Norsk institutt for luftforskning
Norwegian Institute for Air Research

Urbanet Analyse

Assessment of measures to improve local air quality in Bergen

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ABRIDGED VERSION

Abridged version of the assessment of measures, including the City Council's decision of 27 September 2017 and revised calculations for particulate matter as of 15 November 2017

BERGEN KOMMUNE

Statens vegvesen

Contents

1 Introduction

In 2015, the EFTA Court pronounced judgment against Norway for violation of the EU's Ambient Air Quality Directive, both for exceeding limit values for local air quality and because the municipalities' assessments of measures for improving the local air quality did not meet the requirements of the Directive. The judgment concerned a number of municipalities, including Bergen, and the Norwegian Environment Agency has ordered the City of Bergen to revise the applicable assessment of measures from 2015. The reason for the order, was, among other things, that the previous assessment had not calculated the effect of the measures adopted in the action plan.

The Norwegian Institute for Air Research (NILU) has, in cooperation with Urbanet Analyse AS, prepared a revised assessment of measures for improving the air quality in Bergen. The assignment was carried out on behalf of the City of Bergen. The work has been carried out in collaboration with the client and a project group consisting of representatives of relevant agencies/sections in the City of Bergen, as well as representatives of owners of installations (the Norwegian Public Roads Administration, Bergen Port Authority), Hordaland County Council and the County Governor of Hordaland.

The assessments are based on the 2015 action plan and include a revised ten-point programme consisting of packages of various measures.

As part of the work on the assessment, air quality calculations have been carried out for the City of Bergen for nitrogen dioxide (NO_2) and particulate matter (PM_{10} and $PM_{2.5}$) for the current situation (2015), the reference situation (2021), and the expected effect of a package of measures to be launched in 2021. The calculations of the reference situation (2021) are based on the assumption that existing measures will be continued, and expected developments in key parameters have been taken into account, such as the traffic load, the composition of vehicles and population growth.

The assessment of measures and the pertaining action plan were adopted by the City Council on 27 September 2017. The action plan is presented in section 7 and the City Council's decision in section 8.

Revised calculations of particulate matter

After the City Council's consideration, an error was discovered in the calculations of emissions of particulate matter from wood burning. As a consequence of this error, new calculations have been carried out for particulate matter ($PM_{2.5}$ and PM_{10}). The new calculations do not change the main conclusions in the assessment of measures that formed the basis for the City Council's decision. On the contrary, the results show that the adopted measures have a greater effect on concentrations of both PM_{10} and $PM_{2.5}$ than the previous calculations did.

In this abridged version of the assessment, the main results are presented together with revised calculations for particulate matter.

2 Air pollution and health effects

Efforts to improve the air quality in Norwegian towns and cities aim to reduce undesirable health effects of polluted air. Air pollution is a serious health problem worldwide, and it also affects the health of people living in Norway's towns and cities. The most important

polluting components in Norwegian towns and cities are nitrogen dioxide (NO_2) and particulate matter (PM_{10} and $PM_{2.5}$).

Nitrogen oxides (NO and NO_2, referred to as NO_X) are reactive gases formed during combustion at high temperature. Emissions from road traffic (exhaust) are the most important source of NO_x in Norwegian towns and cities. Nitrogen dioxide is not harmful in itself in the concentrations found in Norwegian towns and cities, but it reacts with available tropospheric ozone (O_3) to create a further NO_2 contribution that is far more harmful to health.

The most important health effects of NO_2 are reduced pulmonary function and a worsening of respiratory diseases, such as asthma and bronchitis. Persons with reduced pulmonary function and chronic respiratory diseases are most at risk of suffering health effects from NO_2.

Particulate matter are fine particles that act as gas and are mixed with and transported by air. Particulate matter is divided into two fractions. $PM_{2.5}$ are the smallest particles, with a diameter of 2.5 micrometres or less. PM_{10} are particles with a diameter of between 2.5 and 10 micrometres. $PM_{2.5}$ mainly comes from combustion (wood burning, car exhaust), while the bigger particles come from agitated road dust and tyre wear. The smallest particles can travel far by air, and such long-range pollution can also make a significant contribution to the concentration of $PM_{2.5}$ in Norwegian towns and cities.

Particulate matter can cause different types of health effects depending on the physical and chemical properties of the particles. For example, size will have a bearing on how deep the particles are inhaled into the airways. Surveys from all over the world show a connection between increased levels of particulate matter in the air and the number of hospitalisations and deaths in the population. Exposure to particulate matter can trigger inflammatory reactions that can lead to the development and worsening of pulmonary diseases and cardiovascular diseases. Research also indicates a connection between exposure to particulate matter and effects on foetal development, the nervous system and metabolism.

3 Limit values and national air quality targets

In Norway, there are three different management objectives for local air quality: the Pollution Regulations, the Government's national targets for local air quality, and air quality criteria adopted by the Norwegian Environment Agency and the Institute of Public Health.

Legal authority for the Pollution Regulations is found in the Pollution Control Act, and the Regulations were adopted in 2002 based on the EU's Ambient Air Quality Directive.[1] The Regulations apply to all outdoor air and set out requirements for measurements, calculations, reporting, assessment of measures and the implementation of measures to ensure compliance with the minimum requirements for air quality. The limit values in the Regulations are legally binding, and any failure to meet these minimum requirements requires measures to be implemented.

[1] EU (2008) Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe. Off. J. Eur. Union, L152, 1–44.

Both short-term exposure to high values and exposure to lower levels over time cause health problems. There are therefore different limit values for different time intervals (averaging times).

The national targets are not legally binding, but indicate the Government's level of ambition for air quality in Norway. The air quality criteria are based on existing knowledge about the potential health effects of exposure to air pollution. The criteria are set at a level that most people can be exposed to without experiencing harmful health effects.

Table 1: Applicable limit values, national targets and air quality criteria for NO_2 and particulate matter

Component	Averaging time	Limit value [1]	National targets of 1 Jan. 2017 [2]	Air quality criteria [3]
NO_2	15 minutes			300 µg/m^3
	Hour	200 µg/m^3 Must not be exceeded more than 18 times per calendar year		100 µg/m^3
	Calendar year	40 µg/m^3	40 µg/m^3	40 µg/m^3
PM_{10}	24 hours	50 µg/m^3 Must not be exceeded more than 30 times per calendar year		30 µg/m^3
	Calendar year	25 µg/m^3	20 µg/m^3	20 µg/m^3
$PM_{2.5}$	24 hours			15 µg/m^3
	Calendar year	15 µg/m^3	8 µg/m^3	8 µg/m^3

1: Regulations relating to Pollution Control (the Pollution Regulations), Chapter 7. Local air quality.

2: The Royal Norwegian Ministry of Climate and Environment, Prop. 1 S (2016–2017)

3: The Norwegian Institute of Public Health (2013) Luftkvalitetskriterier – virkninger av luftforurensning på helse ('Air quality criteria – health effects of air pollution') Oslo, the Norwegian Institute of Public Health (Report 2013:9)

4 Air quality monitoring in Bergen, 2002–2016

Bergen currently has four air monitoring stations:[2] two roadside monitoring stations to represent the areas where the highest concentrations are expected (Danmarks plass and Loddefjord) and two urban background stations (Rådhuset and Rolland) representing the air in a larger area, at a distance from the sources. The monitoring stations in Rolland and Loddefjord were installed in autumn 2015, while the two others have been in operation since 2003.

