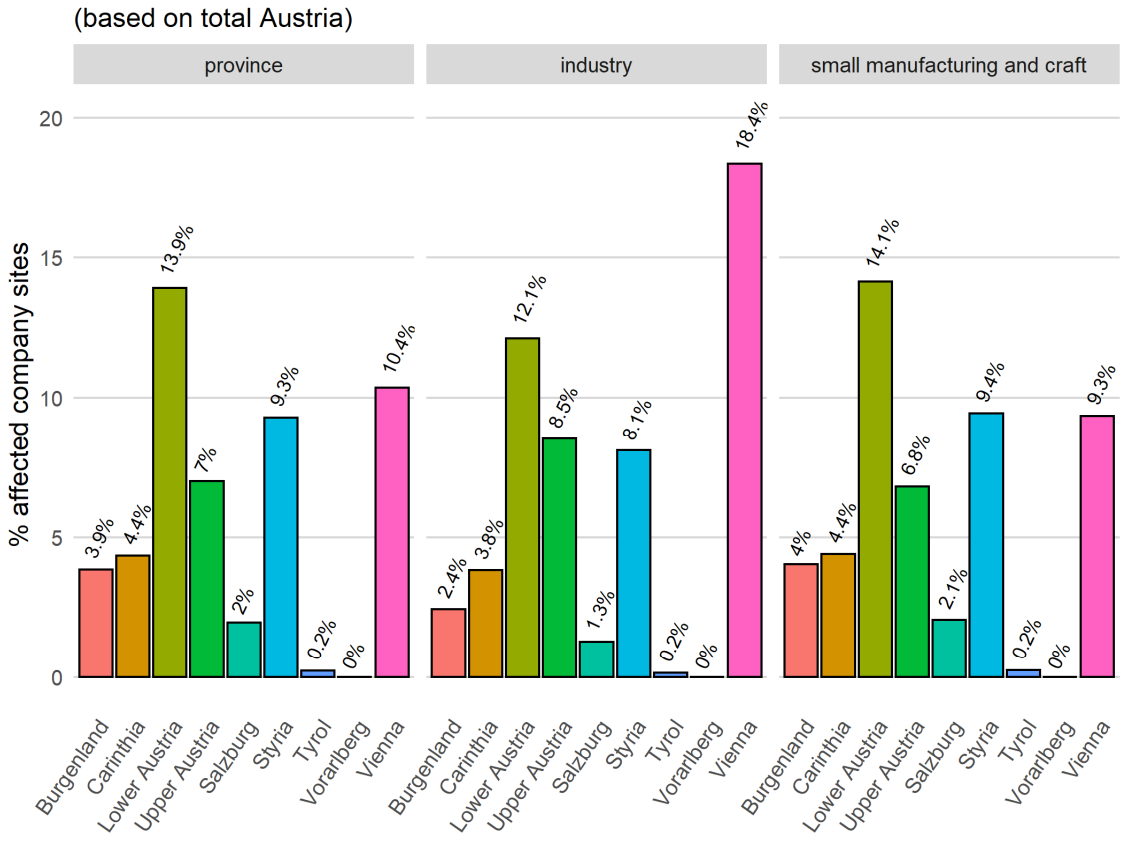

Figure 90: PM_{10} DMV 2018 EU limit (3-4 days exceedance p.a.) – percentage of affected company sites separated by province and division

PM10 DMV 2018 EU limit / target 4												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	2550	2367	183	95.1	94.9	97.9	3.9	4.0	2.4
Carinthia	5147	4670	477	2873	2586	287	55.8	55.4	60.2	4.4	4.4	3.8
Lower A.	14361	12959	1402	9179	8271	908	63.9	63.8	64.8	13.9	14.1	12.1
Upper A.	11812	10368	1444	4625	3986	639	39.2	38.4	44.3	7.0	6.8	8.5
Salzburg	5304	4873	431	1303	1207	96	24.6	24.8	22.3	2.0	2.1	1.3
Styria	9601	8466	1135	6132	5525	607	63.9	65.3	53.5	9.3	9.4	8.1
Tyrol	7117	6510	607	157	145	12	2.2	2.2	2.0	0.2	0.2	0.2
Vorarlberg	3163	2730	433	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Vienna	6846	5470	1376	6846	5470	1376	100.0	100.0	100.0	10.4	9.3	18.4
total	**66031**	**58539**	**7492**	**33665**	**29557**	**4108**				**51.0**	**50.5**	**54.8**

Table 81: PM_{10} DMV 2018 EU limit (3-4 days exceedance p.a.) – number and percentage of affected company sites separated by province and division

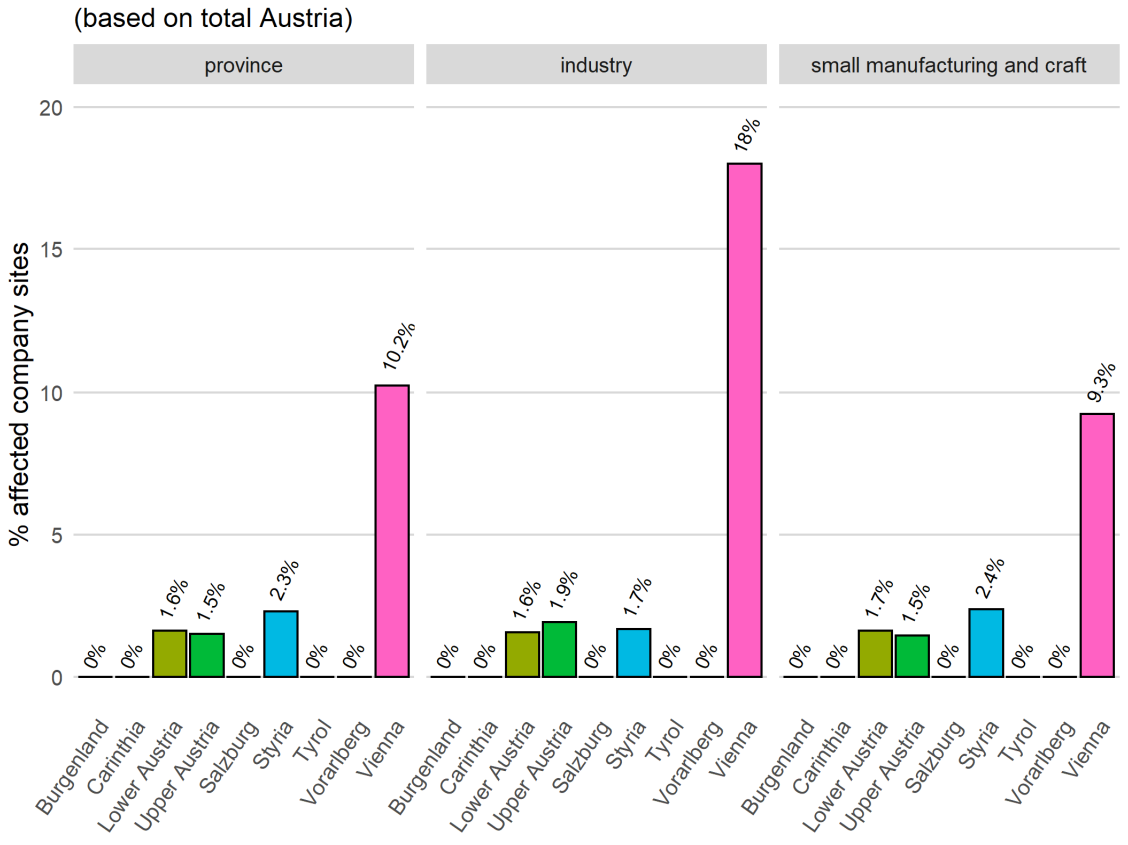

Figure 91: PM_{10} DMV 2019 EU limit (3-4 days exceedance p.a.) – percentage of affected company sites separated by province and division

PM10 DMV 2019 EU limit / target 4												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Carinthia	5147	4670	477	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Lower A.	14361	12959	1402	1087	967	120	7.6	7.5	8.6	1.6	1.7	1.6
Upper A.	11812	10368	1444	1019	873	146	8.6	8.4	10.1	1.5	1.5	1.9
Salzburg	5304	4873	431	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Styria	9601	8466	1135	1533	1405	128	16.0	16.6	11.3	2.3	2.4	1.7
Tyrol	7117	6510	607	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Vorarlberg	3163	2730	433	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Vienna	6846	5470	1376	6766	5416	1350	98.8	99.0	98.1	10.2	9.3	18.0
total	**66031**	**58539**	**7492**	**10405**	**8661**	**1744**				**15.8**	**14.8**	**23.3**

Table 82: PM_{10} DMV 2019 EU limit (3-4 days exceedance p.a.) – number and percentage of affected company sites separated by province and division

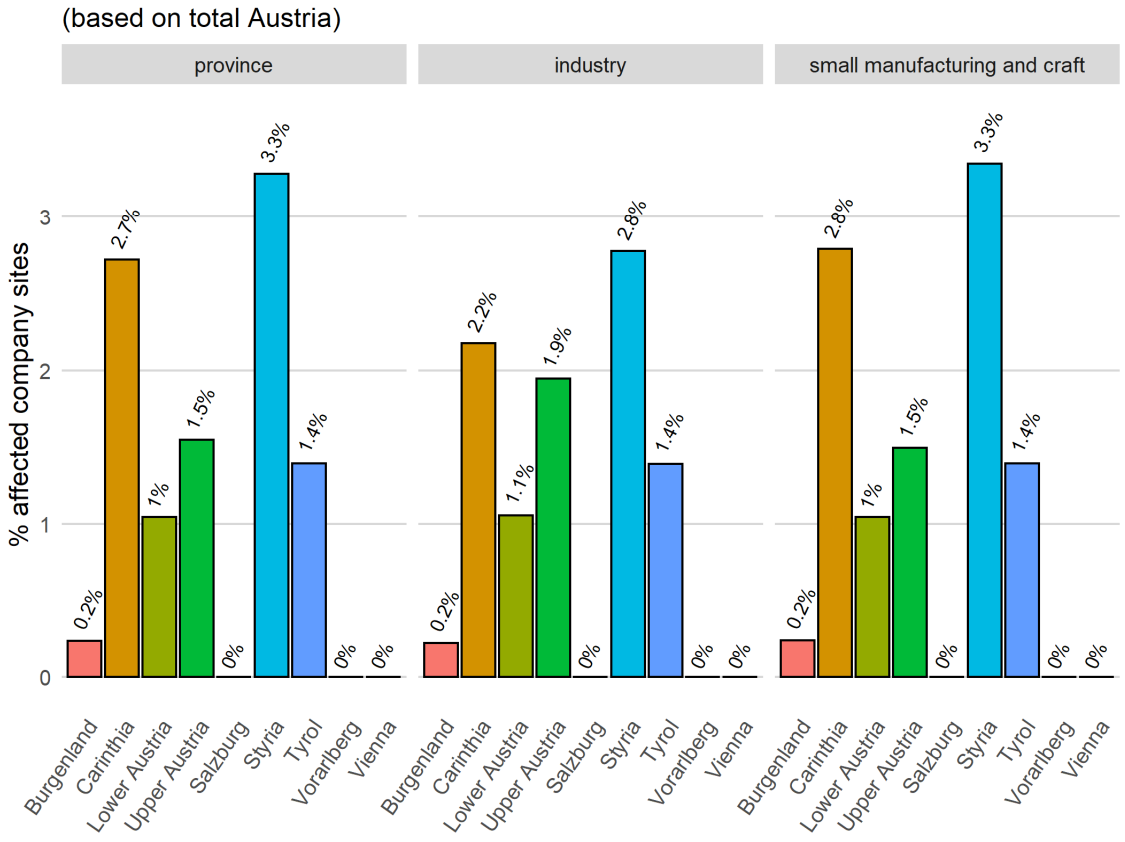

Figure 92: PM_{10} DMV 2020 EU limit (3-4 days exceedance p.a.) – percentage of affected company sites separated by province and division

PM10 DMV 2020 EU limit / target 4												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	160	143	17	6.0	5.7	9.1	0.2	0.2	0.2
Carinthia	5147	4670	477	1795	1632	163	34.9	34.9	34.2	2.7	2.8	2.2
Lower A.	14361	12959	1402	690	611	79	4.8	4.7	5.6	1.0	1.0	1.1
Upper A.	11812	10368	1444	1019	873	146	8.6	8.4	10.1	1.5	1.5	1.9
Salzburg	5304	4873	431	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Styria	9601	8466	1135	2168	1960	208	22.6	23.2	18.3	3.3	3.3	2.8
Tyrol	7117	6510	607	918	814	104	12.9	12.5	17.1	1.4	1.4	1.4
Vorarlberg	3163	2730	433	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Vienna	6846	5470	1376	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
total	**66031**	**58539**	**7492**	**6750**	**6033**	**717**				**10.2**	**10.3**	**9.6**

Table 83: PM_{10} DMV 2020 EU limit (3-4 days exceedance p.a.) – number and percentage of affected company sites separated by province and division

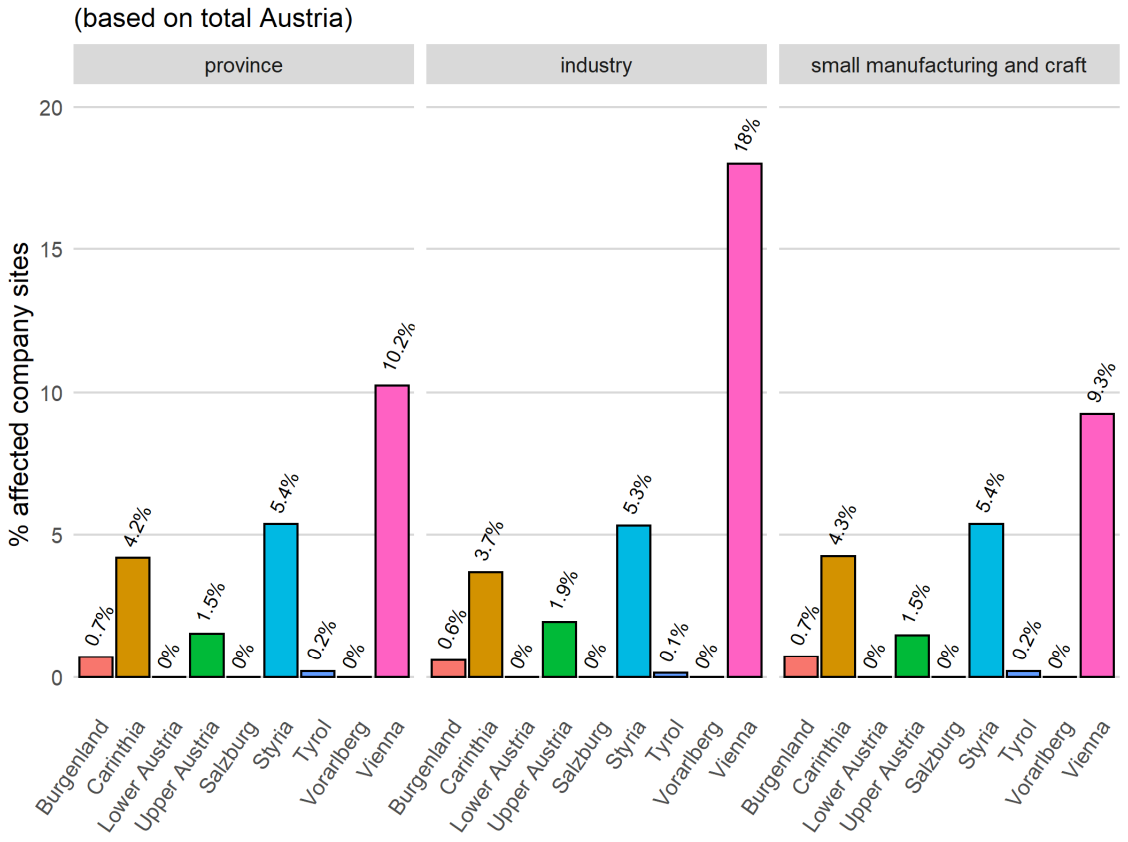

Figure 93: PM_{10} DMV 2021 EU limit (3-4 days exceedance p.a.) – percentage of affected company sites separated by province and division

PM10 DMV 2021 EU limit / target 4												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	478	432	46	17.8	17.3	24.6	0.7	0.7	0.6
Carinthia	5147	4670	477	2766	2489	277	53.7	53.3	58.1	4.2	4.3	3.7
Lower A.	14361	12959	1402	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Upper A.	11812	10368	1444	1019	873	146	8.6	8.4	10.1	1.5	1.5	1.9
Salzburg	5304	4873	431	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Styria	9601	8466	1135	3544	3145	399	36.9	37.1	35.2	5.4	5.4	5.3
Tyrol	7117	6510	607	140	129	11	2.0	2.0	1.8	0.2	0.2	0.1
Vorarlberg	3163	2730	433	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Vienna	6846	5470	1376	6766	5416	1350	98.8	99.0	98.1	10.2	9.3	18.0
total	**66031**	**58539**	**7492**	**14713**	**12484**	**2229**				**22.3**	**21.3**	**29.8**

Table 84: PM_{10} DMV 2021 EU limit (3-4 days exceedance p.a.) – number and percentage of affected company sites separated by province and division

8.2.3 PM_{10} REDEVELOPMENT AREAS AND AFFECTED COMPANY SITES

PM10 DMV (3 to 4 exceedance days p.a.) 2018						
number of company sites	AQG			EU limit		
	total	craft	industry	total	craft	industry
within redev. area	23364	20308	3056	23364	20308	3056
affected outside redev. areas	24789	22083	2706	11764	10519	1245
probably affected by measures	48153	42391	5762	35128	30827	4301

Table 85: PM_{10} DMV 2018 – number of company sites within current PM_{10} redevelopment areas, affected company sites outside current PM_{10} redevelopment areas and sum of both

PM10 DMV (3 to 4 exceedance days p.a.) 2018						
percent of company sites	AQG			EU limit		
	total	craft	industry	total	craft	industry
within redev. area	35.4%	34.7%	40.8%	35.4%	34.7%	40.8%
affected outside redev. areas	37.5%	37.7%	36.1%	17.8%	18.0%	16.6%
probably affected by measures	72.9%	72.4%	76.9%	53.2%	52.7%	57.4%

Table 86; PM_{10} DMV 2018 – percentage of company sites within current PM_{10} redevelopment areas, affected company sites outside current PM_{10} redevelopment areas and sum of both

PM10 DMV (3 to 4 exceedance days p.a.) 2019						
number of company sites	AQG			EU limit		
	total	craft	industry	total	craft	industry
within redev. area	23364	20308	3056	23364	20308	3056
affected outside redev. areas	7636	6823	813	558	495	63
probably affected by measures	31000	27131	3869	23922	20803	3119

Table 87: PM_{10} DMV 2019 – number of company sites within current PM_{10} redevelopment areas, affected company sites outside current PM_{10} redevelopment areas and sum of both

PM10 DMV (3 to 4 exceedance days p.a.) 2019						
percent of company sites	AQG			EU limit		
	total	craft	industry	total	craft	industry
within redev. area	35.4%	34.7%	40.8%	35.4%	34.7%	40.8%
affected outside redev. areas	11.6%	11.7%	10.9%	0.8%	0.8%	0.8%
probably affected by measures	46.9%	46.3%	51.6%	36.2%	35.5%	41.6%

Table 88: PM_{10} DMV 2019 – percentage of company sites within current PM_{10} redevelopment areas, affected company sites outside current PM_{10} redevelopment areas and sum of both

PM10 DMV (3 to 4 exceedance days p.a.) 2020						
number of company sites	AQG			EU limit		
	total	craft	industry	total	craft	industry
within redev. area	23364	20308	3056	23364	20308	3056
affected outside redev. areas	6095	5482	613	2278	2052	226
probably affected by measures	29459	25790	3669	25642	22360	3282

Table 89: PM_{10} DMV 2020 – number of company sites within current PM_{10} redevelopment areas, affected company sites outside current PM_{10} redevelopment areas and sum of both

PM10 DMV (3 to 4 exceedance days p.a.) 2020						
percent of company sites	AQG			EU limit		
	total	craft	industry	total	craft	industry
within redev. area	35.4%	34.7%	40.8%	35.4%	34.7%	40.8%
affected outside redev. areas	9.2%	9.4%	8.2%	3.4%	3.5%	3.0%
probably affected by measures	44.6%	44.1%	49.0%	38.8%	38.2%	43.8%

Table 90: PM_{10} DMV 2020 – percentage of company sites within current PM_{10} redevelopment areas, affected company sites outside current PM_{10} redevelopment areas and sum of both

8.3 PM_{10} DMV (MAX. 35 DAYS EXCEEDANCE P.A.)

PM10, DMV, 133 stations										
	AQG level		EU limit		interim target 3		interim target 2		interim target 1	
year	number	percent	number	percent	number	percent	number	percent	number	percent
2018	4	3.0%	1	0.8%	0	0.0%	0	0.0%	0	0.0%
2019	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
2020	1	0.8%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
2021	2	1.5%	0	0.0%	0	0.0%	0	0.0%	0	0.0%

Table 91: PM_{10} DMV (exceedance on max. 35 days p.a.) – number and percentage of exceeding stations per year for different target / limit values

PM10, DMV, exceedance max 35 days per year										
	AQG level		EU limit		interim target 3		interim target 2		interim target 1	
year	km^2	percent	km^2	percent	km^2	percent	km^2	percent	km^2	percent
2018	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
2019	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
2020	113.5	0.1%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
2021	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%

Table 92: PM_{10} DMV (exceedance on max. 35 days p.a.) – affected area in km^2 (and %) per year with respect to different target / limit values

PM_{10} DMV (max. 35 days exceedance p.a.)								
target	2018		2019		2020		2021	
	number	percent	number	percent	number	percent	number	percent
AQG	0	0.0%	0	0.0%	107	0.1%	0	0.0%
EU	0	0.0%	0	0.0%	0	0.0%	0	0.0%
it3	0	0.0%	0	0.0%	0	0.0%	0	0.0%
it2	0	0.0%	0	0.0%	0	0.0%	0	0.0%
it1	0	0.0%	0	0.0%	0	0.0%	0	0.0%

Table 93: PM_{10} DMV (exceedance on max. 35 days p.a.) – number and percent of affected company sites per year with respect to different target / limit values.

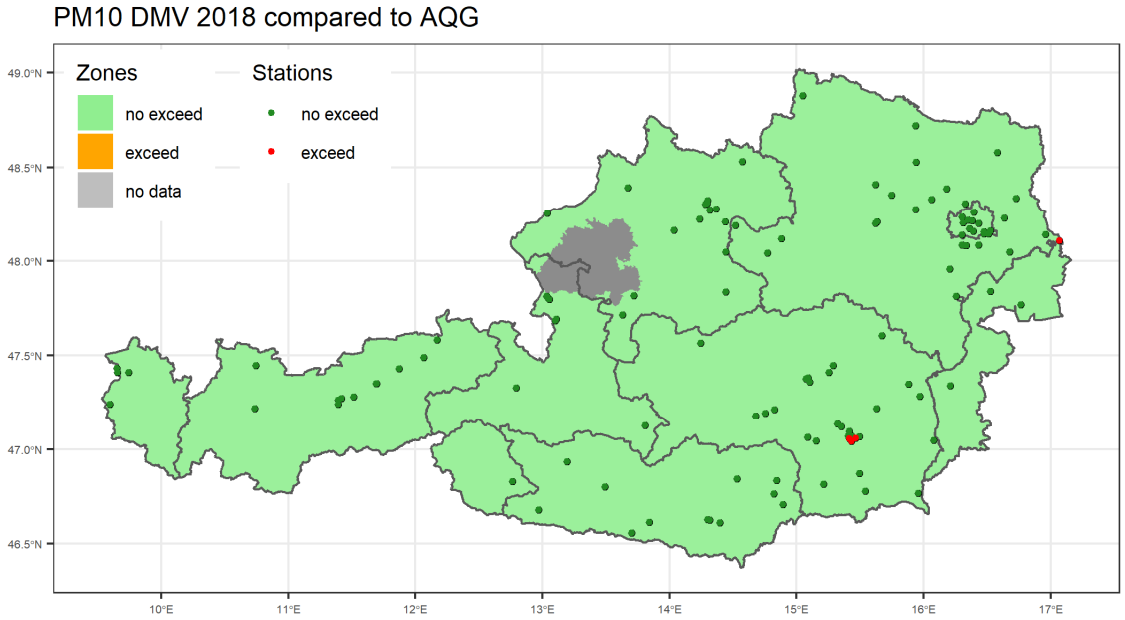

Figure 94: PM_{10} DMV 2018 AQG level (max. 35 days exceedance p.a.) – exceedance stations and areas with respect to AQG level of 45 µg/m³ (4 stations of 133 (3%), affected area: 0 %).

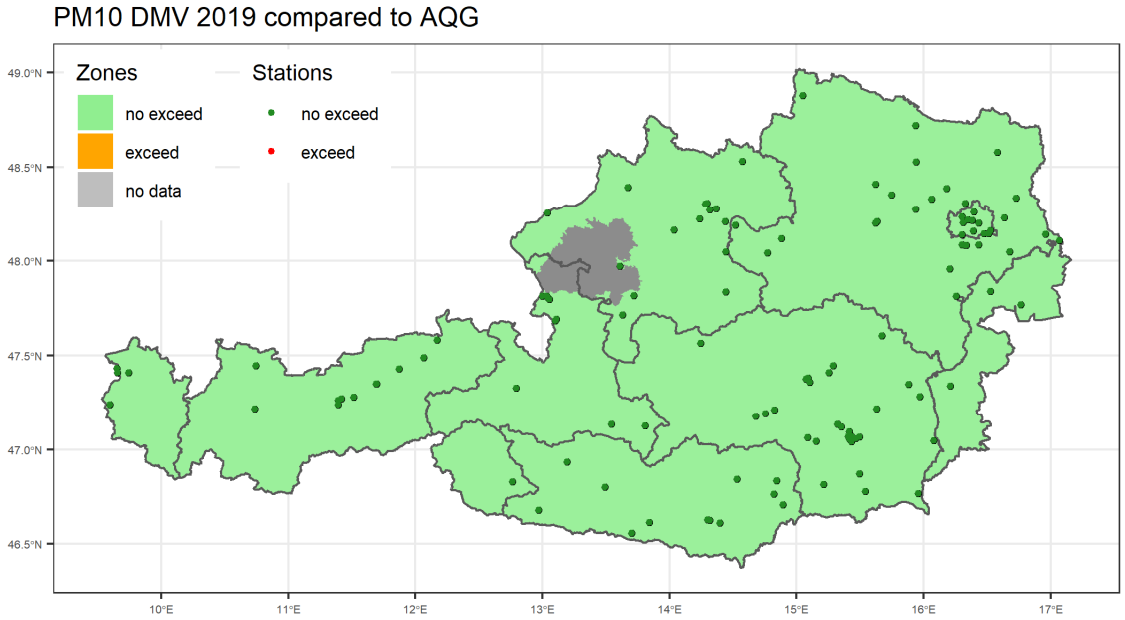

Figure 95: PM_{10} DMV 2019 AQG level (max. 35 days exceedance p.a.) – exceedance stations and areas with respect to AQG level of 45 µg/m³ (0 stations of 133 (0%), affected area: 0 %).

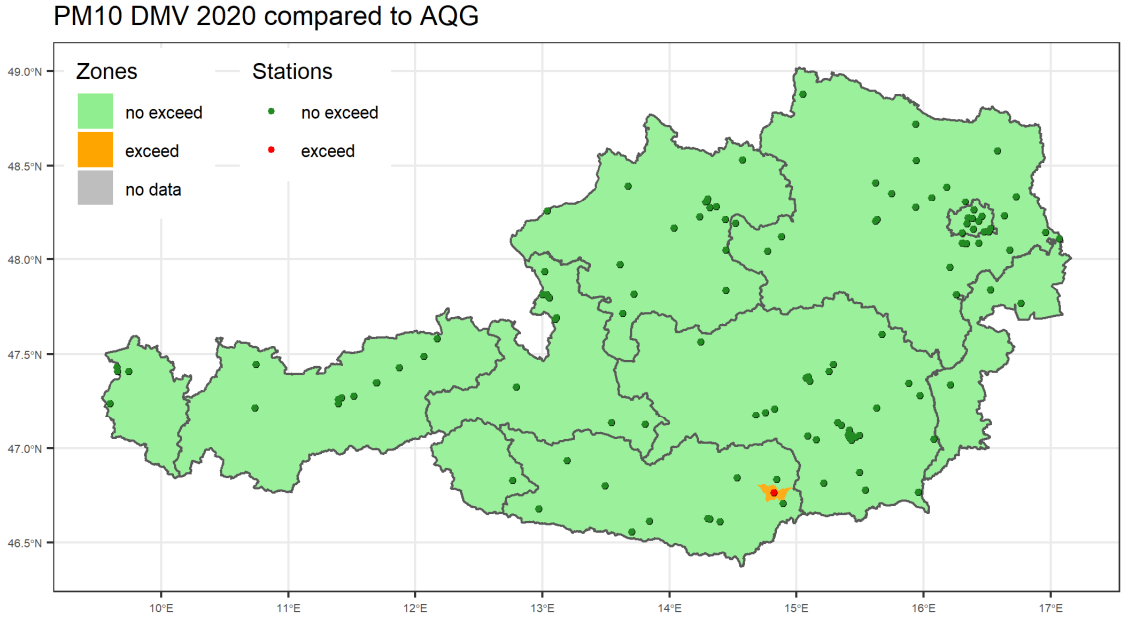

Figure 96: PM_{10} DMV 2020 AQG level (max. 35 days exceedance p.a.) – exceedance stations and areas with respect to AQG level of 45 µg/m³ (1 station of 133 (0.8%), affected area: 0.1%).

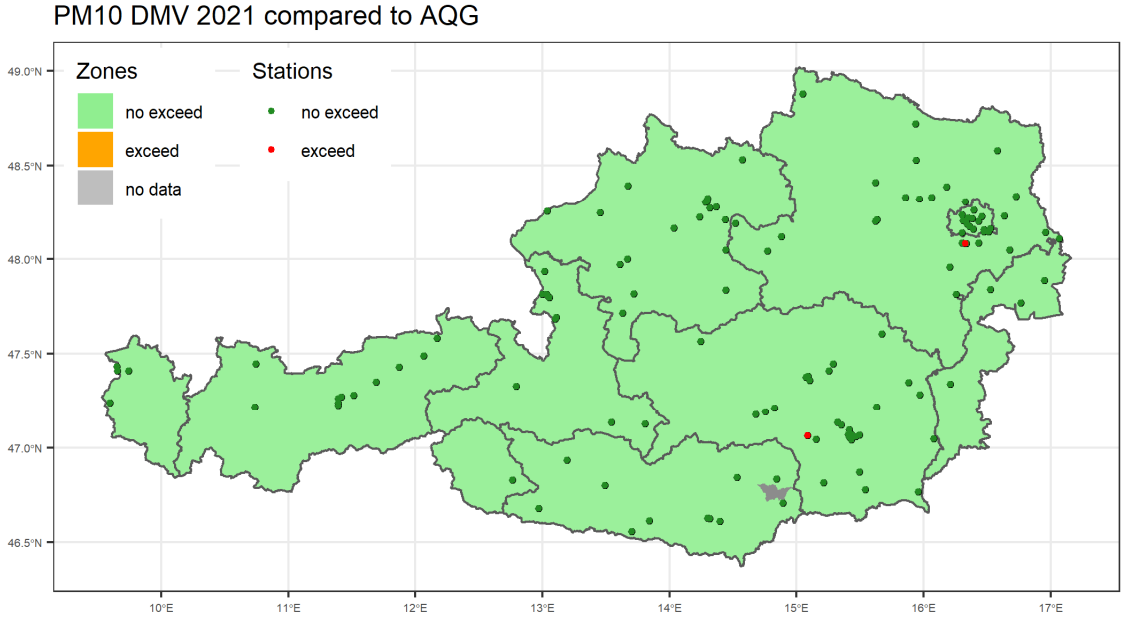

Figure 97: PM_{10} DMV 2021 AQG level (max. 35 days exceedance p.a.) – exceedance stations and areas with respect to AQG level of 45 µg/m³ (2 stations of 133 (1.5%), affected area: 0.0%).

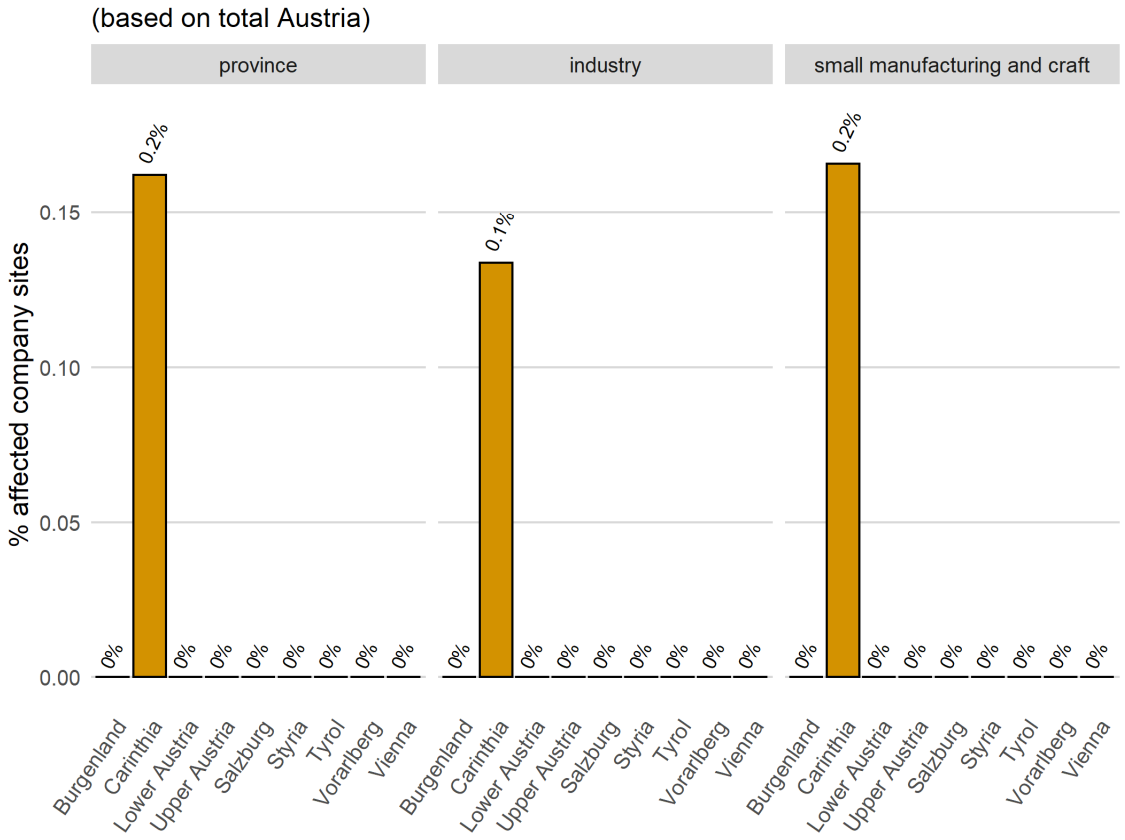

Figure 98: PM_{10} DMV 2020 AQG level (max. 35 days exceedance p.a.) – percentage of affected company sites separated by province and division

federal state	PM10 DMV 2020 AQG											
	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Carinthia	5147	4670	477	107	97	10	2.1	2.1	2.1	0.2	0.2	0.1
Lower A.	14361	12959	1402	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Upper A.	11812	10368	1444	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Salzburg	5304	4873	431	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Styria	9601	8466	1135	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Tyrol	7117	6510	607	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Vorarlberg	3163	2730	433	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Vienna	6846	5470	1376	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
total	**66031**	**58539**	**7492**	**107**	**97**	**10**				**0.2**	**0.2**	**0.1**

Table 94: PM_{10} DMV 2020 AQG level (max. 35 days exceedance p.a.) – number and percentage of affected company sites separated by province and division

8.4 $PM_{2.5}$ YMV

8.4.1 AQG LEVEL

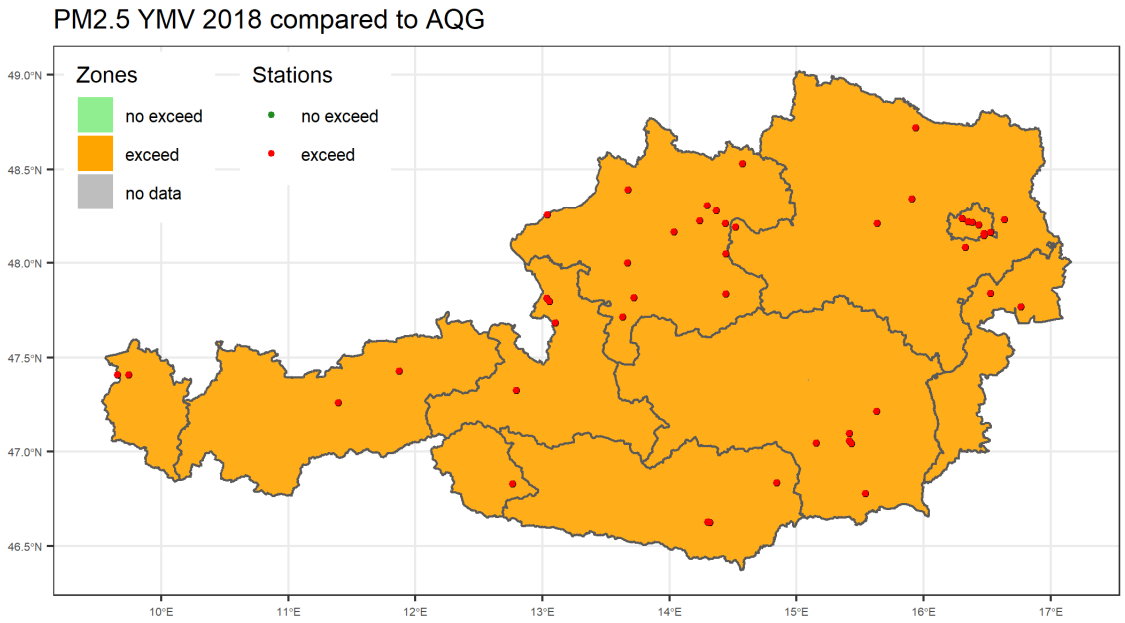

Figure 99: $PM_{2.5}$ YMV 2018 AQG level – exceedance stations and areas with respect to AQG level of 5 µg/m³ (46 stations of 63 (73.0%), affected area: 100.0%).

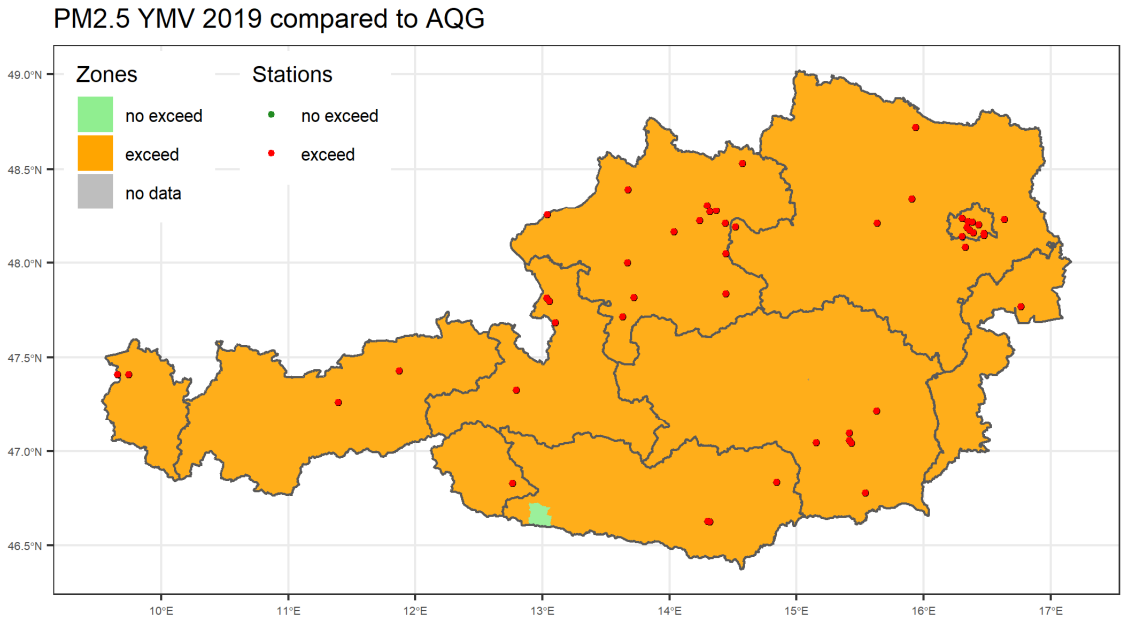

Figure 100: $PM_{2.5}$ YMV 2019 AQG level – exceedance stations and areas with respect to AQG level of 5 µg/m³ (49 stations of 63 (77.8%), affected area: 99.8%).

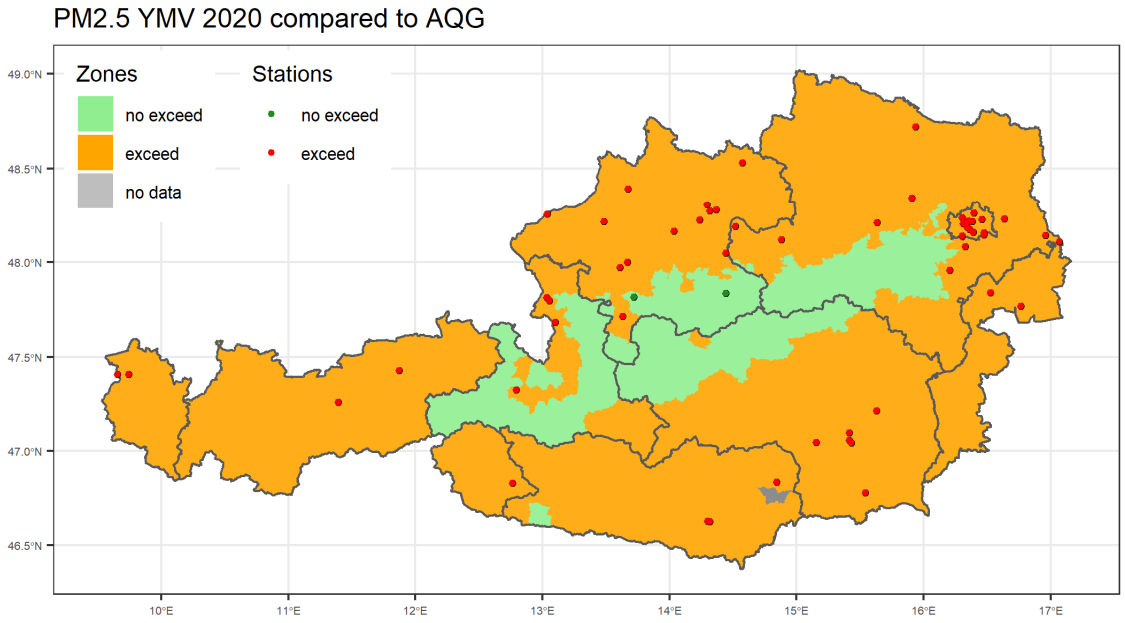

Figure 101: $PM_{2.5}$ YMV 2020 AQG level – exceedance stations and areas with respect to AQG level of 5 µg/m³ (55 stations of 63 (87.3%), affected area: 82.6%).

