



16 November 2023

Impact assessment of a class 3 low-emission zone in an area bounded by Kungsgatan, Birger Jarlsgatan, Hamngatan and Sveavägen.

Summary

In the 2024 budget, the Transport Committee was commissioned by the City Council to introduce a class 3 low-emission zone in an area of the City district on 31 December 2024. The area is bounded by Kungsgatan, Birger Jarlsgatan, Hamngatan and Sveavägen.

Low-emission zones are introduced to improve air quality, reduce noise and be a technology driver. The purpose of this investigation is to assess the impact of the introduction and the city's mandate to introduce the class 3 low-emission zone. The investigation is based on a compilation and analysis of available data and information, as well as new data obtained from traffic measurements, air calculations and meetings with stakeholders.

The class 3 low-emission zone is governed by the Road Traffic Ordinance. This specifies which vehicles are permitted within the zone and that it is up to the municipality to determine which areas shall constitute a low-emission zone. Low-emission zones may be introduced in particularly sensitive areas within urban agglomerations, i.e. areas where many people are present and which are exposed to noise and exhaust gases.

The proposed area has nitrogen dioxide levels exceeding the World Health Organisation (WHO) guideline values and thus poses a risk to public health. There are large volumes of pedestrians in the area. The streets in the area are also relatively narrow and the air circulation is worse compared with the surrounding networks of streets.

The designated area is located in the City district of Stockholm, which is of great importance to Stockholm residents and the city's tourism industry. The low-emission zone is expected to contribute to improved public health through reduced morbidity and mortality from pulmonary and cardiovascular disease, reduced excess mortality and a reduced risk of a variety of health problems, especially among children, the elderly, pregnant women and other persons with poor health. In addition to contributing to better air for everyone living or working in the zone, the low-emission zone primarily affects those who do not have vehicles that meet the requirements of a class 3 low-emission zone. In respect of passenger cars, it will be necessary to either switch to vehicles that meet the requirements or to use other modes of transport or park outside the zone. This is one of Sweden's most accessible areas for travel without a car, which is reflected in the fact that nine per cent of the trips which start or end in the City district are by car.

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In terms of goods traffic, it is assessed that the potential to streamline flows is good and that there are enough vehicles on the market to provide the area with goods transport. Operators whose vehicles for transporting goods to the area do not meet the requirements for a class 3

low-emission zone must either acquire vehicles that meet the requirements, transfer the assignment to someone else or stop accepting assignments in the area.

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The Department has looked at similar regulations in Europe. Few cities in Europe have an equivalent class 3 low-emission zone (zero emission zone). London charges a daily charge for vehicles of older emission classes in line with a low-emission zone. Cities in the Netherlands and Oslo plan to introduce (in 2025 at the earliest) a zero-emission zone where regulation in the first few years will be aimed at goods transport. Paris has made a decision on a zero-emission zone for both light and heavy-duty vehicles from 2030.

The class 3 low-emission zone is likely to be the first of its kind and the Department's opinion is that the area meets the criteria for introducing a class 3 low-emission zone.

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1 Introduction

The assignment

In the 2024 budget, the Transport Committee was commissioned by the City Council to introduce a class 3 low-emission zone in an area of the City district. The budget statement reads: *‘A class 3 zone for environment-friendly vehicles shall be established in an area of the City district on 31 December 2024 and a decision on expansion shall be taken in the first half of 2025.’*

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The area proposed to become a class 3 low-emission zone on 31 December 2024 is bounded by Kungsgatan, Birger Jarlsgatan, Hamngatan and Sveavägen. The area has been identified as an area with high levels of emissions. The intention is for the area to be expanded in the future where there is a need to reduce the levels of harmful emissions.

Purpose and objectives

The purpose of providing for low-emission zones in legislation is to improve air quality, reduce noise and be a technology driver. The purpose of this investigation is to assess the impact of the introduction and the city's mandate to introduce the class 3 low-emission zone.

The aim is for nitrogen dioxide levels in the proposed area to meet the WHO guideline values in the long term.

Delimitations and methodology of the impact assessment

This investigation focuses on the initial introduction of a class 3 low-emission zone for the area, where the regulation is to be introduced on 31 December 2024. The designated area is bounded by Kungsgatan, Birger Jarlsgatan, Hamngatan and Sveavägen. The named streets are not included in the proposed zone. The mouth of the Klara road tunnel on Mäster Samuelsgatan is part of the zone, according to the assignment.

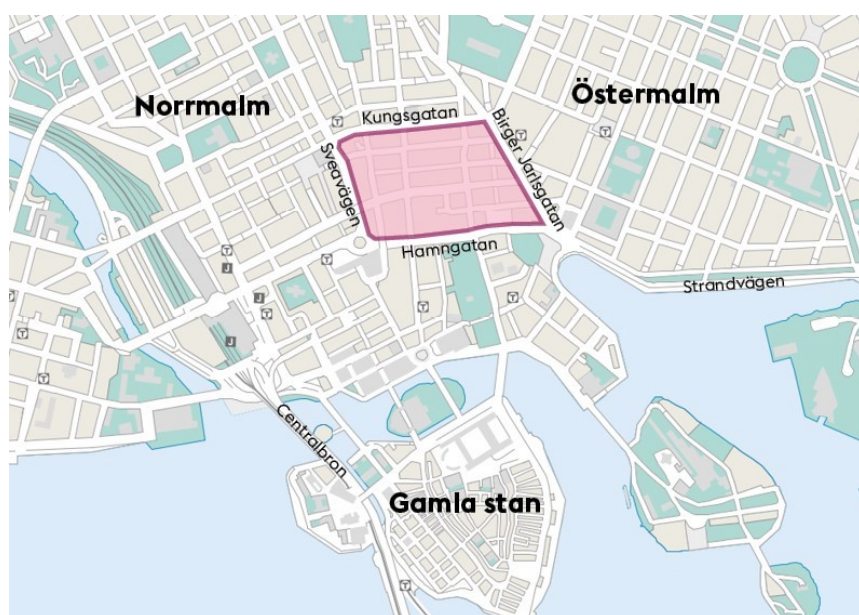


Figure 1. Map of the northern inner city and Gamla stan (Old Town) where the area in pink marks the area for the class 3 low-emission zone to be introduced on 31 December 2024.

A calculation has been performed of how air quality in the area will be affected by the introduction of the class 3 low-emission zone and a possible ban on studded tyres. The calculation has examined the effects on exhaust emissions both in the form of nitrogen dioxide and particulate matter, PM10. The impact on noise has been studied, but no calculation of effects has been carried out.

The investigation is based on a compilation of available data and information, as well as new data from traffic measurements, air calculations and meetings with stakeholders. The Department has had several meetings with different sectors of the business community and public actors. In order to reach out to as many people as possible, the focus has been on relevant industry organisations and property owners. The Department has also carried out traffic measurements in the area, where data on vehicles that passed a number of measuring points were collected. Analysis results and experiences from

previous assignments in connection with the area have also formed the basis for the assessments of traffic impact that have been made. For example, previous analyses concerning the Klara tunnel, Klarabergsgatan and Kungsgatan have been included in the assessment.

In order to reach citizens in the City of Stockholm, the Department turned to Stockholm City Citizen Panel, which comprises citizens from all over the city.

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2 Low-emission zone regulation

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The City of Stockholm has had low-emission zones since 1996, when a class 1 low-emission zone was introduced in the city centre. Class 1 low-emission zone rules govern trucks and buses over 3.5 tonnes which are subject to emission class Euro 6¹. As of 1 January 2020, municipalities were given the opportunity to introduce two additional low-emission zone classes: class 2 and class 3. A class 2 low-emission zone was introduced on Hornsgatan in 2020, covering light-duty vehicles subject to Euro 6 requirements for diesel vehicles and Euro 5 for petrol-powered vehicles.

The Road Traffic Ordinance specifies which vehicles are permitted in the different low-emission zones and it is up to the municipality to determine which area shall constitute a low-emission zone. Low-emission zones may be introduced in particularly sensitive areas within urban agglomerations.

A particularly sensitive area refers to 'an area where a large number of people are present and which includes parks, green areas, sensitive buildings, streets with many road users, as well as areas that are exposed to noise and exhaust gases or where there is a risk of exceeding environmental quality standards'.²

Low-emission zones are governed by the Road Traffic Ordinance

The Road Traffic Ordinance is a national regulation that contains provisions on road traffic. It governs low-emission zones, among other things. The Swedish Transport Agency has drawn up the preparatory work on the low-emission zone regulations for low-emission zone classes 2 and 3, and has issued general recommendations for municipalities on the introduction of low-emission zones³. The recommendations come from both the Swedish Transport Agency and the European Commission.

The Swedish Transport Agency's preparatory work⁴, which formed the basis for the expansion of the low-emission zone regulations to include class 2 and class 3, states that the class 3 low-emission zone:

- was created to reward emission-free and quiet vehicles.
- is expected to be used in smaller areas, in central locations in cities where speeds are below 50 km per hour.
- is expected to have spillover effects due to its contribution to driving new technologies and fleet renewal.