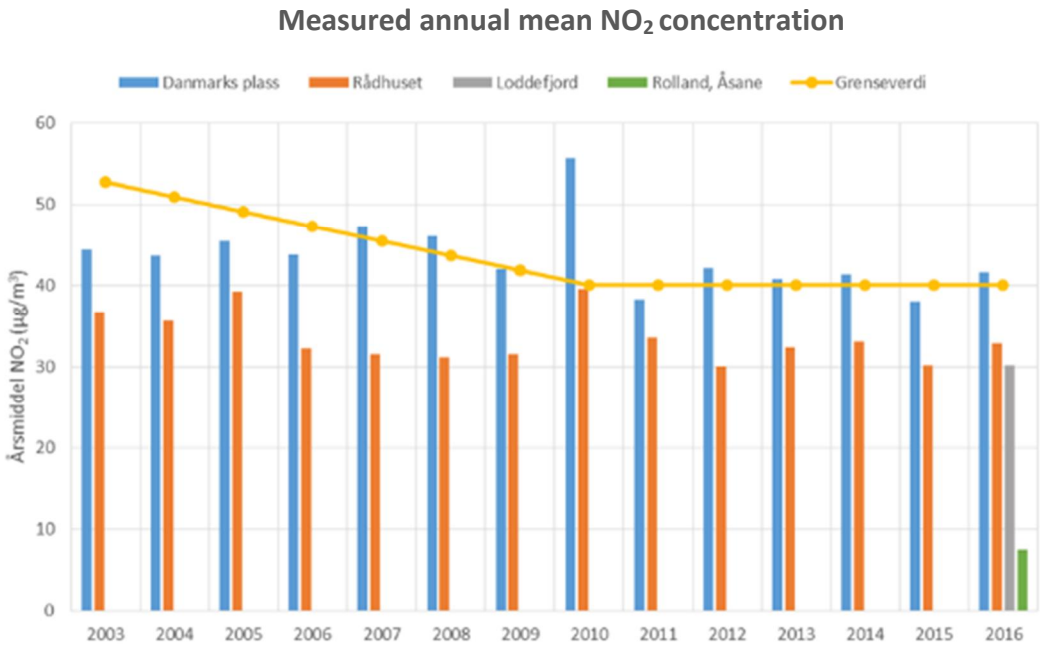
[2] After the assessment was concluded, a new roadside monitoring station has been established near Råtjørn in Fana. In addition, the Rådhuset monitoring station has been moved to Klosterhaugen.

Figure 1: Air monitoring stations in Bergen

Figures 2 to 4 show measurements of NO_2 and particulate matter carried out in Bergen during the period 2003 to 2016.

The main challenge in Bergen in relation to the current regulatory requirements is related to levels of nitrogen dioxide (NO_2). Repeated exceedances of the average mean limit value show that the level is generally too high. In addition, the number of permitted hours of exceedances was also exceeded in 2010 and 2016.

No exceedances of the limit values for particulate matter (PM_{10} and $PM_{2.5}$) have been recorded since the monitoring programme started in 2003.



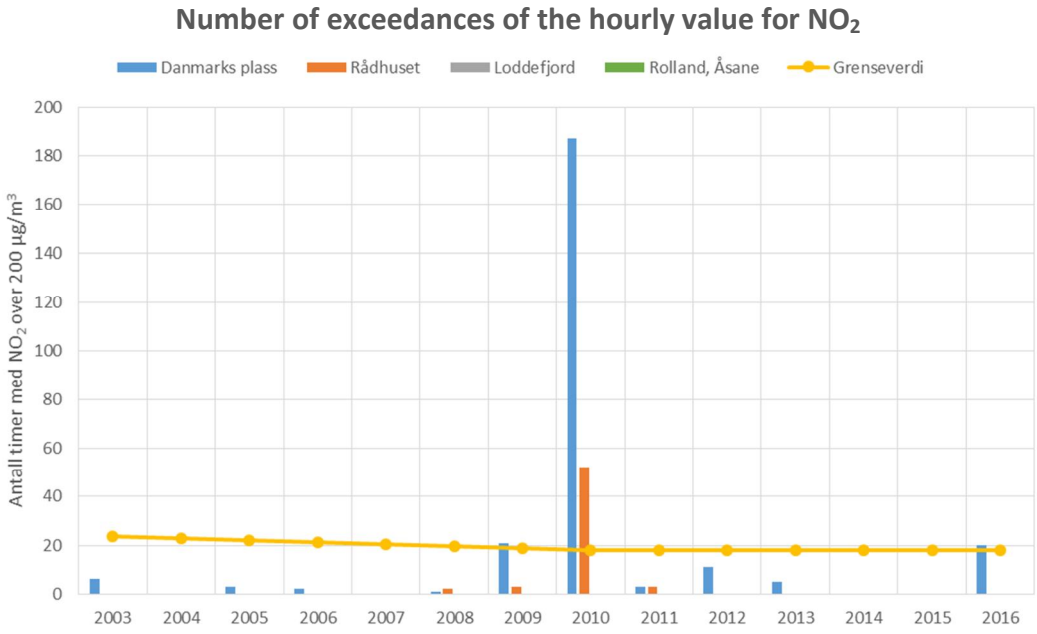
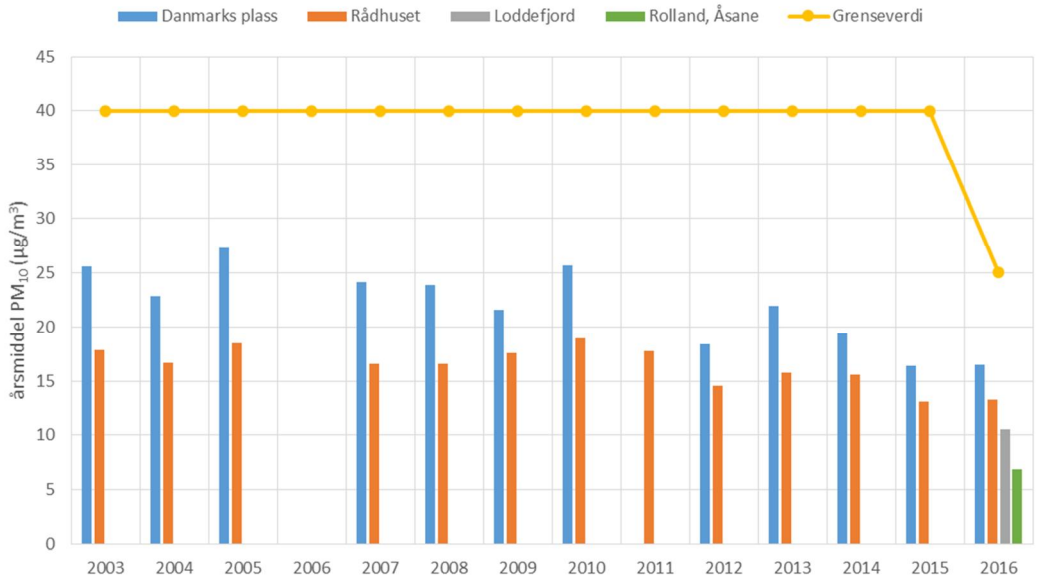


Figure 2: Top: Annual mean NO_2 concentration ($\mu g/m^3$). Bottom: Number of exceedances of the hourly limit value in Bergen, 2003 to 2016. The limit values set out in the Pollution Regulations are shown as a yellow line.