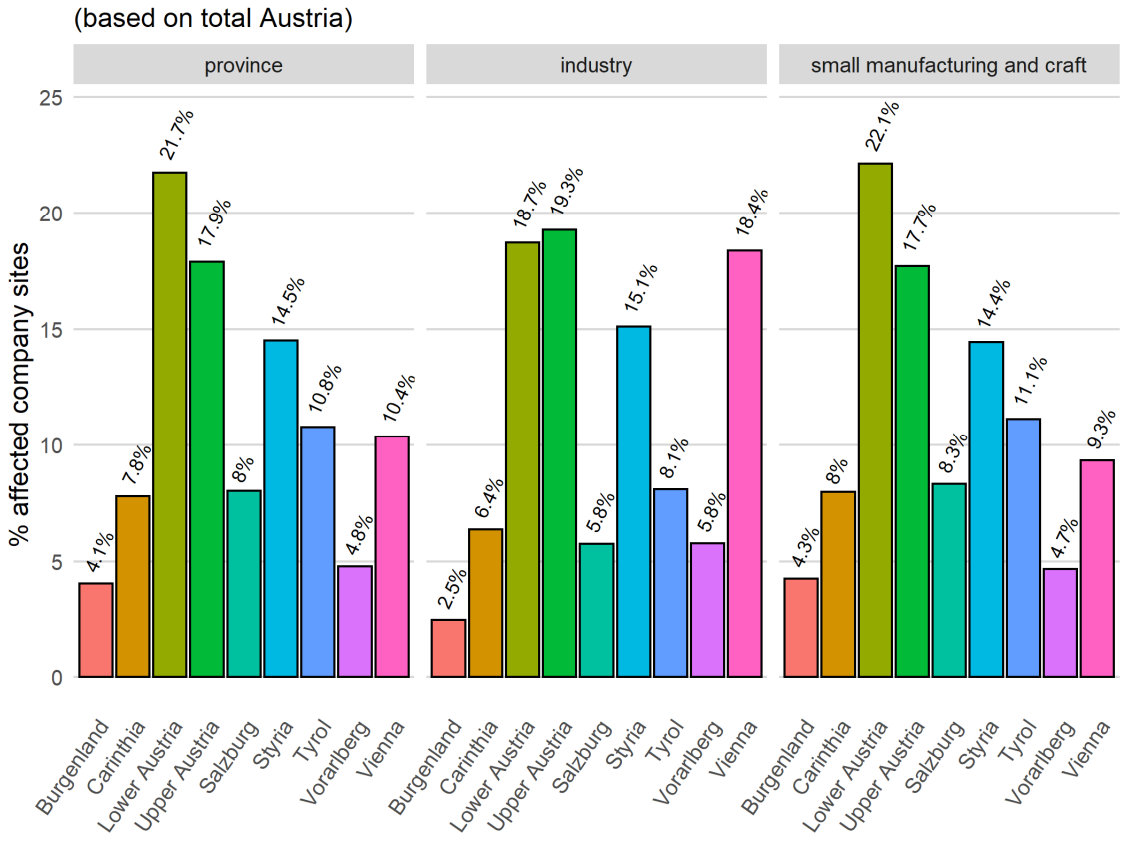

Figure 102: $PM_{2.5}$ YMV 2018 AQG level – percentage of affected company sites separated by province and division

federal state	PM2.5 YMV 2018 AQG level											
	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	2680	2493	187	100.0	100.0	100.0	4.1	4.3	2.5
Carinthia	5147	4670	477	5147	4670	477	100.0	100.0	100.0	7.8	8.0	6.4
Lower A.	14361	12959	1402	14361	12959	1402	100.0	100.0	100.0	21.7	22.1	18.7
Upper A.	11812	10368	1444	11812	10368	1444	100.0	100.0	100.0	17.9	17.7	19.3
Salzburg	5304	4873	431	5304	4873	431	100.0	100.0	100.0	8.0	8.3	5.8
Styria	9601	8466	1135	9582	8451	1131	99.8	99.8	99.6	14.5	14.4	15.1
Tyrol	7117	6510	607	7117	6510	607	100.0	100.0	100.0	10.8	11.1	8.1
Vorarlberg	3163	2730	433	3163	2730	433	100.0	100.0	100.0	4.8	4.7	5.8
Vienna	6846	5470	1376	6846	5470	1376	100.0	100.0	100.0	10.4	9.3	18.4
total	**66031**	**58539**	**7492**	**66012**	**58524**	**7488**				**100.0**	**100.0**	**99.9**

Table 95: $PM_{2.5}$ YMV 2018 AQG level – number and percentage of affected company sites separated by province and division

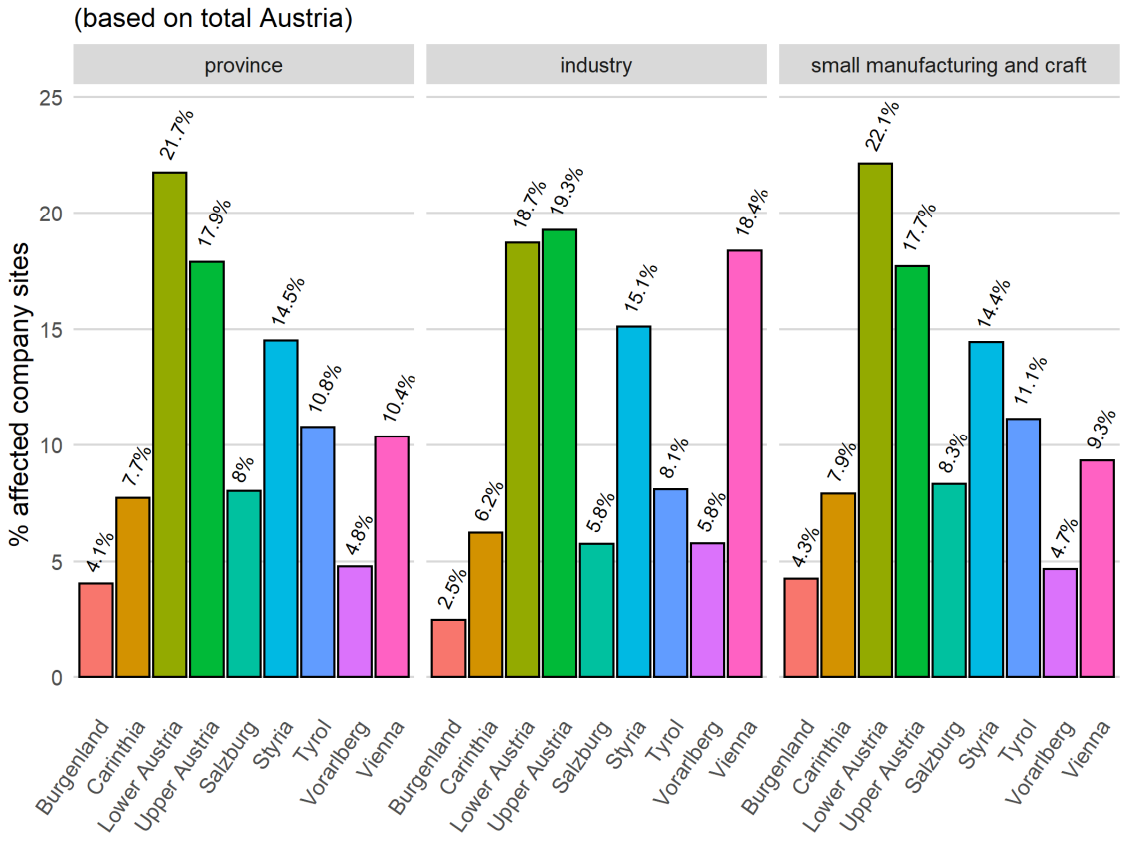

Figure 103: $PM_{2.5}$ YMV 2019 AQG level – percentage of affected company sites separated by province and division

PM2.5 YMV 2019 AQG level												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	2680	2493	187	100.0	100.0	100.0	4.1	4.3	2.5
Carinthia	5147	4670	477	5099	4631	468	99.1	99.2	98.1	7.7	7.9	6.2
Lower A.	14361	12959	1402	14361	12959	1402	100.0	100.0	100.0	21.7	22.1	18.7
Upper A.	11812	10368	1444	11812	10368	1444	100.0	100.0	100.0	17.9	17.7	19.3
Salzburg	5304	4873	431	5304	4873	431	100.0	100.0	100.0	8.0	8.3	5.8
Styria	9601	8466	1135	9582	8451	1131	99.8	99.8	99.6	14.5	14.4	15.1
Tyrol	7117	6510	607	7117	6510	607	100.0	100.0	100.0	10.8	11.1	8.1
Vorarlberg	3163	2730	433	3163	2730	433	100.0	100.0	100.0	4.8	4.7	5.8
Vienna	6846	5470	1376	6846	5470	1376	100.0	100.0	100.0	10.4	9.3	18.4
total	**66031**	**58539**	**7492**	**65964**	**58485**	**7479**				**99.9**	**99.9**	**99.8**

Table 96: $PM_{2.5}$ YMV 2019 AQG level – number and percentage of affected company sites separated by province and division

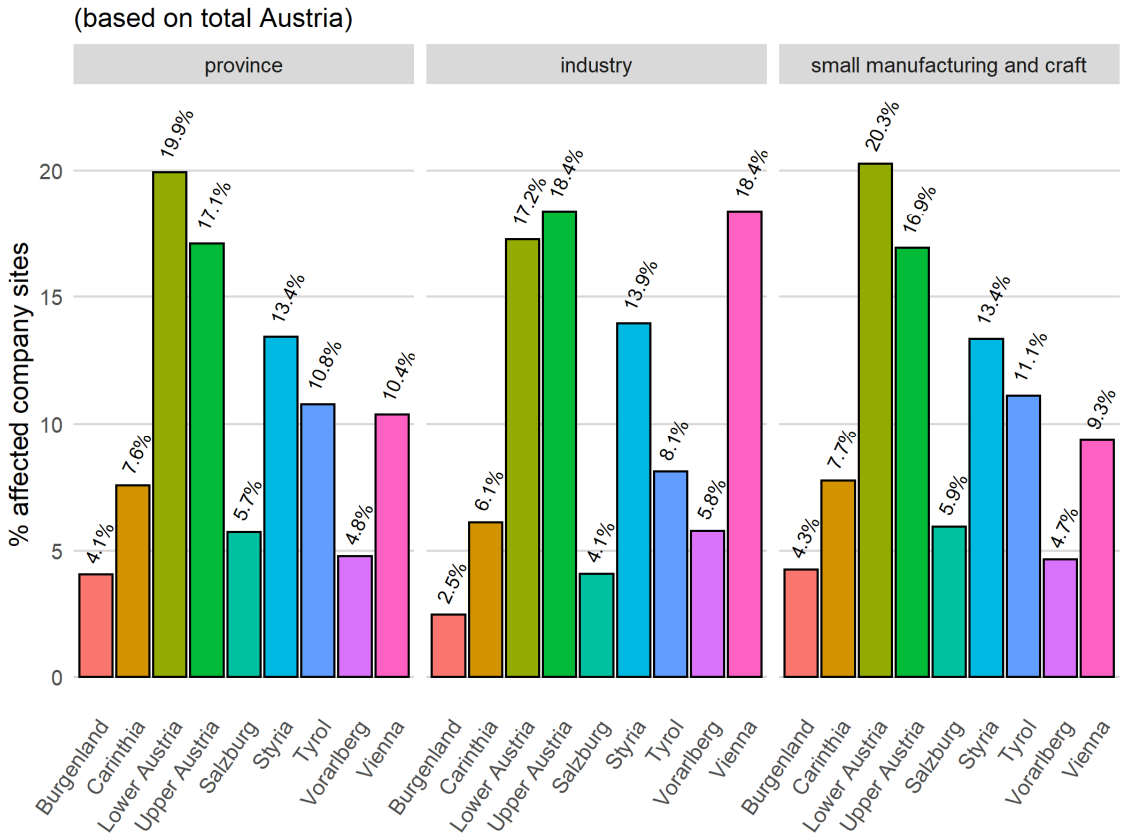

Figure 104: $PM_{2.5}$ YMV 2020 AQG level – percentage of affected company sites separated by province and division

PM2.5 YMV 2020 AQG level												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	2680	2493	187	100.0	100.0	100.0	4.1	4.3	2.5
Carinthia	5147	4670	477	4992	4534	458	97.0	97.1	96.0	7.6	7.7	6.1
Lower A.	14361	12959	1402	13154	11862	1292	91.6	91.5	92.2	19.9	20.3	17.2
Upper A.	11812	10368	1444	11276	9900	1376	95.5	95.5	95.3	17.1	16.9	18.4
Salzburg	5304	4873	431	3785	3478	307	71.4	71.4	71.2	5.7	5.9	4.1
Styria	9601	8466	1135	8860	7815	1045	92.3	92.3	92.1	13.4	13.4	13.9
Tyrol	7117	6510	607	7117	6510	607	100.0	100.0	100.0	10.8	11.1	8.1
Vorarlberg	3163	2730	433	3163	2730	433	100.0	100.0	100.0	4.8	4.7	5.8
Vienna	6846	5470	1376	6846	5470	1376	100.0	100.0	100.0	10.4	9.3	18.4
total	**66031**	**58539**	**7492**	**61873**	**54792**	**7081**				**93.7**	**93.6**	**94.5**

Table 97: $PM_{2.5}$ YMV 2020 AQG level – number and percentage of affected company sites separated by province and division

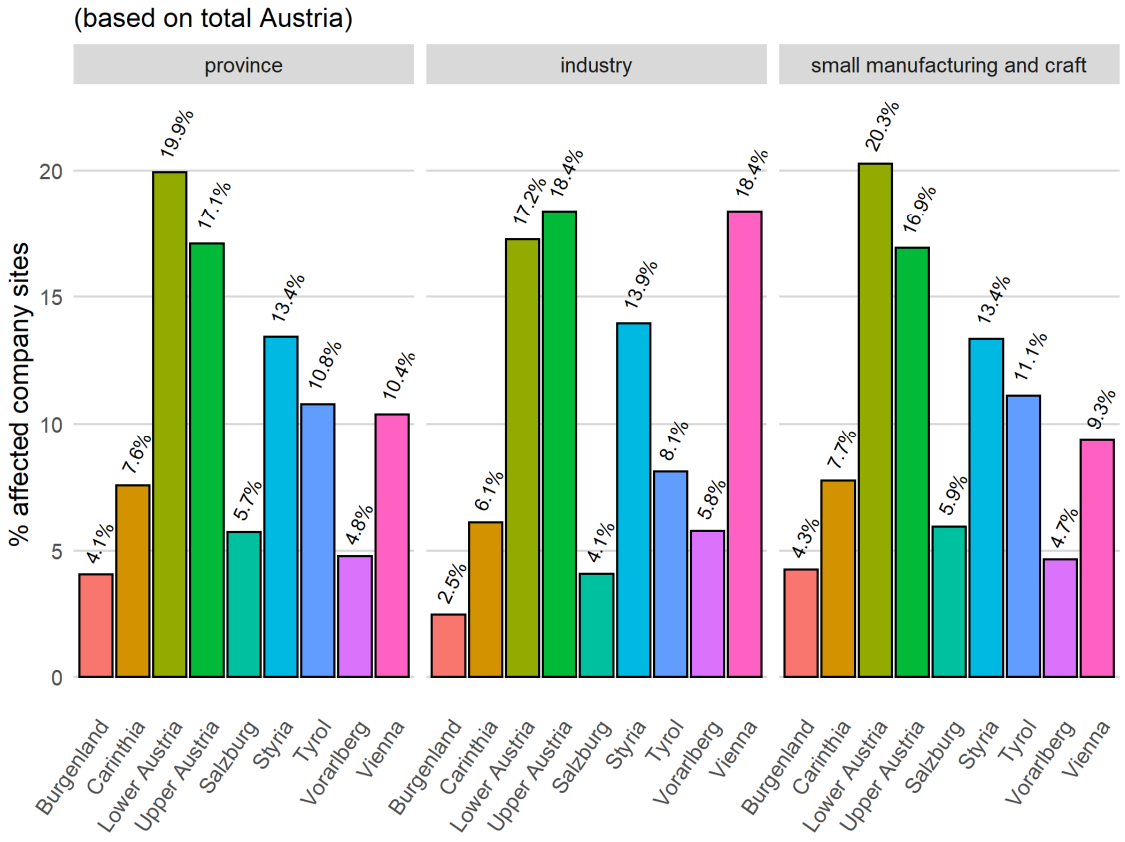

Figure 105: $PM_{2.5}$ YMV 2021 AQG level – percentage of affected company sites separated by province and division

PM2.5 YMV 2021 AQG level												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	2680	2493	187	100.0	100.0	100.0	4.1	4.3	2.5
Carinthia	5147	4670	477	4992	4534	458	97.0	97.1	96.0	7.6	7.7	6.1
Lower A.	14361	12959	1402	13154	11862	1292	91.6	91.5	92.2	19.9	20.3	17.2
Upper A.	11812	10368	1444	11276	9900	1376	95.5	95.5	95.3	17.1	16.9	18.4
Salzburg	5304	4873	431	3785	3478	307	71.4	71.4	71.2	5.7	5.9	4.1
Styria	9601	8466	1135	8860	7815	1045	92.3	92.3	92.1	13.4	13.4	13.9
Tyrol	7117	6510	607	7117	6510	607	100.0	100.0	100.0	10.8	11.1	8.1
Vorarlberg	3163	2730	433	3163	2730	433	100.0	100.0	100.0	4.8	4.7	5.8
Vienna	6846	5470	1376	6846	5470	1376	100.0	100.0	100.0	10.4	9.3	18.4
total	**66031**	**58539**	**7492**	**61873**	**54792**	**7081**				**93.7**	**93.6**	**94.5**

Table 98: $PM_{2.5}$ YMV 2021 AQG level – number and percentage of affected company sites separated by province and division

8.4.2 INTERIM TARGET 4

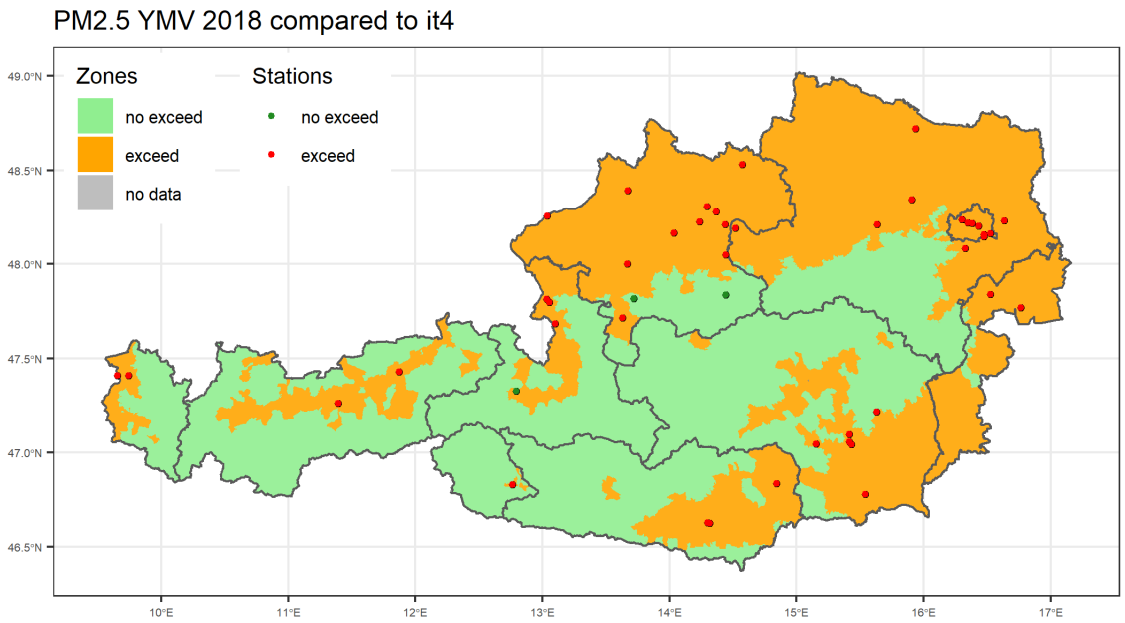

Figure 106: $PM_{2.5}$ YMV 2018 interim target 4 – exceedance stations and areas with respect to interim target 4 of 10 µg/m³ (43 stations of 63 (68.3%), affected area: 49.9%).

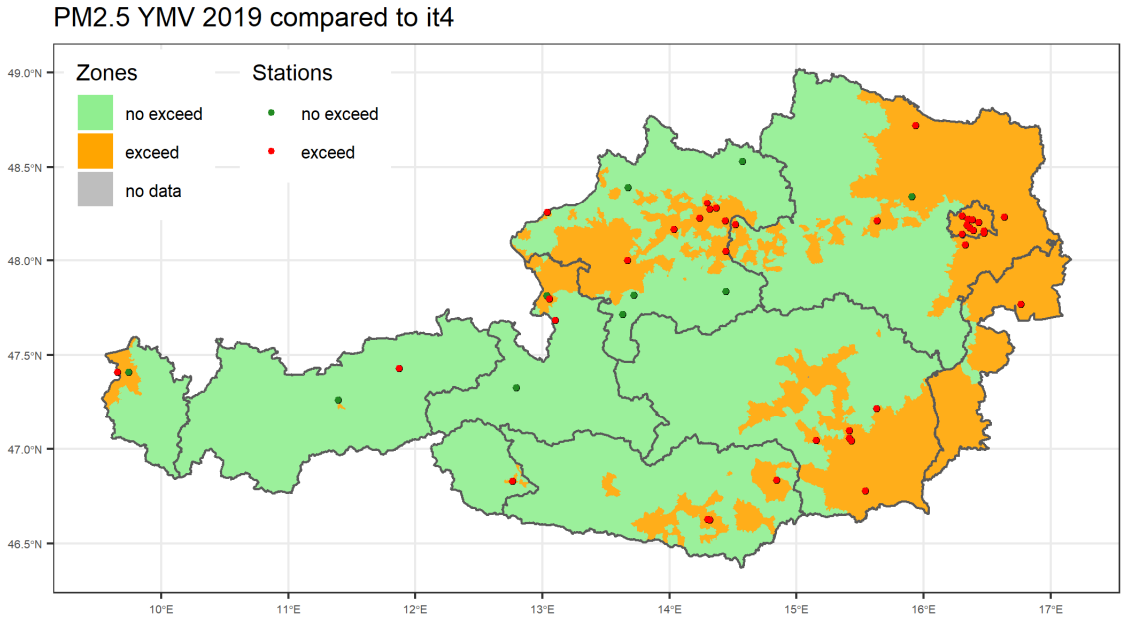

Figure 107: $PM_{2.5}$ YMV 2019 interim target 4 – exceedance stations and areas with respect to interim target 4 of 10 µg/m³ (39 stations of 63 (61.9%), affected area: 28.3%).

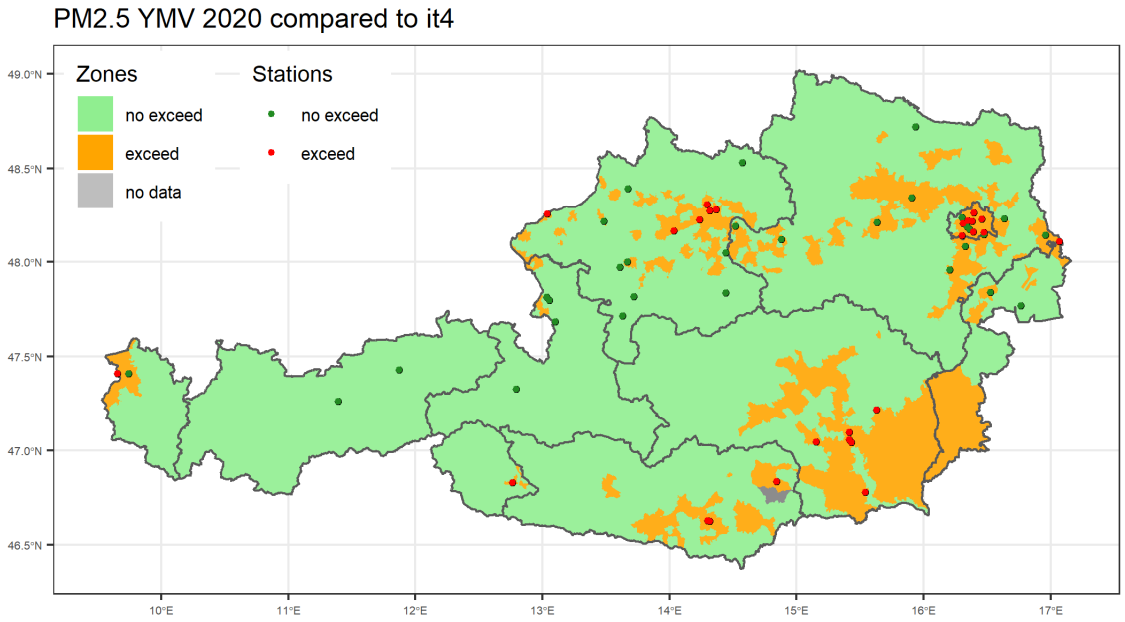

Figure 108: $PM_{2.5}$ YMV 2020 interim target 4 – exceedance stations and areas with respect to interim target 4 of 10 µg/m³ (26 stations of 63 (41.3%), affected area: 16.5%).

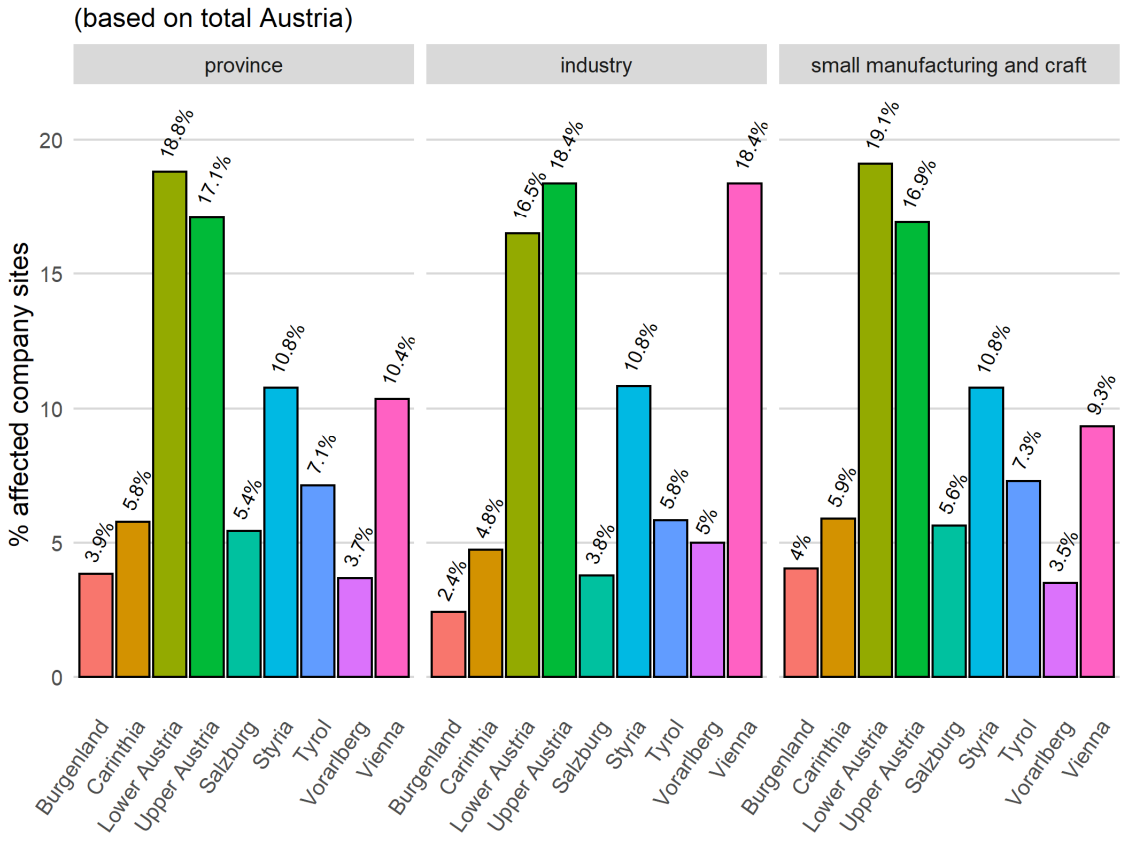

Figure 109: $PM_{2.5}$ YMV 2018 interim target 4 – percentage of affected company sites separated by province and division

federal state	PM2.5 YMV 2018 interim target 4											
	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	2550	2367	183	95.1	94.9	97.9	3.9	4.0	2.4
Carinthia	5147	4670	477	3813	3457	356	74.1	74.0	74.6	5.8	5.9	4.8
Lower A.	14361	12959	1402	12418	11183	1235	86.5	86.3	88.1	18.8	19.1	16.5
Upper A.	11812	10368	1444	11276	9900	1376	95.5	95.5	95.3	17.1	16.9	18.4
Salzburg	5304	4873	431	3591	3306	285	67.7	67.8	66.1	5.4	5.6	3.8
Styria	9601	8466	1135	7118	6306	812	74.1	74.5	71.5	10.8	10.8	10.8
Tyrol	7117	6510	607	4701	4263	438	66.1	65.5	72.2	7.1	7.3	5.8
Vorarlberg	3163	2730	433	2437	2062	375	77.0	75.5	86.6	3.7	3.5	5.0
Vienna	6846	5470	1376	6846	5470	1376	100.0	100.0	100.0	10.4	9.3	18.4
total	**66031**	**58539**	**7492**	**54750**	**48314**	**6436**				**82.9**	**82.5**	**85.9**

Table 99: $PM_{2.5}$ YMV 2018 interim target 4 – number and percentage of affected company sites separated by province and division

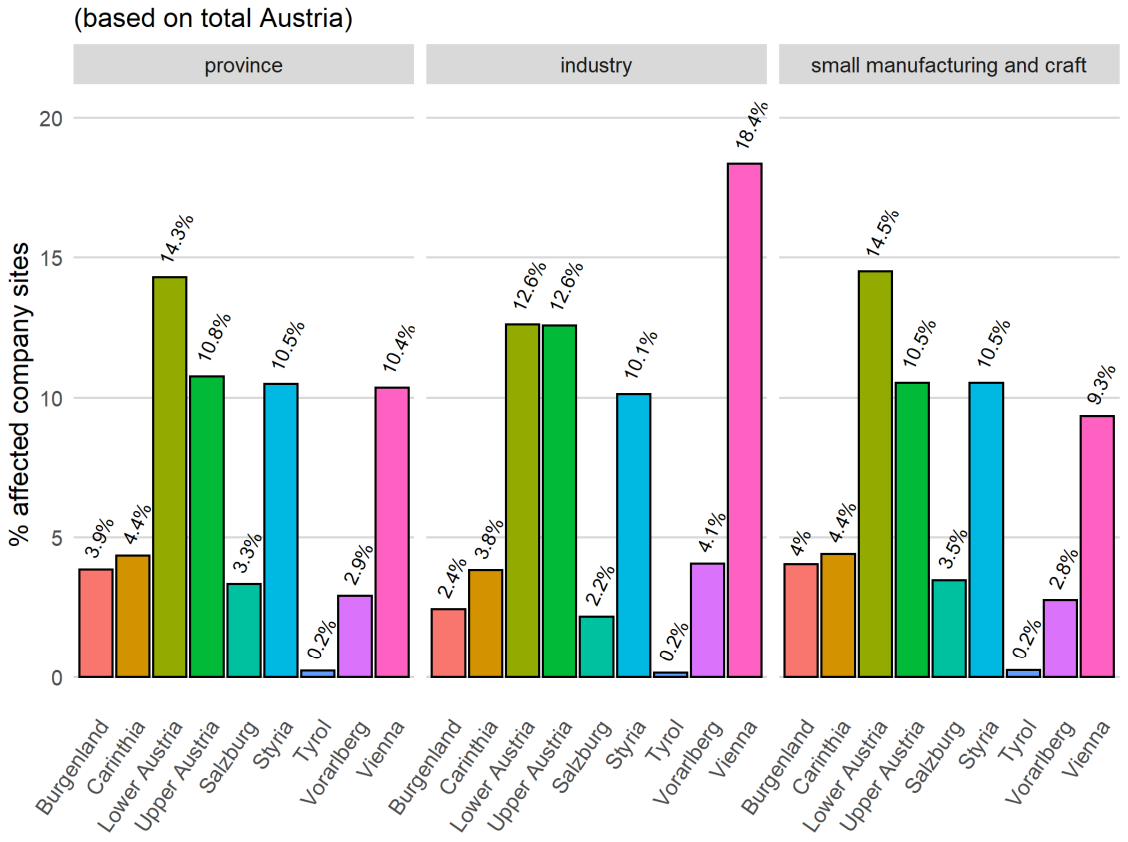

Figure 110: $PM_{2.5}$ YMV 2019 interim target 4 – percentage of affected company sites separated by province and division

PM2.5 YMV 2019 interim target 4												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	2550	2367	183	95.1	94.9	97.9	3.9	4.0	2.4
Carinthia	5147	4670	477	2873	2586	287	55.8	55.4	60.2	4.4	4.4	3.8
Lower A.	14361	12959	1402	9428	8484	944	65.7	65.5	67.3	14.3	14.5	12.6
Upper A.	11812	10368	1444	7109	6167	942	60.2	59.5	65.2	10.8	10.5	12.6
Salzburg	5304	4873	431	2201	2037	164	41.5	41.8	38.1	3.3	3.5	2.2
Styria	9601	8466	1135	6927	6168	759	72.1	72.9	66.9	10.5	10.5	10.1
Tyrol	7117	6510	607	157	145	12	2.2	2.2	2.0	0.2	0.2	0.2
Vorarlberg	3163	2730	433	1927	1622	305	60.9	59.4	70.4	2.9	2.8	4.1
Vienna	6846	5470	1376	6846	5470	1376	100.0	100.0	100.0	10.4	9.3	18.4
total	**66031**	**58539**	**7492**	**40018**	**35046**	**4972**				**60.6**	**59.9**	**66.4**

Table 100: $PM_{2.5}$ YMV 2019 interim target 4 – number and percentage of affected company sites separated by province and division

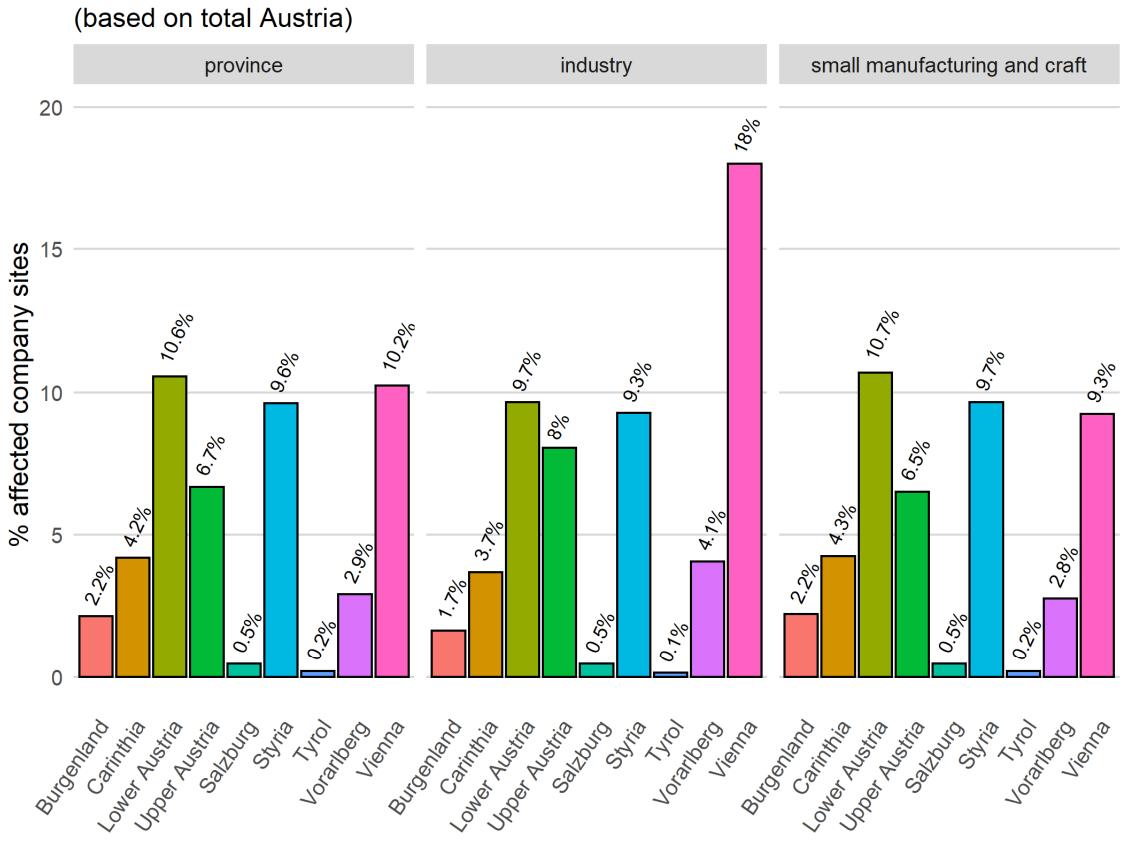

Figure 111: $PM_{2.5}$ YMV 2020 interim target 4 – percentage of affected company sites separated by province and division

federal state	PM2.5 YMV 2020 interim target 4											
	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	1426	1302	124	53.2	52.2	66.3	2.2	2.2	1.7
Carinthia	5147	4670	477	2766	2489	277	53.7	53.3	58.1	4.2	4.3	3.7
Lower A.	14361	12959	1402	6974	6251	723	48.6	48.2	51.6	10.6	10.7	9.7
Upper A.	11812	10368	1444	4407	3805	602	37.3	36.7	41.7	6.7	6.5	8.0
Salzburg	5304	4873	431	314	279	35	5.9	5.7	8.1	0.5	0.5	0.5
Styria	9601	8466	1135	6347	5652	695	66.1	66.8	61.2	9.6	9.7	9.3
Tyrol	7117	6510	607	140	129	11	2.0	2.0	1.8	0.2	0.2	0.1
Vorarlberg	3163	2730	433	1927	1622	305	60.9	59.4	70.4	2.9	2.8	4.1
Vienna	6846	5470	1376	6766	5416	1350	98.8	99.0	98.1	10.2	9.3	18.0
total	**66031**	**58539**	**7492**	**31067**	**26945**	**4122**				**47.0**	**46.0**	**55.0**

Table 101: $PM_{2.5}$ YMV 2020 interim target 4 – number and percentage of affected company sites separated by province and division

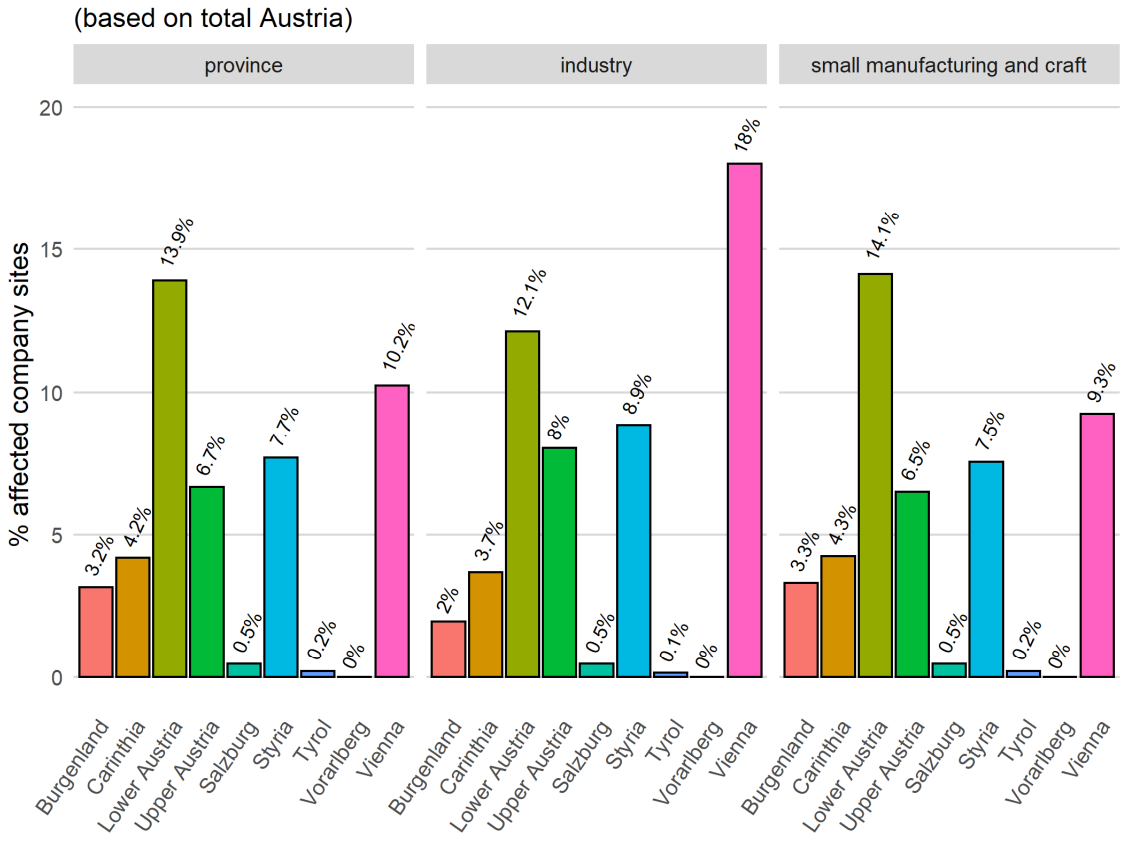

Figure 112: $PM_{2.5}$ YMV 2021 interim target 4 – percentage of affected company sites separated by province and division

PM2.5 YMV 2021 interim target 4												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	2087	1939	148	77.9	77.8	79.1	3.2	3.3	2.0
Carinthia	5147	4670	477	2766	2489	277	53.7	53.3	58.1	4.2	4.3	3.7
Lower A.	14361	12959	1402	9179	8271	908	63.9	63.8	64.8	13.9	14.1	12.1
Upper A.	11812	10368	1444	4407	3805	602	37.3	36.7	41.7	6.7	6.5	8.0
Salzburg	5304	4873	431	314	279	35	5.9	5.7	8.1	0.5	0.5	0.5
Styria	9601	8466	1135	5080	4416	664	52.9	52.2	58.5	7.7	7.5	8.9
Tyrol	7117	6510	607	140	129	11	2.0	2.0	1.8	0.2	0.2	0.1
Vorarlberg	3163	2730	433	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Vienna	6846	5470	1376	6766	5416	1350	98.8	99.0	98.1	10.2	9.3	18.0
total	**66031**	**58539**	**7492**	**30739**	**26744**	**3995**				**46.6**	**45.7**	**53.3**

Table 102: $PM_{2.5}$ YMV 2021 interim target 4 – number and percentage of affected company sites separated by province and division

8.4.3 INTERIM TARGET 3

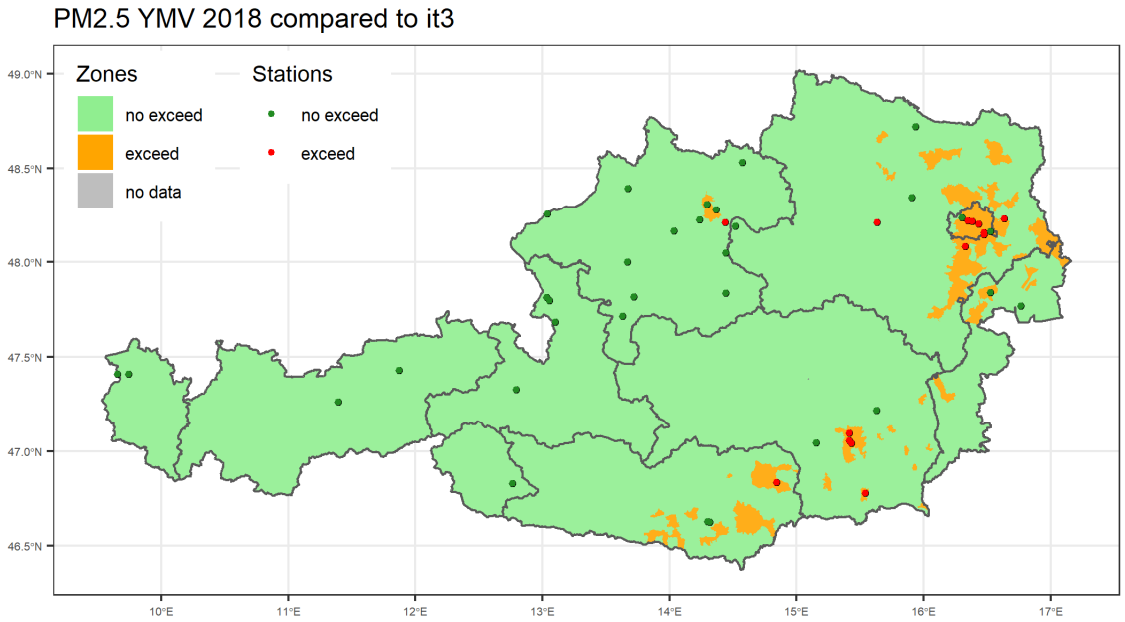

Figure 113: $PM_{2.5}$ YMV 2018 interim target 3 – exceedance stations and areas with respect to interim target 3 of 15 µg/m³ (14 stations of 63 (22.2%), affected area: 4.5%).

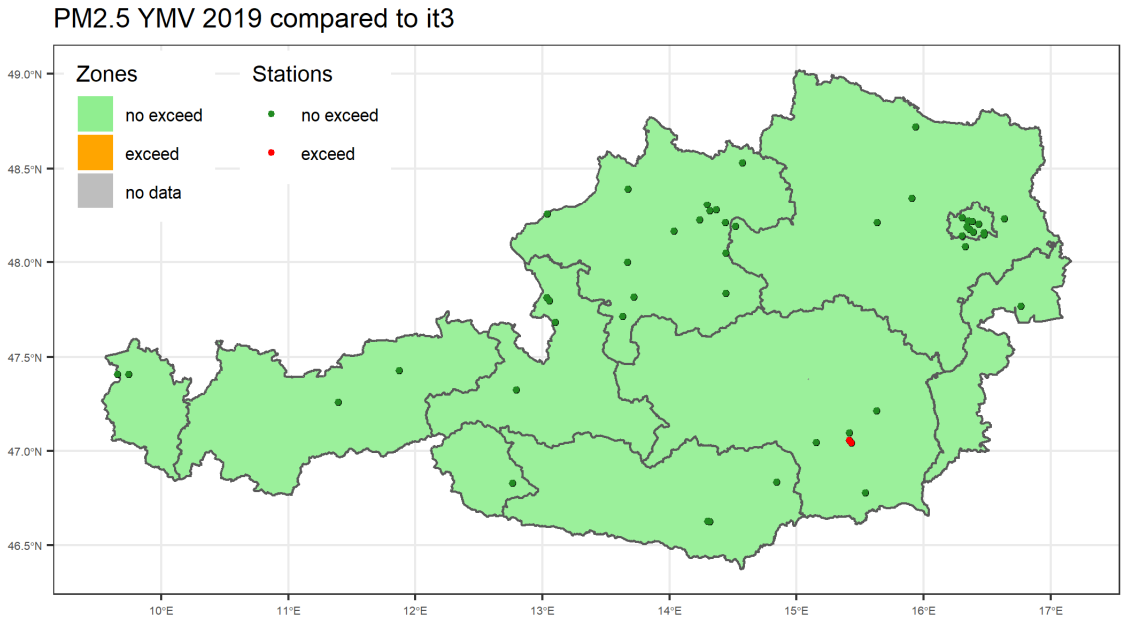

Figure 114: $PM_{2.5}$ YMV 2019 interim target 3 – exceedance stations and areas with respect to interim target 3 of 15 µg/m³ (2 stations of 63 (3.2%), affected area: 0%).

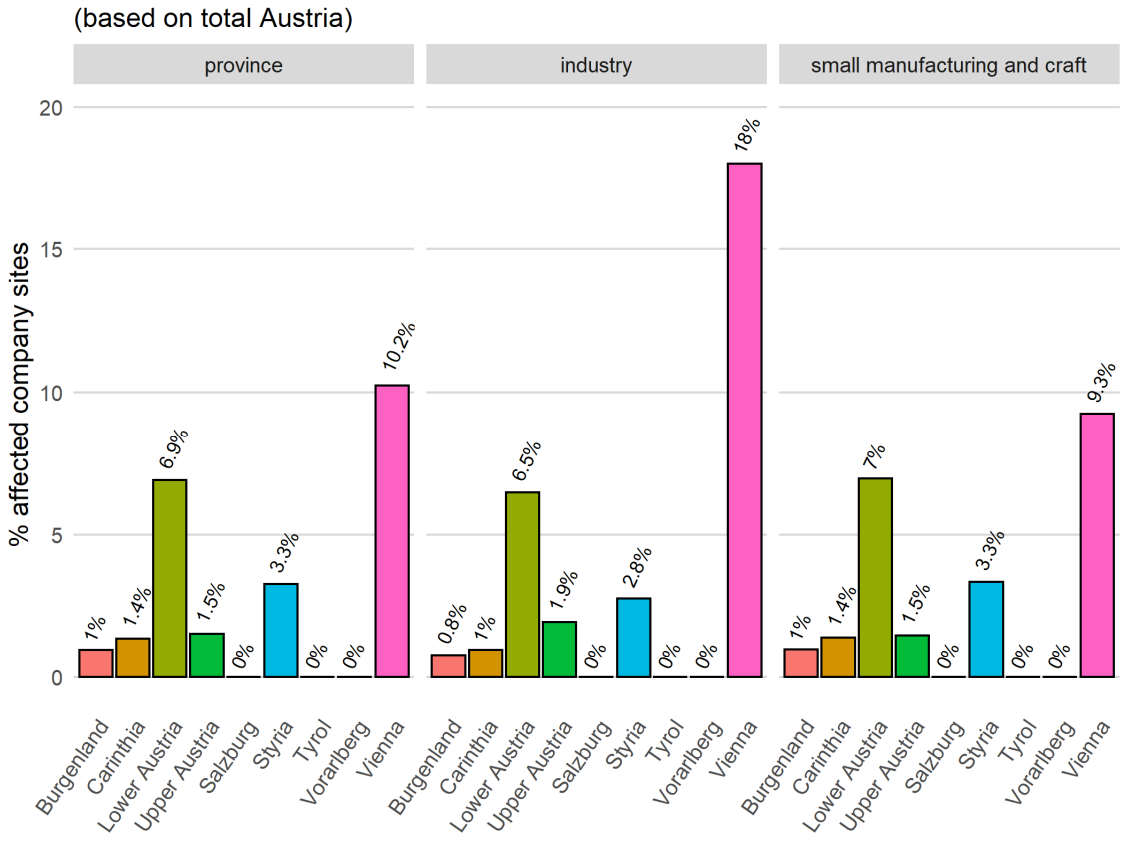

Figure 115: $PM_{2.5}$ YMV 2018 interim target 3 – percentage of affected company sites separated by province and division

PM2.5 YMV 2018 interim target 3												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	645	585	60	24.1	23.5	32.1	1.0	1.0	0.8
Carinthia	5147	4670	477	902	829	73	17.5	17.8	15.3	1.4	1.4	1.0
Lower A.	14361	12959	1402	4566	4080	486	31.8	31.5	34.7	6.9	7.0	6.5
Upper A.	11812	10368	1444	1019	873	146	8.6	8.4	10.1	1.5	1.5	1.9
Salzburg	5304	4873	431	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Styria	9601	8466	1135	2168	1960	208	22.6	23.2	18.3	3.3	3.3	2.8
Tyrol	7117	6510	607	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Vorarlberg	3163	2730	433	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Vienna	6846	5470	1376	6766	5416	1350	98.8	99.0	98.1	10.2	9.3	18.0
total	**66031**	**58539**	**7492**	**16066**	**13743**	**2323**				**24.3**	**23.5**	**31.0**

Table 103: $PM_{2.5}$ YMV 2018 interim target 3 – number and percentage of affected company sites separated by province and division

8.5 $PM_{2.5}$ DMV (3-4 DAYS EXCEEDANCE P.A.)

8.5.1 AQG LEVEL

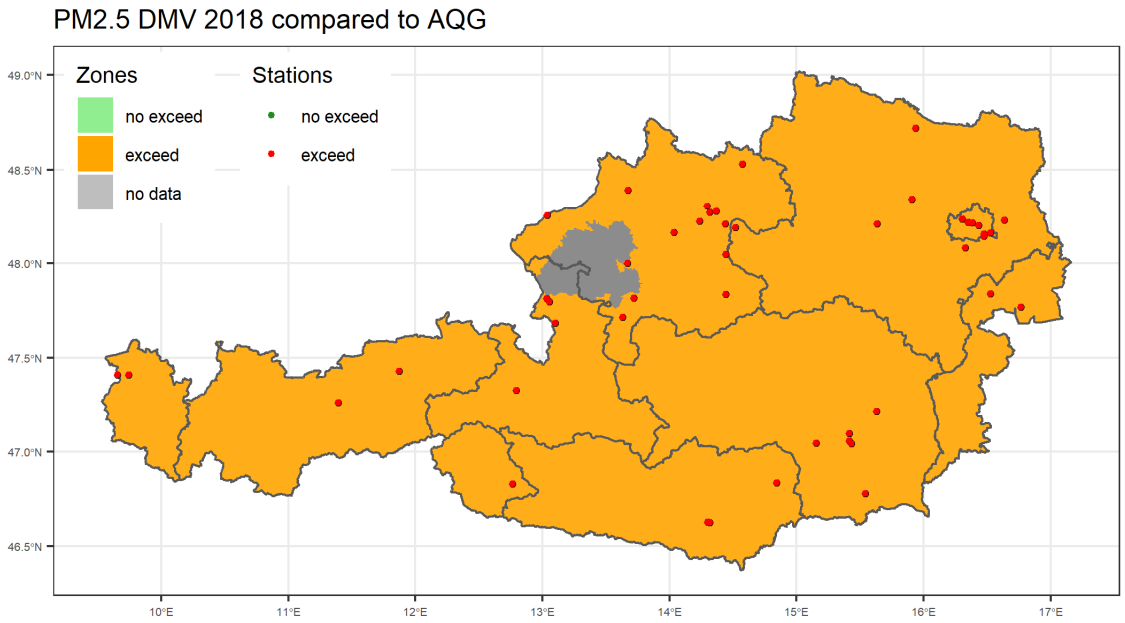

Figure 116: $PM_{2.5}$ DMV 2018 AQG level (3-4 days exceedance p.a.) – exceedance stations and areas with respect to AQG level of 15 µg/m³ (47 stations of 63 (74.6%), affected area: 97.6%).

