

Zero-Emission Delivery Zones Pilot **Executive Report**



September 2025



PBOT
PORTLAND BUREAU OF TRANSPORTATION

alta

Letter from the PBOT Director

Portland has long been an innovative leader in sustainable transportation. We led the nation in rebuilding the first interurban electric streetcar and were the birthplace of carsharing. We were also the first U.S. city to adopt a local emissions reduction plan and the first city in North America to deploy electric vehicle fast chargers in the public right-of-way.

More recently, Portland has taken another important step forward with our Zero-Emission Delivery Zones pilot project. From demonstrating how curb management can be a successful tool for climate action to testing emerging technologies, this project has shown how city governments can move quickly and be on the frontlines of positive change. We've learned a lot through this project, and I'd like to thank all of the PBOT staff who worked on the pilot.

Now the hard work begins. We must build on this project's impact in a time where greenhouse gas emissions continue to rise and local budgets are deeply constrained. While these are challenging times, one thing remains clear: cities are the centerpiece of the economy and we control valuable assets, like the curb zone. I hope our Zero-Emission Delivery Zones pilot inspires our peers to advance similar strategies—after all, local action is now more important than ever before.



Millicent Williams, PBOT Director

Acknowledgments

The City of Portland Zero-Emission Delivery Zones Pilot Project is the result of close collaboration among a diverse and wide-ranging set of partners. Each participant in the project's design, implementation, management, and evaluation was integral to making this unique and innovative project possible. The City appreciates the contributions from the following:

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- Neighbors for Clean Air
- Open Mobility Foundation
- Portland State University
- University of Washington Urban Freight Lab

The City of Portland is grateful to the USDOT for funding this project through the Strengthening Mobility and Revolutionizing Transportation (SMART) Grant Program. The City would like to thank current and former USDOT staff for their support on this project.

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Why do we need greener freight?

In today's world, commerce moves at a rapid pace. Items can be ordered and delivered in a matter of days—if not hours. The freight and logistics industry enables our cities to thrive and move at an unprecedented speed, but there can be tradeoffs when it comes to the health of our communities and our planet.

The emissions from urban logistics vehicles have an outsized impact on our climate compared to emissions from passenger vehicles. Freight accounts for only five percent of on-road vehicle miles traveled (VMT) but almost a quarter of greenhouse gas (GHG) emissions.¹

Last-mile delivery is also a major source of pollution that negatively impacts air quality in our neighborhoods, accounting for almost half of the transportation sector's nitrogen dioxide (NO_x²) emissions and more than half of its PM_{2.5} emissions.³

Long-term public health impacts can be especially significant in areas where freight vehicles frequently load and unload, wait in traffic, idle, or circle the block to look for parking. In addition, communities of color and communities living with low incomes face exponentially higher health impacts of diesel pollution.⁴

Besides the effects on our climate and our bodies, **the presence of large trucks can also contribute to noise pollution, traffic congestion,**

and safety hazards like double parking.⁴

Despite these urgent problems, the United States lags behind other countries in planning for freight decarbonization. A study by the Urban Freight Lab at the University of Washington showed that fewer than half of the U.S. cities they studied had considered last-mile⁵ freight in their sustainability planning,⁶ and of those, less than one third had expressed an intention to dedicate resources toward addressing the issue. Portland was one of only U.S. seven cities whose plans the researchers found to be substantial and comprehensive enough to reduce urban freight emissions.

Learning from our peers

Freight-related emissions are a complex issue with many interrelated contributing factors, and Portland recognizes the value of learning from peers who are also seeking to improve air quality and enhance urban quality of life. Across the European Union and United Kingdom, cities have adopted Low-Emission Zones (LEZ) and Zero-Emission Zones (ZEZ) as key components of their environmental strategy. The ultimate goal of these regulations is to create cities where communities enjoy clean air, quiet and safe streets, and vibrant public places.



What is a Low- or Zero-Emission Zone?

A Low-Emission Zone (LEZ) or Zero-Emission Zone (ZEZ) is a designated area where vehicles that don't meet certain emission standards are either limited from traveling or charged a fee. For example, a city government could outline a zone within the urban core where vehicles are required to display a permit showing that they meet low-emission or even zero-emission standards. Non-compliant vehicles are typically fined. These zones are a popular transportation decarbonization strategy internationally, especially in Europe, where cities are seeing positive outcomes.

