## Public Transit Benefit Categories

<table>
<thead>
<tr>
<th>Improved Public Transit Services</th>
<th>Increased Public Transit Travel</th>
<th>Reduced Automobile Travel</th>
<th>Transit-Oriented Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improved user convenience and comfort</td>
<td>Direct user benefits</td>
<td>Reduced traffic congestion</td>
<td>More livable communities.</td>
</tr>
<tr>
<td>Improved travel options, particularly for non-drivers</td>
<td>Economic development benefits from increased access to education and employment.</td>
<td>Road and parking cost savings</td>
<td>Reduced sprawl (more compact, mixed development) reduces land consumption, reduces costs of providing public services, preserves open space.</td>
</tr>
<tr>
<td>Improved local property values</td>
<td>Increased public fitness and health, since most transit trips include walking and cycling links.</td>
<td>Consumer cost savings</td>
<td>Improved accessibility, particularly for non-drivers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reduced crash risk to others</td>
<td>Reduced vehicle ownership</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Air and noise pollution reductions</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Energy conservation</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Economic development benefits</td>
<td></td>
</tr>
</tbody>
</table>
# Public Transit Benefit Categories

<table>
<thead>
<tr>
<th>Basic Mobility</th>
<th>Efficient Urban Transport</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broadly distributed services, including times and locations with low demand, and special mobility services such as demand response buses.</td>
<td>Service concentrated on busy routes, intended as an efficient substitute for driving in order to reduce traffic problems (traffic and parking congestion, energy consumption and pollution emissions)</td>
</tr>
<tr>
<td>Basic convenience and comfort. Users are transit dependent and so will use the service regardless.</td>
<td>Service must be competitive in convenience and comfort in order to attract travelers away from driving.</td>
</tr>
<tr>
<td>Mostly buses in mixed traffic.</td>
<td>Includes grade separated bus and rail services. Intended to support and encourage transit-oriented development.</td>
</tr>
<tr>
<td>Serves lower-density development.</td>
<td>Tends to be energy efficient (high fuel efficiency per passenger-mile), and by supporting transit-oriented development it can leverage large additional per capita energy savings.</td>
</tr>
</tbody>
</table>
### Comparing Benefits – No Induced Travel

<table>
<thead>
<tr>
<th>Planning Objectives</th>
<th>Expand Roadways</th>
<th>Efficient and Alt. Fuel Vehicles</th>
<th>Shifts from Autos to Alternative Modes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduce traffic congestion</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Roadway cost savings</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Parking cost savings</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Consumer cost savings</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Improve mobility options</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Improve traffic safety</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Energy conservation</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Pollution reduction</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Land use objectives</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Public fitness &amp; health</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>

✓ = Supports objective
Comparing Costs

Dollars Per Vehicle Mile

- Vehicle Ownership
- Crash Damages
- Vehicle Operation
- Travel Time
- Parking
- Road Facilities
- Land Use Impacts
- Congestion
- Resources
- Air Pollution
- Land Value
- Greenhouse Gas
- Water
- Barrier Effect
- Traffic Services
- Noise
- Transport/Diversity
- Waste
## Conventional Evaluation

### Generally Considered
- Congestion impacts
- Vehicle operating costs
- Per-mile crash impacts
- Per-mile pollution emissions.

### Often Overlooked
- Parking costs
- Total consumer costs
- Downstream congestion
- Crash, energy & pollution impacts of changes in mileage
- Land use impacts
- Impacts on mobility options for non-drivers/equity impacts
- Changes in active transport and related health impacts
Comparing Costs

Dollars Per Vehicle Mile

- $0.00
- $0.05
- $0.10
- $0.15
- $0.20
- $0.25
- $0.30

- Often Overlooked
- Generally Considered
Increasing Transit Mode Share

A small portion of the population is transit dependent and will use transit services even if quality is poor and driving is cheap.

As public service quality improves and motorists have more incentive to use alternative modes, transit passengers consist of more discretionary travelers (people who can use automobile travel).

Since transit services experience scale economies (more ridership reduces unit costs and increases the justification for more and better service), incentives for discretionary travelers to use transit tend to improve service.
Trends Supporting Multi-Modalism

- Motor vehicle saturation.
- Aging population.
- Rising fuel prices.
- Increased urbanization.
- Increased traffic and parking congestion.
- Rising roadway construction costs and declining economic return from increased roadway capacity.
- Environmental concerns.
- Health Concerns
High Quality Public Transit

Attracting discretionary travelers requires high quality transit:

• Convenient.
• Relatively fast and reliable compared with driving.
• Comfortable.
• Integrated with communities (within walking distance of many destinations).
• Support strategies (walking and cycling improvements, commute trip reduction programs, efficient parking management, etc.).