Measured annual mean PM_{10} concentration



Number of exceedances of the daily value for PM_{10}

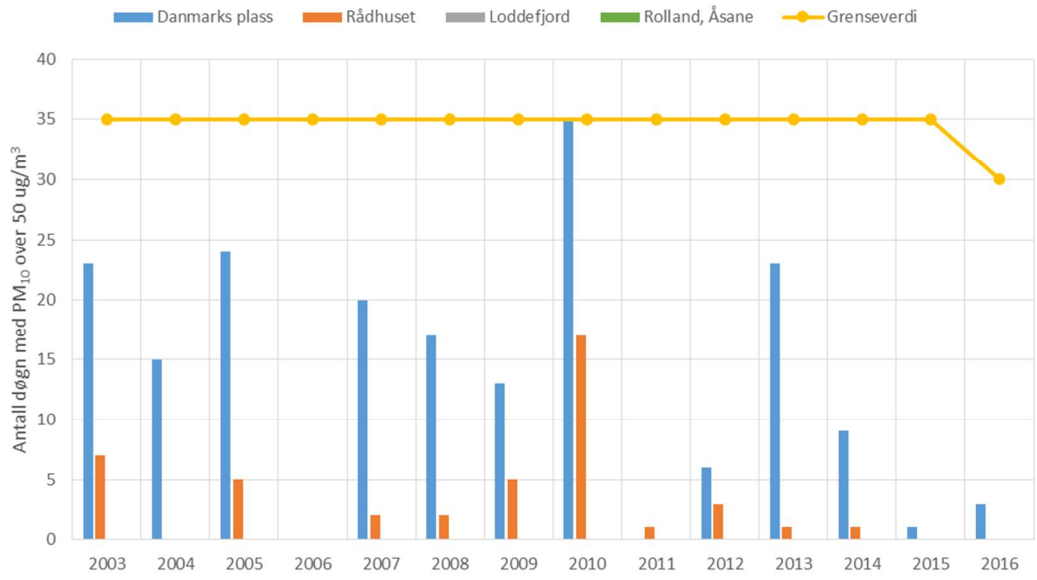


Figure 3: Top: Annual mean PM_{10} concentration (µg/m^3). Bottom: Number of exceedances of the daily limit value in Bergen, 2003 to 2016. The limit values set out in the Pollution Regulations are shown as a yellow line.

Measured annual mean $PM_{2.5}$ concentration

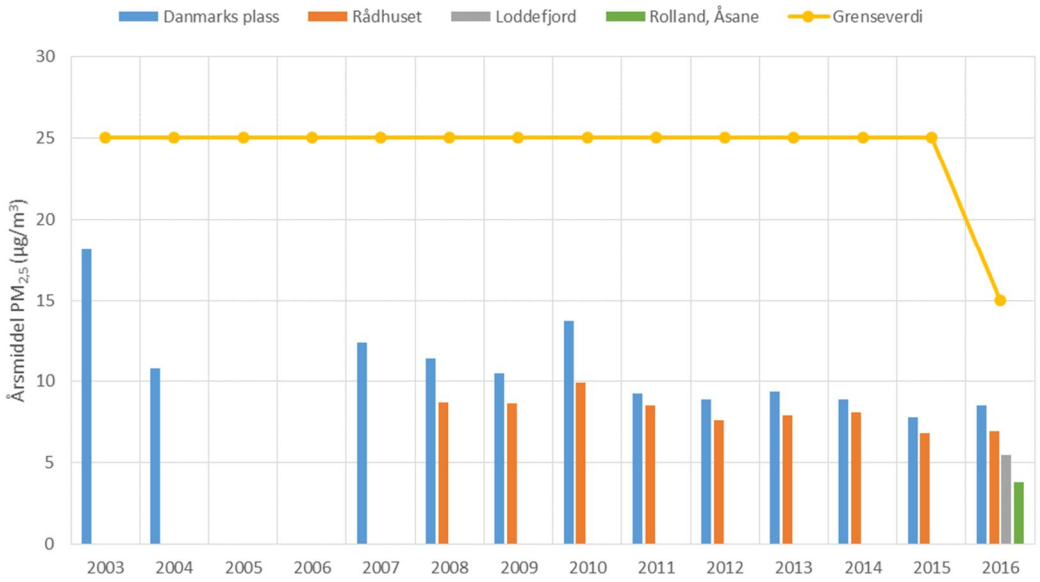


Figure 4: Annual mean $PM_{2.5}$ concentration (µg/m^3) in Bergen, 2003 to 2016. The limit values set out in the Pollution Regulations are shown as a yellow line.

5 Air quality in Bergen today and projections until 2021

NO_2

The air quality calculations show that NO_x emissions from traffic are expected to be reduced by approximately 40 per cent in the period from 2015 to 2021. The reduction is primarily due to the phasing in of new heavy vehicles with Euro VI technology, which have proven to have very low NO_x emissions.[3] In addition, an increased proportion of zero-emission vehicles will help to reduce emissions in the years to come.

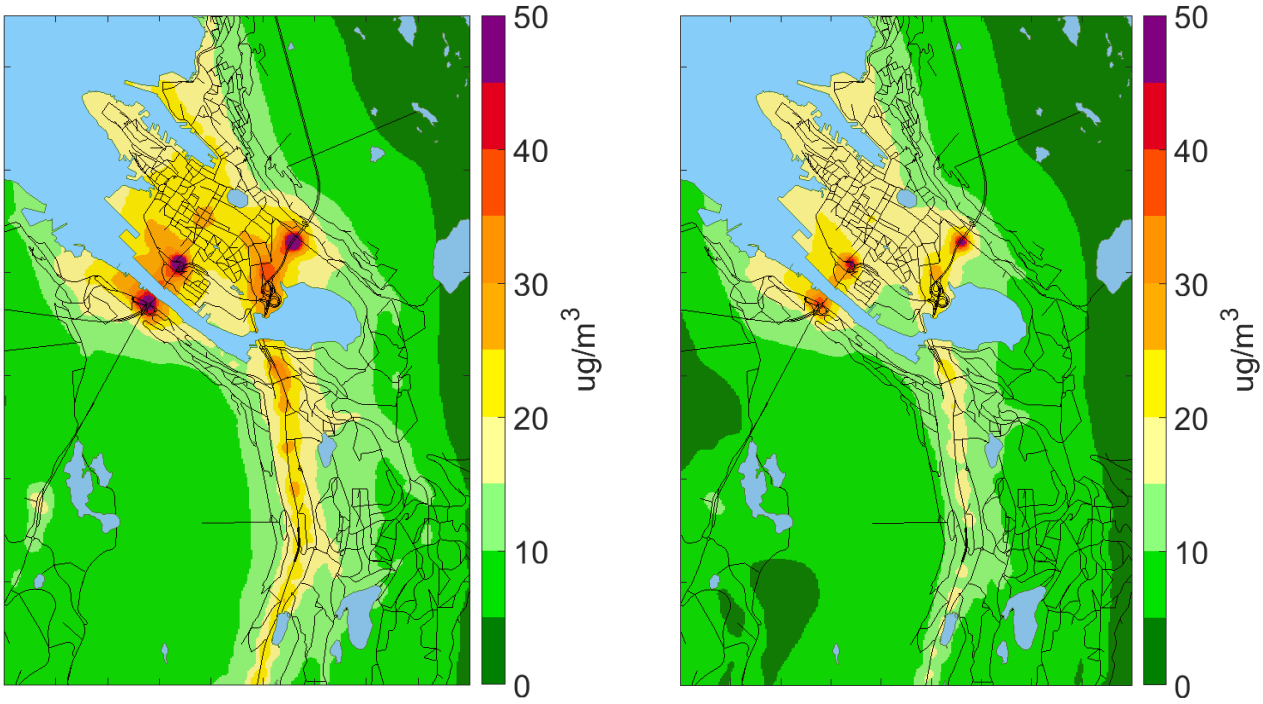
The expected reduction in NO_x emissions also means that a considerable reduction is expected in the annual mean concentrations up until 2021, which means that the risk of exceedances will be considerably reduced; see Figure 5. The calculations still show exceedances of the annual mean value near the tunnel openings of Fløyfjellstunnelen, Nygårdstunnelen and Løvstakktunnelen/Damsgårdstunnelen, but the areas where exceedances occur are smaller than in the current situation.