PARIS, FRANCE

Paris was the first French city to establish an LEZ to tackle the issue of transportation-related air pollution. As a result of the LEZ and other air quality measures, the region documented a 45% reduction in nitrogen dioxide levels and a 35% reduction in concentration of fine particulate matter between 2014 and 2024. The city plans to increase restrictions over time in hopes of increasing the impact of this program. Across France, LEZs are now mandatory in all urban areas with a population of more than 150 thousand residents.⁷

LONDON, UK

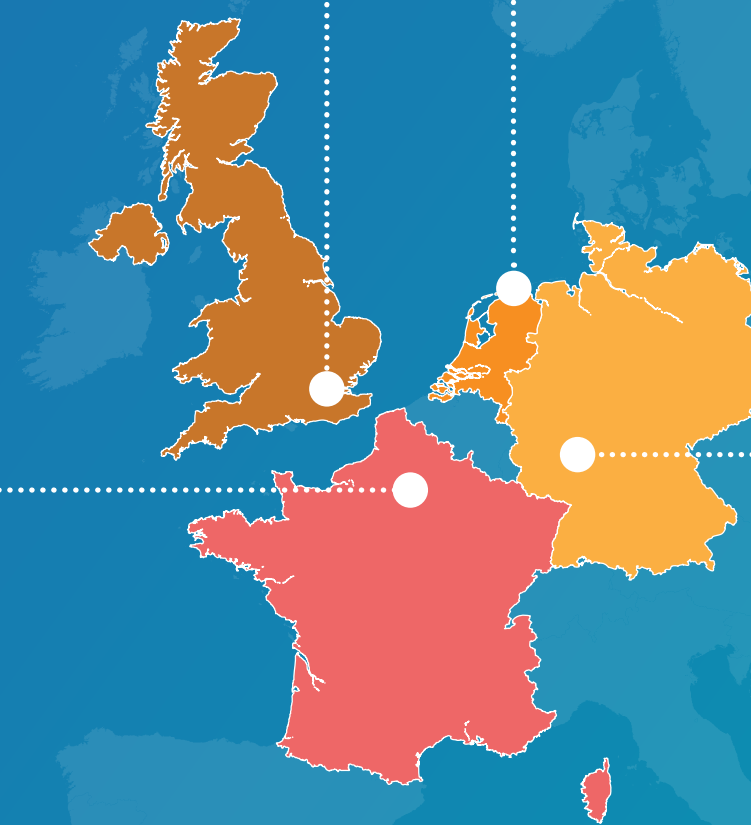
The city of London operates a city-wide Ultra Low Emission Zone (ULEZ), an area where vehicles that do not meet stringent emissions standards must pay a fee to travel. As a result of the ULEZ, nitrogen dioxide levels in central London are more than 50% lower than they were predicted to be without this program,⁸ and the city has documented an eight percent decrease in respiratory issues since 2008.⁹

THE NETHERLANDS

In 2020, Amsterdam instituted an LEZ (called a "Milieuzone") that restricted entry to the city for certain high-emission vehicles. From 2025 on, Amsterdam will only allow new vans and trucks that are zero-emission to travel on the city's ring road. The city is phasing in this restriction, allowing transitional arrangements for newer vehicles. Starting in 2025, all municipalities in The Netherlands have the option to institute areas where only zero-emission vehicles are allowed to travel and 14 Dutch cities introduced milieuzones earlier this year.

FRANKFURT, GERMANY

Frankfurt was one of the first European cities to introduce an LEZ, which restricts entry to only vehicles that meet certain emission standards. The city took a phased approach to implementing these regulations, raising the emission requirements over a period of years to allow time for compliance. At least eight other German cities have also put in place similar regulations to improve air quality in urban areas.



In the U.S. context, Low-Emission and Zero-Emission Zone policies risk potential legal challenges due to impacts from restricting commercial vehicle travel.¹⁰ As a result, U.S. policymakers have focused on addressing freight issues by specifically managing use of the curb. Curb zones house deliveries but are also the site of problematic behaviors, such as idling, double-parking, and circling, which create health and safety issues. Cities regulate these activities, which creates opportunity to make changes on the curb.



SANTA MONICA, CA

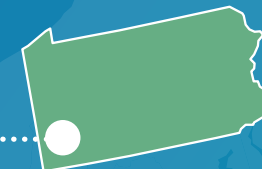
In 2021, the City of Santa Monica partnered with the Los Angeles Cleantech Incubator (LACI) to implement the first voluntary ZEDZ in the U.S. This project defined a one-square-mile test zone downtown where curb access was prioritized for zero-emission vehicles. The Santa Monica ZEDZ used voluntary compliance and was not enforced.

LOS ANGELES, CA

In 2021, the City of Los Angeles' Department of Transportation also started a pilot with LACI to test zero-emission delivery zones. LADOT installed five zero-emission delivery spaces in different parts of the city to test how they could support sustainable deliveries. More recently, LADOT has expanded the pilot to include 30 new spaces that can be used for electric vans, cargo bicycles, and other zero-emission delivery vehicles. Their hope is to reduce congestion and harmful emissions, as well as incentivize delivery businesses to transition to electric fleets.