The economic question is whether the additional costs of providing high quality transit will be repaid over the long-run by additional savings and benefits.
Various studies indicate that high quality public transit (such as rail or Bus Rapid Transit services) tend to leverage additional reductions in vehicle travel by affecting land use. When this occurs, each transit passenger-mile typically reduces 2-9 automobile vehicle-miles.
Congestion Reduction

- Urban road congestion maintains equilibrium. It gets bad enough to discourage further vehicle trips.
- The quality of travel options affects this point of equilibrium: If alternatives are inferior, few motorists will shift mode and congestion will be severe. If alternatives are attractive, motorists are more likely to shift modes, reducing congestion equilibrium.
- The faster the transit service, the faster the traffic speeds on parallel highways. Door-to-door travel times for motorists tend to converge with those of grade-separated transit.
Energy and Emission Reductions

- Transit has relatively low *average* fuel efficiency because most service is designed primarily to provide basic mobility.
- Marginal energy costs of additional ridership is often very low.
- Some transit improvements, such as grade separation and faster loading systems, increase transit energy efficiency by reducing delays and stop-and-go operating conditions.
- High quality transit tends to stimulate transit-oriented development which provides significant additional energy savings and emission reductions.
- High quality public transit provides additional benefits besides energy savings and emission reductions. These co-benefits should be considered when evaluating public transit cost efficiency.
- High quality public transit supports other energy conservation and emission reduction strategies, including transport pricing reforms and smart growth land use policies.
Lifecycle Energy Consumption

Indirect energy
Fuel

Megajoules Per Pass.-Mile

Bus, peak
High Speed Rail
BART
Commuter Rail
Boston Light Rail
SF Light Rail
sedan
SUV
pickup truck
Bus, off-peak
Traffic Fatalities

![Graph showing the relationship between traffic fatalities per 100,000 residents and annual per capita transit passenger-miles. The graph includes two data sets: Automobile Dependent and Multi-Modal. There is a downward trend indicating a decrease in traffic fatalities as the annual per capita transit passenger-miles increase.]
International Data: Public Transit

![Graph showing the relationship between annual per capita transit passenger-miles and traffic fatalities per 100,000 population for different regions. The graph includes data points for Northern Europe, Southern Europe, US, Canada, and Australia.](image-url)
If residents of *Transit Oriented* cities in the U.S. had the same traffic fatality rate as other urban regions there would be about 2,500 additional annual traffic fatalities in the U.S.
Transportation Affordability

![Graph showing the relationship between Per-Capita Annual Transit Passenger-Miles and the transportation portion of household expenditures for automobile dependent and multi-modal households. The graph indicates a negative correlation, with higher transportation expenditures correlating with lower transit passenger-miles.](image-url)
High quality public transit typically requires about $268 in additional subsidies and $104 in additional fares annually per capita, but provides vehicle, parking and road cost savings averaging $1,040 per capita, plus other savings and benefits:

- Parking cost savings.
- Congestion reductions
- Accident reductions
- Pollution reductions
- Improved mobility for non-drivers,
- Improved fitness and health
Property Value Impacts

Property values tend to be 5-15% higher (and sometimes much more) in transit-oriented developments. This reflects the capitalized value of the transport cost savings.
Community Economic Impacts

- Transport savings and efficiencies (congestion, parking, taxes) increases productivity and competitiveness.
- Reducing vehicle expenditures and expanding transit service increases regional employment and business activity.
- Agglomeration efficiencies.
- Supports strategic land use development objectives.
- Increases affordability, allowing businesses to attract employees in areas with high living costs.
- Changes in household expenditures on vehicles and fuel.
Productivity tends to increase with transit ridership. (Each dot is a U.S. urban region.)

Bureau of Economic Analysis and FHWA data
Productivity tends to decline with increased mobility. (Each dot is a U.S. urban region.)

Bureau of Economic Analysis and FHWA data
Summary - Quality Transit

Cities with high quality transit have:

- Four times the per capita transit ridership.
- A fifth lower per capita vehicle mileage.
- 30-50% lower per capita congestion costs.
- A third lower per-capita traffic fatality rates.
- 20% smaller portion of household budgets devoted to transport, savings about $500 annually per capita.
- A third lower transit operating costs.
- 58% higher transit service cost recovery.
- More money circulating in the local economy.
- More per capita walking – improved physical fitness.
- More efficient land use and higher property values.
- Better environmental performance.
Attracting Discretionary Riders

- Quality service (convenient, fast, comfortable).
- Low fares.
- Support (walkable communities, park & ride facilities, commute trip reduction programs).
- Convenient information.
- Parking pricing or “cash out”.
- Attractive stations and stops.
- Positive Image.
Transit-oriented development (TOD) residents tend to own fewer vehicles, drive about half as much per capita, and rely more on walking, cycling and public transit than they would in more automobile-oriented neighborhoods. Only a minor portion of these differences are explained by self-selection.
### Buses Versus Trains