Elevated concentrations around the tunnel openings are expected, provided that there are no ventilation towers in continuous operation, since emissions from the tunnels are released in a limited area. How well the model handles the dispersion from the tunnel openings is difficult to verify, however, as there are few measurements with which to compare the model results. Due to lack of information, the effect of ventilation towers (where such exist) is not included in the calculations. It is therefore possible that the model overestimates the concentrations where ventilation towers are installed (e.g. Fløyfjellstunnelen) and in operation when there is a considerable amount of traffic in the tunnel (for example during

[3] Emissions from vehicles with Euro 6/VI technology. Results of the monitoring programme in EMIROAD 2015 (TØI/1506/2016)

rush hour). More detailed studies are needed to assess the levels in these areas and how large areas around the openings may have concentrations exceeding the limit value.

In 2015, the City of Bergen measured NO_2 with the help of passive monitors in Møhlenpris, Damsgård and Kalfaret. In each place, one monitor was placed relatively close to the tunnel opening and one a few hundred metres away. The measurements show that the levels are considerably lower a distance away from the tunnel opening, but a more detailed analysis is nonetheless recommended to verify the levels in nearby residential areas, especially in areas of Møhlenpris near the tunnel opening of Nygårdstunnelen.

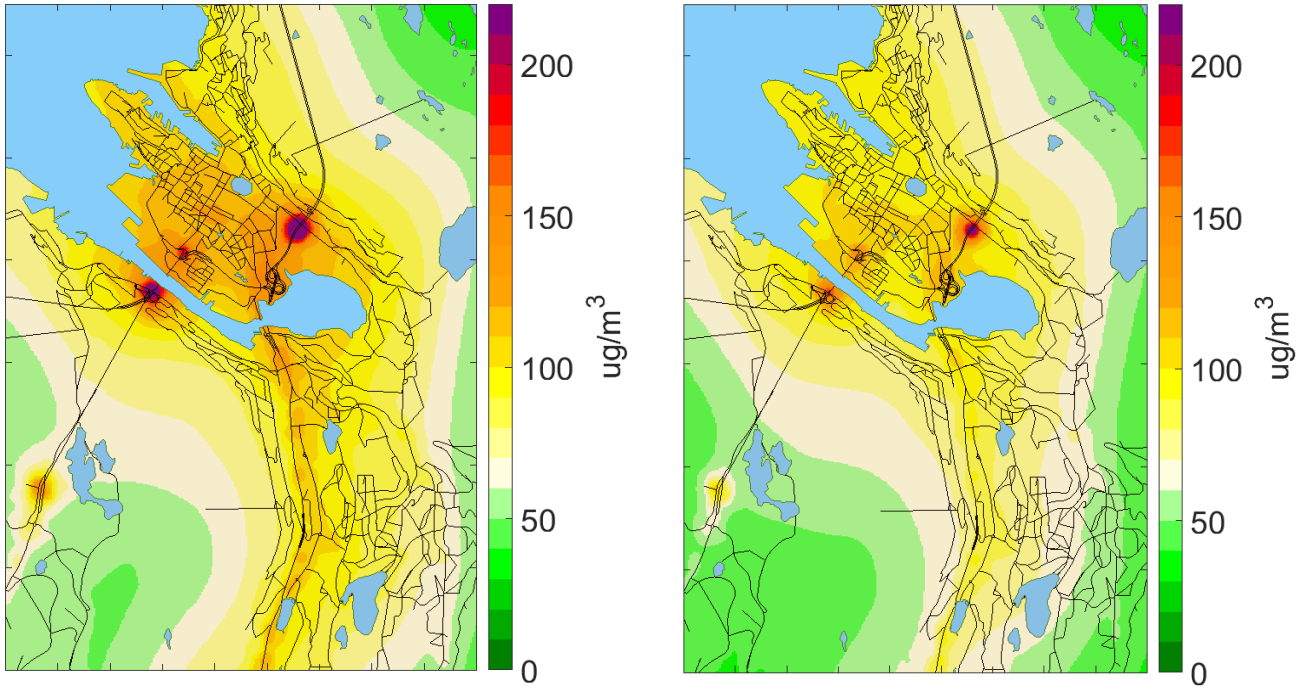


a) Current situation (2015) *b) Reference situation (2021)*

Figure 5: Estimated annual mean NO_2 concentration in Bergen city centre for a) the current situation (2015) and b) the reference situation (2021). Limit value for annual mean NO_2 concentration of 40 µg/m^3.

The calculation results for the current situation (2015) and the reference situation (2021) in relation to the Regulations' requirement for hourly mean values of NO_2 are shown in Figure 6. Because the Regulations' requirement for hourly mean NO_2 permits 18 hours of exceedances of the limit value of 200 µg/m^3, the map shows the geographical distribution of the 19th highest hourly concentration of NO_2.

The risk of exceeding the hourly mean limit value is also expected to be considerably reduced in 2021, but exceedances cannot be ruled out if one or more prolonged inversion episodes occur during the year. Effective immediate measures that can be implemented quickly when there is a risk of exceedances will therefore be important.



a) Current situation (2015) *b) Reference situation (2021)*

Figure 6: The map shows the 19th highest hourly mean NO_2 concentration in Bergen city centre for a) the current situation (2015) and b) the reference situation (2021).

Measures that contribute to reduced traffic and/or accelerate the phasing in of cleaner vehicles will help to further reduce the risk of exceedances of both annual mean and hourly mean limit values.

The results are contingent on NO_x emissions from heavy vehicles with Euro VI technology being as low as expected. So far, the test measurements performed show a far greater reduction than expected in the calculations in the assessment of measures.

PM_{10}

Traffic and wood burning are the most important sources of PM_{10} in Bergen. The calculations show that road dust emissions will increase somewhat up until 2021, while exhaust particle emissions are expected to be reduced in the same period due to cleaner engine technology.

Therefore, only minor changes in the PM_{10} concentration are expected up until 2021; only a slight increase in traffic-exposed areas where there is traffic growth. The calculations show a low risk of exceedances of the limit values for PM_{10} in 2021 (both the annual mean and the daily mean) in most places in Bergen, but exceedances may occur near tunnel openings in Bergen city centre; see Figure 7.

