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Zero Emission Zone in the City of Stockholm: accelerating the introduction of electric vehicles

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Executive Summary

Stockholm plans to introduce a Zero Emission Zone (ZEE) in the city centre. The three main goals for the ZEE in Stockholm city centre are: Improve air quality, reduce noise and accelerate the transition to zero emission vehicles. This will be the first ZEE in Europe targeting both light and heavy vehicles, where vehicles not meeting the requirements will be banned from the area. This paper presents how the implementation has been planned and how the traffic situation was before the introduction, as well as residents' views regarding the ZEE.

1 Stockholm Zero Emission Zone

Stockholm is introducing a Zero Emission Zone (ZEE) in the city centre. The original plan was for an introduction on December 31, 2024. Due to a few different appeals the introduction has been postponed pending the resolution of the appeal process. The three main goals for the ZEE in Stockholm city centre are:

- Improve air quality
- Reduce noise
- Accelerate the transition to zero emission vehicles

1.1 Background

Emissions from road traffic cause negative health effects to people living and visiting areas with poor air quality. Increased sickness, lung disease, and heart issues are some effects that are linked to poor air quality. Air quality is regulated through European Union (EU) Directive (2008/50/EG), where a maximal level of for example nitrogen dioxide (NO₂) is set, with the aim of protecting human health. In 2021, the World Health Organisation (WHO) updated acceptable levels for air quality based on the latest research, indicating that even at low levels of poor air quality, the negative impact on human health is greater than previously understood. The current EU directive from 2008 has been reviewed with the purpose to implement more strict levels based on the WHO's global air quality guidelines. In April 2024, the EU Parliament approved the proposed directive and the next step is for national ministries of Environment to give final approval before the new guidelines can be implemented in EU Member States.

The City of Stockholm has been working for better air quality for several decades. The City's first low emission zone was implemented in 1996, regulating what type of engine is allowed for heavy vehicles over 3.5 tonnes. The permitted standards in the regulation have subsequently been increased and the last

update now only allows heavy vehicles with Euro 6 engine or better. In 2020, the City of Stockholm implemented a similar low emission zone for light vehicles on one local street (Hornsgatan) in the central parts of the city. To further push for better air quality for residents and visitors in Stockholm, the City of Stockholm plans to (from 31 December 2024, now pending resolution of an appeal) implement a ZEZ within a vibrant commercial district at the heart of the city. The ZEZ will only allow light and heavy vehicles with an engine that is fully electric, or runs on hydrogen or biomethane gas (Euro 6). For heavy vehicles, plug-in hybrids (Euro 6) are also permitted.

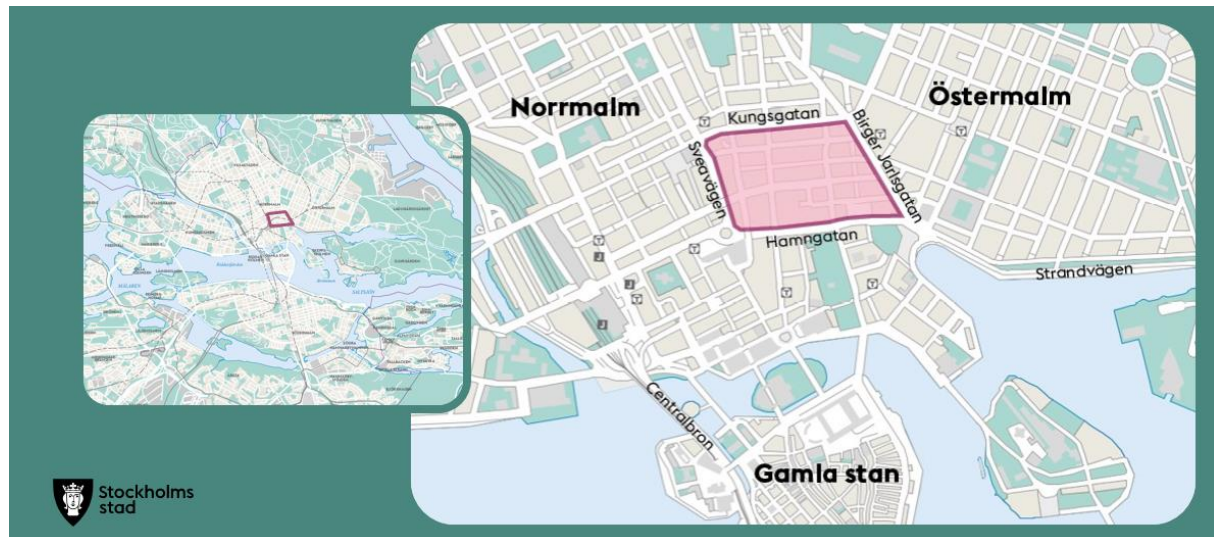


Figure 1: The area for the Zero Emission Zone is located in Stockholm's central business district. The area covers approximately 180,000 m², has about 360 residents and host approximately 25,000 people during daytime who work in the area. In addition, the area has a lot of visitors for business, shopping and leisure. Around 1,000 parking spaces, a majority located in garages, are located within the ZEZ.