PITTSBURGH, PA

The City of Pittsburgh implemented Smart Loading Zones in 2022 as a way to increase the efficiency of deliveries and decrease traffic and vehicle emissions. In these zones, license plate reading technology analyzes activity in the curb zone and automates parking payment. These zones have resulted in a 70% increase in vehicle turnover and a 60% decrease in the average stay length.¹¹ They have also decreased double-parking by 40%,¹² allowing traffic to flow more smoothly and reducing hazards for cyclists and pedestrians. In a similar effort to more efficiently manage the curb and prioritize parking for authorized users, Philadelphia also piloted 20 Smart Loading Zones for six months in the City Center.



Zone versus Zones

When the pilot was envisioned, the goal was to build on approaches trialed by Los Angeles and Santa Monica. Portland envisioned a geographic area where every delivery spaces, known as Truck Loading Zones, would be temporarily transitioned to be for zero-emission vehicles only and regulated as such. Through public involvement and project delivery, city staff learned that the idea of a geographic area was unclear. In response, PBOT shifted its terminology so that Zero-Emission Delivery Zones (ZEDZs) instead refers to a specific loading space at the curb, of which there could be one or many.



A focus on freight: Zero-Emission Delivery Zones

While LEZs and ZEZs require vehicles to meet particular emission standards to travel within an urban area, **Zero-Emission Delivery Zones (ZEDZs)** regulate commercial loading zones in particular. ZEDZs are areas where these loading zones can only be used by zero-emission vehicles, offering priority access to companies that have transitioned their fleets away from internal combustion engines.

Why did we explore ZEDZs in Portland?

To meet the scale and pace of its ambitious carbon emission reduction goals (see callout below), Portland is focusing attention on the transportation sector, which accounts for over 40% of all emissions in the region. Multnomah County – which is home to Portland – is in the top one percent of the highest diesel emissions in the U.S. and that pollution is inequitably dispersed.¹³ The City’s 2022–2025 Climate Emergency Workplan¹⁴ prioritized making freight cleaner, and the 2040 Portland Freight Plan¹⁵ (adopted in 2023) outlines in more detail how the City hopes to accomplish this. The Plan identifies 52 actions, including a recommended priority to “pilot green loading/

low emission zones” within five years.

In 2023, the Portland Bureau of Transportation (PBOT) was awarded a “Strengthening Mobility and Revolutionizing Transportation” (SMART) grant from the US Department of Transportation¹⁶ (USDOT) to address the challenges of curb management and last-mile freight. Through this grant, the City piloted using advanced technologies to test **Zero-Emission Delivery Zones (ZEDZs)** in a 16-block area of downtown Portland by allowing only zero-emission delivery vehicles to use the loading zones in the project area.

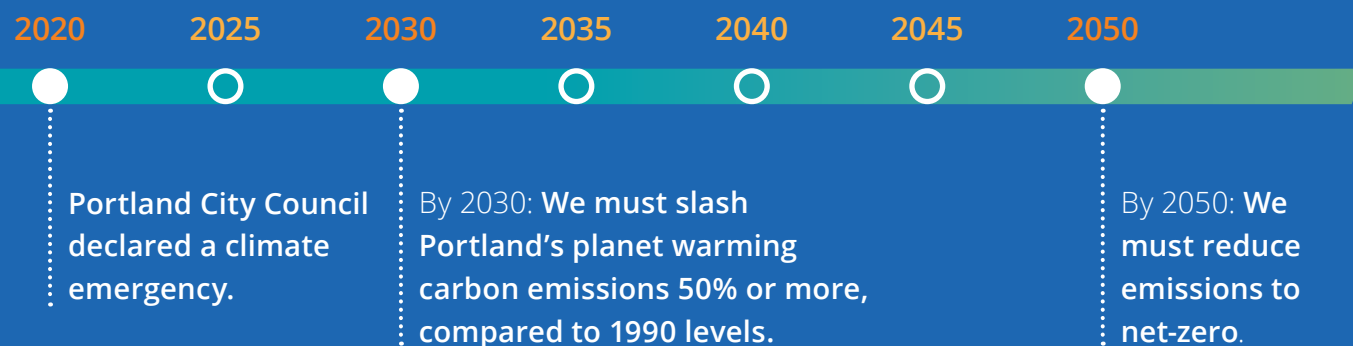
As part of this project, the City also focused on building relationships with delivery companies, established new partnerships and tested the use of a micro-distribution hub and e-cargo tricycle as a last-mile delivery solution. For the City, this pilot represents another step toward encouraging a future of decarbonized transportation.

The **transportation sector** accounts for over 40% of all emissions in the region.



