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Implementation Guides December 2023

How to design and implement a low emission zone

[Air Quality](#)[Transport](#)Originally Published: **March 2019**Author(s): **C40 Cities Climate Leadership Group, C40 Knowledge Hub**

Low emission zones (LEZs) are at the centre of many cities' efforts to tackle the related problems of air pollution, greenhouse gas emissions and congestion. The zones are powerful tools for framing and communicating policies on these issues, and enacting policies within a designated zone, rather than a whole city, can be more acceptable for the public and local businesses. They provide a way for cities to take ambitious action more quickly in a priority area.

Cities can expand these zones and increase their ambition as the benefits become visible. Nevertheless, introducing LEZs is often politically challenging, and cities seeking to implement them are likely to encounter opposition. This article explains the tried and tested policy options for LEZs, and strategies to navigate these obstacles.

Low- or zero-emission zones, clean air zones and low traffic zones (or areas) share an approach: the use of a designated zone with stricter policies to control (primarily transport) emissions and pollution. These terms are often used interchangeably, and we refer to them collectively as LEZs throughout this article. However, they may differ in objectives and the policies enacted within the zone. Cities should define the zone and its policies in accordance with local concerns and the city's objectives.

To date, LEZs have mostly focussed on tackling traffic pollution (particularly NO₂), but they have potential to

also include policies that address the burning of solid waste and cooking fuels, and industrial emissions



Low (or zero) emissions zones typically emphasise both health benefits from better air quality and environmental concerns. There are now many LEZ in place: in Europe alone, 320 cities had an operational LEZ by 2022.¹ Ambitious LEZs are sometimes called ‘ultra-low emission zones’ or ‘zero emission zones’, and while there are few ZEZs in force today cities are increasingly piloting or planning for these higher-ambition areas.² All cities should ultimately aim to achieve a zero emission zone, even if the route to zero emissions is to begin with a LEZ or clean air zone.

Clean air zones often target the same emissions sources as a low emissions zone – particularly traffic emissions. However, when communicating the zone with the public they give greater emphasis to the health benefits from better air quality. They could also tackle sources of air pollution that are not greenhouse gases. These large clean air zones differ from the many smaller, targeted zones used by some cities to manage air quality hotspots.

Low traffic zones. Focussing on congestion and reducing the number of cars on the roads can be a useful approach where traffic and slow travel speeds are the public’s primary concern. Cities focusing on congestion must also be careful to reduce total vehicle emissions by ensuring that the alternative transport modes provided are low emission. If additional public transport capacity is heavily polluting (such as diesel buses) it can neutralise any pollution reduction from lower private vehicle use.

Low-emission zones and ‘15-minute cities’ are sometimes conflated. While these policies can be complementary, they are not the same. To avoid misunderstandings, cities implementing either or both approaches must clearly communicate what each policy does and does not seek to do.

Gain and maintain a popular mandate to act

Cities should frame the need for emissions reductions based on the issues of greatest concern to the public and local businesses. Often, this means congestion and the health impacts of air pollution. Incoming city governments can make tackling these issues a core part of their election manifesto, including by implementing a LEZ. Incumbent city governments can undertake local consultation and run awareness-raising campaigns to begin this journey.

Support for the LEZ needs to be strong enough to pass to successive governments. Cities can consider establishing a cross-party coalition to pursue this. For example, in London, a cross-party committee that labelled the capital’s toxic air a ‘public health emergency’ and the Clean Air Wins campaign helped to build support for the Ultra-Low Emission Zone (ULEZ) and its expansion. Elsewhere in the UK, cross-party support also helped to establish a route towards Bristol’s Clean Air Zone, which began operating in 2022.³

Even if a vast majority of residents consider pollution or congestion to be a problem, this does not always



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translate into the same level of support for a LEZ and its policies. Cities must:

- undertake robust local consultation and make evidence-based decisions to get the details right.
- build a coalition of supporters, including the public.
- ensure that residents see tangible benefits.

If designed well, a LEZ has rapid local benefits that can quickly build support for both the zone and the government implementing it.⁴ Cities should act fast to maintain momentum and reap the benefits within their political term, while taking care to plan a successful LEZ.

The first Mayor of London included a congestion charge zone in his election manifesto

Ken Livingstone was elected as the first Mayor of London in 2000, in part on a pledge to tackle congestion by introducing road pricing in a new Congestion Charge zone. While 90% of residents agreed there was too much traffic on the roads when the zone launched in 2003, only a small majority were in favour of introducing the charge itself. Just one year later, the proportion of Londoners in support of the Congestion Charge zone had risen to 75% and it now would be unthinkable to remove it.⁵ When Mayor Ken Livingstone ran for re-election in 2004, his opponent pledged to scrap the scheme and Mayor Livingstone won a second term. Its impact on air pollution is the main reason for its popularity.⁶ Since then, the zone has become more ambitious and helped to lay the foundation for the subsequent Low Emission Zone and Ultra Low Emission Zone – [learn more about these schemes in our case study](#).