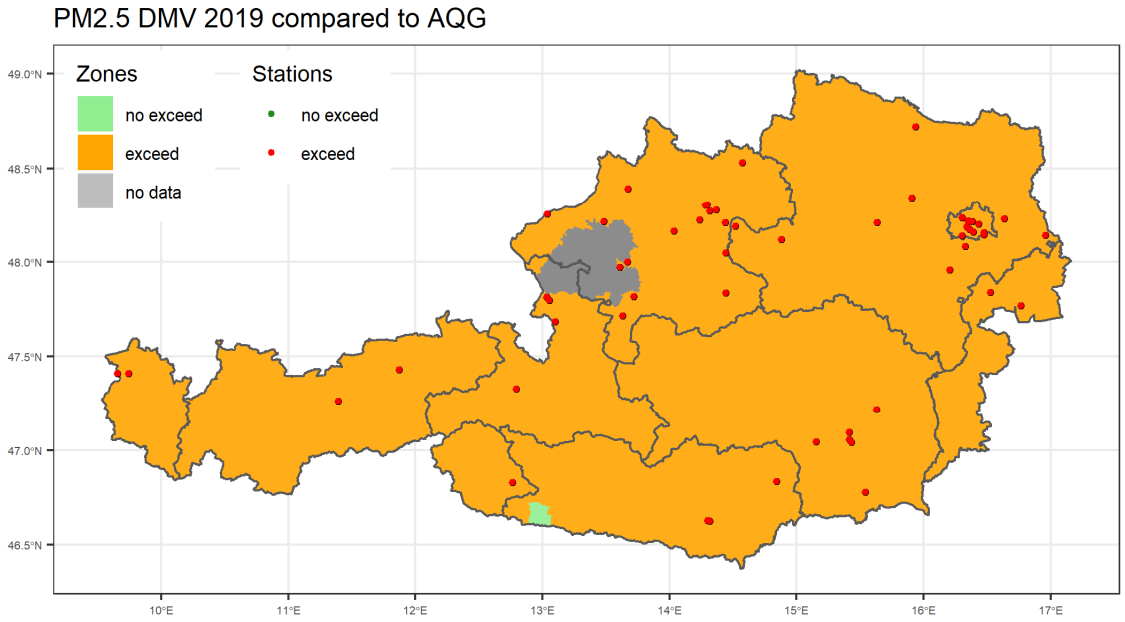

Figure 117: $PM_{2.5}$ DMV 2019 AQG level (3-4 days exceedance p.a.) – exceedance stations and areas with respect to AQG level of 15 µg/m³ (56 stations of 63 (88.9%), affected area: 97.4%).

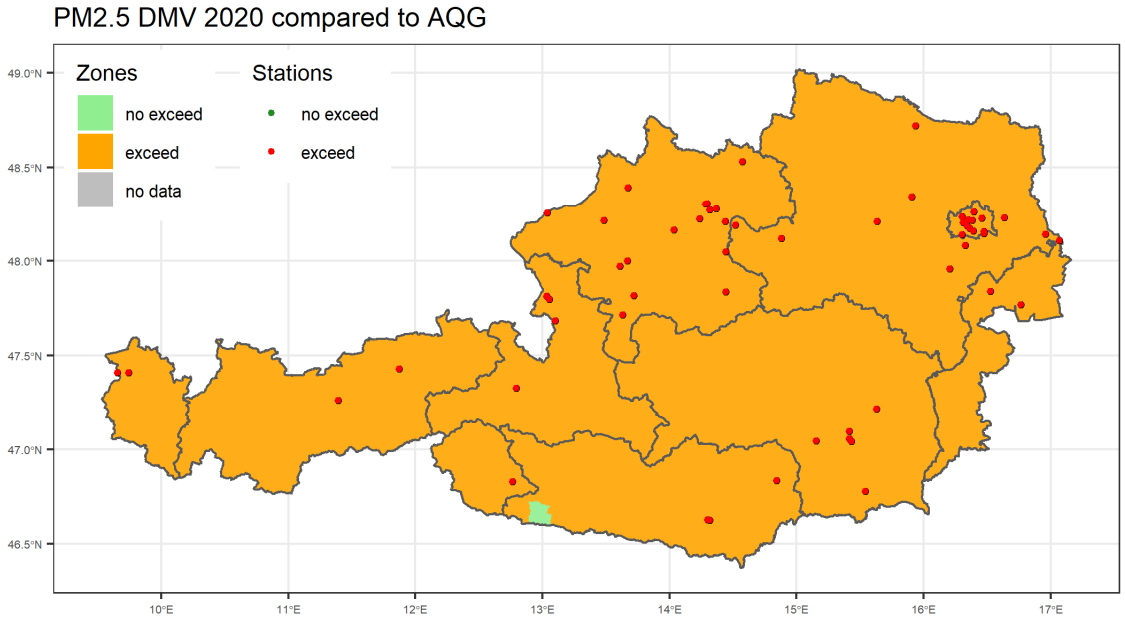

Figure 118: $PM_{2.5}$ DMV 2020 AQG level (3-4 days exceedance p.a.) – exceedance stations and areas with respect to AQG level of 15 µg/m³ 59 stations of 63 (93.7%), affected area: 99.8%).

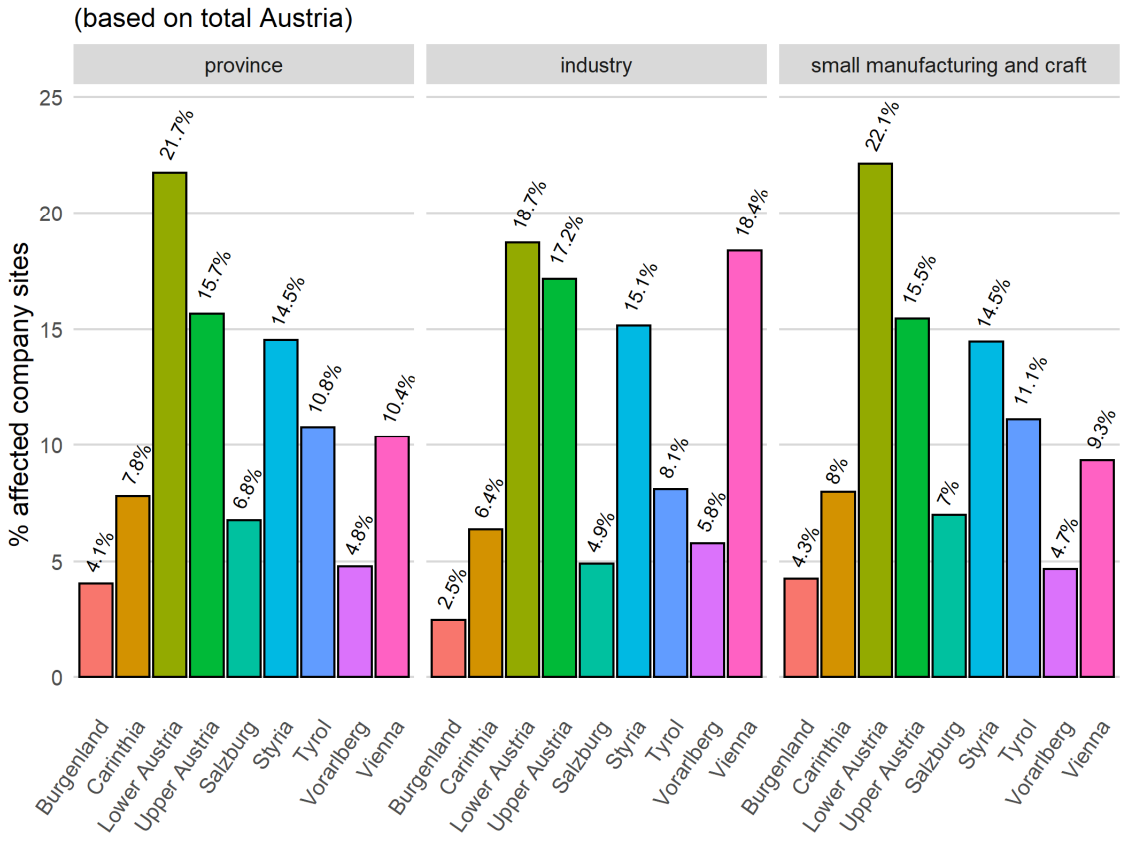

Figure 119: $PM_{2.5}$ DMV 2018 AQG level (3–4 days exceedance p.a.) – percentage of affected company sites separated by province and division

federal state	PM2.5 DMV 2018 AQG level											
	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	2680	2493	187	100.0	100.0	100.0	4.1	4.3	2.5
Carinthia	5147	4670	477	5147	4670	477	100.0	100.0	100.0	7.8	8.0	6.4
Lower A.	14361	12959	1402	14361	12959	1402	100.0	100.0	100.0	21.7	22.1	18.7
Upper A.	11812	10368	1444	10334	9049	1285	87.5	87.3	89.0	15.7	15.5	17.2
Salzburg	5304	4873	431	4466	4099	367	84.2	84.1	85.2	6.8	7.0	4.9
Styria	9601	8466	1135	9601	8466	1135	100.0	100.0	100.0	14.5	14.5	15.1
Tyrol	7117	6510	607	7117	6510	607	100.0	100.0	100.0	10.8	11.1	8.1
Vorarlberg	3163	2730	433	3163	2730	433	100.0	100.0	100.0	4.8	4.7	5.8
Vienna	6846	5470	1376	6846	5470	1376	100.0	100.0	100.0	10.4	9.3	18.4
total	**66031**	**58539**	**7492**	**63715**	**56446**	**7269**				**96.5**	**96.4**	**97.0**

Table 104: $PM_{2.5}$ DMV 2018 AQG level (3-4 days exceedance p.a.) – number and percentage of affected company sites separated by province and division

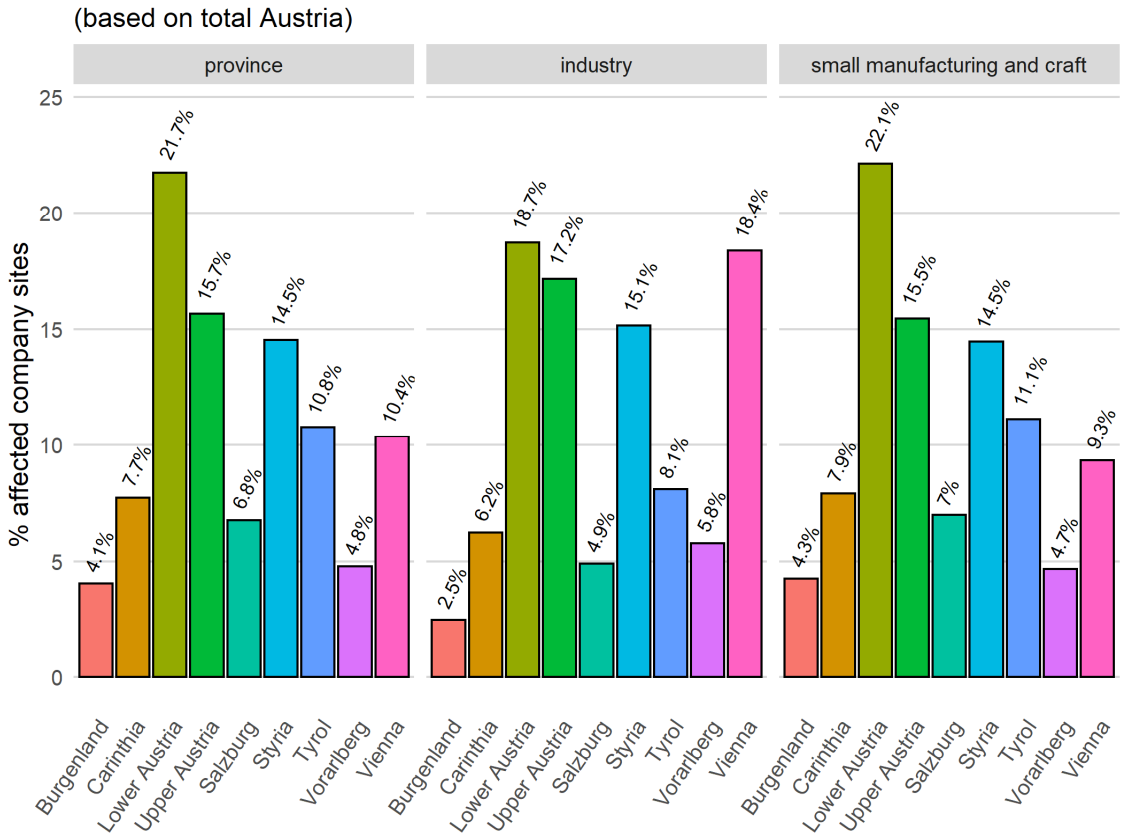

Figure 120: $PM_{2.5}$ DMV 2019 AQG level (3–4 days exceedance p.a.) – percentage of affected company sites separated by province and division

federal state	PM2.5 DMV 2019 AQG level											
	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	2680	2493	187	100.0	100.0	100.0	4.1	4.3	2.5
Carinthia	5147	4670	477	5099	4631	468	99.1	99.2	98.1	7.7	7.9	6.2
Lower A.	14361	12959	1402	14361	12959	1402	100.0	100.0	100.0	21.7	22.1	18.7
Upper A.	11812	10368	1444	10334	9049	1285	87.5	87.3	89.0	15.7	15.5	17.2
Salzburg	5304	4873	431	4466	4099	367	84.2	84.1	85.2	6.8	7.0	4.9
Styria	9601	8466	1135	9601	8466	1135	100.0	100.0	100.0	14.5	14.5	15.1
Tyrol	7117	6510	607	7117	6510	607	100.0	100.0	100.0	10.8	11.1	8.1
Vorarlberg	3163	2730	433	3163	2730	433	100.0	100.0	100.0	4.8	4.7	5.8
Vienna	6846	5470	1376	6846	5470	1376	100.0	100.0	100.0	10.4	9.3	18.4
total	**66031**	**58539**	**7492**	**63667**	**56407**	**7260**				**96.4**	**96.4**	**96.9**

Table 105: $PM_{2.5}$ DMV 2019 AQG level (3-4 days exceedance p.a.) – number and percentage of affected company sites separated by province and division

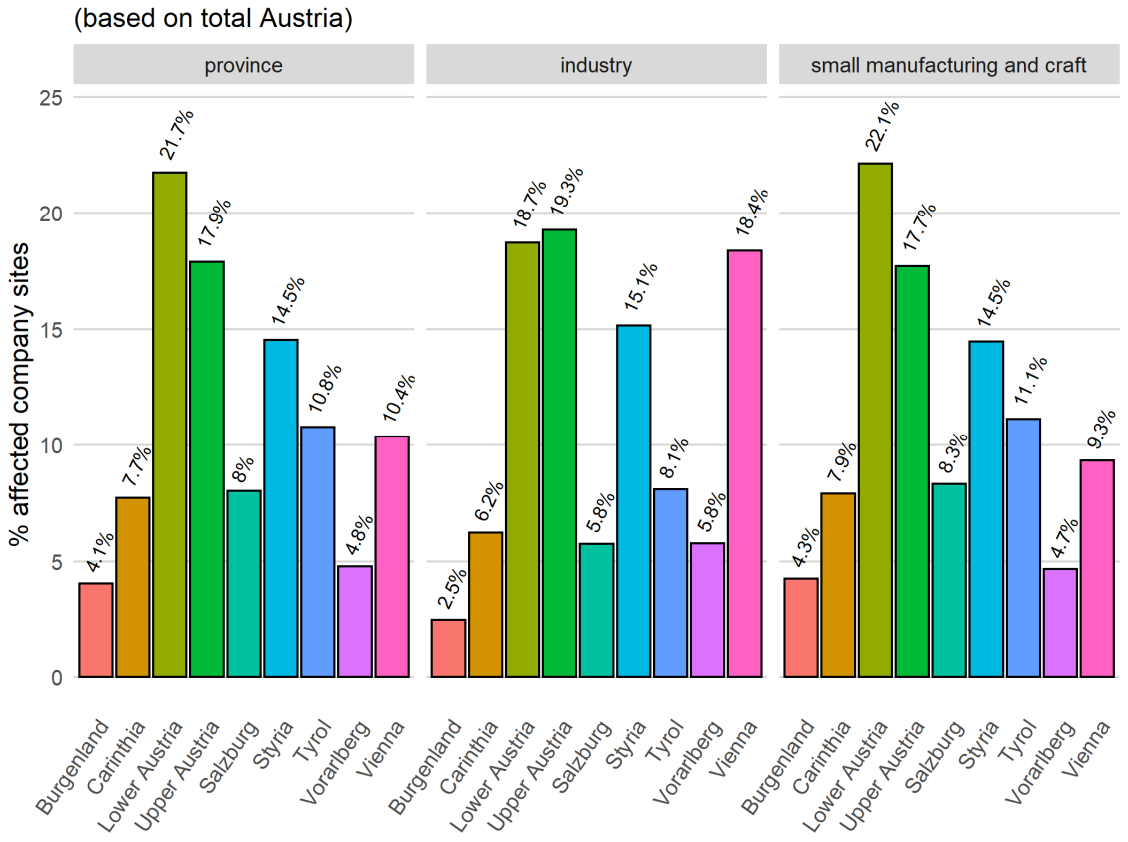

Figure 121: $PM_{2.5}$ DMV 2020 AQG level (3–4 days exceedance p.a.) – percentage of affected company sites separated by province and division

federal state	PM2.5 DMV 2020 AQG level											
	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	2680	2493	187	100.0	100.0	100.0	4.1	4.3	2.5
Carinthia	5147	4670	477	5099	4631	468	99.1	99.2	98.1	7.7	7.9	6.2
Lower A.	14361	12959	1402	14361	12959	1402	100.0	100.0	100.0	21.7	22.1	18.7
Upper A.	11812	10368	1444	11812	10368	1444	100.0	100.0	100.0	17.9	17.7	19.3
Salzburg	5304	4873	431	5304	4873	431	100.0	100.0	100.0	8.0	8.3	5.8
Styria	9601	8466	1135	9601	8466	1135	100.0	100.0	100.0	14.5	14.5	15.1
Tyrol	7117	6510	607	7117	6510	607	100.0	100.0	100.0	10.8	11.1	8.1
Vorarlberg	3163	2730	433	3163	2730	433	100.0	100.0	100.0	4.8	4.7	5.8
Vienna	6846	5470	1376	6846	5470	1376	100.0	100.0	100.0	10.4	9.3	18.4
total	**66031**	**58539**	**7492**	**65983**	**58500**	**7483**				**99.9**	**99.9**	**99.9**

Table 106: $PM_{2.5}$ DMV 2020 AQG level (3-4 days exceedance p.a.) – number and percentage of affected company sites separated by province and division

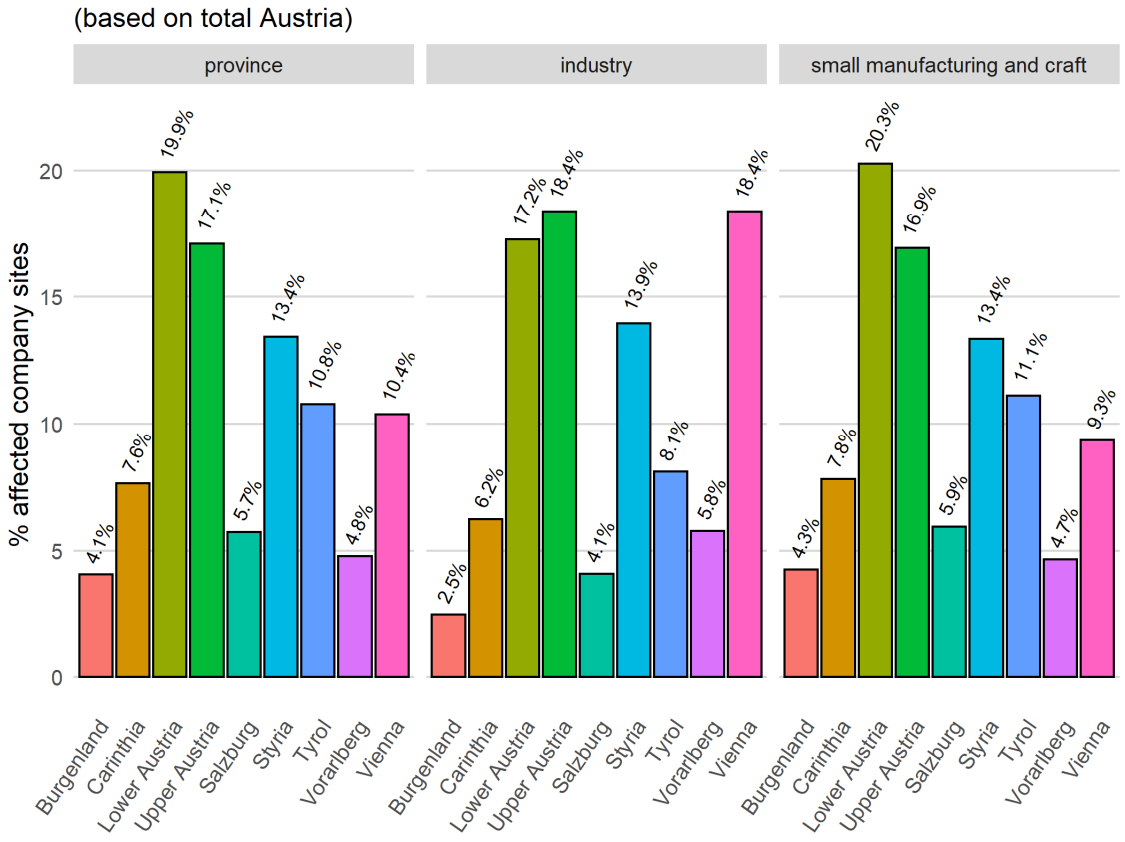

Figure 122: $PM_{2.5}$ DMV 2021 AQG level (3–4 days exceedance p.a.) – percentage of affected company sites separated by province and division

federal state	PM2.5 DMV 2021 AQG level											
	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	2680	2493	187	100.0	100.0	100.0	4.1	4.3	2.5
Carinthia	5147	4670	477	5040	4573	467	97.9	97.9	97.9	7.6	7.8	6.2
Lower A.	14361	12959	1402	13154	11862	1292	91.6	91.5	92.2	19.9	20.3	17.2
Upper A.	11812	10368	1444	11276	9900	1376	95.5	95.5	95.3	17.1	16.9	18.4
Salzburg	5304	4873	431	3785	3478	307	71.4	71.4	71.2	5.7	5.9	4.1
Styria	9601	8466	1135	8860	7815	1045	92.3	92.3	92.1	13.4	13.4	13.9
Tyrol	7117	6510	607	7117	6510	607	100.0	100.0	100.0	10.8	11.1	8.1
Vorarlberg	3163	2730	433	3163	2730	433	100.0	100.0	100.0	4.8	4.7	5.8
Vienna	6846	5470	1376	6846	5470	1376	100.0	100.0	100.0	10.4	9.3	18.4
total	**66031**	**58539**	**7492**	**61921**	**54831**	**7090**				**93.8**	**93.7**	**94.6**

Table 107: $PM_{2.5}$ DMV 2021 AQG level (3-4 days exceedance p.a.) – number and percentage of affected company sites separated by province and division

8.5.2 INTERIM TARGET 4

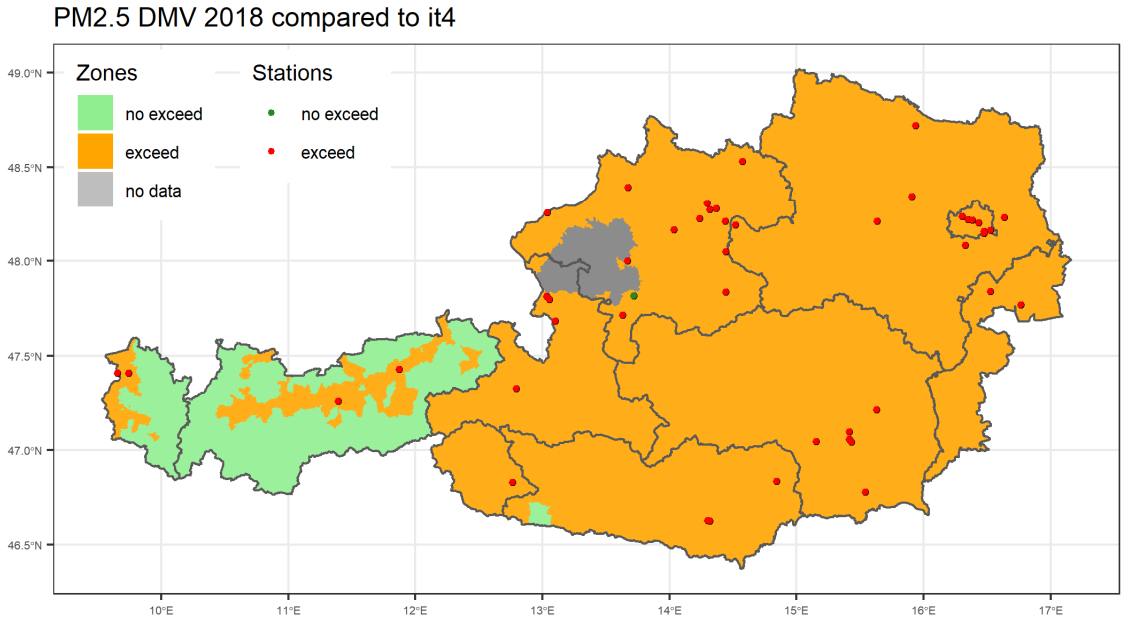

Figure 123: $PM_{2.5}$ DMV 2018 interim target 4 (3-4 days exceedance p.a.) – exceedance stations and areas with respect to interim target 4 of 25 µg/m³ (46 stations of 63 (73.0%), affected area: 85.6%).

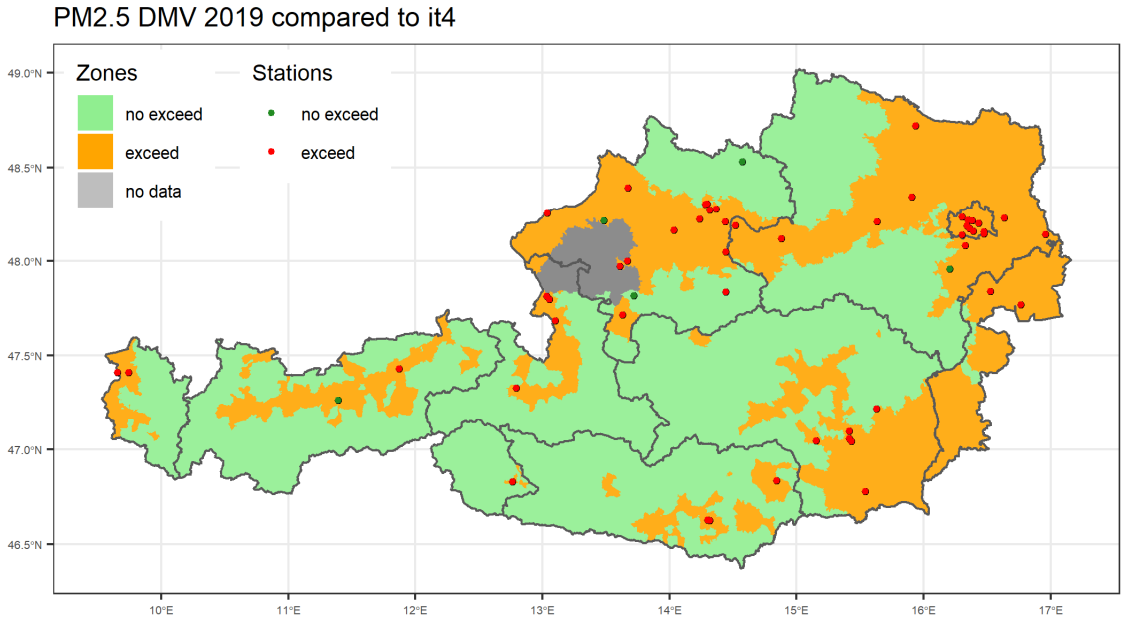

Figure 124: $PM_{2.5}$ DMV 2019 interim target 4 (3-4 days exceedance p.a.) – exceedance stations and areas with respect to interim target 4 of 25 µg/m³ (51 stations of 63 (81.0%), affected area: 36.7%).

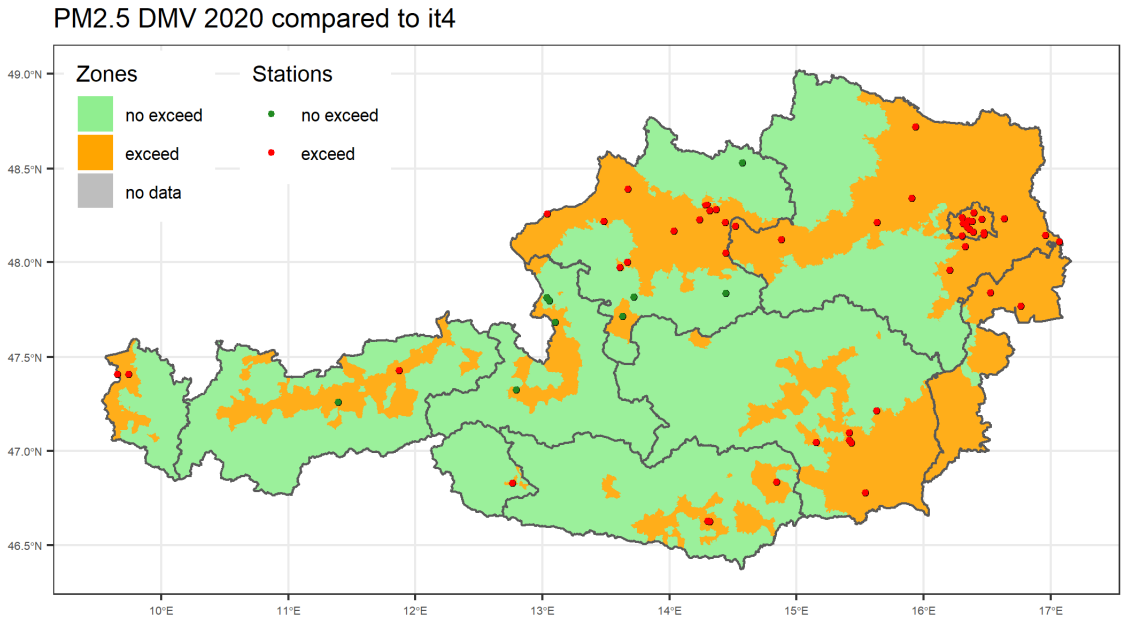

Figure 125: $PM_{2.5}$ DMV 2020 interim target 4 (3-4 days exceedance p.a.) – exceedance stations and areas with respect to interim target 4 of 25 µg/m³ (50 stations of 63 (79.4%), affected area: 36.6%).

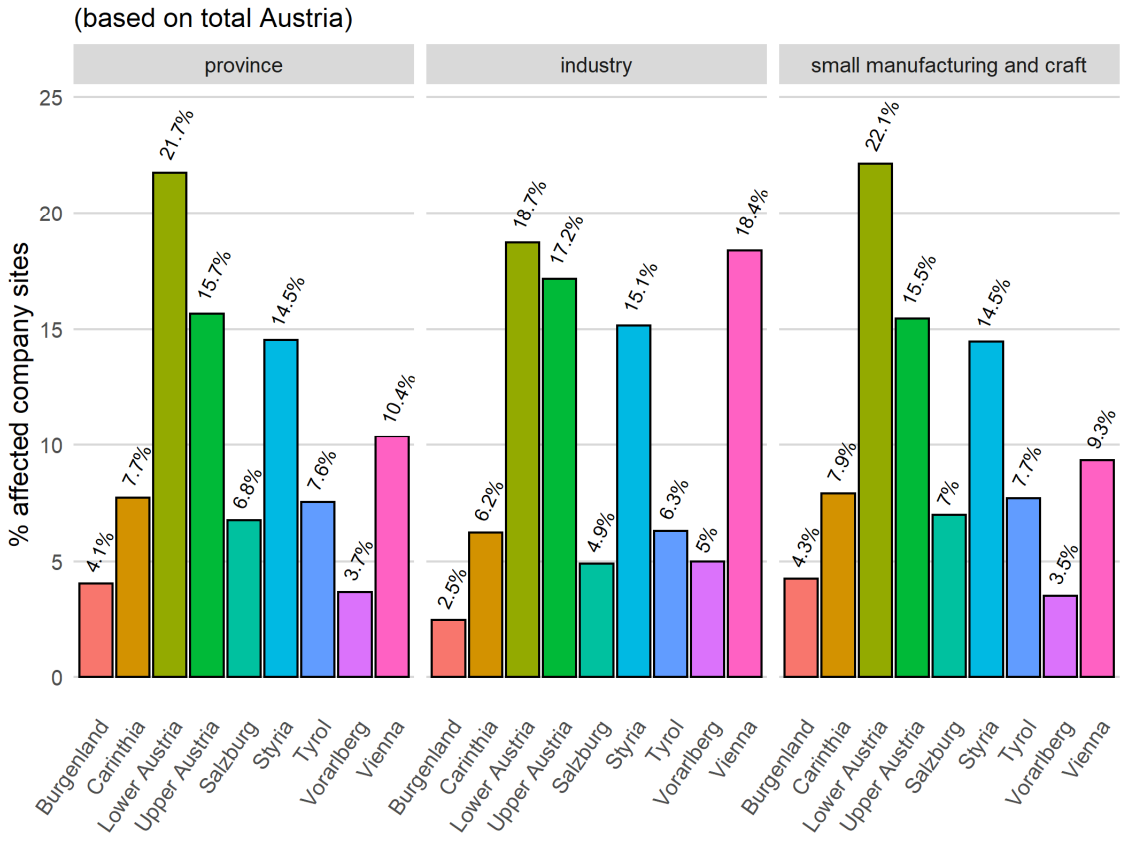

Figure 126: $PM_{2.5}$ DMV 2018 interim target 4 (3–4 days exceedance p.a.) – percentage of affected company sites separated by province and division

PM2.5 DMV 2018 interim target 4												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	2680	2493	187	100.0	100.0	100.0	4.1	4.3	2.5
Carinthia	5147	4670	477	5099	4631	468	99.1	99.2	98.1	7.7	7.9	6.2
Lower A.	14361	12959	1402	14361	12959	1402	100.0	100.0	100.0	21.7	22.1	18.7
Upper A.	11812	10368	1444	10334	9049	1285	87.5	87.3	89.0	15.7	15.5	17.2
Salzburg	5304	4873	431	4466	4099	367	84.2	84.1	85.2	6.8	7.0	4.9
Styria	9601	8466	1135	9601	8466	1135	100.0	100.0	100.0	14.5	14.5	15.1
Tyrol	7117	6510	607	4986	4514	472	70.1	69.3	77.8	7.6	7.7	6.3
Vorarlberg	3163	2730	433	2437	2062	375	77.0	75.5	86.6	3.7	3.5	5.0
Vienna	6846	5470	1376	6846	5470	1376	100.0	100.0	100.0	10.4	9.3	18.4
total	**66031**	**58539**	**7492**	**60810**	**53743**	**7067**				**92.1**	**91.8**	**94.3**

Table 108: $PM_{2.5}$ DMV 2018 interim target 4 (3-4 days exceedance p.a.) – number and percentage of affected company sites separated by province and division

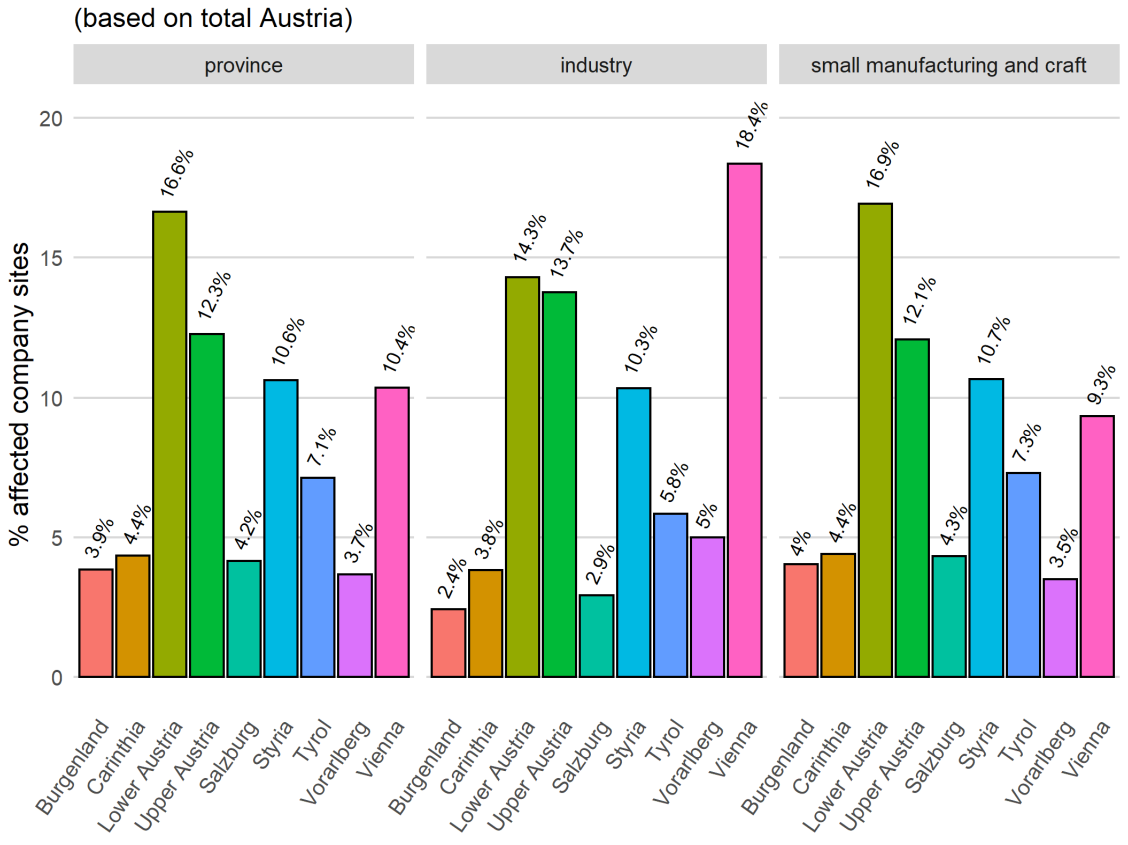

Figure 127: $PM_{2.5}$ DMV 2019 interim target 4 (3–4 days exceedance p.a.) – percentage of affected company sites separated by province and division

PM2.5 DMV 2019 interim target 4												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	2550	2367	183	95.1	94.9	97.9	3.9	4.0	2.4
Carinthia	5147	4670	477	2873	2586	287	55.8	55.4	60.2	4.4	4.4	3.8
Lower A.	14361	12959	1402	10989	9918	1071	76.5	76.5	76.4	16.6	16.9	14.3
Upper A.	11812	10368	1444	8097	7067	1030	68.5	68.2	71.3	12.3	12.1	13.7
Salzburg	5304	4873	431	2753	2532	221	51.9	52.0	51.3	4.2	4.3	2.9
Styria	9601	8466	1135	7014	6239	775	73.1	73.7	68.3	10.6	10.7	10.3
Tyrol	7117	6510	607	4701	4263	438	66.1	65.5	72.2	7.1	7.3	5.8
Vorarlberg	3163	2730	433	2437	2062	375	77.0	75.5	86.6	3.7	3.5	5.0
Vienna	6846	5470	1376	6846	5470	1376	100.0	100.0	100.0	10.4	9.3	18.4
total	**66031**	**58539**	**7492**	**48260**	**42504**	**5756**				**73.1**	**72.6**	**76.8**

Table 109: $PM_{2.5}$ DMV 2019 interim target 4 (3-4 days exceedance p.a.) – number and percentage of affected company sites separated by province and division

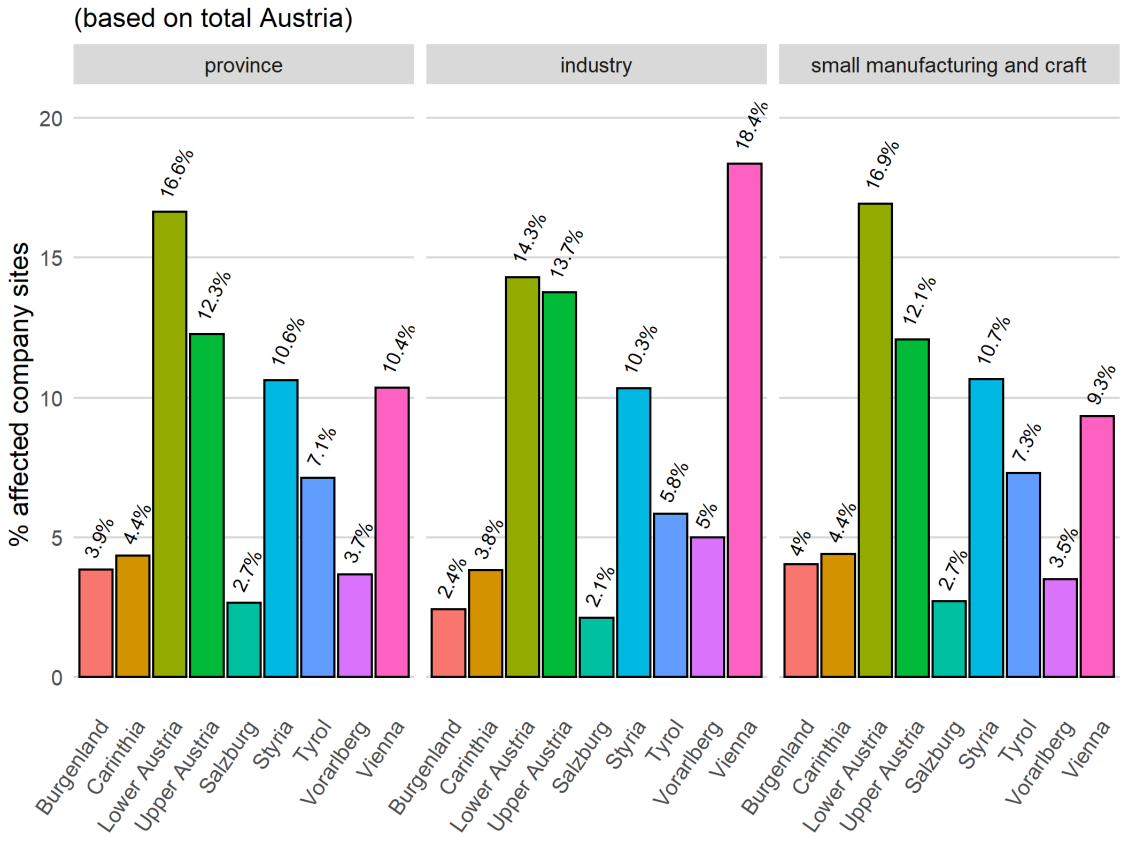

Figure 128: $PM_{2.5}$ DMV 2020 interim target 4 (3–4 days exceedance p.a.) – percentage of affected company sites separated by province and division

PM2.5 DMV 2020 interim target 4												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	2550	2367	183	95.1	94.9	97.9	3.9	4.0	2.4
Carinthia	5147	4670	477	2873	2586	287	55.8	55.4	60.2	4.4	4.4	3.8
Lower A.	14361	12959	1402	10989	9918	1071	76.5	76.5	76.4	16.6	16.9	14.3
Upper A.	11812	10368	1444	8097	7067	1030	68.5	68.2	71.3	12.3	12.1	13.7
Salzburg	5304	4873	431	1764	1604	160	33.3	32.9	37.1	2.7	2.7	2.1
Styria	9601	8466	1135	7014	6239	775	73.1	73.7	68.3	10.6	10.7	10.3
Tyrol	7117	6510	607	4701	4263	438	66.1	65.5	72.2	7.1	7.3	5.8
Vorarlberg	3163	2730	433	2437	2062	375	77.0	75.5	86.6	3.7	3.5	5.0
Vienna	6846	5470	1376	6846	5470	1376	100.0	100.0	100.0	10.4	9.3	18.4
total	**66031**	**58539**	**7492**	**47271**	**41576**	**5695**				**71.6**	**71.0**	**76.0**

Table 110: $PM_{2.5}$ DMV 2020 interim target 4 (3-4 days exceedance p.a.) – number and percentage of affected company sites separated by province and division

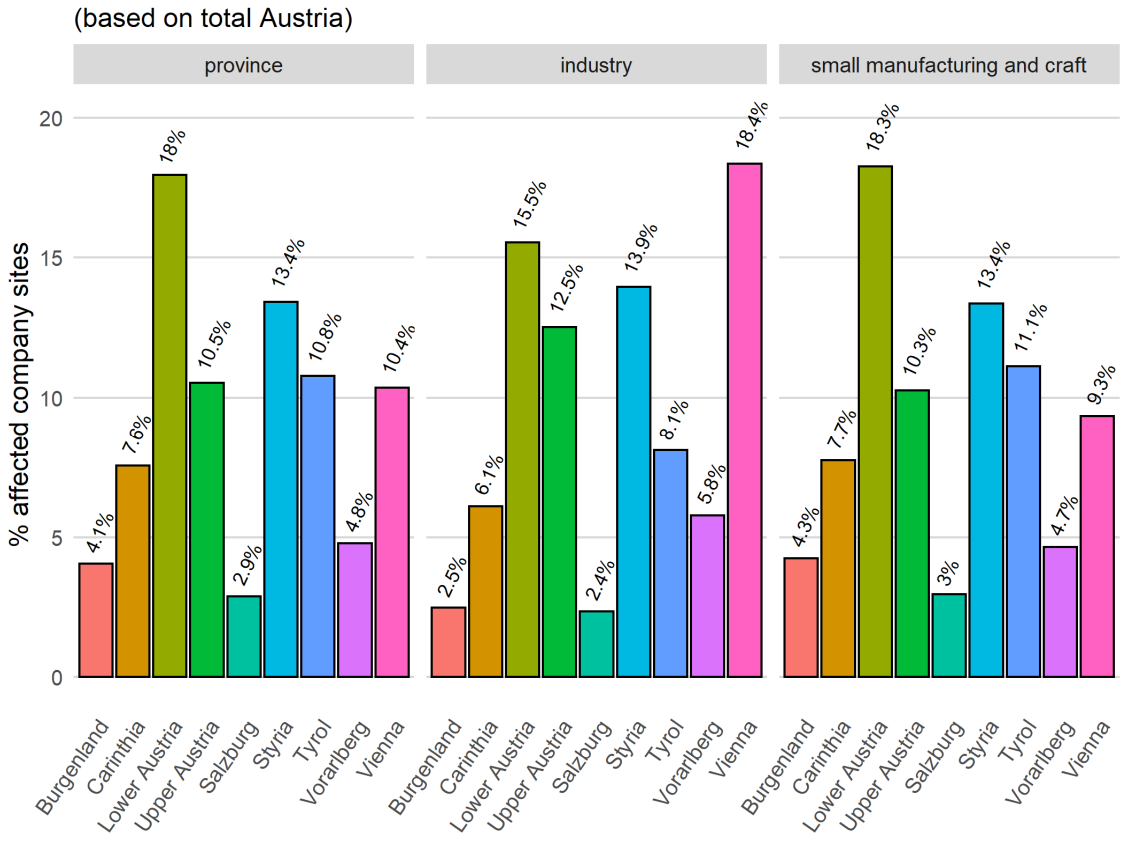

Figure 129: $PM_{2.5}$ DMV 2021 interim target 4 (3–4 days exceedance p.a.) – percentage of affected company sites separated by province and division

PM2.5 DMV 2021 interim target 4												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	2680	2493	187	100.0	100.0	100.0	4.1	4.3	2.5
Carinthia	5147	4670	477	4992	4534	458	97.0	97.1	96.0	7.6	7.7	6.1
Lower A.	14361	12959	1402	11860	10697	1163	82.6	82.5	83.0	18.0	18.3	15.5
Upper A.	11812	10368	1444	6951	6013	938	58.8	58.0	65.0	10.5	10.3	12.5
Salzburg	5304	4873	431	1919	1741	178	36.2	35.7	41.3	2.9	3.0	2.4
Styria	9601	8466	1135	8860	7815	1045	92.3	92.3	92.1	13.4	13.4	13.9
Tyrol	7117	6510	607	7117	6510	607	100.0	100.0	100.0	10.8	11.1	8.1
Vorarlberg	3163	2730	433	3163	2730	433	100.0	100.0	100.0	4.8	4.7	5.8
Vienna	6846	5470	1376	6846	5470	1376	100.0	100.0	100.0	10.4	9.3	18.4
total	**66031**	**58539**	**7492**	**54388**	**48003**	**6385**				**82.4**	**82.0**	**85.2**

Table 111: $PM_{2.5}$ DMV 2021 interim target 4 (3-4 days exceedance p.a.) – number and percentage of affected company sites separated by province and division

8.5.3 INTERIM TARGET 3

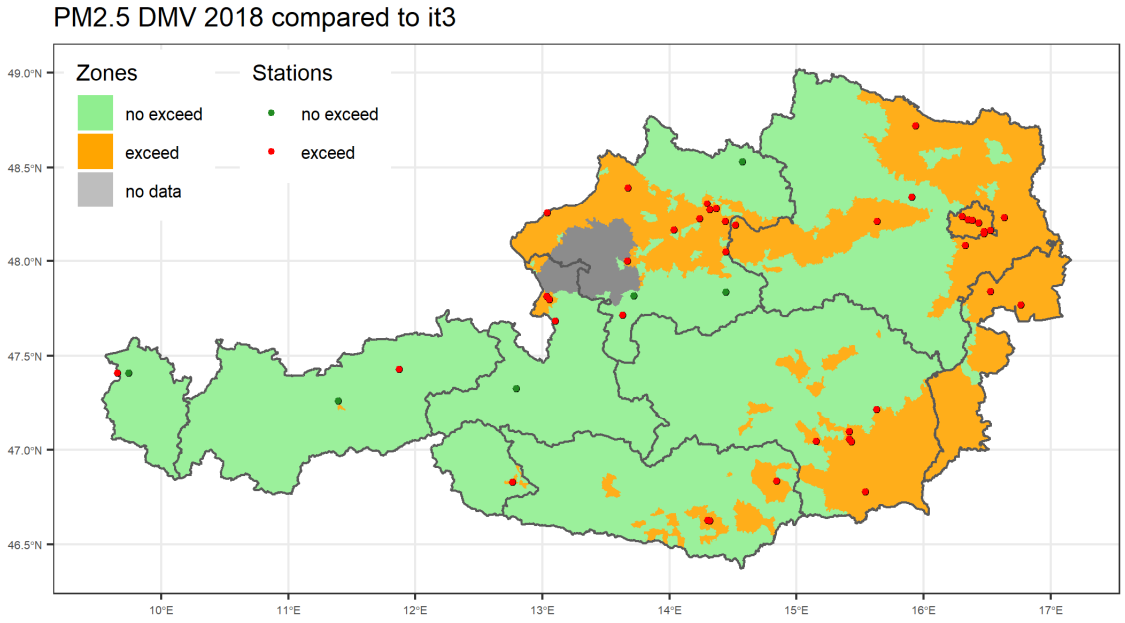

Figure 130: $PM_{2.5}$ DMV 2018 interim target 3 (3-4 days exceedance p.a.) – exceedance stations and areas with respect to interim target 3 of 37.5 µg/m³ (41 stations of 63 (65.1%), affected area: 26.9%).