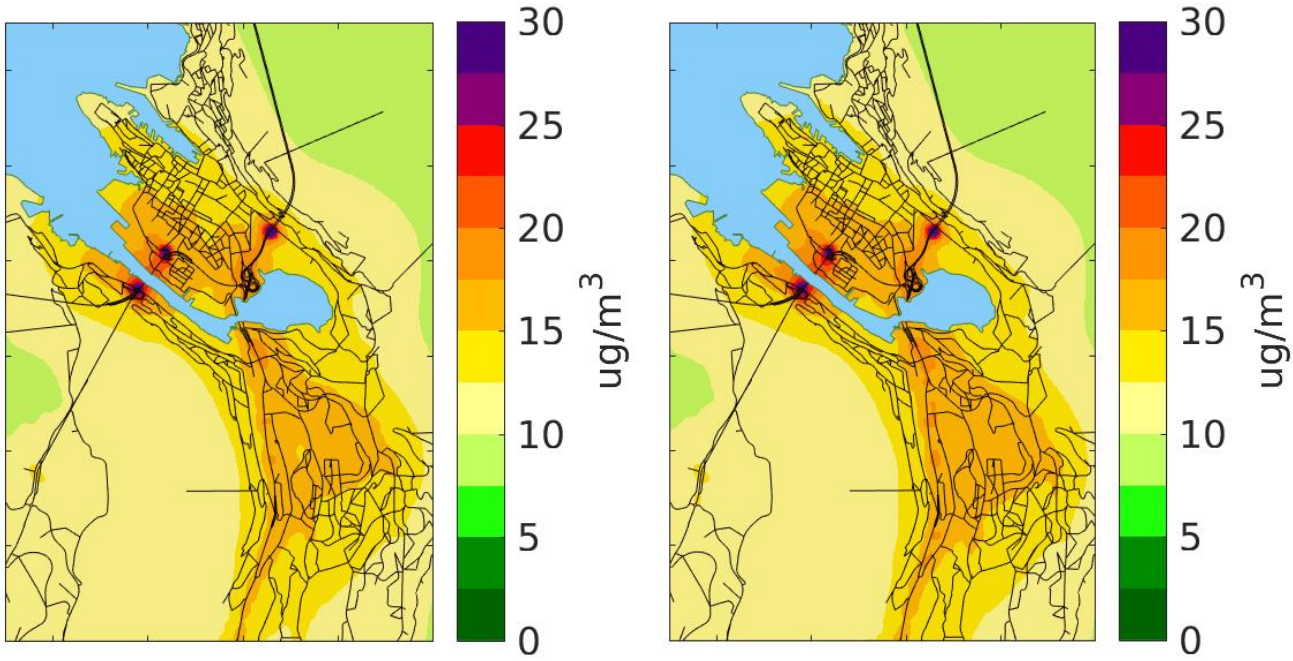
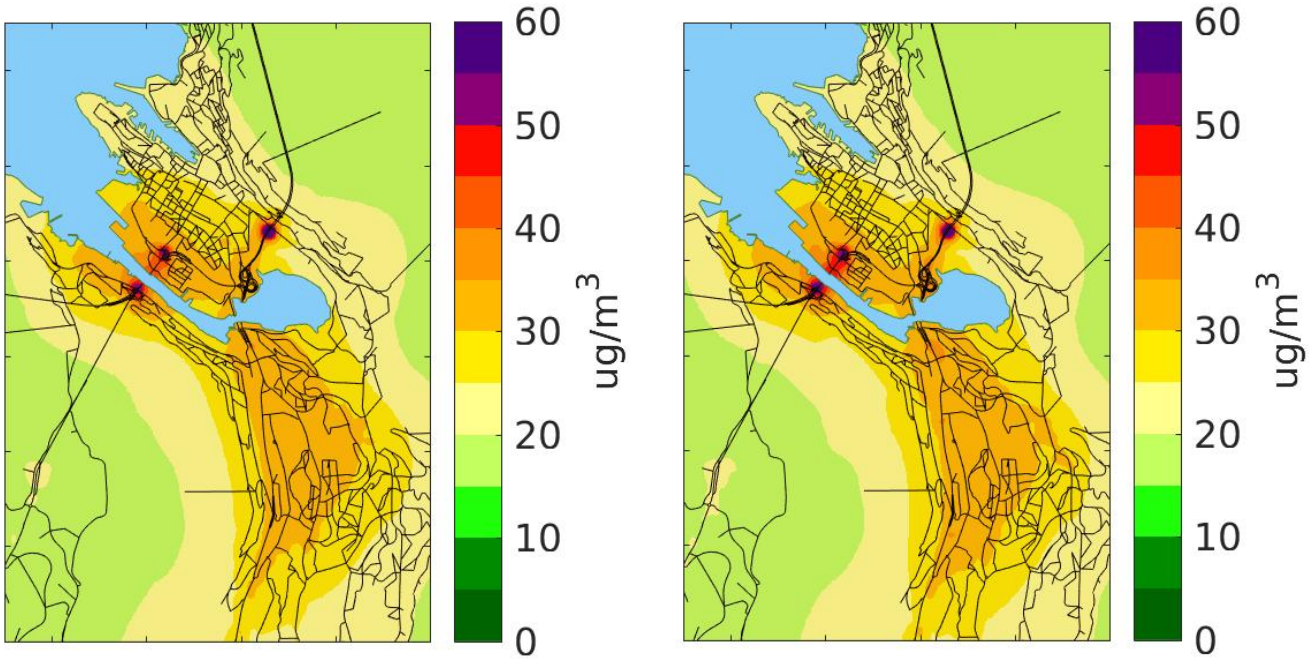


Figure 7: Estimated annual mean PM_{10} concentration in Bergen city centre for a) the current situation (2015) and b) the reference situation (2021).

The estimated annual mean values are also below the Government's national targets and the health authorities' recommendation for the maximum annual mean PM_{10} concentration of 20 µg/m^3 in most places, except areas around tunnel openings.

The calculation results for the current situation (2015) and the reference situation (2021) in relation to the Regulations' requirement for daily mean values of PM_{10} are shown in Figure 8. Because the Regulations' requirement for daily mean PM_{10} permits 30 days of exceedances of the limit value of 50 µg/m^3, the map shows the geographical distribution of the 31st highest daily mean concentration of PM_{10}. Again, the calculations show that levels exceeding the daily mean limit value only are only found in areas near tunnel openings in Bergen city centre. In addition, the calculations show higher values in the areas around the openings of Lyderhorntunnelen (Høiskar et al., 2017).



a) Current situation (2015) *b) Reference situation (2021)*

Figure 8: The map shows the 31st highest daily mean PM_{10} concentration in Bergen city centre for a) the current situation and (2015) and b) the reference situation (2021).