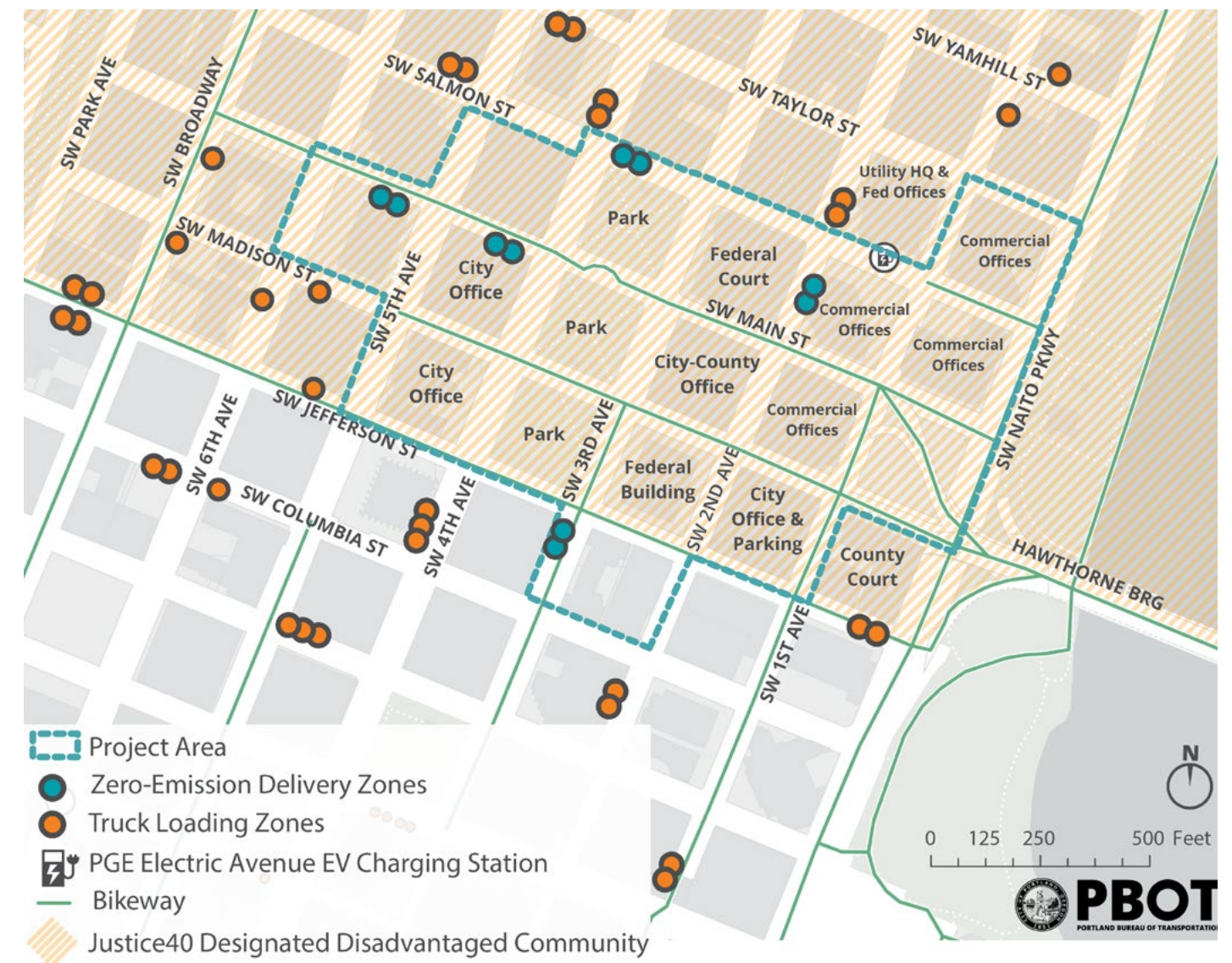
PORTLAND CITY COUNCIL’S CLIMATE GOALS

City Council declared a climate emergency in 2020 and directed City bureaus to restore a safe climate for all Portlanders, centering the needs and priorities of Black and Indigenous people, communities of color, immigrants, refugees, low-income individuals, labor and workers, people living with disabilities, youth, and individuals experiencing homelessness.



Project area

The map below illustrates the project area sits (outlined in teal). During the six-month pilot period, only zero-emission vehicles were permitted to park at **Zero-Emission Delivery Zones** within this area (indicated by teal dots). Internal combustion engine vehicles could park at metered spaces, use internal loading bays, or travel through.



What were our project goals?

PBOT designed the Zero-Emission Delivery Zones pilot to make progress toward the following goals:

Increase Safety & Reliability

Reduce conflicts between travel modes, as well as behaviors like idling, circling, and double-parking. Improve compliance in commercial loading zones. Increase the use of smaller, quieter, and cleaner freight vehicles.

Build Resiliency

Decrease greenhouse gas emissions from transportation and help to future-proof the freight industry by diversifying goods delivery vehicles.

Ensure Equity & Access

Make zero- or low-emission vehicles more accessible for small and emerging businesses. Improve air quality to reduce adverse effects of freight-related pollution. Create new job opportunities through workforce training and new industry growth.

Steward our Climate

Decrease pollution, vehicle miles traveled, traffic noise, and congestion while improving air quality and overall public health.

Facilitate Partnerships

Work with public and private partners to support and encourage adoption of zero-emission vehicles, establish new partnerships for last-mile delivery, and act as a model for other cities in the encouragement of sustainable transportation and delivery practices.