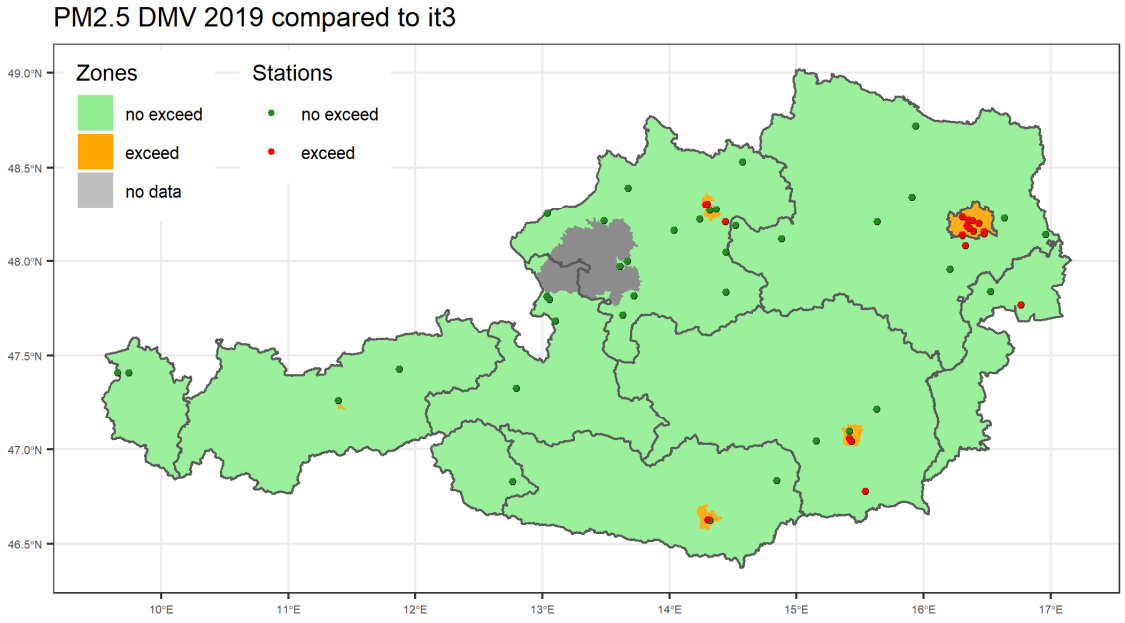

Figure 131: $PM_{2.5}$ DMV 2019 interim target 3 (3-4 days exceedance p.a.) – exceedance stations and areas with respect to interim target 3 of 37.5 µg/m³ (19 stations of 63 (30.2%), affected area: 0.9%).

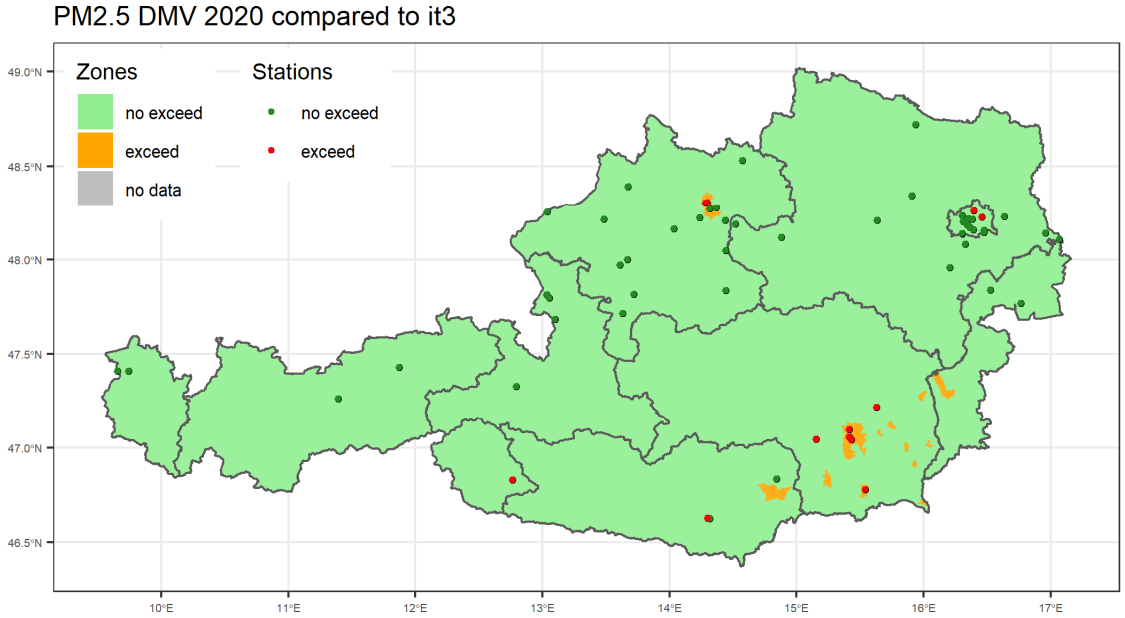

Figure 132: $PM_{2.5}$ DMV 2020 interim target 3 (3-4 days exceedance p.a.) – exceedance stations and areas with respect to interim target 3 of 37.5 µg/m³ (12 stations of 63 (19%), affected area: 0.8%).

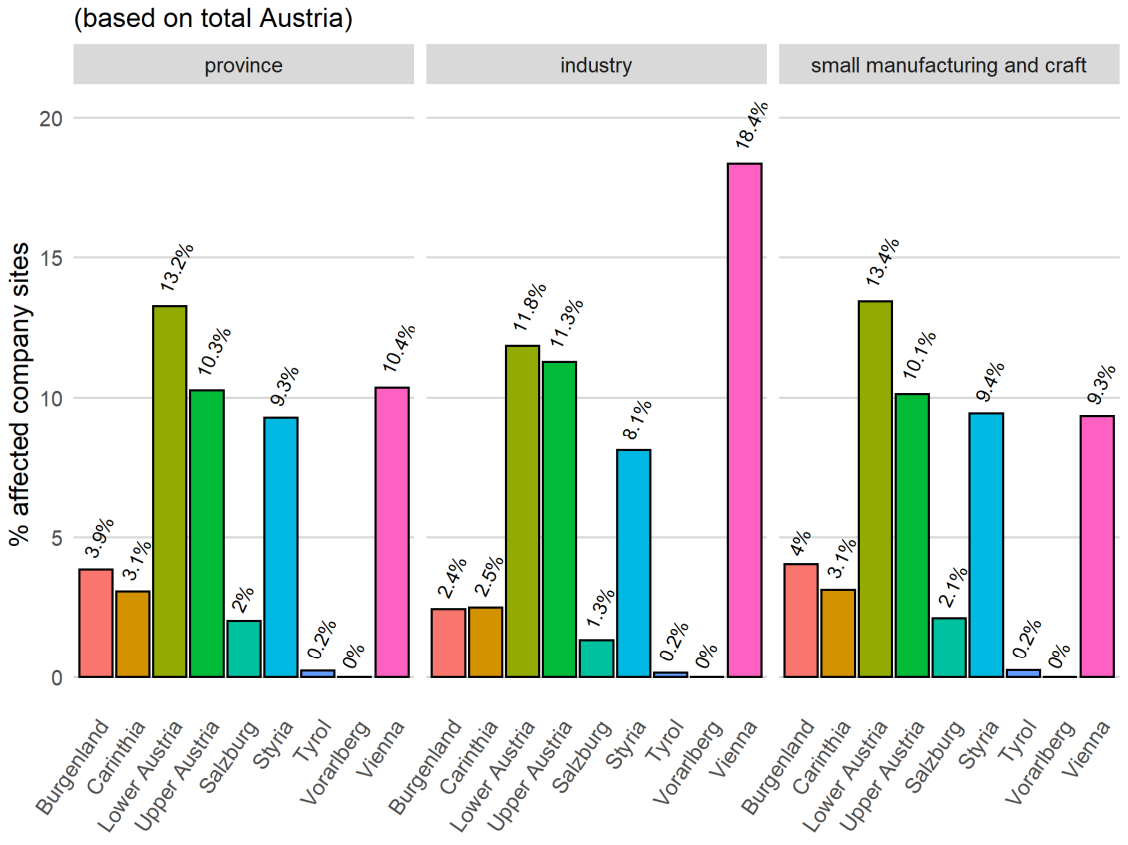

Figure 133: $PM_{2.5}$ DMV 2018 interim target 3 (3–4 days exceedance p.a.) – percentage of affected company sites separated by province and division

PM2.5 DMV 2018 interim target 3												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	2550	2367	183	95.1	94.9	97.9	3.9	4.0	2.4
Carinthia	5147	4670	477	2025	1837	188	39.3	39.3	39.4	3.1	3.1	2.5
Lower A.	14361	12959	1402	8749	7862	887	60.9	60.7	63.3	13.2	13.4	11.8
Upper A.	11812	10368	1444	6773	5929	844	57.3	57.2	58.4	10.3	10.1	11.3
Salzburg	5304	4873	431	1342	1242	100	25.3	25.5	23.2	2.0	2.1	1.3
Styria	9601	8466	1135	6132	5525	607	63.9	65.3	53.5	9.3	9.4	8.1
Tyrol	7117	6510	607	157	145	12	2.2	2.2	2.0	0.2	0.2	0.2
Vorarlberg	3163	2730	433	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Vienna	6846	5470	1376	6846	5470	1376	100.0	100.0	100.0	10.4	9.3	18.4
total	**66031**	**58539**	**7492**	**34574**	**30377**	**4197**				**52.4**	**51.9**	**56.0**

Table 112: $PM_{2.5}$ DMV 2018 interim target 3 (3-4 days exceedance p.a.) – number and percentage of affected company sites separated by province and division

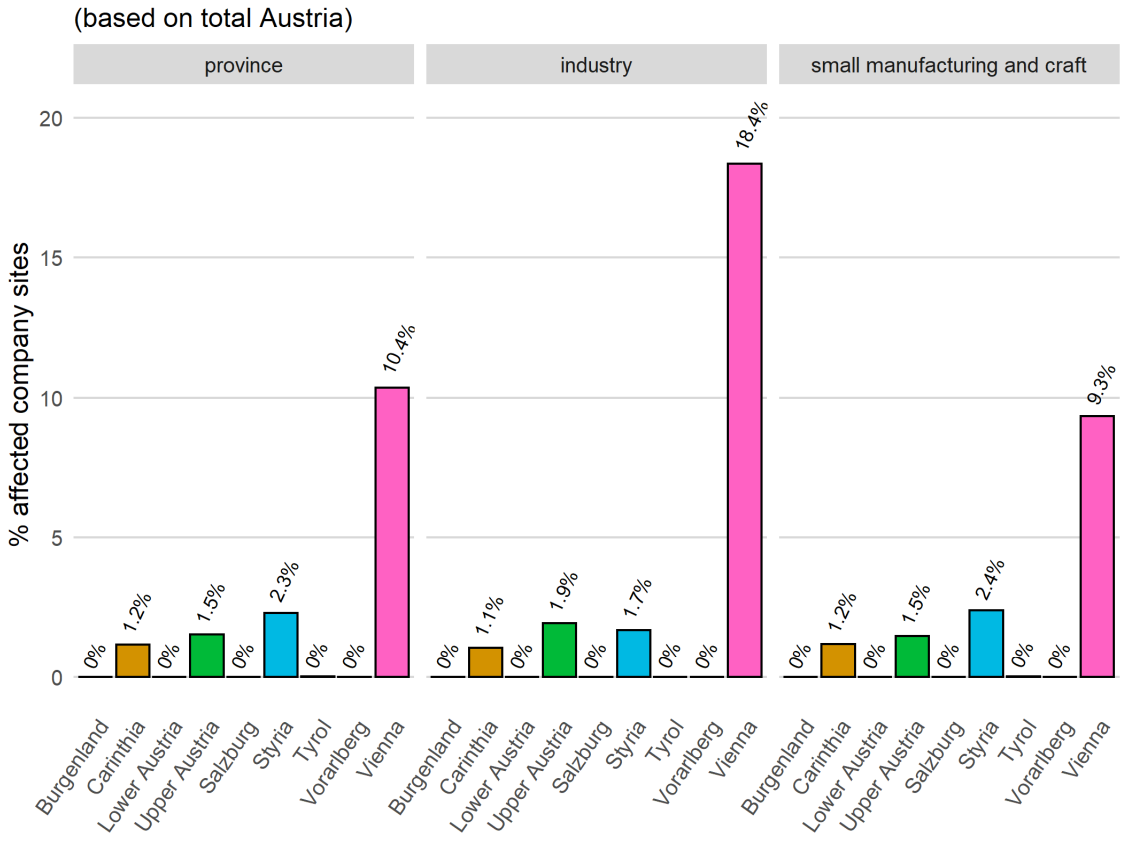

Figure 134: $PM_{2.5}$ DMV 2019 interim target 3 (3–4 days exceedance p.a.) – percentage of affected company sites separated by province and division

PM2.5 DMV 2019 interim target 3												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Carinthia	5147	4670	477	786	706	80	15.3	15.1	16.8	1.2	1.2	1.1
Lower A.	14361	12959	1402	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Upper A.	11812	10368	1444	1019	873	146	8.6	8.4	10.1	1.5	1.5	1.9
Salzburg	5304	4873	431	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Styria	9601	8466	1135	1533	1405	128	16.0	16.6	11.3	2.3	2.4	1.7
Tyrol	7117	6510	607	17	16	1	0.2	0.2	0.2	0.0	0.0	0.0
Vorarlberg	3163	2730	433	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Vienna	6846	5470	1376	6846	5470	1376	100.0	100.0	100.0	10.4	9.3	18.4
total	**66031**	**58539**	**7492**	**10201**	**8470**	**1731**				**15.4**	**14.5**	**23.1**

Table 113: $PM_{2.5}$ DMV 2019 interim target 3 (3-4 days exceedance p.a.) – number and percentage of affected company sites separated by province and division

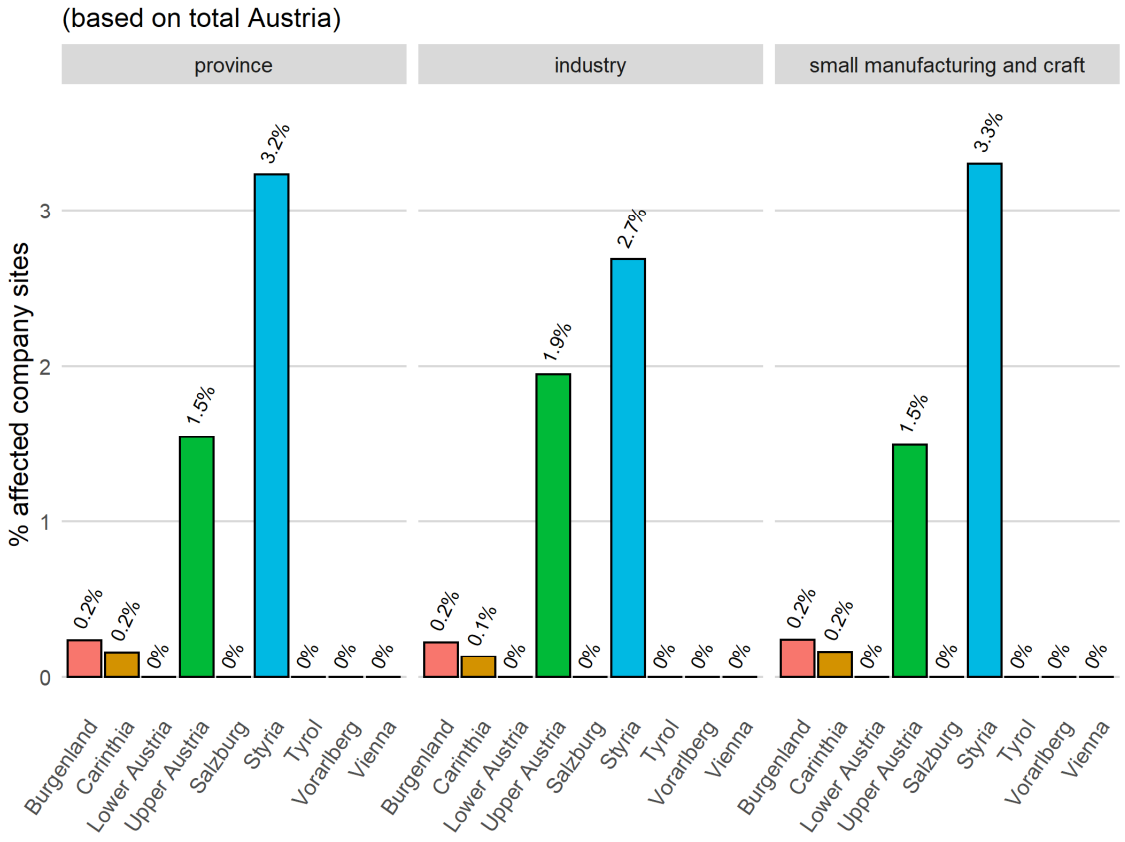

Figure 135: $PM_{2.5}$ DMV 2020 interim target 3 (3–4 days exceedance p.a.) – percentage of affected company sites separated by province and division

PM2.5 DMV 2020 interim target 3												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	160	143	17	6.0	5.7	9.1	0.2	0.2	0.2
Carinthia	5147	4670	477	107	97	10	2.1	2.1	2.1	0.2	0.2	0.1
Lower A.	14361	12959	1402	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Upper A.	11812	10368	1444	1019	873	146	8.6	8.4	10.1	1.5	1.5	1.9
Salzburg	5304	4873	431	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Styria	9601	8466	1135	2133	1932	201	22.2	22.8	17.7	3.2	3.3	2.7
Tyrol	7117	6510	607	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Vorarlberg	3163	2730	433	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Vienna	6846	5470	1376	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
total	**66031**	**58539**	**7492**	**3419**	**3045**	**374**				**5.2**	**5.2**	**5.0**

Table 114: $PM_{2.5}$ DMV 2020 interim target 3 (3-4 days exceedance p.a.) – number and percentage of affected company sites separated by province and division

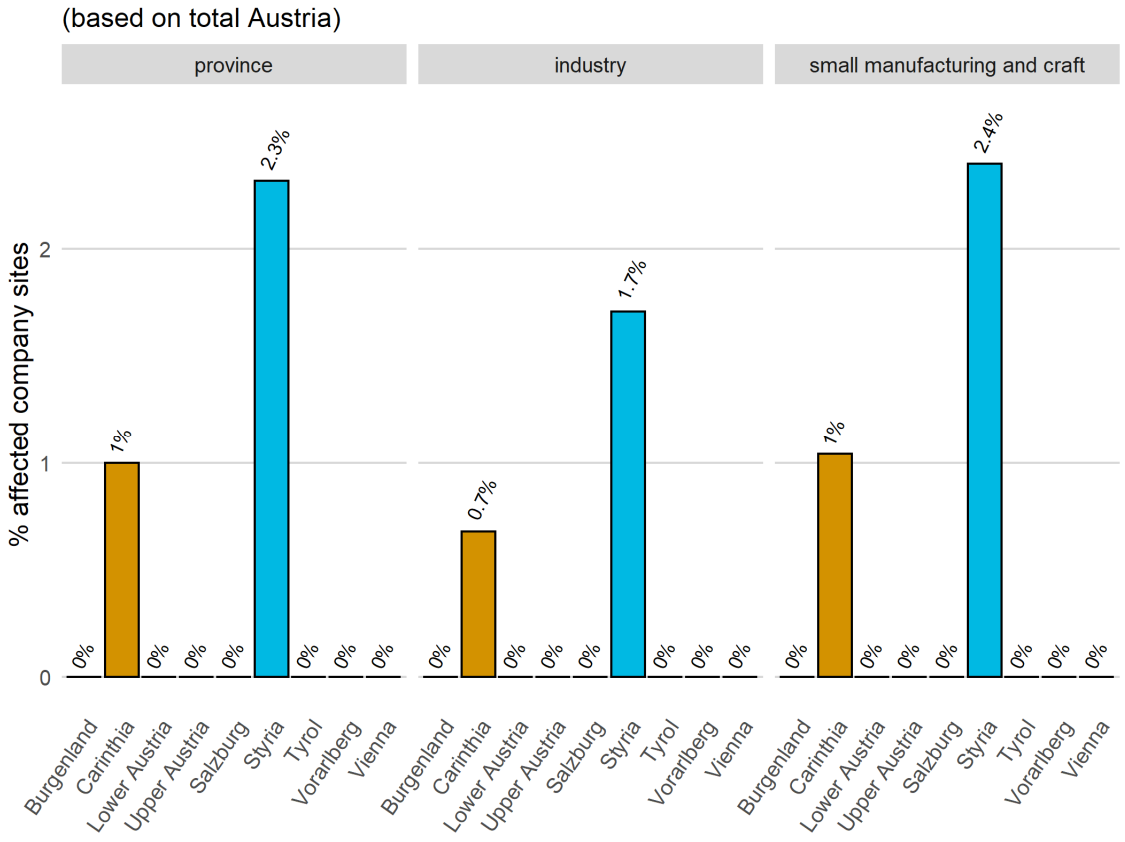

Figure 136: $PM_{2.5}$ DMV 2021 interim target 3 (3–4 days exceedance p.a.) – percentage of affected company sites separated by province and division

PM2.5 DMV 2021 interim target 3												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Carinthia	5147	4670	477	661	610	51	12.8	13.1	10.7	1.0	1.0	0.7
Lower A.	14361	12959	1402	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Upper A.	11812	10368	1444	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Salzburg	5304	4873	431	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Styria	9601	8466	1135	1533	1405	128	16.0	16.6	11.3	2.3	2.4	1.7
Tyrol	7117	6510	607	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Vorarlberg	3163	2730	433	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Vienna	6846	5470	1376	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
total	**66031**	**58539**	**7492**	**2194**	**2015**	**179**				**3.3**	**3.4**	**2.4**

Table 115: $PM_{2.5}$ DMV 2021 interim target 3 (3-4 days exceedance p.a.) – number and percentage of affected company sites separated by province and division

8.5.4 INTERIM TARGET 2

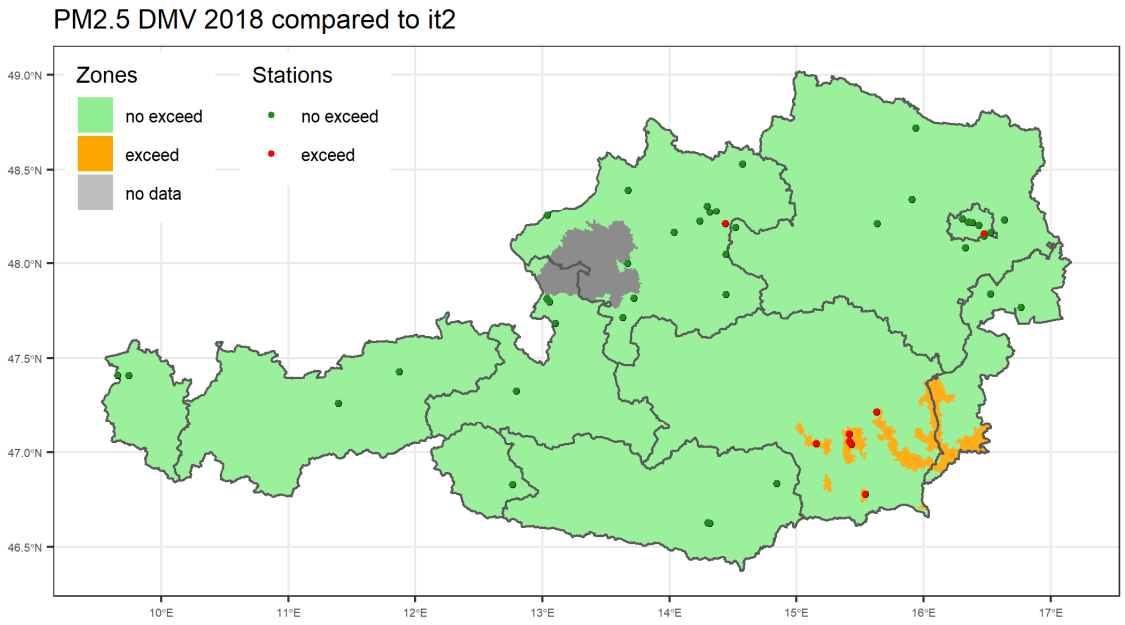

Figure 137: $PM_{2.5}$ DMV 2018 interim target 2 (3-4 days exceedance p.a.) – exceedance stations and areas with respect to interim target 2 of 50 µg/m³ (8 stations of 63 (12.7%), affected area: 1.8%).

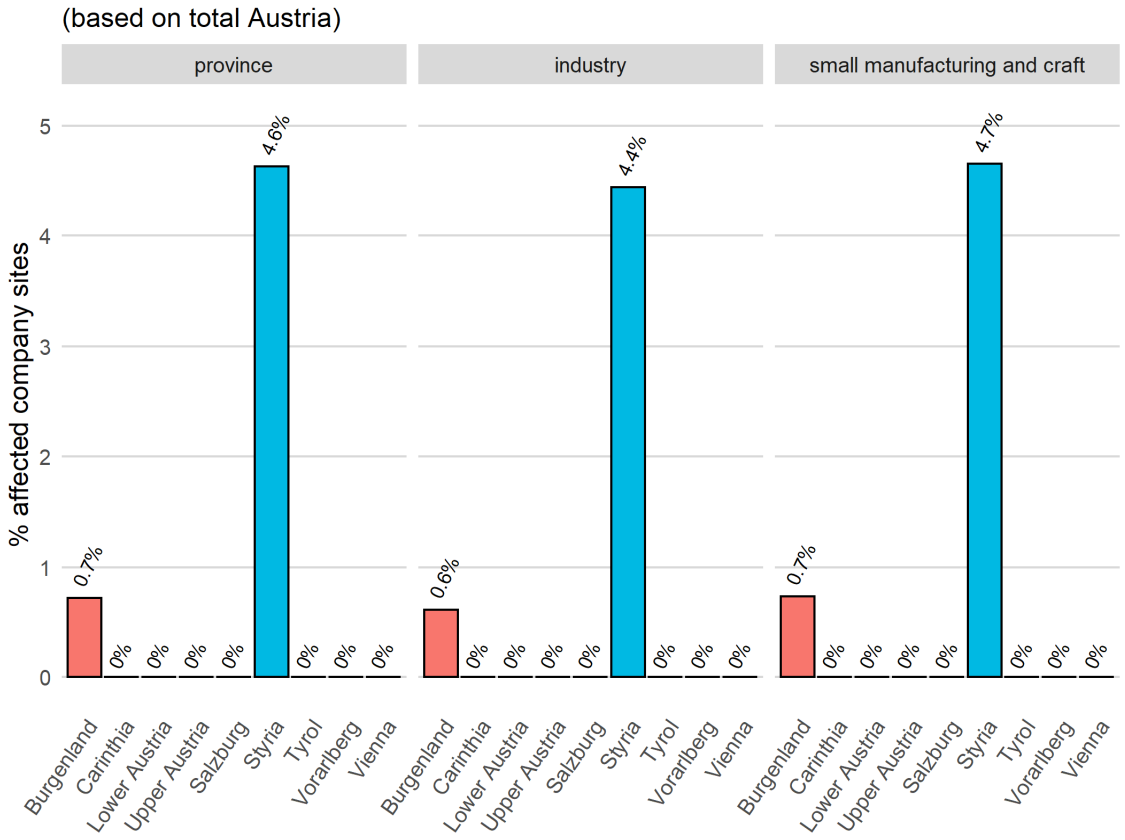

Figure 138: $PM_{2.5}$ DMV 2018 interim target 2 (3–4 days exceedance p.a.) – percentage of affected company sites separated by province and division

PM2.5 DMV 2018 interim target 2												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	478	432	46	17.8	17.3	24.6	0.7	0.7	0.6
Carinthia	5147	4670	477	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Lower A.	14361	12959	1402	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Upper A.	11812	10368	1444	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Salzburg	5304	4873	431	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Styria	9601	8466	1135	3060	2727	333	31.9	32.2	29.3	4.6	4.7	4.4
Tyrol	7117	6510	607	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Vorarlberg	3163	2730	433	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Vienna	6846	5470	1376	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
total	**66031**	**58539**	**7492**	**3538**	**3159**	**379**				**5.4**	**5.4**	**5.1**

Table 116: $PM_{2.5}$ DMV 2018 interim target 2 (3-4 days exceedance p.a.) – number and percentage of affected company sites separated by province and division

8.6 $PM_{2.5}$ DMV (MAX. 35 DAYS EXCEEDANCE P.A.)

PM2.5, DMV, 63 stations										
	AQG level		interim target 4		interim target 3		interim target 2		interim target 1	
year	number	percent	number	percent	number	percent	number	percent	number	percent
2018	45	71.4%	26	41.3%	1	1.6%	0	0.0%	0	0.0%
2019	52	82.5%	5	7.9%	0	0.0%	0	0.0%	0	0.0%
2020	50	79.4%	3	4.8%	0	0.0%	0	0.0%	0	0.0%
2021	53	84.1%	4	6.3%	0	0.0%	0	0.0%	0	0.0%

Table 117: $PM_{2.5}$ DMV (exceedance on max. 35 days p.a.) – number and percentage of exceeding stations per year for different target / limit values

PM2.5, DMV, exceedance max. 35 days per year										
	AQG level		interim target 4		interim target 3		interim target 2		interim target 1	
year	km^2	percent	km^2	percent	km^2	percent	km^2	percent	km^2	percent
2018	39801.6	47.4%	12535.8	14.9%	0	0.0%	0	0.0%	0	0.0%
2019	35911.8	42.8%	223.6	0.3%	0	0.0%	0	0.0%	0	0.0%
2020	30870.8	36.8%	241.0	0.3%	0	0.0%	0	0.0%	0	0.0%
2021	32799.2	39.1%	127.6	0.2%	0	0.0%	0	0.0%	0	0.0%

Table 118: $PM_{2.5}$ DMV (exceedance on max. 35 days p.a.) – affected area in km^2 (and %) per year with respect to different target / limit values

PM2.5 DMV (exceedance max. 35 days p.a.)										
target	AQG		interim target 4		interim target 3		interim target 2		interim target 1	
	number	percent	number	percent	number	percent	number	percent	number	percent
2018	52453	79.4%	25012	37.9%	0	0.0%	0	0.0%	0	0.0%
2019	51145	77.5%	2552	3.9%	0	0.0%	0	0.0%	0	0.0%
2020	47394	71.8%	1640	2.5%	0	0.0%	0	0.0%	0	0.0%
2021	49603	75.1%	1533	2.3%	0	0.0%	0	0.0%	0	0.0%

Table 119: $PM_{2.5}$ DMV (exceedance on max. 35 days p.a.) – number and percent of affected company sites per year with respect to different target / limit values.

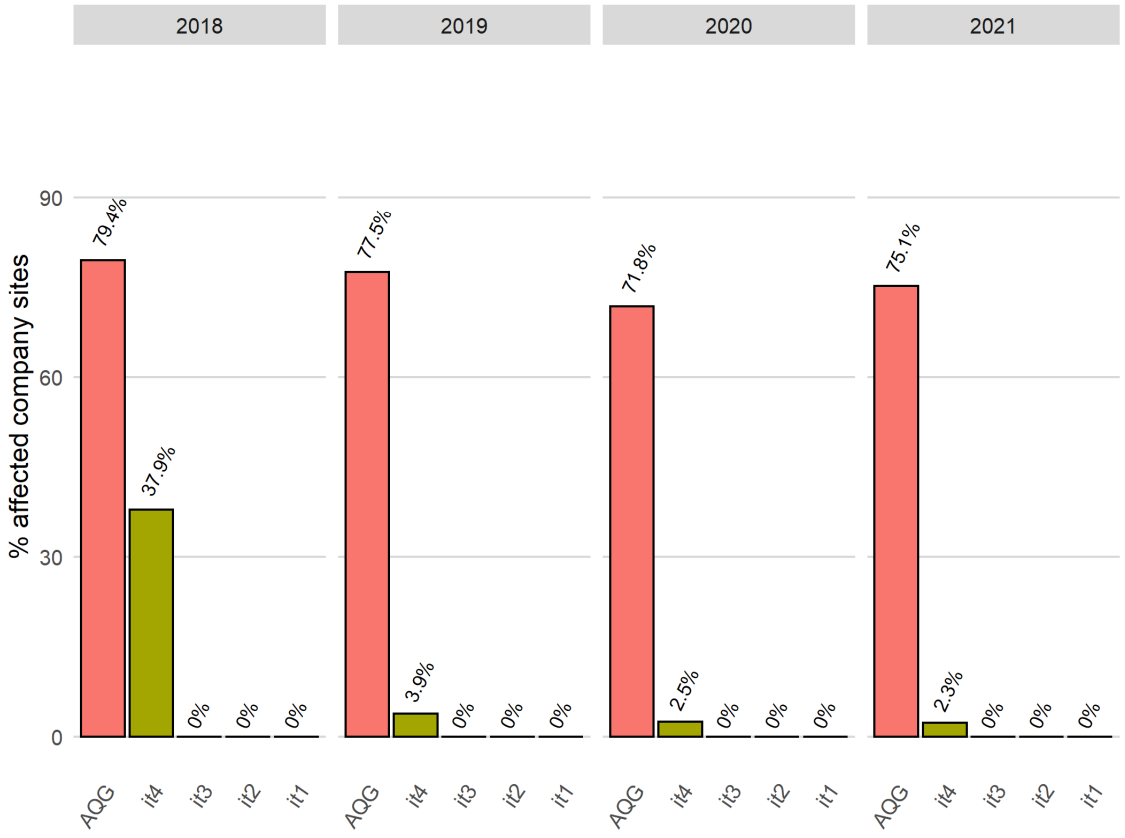

Figure 139: $PM_{2.5}$ DMV (max. 35 exceedance days p.a.) - percent affected manufacturing company sites per year with respect to different target and limit values

8.6.1 AQG LEVEL

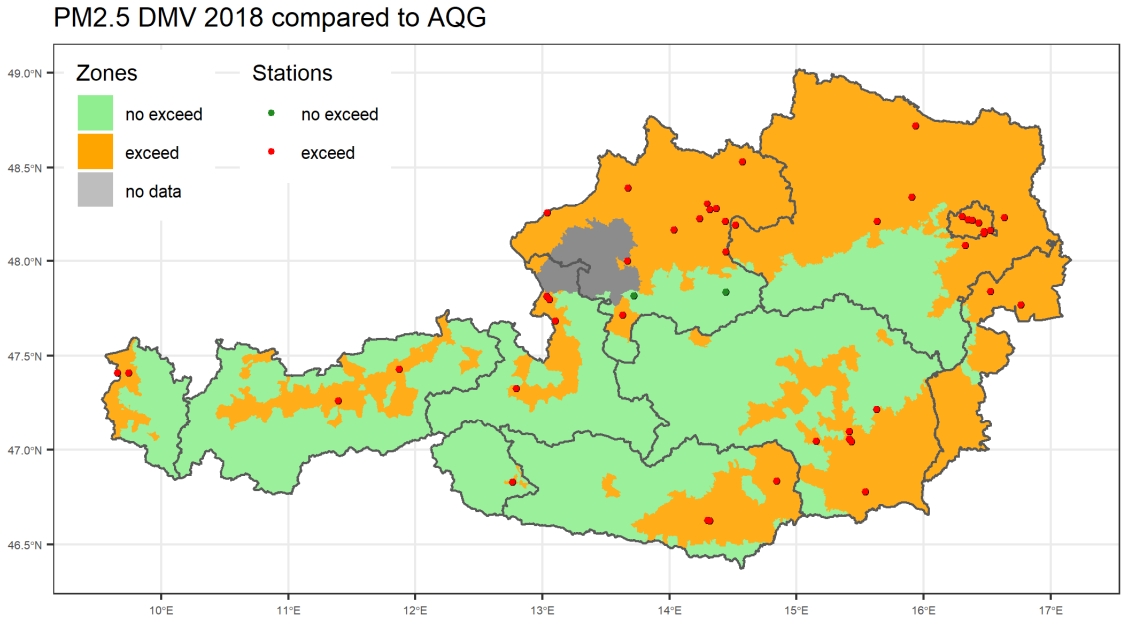

Figure 140: $PM_{2.5}$ DMV 2018 AQG level (max. 35 days exceedance p.a.) – exceedance stations and areas with respect to AQG level of 15 µg/m³ (45 stations of 63 (71.4%), affected area: 47.4%).

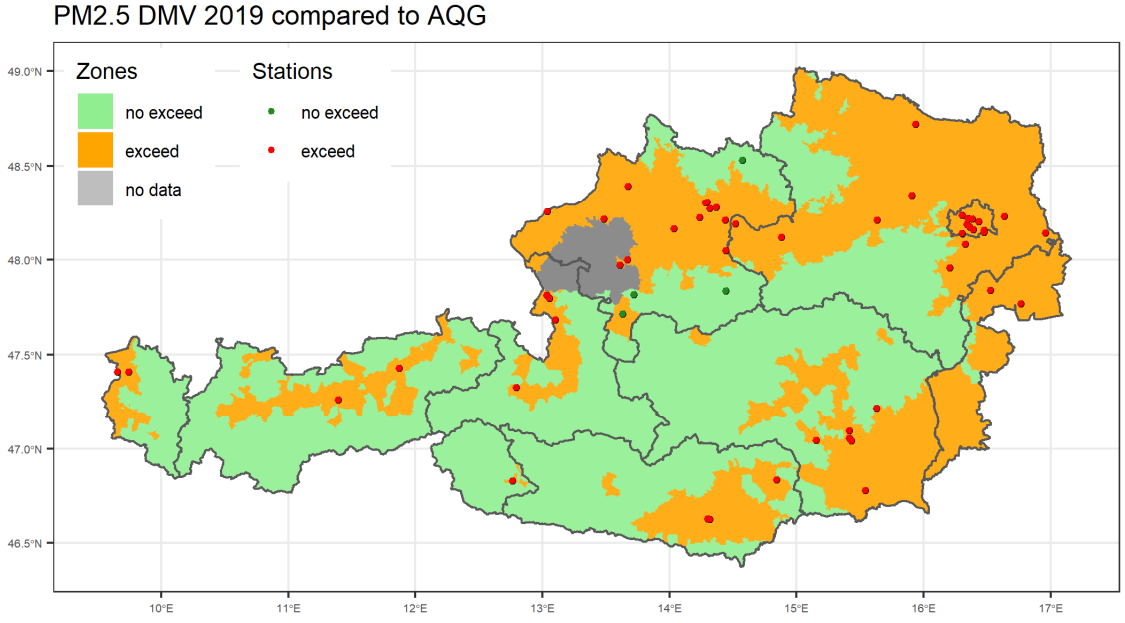

Figure 141: $PM_{2.5}$ DMV 2019 AQG level (max. 35 days exceedance p.a.) – exceedance stations and areas with respect to AQG level of 15 µg/m³ (52 stations of 63 (82.5%), affected area: 42.8%).

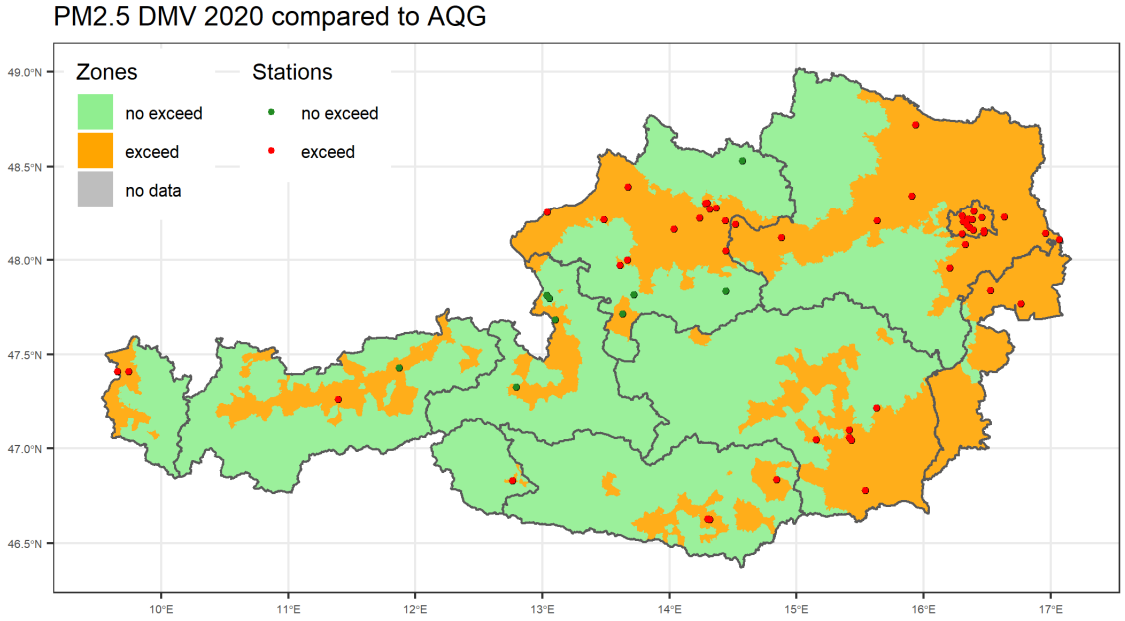

Figure 142: $PM_{2.5}$ DMV 2020 AQG level (max. 35 days exceedance p.a.) – exceedance stations and areas with respect to AQG level of 15 µg/m³ (53 stations of 63 (84.1%), affected area: 36.8%).

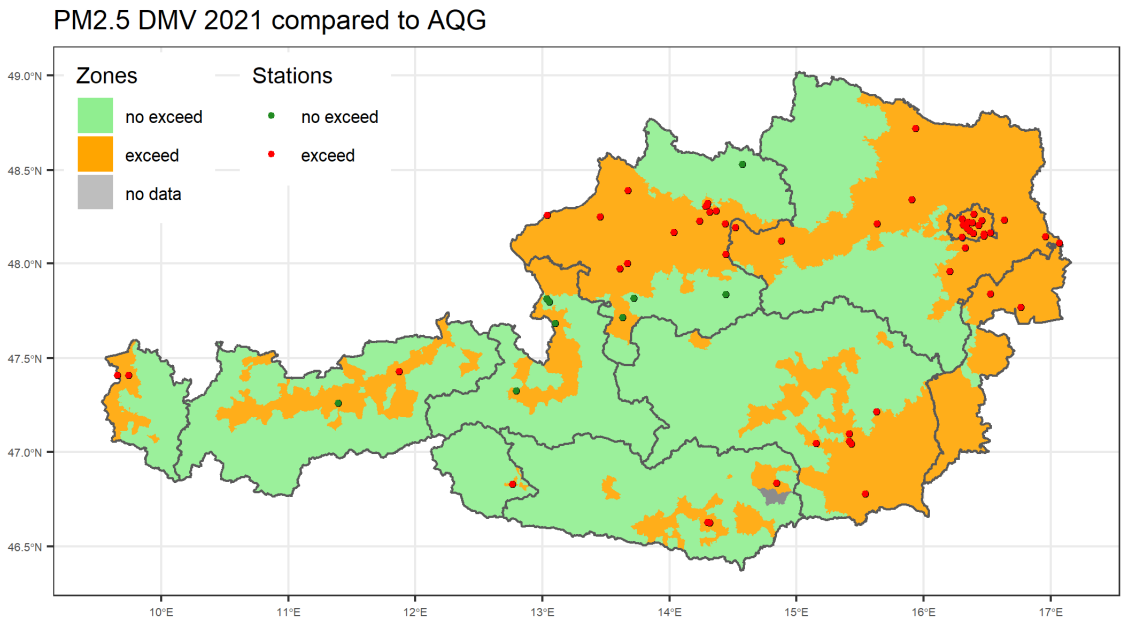

Figure 143: $PM_{2.5}$ DMV 2021 AQG level (max. 35 days exceedance p.a.) – exceedance stations and areas with respect to AQG level of 15 µg/m³ (50 stations of 63 (79.4%), affected area: 39.1%).