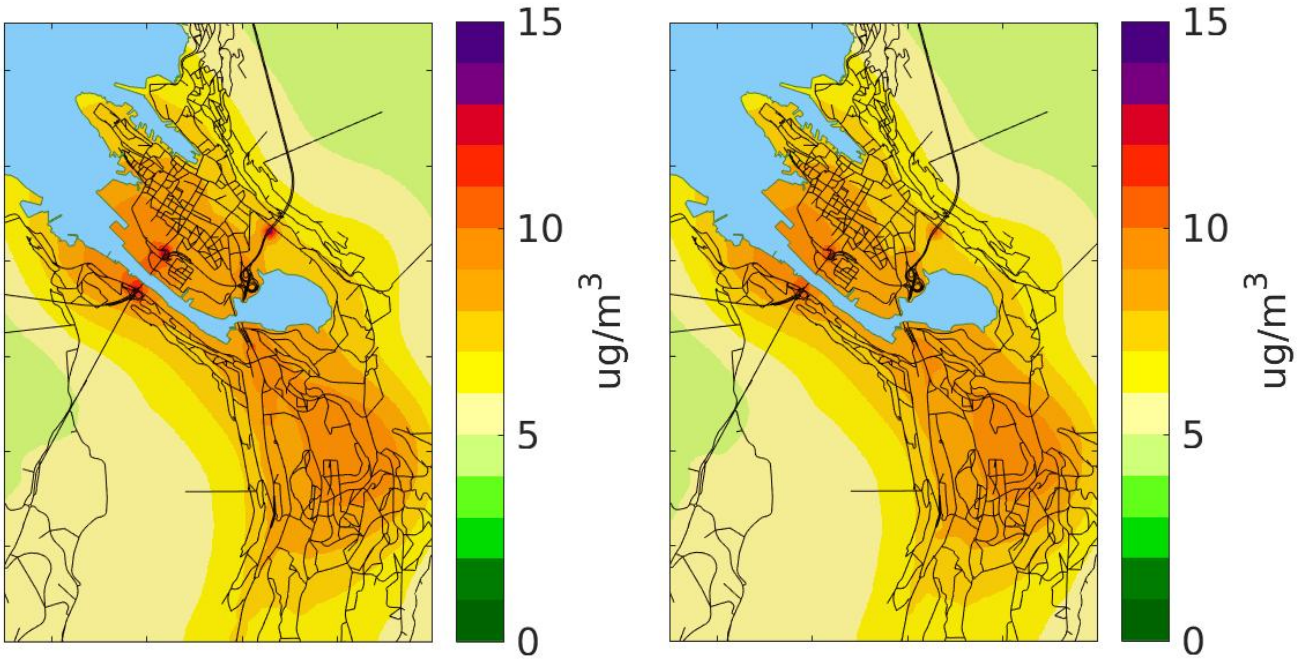
The concentrations around tunnel openings are uncertain, and more detailed studies are therefore recommended of the levels around the openings, especially in built-up areas or areas where new buildings are planned.

Despite the fact that the PM_{10} concentrations are below the limit values in most places, the number of days when the daily mean exceeds the air quality criteria (the health authorities' recommendations) is nonetheless high, and measures that reduce emissions of particulate matter may reduce this number.

$PM_{2.5}$

The calculations show that the annual mean $PM_{2.5}$ concentration is well below the limit value of 15 µg/m^3 throughout the municipality; see Figure 9. In areas close to the city centre, the calculations show $PM_{2.5}$ concentrations near or just above the national targets and the health authorities' recommendation of 8 µg/m^3, both for the current situation (2015) and for the reference situation (2021).

The levels of $PM_{2.5}$ in Bergen will thus not trigger a requirement for measures to be introduced to reduce the levels, because the limit value in the Pollution Regulations is not exceeded. Measures to reduce $PM_{2.5}$ emissions, on the other hand, may help to reduce the annual mean value and the number of days when the daily mean exceeds the air quality criteria, and also reduce the risk of exceeding the daily mean limit value for PM_{10}.



a) Current situation (2015) *b) Reference situation (2021)*

Figure 9: Estimated annual mean $PM_{2.5}$ concentration in Bergen city centre for a) the current situation (2015) and b) the reference situation (2021).

The risk of exceeding the limit values for NO_2 will be reduced considerably up until 2021, with regard to both the annual mean and the hourly mean. Exceedances may occur in areas near some tunnel openings.

For PM_{10} and $PM_{2.5}$, minor changes in the levels are expected up until 2021 compared with the current level, if no additional measures are implemented.

The annual mean and daily mean PM_{10} concentrations are well below the limit values, and also below the national targets and air quality criteria, except around some tunnel openings.

The annual mean $PM_{2.5}$ concentrations are well below the limit value throughout the municipality. In areas close to the city centre, the $PM_{2.5}$ concentrations are near or just above the national targets and the health authorities' recommendation. In other parts of the municipality, the annual mean is below the national targets.

6 Effect of package of measures

Based on a review of the results of the projections up until 2021, the working group agreed on what measures to recommend in a revised ten-point action plan for improved air quality in Bergen. Measures with a quantifiable effect were included in a package of measures, and new traffic, emission and dispersion calculations were carried out for the package as a whole.

The package includes the following measures:

1. **Environmentally differentiated road tolls and new toll collection points**

   The measure is expected to have a traffic-reducing effect and to reduce emissions of NO_2 and particulate matter from traffic.

2. **Prohibition against old wood-burning stoves from 2021**
   The measure is expected to reduce emissions of particulate matter.

3. **Studded tyres fee continued as today**

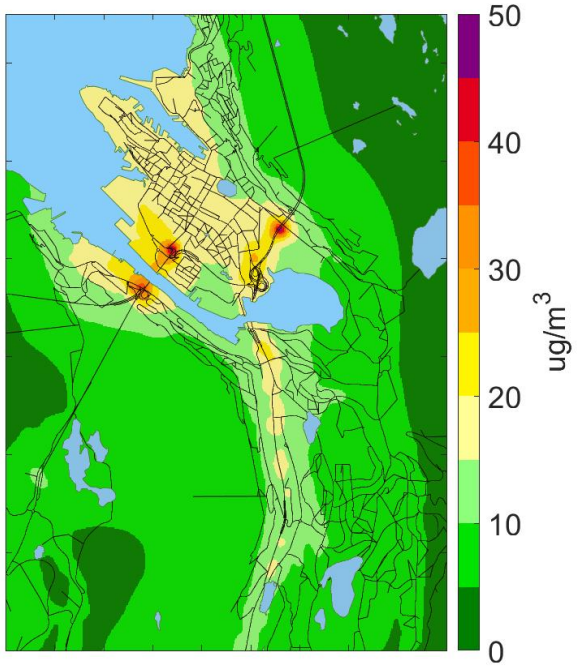
   The measure is not new and is therefore already included in the projection up until 2021. Continuation of the measure ensures a high proportion of non-studded tyres and reduces road dust emissions.

4. **Bergen Light Rail line to Fyllingsdalen**.

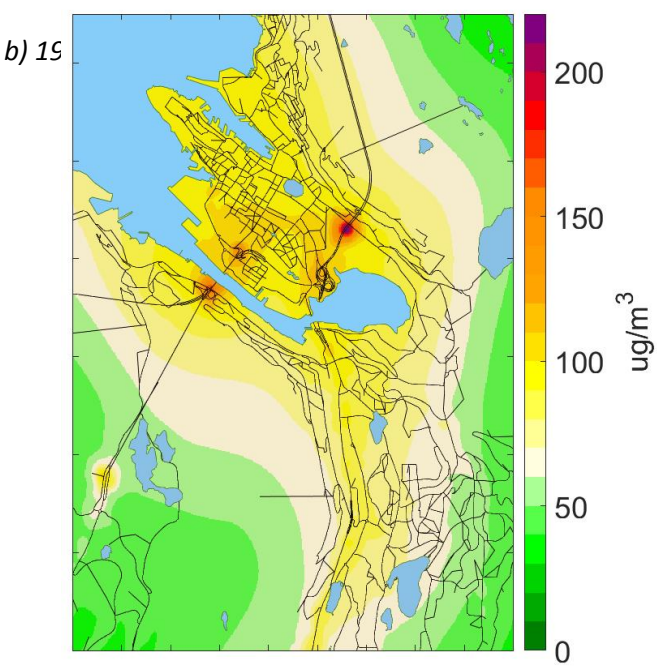
   The measure is expected to have a traffic-reducing effect and to reduce emissions of NO_2 and particulate matter from traffic.

The calculations show that the proposed measures will reduce the annual mean NO_2 and PM_{10} concentrations in Danmarks plass by 4 and 6 per cent, respectively, while the effect will be less pronounced in places not equally affected by traffic.