According to the Swedish Transport Agency, an area with the strictest requirements for emission-free vehicles should not be so large that it entails disproportionate restrictions on free movement, in this case for vehicles. The National Board of Trade is the Swedish authority responsible for matters relating to foreign trade, the EU's internal market and EU trade policy. The National Board of Trade decides whether the municipality's decision to introduce a class 3 low-emission zone should be notified to the European Commission. The Commission in turn examines whether the proposal restricts freedom of movement.

Which vehicles are covered by a class 3 low-emission zone

Low-emission zones are divided into 3 classes:

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The emission classes in which Euro 6 is included is a classification system governed by the Exhaust Emission Control Act (2011:318), which is based on EU directives (715/2007 and 2005/55/EC). The emission class a vehicle is assigned to is based on how much carbon monoxide (CO), hydrocarbons (HC), nitrogen oxides (NOx) and particulate matter an engine emits.

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Low-emission zones – Swedish Transport Agency retrieved 9 May 2023

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SAIC ADV 4545, Low-emission zones for light vehicles

SAIC ADV 4545

1. Class 1 low-emission zones are subject to provisions for heavy buses and heavy goods vehicles.
 2. Class 2 low-emission zones are subject to provisions for light buses, light trucks and passenger cars.
 3. Class 3 low-emission zones are subject to provisions for vehicles listed in points 1 and 2. Page 7 (29)
- Class 3 low-emission zones have the strictest requirements for vehicles. In this zone, only electric, fuel cell and gas vehicles of emission class Euro 6 may be used. Heavy-duty vehicles may be plug-in hybrids if the vehicles comply with Euro 6 emission standards. Plug-in or electric hybrid passenger cars, light trucks or light buses are not permitted within class 3 low-emission zones.

Mobile machinery⁵, motorcycles and mopeds are not covered by the regulation.

Class 3 low-emission zones takes precedence over class 1 low-emission zones if the two regulations cover the same area.

Vehicles used within a low-emission zone must be able to demonstrate the emission requirements the vehicle is in compliance with. For most vehicles, these data are included in the Swedish Road Traffic Register. Where the data are not included in the Swedish Road Traffic Register (e.g. vehicles from other countries), the driver must carry documents showing the vehicle's emission requirements.

General exemptions under the Road Traffic Ordinance

The Road Traffic Ordinance contains a list of specific vehicles exempted from class 3 low-emission zones, see Table 1. In addition to those vehicles, road maintenance vehicles are also exempted, if circumstances so require, that is to say, vehicles used for snow removal, gritting, sweeping or other road maintenance.⁶

Table 1. The following vehicles are exempt from the regulations on class 3 low-emission zones in accordance with the Road Traffic Ordinance.

Exempt vehicles	Explanation from the Road Traffic Ordinance
Vehicles used for professional purposes by a police officer or some other official employed by the Swedish Police Authority or Swedish Security Service, customs officer, coastguard official, doctor, nurse, midwife or veterinary surgeon.	Refers to important social functions
Vehicles used for the transportation of unwell persons to a doctor or hospital.	
Vehicles used for emergency services.	
Vehicles used in other comparable urgent circumstances.	
Emergency vehicles in cases other than those referred to above	
Vehicles used by personnel of the Swedish Prison and Probation Service for the transport of Transport Department Transport planning Fleminggatan 4 Box 8311 104 20 Stockholm, Sweden Telephone +46 (0)8 508 87 511 Switchboard +46 (0)8 508 27 200 emil.hagman@stockholm.se trankorner@stockholm.se Corporate Identity No 212000-0142 Samskipperna	Since the Prison and Probation Service and the Swedish Security Service use light vehicles for their essential activities, they have also been exempted from the low-emission zone regulations.

⁵ Excavators, loaders, leaf blowers, trucks, etc.

⁶ Chapter 12, Section 11 of the Road Traffic Ordinance

persons held in custody or for urgent professional purposes.	
Vehicles belonging to or used by the Swedish Armed Forces, the Swedish Defence Materiel Administration, the National Defence Radio Establishment or the Swedish Defence Research Agency.	The legislature has prioritised ease of access for the various activities of the Swedish defence institutions and considered their possible impact within a future low-emission zone to be minor.
Vehicles used in specially arranged transportation as referred to in the Mobility Service Act (1997:736).	The mobility service contributes to the public benefit. When a mobility service vehicle is ready to be put into service, it is used for around five years. The Swedish Transport Agency believes that the existing fleet of vehicles for mobility services will have been replaced in 2025, when it may be appropriate re-evaluate the exemption.
Vehicles whose driver or passenger holds a parking permit for persons with reduced mobility pursuant to Chapter 13, Section 8 of this Ordinance.	Vehicles with passengers or drivers holding a parking permit for persons with reduced mobility are exempt.
Vehicles for which a car allowance has been granted under Chapter 52 of the Social Insurance Code. Ordinance (2018:1562).	These are vehicles that have been specially adapted with the help of an adaptation grant, basic grant and procurement grant, etc.

Exemption from low-emission zone regulations

In the same way as for other local traffic regulations, it is possible to apply for a vehicle exemption from the Transport Department in order to be exempted from the class 3 low-emission zone regulations. The municipality may grant an exemption if there are special reasons and this can be done without danger to road safety, road damage or any other significant inconvenience⁷. A vehicle exemption is an exemption for a specific vehicle. The exemption allows the vehicle to travel where it is not otherwise permitted. The terms *danger to road safety, road damage or any other significant inconvenience* are, according to the Swedish Transport Agency, something that the municipality, in its role as highway authority, must make a decision on. In order to obtain an exemption, the reasons must be unique and specific to the applicant. The main rule, in this case the class 3 low-emission zone regulations, must not be replaced by exemptions that are too general.

If the vehicle has received an exemption from the low-emission zone regulations, the exemption document must be available to be presented to the police either in physical or digital form.

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Chapter 13, Section 4 of the Road Traffic Ordinance

It is the Police Authority that is the supervisory authority for the local traffic regulations on low-emission zones and which monitors any possible infringements of the provisions on class 3 low-emission zones. Traffic monitoring is among the tasks that form part of the public order

and safety responsibilities of the police. Anyone who does not comply with low-emission zone regulations can be issued with a penalty fine of SEK 1 000⁸.

3 Air quality and noise – exposure, standards and guideline values.

Air quality

Road traffic emissions are a source of air pollution such as *nitrogen dioxide* (NO₂) from exhaust gases and *particulate matter* (PM10) from tyres, road surfaces and brakes.⁹ Air pollution from road traffic causes a variety of adverse health effects, with increased morbidity and mortality from pulmonary and cardiovascular diseases having the greatest impact on public health. Swedish research has shown that the health effect in Sweden is significant with thousands of cases of excess mortality per year, and that local emissions are important.¹⁰ The elderly, children and people already in poor health are particularly vulnerable groups in terms of the impact of air pollution. Studies show that high exposure to air pollution early in life risks leading to lifelong consequences for physical and mental development. E.g. asthma and allergies, impaired lung function and neuropsychiatric disorders such as ADHD and autism.¹¹ There is a correlation between the mother's exposure to air pollution during pregnancy and the risk of gestational diabetes, pre-eclampsia and high blood pressure. There is also a correlation between exposure during pregnancy and low birth weight of the baby, especially with regard to exposure to small air pollution particles present in exhaust emissions. Low-emission zones regulate emissions from vehicles of exhaust-related air pollutants such as nitrogen dioxide. PM10 levels do not decrease when switching to zero-emission vehicles, as they stem mainly from wear on tyres, roads and brakes. When it comes to exposure to air pollution, street design plays a role, as streets surrounded by buildings or other enclosing elements give rise to poorer circulation of air. Streets with a lot of traffic where many people live or work means that more people are exposed to the pollution.

Air quality limit values and guidelines

Air quality monitoring and evaluation is governed by laws and directives at both national and EU level. *Environmental quality standards* are governed by the EU and are mandatory limit values that must be met.¹² *Environmental quality objectives*¹³ are national recommendations to be pursued and which should be met in the long term. The World Health Organisation (WHO) tightened its guidelines for air pollution in 2021 because research had shown that air pollution is more harmful to human health than previously known, even at low levels.¹⁴

⁸ The amount of the fine as at 22 September 2023

⁹ There are also other air pollutants from road traffic, but the biggest challenges in the City of Stockholm are nitrogen dioxide and PM10.

¹⁰ Achievements and experience from science policy interaction in the field of air pollution. IVL 2021

¹¹ <https://www.ivl.se/english/ivl/publications/publications/achievements-and-experiences-from-science-policy-interaction-in-the-field-of-air-pollution.html>

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¹² The Air Quality Ordinance (2010:477) contains the Swedish environmental quality standards for outdoor air. These

standards contribute to the protection of human health and the environment and to meeting the requirements of EU

Directives 2008/50/EC and 2004/107/EC.

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¹³ Achievements and experiences from science-policy interaction in the field of air pollution. IVL C622. 2021

Stan Aronson

Table 2. A selection of WHO guidelines in relation to EU requirements and Swedish law. The number of permitted exceedances of the specified levels differs and the different percentiles (the value that a certain percentage of observations should be lower than) are shown in footnotes. Normal levels are therefore not directly comparable.