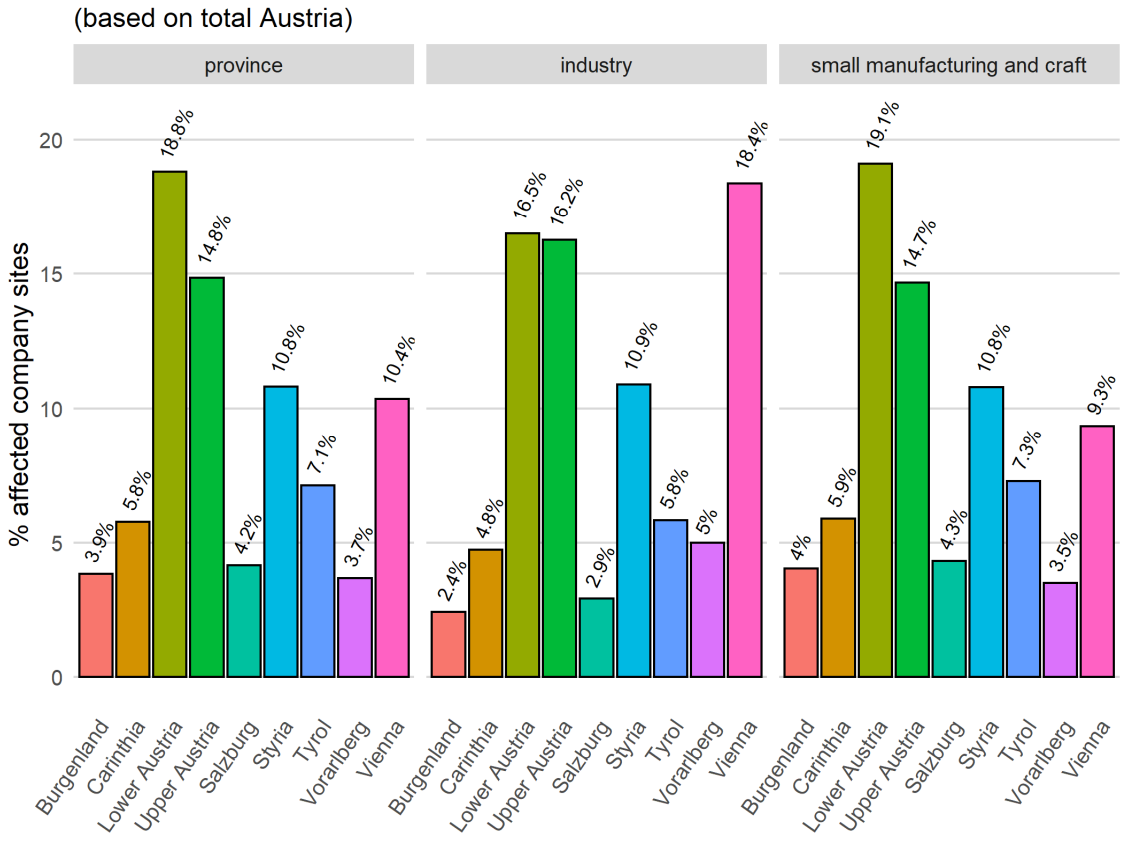

Figure 144: $PM_{2.5}$ DMV 2018 AQG level (max. 35 days exceedance p.a.) – percentage of affected company sites separated by province and division

PM2.5 DMV 2018 AQG level												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	2550	2367	183	95.1	94.9	97.9	3.9	4.0	2.4
Carinthia	5147	4670	477	3813	3457	356	74.1	74.0	74.6	5.8	5.9	4.8
Lower A.	14361	12959	1402	12418	11183	1235	86.5	86.3	88.1	18.8	19.1	16.5
Upper A.	11812	10368	1444	9798	8581	1217	82.9	82.8	84.3	14.8	14.7	16.2
Salzburg	5304	4873	431	2753	2532	221	51.9	52.0	51.3	4.2	4.3	2.9
Styria	9601	8466	1135	7137	6321	816	74.3	74.7	71.9	10.8	10.8	10.9
Tyrol	7117	6510	607	4701	4263	438	66.1	65.5	72.2	7.1	7.3	5.8
Vorarlberg	3163	2730	433	2437	2062	375	77.0	75.5	86.6	3.7	3.5	5.0
Vienna	6846	5470	1376	6846	5470	1376	100.0	100.0	100.0	10.4	9.3	18.4
total	**66031**	**58539**	**7492**	**52453**	**46236**	**6217**				**79.4**	**79.0**	**83.0**

Table 120: $PM_{2.5}$ DMV 2018 AQG level (max. 35 days exceedance p.a.) – number and percentage of affected company sites separated by province and division

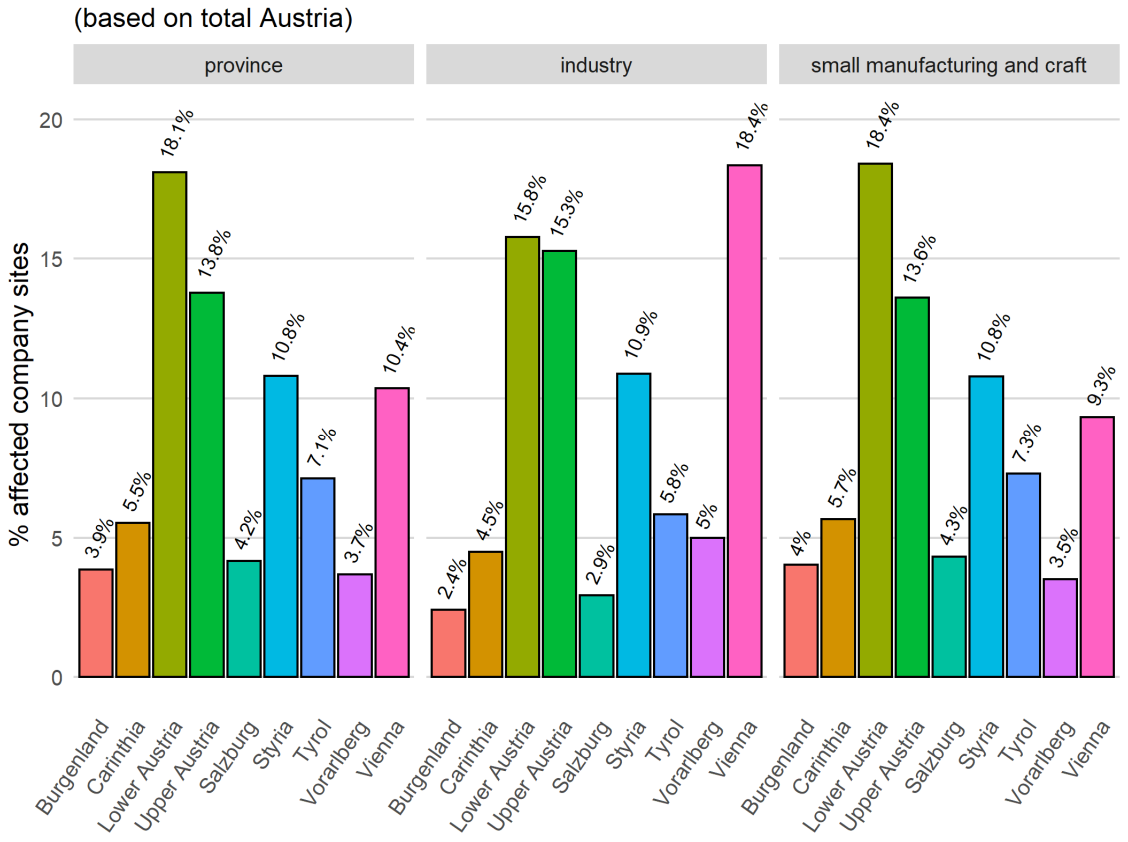

Figure 145: $PM_{2.5}$ DMV 2019 AQG level (max. 35 days exceedance p.a.) – percentage of affected company sites separated by province and division

PM2.5 DMV 2019 AQG level												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	2550	2367	183	95.1	94.9	97.9	3.9	4.0	2.4
Carinthia	5147	4670	477	3659	3322	337	71.1	71.1	70.6	5.5	5.7	4.5
Lower A.	14361	12959	1402	11963	10782	1181	83.3	83.2	84.2	18.1	18.4	15.8
Upper A.	11812	10368	1444	9099	7956	1143	77.0	76.7	79.2	13.8	13.6	15.3
Salzburg	5304	4873	431	2753	2532	221	51.9	52.0	51.3	4.2	4.3	2.9
Styria	9601	8466	1135	7137	6321	816	74.3	74.7	71.9	10.8	10.8	10.9
Tyrol	7117	6510	607	4701	4263	438	66.1	65.5	72.2	7.1	7.3	5.8
Vorarlberg	3163	2730	433	2437	2062	375	77.0	75.5	86.6	3.7	3.5	5.0
Vienna	6846	5470	1376	6846	5470	1376	100.0	100.0	100.0	10.4	9.3	18.4
total	**66031**	**58539**	**7492**	**51145**	**45075**	**6070**				**77.5**	**77.0**	**81.0**

Table 121: $PM_{2.5}$ DMV 2019 AQG level (max. 35 days exceedance p.a.) – number and percentage of affected company sites separated by province and division

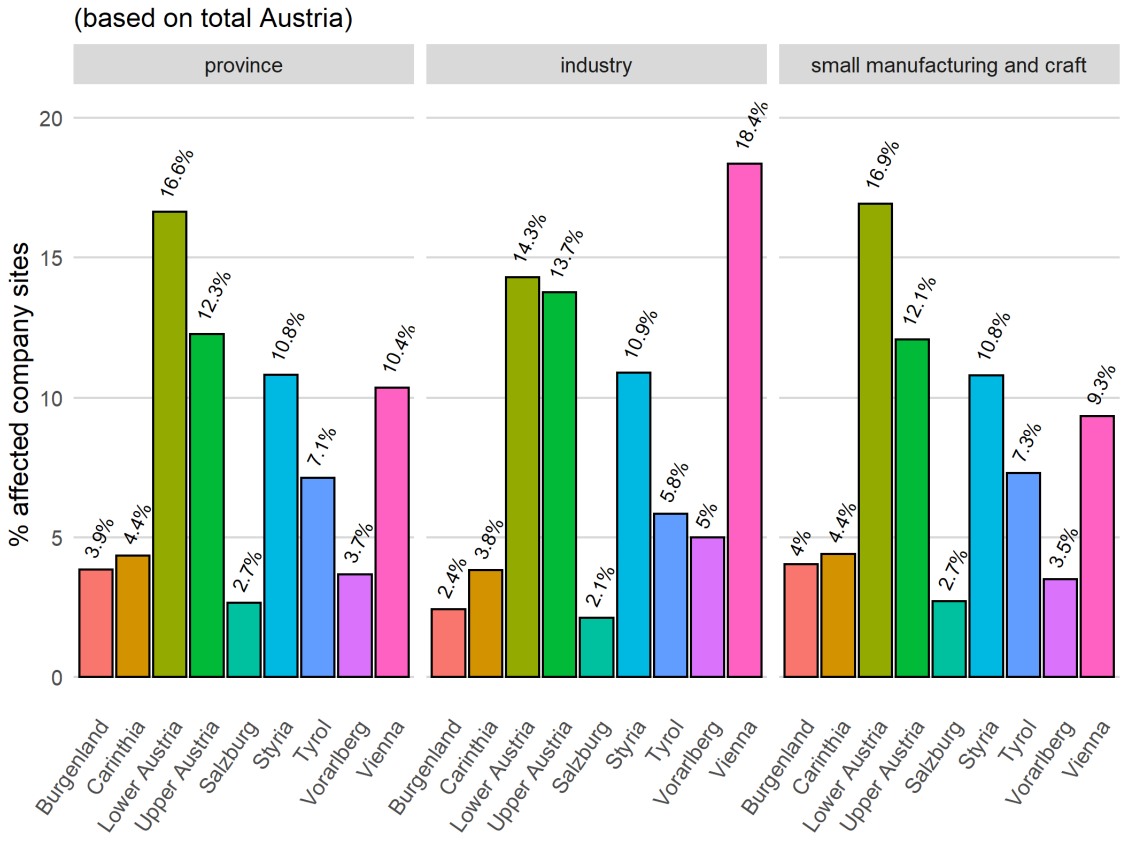

Figure 146: $PM_{2.5}$ DMV 2020 AQG level (max. 35 days exceedance p.a.) – percentage of affected company sites separated by province and division

PM2.5 DMV 2020 AQG level												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	2550	2367	183	95.1	94.9	97.9	3.9	4.0	2.4
Carinthia	5147	4670	477	2873	2586	287	55.8	55.4	60.2	4.4	4.4	3.8
Lower A.	14361	12959	1402	10989	9918	1071	76.5	76.5	76.4	16.6	16.9	14.3
Upper A.	11812	10368	1444	8097	7067	1030	68.5	68.2	71.3	12.3	12.1	13.7
Salzburg	5304	4873	431	1764	1604	160	33.3	32.9	37.1	2.7	2.7	2.1
Styria	9601	8466	1135	7137	6321	816	74.3	74.7	71.9	10.8	10.8	10.9
Tyrol	7117	6510	607	4701	4263	438	66.1	65.5	72.2	7.1	7.3	5.8
Vorarlberg	3163	2730	433	2437	2062	375	77.0	75.5	86.6	3.7	3.5	5.0
Vienna	6846	5470	1376	6846	5470	1376	100.0	100.0	100.0	10.4	9.3	18.4
total	**66031**	**58539**	**7492**	**47394**	**41658**	**5736**				**71.8**	**71.2**	**76.6**

Table 122: $PM_{2.5}$ DMV 2020 AQG level (max. 35 days exceedance p.a.) – number and percentage of affected company sites separated by province and division

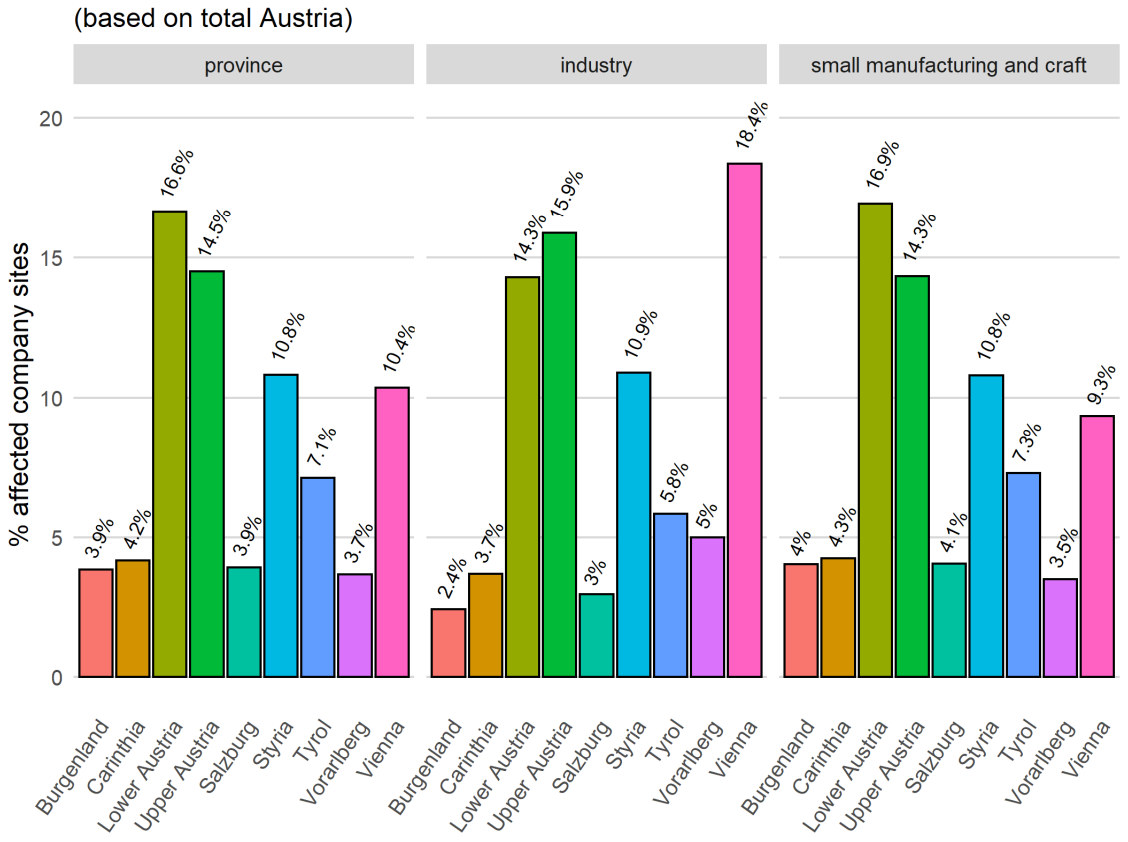

Figure 147: $PM_{2.5}$ DMV 2021 AQG level (max. 35 days exceedance p.a.) – percentage of affected company sites separated by province and division

PM2.5 DMV 2021 AQG level												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	2550	2367	183	95.1	94.9	97.9	3.9	4.0	2.4
Carinthia	5147	4670	477	2766	2489	277	53.7	53.3	58.1	4.2	4.3	3.7
Lower A.	14361	12959	1402	10989	9918	1071	76.5	76.5	76.4	16.6	16.9	14.3
Upper A.	11812	10368	1444	9575	8386	1189	81.1	80.9	82.3	14.5	14.3	15.9
Salzburg	5304	4873	431	2602	2378	224	49.1	48.8	52.0	3.9	4.1	3.0
Styria	9601	8466	1135	7137	6321	816	74.3	74.7	71.9	10.8	10.8	10.9
Tyrol	7117	6510	607	4701	4263	438	66.1	65.5	72.2	7.1	7.3	5.8
Vorarlberg	3163	2730	433	2437	2062	375	77.0	75.5	86.6	3.7	3.5	5.0
Vienna	6846	5470	1376	6846	5470	1376	100.0	100.0	100.0	10.4	9.3	18.4
total	**66031**	**58539**	**7492**	**49603**	**43654**	**5949**				**75.1**	**74.6**	**79.4**

Table 123: $PM_{2.5}$ DMV 2021 AQG level (max. 35 days exceedance p.a.) – number and percentage of affected company sites separated by province and division

8.6.2 INTERIM TARGET 4

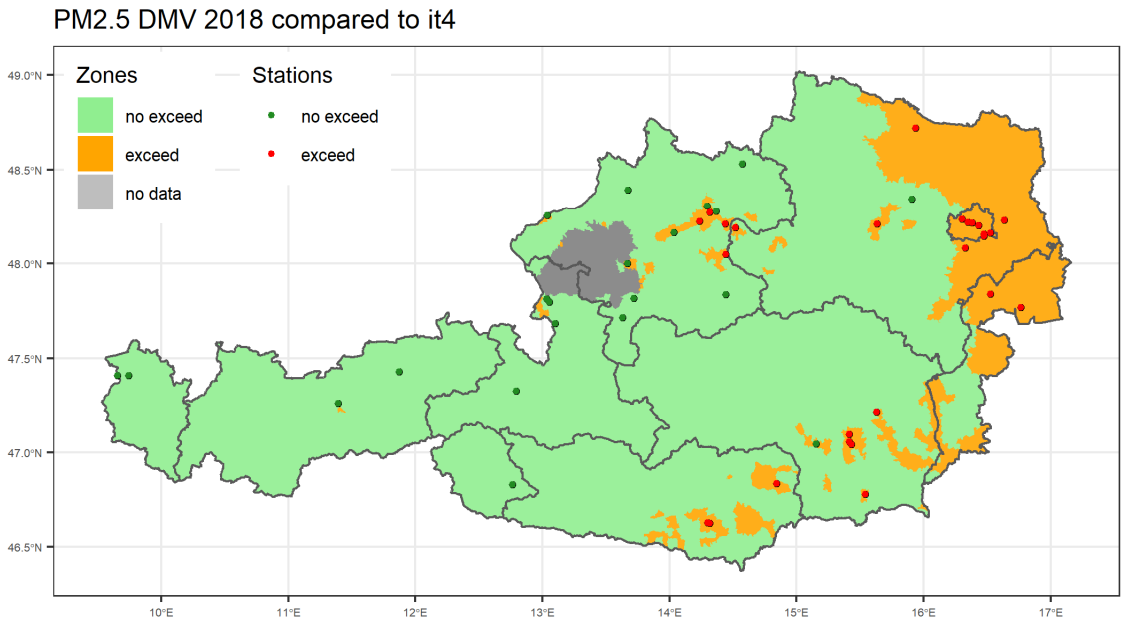

Figure 148: $PM_{2.5}$ DMV 2018 interim target 4 (max. 35 days exceedance p.a.) – exceedance stations and areas with respect to interim target 4 of 25 µg/m³ (26 stations of 63 (41.3%), affected area: 14.9%).

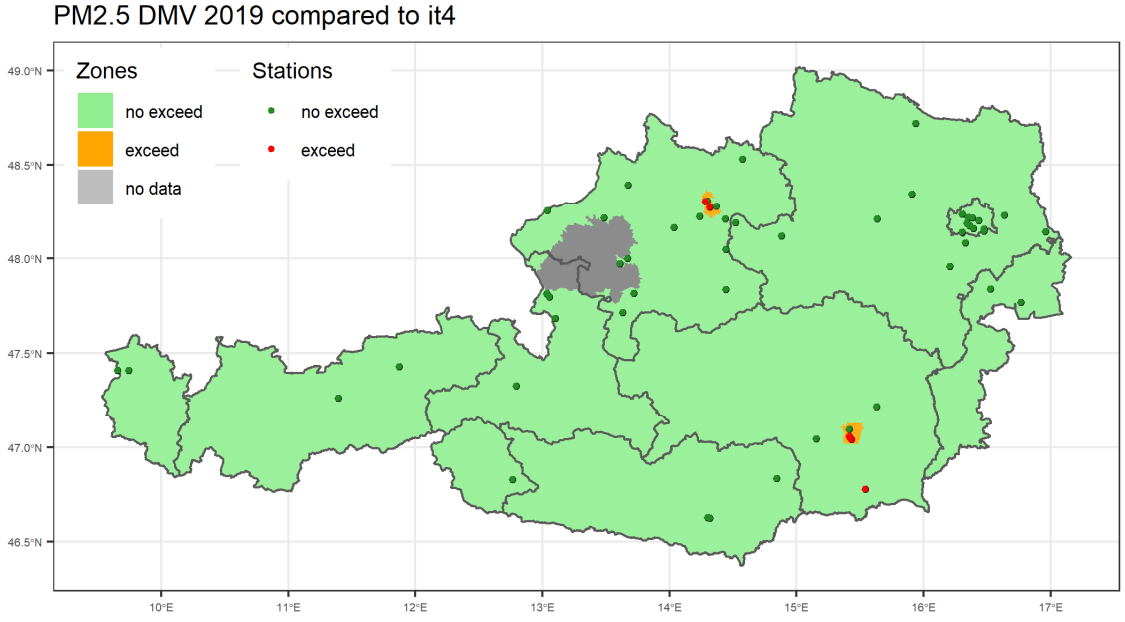

Figure 149: $PM_{2.5}$ DMV 2019 interim target 4 (max. 35 days exceedance p.a.) – exceedance stations and areas with respect to interim target 4 of 25 µg/m³ (5 stations of 63 (7.9%), affected area: 0.3%).

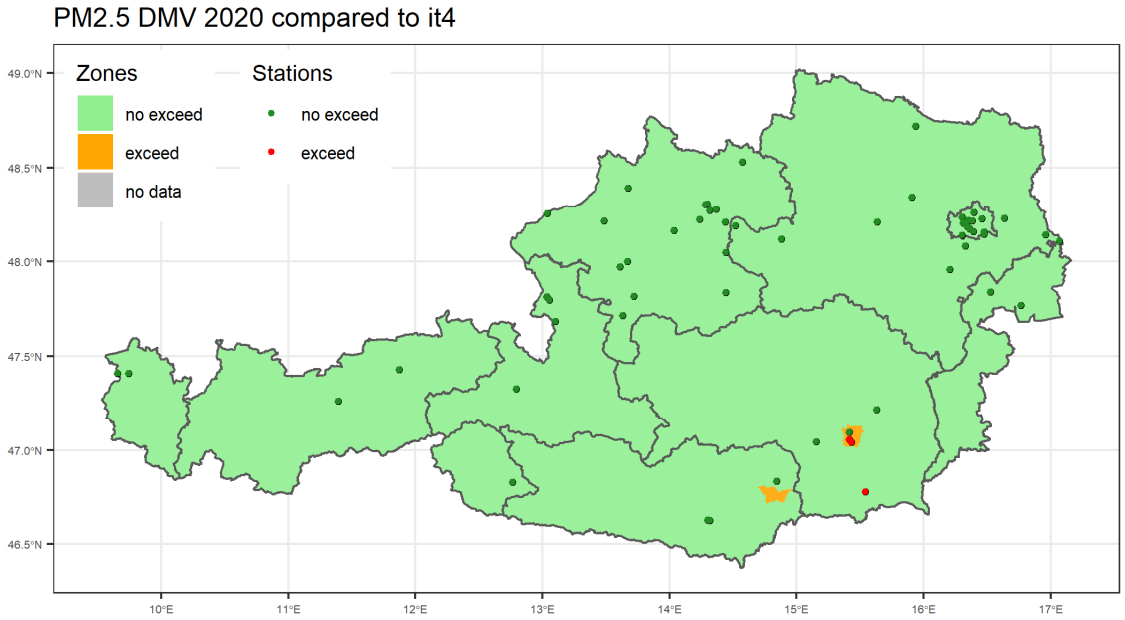

Figure 150: $PM_{2.5}$ DMV 2020 interim target 4 (max. 35 days exceedance p.a.) – exceedance stations and areas with respect to interim target 4 of 25 µg/m³ (3 stations of 63 (4.8%), affected area: 0.3%).

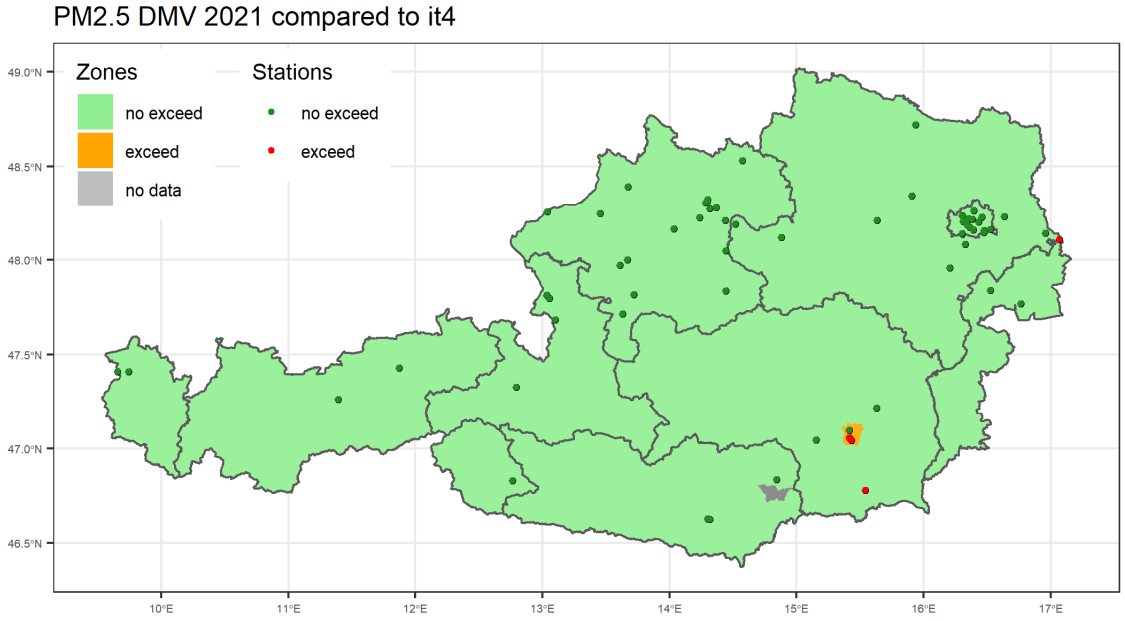

Figure 151: $PM_{2.5}$ DMV 2021 interim target 4 (max. 35 days exceedance p.a.) – exceedance stations and areas with respect to interim target 4 of 25 µg/m³ (4 stations of 63 (6.3%), affected area: 0.2%).

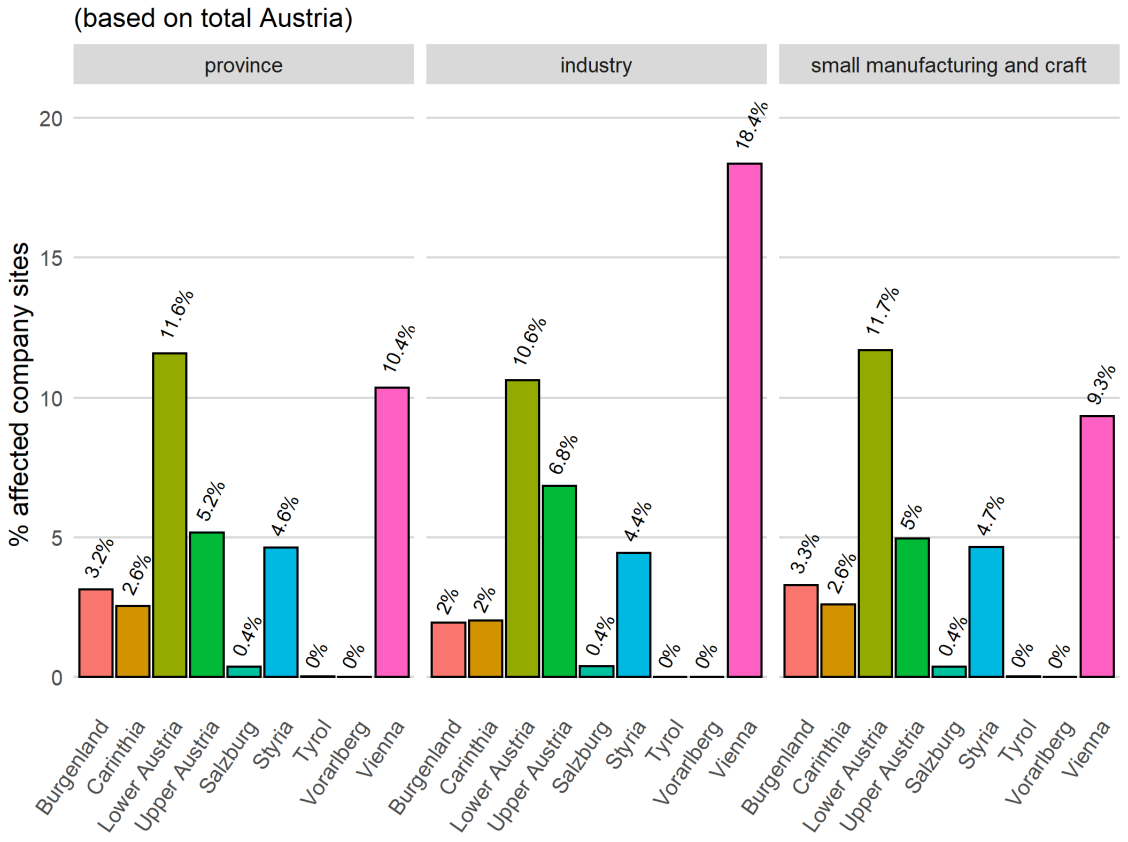

Figure 152: $PM_{2.5}$ DMV 2018 interim target 4 (max. 35 days exceedance p.a.) – percentage of affected company sites separated by province and division

federal state	PM2.5 DMV 2018 interim target 4											
	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	2087	1939	148	77.9	77.8	79.1	3.2	3.3	2.0
Carinthia	5147	4670	477	1688	1535	153	32.8	32.9	32.1	2.6	2.6	2.0
Lower A.	14361	12959	1402	7646	6850	796	53.2	52.9	56.8	11.6	11.7	10.6
Upper A.	11812	10368	1444	3421	2909	512	29.0	28.1	35.5	5.2	5.0	6.8
Salzburg	5304	4873	431	247	218	29	4.7	4.5	6.7	0.4	0.4	0.4
Styria	9601	8466	1135	3060	2727	333	31.9	32.2	29.3	4.6	4.7	4.4
Tyrol	7117	6510	607	17	16	1	0.2	0.2	0.2	0.0	0.0	0.0
Vorarlberg	3163	2730	433	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Vienna	6846	5470	1376	6846	5470	1376	100.0	100.0	100.0	10.4	9.3	18.4
total	**66031**	**58539**	**7492**	**25012**	**21664**	**3348**				**37.9**	**37.0**	**44.7**

Table 124: $PM_{2.5}$ DMV 2018 interim target 4 (max. 35 days exceedance p.a.) – number and percentage of affected company sites separated by province and division

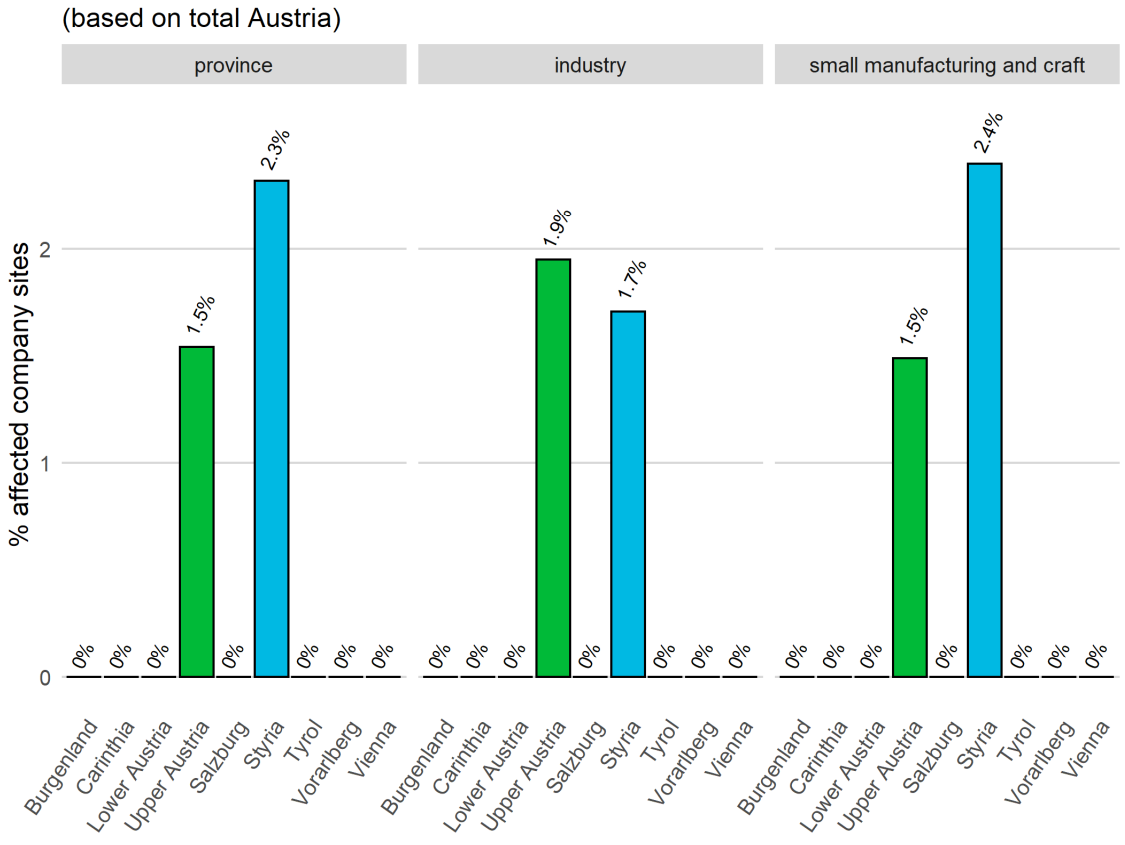

Figure 153: $PM_{2.5}$ DMV 2019 interim target 4 (max. 35 days exceedance p.a.) – percentage of affected company sites separated by province and division

PM2.5 DMV 2019 interim target 4												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Carinthia	5147	4670	477	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Lower A.	14361	12959	1402	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Upper A.	11812	10368	1444	1019	873	146	8.6	8.4	10.1	1.5	1.5	1.9
Salzburg	5304	4873	431	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Styria	9601	8466	1135	1533	1405	128	16.0	16.6	11.3	2.3	2.4	1.7
Tyrol	7117	6510	607	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Vorarlberg	3163	2730	433	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Vienna	6846	5470	1376	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
total	**66031**	**58539**	**7492**	**2552**	**2278**	**274**				**3.9**	**3.9**	**3.7**

Table 125: $PM_{2.5}$ DMV 2019 interim target 4 (max. 35 days exceedance p.a.) – number and percentage of affected company sites separated by province and division

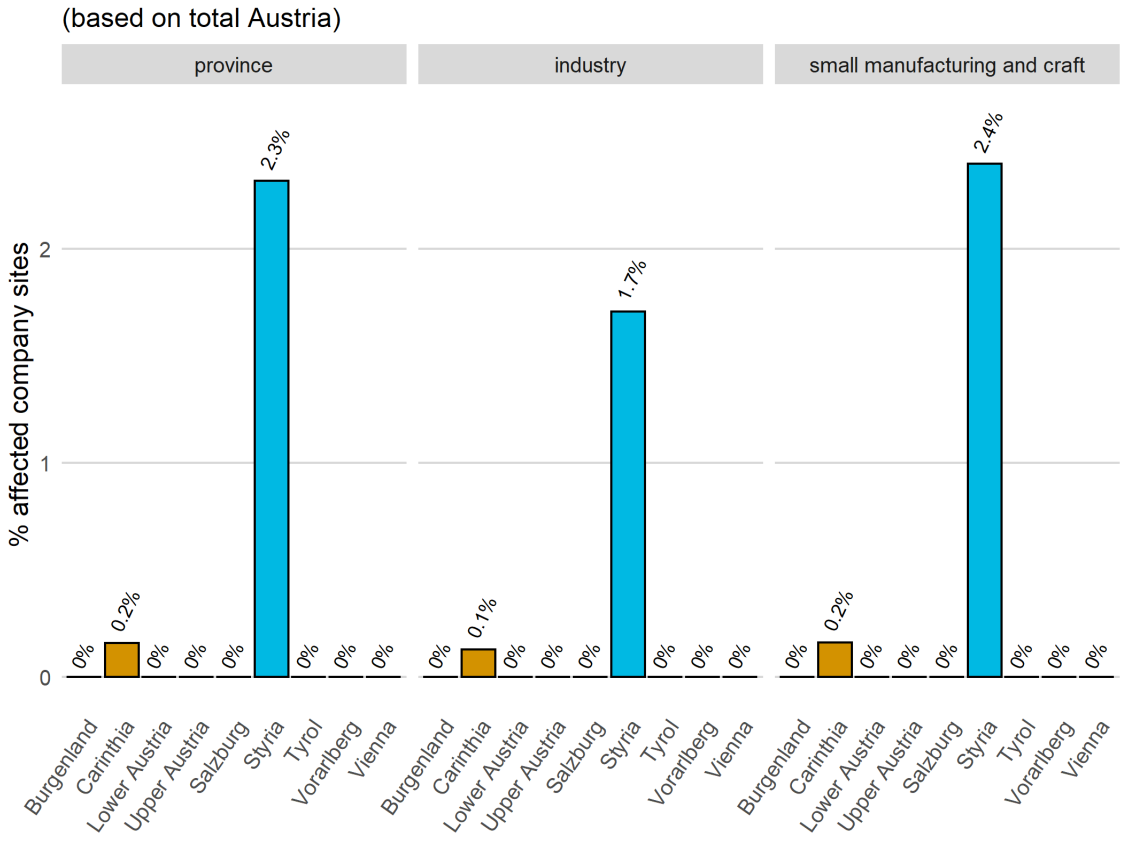

Figure 154: $PM_{2.5}$ DMV 2020 interim target 4 (max. 35 days exceedance p.a.) – percentage of affected company sites separated by province and division

PM2.5 DMV 2020 interim target 4												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Carinthia	5147	4670	477	107	97	10	2.1	2.1	2.1	0.2	0.2	0.1
Lower A.	14361	12959	1402	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Upper A.	11812	10368	1444	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Salzburg	5304	4873	431	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Styria	9601	8466	1135	1533	1405	128	16.0	16.6	11.3	2.3	2.4	1.7
Tyrol	7117	6510	607	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Vorarlberg	3163	2730	433	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Vienna	6846	5470	1376	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
total	**66031**	**58539**	**7492**	**1640**	**1502**	**138**				**2.5**	**2.6**	**1.8**

Table 126: $PM_{2.5}$ DMV 2020 interim target 4 (max. 35 days exceedance p.a.) – number and percentage of affected company sites separated by province and division

Figure 155: $PM_{2.5}$ DMV 2021 interim target 4 (max. 35 days exceedance p.a.) – percentage of affected company sites separated by province and division

PM2.5 DMV 2021 interim target 4												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Carinthia	5147	4670	477	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Lower A.	14361	12959	1402	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Upper A.	11812	10368	1444	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Salzburg	5304	4873	431	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Styria	9601	8466	1135	1533	1405	128	16.0	16.6	11.3	2.3	2.4	1.7
Tyrol	7117	6510	607	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Vorarlberg	3163	2730	433	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Vienna	6846	5470	1376	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
total	**66031**	**58539**	**7492**	**1533**	**1405**	**128**				**2.3**	**2.4**	**1.7**

Table 127: $PM_{2.5}$ DMV 2021 interim target 4 (max. 35 days exceedance p.a.) – number and percentage of affected company sites separated by province and division

8.7 NO_2 YMV

8.7.1 AQG LEVEL

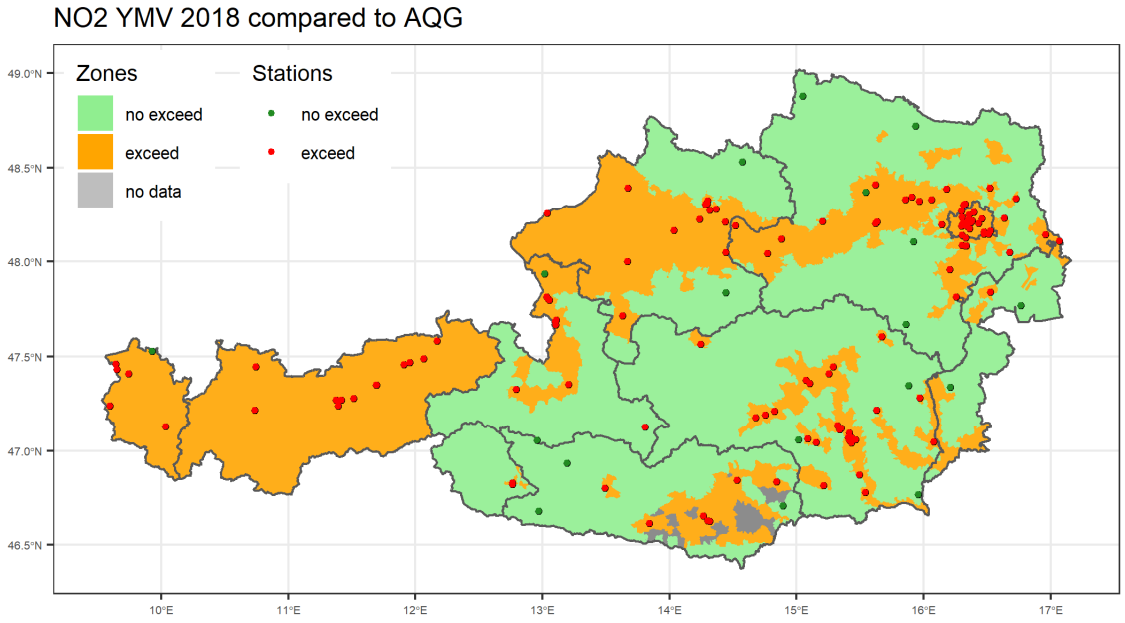

Figure 156: NO_2 YMV 2018 AQG level – exceedance stations and areas with respect to AQG level of 10 µg/m³ (122 stations of 148 (82.4%), affected area: 39.9%).

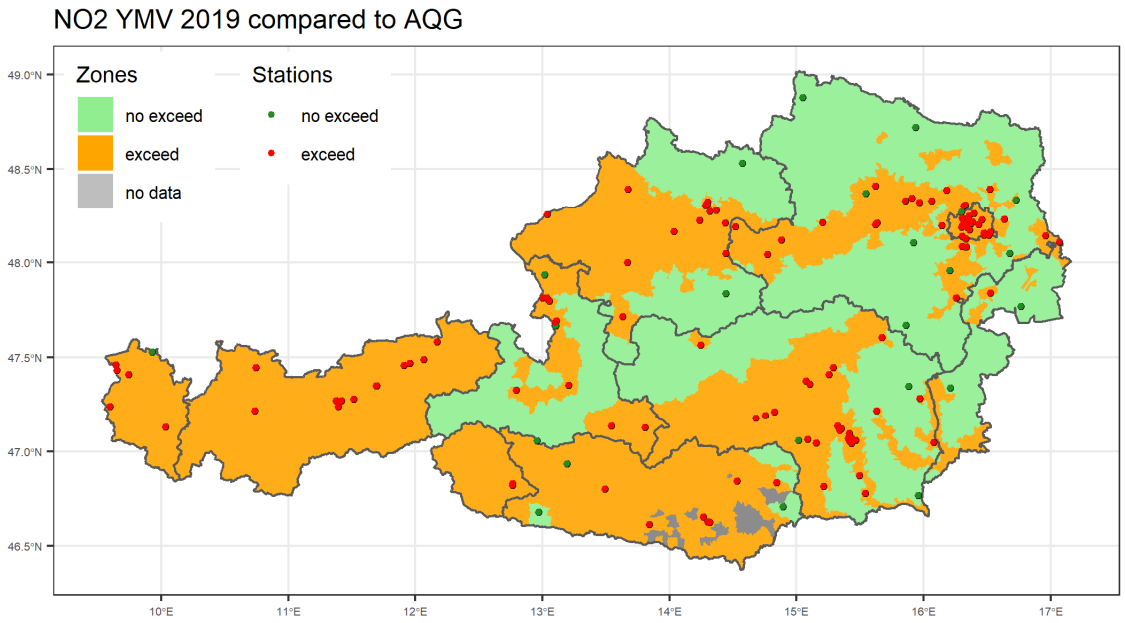

Figure 157: NO_2 YMV 2019 AQG level – exceedance stations and areas with respect to AQG level of 10 µg/m³ (119 stations of 148 (80.4%), affected area: 56.7%).

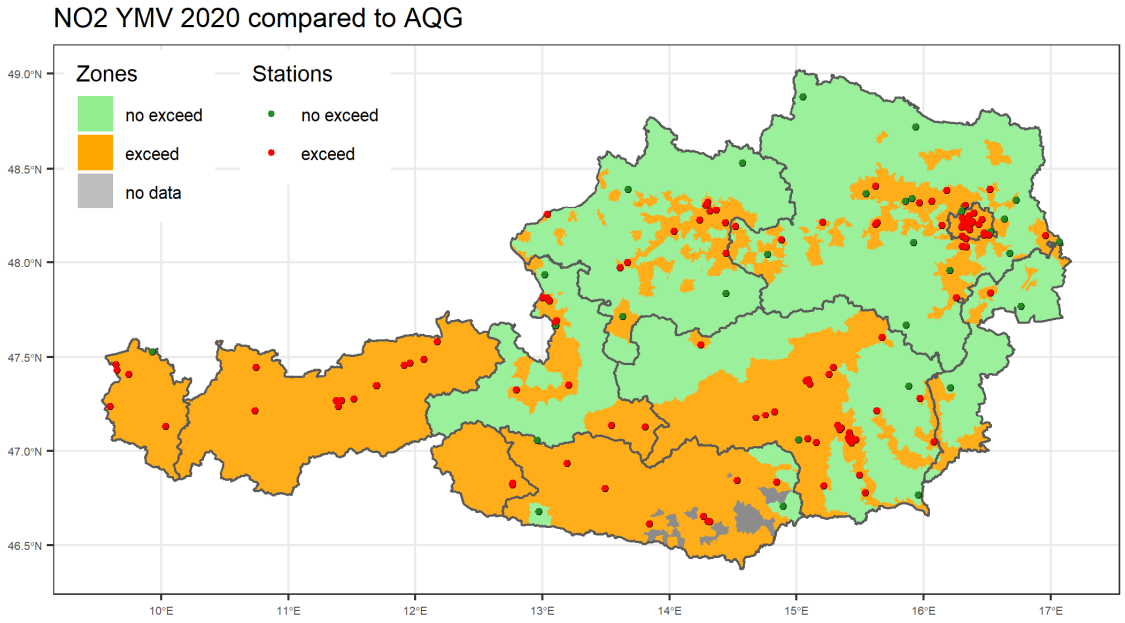

Figure 158: NO_2 YMV 2020 AQG level – exceedance stations and areas with respect to AQG level of 10 µg/m³ (113 stations of 148 (76.4%), affected area: 49.4%).