Improve Data Systems

Test new technologies and use data tools to gain insight and improve efficiency.



By establishing temporary Zero-Emission Delivery Zones in downtown Portland, PBOT tested strategies that could contribute to positive outcomes in the following areas:

Environment



The City of Portland has committed to achieving net-zero carbon emissions by 2050. Nearly one-quarter of carbon emissions in Portland's transportation system come from freight, making this a key area for decarbonization.

Public health



Exposure to air pollution increases our vulnerability to chronic health conditions, such as cardiovascular disease and asthma. In Portland, **nearly 90,000 residents live within 1.2 miles of the city's biggest sources of air pollution**, such as freeways and industrial facilities.¹⁸

Traffic safety



Increased use of e-commerce has meant higher and higher volumes of vans and trucks on the street each year. According to the 2040 Portland Freight report, there were **2,267 collisions involving trucks between 2014 and 2018 in Portland.** Because of their weight and size, crashes involving these trucks are more likely to result in serious injuries and fatalities.¹⁷

Curb management



Parking, loading, and unloading areas are in high demand in downtown Portland. Issues like double-parking, idling, and circling for parking can create hazards for road users, contribute to congestion, and produce harmful air pollution. The presence of loud, polluting delivery vehicles can also have a negative impact on pedestrians and urban public spaces.



Testing Zero-Emission Delivery Zones in Portland

The Zero-Emission Delivery Zones pilot program included the following actions:



Establish Zero-Emission Delivery Zones

- Portland became **the first U.S. city to pilot regulated ZEDZs** that used parking permits for enforcement.
- PBOT **changed parking rules** in designated Truck Loading Zones (TLZs) to only allow permitted zero-emission vehicles.
- PBOT **created a free digital parking permit** to help enforce compliance and enabled parking enforcement staff to easily identify compliant vehicles.
- PBOT used the pilot to **foster partnerships and engage with industry** on zero-emission fleets and sustainable freight practices.



Facilitate Micro-Distribution Hub (MicroHub) Operations and Last-Mile Solutions

- PBOT **promoted cyclelogistics** as a sustainable last-mile delivery method.
- PBOT explored diverting goods to **B-Line for local delivery within the project area** and facilitated discussions between companies and B-Line Urban Delivery for potential collaboration.
- PBOT, B-Line, and INRIX developed tools to **map e-cargo tricycle routes** and usage.
- PBOT took steps to **assess the broader potential for e-cargo tricycle deliveries** in Portland.



Use Data, Sensors, and Curb Access to Manage the Zero-Emission Delivery Zones

- PBOT partnered with Portland State University to use video cameras to monitor use of several truck loading zones, **providing baseline data on curb use.**
- PBOT partnered with Automotus and Cleverciti to **test computer-vision sensors**, which collected data on deliveries, duration, time of day, and vehicle type.
- PBOT partnered with INRIX to **digitize parking and loading rules** for the ZEDZs.
- INRIX shared digital curb data with private companies to assist with **routing and logistics planning.**



Photo courtesy of B-Line



Cyclelogistics

In urban areas, cargo bikes can be an effective replacement for last-mile delivery vehicles with internal combustion engines. Among other benefits,¹⁹ cargo delivery bikes (including e-cargo tricycles) reduce harmful pollution, take up less curb space, can avoid congestion by using bicycle infrastructure and occupying less roadway space, enable parking closer to the delivery destination, and pose less of a danger to other road users. They also cost much less to purchase and maintain than a delivery truck, providing cost savings. While they aren't suitable for all environments or delivery types and then may carry fewer goods, **a UK study estimated 10–30% of trips by delivery and service companies could potentially be replaced with e-cargo bikes.**²⁰

Like other delivery vehicles, cargo bikes need a centralized location, or hub, where they can sort and load parcels to be delivered across the city. According to the City of Portland's Micro-Delivery Hub Feasibility Study, to enable efficient deliveries, these "microhubs" would ideally be located within a mile of their final destinations.²¹ Building cyclelogistics microhubs in central locations could enable bicycle delivery companies to operate efficiently and reliably,

making them an important component in freight decarbonization.

In Portland, established cyclelogistics provider B-Line Urban Delivery operates a fleet of e-cargo tricycles that services more than 200 businesses, institutions, and non-profits in the area. In 2024 alone, the company made over 45,000 deliveries (both within and outside of the ZEDZs), preventing over two thousand metric tons of CO₂ from being released into the atmosphere.²² B-Line was an essential partner in the Zero Emission Delivery Zones pilot in Portland, as they made it possible to offer companies an alternative option for last-mile logistics that aligned with sustainability and safety goals. As a result of the pilot program, six new companies contracted with B-Line for last-mile delivery services.