Pollutant	EU Directive Environmental quality standards from 2008	Swedish environmental quality standards	Swedish Environmental quality objective Clean Air	WHO Guidelines 2021
NO ₂ annual average value	40 µg/m ³	40 µg/m ³	20 µg/m ³	10 µg/m ³
NO ₂ daily value	-	60 ¹ µg/m ³	-	25 ² µg/m ³
NO ₂ hourly value	200 ³ µg/m ³	90 ⁴ µg/m ³	60 µg/m ³	200 µg/m ³
¹ 98th percentile, 7 exceedance days per year ² 99th percentile, 3-4 exceedance days per year ³ 99.8th percentile, 18 exceedance days per year ⁴ 98th percentile, 175 exceedance days per year				

The WHO air quality guidelines are recommendations and are based on strictly health-based guideline values. The WHO estimates that the level of NO₂ long-term needs to be below 10 µg/m³ to fully protect the health of the population. This level is significantly lower than both the current environmental quality standard (40 µg/m³) and Sweden’s environmental objective (20 µg/m³). There is a proposal for a revised Air Quality Directive at EU level that proposes more stringent air quality standards by 2030 more in line with WHO guidelines, which is likely to lead to a tightening of national environmental quality standards.¹⁵

In recent years, the air in Stockholm has improved in terms of traffic-related air pollution. In addition to increased use of more low-emission light-duty vehicles and reduced traffic, emissions from heavy-duty vehicles have also decreased. One likely reason for reduced emissions from heavy-duty vehicles is the regulation of a class 1 low-emission zone in the city centre combined with tighter procurement requirements.¹⁶ The County Administrative Board’s action programme for particulate matter and nitrogen dioxides that the city follows and which has been in force since 2012 has also contributed to improved air quality. A new action programme is planned to be adopted by the County Administrative Board in 2023. The city’s goal is to further improve air quality in Stockholm and reduce air pollution levels to the guideline values recommended by the WHO. The city’s ambition¹⁷ is to meet the national environmental quality objectives by 2027, WHO annual averages by 2030 and WHO daily average values by 2050 (as proposed in the EU proposal for a new Air Quality Directive). The city also aims to reduce emissions from the transport sector by 80 per cent by 2030 compared with 2010, to accelerate electrification and an emission-free city centre by 2030. The city has an ongoing investigation into what additional measures will be needed to improve air quality in accordance with WHO guidelines.

Air pollution in the area

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Current environmental quality standards for NO₂ are met in the area.
However, the WHO guideline values are not met. The figure below

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The vehicle fleet has mainly affected emissions of exhaust gases while operational measures (e.g. dust control) have contributed to reduced concentrations of PM10. Reduced use of studded tyres has also contributed to reduced PM10 levels.
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In the proposal for the City of Stockholm’s Environmental Programme 2030

shows levels of nitrogen dioxide in the area, where areas marked in red indicate that the WHO guideline values are not met and where dark red areas indicate that Sweden's Clean Air environmental objective has not been met.

Page 11 (29)



NO₂ annual average

nitrogen dioxide in 2023 in the area.

No₂ 10–20 µg/m³ above the WHO guideline value

Major roads are the largest source of noise exposure in the city. Spending time in noisy environments can lead to problems such as fatigue, difficulty concentrating, headaches, changes in blood pressure and stress reactions. Calculations show that traffic noise exposure in Sweden gives rise to approximately 1 000 heart attacks and 1 000 strokes per year and that around 500 of these lead to death.¹⁸ Noise affects people differently depending on the type of noise involved. Groups that may be more sensitive to noise include children and adolescents, the elderly and people who are chronically ill, people with hearing loss and people whose mother tongue is different from the national language.¹⁹ On streets where the speed exceeds around 30 km/h, the noise from the tyres takes over, but at lower speeds it is the engine noise that dominates the noise. Electric vehicles have a lower engine noise than fossil fuel-powered vehicles, which is why a class 3 low-emission zone is expected to have a positive effect on noise levels in the area.

Noise guidelines

There is a national guideline value²⁰ which states that highway authorities are obligated to implement measures at noise values above 65 dBA daily equivalent at the façade. For several years, the city has used a stricter level for action than the national guideline value. Grants for noise protection measures are offered to property owners in older existing environments if 62 dBA is exceeded at the façade.

The national guideline value for road traffic noise and risk of nuisance is 55 dBA equivalent sound level outdoors at the façade. According to case-law, this national guideline value is a long-term objective that is indicative and does not constitute a legally binding standard. The WHO's strictly health-based guideline value is 53 dB Lden (equivalent to approximately 50 dBA).

Noise in the area

The streets in the area have a speed limit below 30 km/h. This means that the noise impact today comes mainly from engine noise and not from tyre noise, which is more prominent on streets with speeds above 30 km/h. Most streets have noise levels above the guideline value for nuisance and the national guideline value for when action needs to be taken, see Figure 3.

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¹⁸ WSP, Karolinska Institutet, Umeå University. Methodology for DALY calculation in the transport sector 2016.

¹⁹ <https://www.stockholm.se/halsopaverkan/>

²⁰ Published in the Government Infrastructure Bill (1996/97:53)



Figure 3. The City of Stockholm's noise map shows LAeq Day Road municipal

4 Current situation in the area

The designated area is located in the City district, which is of great importance to Stockholm residents and the city's tourism industry. The area has a large concentration of offices, shops and restaurants that contribute to a large flow of people from different parts of the region.

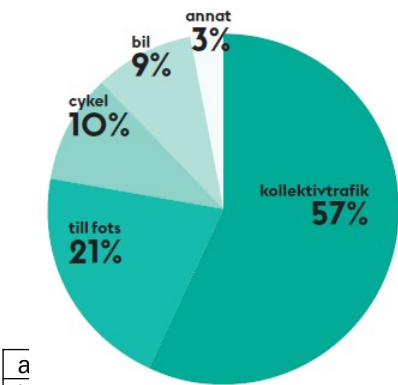
The area's grid structure from the 19th century has been preserved, featuring older and small-scale buildings along narrow streets, but the area also has tunnel entrances and car parks dating from the transformation of the city centre in the 1960s and 1970s.

Travel to and from the City district

The City district is the hub for travel in Stockholm. It is one of Sweden's most accessible areas for travel without a car, which is reflected in the fact that nine per cent of trips which start or finish in City are by car.

The dominant mode of transport to and from the City district is public transport, see Figure 4. However, note that the figure is based on a survey of travel habits from 2015 and that some changes have taken place since then. For example, the share of public transport has decreased and the share of bicycles has increased, while vehicle traffic in the City district has decreased by about 25 per cent since 2017.

Figure 4. Share by mode of transport for trips on weekdays starting or finishing in the City district (Travel habits survey 2015)



a	other
bil	car
cykel	bicycle
till fots	on foot
kollektivtrafik	public transport

Transport supply and flows in the area

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As regards pedestrians in the area, the highest number of pedestrians is on Biblioteksgatan, Norrlandsgatan and Regeringsgatan, each of which have over 20 000 pedestrians daily. Mäster Samuelsgatan and Jakobsgatan have 16 000 and 12 000 pedestrians daily. The figures come from foot traffic surveys in 2017 and travel by walking has increased further since then.

Norrlandsgatan has the highest flow of cyclists in the area, with around 2 500 cyclists daily.

Public transport access to the area is extensive. There are four metro stations near the area (Page 13 (29) centralen, Hötorget, Kungsträdgården and Östermalmstorg). The Central Station interchange is Sweden's largest and most important public transport interchange hub. In addition to this, there is the Spårväg City and Djurgårdslinjen tram line, which operates on the Strandvägen-Hamngatan-Klarabergsgatan route with tram connections towards Djurgården.

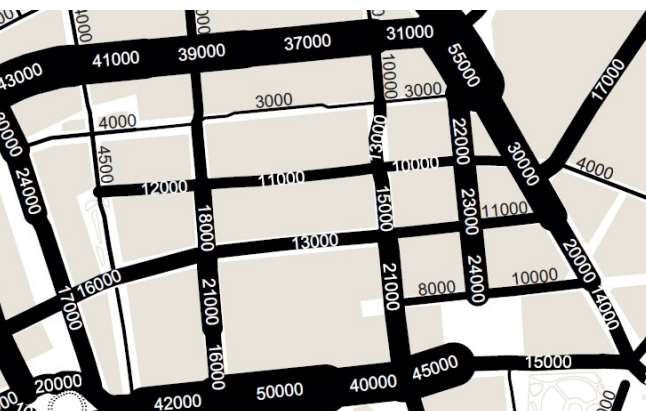


Figure 5. Pedestrian flow to the left and motor vehicle traffic to the right (Transport Department, 2017).

Bus trunk route 2 and night bus 96 pass through the area. A number of other bus routes pass near the area, including bus trunk routes 1 and 3. In total,

around 25 000 passengers per day travel on the three bus trunk routes through the City district.

There are also regular ferry services close to the area. The ferry routes 80 and 83 operated by SL, the public transport operator in Stockholm, enable commuting between Nybroplan and Nacka, Lidingö, Värmdö and others. The Djurgård ferry strengthens the connection between Gamla Stan and Djurgården and Waxholmsbolaget's ferries from Strömkajen connect the area with the Stockholm archipelago.