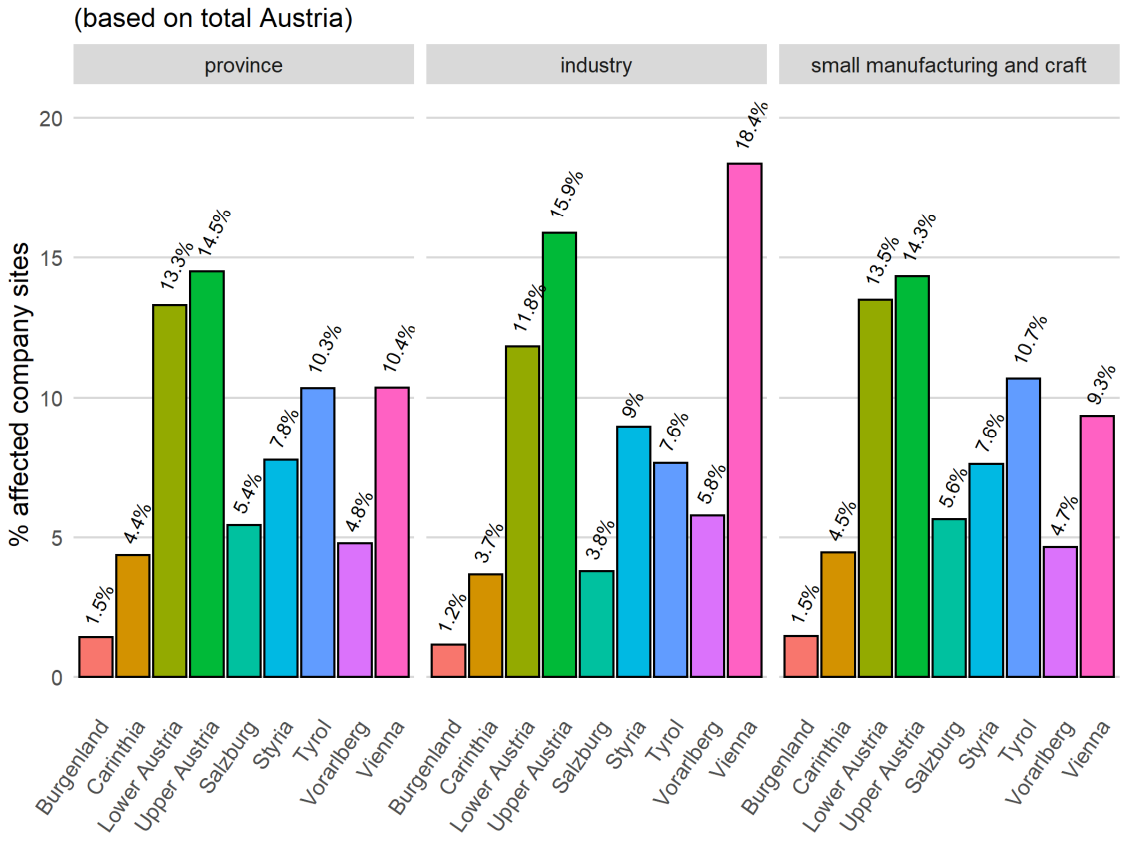

Figure 159: NO_2 YMV 2018 AQG level – percentage of affected company sites separated by province and division

NO2 YMV 2018 AQG level												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	963	874	89	35.9	35.1	47.6	1.5	1.5	1.2
Carinthia	5147	4670	477	2891	2615	276	56.2	56.0	57.9	4.4	4.5	3.7
Lower A.	14361	12959	1402	8784	7898	886	61.2	60.9	63.2	13.3	13.5	11.8
Upper A.	11812	10368	1444	9575	8386	1189	81.1	80.9	82.3	14.5	14.3	15.9
Salzburg	5304	4873	431	3591	3306	285	67.7	67.8	66.1	5.4	5.6	3.8
Styria	9601	8466	1135	5129	4457	672	53.4	52.6	59.2	7.8	7.6	9.0
Tyrol	7117	6510	607	6832	6259	573	96.0	96.1	94.4	10.3	10.7	7.6
Vorarlberg	3163	2730	433	3163	2730	433	100.0	100.0	100.0	4.8	4.7	5.8
Vienna	6846	5470	1376	6846	5470	1376	100.0	100.0	100.0	10.4	9.3	18.4
total	**66031**	**58539**	**7492**	**47774**	**41995**	**5779**				**72.4**	**71.7**	**77.1**

Table 128: NO_2 YMV 2018 AQG level – number and percentage of affected company sites separated by province and division

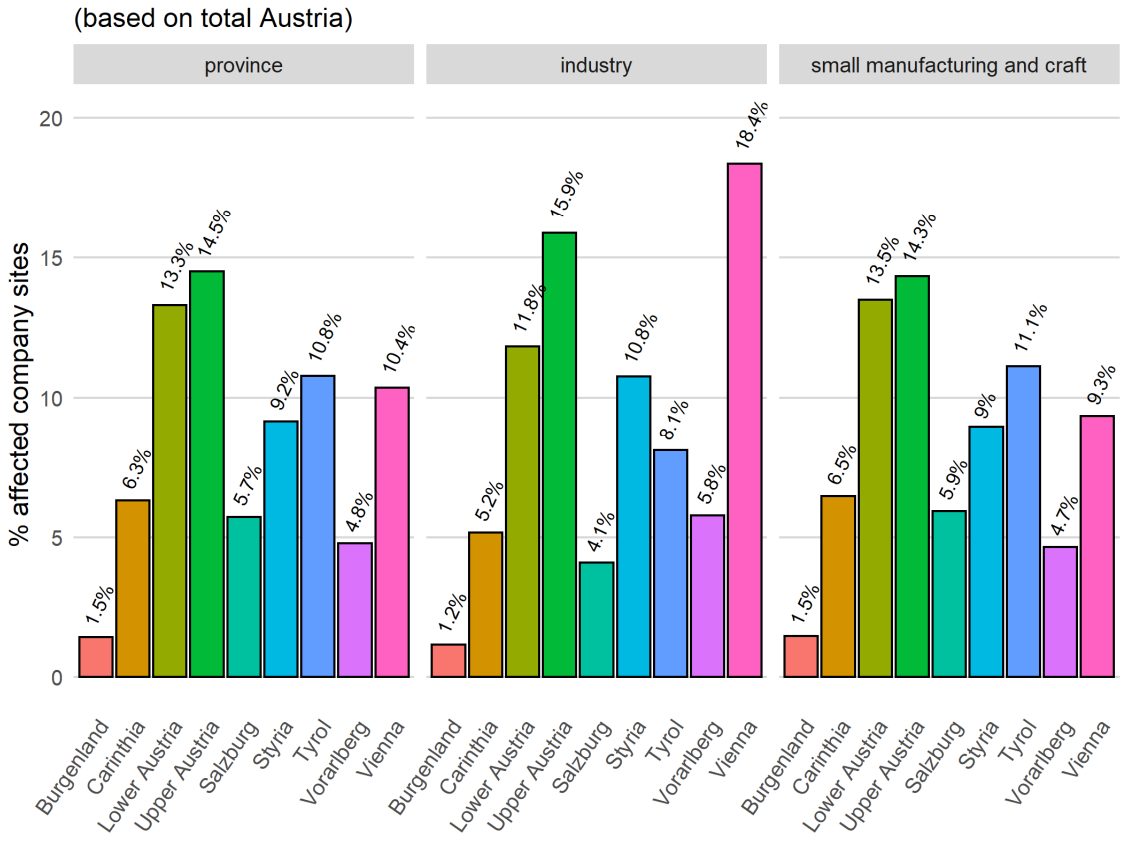

Figure 160: NO_2 YMV 2019 AQG level – percentage of affected company sites separated by province and division

federal state	NO2 YMV 2019 AQG level											
	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	963	874	89	35.9	35.1	47.6	1.5	1.5	1.2
Carinthia	5147	4670	477	4177	3789	388	81.2	81.1	81.3	6.3	6.5	5.2
Lower A.	14361	12959	1402	8784	7898	886	61.2	60.9	63.2	13.3	13.5	11.8
Upper A.	11812	10368	1444	9575	8386	1189	81.1	80.9	82.3	14.5	14.3	15.9
Salzburg	5304	4873	431	3785	3478	307	71.4	71.4	71.2	5.7	5.9	4.1
Styria	9601	8466	1135	6053	5247	806	63.0	62.0	71.0	9.2	9.0	10.8
Tyrol	7117	6510	607	7117	6510	607	100.0	100.0	100.0	10.8	11.1	8.1
Vorarlberg	3163	2730	433	3163	2730	433	100.0	100.0	100.0	4.8	4.7	5.8
Vienna	6846	5470	1376	6846	5470	1376	100.0	100.0	100.0	10.4	9.3	18.4
total	**66031**	**58539**	**7492**	**50463**	**44382**	**6081**				**76.4**	**75.8**	**81.2**

Table 129: NO_2 YMV 2019 AQG level – number and percentage of affected company sites separated by province and division

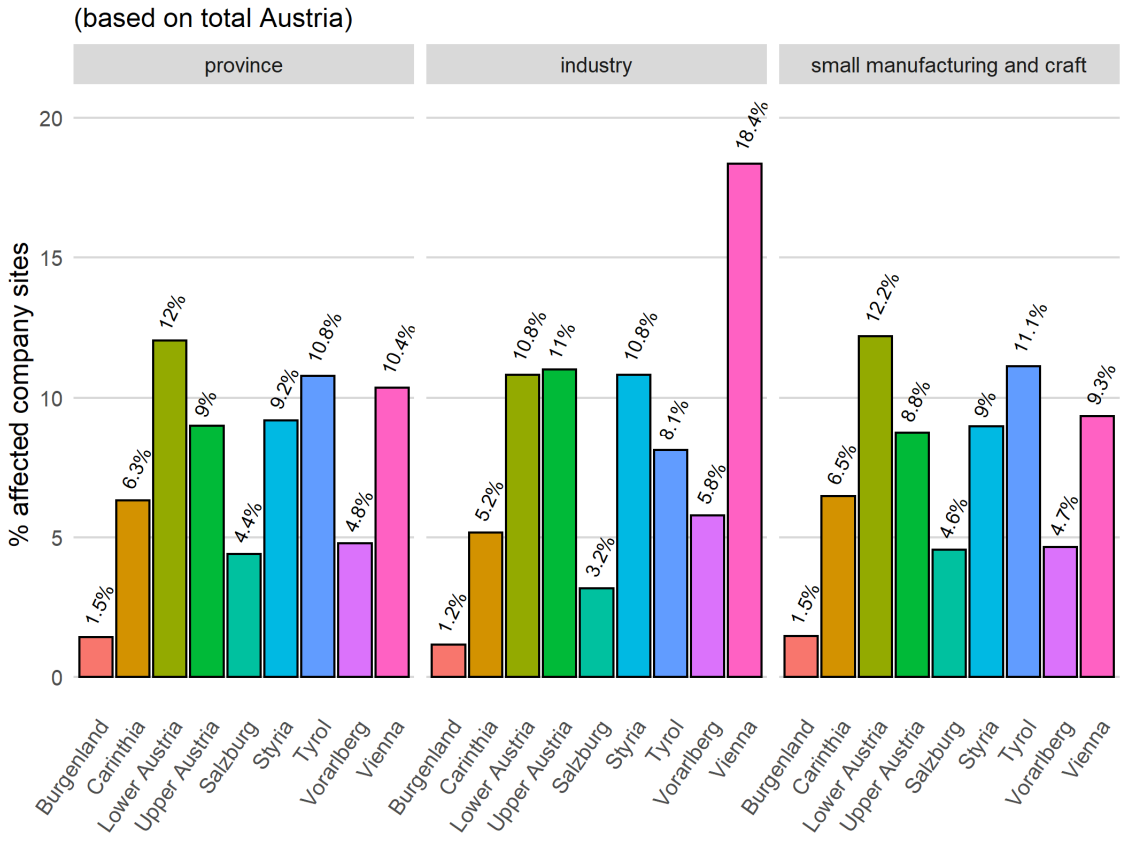

Figure 161: NO_2 YMV 2020 AQG level – percentage of affected company sites separated by province and division

NO2 YMV 2020 AQG level												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	963	874	89	35.9	35.1	47.6	1.5	1.5	1.2
Carinthia	5147	4670	477	4177	3789	388	81.2	81.1	81.3	6.3	6.5	5.2
Lower A.	14361	12959	1402	7945	7134	811	55.3	55.1	57.8	12.0	12.2	10.8
Upper A.	11812	10368	1444	5949	5124	825	50.4	49.4	57.1	9.0	8.8	11.0
Salzburg	5304	4873	431	2908	2669	239	54.8	54.8	55.5	4.4	4.6	3.2
Styria	9601	8466	1135	6072	5262	810	63.2	62.2	71.4	9.2	9.0	10.8
Tyrol	7117	6510	607	7117	6510	607	100.0	100.0	100.0	10.8	11.1	8.1
Vorarlberg	3163	2730	433	3163	2730	433	100.0	100.0	100.0	4.8	4.7	5.8
Vienna	6846	5470	1376	6846	5470	1376	100.0	100.0	100.0	10.4	9.3	18.4
total	**66031**	**58539**	**7492**	**45140**	**39562**	**5578**				**68.4**	**67.6**	**74.5**

Table 130: NO_2 YMV 2020 AQG level – number and percentage of affected company sites separated by province and division

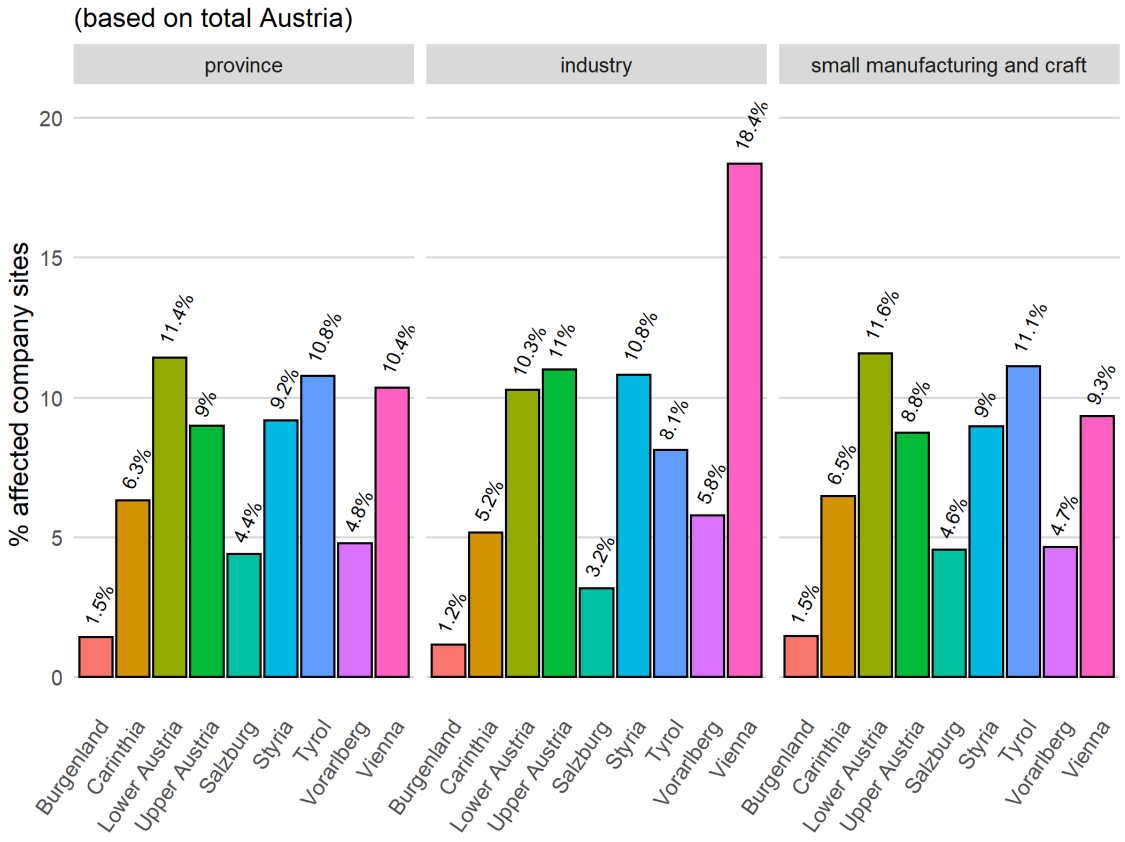

Figure 162: NO_2 YMV 2021 AQG level –percentage of affected company sites separated by province and division

NO2 YMV 2021 AQG level												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	963	874	89	35.9	35.1	47.6	1.5	1.5	1.2
Carinthia	5147	4670	477	4177	3789	388	81.2	81.1	81.3	6.3	6.5	5.2
Lower A.	14361	12959	1402	7548	6778	770	52.6	52.3	54.9	11.4	11.6	10.3
Upper A.	11812	10368	1444	5949	5124	825	50.4	49.4	57.1	9.0	8.8	11.0
Salzburg	5304	4873	431	2908	2669	239	54.8	54.8	55.5	4.4	4.6	3.2
Styria	9601	8466	1135	6072	5262	810	63.2	62.2	71.4	9.2	9.0	10.8
Tyrol	7117	6510	607	7117	6510	607	100.0	100.0	100.0	10.8	11.1	8.1
Vorarlberg	3163	2730	433	3163	2730	433	100.0	100.0	100.0	4.8	4.7	5.8
Vienna	6846	5470	1376	6846	5470	1376	100.0	100.0	100.0	10.4	9.3	18.4
total	**66031**	**58539**	**7492**	**44743**	**39206**	**5537**				**67.8**	**67.0**	**73.9**

Table 131: NO_2 YMV 2021 AQG level – number and percentage of affected company sites separated by province and division

8.7.2 INTERIM TARGET 3

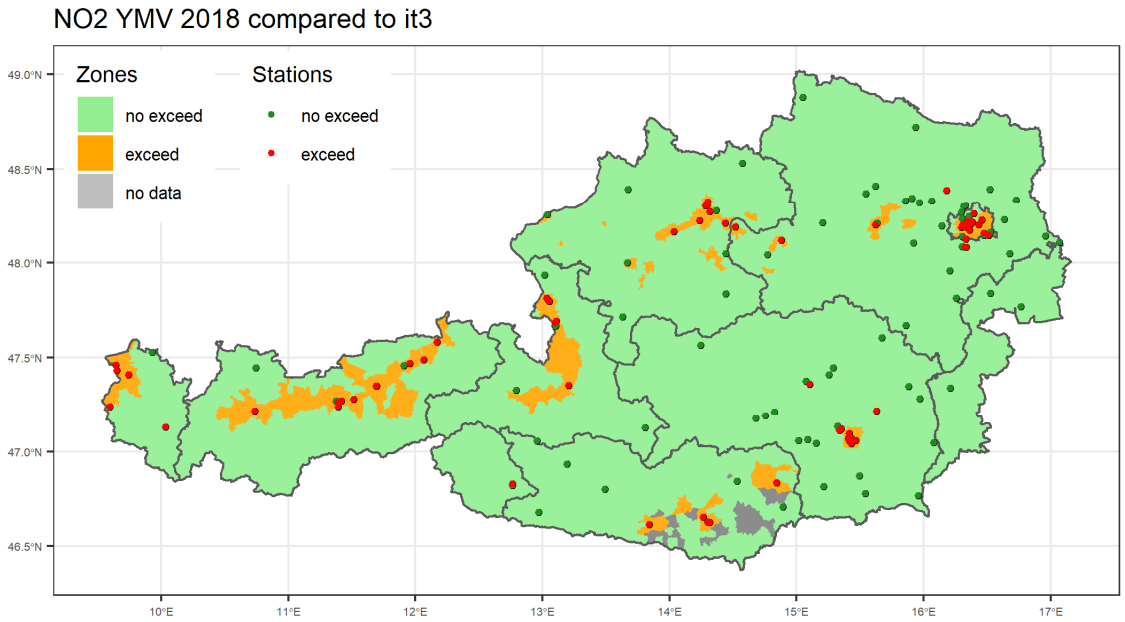

Figure 163: NO_2 YMV 2018 interim target 3 – exceedance stations and areas with respect to interim target 3 of 20 µg/m³ (63 stations of 148 (42.6%), affected area: 6.5%).

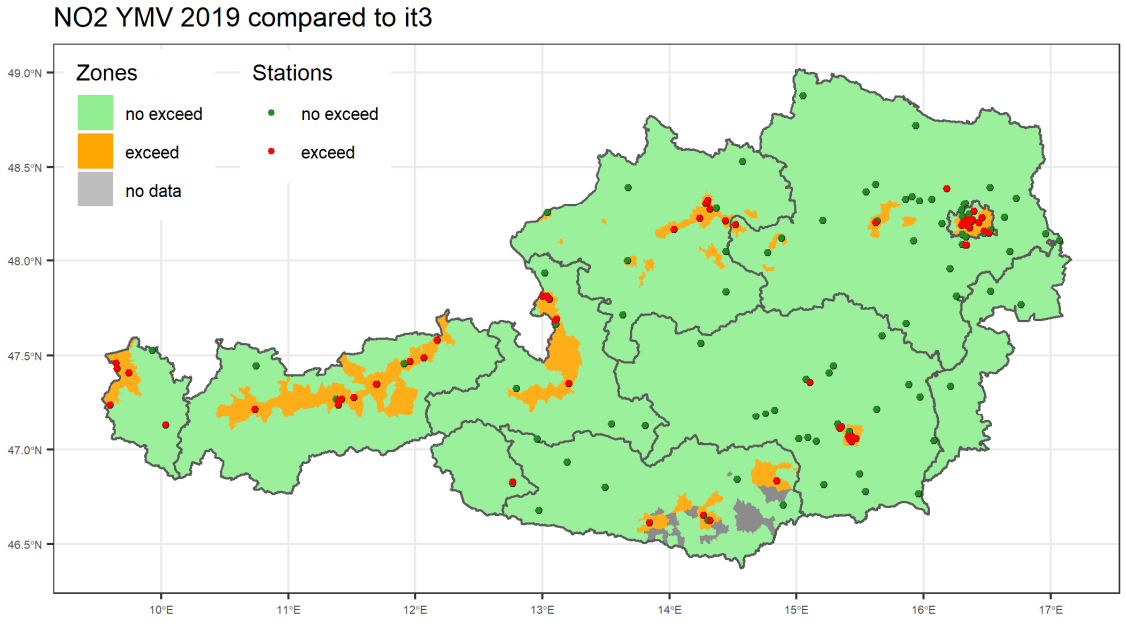

Figure 164: NO_2 YMV 2019 interim target 3 – exceedance stations and areas with respect to interim target 3 of 20 µg/m³ (60 stations of 148 (40.5%), affected area: 6.5%).

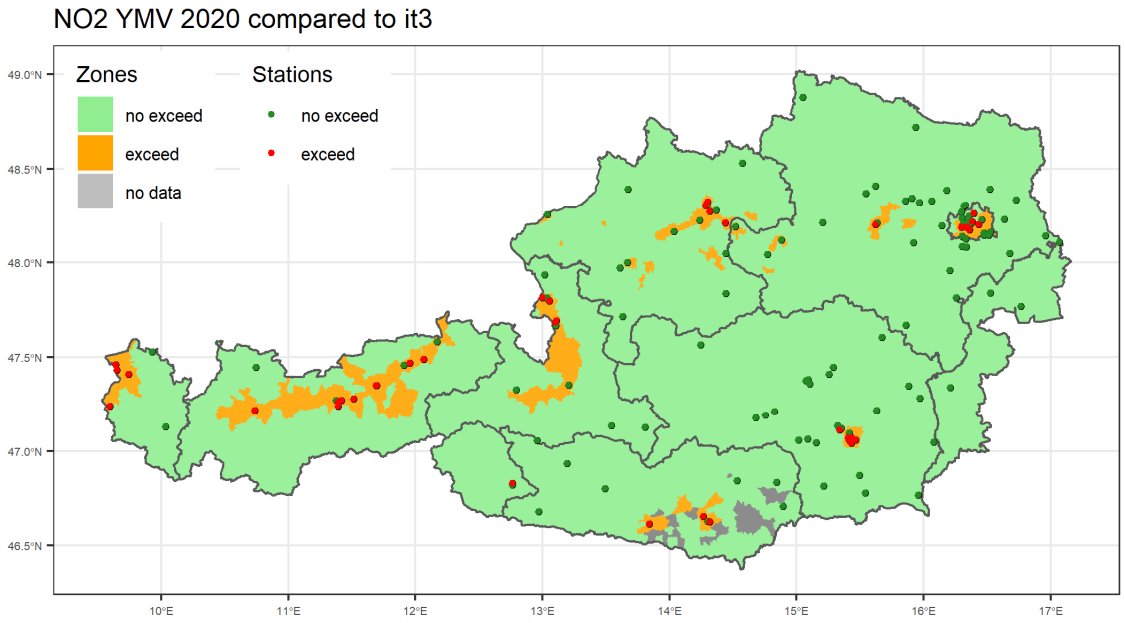

Figure 165: NO_2 YMV 2020 interim target 3 – exceedance stations and areas with respect to interim target 3 of 20 µg/m³ (38 stations of 148 (25.7%), affected area: 6.2%).

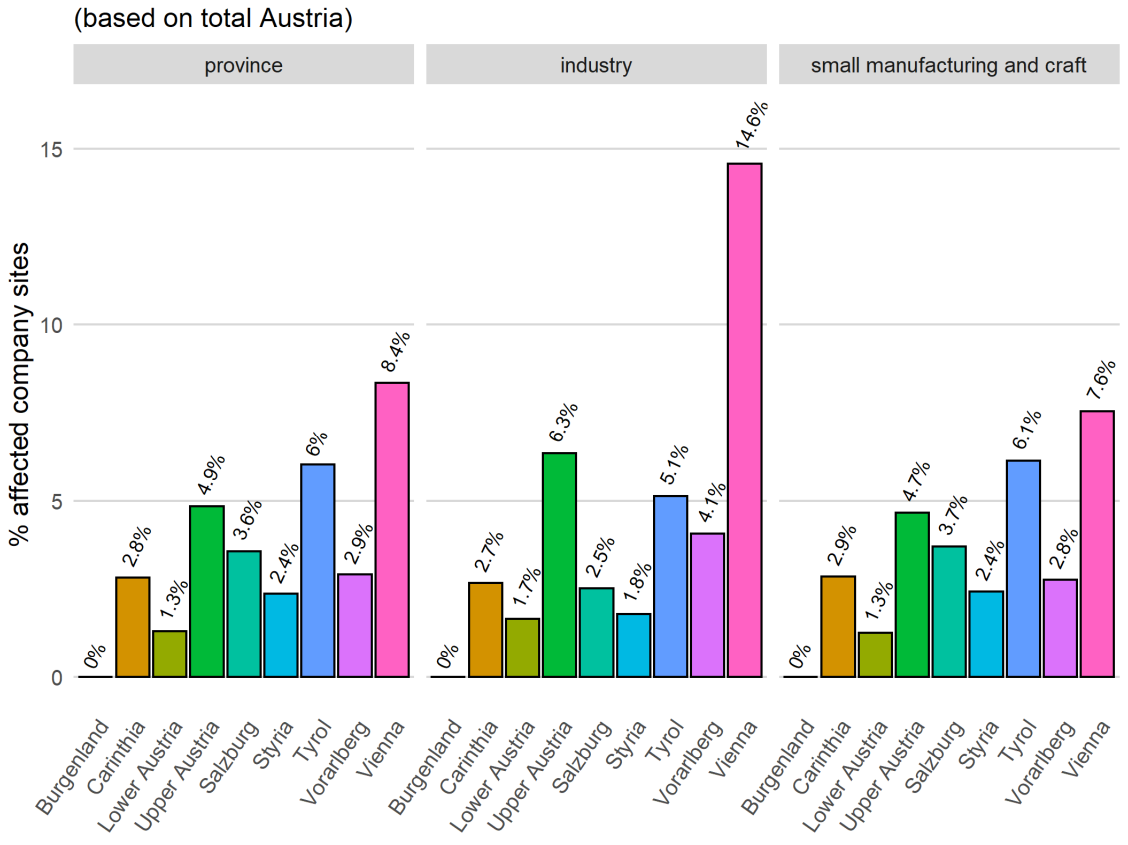

Figure 166: NO_2 YMV 2018 interim target 3 –percentage of affected company sites separated by province and division

NO2 YMV 2018 interim target 3												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Carinthia	5147	4670	477	1875	1674	201	36.4	35.8	42.1	2.8	2.9	2.7
Lower A.	14361	12959	1402	875	750	125	6.1	5.8	8.9	1.3	1.3	1.7
Upper A.	11812	10368	1444	3203	2728	475	27.1	26.3	32.9	4.9	4.7	6.3
Salzburg	5304	4873	431	2364	2174	190	44.6	44.6	44.1	3.6	3.7	2.5
Styria	9601	8466	1135	1568	1433	135	16.3	16.9	11.9	2.4	2.4	1.8
Tyrol	7117	6510	607	3977	3592	385	55.9	55.2	63.4	6.0	6.1	5.1
Vorarlberg	3163	2730	433	1927	1622	305	60.9	59.4	70.4	2.9	2.8	4.1
Vienna	6846	5470	1376	5515	4423	1092	80.6	80.9	79.4	8.4	7.6	14.6
total	**66031**	**58539**	**7492**	**21304**	**18396**	**2908**				**32.3**	**31.4**	**38.8**

Table 132: NO_2 YMV 2018 interim target 3 – number and percentage of affected company sites separated by province and division

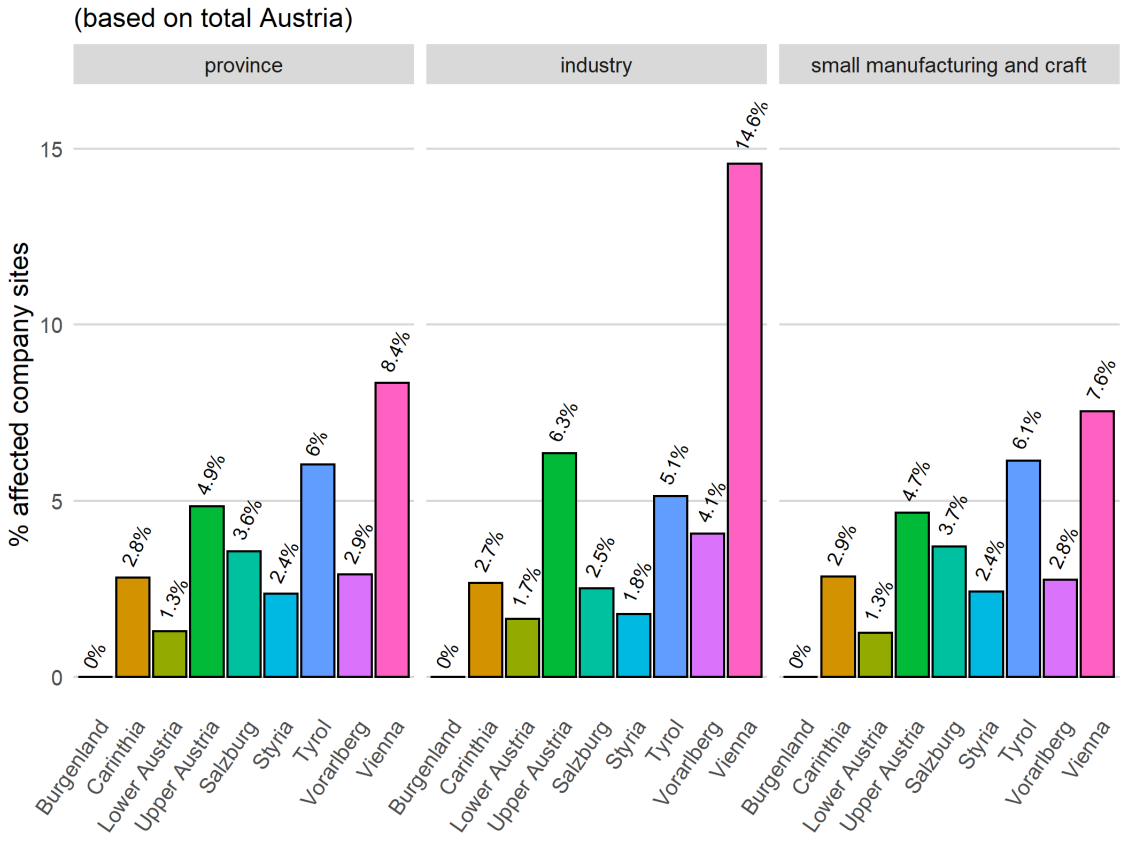

Figure 167: NO_2 YMV 2019 interim target 3 –percentage of affected company sites separated by province and division

federal state	NO2 YMV 2019 interim target 3											
	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Carinthia	5147	4670	477	1875	1674	201	36.4	35.8	42.1	2.8	2.9	2.7
Lower A.	14361	12959	1402	875	750	125	6.1	5.8	8.9	1.3	1.3	1.7
Upper A.	11812	10368	1444	3203	2728	475	27.1	26.3	32.9	4.9	4.7	6.3
Salzburg	5304	4873	431	2364	2174	190	44.6	44.6	44.1	3.6	3.7	2.5
Styria	9601	8466	1135	1568	1433	135	16.3	16.9	11.9	2.4	2.4	1.8
Tyrol	7117	6510	607	3977	3592	385	55.9	55.2	63.4	6.0	6.1	5.1
Vorarlberg	3163	2730	433	1927	1622	305	60.9	59.4	70.4	2.9	2.8	4.1
Vienna	6846	5470	1376	5515	4423	1092	80.6	80.9	79.4	8.4	7.6	14.6
total	**66031**	**58539**	**7492**	**21304**	**18396**	**2908**				**32.3**	**31.4**	**38.8**

Table 133: NO_2 YMV 2019 interim target 3 – number and percentage of affected company sites separated by province and division

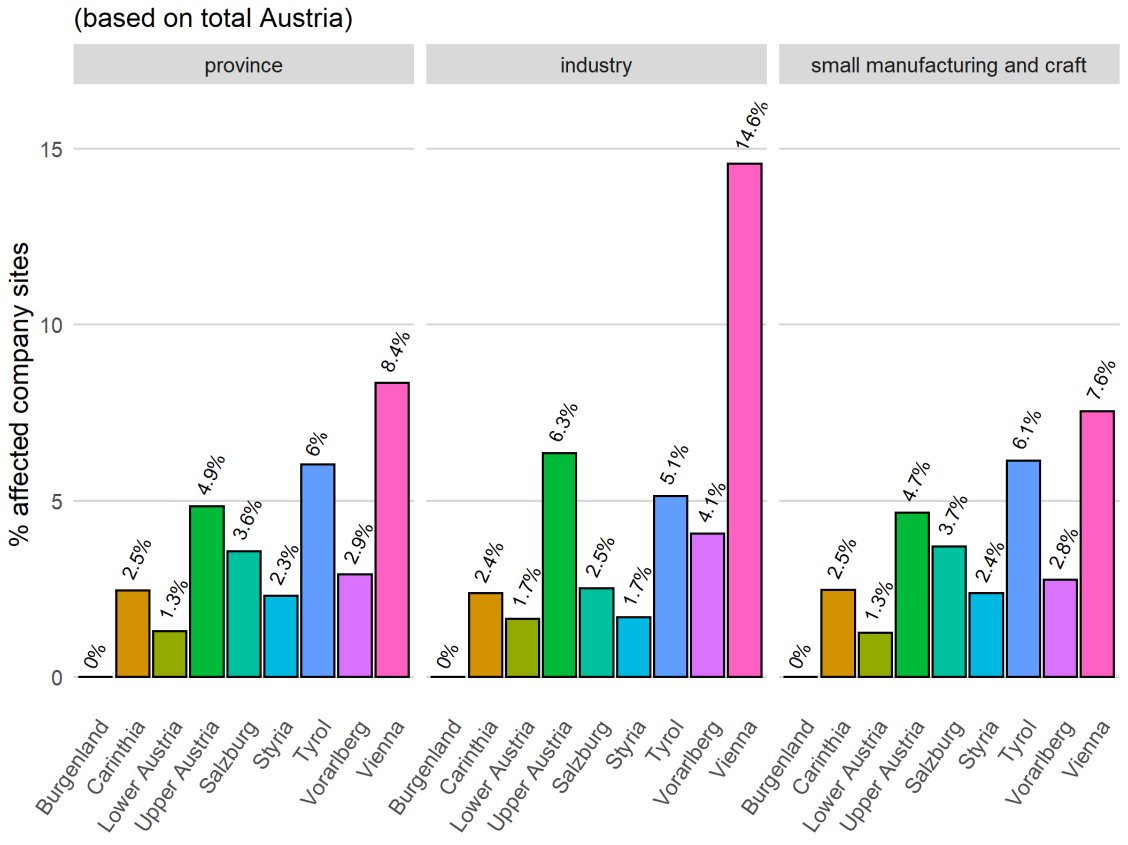

Figure 168: NO_2 YMV 2020 interim target 3 –percentage of affected company sites separated by province and division

NO2 YMV 2020 interim target 3												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Carinthia	5147	4670	477	1634	1455	179	31.7	31.2	37.5	2.5	2.5	2.4
Lower A.	14361	12959	1402	875	750	125	6.1	5.8	8.9	1.3	1.3	1.7
Upper A.	11812	10368	1444	3203	2728	475	27.1	26.3	32.9	4.9	4.7	6.3
Salzburg	5304	4873	431	2364	2174	190	44.6	44.6	44.1	3.6	3.7	2.5
Styria	9601	8466	1135	1533	1405	128	16.0	16.6	11.3	2.3	2.4	1.7
Tyrol	7117	6510	607	3977	3592	385	55.9	55.2	63.4	6.0	6.1	5.1
Vorarlberg	3163	2730	433	1927	1622	305	60.9	59.4	70.4	2.9	2.8	4.1
Vienna	6846	5470	1376	5515	4423	1092	80.6	80.9	79.4	8.4	7.6	14.6
total	**66031**	**58539**	**7492**	**21028**	**18149**	**2879**				**31.8**	**31.0**	**38.4**

Table 134: NO_2 YMV 2020 interim target 3 – number and percentage of affected company sites separated by province and division

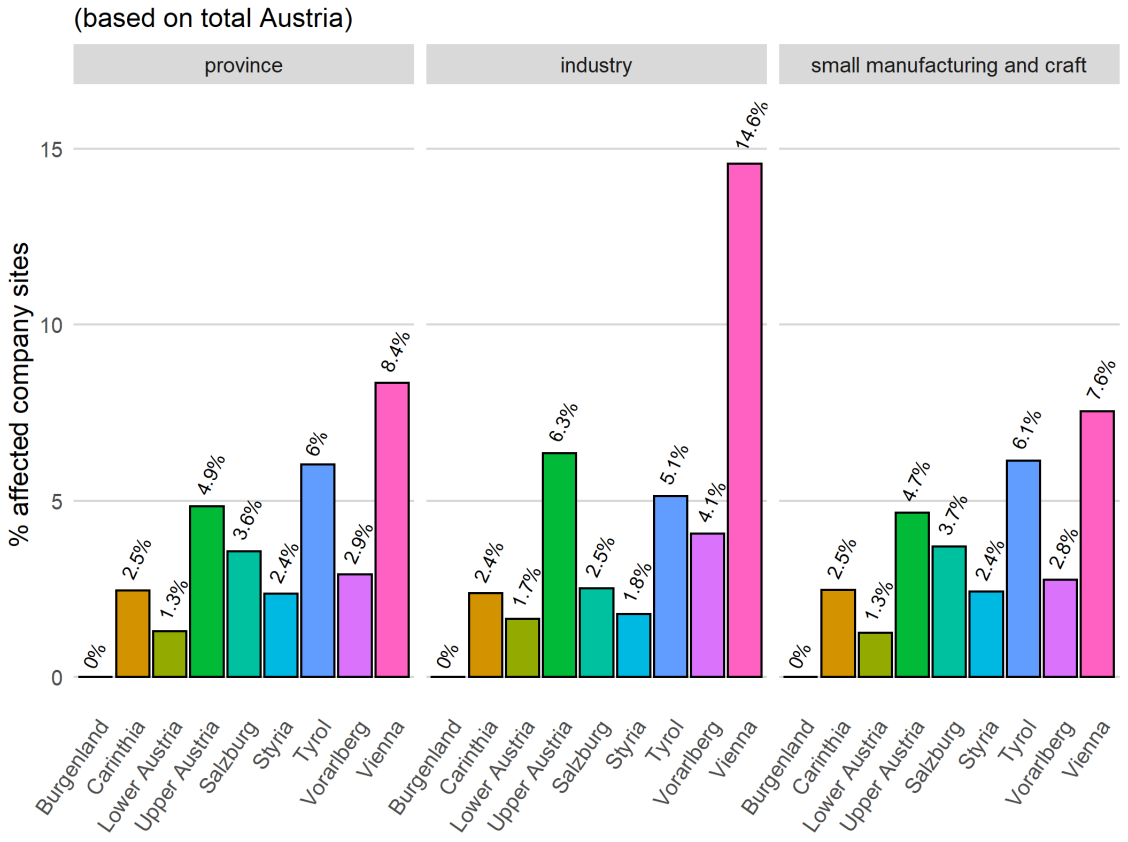

Figure 169: NO_2 YMV 2021 interim target 3 –percentage of affected company sites separated by province and division

federal state	NO2 YMV 2021 interim target 3											
	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Carinthia	5147	4670	477	1634	1455	179	31.7	31.2	37.5	2.5	2.5	2.4
Lower A.	14361	12959	1402	875	750	125	6.1	5.8	8.9	1.3	1.3	1.7
Upper A.	11812	10368	1444	3203	2728	475	27.1	26.3	32.9	4.9	4.7	6.3
Salzburg	5304	4873	431	2364	2174	190	44.6	44.6	44.1	3.6	3.7	2.5
Styria	9601	8466	1135	1568	1433	135	16.3	16.9	11.9	2.4	2.4	1.8
Tyrol	7117	6510	607	3977	3592	385	55.9	55.2	63.4	6.0	6.1	5.1
Vorarlberg	3163	2730	433	1927	1622	305	60.9	59.4	70.4	2.9	2.8	4.1
Vienna	6846	5470	1376	5515	4423	1092	80.6	80.9	79.4	8.4	7.6	14.6
total	**66031**	**58539**	**7492**	**21063**	**18177**	**2886**				**31.9**	**31.1**	**38.5**

Table 135: NO_2 YMV 2021 interim target 3 – number and percentage of affected company sites separated by province and division

8.7.3 INTERIM TARGET 2

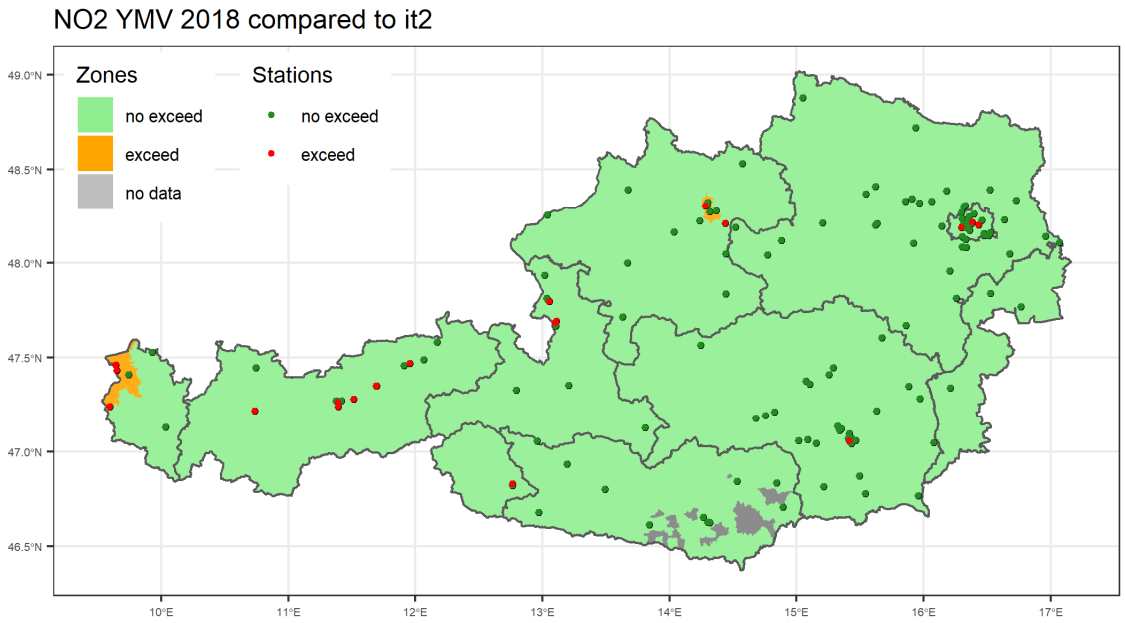

Figure 170: NO_2 YMV 2018 interim target 2 – exceedance stations and areas with respect to interim target 2 of 30 µg/m³ (20 stations of 148 (13.5%), affected area: 0.6%).

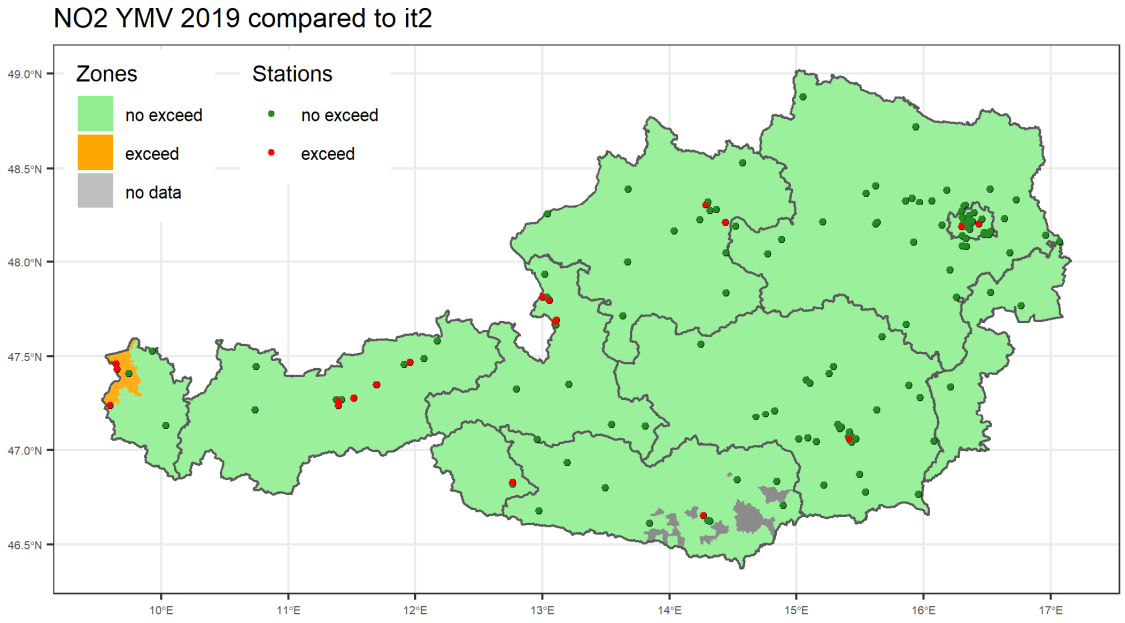

Figure 171: NO_2 YMV 2019 interim target 2 – exceedance stations and areas with respect to interim target 2 of 30 µg/m³ (20 stations of 148 (13.5%), affected area: 0.5%).

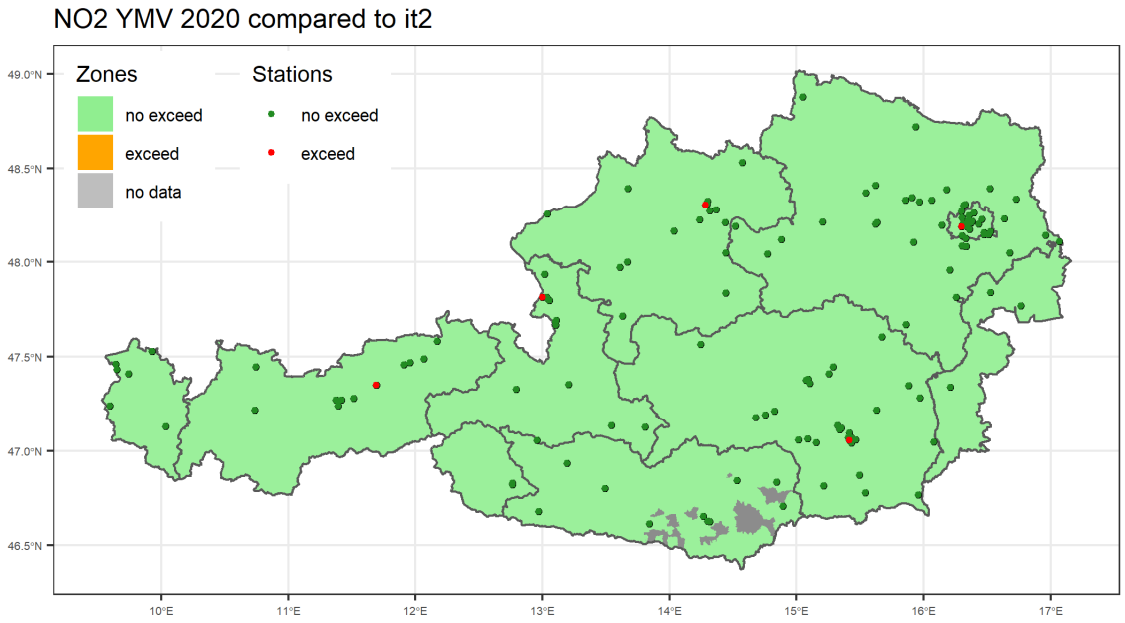

Figure 172: NO_2 YMV 2020 interim target 2 – exceedance stations and areas with respect to interim target 2 of 30 µg/m³ (5 stations of 148 (3.4%), affected area: 0.0%).

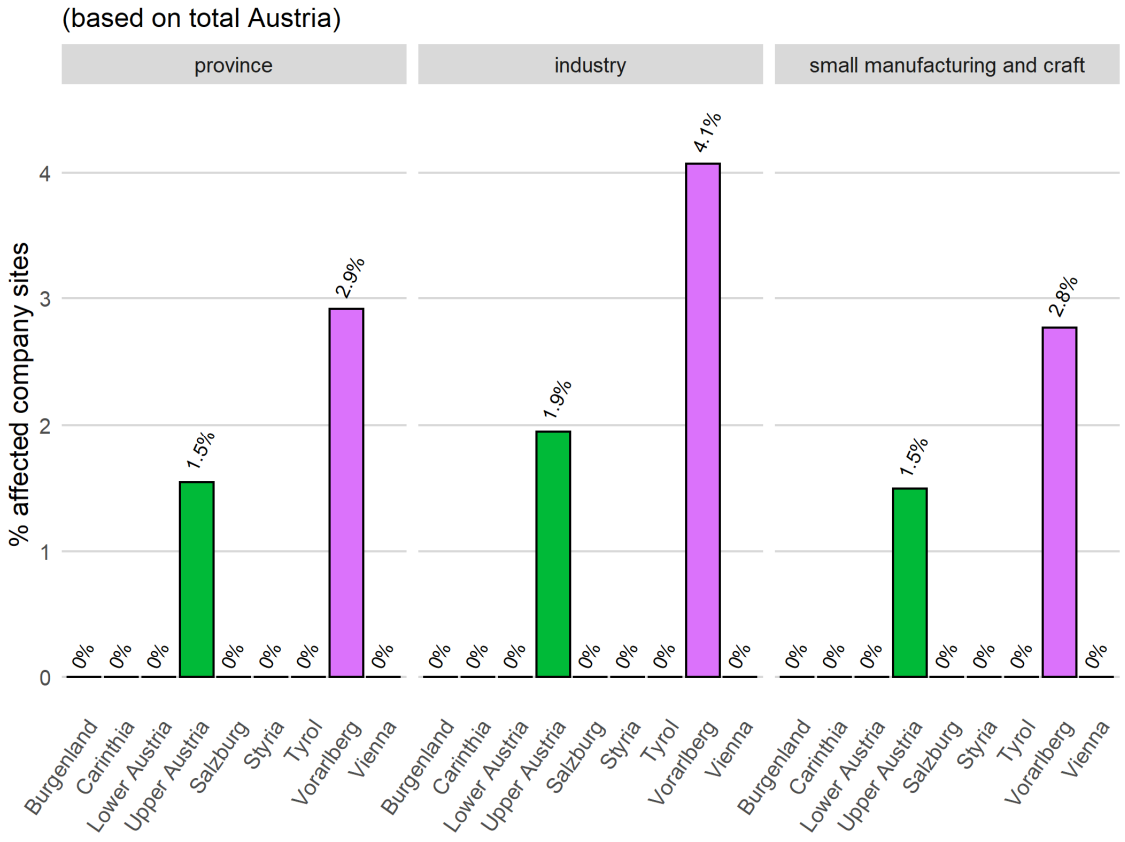

Figure 173: NO_2 YMV 2018 interim target 2 –percentage of affected company sites separated by province and division

NO2 YMV 2018 interim target 2												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Carinthia	5147	4670	477	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Lower A.	14361	12959	1402	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Upper A.	11812	10368	1444	1019	873	146	8.6	8.4	10.1	1.5	1.5	1.9
Salzburg	5304	4873	431	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Styria	9601	8466	1135	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Tyrol	7117	6510	607	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Vorarlberg	3163	2730	433	1927	1622	305	60.9	59.4	70.4	2.9	2.8	4.1
Vienna	6846	5470	1376	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
total	**66031**	**58539**	**7492**	**2946**	**2495**	**451**				**4.5**	**4.3**	**6.0**

Table 136: NO_2 YMV 2018 interim target 2 – number and percentage of affected company sites separated by province and division

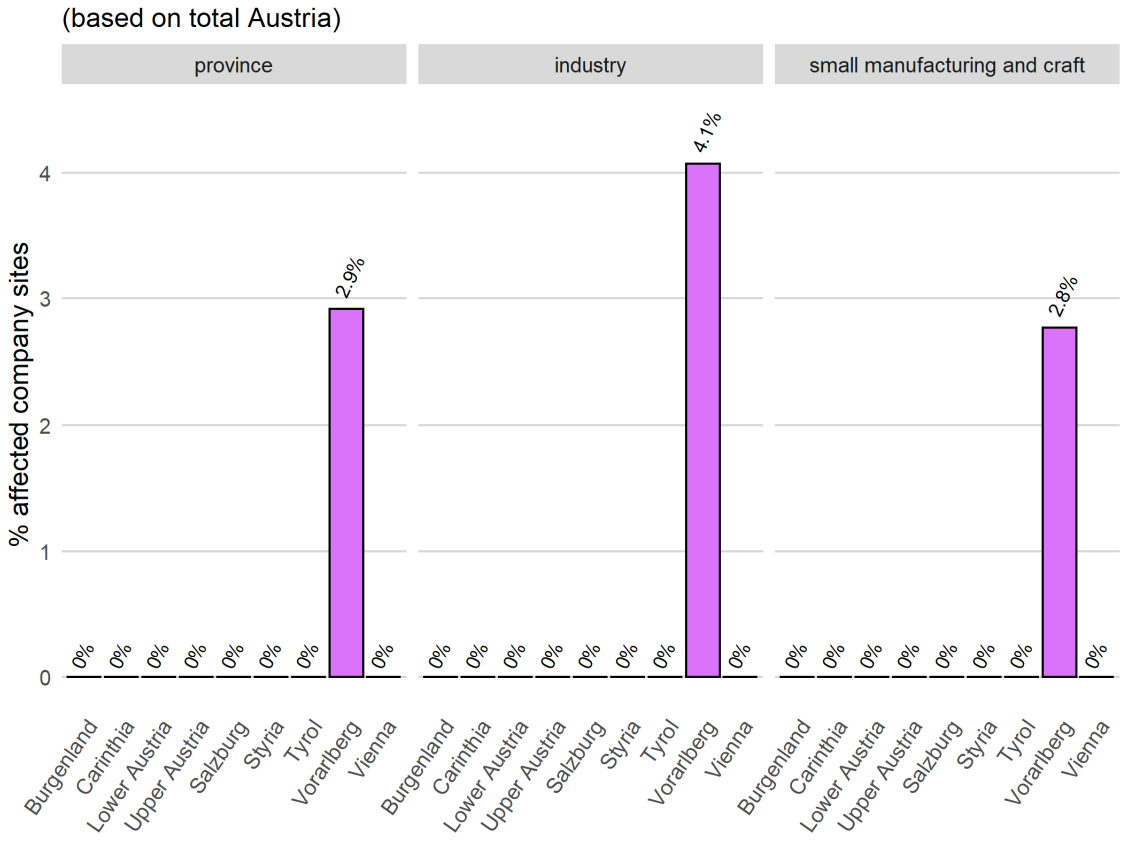

Figure 174: NO_2 YMV 2019 interim target 2 –percentage of affected company sites separated by province and division

NO2 YMV 2019 interim target 2												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Carinthia	5147	4670	477	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Lower A.	14361	12959	1402	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Upper A.	11812	10368	1444	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Salzburg	5304	4873	431	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Styria	9601	8466	1135	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Tyrol	7117	6510	607	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Vorarlberg	3163	2730	433	1927	1622	305	60.9	59.4	70.4	2.9	2.8	4.1
Vienna	6846	5470	1376	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
total	**66031**	**58539**	**7492**	**1927**	**1622**	**305**				**2.9**	**2.8**	**4.1**

Table 137: NO_2 YMV 2019 interim target 2 – number and percentage of affected company sites separated by province and division

8.8 NO_2 DMV (3-4 EXCEEDANCE DAYS)

8.8.1 AQG LEVEL

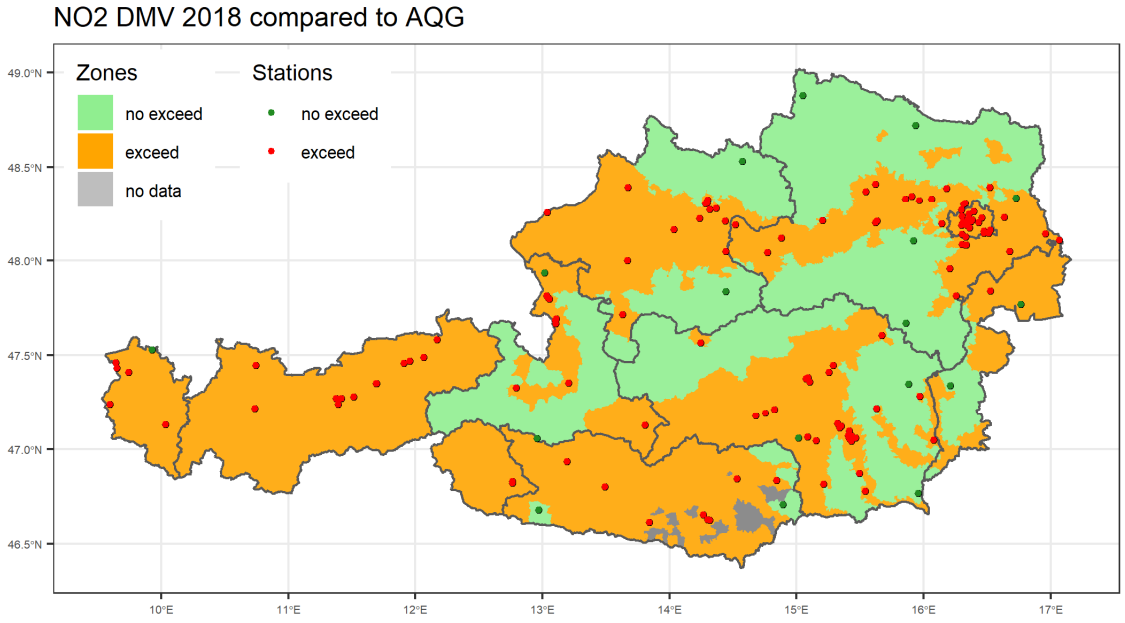

Figure 175: NO_2 DMV 2018 AQG level (3-4 days exceedance p.a.) – exceedance stations and areas with respect to AQG level of 25 µg/m³ (124 stations of 148 (83.8%), affected area: 60.4%).