Define the size, scope and framing of the LEZ based on local evidence

The design of a LEZ is sensitive and complex. Decisions about the size, scope and framing should be based on concrete evidence of the local problem. In particular it should consider:

- Major local pollutants and their sources.
- The exposed population, including residents, workers, commuters, schools and outdoor recreational centres.
- The scale and spatial extent of the congestion problem.
- Local demographics.
- Current modal split and who has access to (or is dependent on) a private vehicle.
- Public priorities around air pollution and emissions.
- Clear and recognisable urban boundaries such as a boundary road.

To have the biggest impact, the LEZ should target high activity, high pollution, and/or high population density areas where exposure is most serious. The area can be one major area, or multiple smaller areas. Often, this means city centres, ports, dense residential areas and shopping areas.



Cities should commission research and policy analysis to gather this information, and understand the benefits and disadvantages of policy options for a range of stakeholders. Consider establishing an independent body to make policy recommendations based on the analysis.

Pursue ambitious policy options and incrementally increase ambition

The tried and tested LEZ policies are concerned with defining the types of vehicles entering the zone, the restrictions and/or disincentives they subject to, and driving a modal shift to non-motorised travel. The approach a city can take will depend on the range of powers at their disposal.

Understand the legal basis for establishing and enforcing an LEZ in your city

Some countries, including many in Europe, have national or regional laws allowing cities to introduce access restrictions, charging schemes, restricted traffic zones and other policies that might comprise an LEZ. Here, compliance is usually monitored through automated cameras and/or police enforcement.⁷ Some countries such as the Netherlands mandate such policies; according to the 2019 National Climate Agreement, the 30-40 largest Dutch cities are required to implement a zero-emission delivery zone by 2025. Where cities do not have a legal basis for creating and enforcing an LEZ, such as in the United States, trials of voluntary schemes can provide an avenue to get started.

Seek legal advice to understand what is feasible. Cities pioneering these policies in their jurisdiction may be able to pave the way for others to follow suit, for instance by clarifying city powers or collaborating to advocate for legal reform at other levels of government. Legal interventions: How cities can drive climate action highlights a number of LEZ cases, including how statements and evidence submitted by the Mayor of London strengthened a legal judgement in favour of Clean Air Zones in other English cities.

Your city's approach could include one or a combination of the below:

- **Close the zone, or some roads in the zone, to all vehicles** (including electric vehicles) through pedestrianised, walking, cycling and public transit areas. Copenhagen, Brussels, Munich, Milan and other cities already have car-free areas. Barcelona's pedestrian-friendly Superblocks are being gradually implemented alongside a LEZ introduced in 2020. Introducing a weekly, monthly or annual car-free day can help cities build support for a ban by demonstrating what the city would be like with fewer cars. Car free days are held in cities around the world including Addis Ababa, Jakarta, Reykjavik, Minneapolis, San Antonio (Texas), Paris and Bogotá.^{8, 9}
- **Ban the most polluting vehicles, or all internal combustion engine (ICE) vehicles, from the roads.** This requires cities to set vehicle emissions standards to define which vehicles are allowed in the zone, usually enforced through a substantial fine (the fine for entering the LEZ with a non-compliant vehicle is \$120 in Lisbon and \$212 in Seoul, for example).¹⁰ Standards and restrictions should be reviewed and updated regularly with increasing strictness. In 2018, Madrid's LEZ banned

the oldest and most polluting vehicles from the city centre, ahead of a planned total ban on private vehicles (except residents) by 2025.¹¹ Banning ICE vehicles but permitting electric vehicles can help to drive EV uptake.

- **Introduce road pricing for all, or highly polluting, vehicles.** This is a useful bridging policy on route to an outright ban on vehicles, and helps to remove the most polluting vehicles from the roads. A charge creates a trip-based disincentive to vehicle use, influences future vehicle purchase decisions and prepares citizens for a future tightening of restrictions. It requires the setting of emissions standards to define which vehicles are charged, and by how much. Relative to banning vehicles, road pricing has the advantage of creating revenue that can cover the costs of the scheme and, when there is a surplus, be reinvested in the city's transport network to provide residents with better transport alternatives – which is vital for success. Schemes might begin by targeting specific vehicle types such as freight or taxis, based on pollution criteria.

Consider a freight-focussed LEZ

Urban freight produces an outsized share of cities' transport-sector air pollution and emissions. Read *Zero-emission zones: Don't wait to start with freight* for advice on establishing an effective LEZ for freight.

- **Ban or significantly reduce parking in the zone.** Redistribute the road space to cycling infrastructure, pedestrians and 'parklets'. When Oslo's plan for a car-free city centre zone met backlash from local businesses, the city instead banned on-street parking and introduced measures to promote walking, cycling and public transport. The Car-free Liveability Programme, together with measures outlined in the Oslo Street Design Manual, have helped to substantially reduce the number of private vehicles.¹² Consider using temporary street installations to demonstrate alternative uses for parking space and support the case for street reallocation.
- **Voluntary schemes and incentives.** Cities that do not have the necessary powers to implement the above actions (and many do not) can explore voluntary or non-binding schemes, and work with the relevant authorities to develop supportive policies. Montréal's Climate Plan for 2020-2030 aims to establish a nonbinding ZEZ in the downtown area by 2030, targeting deliveries and supported by an urban logistics hub on city-owned land, while Santa Monica is incentivising participation in a zero-emission delivery zone through priority access to loading curb areas and parking. Planning and implementation of low- and zero-emission zones explains more about these schemes and others in Amsterdam, Brussels, London, Los Angeles, Oslo, Oxford and Paris.