Several new projects for the expansion of public transport are underway. For example, there are plans for an extension of the Roslagsbanan commuter railway to T-Centralen metro station, a new tram service to Norra Djurgårdsstaden and the construction of new metro connections on the Blue Line to Nacka.

In terms of vehicle traffic, the most important roads connecting the area are Klarastrandsleden, the Centralbron bridge, the Klara tunnel, Sveavägen, Östra Kungsgatan, Hamngatan, Stallgatan and Birger Jarlsgatan. These are part of the primary road network, which is a defined road network that is very important for accessibility between the different parts of the county. Other streets have a more local traffic function.

Around 12 000 motor vehicles per day travel on Mäster Samuelsgatan. The daily number of motor vehicles using Norrlandsgatan is around 13 000 and for Regeringsgatan it is 7 000. Around 30 000 vehicles a day travel through the entire Klara tunnel. The northbound section of the tunnel at the tunnel mouth on Mäster Samuelsgatan is used by around 4 000 motor vehicles per day. The southbound section is used by around 8 000 motor vehicles per day. Vehicle numbers include goods transport vehicles, more details on which is presented below.

The area has around 1 000 parking spaces and around 20 drop-off points; the assessment is therefore

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that a majority of passenger cars are only passing through the area because access to parking or drop-off determines whether or not a vehicle stops in the area. The area is also served by around 800 taxis per day, and 16 per cent of the taxis entering the area currently meet the requirements for a class 3 low-emission zone. Of the 800 taxis operating in the area, it is difficult to reliably tell how many had a reason to be in the area and how many were only passing through.

Businesses in the area

Around 20 000 people work in the area and there is a wide range of shops, restaurants, cafés and bars that attract visitors and generate goods transport in the form of deliveries of goods and services and collection of waste and recycling. Goods transport consists mainly of light and heavy goods vehicles, but some transport also takes place by means of cargo bikes or light electric vehicles. Loading and unloading is handled at loading places along streets (about 20) or in underground service traffic tunnels. In the area there are three large and 13 small service traffic tunnels in properties. These are mainly accessed from Sveavägen, Regeringsgatan and Mäster Samuelsgatan.

Around 2 800 unique trucks enter the area on an average day. Of these, around 250 are heavy trucks, 550 are light trucks with tail lift and 2 000 are vans. Currently, 3 per cent of light trucks with tail lift, 8 per cent of vans and 12 per cent of heavy trucks entering the area meet the requirements for a class 3 low-emission zone. 23 per cent of the unique trucks that enter the area have a destination point in the area, the rest are judged to be through traffic.

Households in the area

Just under 400 people live in the area. Around 50 passenger cars are registered to people living in the area.²¹ Households generate traffic in the form of e-commerce deliveries, services, visitor traffic and residents' own journeys.

Parking in the area

Car parking

There are around 1 000 publicly available²² parking spaces in car parks and 150 on-street parking spaces in the area. Currently, 37 per cent of parking spaces in car parks have charging points. There are currently no on-street charging points in the area but the Transport Department is reviewing the possibilities of establishing these. In addition, there are six private car parks that the Transport Department has no information about.

Bicycle parking

In the area there are many parking spaces for bicycles and electric scooters. For example, Regeringsgatan and Norrlandsgatan have a very high concentration of parked bicycles and scooters, and bicycle parking is overcrowded for much of the day.

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²¹ Company cars and some lease cars are not visible in the statistics
²² Private or public operators providing parking spaces for residents or visitors

5 Proportion of current vehicle fleet meeting the requirements of a class 3 low-emission zone

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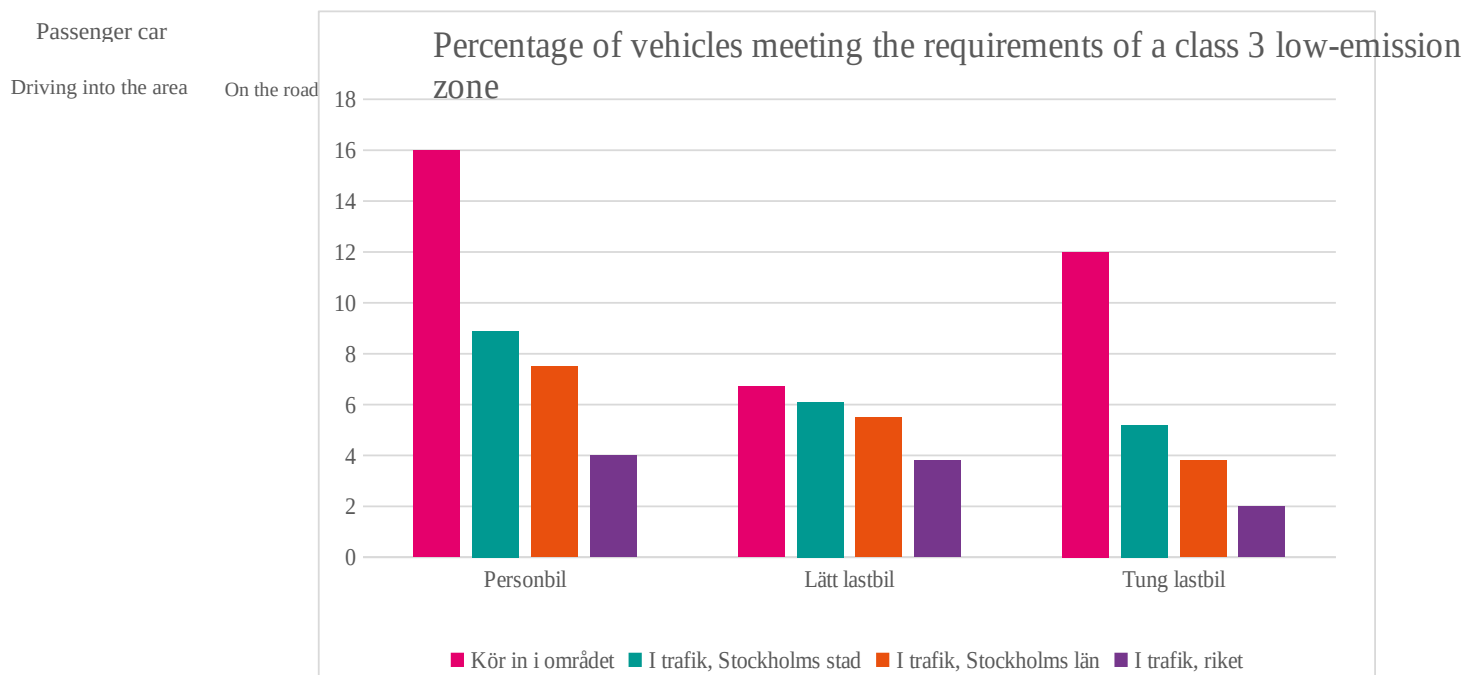
Vehicles operating in the area and vehicles on the road in the city, county and country

The proportion of vehicles that meet the requirements of a class 3 low-emission zone is higher among the vehicles operating in the area compared with the proportion for registered vehicles on the road in the City of Stockholm, Stockholm County and the whole country, see Figure 7. The proportion of passenger cars currently operating in the area and meeting the requirements is 16 per cent. The proportion of light trucks is marginally higher compared with registered vehicles on the road in the City of Stockholm. For heavy goods vehicles, the share is more than twice as high among the vehicles operating in the area compared with registered vehicles on the road. The vast majority of heavy-duty vehicles that meet the requirements of a class 3 low-emission zone are gas-fuelled vehicles.

Figure 7. Proportion (%) of vehicles that meet the requirements of a class 3 low-emission zone among vehicles operating in the area in 2023, as well as registered vehicles on the road in the City of Stockholm, the County and in the whole country in 2022. In the statistics for vehicles on the road, all gas-fuelled vehicles are reported as they cannot be distinguished by the emission class of the vehicle.

Access to vehicles meeting the requirements of a class 3 low-emission zone

New registration of vehicles in September 2023 showed that 45 per cent of passenger cars, 27 per cent



of light trucks and 12 per cent of heavy goods vehicles met the requirements of a class 3 low-emission zone.²³ Most of the new registrations are electric cars that were purchased before the bonus malus system was abolished last year, but which were delivered only in summer/autumn 2023. Delivery

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times have been long as a result of the pandemic and because of component shortages and contributed to a lag in statistics. For passenger cars, delivery times from the factory are approaching normal, with expected delivery times of 3–6 months. The industry testifies that sales of electric cars have slowed down as a result of increased prices, increased interest rates and the abolition of the bonus malus system,

which is expected to show in the statistics later in the year and especially in 2024. For 2024, the forecast from passenger car traffic is nevertheless that the share of electric cars – in the case of pre-ordered vehicles – will be around 50 per cent. However, the total passenger car market is expected to be smaller than in 2023 and earlier years as many people are waiting to replace their car, leading to a weaker car market. Page 16 (29)

For those interested in purchasing a new passenger car adapted for a class 3 low-emission zone, the investment is around 10 per cent more expensive than a plug-in hybrid, 20 per cent more expensive than a diesel-powered vehicle and almost twice as expensive as a petrol-powered vehicle. A gas-fuelled vehicle is an equivalent investment to a petrol-powered vehicle, but not as common on the market. The abolition of the bonus malus system in combination with the scaling down of the biofuels obligation and reduced tax on fossil fuels means that incentives to switch to electricity are decreasing. On the other hand, the fact that electric vehicles have a lower vehicle tax and that the cost of fossil fuels is increasing should contribute to increasing incentives to switch to electricity. The government's announcement of the introduction of a scrapping premium for those who replace their fossil fuel car with an electric car will hopefully further increase the incentives for private individuals. For new light trucks, the cost of gas-powered vehicles is on a par with diesel-powered versions. A new electric light truck is about 60 per cent more expensive than a gas-powered or diesel-powered version. The total cost from a life cycle perspective shows that there is a relatively small difference in the total cost of electric and diesel light trucks.²⁴

The secondary market offers an alternative, with passenger cars and light trucks that meet class 3 low-emission zone requirements and where the investment is not as high as for a new vehicle. For heavy trucks, gas-powered versions are marginally more expensive than diesel-powered versions. Electric heavy-duty trucks, on the other hand, are about two to three times more expensive than a diesel-powered version and although the fuel cost is lower for electric vehicles, the cost is also higher from a life cycle perspective. Electric trucks generally qualify for a subsidy under the Climate Leap initiative.