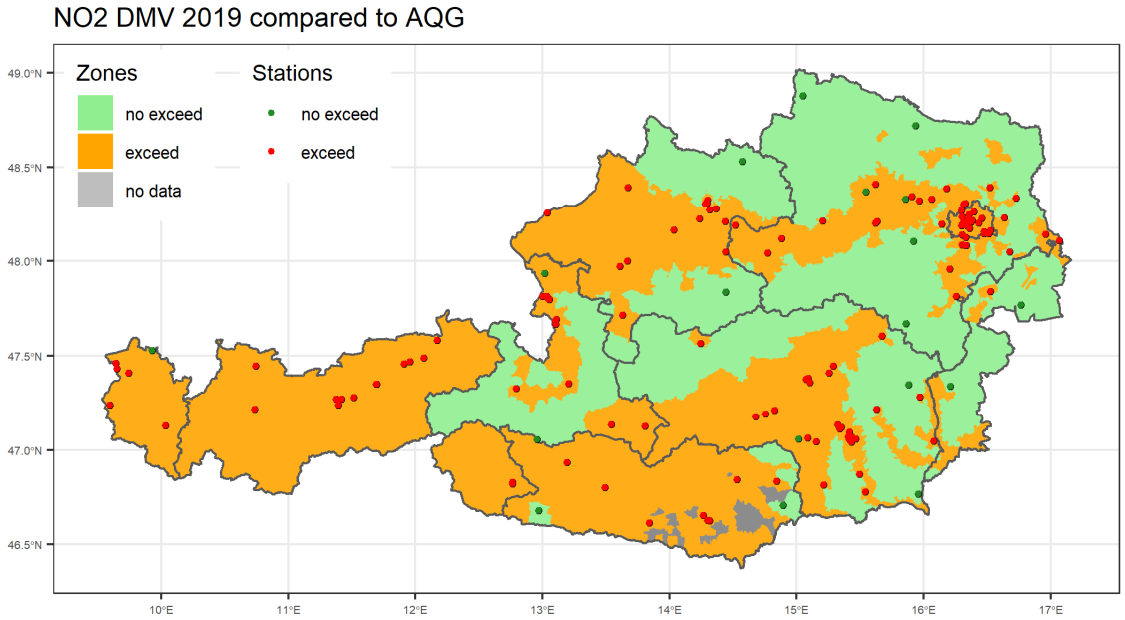

Figure 176: NO_2 DMV 2019 AQG level (3-4 days exceedance p.a.) – exceedance stations and areas with respect to AQG level of 25 µg/m³ (126 stations of 148 (85.1%), affected area: 56.7%).

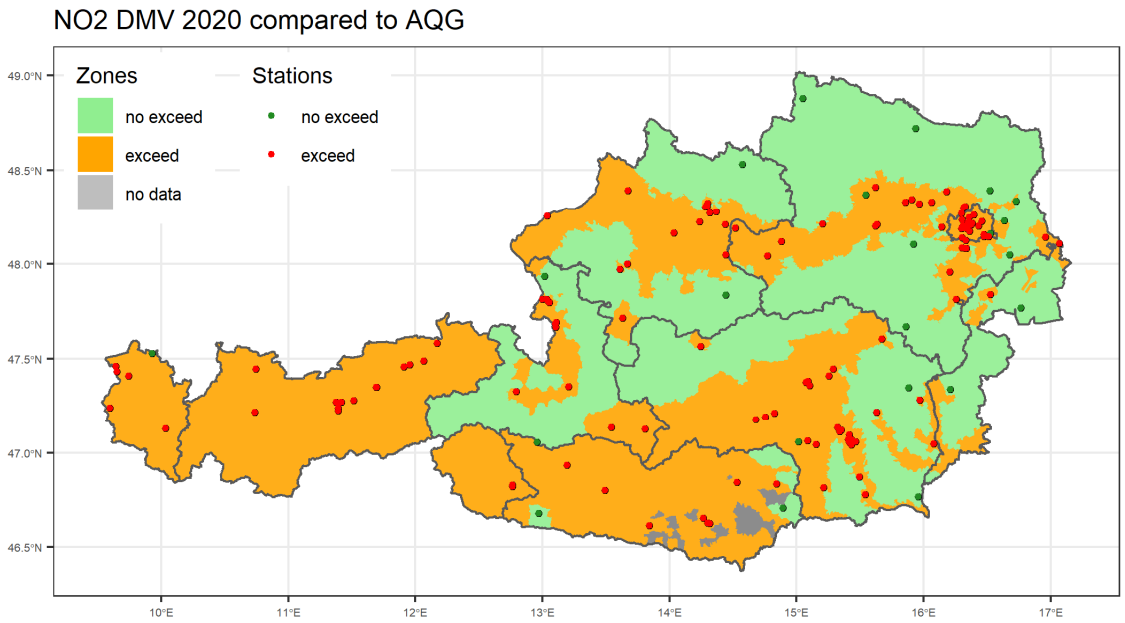

Figure 177: NO_2 DMV 2020 AQG level (3-4 days exceedance p.a.) – exceedance stations and areas with respect to AQG level of 25 µg/m³ (123 stations of 148 (83.1%), affected area: 53.8%).

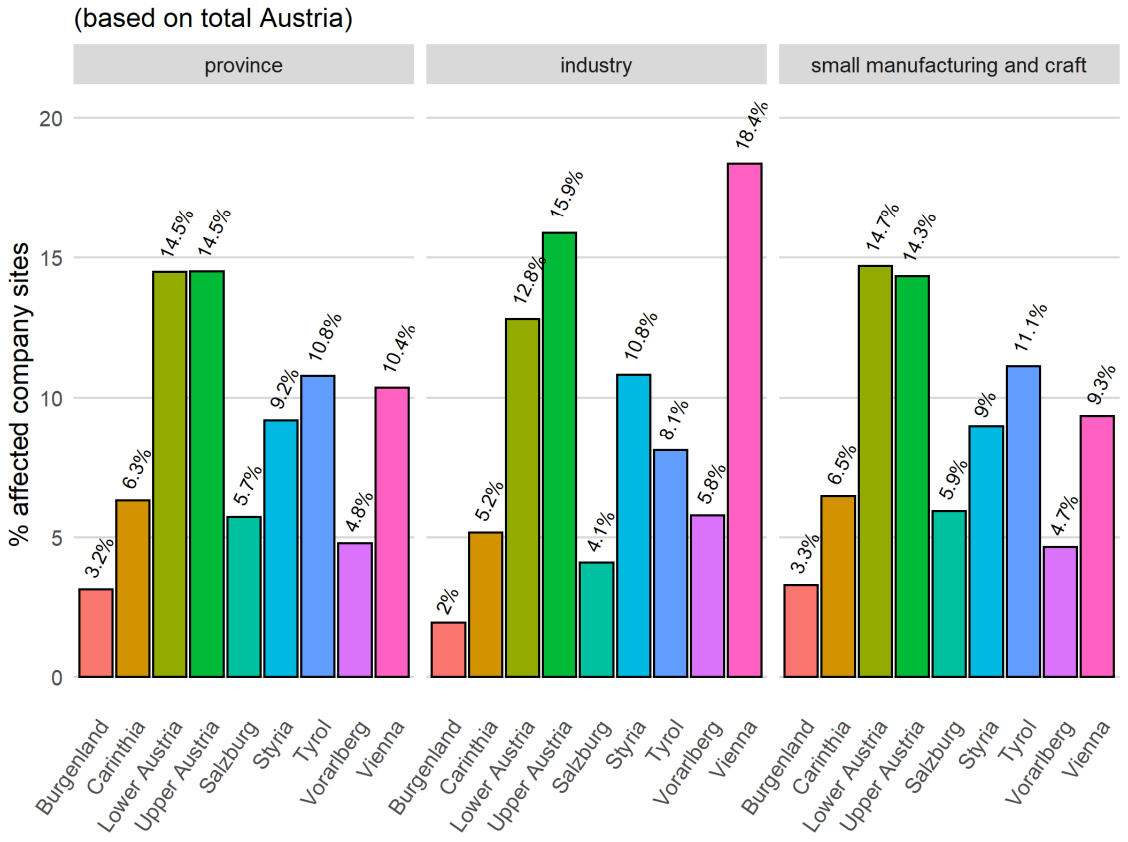

Figure 178: NO_2 DMV 2018 AQG level (3-4 days exceedance p.a.) –percentage of affected company sites separated by province and division

NO2 DMV 2018 AQG level (3-4 exceedance days p.a.)												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	2087	1939	148	77.9	77.8	79.1	3.2	3.3	2.0
Carinthia	5147	4670	477	4177	3789	388	81.2	81.1	81.3	6.3	6.5	5.2
Lower A.	14361	12959	1402	9557	8598	959	66.5	66.3	68.4	14.5	14.7	12.8
Upper A.	11812	10368	1444	9575	8386	1189	81.1	80.9	82.3	14.5	14.3	15.9
Salzburg	5304	4873	431	3785	3478	307	71.4	71.4	71.2	5.7	5.9	4.1
Styria	9601	8466	1135	6072	5262	810	63.2	62.2	71.4	9.2	9.0	10.8
Tyrol	7117	6510	607	7117	6510	607	100.0	100.0	100.0	10.8	11.1	8.1
Vorarlberg	3163	2730	433	3163	2730	433	100.0	100.0	100.0	4.8	4.7	5.8
Vienna	6846	5470	1376	6846	5470	1376	100.0	100.0	100.0	10.4	9.3	18.4
total	**66031**	**58539**	**7492**	**52379**	**46162**	**6217**				**79.3**	**78.9**	**83.0**

Table 138: NO_2 DMV 2018 AQG level (3-4 exceedance days p.a.) – number and percentage of affected company sites separated by province and division

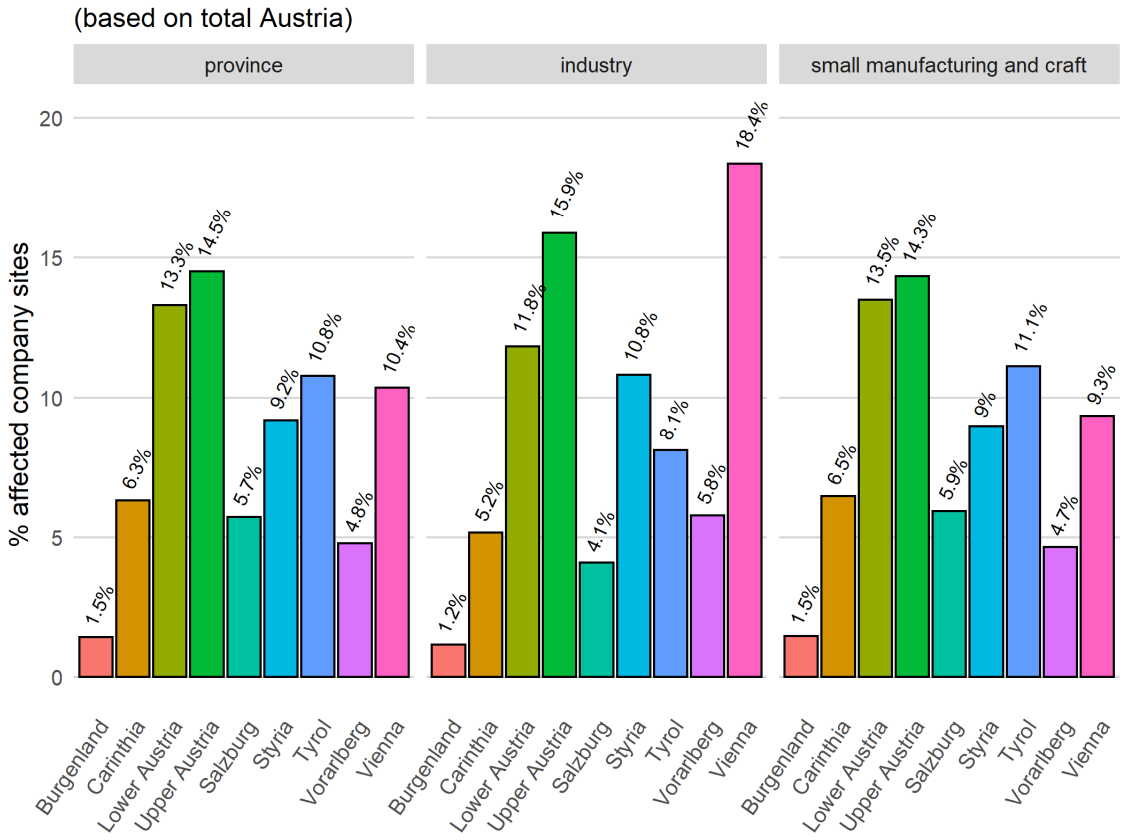

Figure 179: NO_2 DMV 2019 AQG level (3-4 days exceedance p.a.) –percentage of affected company sites separated by province and division

NO2 DMV 2019 AQG level (3-4 exceedance days p.a.)												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	963	874	89	35.9	35.1	47.6	1.5	1.5	1.2
Carinthia	5147	4670	477	4177	3789	388	81.2	81.1	81.3	6.3	6.5	5.2
Lower A.	14361	12959	1402	8784	7898	886	61.2	60.9	63.2	13.3	13.5	11.8
Upper A.	11812	10368	1444	9575	8386	1189	81.1	80.9	82.3	14.5	14.3	15.9
Salzburg	5304	4873	431	3785	3478	307	71.4	71.4	71.2	5.7	5.9	4.1
Styria	9601	8466	1135	6072	5262	810	63.2	62.2	71.4	9.2	9.0	10.8
Tyrol	7117	6510	607	7117	6510	607	100.0	100.0	100.0	10.8	11.1	8.1
Vorarlberg	3163	2730	433	3163	2730	433	100.0	100.0	100.0	4.8	4.7	5.8
Vienna	6846	5470	1376	6846	5470	1376	100.0	100.0	100.0	10.4	9.3	18.4
total	**66031**	**58539**	**7492**	**50482**	**44397**	**6085**				**76.5**	**75.8**	**81.2**

Table 139: NO_2 DMV 2019 AQG level (3-4 exceedance days p.a.) – number and percentage of affected company sites separated by province and division

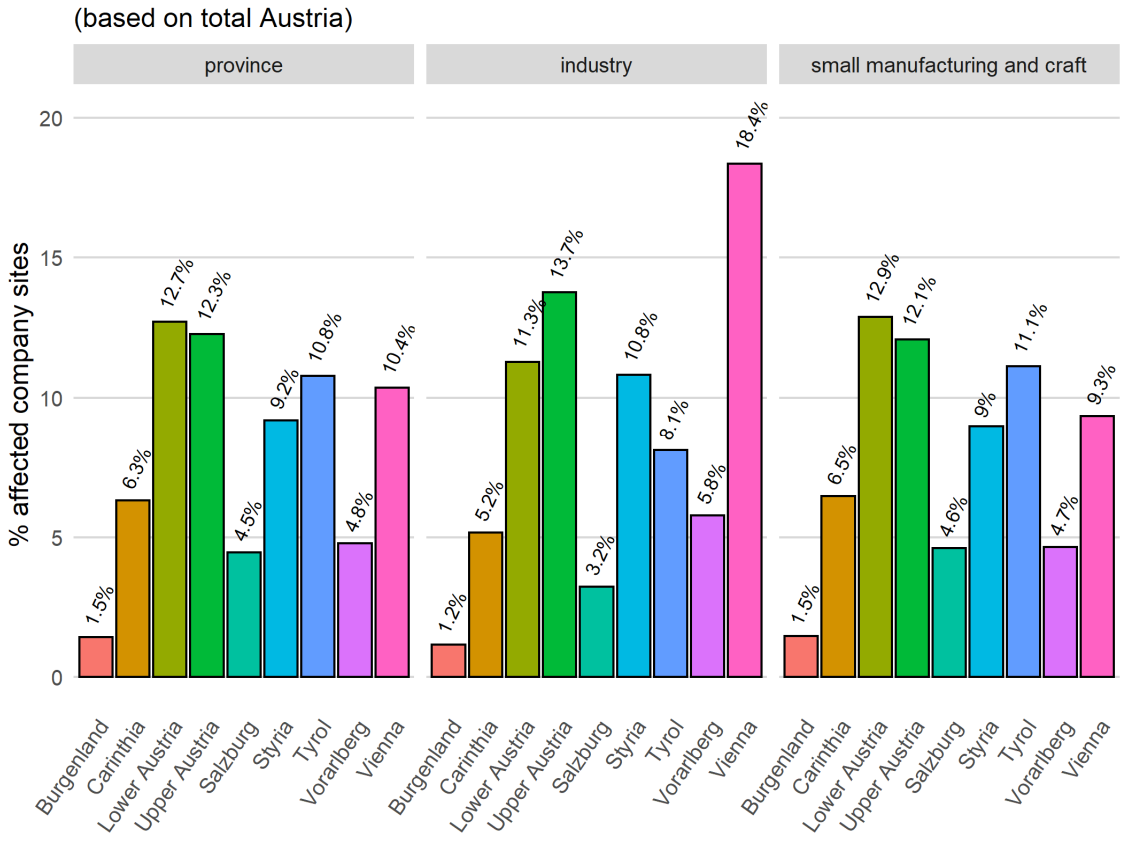

Figure 180: NO_2 DMV 2020 AQG level (3-4 days exceedance p.a.) –percentage of affected company sites separated by province and division

NO2 DMV 2020 AQG level (3-4 exceedance days p.a.)												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	963	874	89	35.9	35.1	47.6	1.5	1.5	1.2
Carinthia	5147	4670	477	4177	3789	388	81.2	81.1	81.3	6.3	6.5	5.2
Lower A.	14361	12959	1402	8387	7542	845	58.4	58.2	60.3	12.7	12.9	11.3
Upper A.	11812	10368	1444	8097	7067	1030	68.5	68.2	71.3	12.3	12.1	13.7
Salzburg	5304	4873	431	2947	2704	243	55.6	55.5	56.4	4.5	4.6	3.2
Styria	9601	8466	1135	6072	5262	810	63.2	62.2	71.4	9.2	9.0	10.8
Tyrol	7117	6510	607	7117	6510	607	100.0	100.0	100.0	10.8	11.1	8.1
Vorarlberg	3163	2730	433	3163	2730	433	100.0	100.0	100.0	4.8	4.7	5.8
Vienna	6846	5470	1376	6846	5470	1376	100.0	100.0	100.0	10.4	9.3	18.4
total	**66031**	**58539**	**7492**	**47769**	**41948**	**5821**				**72.3**	**71.7**	**77.7**

Table 140: NO_2 DMV 2020 AQG level (3-4 exceedance days p.a.) – number and percentage of affected company sites separated by province and division

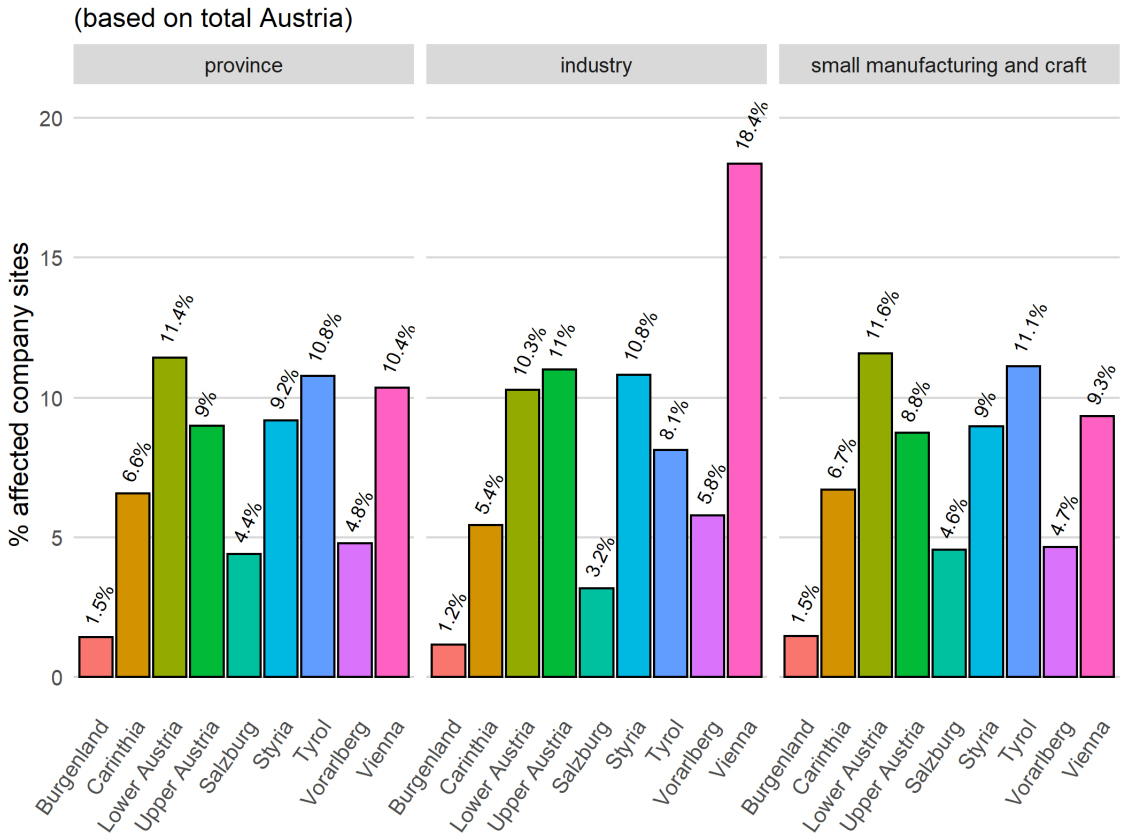

Figure 181: NO_2 DMV 2021 AQG level (3-4 days exceedance p.a.) –percentage of affected company sites separated by province and division

NO2 DMV 2021 AQG level (3-4 exceedance days p.a.)												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	963	874	89	35.9	35.1	47.6	1.5	1.5	1.2
Carinthia	5147	4670	477	4331	3924	407	84.1	84.0	85.3	6.6	6.7	5.4
Lower A.	14361	12959	1402	7548	6778	770	52.6	52.3	54.9	11.4	11.6	10.3
Upper A.	11812	10368	1444	5949	5124	825	50.4	49.4	57.1	9.0	8.8	11.0
Salzburg	5304	4873	431	2908	2669	239	54.8	54.8	55.5	4.4	4.6	3.2
Styria	9601	8466	1135	6072	5262	810	63.2	62.2	71.4	9.2	9.0	10.8
Tyrol	7117	6510	607	7117	6510	607	100.0	100.0	100.0	10.8	11.1	8.1
Vorarlberg	3163	2730	433	3163	2730	433	100.0	100.0	100.0	4.8	4.7	5.8
Vienna	6846	5470	1376	6846	5470	1376	100.0	100.0	100.0	10.4	9.3	18.4
total	**66031**	**58539**	**7492**	**44897**	**39341**	**5556**				**68.0**	**67.2**	**74.2**

Table 141: NO_2 DMV 2021 AQG level (3-4 exceedance days p.a.) – number and percentage of affected company sites separated by province and division

8.9 INTERIM TARGET 2

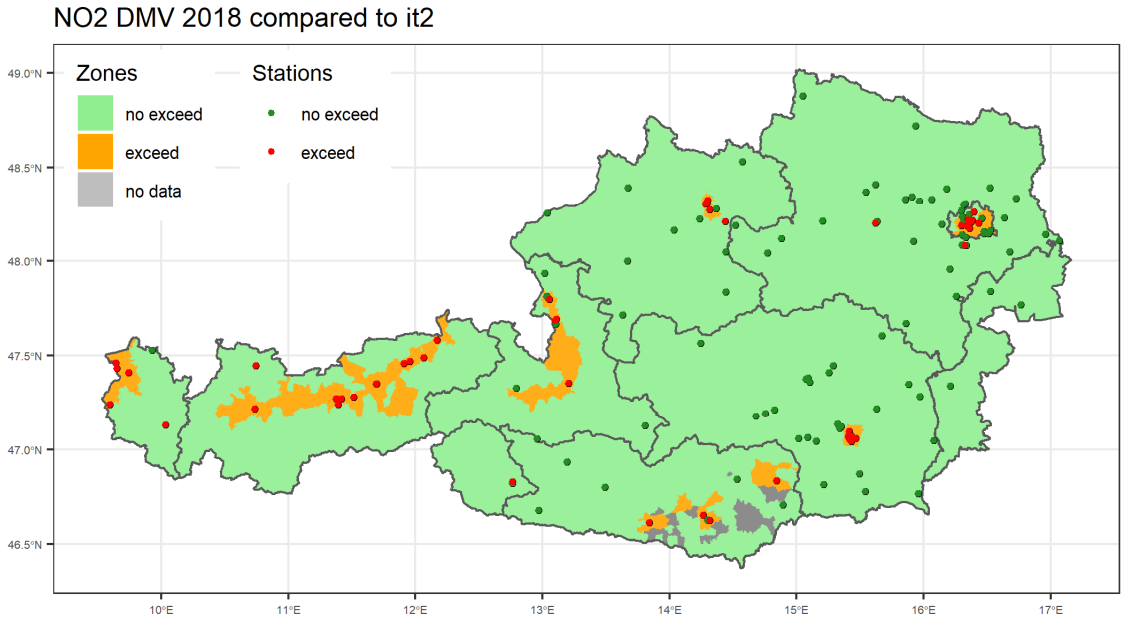

Figure 182: NO_2 DMV 2018 interim target 2 (3-4 days exceedance p.a.) – exceedance stations and areas with respect to interim target 2 of 50 µg/m³ (48 stations of 148 (32.4%), affected area: 5.5%).

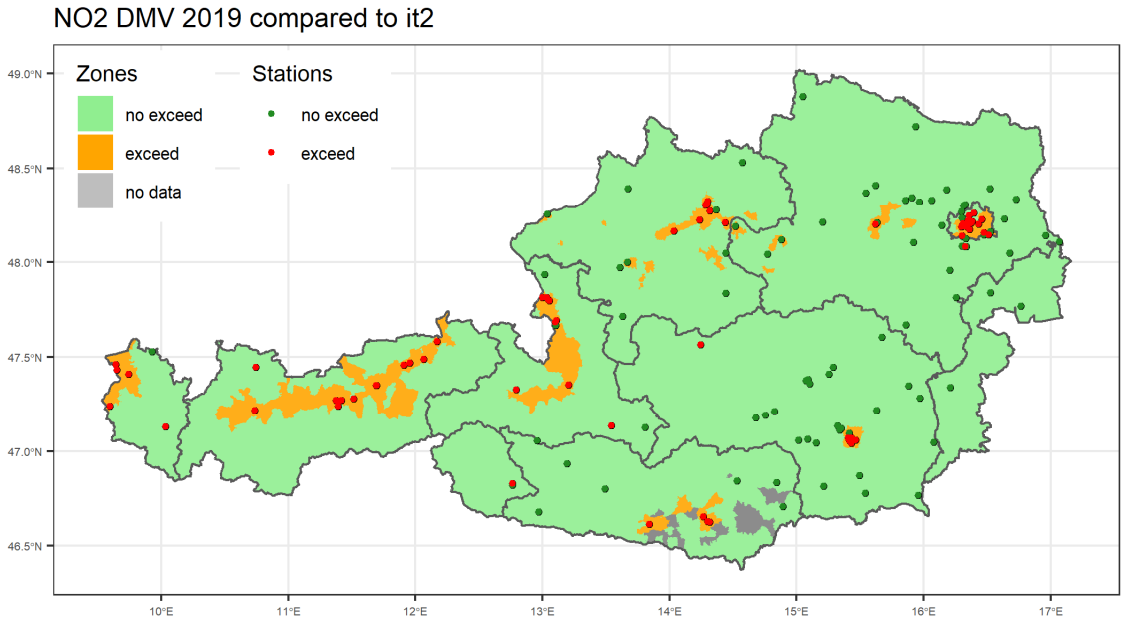

Figure 183: NO_2 DMV 2019 interim target 2 (3-4 days exceedance p.a.) – exceedance stations and areas with respect to interim target 2 of 50 µg/m³ (62 stations of 148 (41.9%), affected area: 6.2%).

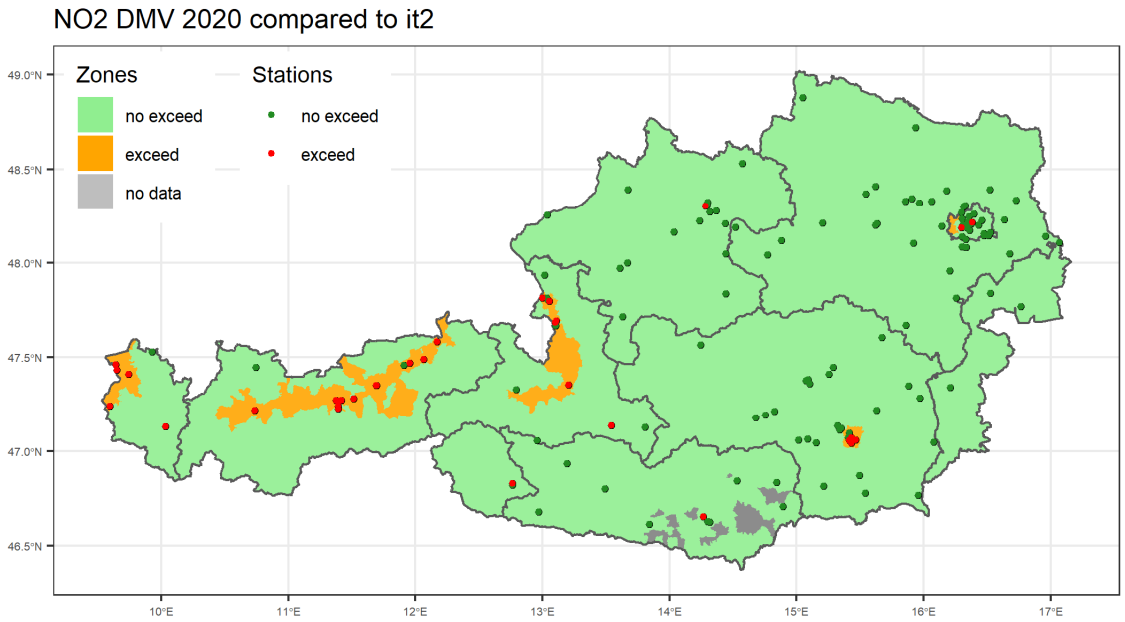

Figure 184: NO_2 DMV 2020 interim target 2 (3-4 days exceedance p.a.) – exceedance stations and areas with respect to interim target 2 of 50 µg/m³ (32 stations of 148 (21.6%), affected area: 4.4%).

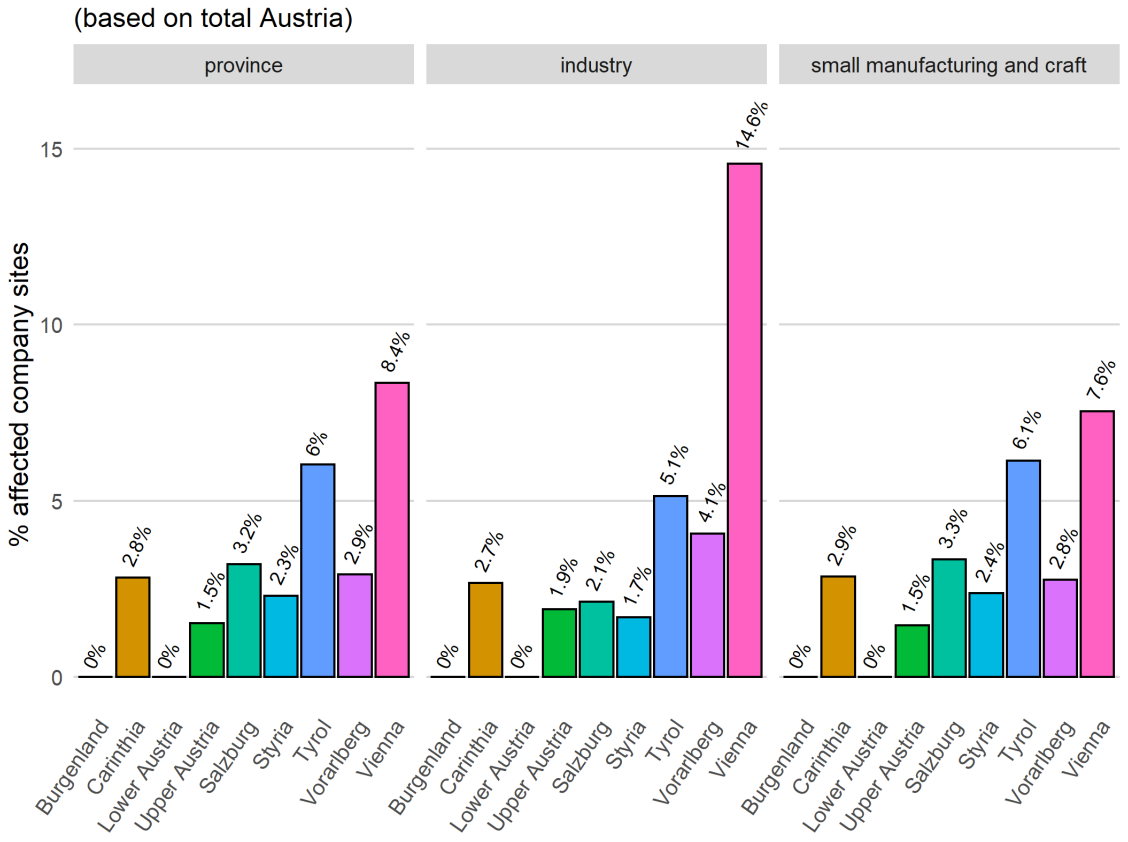

Figure 185: NO_2 DMV 2018 interim target 2 (3-4 days exceedance p.a.) –percentage of affected company sites separated by province and division

NO2 DMV 2018 interim target 2 (3-4 exceedance days p.a.)												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Carinthia	5147	4670	477	1875	1674	201	36.4	35.8	42.1	2.8	2.9	2.7
Lower A.	14361	12959	1402	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Upper A.	11812	10368	1444	1019	873	146	8.6	8.4	10.1	1.5	1.5	1.9
Salzburg	5304	4873	431	2117	1956	161	39.9	40.1	37.4	3.2	3.3	2.1
Styria	9601	8466	1135	1533	1405	128	16.0	16.6	11.3	2.3	2.4	1.7
Tyrol	7117	6510	607	3977	3592	385	55.9	55.2	63.4	6.0	6.1	5.1
Vorarlberg	3163	2730	433	1927	1622	305	60.9	59.4	70.4	2.9	2.8	4.1
Vienna	6846	5470	1376	5515	4423	1092	80.6	80.9	79.4	8.4	7.6	14.6
total	**66031**	**58539**	**7492**	**17963**	**15545**	**2418**				**27.2**	**26.6**	**32.3**

Table 142: NO_2 DMV 2018 interim target 2 (3-4 exceedance days p.a.) – number and percentage of affected company sites separated by province and division

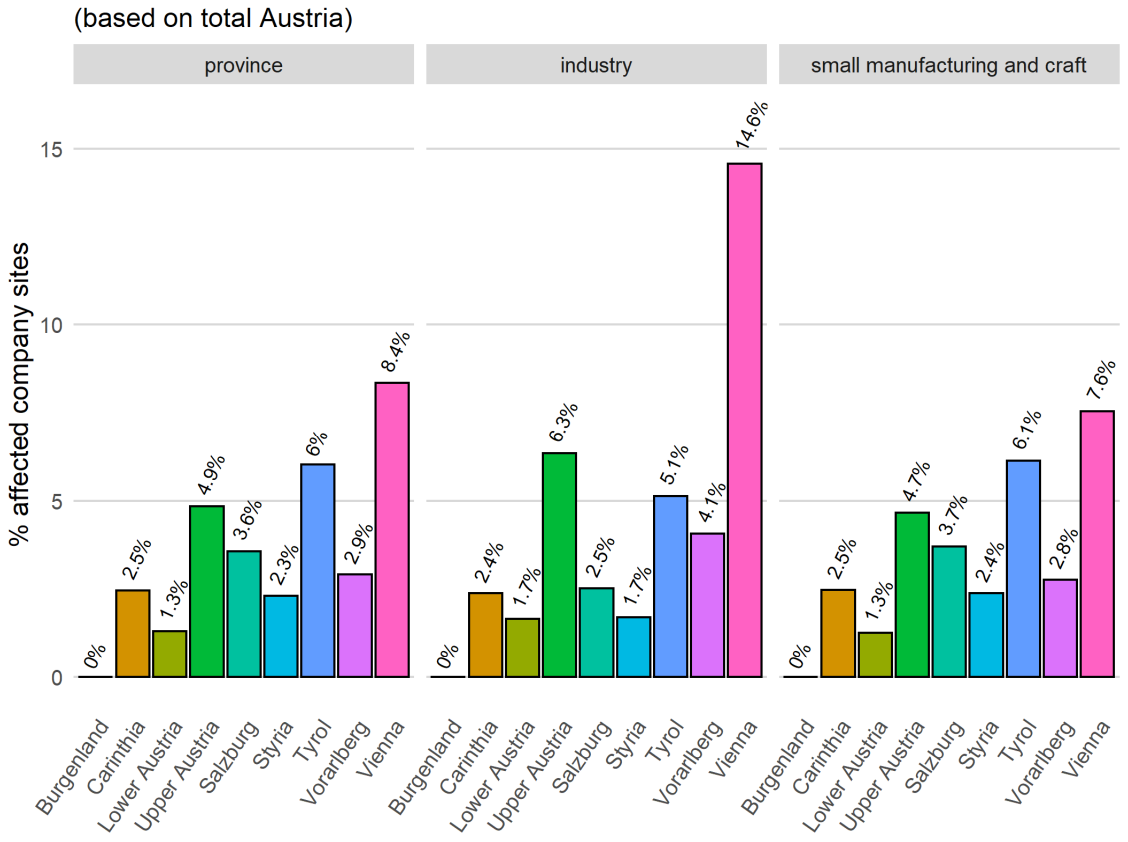

Figure 186: NO_2 DMV 2019 interim target 2 (3-4 days exceedance p.a.) –percentage of affected company sites separated by province and division

NO2 DMV 2019 interim target 2 (3-4 exceedance days p.a.)												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Carinthia	5147	4670	477	1634	1455	179	31.7	31.2	37.5	2.5	2.5	2.4
Lower A.	14361	12959	1402	875	750	125	6.1	5.8	8.9	1.3	1.3	1.7
Upper A.	11812	10368	1444	3203	2728	475	27.1	26.3	32.9	4.9	4.7	6.3
Salzburg	5304	4873	431	2364	2174	190	44.6	44.6	44.1	3.6	3.7	2.5
Styria	9601	8466	1135	1533	1405	128	16.0	16.6	11.3	2.3	2.4	1.7
Tyrol	7117	6510	607	3977	3592	385	55.9	55.2	63.4	6.0	6.1	5.1
Vorarlberg	3163	2730	433	1927	1622	305	60.9	59.4	70.4	2.9	2.8	4.1
Vienna	6846	5470	1376	5515	4423	1092	80.6	80.9	79.4	8.4	7.6	14.6
total	**66031**	**58539**	**7492**	**21028**	**18149**	**2879**				**31.8**	**31.0**	**38.4**

Table 143: NO_2 DMV 2019 interim target 2 (3-4 exceedance days p.a.) – number and percentage of affected company sites separated by province and division

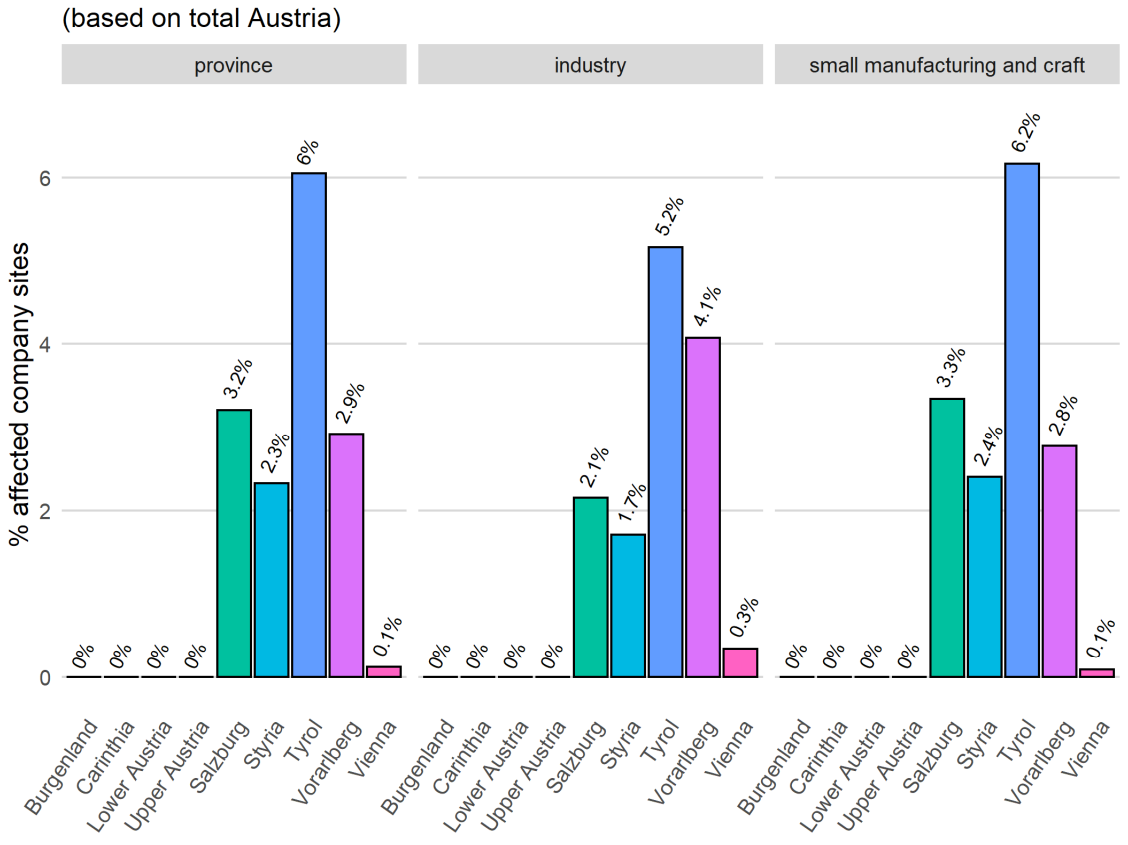

Figure 187: NO_2 DMV 2020 interim target 2 (3-4 days exceedance p.a.) –percentage of affected company sites separated by province and division

NO2 DMV 2020 interim target 2 (3-4 exceedance days p.a.)												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Carinthia	5147	4670	477	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Lower A.	14361	12959	1402	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Upper A.	11812	10368	1444	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Salzburg	5304	4873	431	2117	1956	161	39.9	40.1	37.4	3.2	3.3	2.1
Styria	9601	8466	1135	1533	1405	128	16.0	16.6	11.3	2.3	2.4	1.7
Tyrol	7117	6510	607	3994	3608	386	56.1	55.4	63.6	6.0	6.2	5.2
Vorarlberg	3163	2730	433	1927	1622	305	60.9	59.4	70.4	2.9	2.8	4.1
Vienna	6846	5470	1376	80	54	26	1.2	1.0	1.9	0.1	0.1	0.3
total	**66031**	**58539**	**7492**	**9651**	**8645**	**1006**				**14.6**	**14.8**	**13.4**

Table 144: NO_2 DMV 2020 interim target 2 (3-4 exceedance days p.a.) – number and percentage of affected company sites separated by province and division

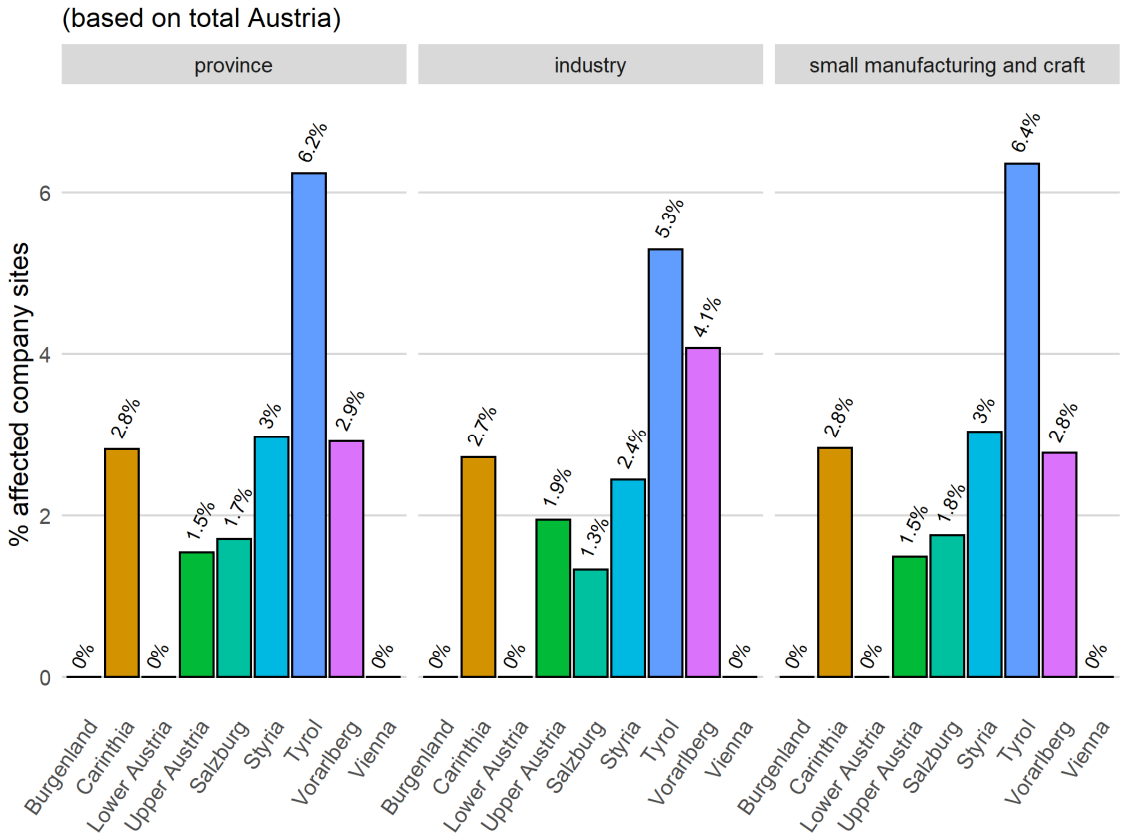

Figure 188: NO_2 DMV 2021 interim target 2 (3-4 days exceedance p.a.) –percentage of affected company sites separated by province and division