The ZEZ aims to foster a healthier urban environment by improving air quality and noise. The implementation aligns with WHO NO₂ recommendations and is expected to accelerate the transition to electric vehicles. However, addressing PM₁₀ remains a challenge due to tyre, brake, and road wear. Consequently, the City will promote alternative modes of transportation such as walking, cycling, and public transit and aims to make it more attractive to spend time in the zone, thereby reducing overall motorized traffic. Collaborative efforts with stakeholders seek to devise sustainable business models for more efficient freight transport to the city. With these measures, the City of Stockholm is ensuring a vibrant and environmentally friendly city centre.

2 Europe's first Zero Emission Zone for both light and heavy vehicles

This will be the first ZEZ in Europe targeting both light and heavy vehicles, where vehicles not meeting the requirements will be banned from the area. The purpose of the regulation is to improve air quality. It is also a tool to drive electric vehicle technology forward. The introduction of the ZEZ will lead to an increase of zero emission vehicles in Stockholm. Given the strict regulation, and that at this is the first ZEZ in Sweden, spreading information and communicating with different stakeholders has been vital to achieve a good implementation. The City expect that some stakeholders may have difficulties in adapting to the new rules. The City is therefore involved in several innovation projects that are focusing on finding sustainable solutions for different stakeholders within the zone, such as consolidation hubs, communication strategies etc.

The process from mission to final decision:

- Understanding the regulation and studying other cities
- Study and measure the area more closely

- Stakeholder involvement
- Development of new ways of measuring the effects of the implementation

Actions supporting successful implementation have so far been communication, charging infrastructure, permission for off-peak deliveries with electric vehicles and consolidation initiatives. Once the zone is launched surveillance and permits will be key as well.

A consolidation hub has been established outside the ZEZ (in Årsta) and is operating. From the consolidation hub deliveries are made by electric trucks to businesses within the ZEZ. Most of the property owners and businesses see positive aspects since the ZEZ will make the area more attractive and attract more customers. Heavy electric trucks may also make deliveries after 10 o'clock at night, something that diesel trucks are not allowed to do. This gives an extra incentive and increases the possibility for a positive business model for the delivery companies.

Even though construction machinery is not included in the ZEZ, the City of Stockholm is requiring that on-going work on roads and pedestrian lanes be carried out by electric machinery and equipment.

The area within the ZEZ has been supplied with more bicycle parking and a number of micro parks as traffic will be reduced and greater area can be reallocated from cars to bicycles and pedestrians.

Data from cell phone antennas are being collected to reveal the share of walking, bicycling and cars traveling to and from the area. This has yet to be analysed.

3 Results achieved

A few residents and a few organisations have questioned the decision to introduce the ZEZ in Stockholm.

There are two ongoing legal proceedings connected to the introduction of ZEZ in Stockholm, one in which the Administrative Court is reviewing whether the city council made the decision correctly, and one in which the County Administrative Board of Stockholm is reviewing the regulation that regulates the environmental zone.

On 18 February 2025, the Administrative Court rejected the appeals that had been filed and concluded that the city council's decision had been made correctly and that it did not violate the law. Some organisations have appealed this rejection to higher level and there is at this point no information if the higher level decides to review this or not.

The County Administrative Board's review is still ongoing.

The City of Stockholm will introduce the ZEZ when possible, based on the decision of the reviewing body, and will then communicate a new date for introduction.

So far most stakeholders have been more positive than expected.

3.1 Residents in Stockholm (outside and inside the ZEZ)

In August 2024 a web-survey on the ZEZ was sent out to the City of Stockholm's citizen panel. The City of Stockholm's citizen panel consists of approximately 4,650 Stockholmers who receive emails a number of times a year with links to questions about urban development. 61 percent of the recipients answered the survey. The purpose of the survey was to identify how Stockholmers believe they will be affected by the environmental zone and whether those who live outside the area will travel differently to get to the area when it becomes an environmental zone. The main results include:

- A majority (65 percent) believe that they will be little affected by the ZEZ. One in five believe that they will be affected a lot and among these there is an overrepresentation of men, age 18-29 and those living in the inner city of Stockholm. Among those who believe that they will be affected a lot, positive comments are given such as cleaner air, a more pleasant urban environment, less noise and better accessibility for pedestrians and cyclists. The negative comments concern, among other things, more difficult accessibility, queues and more emissions in other places, poorer conditions for transport and deliveries in the area and not having access to or the possibility of using an electric car.
- Just over half of the respondents (56 percent) believe that they will be positively affected by the new ZEZ. One in five believe that they will be negatively affected. Among those who believe that they will be greatly affected, over half state that they believe that they will be negatively affected. Those who state that the ZEZ will have a positive impact primarily name cleaner air and less traffic as positive reasons. Among those who believe that the environmental zone will have a negative impact, the main reasons are traffic restrictions and more difficult access.
- Four out of five say they will travel the same way as before the ZEZ. Men, those over 80 and residents of the west part of Stockholm (Västerort) are more likely to say they will reduce their visits to the area.