<table>
<thead>
<tr>
<th>Bus Rapid Transit</th>
<th>Light Rail</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Lower capital costs.</td>
<td>• Greater demand. Tends to attract more discretionary riders.</td>
</tr>
<tr>
<td>• Flexibility. Bus routes can change and expand when needed.</td>
<td>• Greater comfort, due to larger seats, more legroom, and smoother ride.</td>
</tr>
<tr>
<td>• Requires no special facilities. Buses can use existing roadways, and general</td>
<td>• Lower operating costs per passenger-kilometer on high-volume corridors.</td>
</tr>
<tr>
<td>traffic lanes can be converted into a busway.</td>
<td>• Greater maximum capacity.</td>
</tr>
<tr>
<td>• More suitable for dispersed land use, and so can serve a greater catchment</td>
<td>• More positive land use impacts. Rail tends to be a catalyst for more</td>
</tr>
<tr>
<td>area.</td>
<td>accessible development patterns.</td>
</tr>
<tr>
<td>• Several routes can converge onto one busway, reducing transfers.</td>
<td>• Less air and noise pollution, particularly when electric powered.</td>
</tr>
<tr>
<td>• Used more by transit dependent people, so bus service improvements provide</td>
<td>• Rail stations tend to be more pleasant than bus stations, so rail is</td>
</tr>
<tr>
<td>greater equity benefits.</td>
<td>preferred where many transit vehicles congregate.</td>
</tr>
<tr>
<td></td>
<td>• More voter support for rail than for bus improvements.</td>
</tr>
</tbody>
</table>
Between 1996 and 2003 total transit use increased much faster in U.S. cities that have new or expanded rail service than in cities that only expanded bus service.
Social Equity

Equity objectives:

• An equal share of public resources for people with equal needs.

• Savings and benefits to lower-income people.

• Increased opportunity to people who are physically, socially or economically disadvantaged.

• Basic mobility.
Memo From Future Self

Hope for the best but prepare for the worst:

- Physical disability – diverse and integrated transport with universal design (accommodates people with disabilities and other special needs).
- Poverty and inflation – affordable housing in accessible, multi-modal locations.
- Higher energy prices – improve efficient modes (walking, cycling and public transport).
- Isolation and loneliness – community cohesion (opportunities for neighbors to interact in positive ways).
## Responding To Criticisms

<table>
<thead>
<tr>
<th>Criticism</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public transit carries too small a portion of travel in North America significantly reduce automobile travel.</td>
<td>High quality public transit and transit oriented development can have a large leverage effect: each transit passenger-mile can reduce 2-10 automobile vehicle-miles.</td>
</tr>
<tr>
<td>On average, U.S. public transit is not very energy efficient, only slightly more efficient than car travel and less than a hybrid car.</td>
<td>The marginal energy costs of additional transit travel can be small, and with its leverage effects, high quality public transit can provide large energy savings.</td>
</tr>
<tr>
<td>Public transit, especially urban rail, has high costs per passenger-mile.</td>
<td>Although it severs a small portion of total travel, it operates on major urban corridors where accommodating additional automobile travel is also very costly.</td>
</tr>
<tr>
<td>Public transit travel has increased little in recent years despite “massive” investments.</td>
<td>Transit spending is actually small compared with total road and parking expenditures, and about half is intended to provide basic mobility for non-drivers rather than attract travelers out of cars. Where high quality public transit is provided, ridership often increases substantially.</td>
</tr>
<tr>
<td>Public transit is costly, requiring large subsidies.</td>
<td>High quality public transit provides many co-benefits, and its subsidies are often smaller than total road and parking subsidies required for urban-peak driving.</td>
</tr>
</tbody>
</table>
More balanced transport policy is no more “anti-car” than a healthy diet is anti-food. Motorists have every reason to support these reforms:

• Reduced traffic and parking congestion.
• Improved safety.
• Improved travel options.
• Reduced chauffeuring burden.
• Often the quickest and most cost effective way to improve driving conditions.
Key Messages

• Public transport can provide many different types of benefits to users and society, particularly if it substitutes for automobile travel.

• High quality (convenient, comfortable, integrated, and affordable) transit service and transit-oriented development are most effective at reducing automobile travel.

• Public transit projects can be a catalyst for more accessible, compact land use development, which provides additional benefits.

• Conventional planning tends to overlook and undervalue many of these benefits.

• Current demographic and economic trends are increasing user demands and social benefits of alternative modes, particularly high quality transit.

• Public transit improvements and transit-oriented development can benefit physically, economically and socially disadvantaged people and so help achieve equity objectives.
“Contrasting Visions of Urban Transport: Critique of ‘Fixing Transit’”
“Rail Transit In America: Comprehensive Evaluation of Benefits”
“Evaluating New Start Transit Program Performance”
“Evaluating Public Transit Benefits and Costs”
“Evaluating Rail Transit Criticism”
“Smart Congestion Relief”
“The Selfish Automobile”
“Raise My Taxes Please!”
and more...

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