The model calculations also show that, even with these measures, there may still be a risk of limit value exceedances for NO_2 and PM_{10} near tunnel openings in Bergen city centre; see Figure 10 and 11. This concerns both the annual mean and the short-term mean values (hourly for NO_2 and daily for PM_{10}).

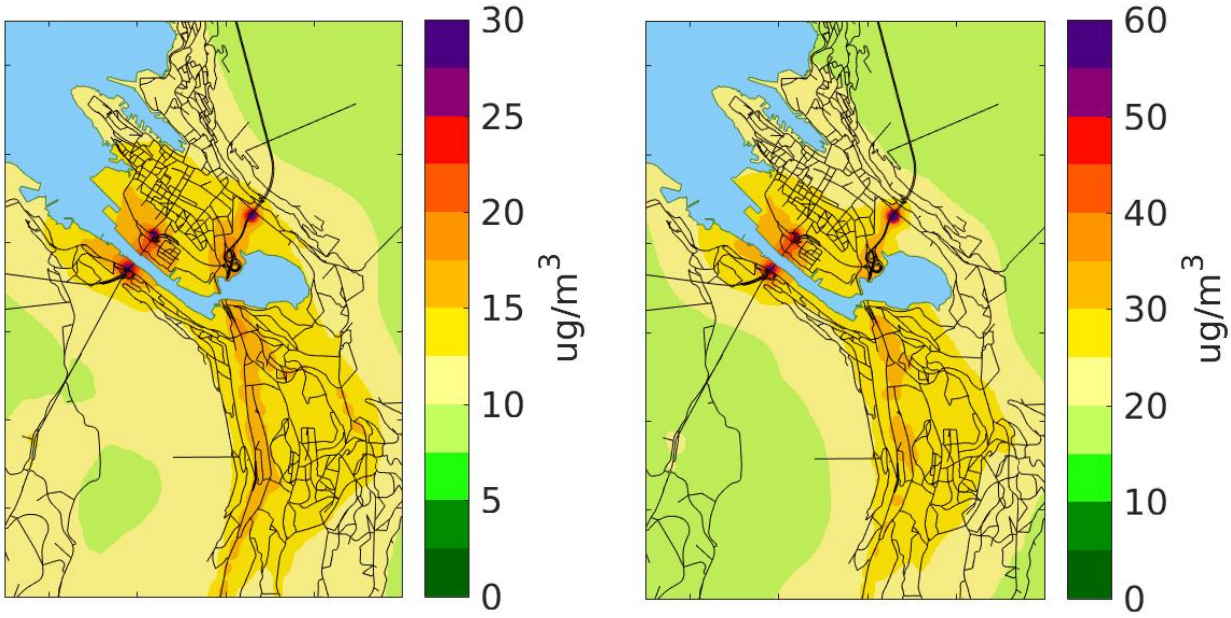


a) Annual mean NO_2



b) 19th highest hourly mean NO_2

Figure 10: The figure on the left shows the estimated annual mean NO_2 concentration (µg/m^3) for the reference situation (2021) if the package of measures is implemented, while the figure on the right shows the 19th highest hourly mean.



a) *Annual mean PM_{10}*

b) *31st highest daily mean PM_{10}*

Figure 11: The figure on the left shows the estimated annual mean PM_{10} concentration (µg/m^3) for the reference situation (2021) if the package of measures is implemented, while the figure on the right shows the 31st highest daily mean.

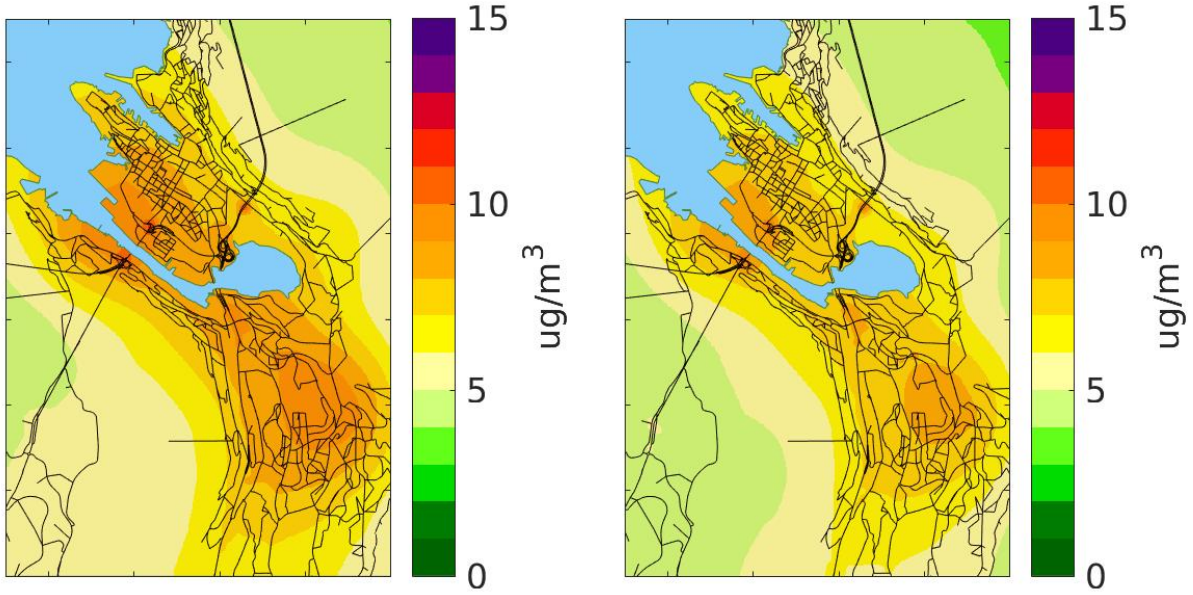
The model calculations are uncertain around tunnel openings, and previous measurements show that the levels decrease markedly in step with the distance to the opening. A more detailed mapping should be carried out of NO_2 and PM_{10} concentrations in areas around tunnel openings that show elevated values, to document whether the levels in residential and public areas exceed the limit values.

The calculations show that the risk of limit value exceedances for NO_2 is low in 2021. However, it is important to underline that the annual mean and the number of exceedances of the hourly mean limit values depend on meteorological conditions and may vary substantially from one winter to the next. The weather in the year that forms the basis for the calculations (2015) was relatively mild, and exceedances cannot be ruled out in a year with prolonged periods of poor dispersion conditions (inversion episodes). It is therefore important to have effective immediate measures that can be implemented when there is a risk of high air pollution.

For $PM_{2.5}$, the annual mean is currently well below the limit values throughout the City of Bergen. The Pollution Regulations therefore do not require measures to be implemented to reduce the $PM_{2.5}$ levels.

The package of measures leads to a reduction in the annual mean $PM_{2.5}$ concentrations of approximately 10 per cent in Bergen city centre. If the proposed measures are introduced, most areas in Bergen are expected to have annual mean values below the national targets;

see Figure 12. The calculations thereby show that a prohibition against the use of old wood-burning stoves in 2021 will be an important contribution to reducing $PM_{2.5}$ levels in Bergen city centre.



a) The reference situation (2021)

b) The reference situation (2021) if the package of measures is implemented

Figure 12: The figure shows the annual mean $PM_{2.5}$ concentration for a) the reference situation (2021) and b) the reference situation (2021) if the package of measures is implemented. The package of measures leads to a reduction in the annual mean concentrations of approximately 10 per cent in Bergen city centre.