6 Justification for introducing a class 3 low-emission zone in the designated area

The Transport Department considers that it is justified to introduce a class 3 low-emission zone in the proposed area.

Annual average NO₂ levels in the area currently exceed WHO guideline values and therefore pose a risk to public health. The city's ambition is not to exceed these guideline values by 2030 throughout the entire city. The introduction of a class 3 low-emission zone in this area from 2024 is expected to help accelerate the conversion of the vehicle fleet and contribute to more people opting for alternative modes of transport. This, in turn, will have spillover effects for the entire city and increases the city's chances of reaching the goal of clean air by 2030.

In addition to the air pollution in the area, the reasons for the zone include the following:

- It is an area where many people are present and are exposed to air pollution.
- The area has levels that exceed the applicable noise guideline values.
- The area has relatively narrow streets, where air circulation is worse than the surrounding road network.
- There is good access to alternative modes of transport for those who want to reach the area without a car.
- There are alternative routes for vehicles that are not permitted to drive in the low-emission zone and which do not have a destination point within the zone.

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Statens miljöbuss system for trucks (WSP) 2022

In addition to the above reasons, the Transport Department also believes that the measure will have a positive effect on the climate through reduced emissions of CO₂ and a positive impact on accessibility in cases where more people choose to use alternative modes of transport or increase transport efficiency. Page 17 (29)

Alternative modes of transport and routes bypassing the area

Travellers whose destination point is within the proposed low-emission zone must either switch to vehicles permitted in the low-emission zone or choose other modes of transport such as walking, cycling or public transport. As regards passenger transport by car, it is possible to park outside the zone, and walk or cycle the last part of the journey. Vehicles for persons with disabilities or reduced mobility are still permitted in the zone. For goods transport, one option is to join a co-loading solution in order to have the goods delivered by another operator who meets the requirements of the zone. Those who do not have a destination point within the zone can use alternative routes (see Figures 8 and 9). Southbound traffic from Östermalm can bypass the zone by using the Norra Länken motorway, or via the routes Kungsgatan-Sveavägen-Klara tunnel, or Hamngatan-Regeringsgatan-Klara tunnel. From Vasastan, the zone can be bypassed using the Sveavägen-Klara tunnel or via Torsgatan-Vasagatan-Vasabron.

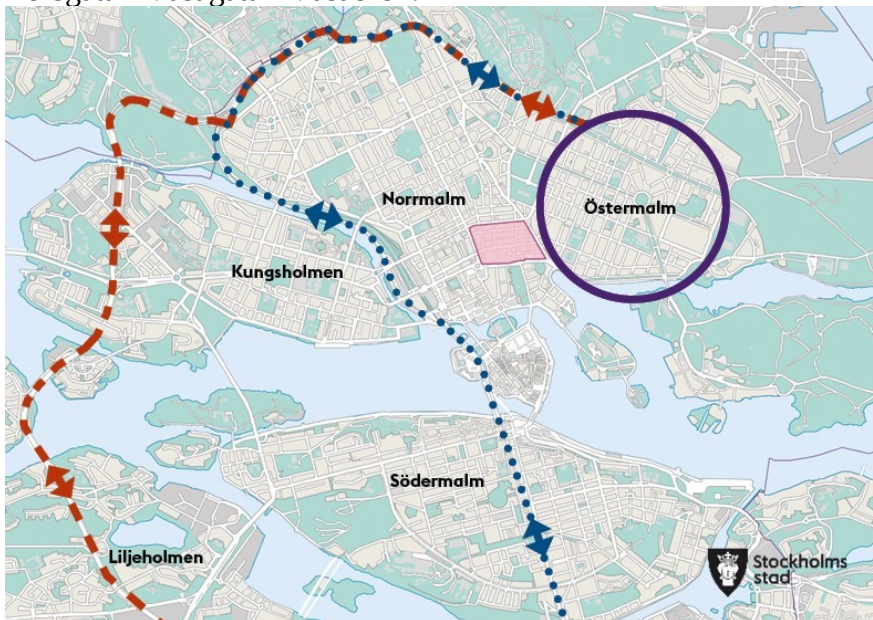


Figure 8. Map showing alternative routes for traffic that needs to bypass the zone.



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Alternatives to the introduction of a class 3 low-emission zone in the proposed areas Page 18 (29)

The Transport Department has studied whether there are alternative measures that can have the same effect as provisions for a class 3 low-emission zone.

A class 3 low-emission zone contributes to a 99 per cent reduction in nitrogen dioxide emissions in the area, assuming full compliance with the requirements. In order to meet the WHO guideline value with the current vehicle fleet, traffic needs to be reduced by around 70–80 per cent in the area. In order to achieve this without introducing a class 3 low-emission zone, the Transport Department believes that major closures and/or capacity reduction measures would be required for motor vehicle traffic. This could be achieved, for example, by means of regulation on converting the streets to bus lanes, introducing pedestrian streets or other traffic-restricting measures. Extensive measures of this kind are expected to result in greater restrictions on accessibility in general and for commercial transport compared with the introduction of a class 3 low-emission zone.

The introduction of class 2 low-emission zone in the area would have less impact on emissions of nitrogen oxides than a class 3 low-emission zone. According to estimates at Hornsgatan, at full compliance the reduction would be around 11 per cent, compared with 99 per cent in a class 3 low-emission zone. Unlike a class 3 low-emission zone, class 2 low-emission zones only cover passenger cars and light trucks and many of the current petrol and diesel vehicles are permitted. ”

7 Impacts of introducing a class 3 low-emission zone in the proposed zone

This section deals with the impacts arising from a class 3 low-emission zone in general and specifically in the proposed area.

The introduction of a class 3 low-emission zone is expected to contribute to the following objectives set by the city:

- reduce air pollution levels to the guideline values recommended by the WHO
- reduce emissions from the transport sector by 80 per cent by 2030
- zero-emission city centre by 2030

Calculation of the effects on air quality and noise within the zone

According to calculations, the introduction of a class 3 low-emission zone reduces emissions from local road traffic and improves air quality. Local emissions of nitrogen oxides from road traffic are estimated to decrease by approximately 1.5 tonnes per year, corresponding to a reduction of approximately 99 per cent in the area of the low-emission zone. Emissions of carbon dioxide (CO₂) from road traffic are expected to decrease by approximately 730 tonnes, which corresponds to a reduction of 90 per cent. The calculations are based on the annual average value in 2025 with full compliance with the rules for a class 3 low-emission zone.

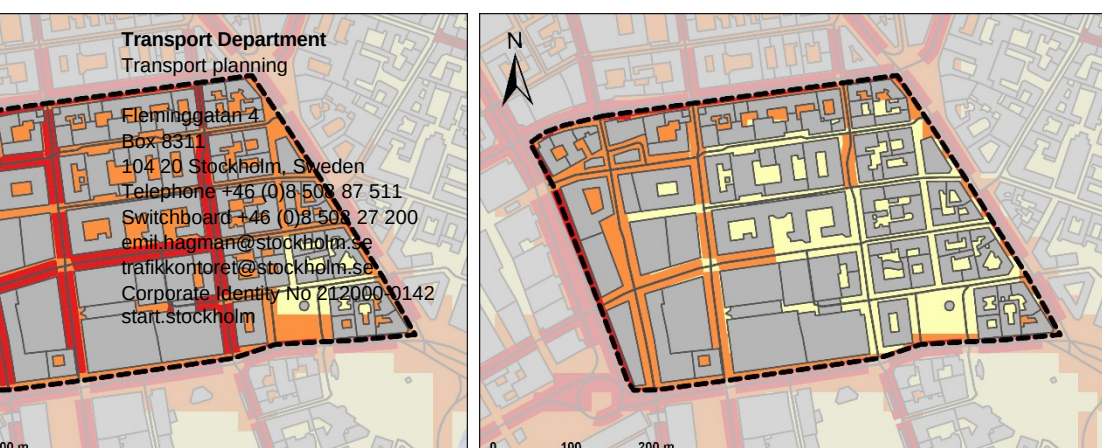


Figure 10. The maps show a calculation of the annual average value of nitrogen dioxide, NO₂ µg/m³ (micrograms per cubic

metre) in 2025 without (left) and with (right) a class 3 low-emission zone. The WHO guideline value for health protection is not met in red areas.