In 2024, 45,000+ deliveries by B-Line e-cargo tricycles saved

over 2,000 metric tons of CO₂ from entering

Truck Loading Zone compliance issues

Before undertaking this pilot, PBOT was aware of issues with Truck Loading Zones (TLZs) that posed health and safety challenges. These interrelated issues included:

⊘ UNAUTHORIZED, NON-COMMERCIAL VEHICLES USING THE DELIVERY ZONES

As a result of video analysis conducted by PSU, it was discovered there is a 75% non-compliance rate among vehicles using TLZs. This means that vehicles other than delivery vehicles were using spaces designated for deliveries.

⌚ OVERSTAYING

Some vehicles, even authorized delivery vehicles, may occupy a loading zone longer than permitted. A study of Portland's downtown loading zones found that there was a 13% overstay rate in downtown TLZs.²³

⚠️ DOUBLE-PARKING

When delivery drivers are unable to use TLZs, they may double park, blocking the bicycle lane or vehicle travel lane, creating potential hazards for other road users. They may also illegally park in other spots.

🔄 IDLING AND CIRCLING FOR PARKING

Idling and circling behaviors contribute to traffic congestion, pollution, and noise in urban areas. This makes Portland's streets less desirable to people shopping, dining outside at restaurants, or others walking or biking.

Enforcing the zone

In Portland, TLZs are already regulated and enforced by the PBOT's parking enforcement division, so the new Zero-Emission Delivery Zones required that project staff work with enforcement and regulatory staff to understand existing policy, develop regulations, and design new signage.

To streamline parking enforcement activities, PBOT created a free digital parking permit for delivery companies operating zero-emission vehicles. The digital permit included information about a vehicle's make, model, and fuel source, allowing staff to confirm it was zero-emission. With the permit, parking enforcement staff could scan a license plate and easily determine whether the vehicle was authorized to park in the ZEDZs.

Stakeholders, communities and partnerships

Throughout the pilot, PBOT worked to raise awareness of and build support for the Zero-Emission Delivery Zones. City staff also committed to transparent information sharing with the public throughout the duration of the project. As part of its efforts to engage a wide range of stakeholders, PBOT staff held one-on-one meetings, convened more than 10 different focus groups, conducted outreach with over 40 stakeholders, and sent out over 160 surveys to project area. Stakeholder groups included:

- Communities living within the project area
- Local private and public sector businesses
- Delivery and logistics companies
- Federal and County government partners
- Environmental justice groups and community organizations
- Personal privacy stakeholders
- Other City departments

20+
FOCUS GROUPS



40+
STAKEHOLDERS



160+
SURVEYS



KEY TAKEAWAYS

Stakeholder feedback demonstrated that:

Private businesses are eager to meet their sustainability commitments but remain concerned about the cost and complexity of transitioning to zero-emission fleets. Some stakeholders highlighted challenges such as the upfront cost, time required to transition to electric fleets or e-cargo tricycles, and limited access to EV charging infrastructure.

Communities citywide are interested in the benefits of ZEDZs. Some stakeholders felt the initial geographic scale of the project was too limited to deliver meaningful benefits across Portland's neighborhoods. Communities expressed a desire for the project to expand into their neighborhood.

Transparency in sensor use is essential. Stakeholders emphasized the importance of transparent communication about sensor monitoring during the pilot and ensuring all sensors are removed once the pilot concludes.

Ongoing communication remains a priority. Stakeholders are interested in receiving continued updates about the project. Focus group participants requested the creation of feedback loops to ensure all users understand the role and regulations of the ZEDZs, as well as build interest and excitement for sustainable delivery measures.

Key milestones



Project successes

During its six-month run, the Zero-Emission Delivery Zones (ZEDZs) pilot achieved successes in each of its three objectives:



Establish Zero-Emission Delivery Zones

- ✓ Portland established the **first regulated ZEDZs in the nation** following extensive outreach and communication with stakeholders and key City partners.
- ✓ PBOT approved **over 65 zero-emission vehicle digital permits**.
- ✓ **DHL bought three electric vehicles for deliveries in Portland** and installed chargers at their local facility.
- ✓ As a result of this project, **Amazon rerouted their zero-emission vehicles** to be deployed within the project area.
- ✓ The first **FedEx-branded zero-emission vehicles** in Portland were spotted in the project area in March 2025.
- ✓ HYPHN decided to purchase their **first zero-emission vehicle** for their moving company operations as a result of this project.
- ✓ **The City of Portland's Printing & Distribution department purchased an electric vehicle for City deliveries**, showcasing its commitment to leading by example. Based on fleet vehicle tracking, this van is forecasted to travel 130,000 miles during its useful life. This single replacement ZEV is estimated to avoid 88.9 metric tons of GHG emissions. **This is equivalent to carbon sequestered by 89.2 acres of U.S. forests in one year.**²⁴