On days with inversion, the $PM_{2.5}$ levels may nonetheless exceed the daily mean air quality criteria. Emissions from wood burning make a substantial contribution to the high levels on such days, and reducing these emissions can reduce the number of days when the daily mean exceeds the air quality criteria (the health authorities' recommendations).

The risk of exceeding the limit values for NO_2, PM_{10} and $PM_{2.5}$ is deemed to be low in 2021. The proposed measures help to reduce the risk of limit value exceedances for both NO_2 and PM_{10}. The measures will also help to reduce levels of particulate matter and NO_2 on days with inversion.

It is important that effective immediate measures can be implemented to reduce NO_2 emissions on days when there is a risk of high air pollution, in order to further reduce the risk of exceedances.

7 Ten-point programme for improved air quality in Bergen

Based on a review of the results of the calculations in this assessment and discussions in the working group, a revised ten-point action plan is recommended, as shown in Table 2.

Table 2: Recommended ten-point action programme for improved air quality in Bergen. Assessment of measures to improve local air quality in Bergen.

Ten-point action plan for improved air quality in Bergen	Effect	Responsibility	Time frame	Cost
1. Time-differentiated and environmentally differentiated road tolls with new rates and collection points	NO_2 PM_{10}	The parties to the Bergen Programme. Must be considered by the Storting.	Tentative consideration in autumn 2017.	Generates income. Precondition for point 2.
2. Strengthening of public transport – Bergen Light Rail line to Fyllingsdalen, in addition to facilitating more trolleybuses and zero-emission buses	NO_2 PM_{10}	The parties to the Bergen Programme.	Currently at the planning stage.	Funded by urban growth agreement and road tolls.
3. Shoreside power for ships at berth, and maximum limit for number of cruise ship calls a day	NO_2	Port of Bergen	Ongoing.	Cruise ships: NOK 140 mill. not financed. Offshore, Hurtigruten, others: NOK 27 mill., ENOVA application
4. Measures in and around the tunnels in Bergen city centre	NO_2 PM_{10}	The Norwegian Public Roads Administration (NPRA)	Mapping of scope can start immediately. Monitoring for at least a year	One year of monitoring using 20 monitoring stations costs in the region of NOK 120,000.
5a. Parking restrictions	NO_2 PM_{10}	Relevant municipalities	Ongoing, many measures already introduced.	The measure is not specific enough for a concrete assessment of revenues and costs.
5b. Building more park-and-ride facilities		Hordaland County Council	Establishing 3,500 new places by 2030	
6. Continuation of studded tyres fee	PM_{10}	City of Bergen	Introduced	Generates income.
7. Street cleaning and dust binding	PM_{10}	NPRA / City of Bergen	Ongoing	NPRA – approx. NOK 2.5 mill. City of Bergen – approx. NOK 1 mill.
8. Grant for replacement of old wood-burning stoves, and prohibition from 2021	$PM_{2.5}$ PM_{10}	City of Bergen	Ongoing. Prohibition from 2021.	Total cost: NOK 50 mill., plus inspection costs.
9. Warnings and information	NO_2, PM_{10}, $PM_{2.5}$	City of Bergen	Ongoing	NOK 1.5 mill.
10. Mobility and municipal measures, with particular focus on facilitating cycling and carpooling.	NO_2, PM_{10}	City of Bergen	Ongoing	

8 Bergen City Council, decision of 27 Sept. 2017, item 230/17

‘Assessment of measures for improved local air quality in Bergen 2017’

1. Bergen City Council endorses the ‘Assessment of measures for improved local air quality in Bergen 2017’.

2. The revised ten-point programme as described in Part 2 of the ‘Assessment of measures for improved air quality in Bergen’, with the changes and specifications provided under ‘the City Government’s recommendations’ as described in this item, make up the City of Bergen’s action plan for improved air quality.

3. The budgetary consequences of the action plan will be considered in connection with Interim Report 2 (for 2017) and in connection with the City Government’s proposal for the Action Plan 2018–2021/Budget 2018.

4. Point 2 is changed to: ‘Strengthening of public transport – Bergen Light Rail line to Fyllingsdalen, in addition to facilitating more trolleybuses and zero-emission buses.’

5. Public transport must be competitive and an attractive alternative. Work continues on establishing bus and taxi lanes on the most heavily trafficked roads into Bergen.

6. Point 10 is changed to: ‘Mobility and municipal measures, with particular focus on facilitating cycling and carpooling.’

The City Government’s recommendations

The City Government proposes the following changes and specifications in the ten-point programme:

<u>Point 1: Time-differentiated and environmentally differentiated road tolls with new rates and collection points</u>

The City of Bergen has previously decided to introduce low-emission zones when this option becomes available. The City Government believes we now have an assessment that means that, in practice, it will not be necessary to introduce low-emission zones subject to fees, because technological development, supplemented by the introduction of environmentally differentiated road tolls, can have a very good effect on the local air quality and will ensure that Bergen meets the statutory requirements by a good margin within a few years.

In that connection, the City Government refers to the City of Bergen’s consultative statement to the Regulations on low-emission zones (City Government item 1381/16), which states:

‘*In its further work, the City of Bergen will consider the resources needed and the expediency of establishing low-emission zones as a municipal, parallel system to road tolls*.’

<u>Point 2: Strengthening of public transport – Bergen Light Rail line to Fyllingsdalen</u>

The parties to the Bergen Programme are responsible until the end of the year. From 2018, the Bergen Programme will be replaced by an Urban Growth Agreement.

The City Government would like to point out that 'Strengthening of public transport' does not only concern the Bergen Light Rail line to Fyllingsdalen. Reference is made to the draft Urban Growth Agreement for Bergen, which was approved by the City Council on 31 May 2017 under item 145/17 'Draft first-generation Urban Growth Agreement for Bergen, 2017–2023'.

The main goal of the agreement is to contribute to zero growth in passenger car transport in the area covered by the agreement, meaning the entire City of Bergen. In other words, all growth in passenger traffic shall be in the form of public transport, cycling and walking. Commercial traffic and through-traffic are exempt from the zero growth objective.

This item is closely linked to parallel item 146/17 'Road toll application for new city package in Bergen', intended to ensure local co-funding of the content of the Urban Growth Agreement.

Point 5: Parking restrictions and park-and-ride facilities

The City Government believes these measures are so different that they must be split into two points:

5a Parking restrictions. The municipalities concerned are responsible for this measure. At the same time, reference is made to long-term measures in the development of the new land use strategy in the land use part of the municipal master plan (KPA), which will further strengthen this.

5b Building more park-and-ride facilities. Hordaland County Council is responsible for park-and-ride facilities. Reference is made to the 'Strategy for park-and-ride facilities', adopted by the county council (Fylkestinget) on 11 March 2015. Fylkestinget has adopted a strategy for growth from today's 2,500 places to approx. 6,000 places in park-and-ride facilities up until 2030. Arrangements shall be made for electric car charging in 20 per cent of the places.

Point 10: Mobility and municipal measures

Reference is made to the Green Strategy and the 'Climate and Environmental Plan for the City of Bergen's activities from 2017 to 2020', which was considered and adopted by the City Council on 22 March 2017. These plans are ambitious in relation to changed mobility, zero-emission technology and traffic development; this is also positive for air quality.

9 References

Høiskar, B. A. K., Sundvor, I., Johnsrud, M., Haug, T. W., Solli, H. (2017) Assessment of measures for improved local air quality in Bergen (NILU report, 15/2017). Kjeller: NILU.

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