N02 årsmedelvärde år 2025 utan miljözon klass 3	N02 annual average in 2025 without a class 3 low-emission zone
> 10 pg/m3 Över WHO:s riktvärde	> 10 pg/m³ Above WHO guideline value
Vägar	Roads
- Gräns miljözon klass 3	- Boundary of class 3 low-emission zone

The introduction of class 3 low-emission zones is deemed to have a positive effect on noise levels in areas given that the engine noise of electric vehicles is quieter than other vehicles.

In the short term, there is a risk that traffic flows and emissions may increase on the main streets surrounding the low-emission zone, such as Kungsgatan and Sveavägen. However, some of this traffic is expected to be vehicles without exhaust emissions, as permitted vehicles in the low-emission zone are largely driven outside the zone. In the event that the streets risk exceeding the applicable environmental quality standards, the Transport Department needs to review the measures needed to reduce the levels. However, these streets, along with other alternative roads, are wider than the streets in the zone, which means that the conditions for good air circulation are better than inside the zone. Greenhouse gas emissions from fossil fuel vehicles used on alternative roads are estimated to increase if they choose routes that are longer than the route they use today.

Effects on traffic flows inside and outside the zone

The vast majority of vehicle journeys today are estimated to be through traffic, while the rest are estimated to have a reason for visiting the zone. If the vehicles that only pass through the area do not meet the requirements of the low-emission zone, they will have to use alternative roads around the low-emission zone. Those who have a destination point in the area must switch to alternative modes of transport, routes or vehicles that comply with the low-emission zone requirements. As more people switch or choose alternative routes and times, the negative effects on traffic are expected to decrease.

No traffic simulation calculations have been carried out specifically for the change in traffic in the low-emission zone as the experience of traffic simulation calculations in the City district is that these tend to overestimate the capacity of the road network and show higher outcomes than is seen in the actual outcome. The Transport Department believes that low-emission zone regulation will generate a higher proportion of vehicles that comply with the regulations even outside the zone, and that there will be a transfer to other modes of transport. The Transport Department has instead based its estimates on lessons learned from previous projects and has made a qualitative assessment of how traffic will be affected. The assessment is that the surrounding road network may initially experience a 15–20 per cent increase in traffic from traffic that previously passed through the zone and now needs to bypass the zone. Since Kungsgatan is already at the limit of capacity during rush hour, the additional traffic will either extend the rush hour, spread out into the rest of the road network, or journeys will not take place because drivers choose to use a different mode of transport.

The biggest impact on traffic of the low-emission zone will be at the Klara tunnel, where it is estimated that rush hour queues in the City district and on the Centralbron bridge/Klarastrandsleden will increase.

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Northbound traffic will move to the exit towards Sveavägen-Kungsgatan but also to Herkulesgatan-Regeringsgatan-Hamngatan (see Figure 8). Some traffic will disappear as traffic involving destination points outside the area is expected to find other routes.

The effects are expected to be greater on southbound traffic. There are many vehicles that want to drive southwards to the Centralbron bridge. Demand is expected to decrease from Strandvägen as many vehicles will take longer routes around the area (e.g. via Norra länken) but there will continue to be high demand for journeys along the Strandvägen-Centralbron route. This can be seen mainly in the eastern part of the city, where the options for getting from Birger Jarlsgatan to Centralbron are limited. The alternatives available, a left turn from Hamngatan into Regeringsgatan, have limited capacity to handle the traffic that would otherwise drive into the tunnel. Instead, the traffic from Birger Jarlsgatan and further towards the tunnel will need to turn into Kungsgatan, which will lead to a lower average speed on Kungsgatan (see Figure 9).

Socioeconomic impact

A class 3 low-emission zone affects the national economy in different ways. Most negative socioeconomic impacts are expected to subside over time, as actors in the area and society at large implement changes. The following points are assessed to have effects on the national economy in a positive or negative sense.

- People using the streets within the low-emission zone will be exposed to less harmful air, leading to better public health and probably reduced healthcare costs.
- For those who are able to choose other modes of transport such as public transport, walking or cycling, the increased physical activity can contribute to better health and probably reduced healthcare costs.
- The area will have better air and less noise nuisance and will thus be perceived as more attractive. The Transport Department believes that this can lead to more people visiting shops, restaurants and experiences in the area, thus contributing to increased revenue for businesses in the area.
- Companies that have already switched to vehicles and services permitted in the low-emission zone are expected to gain a competitive advantage and also a faster return on their investment.
- Companies that sell, lease and manufacture vehicles that are allowed within the low-emission zone are deemed to benefit from the introduction.
- The low-emission zone is expected to contribute to the development and implementation of new business models in the logistics and transport sector. This can also open up opportunities for new companies to enter the market. For example, it may boost co-loading solutions, where a number of actors join forces to buy shared transport into the area.
- Companies providing shared mobility, such as bicycle-sharing or electric car pools, are deemed to benefit from more people choosing to use their services.
- Technology development is expected to benefit as a result of increased demand for vehicles able to meet the requirements of the class 3 low-emission zone. An increase in charging infrastructure is also expected.
- The low-emission zone is expected to contribute to reducing the number of vehicles in the area initially, which is expected to facilitate accessibility for those allowed to travel in the zone.
- For those stakeholders who are not able to choose other modes of transport, the impact is that they need to invest in vehicles that comply with the low-emission zone regulation, or that they need to change their travel habits, change modes of transport or logistical patterns. The extent

of the impact depends on the purchasing power of the stakeholder and whether the investment is made in an electric or gas-powered vehicle, or a new or used vehicle.

- Depending on how carriers manage to streamline logistics, transport costs to the area may increase. The cost is estimated to be higher for companies whose transport takes place using vehicles that have few deliveries in the area. The Transport

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Department considers that there is a risk that costly transport costs may be charged to the end customer.

- Those who need to be able to access their home by car and are unable to switch to a car that complies with the low-emission zone regulation are expected to have less access to their home.
- Operators providing parking spaces in the area are expected to see reduced revenues initially when vehicles cannot enter the area. At the same time, revenue for operators providing parking spaces outside the area is expected to increase.

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Impact on goods transport in the zone

Small and large enterprises that have already started the transition to electric power, gas-powered vehicles or bicycles will benefit from the introduction of a class 3 low-emission zone. They highlight that all actors operating within the area of the low-emission zone will be subject to the same requirements as a result of the low-emission zone, while some highlight the risk of distortion of competition as the low-emission zone is located in a small, defined area. The low-emission zone also risks entailing logistical challenges for carriers through changes to routes. Both light and heavy duty vehicles are available to order on the market. One challenge is that the delivery times for vehicles can be around 12 months, sometimes longer. There is therefore a risk that vehicles will not be delivered in time for the introduction. The Transport Department is reviewing the possibility of exemptions in cases where operators are unable to have the vehicles they have ordered delivered in time.

Ongoing research in the area indicates that transport efficiency can be improved. Of the approximately 2 800 unique trucks that enter the area in one day, around 650 vehicles have a reason to visit the area, the rest being through traffic. In terms of the daily volume of goods demanded by the various businesses, the number of trucks needed is estimated to be around 450 per day. The assessment is that the potential to streamline flows is good and that at the time of the introduction of the class 3 low-emission zone (or shortly thereafter), there will be a sufficient number of vehicles on the market to provide the area with the goods transport required.

The Transport Department estimates that the low-emission zone will improve the opportunities for realisation of new transport solutions based on co-loading systems, which can contribute to increased transport efficiency and thereby reduce the number of truck journeys to the area. Interviews with drivers when unloading in the area in 2023 indicate a low average vehicle load rate. For light trucks, an average load of 500 kg was indicated, while the load indicated for heavy trucks was around 3 tonnes. These quantities indicate that the majority of current shipments can be performed using trucks with lower load capacity than the vehicles used today. However, some operators have commented on hurdles involving electric light trucks as they weigh more than diesel-powered vehicles and category B driving licences are subject to weight restrictions. The Transport Department therefore welcomes the government's assignment for the Swedish Transport Agency to develop a pilot project to increase the limit for category B driving licences that will be reported in spring 2024. The pilot project is expected to contribute to increasing the proportion of light trucks that meet the requirements of the class 3 low-emission zone in Stockholm.

The investment cost for heavy-duty electric trucks is high and many actors believe that it takes time to get a return on the vehicles. There is therefore a demand for allowing transport at night because trucks can then be used for more hours a day. This is something the Transport Department is working to enable. The cost of buying gas-powered cars or leasing vehicles is not as high as the cost of buying an electric vehicle. There may be vehicles that do not want to incur the increased cost involved and they may avoid accepting assignments in the area. The Transport Department estimates that the low-emission zone will mean that truck transport will be redistributed

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so that transport using vehicles that meet the requirements of the class 3 low-emission zone will increase in the central areas. Those operators who do not have their own parking space or depot where they can charge vehicles are expected to find it most difficult to adapt their vehicle fleet, e.g. craftsmen. Industry representatives believe that there is a risk that craftsmen may refuse customers in the zone for financial reasons as they are unable to invest in the right vehicle in order to only carry out work within the zone a couple of times a year. In this context, the Transport Department considers that there are already actors who meet the requirements of the low-emission zone and that the number will increase in connection with the introduction of the low-emission zone.