Facilitate Micro-Distribution Hub (MicroHub) Operations and Last-Mile Solutions

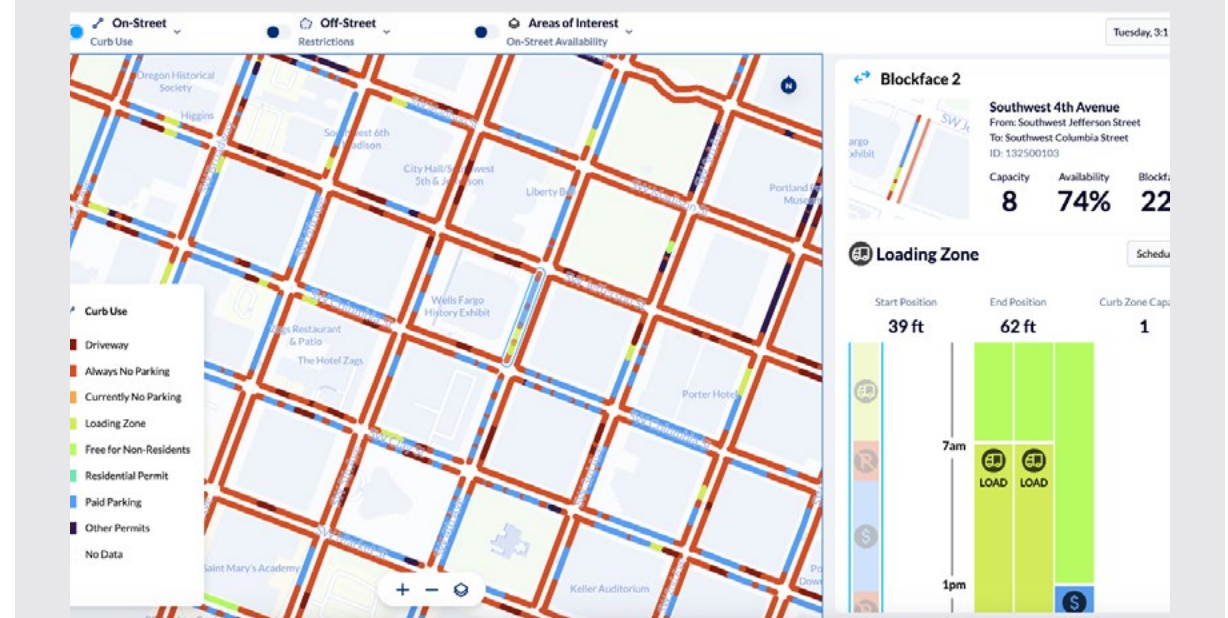
- ✓ B-Line and INRIX created the **first known Mobility Data Specification (MDS), an open-source data standard, feed for a logistics company (B-Line) in the country**, allowing the City to better understand how e-cargo tricycles travel.
- ✓ B-Line **partnered with six businesses** within the project area to trial diverting deliveries into the ZEDZs.
- ✓ PBOT used SMART funding to incentivize B-Line's purchase of their **first zero-emission van**, creating opportunities to expand their service area and diversify the types of goods they deliver.
- ✓ B-Line researched **public policy issues on the commercial operation of light electric vehicles** in Portland. B-Line focused on identifying possible barriers around electric quadracycles and cargo-trailers, which are becoming more prevalent for urban deliveries in other cities.
- ✓ PBOT issued a Request for Information asking companies to **propose plans to repurpose some portion of PBOT-owned public parking garages** in the downtown core as a micro-delivery hub.
- ✓ PBOT facilitated **conversations between major retailers and B-Line Urban Delivery** for provision of last-mile delivery services



Use Data, Sensors, and Curb Access to Manage the Zero-Emission Delivery Zones

- ✓ PBOT partnered with INRIX to **digitize all of the city's parking and loading rules**. This information was formerly available only on physical signs, but the partnership made this data readily available to private sector companies in INRIX's ecosystem..
- ✓ B-Line also used the Curb Data Specification (CDS) to ingest INRIX's parking and loading rules for Portland, **showing the promise of two-way public- and private- sector data exchanges**.
- ✓ PBOT used Automotus and Cleverciti **sensors to monitor use of downtown Truck Loading Zones** to better understand the issues surrounding them.
- ✓ **Video monitoring** has created a common understanding among stakeholders of problematic noncompliance issues occurring in Truck Loading Zones.
- ✓ Sensor data from Automotus and Cleverciti was integrated into the INRIX platform using the Curb Data Specification (CDS), showing how **open-source data standards can create new insights and partnerships**
- ✓ PBOT participated in the Open Mobility Foundation's SMART Curb Collaborative, which was a group of ten leading U.S. cities **testing how advanced technologies could tackle challenges in curb management** on city streets.
- ✓ Sensor data from Automotus and Cleverciti was integrated into the INRIX platform using the Curb Data Specification (CDS), showing how open-source data standards can create new insights and partnerships..

A LOOK INSIDE INRIX'S CURB ANALYTICS DASHBOARD:



Portland's experience offers useful lessons learned for other cities around the U.S. seeking to follow in their path.