Around 350 people live within the ZEZ. Around 190 addresses to people living in the ZEZ have been identified and a survey was sent out in November 2024 to these addresses. Only 50 cars are currently registered with a private resident in the area. A total of 60 answers was returned. Half of the answers belonged to a car owner and half did not own a car. Residents with a car complying with the ZEZ regulation and residents without a car were positive about the ZEZ. Residents with a car that did not comply with the ZEZ were negative. A total of 27 % of the residents were disturbed by traffic in their homes (noise and/or air pollution) compared to 7 % in the entire municipality. A similar survey will be sent out in November 2025 for comparison.

3.2 Vehicles traveling in the ZEZ

The percentage of the vehicles already complying with the ZEZ regulation has increased (see figure 2) before the regulations have been introduced.

	June 2023	Oct 2024	March 2025
Heavy trucks	12	24	32
Light duty trucks	8	11	12
Passenger cars	16	21	26

Figure 2) percentage of the vehicles travelling in the ZEZ that already compile with the decided standards for driving in the zone, despite the fact that the regulations have not yet been implemented.

Electric passenger cars represented more than half of the new car sales in Stockholm in 2024. The number of electric light and heavy trucks is also starting to increase, but are not yet as high as for passenger cars. Several of the larger good delivery companies have set goals for zero emission vehicles and have started their investments in electric trucks and are testing and operating electric trucks already at a smaller scale. With positive experience and incentives, such as the ZEZ, the electric heavy vehicles are about to grow in numbers.

3.3 Air quality, nitrogen dioxide (NO₂)

Air quality measurements have been carried out in the ZEZ at Norrlandsgatan since autumn 2024 (non-active samplers). Nitrogen dioxide (NO₂) was measured on average 20,5 µg/m³, which is higher than the worst street in the inner city, Hornsgatan, with 20 µg/m³. Measurements at Hornsgatan (active sampler) have been carried out for decades. Results are shown in figure 3 below.

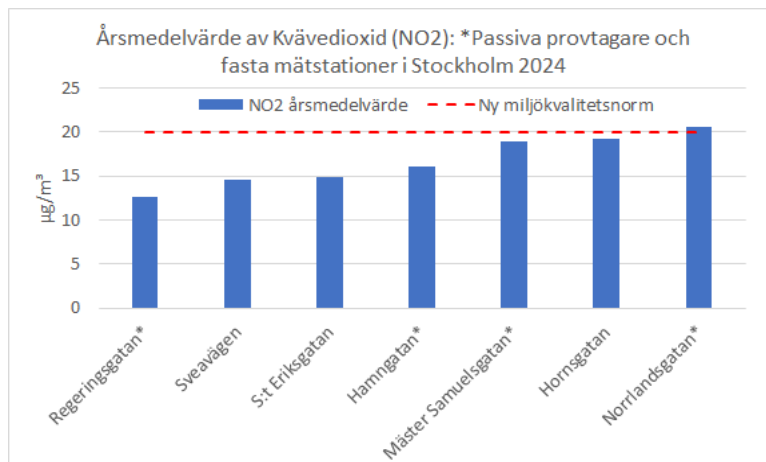


Figure 3) Annual mean value for nitrogen dioxide from active samplers, located on different streets in Stockholm in 2024. The new non-active sampler in the ZEZ is Norrlandsgatan to the right. Norrlandsgatan in the ZEZ shows the highest values.

There is an investigation ongoing to increase the size of the ZEZ within the city centre. At this point there is no date set for when this decision will be made, nor when the zone will be expanded

References

Centrum för arbets- och miljömedicin. Power point presentation on first survey to residents before the introduction of the Zero Emission Zone in Stockholm (February 2025).

Origo Group. Miljözon, Stockholms stads Medborgarpanel (September 2024)

Presenter Biography



Eva Sunnerstedt from the Environment and Health Administration within the City of Stockholm is Head of the Clean Vehicles and Sustainable Transport unit within the city. Eva Sunnerstedt has extensive knowledge within the fields of clean vehicles and fuels and has worked with electric vehicles and charging infrastructure since the late 1990s. The Stockholm EV Strategy, a nationwide procurement of electric cars and vans, and the business model for on-street charging in Stockholm are examples of her previous responsibilities. She was involved in the team that introduced the first environmental zone for heavy trucks in 1996. Now she is the representative from the Environment and Health administration in the team for introducing the ZEZ in Stockholm.



Amanda Baumgartner from the Traffic Administration within the City of Stockholm is a senior strategist at the traffic planning department since 2017. Her main focus has been working toward sustainable freight solutions together with both local, national and international stakeholders. Since 2023 she has been the project manager of the mission to implement the Zero emission zone.

