Technical Highlights

Travel Efficiency Strategies: Transit Improvements

Air quality in the United States has improved over the years as emission control technologies have reduced emissions from all pollution sectors. Yet the transportation sector continues to be a major source of criteria pollutant and greenhouse gas (GHG) emissions across the country. While emissions per mile traveled have decreased, growth in travel activity has offset some of those reductions and presents a challenge to achieving and maintaining air quality and protecting public health.[1] Investing in and implementing programs that reduce travel activity can help to achieve state and local air quality and climate goals, while creating a more accessible and sustainable transportation system.

Introduction to Travel Efficiency

Travel Efficiency (TE) strategies focus on reducing vehicle emissions by changing how often, how far, and by what mode people choose to travel. Transportation and air quality planners can use TE strategies to influence travel behavior and reduce vehicle miles traveled (VMT). TE strategies include:

- Travel demand management;
- Transit improvements;
- Transportation pricing;
- Land use/smart growth; and
- Bicycle and pedestrian programs.

EPA developed the Travel Efficiency Assessment Method (TEAM) to quantify the potential emission reduction benefits of TE strategies.[2]

[1] See Our Nation's Air (https://gispub.epa.gov/air/trendsreport/2024/#home), EPA's annual interactive report on air quality.

[2] For more information on the Travel Efficiency Assessment Method (TEAM), user guide, and 12 cases studies in partnership with agencies from across the country, please visit EPA's Travel Efficiency website (https://www.epa.gov/state-and-local-transportation/estimating-emission-reductions-travel-efficiency-strategies).

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This document provides an overview of transit improvement strategies and implementation approaches.

Transit Improvement Strategies

Transit improvements are a type of TE strategy that enhance or expand transit service with the goal of increasing transit ridership. Strategies in this category typically reduce travel costs, reduce travel or wait times, or expand the service area or operating times to increase the number of commuters served. Agencies may also improve the convenience, comfort, and safety of transit systems to make transit services a more appealing option for passengers. These improvements may be applied to public transportation systems, private transit providers, and joint public-private partnerships.

Important considerations in transit improvement planning include project costs, implementation timelines, and user impact. While some transit improvements—such as building new or expanded light or heavy rail systems—may require large infrastructure investments with long timelines, others may be relatively quick to implement. For example, offering free or reduced fares or adding additional vehicles to existing bus routes may have shorter implementation timelines, which could increase ridership and thereby reduce emissions in a shorter timeframe.

In the TEAM case studies, EPA partnered with state and local agencies to assess various strategies. These included potential transit improvement strategies, which were estimated to provide significant VMT reductions.[3] Other potential benefits from these strategies include:

- Reducing emissions of criteria air pollutants and greenhouse gases; and
- Providing additional travel options to all citizens and increased accessibility for people without other reliable options.

Implementation Approaches

Regional and local government agencies have many options for designing their transit services. The following table provides examples of how transit improvements might be implemented at a local or regional scale. Through their impacts on transit cost, time, convenience, and comfort, each of these improvements could increase transit ridership and decrease overall VMT.

[3] Transit improvements, including increasing service frequency and service area, decreasing wait times, or providing subsidies, generally had significant impact on decreasing in VMT. In Puget Sound, for example, providing targeted transit subsidies to low-income populations had an estimated effect of reducing regional VMT by 1.78% compared to the "business-as-usual" case. In other cases, increasing transit frequency or reducing wait times resulted in a decrease of regional VMT by 0.30 - 0.55%. See EPA's factsheet, Travel Efficiency Assessment Method: Key Takeaways from State and Local Case Studies to Reduce Transportation Emissions, EPA-420-F-20-042, July 2020.

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Reduce Passenger Cost	Reduce Travel Times	Expand Service	Improve Comfort, Safety, and Convenience
• Provide free or reduced transit fares broadly or to certain groups such as senior citizens, low-income individuals, veterans, or students • Sell bundled transit passes at a discount	• Introduce Bus Rapid Transit (BRT) service lines (including dedicated bus lanes, bus-priority signalization, off-board fare collection) • Add more vehicles to existing routes to increase frequency and reduce time passengers spend waiting at bus stops • Build transit hubs to more efficiently connect different modes of transit	• Expand transit service into a new geographic area previously not served • Add off-peak travel service • Restructure bus routes to maximize geographic coverage and accessibility • Complement public transit networks by partnering with private rideshare companies to provide on-demand bus service in areas not served by public transit	• Improve amenities at transit stops (e.g., add covered waiting areas, seating, and adequate lighting) • Increase frequency of cleaning at transit stops and aboard vehicles • Standardize and centralize fare structure, routes, and branding across all transit services in a region

Implementation Example: Bus Rapid Transit in Indianapolis

In 2019, Indianapolis launched its IndyGo Red Line, the first of several planned Bus Rapid Transit (BRT) routes in the city.[4] BRT systems are bus lines designed to be high-capacity, fast, and reliable, often drawing comparisons to light rail, thanks to features such as dedicated bus lanes, bus-priority signalization (giving buses priority at intersections), large and frequent buses, off-board fare collection, and at-grade boarding platforms. In Indianapolis, the Red Line route covers 13 miles with a 10–15-minute vehicle frequency and stops every one-half mile. The Red Line is served by an all-electric fleet that runs largely in central bus-only lanes featuring signal prioritization and raised, center-platform stations for quick boarding. Transit planners in Indianapolis found that BRT was a cost-efficient alternative to light rail; limited funding that would have paid for a single rail line was instead directed to 55 miles of BRT, which will serve a much larger area of the city.[5] Intensive community involvement, public education, and communication campaigns were all key to the project's success. Transit ridership has increased dramatically since the Red Line was introduced in 2019.[6] By 2025, a combined grid network of local buses and additional BRT lines is estimated to increase transit service in Indianapolis by 70%.[7]

Implementation Example: Free Bus Fares in Wenatchee, Washington

In the spring of 2020, during the COVID-19 pandemic, Link Transit in Wenatchee Valley, Washington, decided to suspend all bus fares during the crisis.[8] In July 2021, the transit agency

[4] For more background, see IndyGo Red Line webpage (https://www.indygo.net/red-line/).
[5] What Indy learned when it opened a mostly bus-only rapid transit route, Kinder Institute for Urban Research, February 10, 2020.
[6] Ibid.
[7] See the IndyGo Bus Rapid Transit webpage (https://www.indygo.net/bus-rapid-transit/).
[8] See Link Transit website (https://www.linktransit.com/).

extended its zero-fare policy with a one-year pilot program, which was recently made permanent.[9] Link Transit also expanded its service in 2022, adding new routes and express lines. The free transit service is funded by a combination of local sales tax and federal and state grants. With its new policies, Link Transit provides additional access to transportation and increases transit efficiency by speeding up boarding times. As a result, ridership recovered to 96% of pre-COVID levels by May of 2022.[10]

More Information

For more information about EPA's work on travel efficiency (including TEAM user guide, technical documentation and detailed case studies), please visit EPA's Travel Efficiency website.

[9] See Link Transit Zero Fare FAQ (https://www.linktransit.com/rider-tools-and-rules/fares/).

[10] Wenatchee Valley's Link Transit adopts a permanent zero-fare policy, The Wenatchee World, June 24, 2022.