1. Identify your assets and challenges.

Cities control the curb, create and approve permits, and manage lane use, which are all valuable assets and potential tools. At the same time, pilot projects may also reveal unexpected internal challenges, such as procurement or other process constraints. Understanding all the assets cities can leverage, as well as any limiting factors, is critical for success.

2. Engage with peer cities.

Collaboration provides insight, inspiration, and lessons learned from experience on the ground. It can also help cities develop common standards and strategies that can better facilitate cooperation with nationwide freight and logistics companies. Portland has found it helpful to collaborate with other cities through organizations like the Open Mobility Foundation, C40 Cities, and the Los Angeles Clean Tech Incubator.

3. Have a community engagement plan from the beginning.

Establishing trust and building effective relationships with stakeholders from the beginning is key to a smooth process. Cities should proactively engage businesses and community members, have clear communications, respond promptly to concerns, and provide regular updates on progress.

4. Establish partnerships with key industry stakeholders.

Cities should find out the interests, concerns, and operations of industry, so they can productively shape project design and be better positioned to collaborate and succeed.

5. Use data to illustrate the problem for stakeholder buy-in.

A clear, data-driven understanding of the challenges that a pilot project aims to solve is essential for generating stakeholder support. Framing the issue through compelling narratives and concrete evidence builds interest and momentum for change. For example, in Portland, camera data from the Zero-Emission Delivery Zones showed that there is a 75% non-compliance rate among vehicles using Truck Loading Zones, impacting access for permitted users. Highlighting this kind of insight can be a powerful catalyst for action.

6. Find your champions.

Having strong local support and interest from policymakers, as well as external stakeholders, will increase the odds of success and make it easier to weather inevitable challenges. Industry leaders aren't the only ones interested in improving freight systems; community groups often support efforts that result in less noise and diesel fumes in their neighborhoods and address climate goals.

7. Start small but plan to scale.

Portland designed its six-month demonstration project knowing it could not address every challenge or deliver similar outcomes as seen in European cities. PBOT focused on a proof-of-concept, but kept expansion in mind. A future phase of Portland's ZEDZs program could expand to different areas, span longer time frames, and provide financial and technical assistance. This would provide companies with more certainty and time to plan for fleet transitions.

8. Use tools that are easy to access, replicate, and scale.

Advanced technology may not always be necessary; in some cases, lower-tech options are less complicated and labor-intensive to employ. Where technology is justified, understand how internally developed or externally purchased or developed data systems, tools, and software will be managed, maintained, and scaled.

9. Balance speed with transparency.

While there is a temptation to move at the rapid pace of technology, cities must balance innovation with public process and responsible stewardship of public assets. Introducing new technologies, such as sensors or cameras, to the urban environment must be done with care and communication.

10. Understand the things that are out of your control.

The terms of the SMART grant forbid the use of any funds for direct enforcement. Without the ability to increase enforcement in the loading zones, fostering compliance was significantly more difficult. Understanding these limitations before the grant period allowed the project team the opportunity to collaborate with the City's parking enforcement division to address violations independently, but adequate enforcement at the curb still remains a challenge.



The future of zero-emission delivery in Portland

The City of Portland’s pilot has demonstrated success and sets the stage for future progress. The innovative tools and partnerships from this pilot have laid the groundwork for later collaboration to tackle the challenges of freight decarbonization. As funding is identified, some of the possible actions that have arisen out of this pilot include the following:

- **Update the City’s existing truck loading policies** to create a more systematic approach to curb management, including permit requirements and assessing loading zone locations.
- **Expand zero-emission delivery zones** in different areas of the city to extend public health and safety benefits to more communities.
- **Expand fast stop (free, five-minute zones for pickups/drop-offs)** locations across the city for ZEDZs,

- **Expand testing of technology and sensors** at truck loading zones .
- **Explore new enforcement strategies** to improve efficient use of loading zones.
- **Explore updating regulations** and piloting light- and medium-duty electric vehicle charging for delivery vehicles in the right-of-way.
- **Address zoning code challenges** for microhub feasibility and implementation.
- **Develop pilot** for on-street microhubs and update regulations as needed.
- **Assess the need to update policy** to better support e-cargo bike delivery operations, including quadricycles and electric-assist trailers.
- **Develop industry support program** to speed up the transition to zero-emission vehicles.

- **Expand curb digitization efforts** to efficiently communicate parking and loading zone rules to freight and ride-hail companies, including automated vehicles.
- **Work with local companies, non-profits, and major retailers** to expand zero-emission vehicle delivery in Portland.
- **Explore solutions to improve the safety, efficiency and attractiveness** of where freight and the public realm intersect.

Through this pilot program, the City has sent a powerful market signal encouraging private companies to accelerate their transition to more sustainable fleets. In working to facilitate the switch to zero-emission vehicles, Portland hopes to be a model for other cities that want to tackle transportation-related impacts to the climate and our community health.

Endnotes

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