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Ensuring compliance is important to make sure that operators driving in the area are on an equal footing. In this context, the Transport Department's dialogue with the police is important to ensure that those who do not comply with the regulations are fined. If the level of regulatory compliance is low, the Transport Department believes that the operators who have made an investment may be affected because of unfair competition. Here, it is important that all parts of the chain work to ensure that compliance is maintained so that everyone has the chance to make a switch on an equal footing.

Impact on activities within the zone

The employees and visitors of businesses in the zone will be exposed to less harmful air and lower noise levels.

The Transport Department estimates that transport costs may increase in the area if all vehicles on the road today were to convert to vehicles that are compliant with the regulations. New business models such as co-loading solutions will therefore be important to ensure shops, restaurants, residents and businesses in the area are able to receive their deliveries without being affected by unnecessary cost increases. Here, the city is actively working in innovation projects together with other actors, such as property owners, transport operators and hauliers, to find new business models. Together, we are developing a common understanding of potential solutions and about the role the city can play in facilitating co-loading.

There are no large public destination points for tourist buses in the area, but the area is used by buses as a route to destination points outside the area. Electric long-distance buses are not yet being manufactured, but according to Scania they will be on the market around 2027. Gas-powered alternatives are available on the market, but the industry believes that these are not optimal vehicles for this purpose. The tourist buses that have to make a stop in the area may need to apply for an exemption in cases where no better alternative is available. The tourist buses that currently only pass through the area will be required to take new routes.

Impact on passenger transport

The Transport Department estimates that residents and visitors in the area will be exposed to less harmful air and lower noise levels due to the introduction of a class 3 low-emission zone.

Residents and visitors using a car in the area make up a small proportion of total traffic. There are a total of around 50 privately owned vehicles belonging to residents in the area and nine per cent of

travellers whose destination point is the City district make this journey by car. Access to alternative modes of transport and alternative roads around the low-emission zone is good. Residents and visitors who have a car will either be required to park outside the zone, buy/lease new vehicles or change their travel habits and/or modes of transport. For residents and visitors who have a car but do not have their own parking space, limited access to charging infrastructure may constitute an obstacle to investing in an electric car.

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For taxi operations, the main challenge is primarily the mobility service, but since they are exempted from the class 3 low-emission zone regulation, this business sector will not face any major challenges as a result of the introduction.

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Impact on public transport buses

The only services in the area are SL's bus trunk route 2 and night bus 96. SL already operates electric buses in some parts of the Stockholm region. The goal is that all buses will run on electricity by 2035 and preparations are already underway for charging at all bus depots. The new agreement for city centre buses contains a requirement for 100 per cent electricity and is expected to enter into force no earlier than August 2026. It is not certain that SL will be able to guarantee that all vehicles operating in the zone will be able to comply with the regulation at the time of entry into force.

The Transport Department's assessment is that public transport that needs to enter the area but does not meet the requirements of the class 3 low-emission zone must apply for exemption.

Impact on the city's own transport

The city's own vehicles largely meet the requirements for the class 3 low-emission zone today. This is not the case for the city's procured transport, but most companies that have contracts with the city have electric cars or gas-powered cars to some extent. Contractors can use the vehicles that need to enter the low-emission zone for these transport operations, while other vehicles are used outside the zone. For the transport operations covered by the current contract, it is the duty of the contractor to perform the contracted work in accordance with new legal requirements. They therefore need to ensure that they have the right vehicle when they enter the area.

Citizens' views on how the class 3 low-emission zone may affect them

4 500 citizens from across the city are part of the Stockholm City Citizen Panel, which was given the opportunity to give their views on how the introduction of a low-emission zone is expected to affect them. A total of 2 703 persons responded to the survey. The majority of respondents estimated that they will be positively affected, the main reasons being that the low-emission zone contributes to cleaner air and less traffic. Other reasons highlighted are that they themselves will benefit in the form of better walking and cycling opportunities or that it contributes to the city's development.

Just over a quarter of respondents believe that they will be negatively affected, with the main reason being that it imposes traffic restrictions. Other reasons highlighted were that they need to avoid certain roads, do not have access to or the possibility to have an electric car, and that it has an adverse effect on trade and transport in the area.

Impact on gender equality and equality

More women walk and travel by public transport, while more men travel by car. Men make longer trips, and more men than women in the low-emission zone own a car. For the most part, commercial road users are men.

The introduction of a class 3 low-emission zone is deemed to have a positive impact on the health of everyone living and working or otherwise often present in the area.

Children, young people, pregnant women, the elderly and those who are already in poor health will benefit even more from the introduction of a class 3 low-emission zone.

While the zone has a positive impact on health, it can also have a negative impact on personal finances or make it difficult for certain groups to continue to work in the same way as before. Residents who

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own cars, visitors and commercial transport operators driving within the low-emission zone but who do not have a vehicle that meets the low-emission zone regulations will be affected by the decision. The impact will be greatest on companies and households whose financial margins are small and for whom it is more difficult to switch to a new vehicle. Average income in the northern city centre district exceeds average income in the City of Stockholm by around 30 per cent.

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Based on the above reasoning, the low-emission zone is expected to affect men and women to different degrees. At present, women contribute less to emissions but are exposed to more air pollution. Children, young people and the elderly also contribute little to emissions but are groups on which emissions have a greater negative impact. The proposal therefore means that women and men, children, young people and the elderly have the same opportunities to have clean air. Therefore, the overall impact of the proposal on gender equality and equality is deemed to be positive.

8 Summary of the investigation and recommendation.

Based on the budget assignment to introduce a class 3 low-emission zone in the designated area by 31 December 2024, the Transport Department assesses that the area meets the criteria for this. The measure is expected to contribute to improving the air and reducing noise in an area where many people are present and where streets are also relatively narrow. The measure is also expected to contribute to technological development by accelerating the pace of transition. The Transport Department considers that the introduction does not limit freedom of movement as there are good alternative routes or modes of travel that can be used to reach and bypass the designated area.

For successful implementation, including good compliance with and acceptance of the regulation, the Transport Department intends to continue inviting stakeholders to collaborate. Furthermore, the Transport Department has identified a number of actions that will contribute to successful implementation and to which the city or other actors can contribute in various ways.

Exemptions for special reasons

The Transport Department can already see that some operators will not be able to switch to vehicles approved for a class 3 low-emission zone before 31 December 2024. This risks leading to low compliance or to some functions being excluded from the area. The municipality has the option to grant exemptions for vehicles if there are special reasons and if this can be done without danger to road safety, road damage or any other significant inconvenience.

The Transport Department's assessment is that stakeholders who have placed an order in good time before the introduction but who will not have the vehicle delivered in time for the introduction, or stakeholders who use vehicles of a kind that are not yet manufactured to meet class 3 low-emission zone requirements fulfil the special reasons for exemption. The Transport Department examines each individual application for exemption individually to see if the application meets the requirements for obtaining an exemption.

Broad and clear communication

Communication is important to ensure acceptance of and compliance with low-emission zone regulations in order to bring about the effects that the low-emission zone aims to achieve. The Transport Department will carry out extensive communication activities both before and after the introduction.

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The Transport Department will also actively work to change the municipalities' ability to monitor the regulations themselves. In order to find solutions for monitoring the low-emission zone, the City of Stockholm should cooperate with other municipalities in the country that are planning to introduce low-emission zones and with the police authority. During the investigation work, the Transport Department has been in constant contact with the police authority regarding monitoring and, in the event of a decision on introduction, this contact and dialogue will be intensified. There is a proposal from the Swedish Transport Agency to give municipalities the opportunity to monitor low-emission zones themselves via parking monitoring. The Transport Department welcomes the proposal and awaits a national decision according to the Swedish Transport Agency's proposal.

Increased access to charging infrastructure

A prerequisite for stakeholders opting to switch to electric vehicles is that there is a predictable supply of charging infrastructure. Publicly available normal chargers and fast chargers are a necessary complement to charging at the car's primary parking space (usually at home). There is particular demand for fast charging during the day and mainly for vehicles used by service providers such as taxis and distribution vehicles. The main constraints for establishing fast charging are access to land and capacity in the electricity grid. It is also a very costly solution compared with normal charging, both in terms of investment and cost of use. It is still necessary to establish overnight depot charging for all businesses that use electric vehicles for transportation in Stockholm.

The City of Stockholm is working to increase the possibilities for on-street charging and charging in parking facilities.²⁵ It is primarily Stockholm Parkering and the city's housing company that are building charging infrastructure in their facilities. On-street charging infrastructure will complement this and is primarily intended for those who depend on on-street charging. In 2022–2023, approximately 250 new on-street charging points were built in the northern city centre, and there are a total of 450 charging points in the district. Location, design and distribution of on-street charging infrastructure remain important issues to work with.

In respect of goods and bus services, the need is primarily for charging points at terminals or depots. Access to land, electricity grid capacity and funding for investment are key issues that need to be solved in terms of charging infrastructure for heavy-duty vehicles. Several actors indicate that there is uncertainty as to whether electricity capacity will be sufficient or whether they will be allowed to set up charging infrastructure. Among other things, the Electrification Pact networks and interfaces can be used to create a better situational picture and facilitate the desired expansion. Regional cooperation is also important because charging infrastructure for heavy-duty vehicles in other municipalities may be a prerequisite for enabling zero-emission transport in Stockholm and vice versa.