The commissioned policy analysis mentioned previously will need to assess which options are politically feasible, aiming for the highest emissions reductions possible. It will also need to answer key design and implementation questions, such as which roads to include, what vehicle monitoring technology to use, what road pricing charges to set, how to use road-pricing revenue, and how to ensure fairness and accessibility.¹³

City experience indicates that LEZ policies should be introduced incrementally and gradually made stricter, rather than taking a sudden ‘big bang’ approach.¹⁴ This usually leads to greater acceptance by the public and local businesses. It is also usually more affordable for the city. Over time, you can increase the area covered by the zone, the vehicle standards, the levels of charging and the area(s) in which polluting vehicles (or all vehicles) are banned.

35 cities have committed to designating a major area of the city as a Zero Emission Area by 2030. While each city is developing its own context-specific approach, four implementation priorities are emerging – the use of street-based pilots, establishing vehicle regulation cordons, designing the ZEA at a district scale, and publishing a clear timeline. Read [*How C40 cities are implementing zero emission areas*](#) to learn more and find the ZEA designs and plans for Amsterdam, Auckland, Barcelona, London, Milan, Oslo, Oxford and Seoul.

Provide real alternatives by investing in walking, cycling, public transport and electric vehicle charging infrastructure

A LEZ will not work in isolation; residents and businesses must have access to affordable, attractive and convenient alternatives. Alternatives should be introduced ahead of or at the same time as the LEZ policies. Most importantly:

- **The LEZ should be one central part of a city-wide strategy to promote access to and use of public transport, walking and cycling**, reducing the number of vehicles on the road as well as spurring the transition to zero emission vehicles. [Read this for an overview](#) of how to provide these alternatives and links to further articles on their implementation.
- **Support should be made available for low-income individuals, non-profits, sole traders and small local businesses** that rely on a vehicle for access and deliveries, such as scrappage/vehicle replacement schemes to support the shift to cleaner vehicles that meet LEZ emission standards, or support for ‘last mile’ deliveries. [Low- and zero-emission zones and social equity](#) looks at supplementary support measures targeting those in most financial need in Brussels, Paris and London.

- **Support the rollout of electric vehicle charging infrastructure**, and consider priority access to parking and fast charging for high-mileage commercial vehicles, such as taxis.¹⁵ *How to build an electric vehicle city: deploying charging infrastructure* explains more.
- **Policies to support alternatives need to be well publicised and funded.** If road pricing is used, cities should consider ringfencing the revenue to pay for this investment. The London Congestion Charge generated over £2 billion in revenue in its first decade alone (2003-2013), with net income in 2022 reaching £307 million, all of which has been reinvested into London's transport system.^{16, 17}

The opportunity of Low Emission Zones: A Taming Traffic deep dive report looks more closely at policies that complement LEZs, including street redesigns, public transport service improvements, financial incentives, and parking and land use reform promoting compact/infill development and transit-oriented development. It also sets out the details of LEZs in London, Antwerp, Seoul, Lisbon, Rome, Haifa, Brussels and Shenzhen.

Consult and collaborate to build a coalition of powerful supporters

Cities will need vocal and powerful supporters to overcome opposition and implement the LEZ policies. Cities should consider setting up a body to facilitate collaboration with business groups, multiple local government authorities (where a LEZ crosses local government boundaries) and representatives of public interest groups, in the design of the LEZ.

Business objections are usually about ease of delivery access, the cost of upgrading a fleet to cleaner vehicles, and concerns about reduced customer numbers. Securing their support is vital. Work with major business groups to make the case based on evidence of the likely benefits for businesses – such as reduced time lost to congestion and increased footfall for shoppers not in cars. Understand their concerns and secure their support.

Cities may need to alter plans to secure businesses' support, for instance by altering planned timing that road pricing is applied or taking a more incremental approach (as in Oslo, which is implementing a 'fewest possible vehicles' approach rather than the initially planned ban on vehicles in the city centre).¹⁸

Where the LEZ area incorporates land owned or administrated by different government authorities and different levels of government, the support of all parties will often be needed, both politically and also for the practical implementation of the scheme.

Communicate with the public and ensure equitable benefits are clear

Even if there is initial public support for the implementation of a LEZ, this can quickly be lost if the proposed scheme is considered unworkable or is not well understood. Cities should run public consultations and well-informed public awareness campaigns to promote understanding of how it will

work and the benefits it will deliver, and to understand and address public concerns. It is important to keep citizens informed about the timing of upcoming restrictions or charges, when they will be affected and how they can prepare.

Policy analysis must include the distribution of LEZ benefits and the approaches to offering transport alternatives. Supporting measures must be introduced to ensure that benefits are equitable. This can include financial support for citizens and small businesses switching to cleaner vehicles (scrappage schemes), and ensuring bus routes and cycle paths reach low income areas, for example.

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