NO2 DMV 2021 interim target 2 (3-4 exceedance days p.a.)												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Carinthia	5147	4670	477	1864	1660	204	36.2	35.5	42.8	2.8	2.8	2.7
Lower A.	14361	12959	1402	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Upper A.	11812	10368	1444	1019	873	146	8.6	8.4	10.1	1.5	1.5	1.9
Salzburg	5304	4873	431	1128	1028	100	21.3	21.1	23.2	1.7	1.8	1.3
Styria	9601	8466	1135	1963	1780	183	20.4	21.0	16.1	3.0	3.0	2.4
Tyrol	7117	6510	607	4117	3721	396	57.8	57.2	65.2	6.2	6.4	5.3
Vorarlberg	3163	2730	433	1927	1622	305	60.9	59.4	70.4	2.9	2.8	4.1
Vienna	6846	5470	1376	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
total	**66031**	**58539**	**7492**	**12018**	**10684**	**1334**				**18.2**	**18.3**	**17.8**

Table 145: NO_2 DMV 2021 interim target 2 (3-4 exceedance days p.a.) – number and percentage of affected company sites separated by province and division

8.10 NO_2 DMV (MAX. 35 EXCEEDANCE DAYS P.A.)

NO2, DMV, 148 stations						
	AQG level		interim target 2		interim target 1	
year	number	percent	number	percent	number	percent
2018	99	66.9%	19	12.8%	0	0.0%
2019	103	69.6%	20	13.5%	0	0.0%
2020	89	60.1%	3	2.0%	0	0.0%
2021	92	62.2%	2	1.4%	0	0.0%

Table 146: NO_2 DMV (exceedance on max. 35 days p.a.) – number and percentage of exceeding stations per year for different target / limit values

NO2, DMV, max. 35 exceedance days per year						
	AQG level		interim target 2		interim target 1	
year	km^2	percent	km^2	percent	km^2	percent
2018	23767.1	28.3%	0.0	0.0%	0	0.0%
2019	23701.1	28.3%	3402.5	4.1%	0	0.0%
2020	20518.0	24.5%	0.0	0.0%	0	0.0%
2021	10742.7	12.8%	0.0	0.0%	0	0.0%

Table 147: NO_2 DMV (exceedance on max. 35 days p.a.) – affected area in km^2 (and %) per year with respect to different target / limit values

NO_2 DMV (max. 35 exceedance days p.a.)								
target	2018		2019		2020		2021	
	number	percent	number	percent	number	percent	number	percent
AQG	38108	57.7%	38011	57.6%	31769	48.1%	29035	44.0%
it2	0	0.0%	7032	10.6%	0	0.0%	0	0.0%
it1	0	0.0%	0	0.0%	0	0.0%	0	0.0%

Table 148: NO_2 DMV (exceedance on max. 35 days p.a.) – number and percent of affected company sites per year with respect to different target / limit values

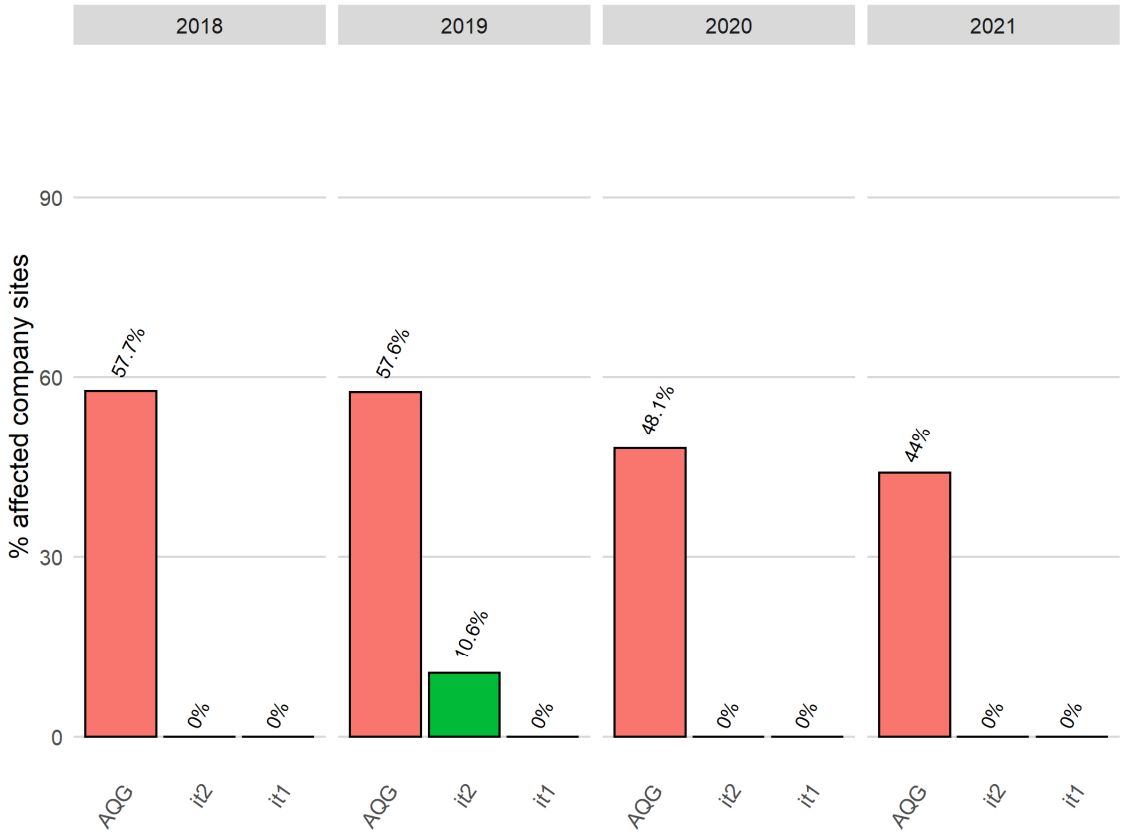

Figure 189: NO_2 DMV (max. 35 exceedance days p.a.) - percent affected manufacturing company sites per year with respect to different target and limit values

8.10.1 AQG LEVEL

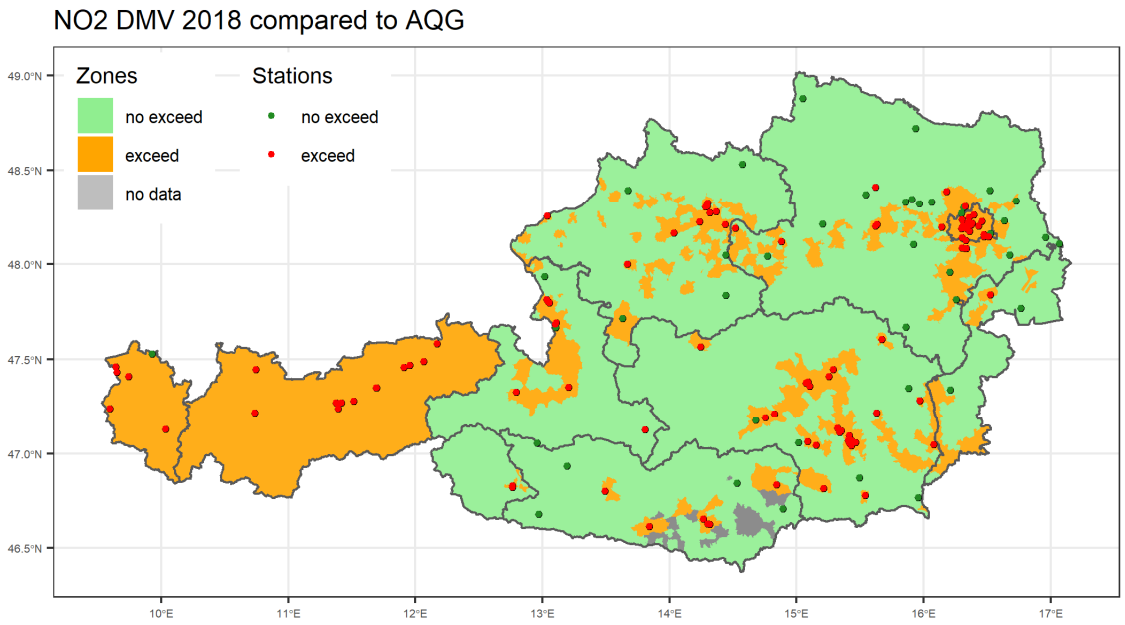

Figure 190: NO_2 DMV 2018 AQG level (max. 35 days exceedance p.a.) – exceedance stations and areas with respect to AQG level of 25 µg/m³ (99 stations of 148 (66.9%), affected area: 28.3%).

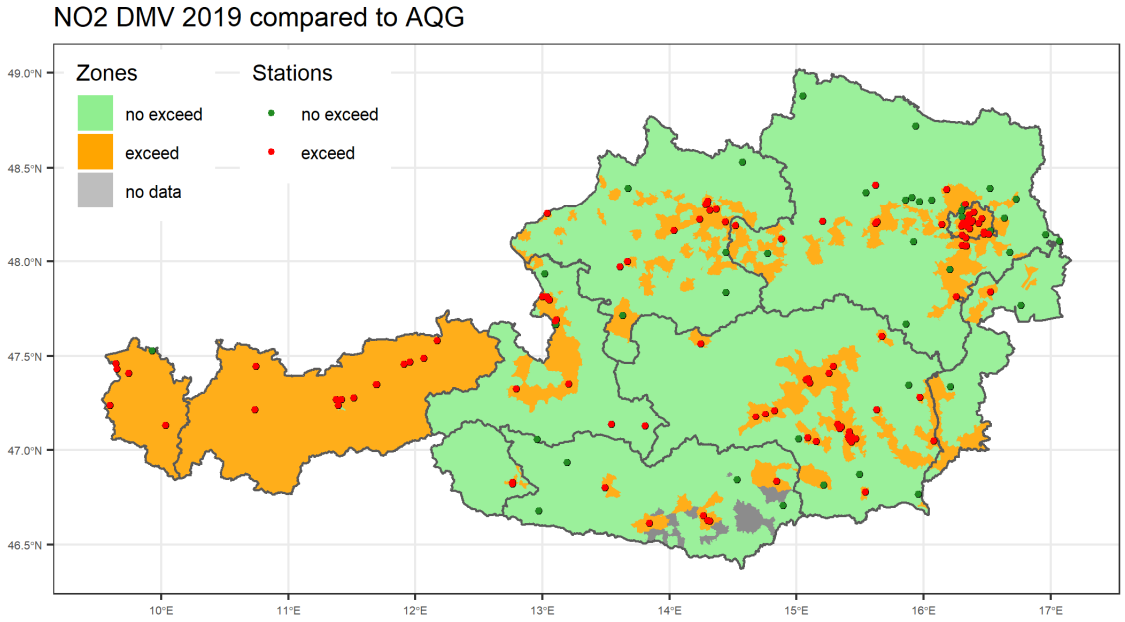

Figure 191: NO_2 DMV 2019 AQG level (max. 35 days exceedance p.a.) – exceedance stations and areas with respect to AQG level of 25 µg/m³ (103 stations of 148 (69.6%), affected area: 28.3%).

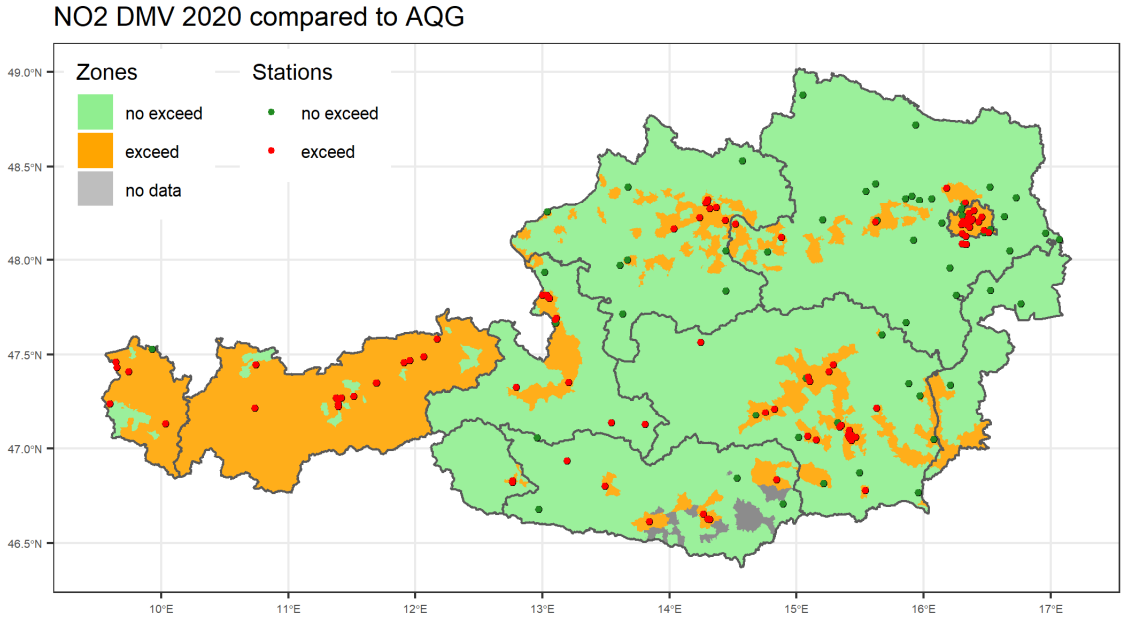

Figure 192: NO_2 DMV 2020 AQG level (max. 35 days exceedance p.a.) – exceedance stations and areas with respect to AQG level of 25 µg/m³ (89 stations of 148 (60.1%), affected area: 24.5%).

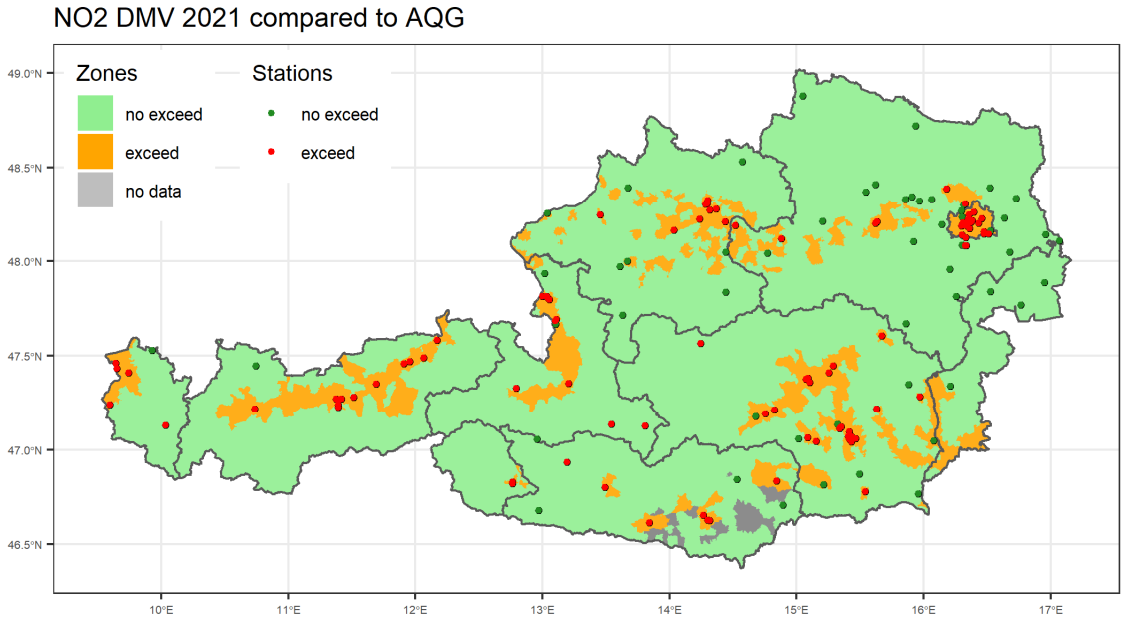

Figure 193: NO_2 DMV 2021 AQG level (max. 35 days exceedance p.a.) – exceedance stations and areas with respect to AQG level of 25 µg/m³ (92 stations of 148 (62.2%), affected area: 12.8%).

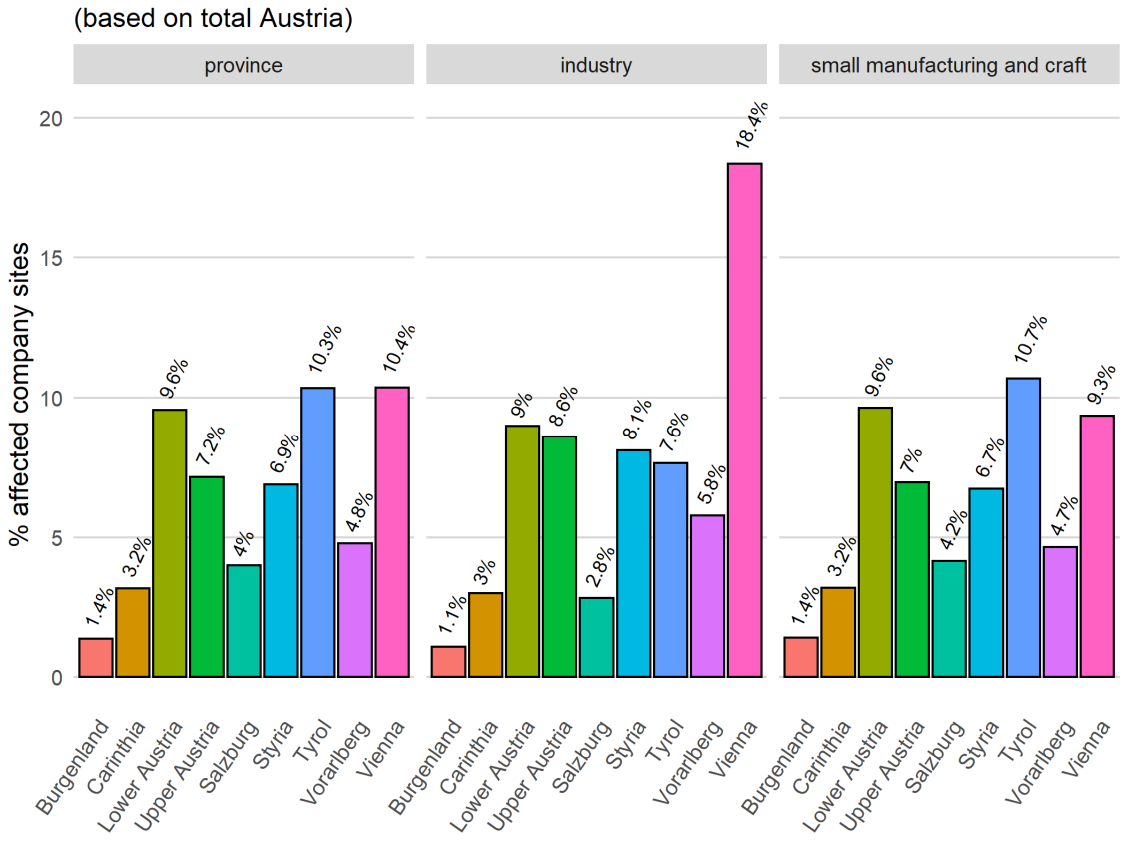

Figure 194: NO_2 DMV 2018 AQG level (max. 35 exceedance days p.a.) –percentage of affected company sites separated by province and division

NO2 DMV 2018 AQG level (max. 35 exceedance days p.a.)												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	924	841	83	34.5	33.7	44.4	1.4	1.4	1.1
Carinthia	5147	4670	477	2105	1879	226	40.9	40.2	47.4	3.2	3.2	3.0
Lower A.	14361	12959	1402	6310	5637	673	43.9	43.5	48.0	9.6	9.6	9.0
Upper A.	11812	10368	1444	4725	4081	644	40.0	39.4	44.6	7.2	7.0	8.6
Salzburg	5304	4873	431	2654	2441	213	50.0	50.1	49.4	4.0	4.2	2.8
Styria	9601	8466	1135	4549	3941	608	47.4	46.6	53.6	6.9	6.7	8.1
Tyrol	7117	6510	607	6832	6259	573	96.0	96.1	94.4	10.3	10.7	7.6
Vorarlberg	3163	2730	433	3163	2730	433	100.0	100.0	100.0	4.8	4.7	5.8
Vienna	6846	5470	1376	6846	5470	1376	100.0	100.0	100.0	10.4	9.3	18.4
total	**66031**	**58539**	**7492**	**38108**	**33279**	**4829**				**57.7**	**56.8**	**64.5**

Table 149: NO_2 DMV 2018 AQG level (max. 35 exceedance days p.a.) – number and percentage of affected company sites separated by province and division

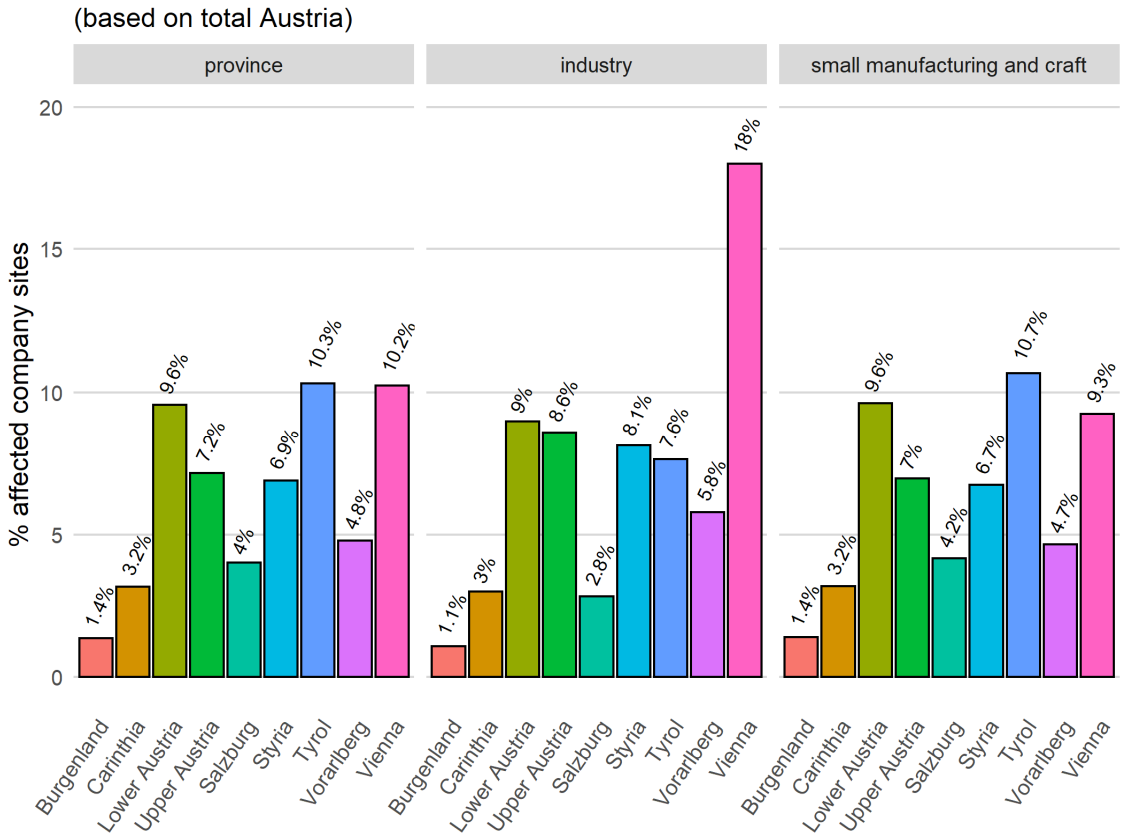

Figure 195: NO_2 DMV 2019 AQG level (max. 35 exceedance days p.a.) –percentage of affected company sites separated by province and division

NO2 DMV 2019 AQG level (max. 35 exceedance days p.a.)												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	924	841	83	34.5	33.7	44.4	1.4	1.4	1.1
Carinthia	5147	4670	477	2105	1879	226	40.9	40.2	47.4	3.2	3.2	3.0
Lower A.	14361	12959	1402	6310	5637	673	43.9	43.5	48.0	9.6	9.6	9.0
Upper A.	11812	10368	1444	4725	4081	644	40.0	39.4	44.6	7.2	7.0	8.6
Salzburg	5304	4873	431	2654	2441	213	50.0	50.1	49.4	4.0	4.2	2.8
Styria	9601	8466	1135	4549	3941	608	47.4	46.6	53.6	6.9	6.7	8.1
Tyrol	7117	6510	607	6815	6243	572	95.8	95.9	94.2	10.3	10.7	7.6
Vorarlberg	3163	2730	433	3163	2730	433	100.0	100.0	100.0	4.8	4.7	5.8
Vienna	6846	5470	1376	6766	5416	1350	98.8	99.0	98.1	10.2	9.3	18.0
total	**66031**	**58539**	**7492**	**38011**	**33209**	**4802**				**57.6**	**56.7**	**64.1**

Table 150: NO_2 DMV 2019 AQG level (max. 35 exceedance days p.a.) – number and percentage of affected company sites separated by province and division

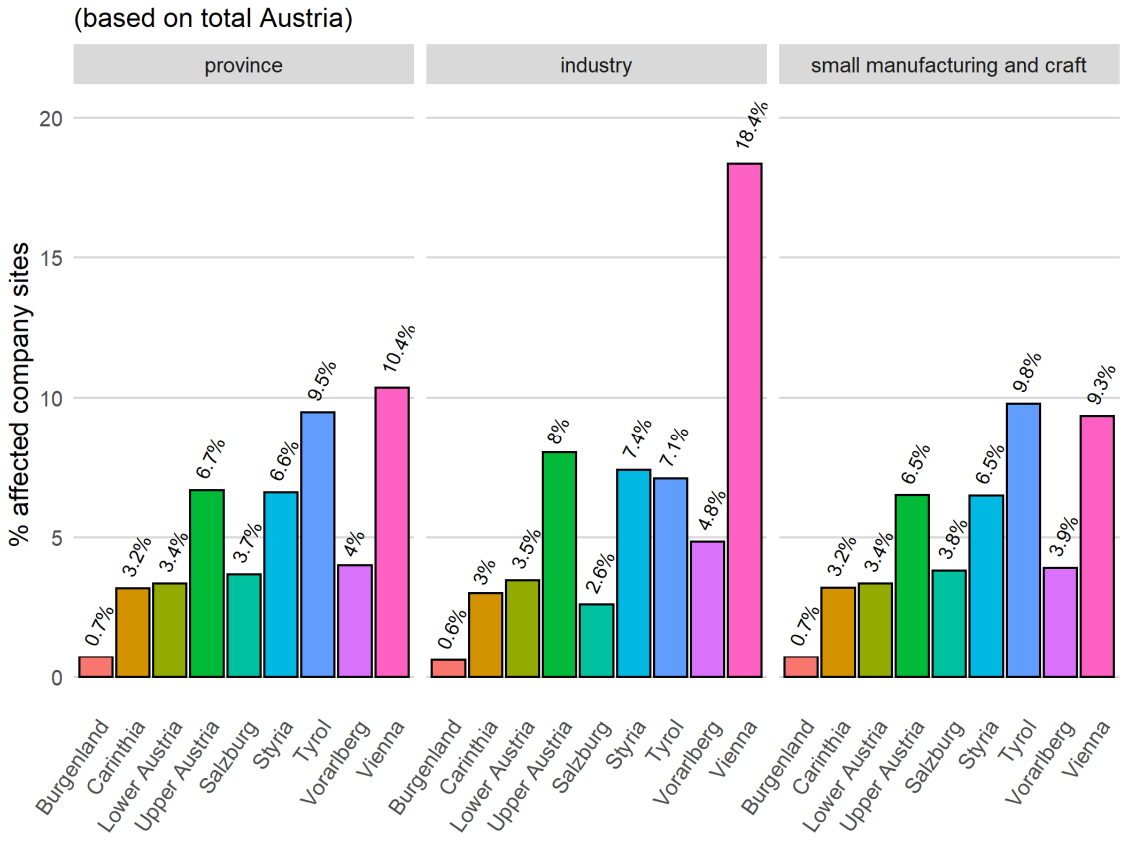

Figure 196: NO_2 DMV 2020 AQG level (max. 35 exceedance days p.a.) –percentage of affected company sites separated by province and division

NO2 DMV 2020 AQG level (max. 35 exceedance days p.a.)												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	478	432	46	17.8	17.3	24.6	0.7	0.7	0.6
Carinthia	5147	4670	477	2105	1879	226	40.9	40.2	47.4	3.2	3.2	3.0
Lower A.	14361	12959	1402	2226	1965	261	15.5	15.2	18.6	3.4	3.4	3.5
Upper A.	11812	10368	1444	4407	3805	602	37.3	36.7	41.7	6.7	6.5	8.0
Salzburg	5304	4873	431	2431	2235	196	45.8	45.9	45.5	3.7	3.8	2.6
Styria	9601	8466	1135	4358	3803	555	45.4	44.9	48.9	6.6	6.5	7.4
Tyrol	7117	6510	607	6265	5733	532	88.0	88.1	87.6	9.5	9.8	7.1
Vorarlberg	3163	2730	433	2653	2290	363	83.9	83.9	83.8	4.0	3.9	4.8
Vienna	6846	5470	1376	6846	5470	1376	100.0	100.0	100.0	10.4	9.3	18.4
total	**66031**	**58539**	**7492**	**31769**	**27612**	**4157**				**48.1**	**47.2**	**55.5**

Table 151: NO_2 DMV 2020 AQG level (max. 35 exceedance days p.a.) – number and percentage of affected company sites separated by province and division

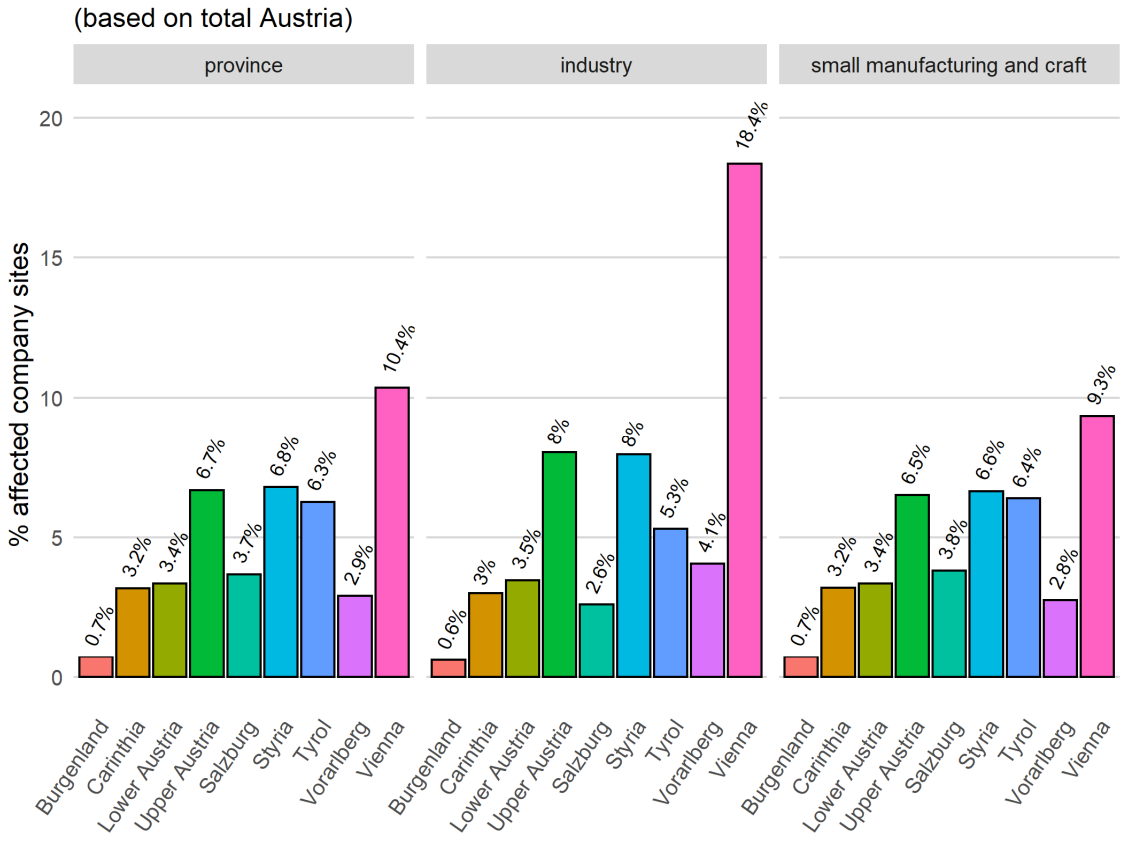

Figure 197: NO_2 DMV 2021 AQG level (max. 35 exceedance days p.a.) –percentage of affected company sites separated by province and division

NO2 DMV 2021 AQG level (max. 35 exceedance days p.a.)												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	478	432	46	17.8	17.3	24.6	0.7	0.7	0.6
Carinthia	5147	4670	477	2105	1879	226	40.9	40.2	47.4	3.2	3.2	3.0
Lower A.	14361	12959	1402	2226	1965	261	15.5	15.2	18.6	3.4	3.4	3.5
Upper A.	11812	10368	1444	4407	3805	602	37.3	36.7	41.7	6.7	6.5	8.0
Salzburg	5304	4873	431	2431	2235	196	45.8	45.9	45.5	3.7	3.8	2.6
Styria	9601	8466	1135	4481	3885	596	46.7	45.9	52.5	6.8	6.6	8.0
Tyrol	7117	6510	607	4134	3737	397	58.1	57.4	65.4	6.3	6.4	5.3
Vorarlberg	3163	2730	433	1927	1622	305	60.9	59.4	70.4	2.9	2.8	4.1
Vienna	6846	5470	1376	6846	5470	1376	100.0	100.0	100.0	10.4	9.3	18.4
total	**66031**	**58539**	**7492**	**29035**	**25030**	**4005**				**44.0**	**42.8**	**53.5**

Table 152: NO_2 DMV 2021 AQG level (max. 35 exceedance days p.a.) – number and percentage of affected company sites separated by province and division

8.10.2 INTERIM TARGET 2

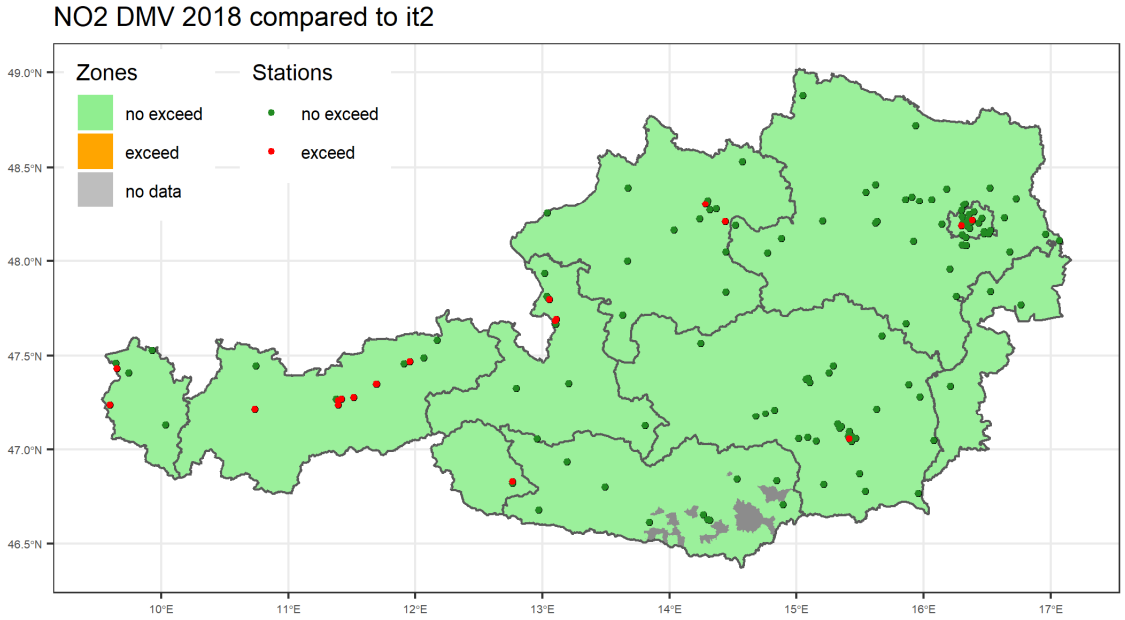

Figure 198: NO_2 DMV 2018 interim target 2 (max. 35 days exceedance p.a.) – exceedance stations and areas with respect to interim target 2 of 50 µg/m³ (19 stations of 148 (12.8%), affected area: 0.0%).

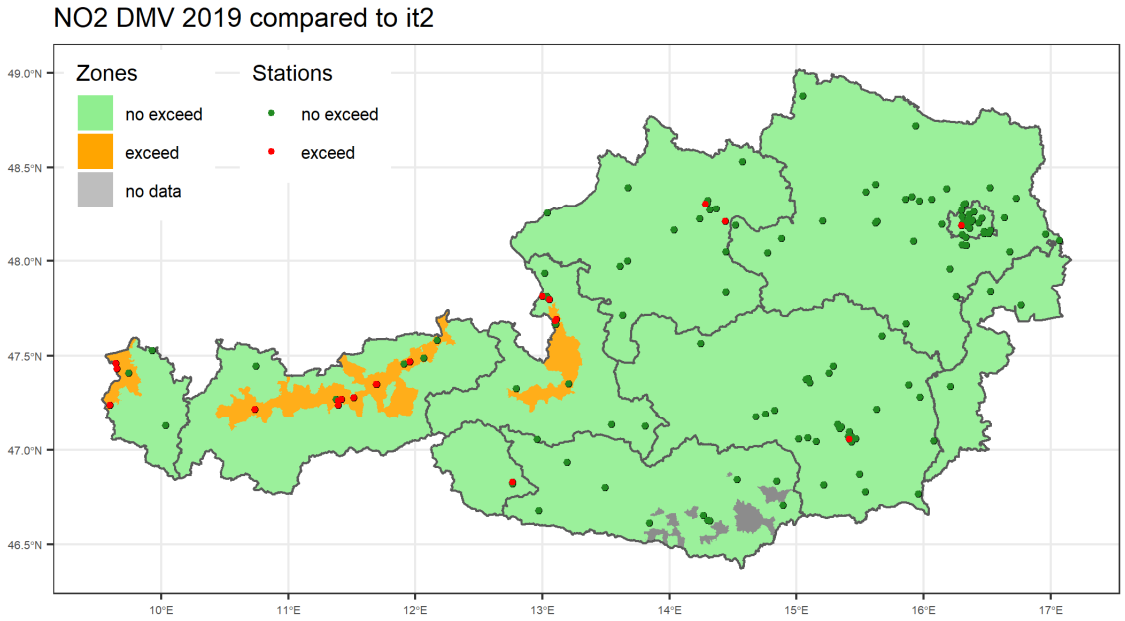

Figure 199: NO_2 DMV 2019 interim target 2 (max. 35 days exceedance p.a.) – exceedance stations and areas with respect to interim target 2 of 50 µg/m³ (20 stations of 148 (13.5%), affected area: 4.1%).

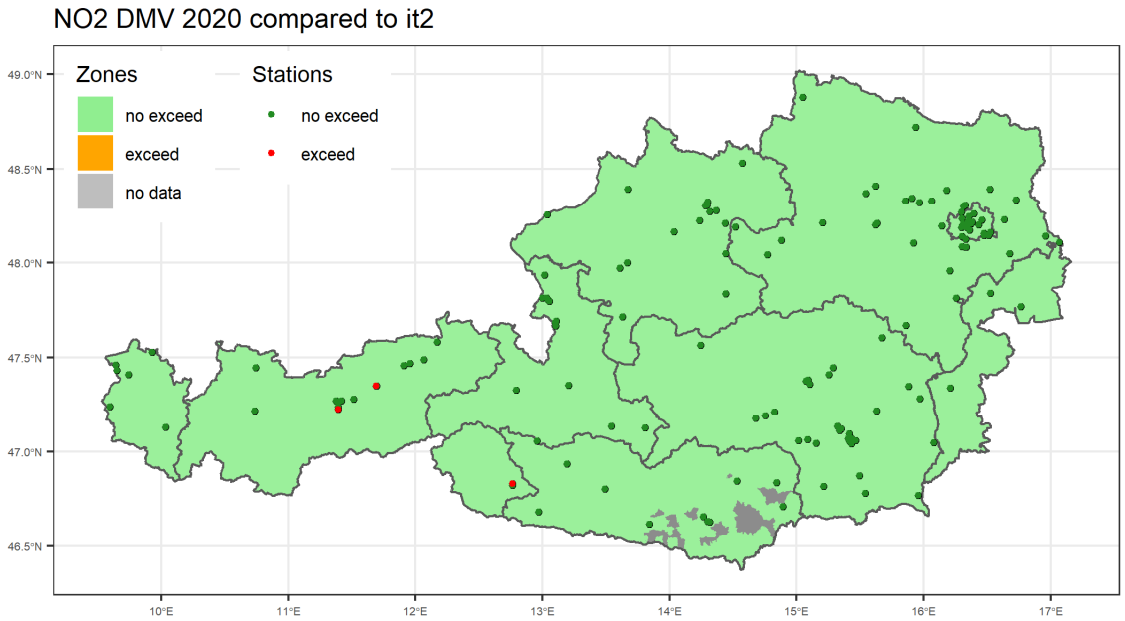

Figure 200: NO_2 DMV 2020 interim target 2 (max. 35 days exceedance p.a.) – exceedance stations and areas with respect to interim target 2 of 50 µg/m³ (3 stations of 148 (2.0%), affected area: 0.0%).

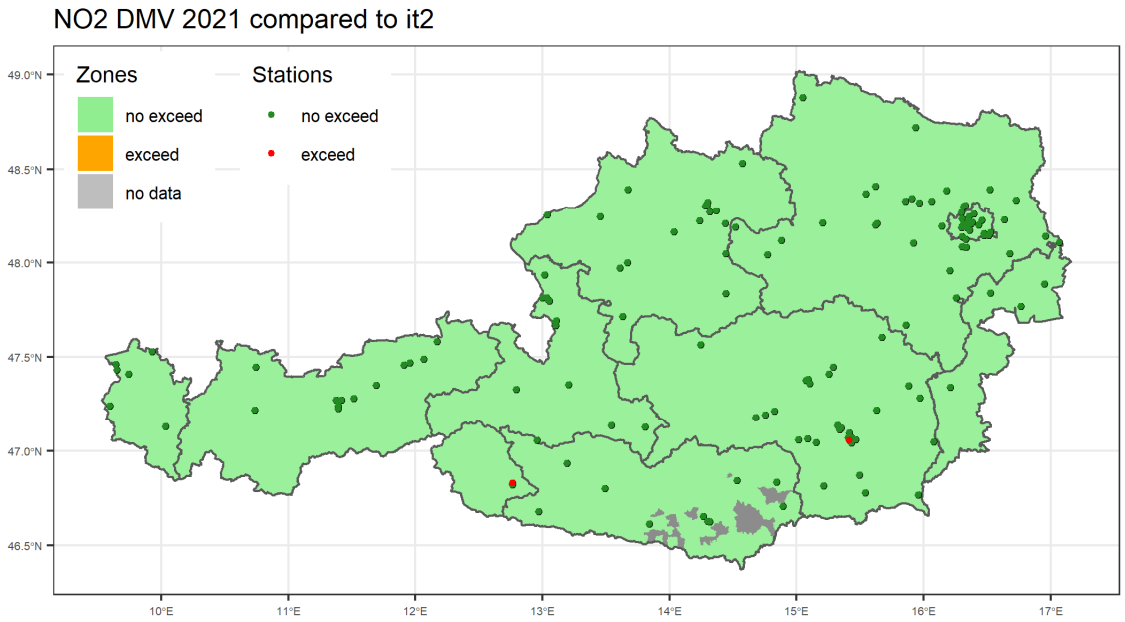

Figure 201: NO_2 DMV 2021 interim target 2 (max. 35 days exceedance p.a.) – exceedance stations and areas with respect to interim target 2 of 50 µg/m³ (2 stations of 148 (1.4%), affected area: 0.0%).

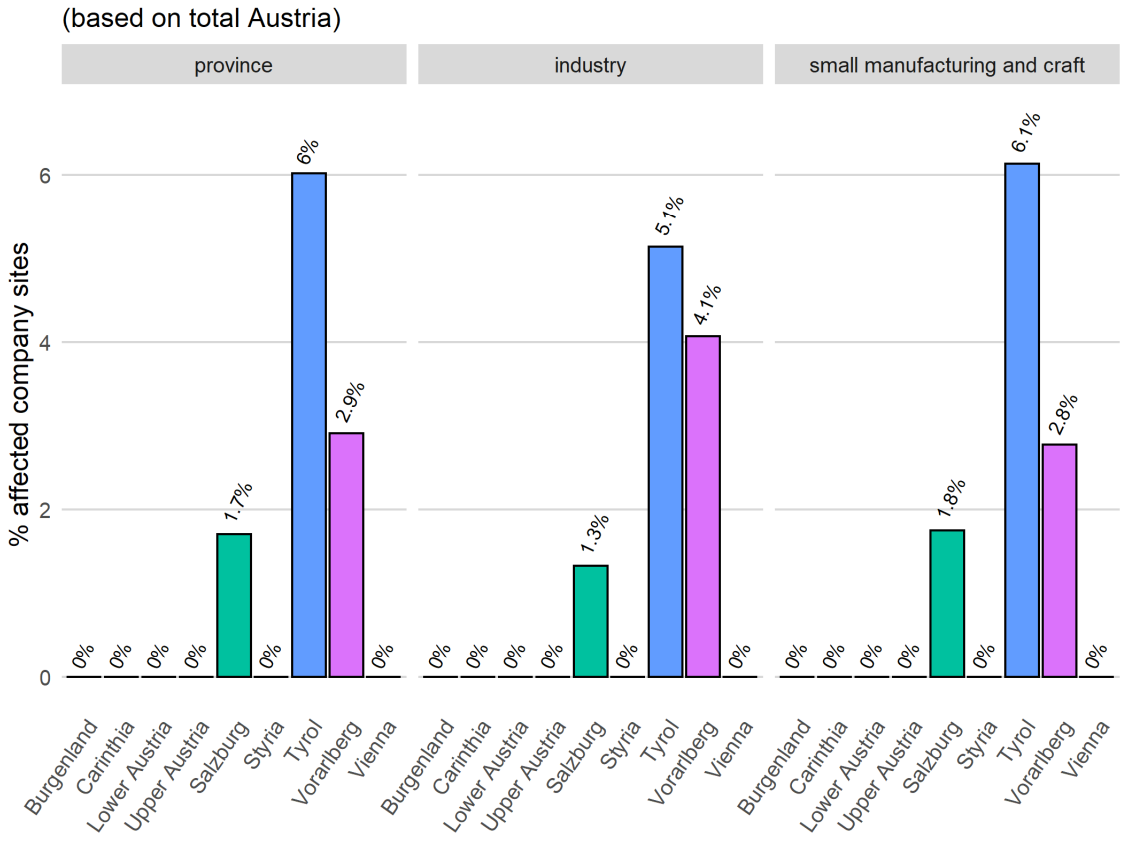

Figure 202: NO_2 DMV 2019 interim target 2 (max. 35 exceedance days p.a.) –percentage of affected company sites separated by province and division

NO2 DMV 2019 interim target 2 (max. 35 exceedance days p.a.)												
federal state	total number			number affected			% affected (per fed. state)			% affected (based on AT)		
	state	craft	industry	state	craft	industry	state	craft	industry	state	craft	industry
Burgenland	2680	2493	187	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Carinthia	5147	4670	477	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Lower A.	14361	12959	1402	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Upper A.	11812	10368	1444	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Salzburg	5304	4873	431	1128	1028	100	21.3	21.1	23.2	1.7	1.8	1.3
Styria	9601	8466	1135	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Tyrol	7117	6510	607	3977	3592	385	55.9	55.2	63.4	6.0	6.1	5.1
Vorarlberg	3163	2730	433	1927	1622	305	60.9	59.4	70.4	2.9	2.8	4.1
Vienna	6846	5470	1376	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
total	**66031**	**58539**	**7492**	**7032**	**6242**	**790**				**10.6**	**10.7**	**10.5**

Table 153: NO_2 DMV 2021 interim target 2 (max. 35 exceedance days p.a.) – number and percentage of affected company sites separated by province and division

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