In order to take a holistic approach to the issue of transport efficiency and electrification, the City of Stockholm, together with thirteen other actors, has been granted funding for an innovation project, SNABBSAM. Using a systemic approach, the project will demonstrate how transport and emissions can reduce and contribute to a climate-positive Stockholm. The project entails a shift in regulation and policy, infrastructure, vehicles and logistics, business models and behaviours. The project is based on the introduction of a class 3 low-emission zone and is aiming for a completely emission-free city centre by 2030.

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Improved value for visitors

In order to create added value in the neighbourhood in connection with the introduction of the class 3 low-emission zone, regulation can be combined with other measures to improve quality for visitors to the area. Such

The city has a target of 100 per cent charging points in its own facilities by 2026, 100 per cent charging points in facilities and areas operated by the city in the city centre by 2030.

measures may be aimed at creating more seating, more greenery or other factors adding quality for people present in the area.

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Already today, there are different forms of activities in the area in summer. On Malmkillnadsgatan, the city, together with the property owners Vasakronan and Pembroke, encourage more activity on the street through a greater number of cafés and restaurants with outdoor seating, street furniture and greenery. On Jakobsbergsgatan, AMF fastigheter, together with the city, has provided the street with furniture, plants, bunting and works of art. On Biblioteksgatan, the property owner Hufvudstaden has for several years operated a flower scheme to enhance the streets in the area.

The development of already existing placemaking could mean that parking spaces are used in other ways when the needs of the area change.

Promote increased co-loading for goods transport

The low-emission zone opens up new business models for co-loading. Co-loading solutions enable operators who are unable to switch to vehicles permitted in the area to have their goods transported by another party. The city is working to increase knowledge about sustainable business models and spread good examples to new areas and businesses. The city is also actively working to gain knowledge about the conditions surrounding new possible policy tools that support sustainable innovation, such as co-loading solutions.

Remove the night ban on certain streets within the low-emission zone

Today, the City of Stockholm does not allow heavy trucks over 3.5 tonnes to travel within the City of Stockholm between 10pm and 6am except for a few specific streets. The justification for this ban is to avoid disturbing sleeping residents as heavy trucks contribute to increased noise levels.

However, the Transport Department has for several years worked together with other actors to find solutions to enable quiet transport at night, known as off peak transport. A factor for ensuring that transport can successfully be carried out during off-peak hours is that trucks are sufficiently quiet to ensure that residents are not disturbed. It would therefore be an advantage if the trucks are powered by electricity or gas, which are quieter than diesel vehicles, and if underground service traffic tunnels can be used as far as possible. Other aspects of the work associated with goods transport may also need to be adapted. This could include noise reduction materials for roll cages, reversing signals adapted so as not to be perceived as disturbing, or facilitating the use of unmanned goods reception facilities by means of digital locks for times when staff are not on site.

In addition to improved accessibility and higher profitability, there are a number of other advantages from having more heavy transport outside peak hours, such as improved qualitative factors and road safety in the urban environment, not least in the city's most central areas. It is likely that a change in transport times would not work for all types of transport and goods, but even a minor change can have a major impact. Several carriers have asked about the possibility to transport goods at night. By being allowed to also drive between 10pm and 6am, one truck can often carry out the same transport as two trucks during daytime because the vehicle can be used around the clock.

The Transport Department should therefore work to remove the night ban on streets within and to the zone in order to promote this changeover. In connection with this, other actors will also need to work to ensure that receiving of goods can take place as quietly as possible and ensure that the goods reception is adapted to receive goods at night.

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Introduce ban on studded tyres

The class 3 low-emission zone will primarily have an effect on nitrogen dioxide as the provision means that exhaust gas emissions will be reduced. Particulate matter is mainly caused by road, tyre and brake wear, which will persist despite the introduction of the class 3 low-emission zone. In order to improve air quality also in respect of particulate matter (PM10), the city should review the introduction of a ban on studded tyres in the low-emission zone. Calculations indicate that this would help reduce particulate matter by up to 55 per cent in the area.

8 Follow-up

Follow-up of new regulations is important, both to check whether the class 3 low-emission zone is fit for purpose and whether there is an opportunity to improve the regulation or the scope of it. It is important to have a follow-up plan after the introduction of the low-emission zone and to measure and evaluate the data related to the project. The project intends to measure the composition of vehicle flows both before and after the introduction of the class 3 low-emission zone. The class 3 low-emission zone should be evaluated over a longer period of time.

Points that should be included in a follow-up plan include:

- Impact on the environment or public health
- Are there opportunities to improve the regulation
- Does the regulation need to be amended to take account of changes to laws or regulations
- What is the level of compliance
- How has transport efficiency in the area developed
- Collaboration with other cities that have similar regulations, sharing experiences

9 External analysis

The external analysis presents an overview of how other cities across Europe have worked to introduce zero emission zones and other advanced low-emission zones.

Usually, the concept of 'zero-emission zone' aims to eliminate exhaust gases by, for example, permitting only journeys using electric, biogas or hydrogen vehicles. On the other hand, the term 'low-emission zone' aims to minimise exhaust gases, air pollution, noise, etc. through restrictions on certain vehicles and/or vehicle categories. In addition, there is the concept of 'congestion charge', which can be linked to or applied in addition to the zero emission and low-emission zone concepts. In all cases, practices and regulations vary between cities, where some cities focus on all transport and others on specific vehicles. Some systems are subject to charges.

In 2022, an expert group was set up by the European Commission to focus on urban mobility issues for five years, including a working group focusing on low-emission zones. The City of Stockholm is part of the working group, which is led by the POLIS network and develops recommendations to guide municipalities on how to design and enforce low-emission zones for passenger and goods transport.

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Oslo

A few years ago, politicians in Oslo proposed that a zero-emission zone be set up in the city centre by 2022/2023. Instead, the investigation suggested a larger area at a later date. The rationale for the proposal was to provide predictability for stakeholders through clarity on the timing

of introduction, geographical delimitation and relevant vehicle groups, as well as to invest ahead of the launch. The zone will be introduced no earlier than 2025 and only if there is a change in national legislation – something the current Norwegian government has said is ruled out. Page 28 (29)

Bergen

Bergen has also prepared for the possible introduction of a zero-emission zone for passenger cars and goods transport in 2025. Vehicles defined as fossil-free are allowed access, i.e. battery electric and hydrogen. Pending national permission to introduce the zone, the municipality is establishing and launching complementary measures such as commuter car parks, mobility hubs with car pools and car sharing services, financial support schemes for light trucks and transshipment areas for heavy goods vehicles.

London

Since 2018, zero emission zones have been part of London's transport strategy and there were ambitions to introduce zero emission zones in local town centres (i.e. municipalities in Greater London, from 2020) and also in the central areas of the city (from 2025). Small trials on individual streets and squares have been carried out but in August 2023 the mayor decided that no large zero-emission zones will be introduced in central London in the near future. On the other hand, London has had a congestion charge zone and various low-emission zones, which are now referred to as the 'Low Emission Zone' (LEZ) and the 'Ultra Low Emission Zone' (ULEZ).

Netherlands

Most cities in the Netherlands have local low-emission zones and from 2025 zero emission zones will be introduced for goods transport in the largest cities. For example, Amsterdam has a low-emission zone with restrictions on diesel vehicles and plans for zero-emission zones which will cover goods traffic, taxis, mopeds, and pleasure and recreational craft. It will only apply to newly registered vehicles within the zones. However, it is not clear which zones are to be covered, only that zones will be introduced in the city centre by 2025 and in the outer areas of the city from 2030.

Rotterdam will also introduce a zero emission zone for goods transport, but the scope of the zone has not been determined. The starting point in Rotterdam has been a 'covenant' (i.e. pact) between the municipality and transport operators regarding the transition to zero-emission transport. Rotterdam has also created a very informative information page aimed at transport companies. This includes information on how to change vehicles and fuels, as well as what incentives and subsidies are available. In addition, it includes personal advice and offers on trials to facilitate the transition.

Other cities in the Netherlands are also working on zero emission zones. In Groningen there are restrictions on travel by cars, vans and trucks in the city centre between 12 noon and 5 am. This will be complemented by requirements for all vehicles to be zero-emission vehicles, which will also apply to a wider area for goods transport compared with passenger cars. Development in many cities is moving towards zero-emission zones combined with other types of traffic restrictions, the allocation of street space, and the introduction of dynamic or time booking systems for loading space.

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Other examples

Copenhagen has started planning zero-emission zones for vans and trucks, and for preschool zones where only electric and hydrogen vehicles are allowed.

Cities such as Paris (from 2030) and Gothenburg (Inom Vallgraven preliminarily 2026) also plan to introduce zero-emission zones.

In Portland, USA, emission-free vehicles are prohibited from stopping, loading and unloading in loading zones within a low-emission zone. Fossil-powered vehicles can still drive in and park in the zone and pay the parking fee or stop on private land. Emission-free trucks can stop free of charge in the loading zones. Page 29 (29)

End.

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