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# Tackling Public Transit in Tennessee

*Why We're on the Road of Higher Emissions and Greater Inefficiency*

by Randal O'Toole

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## EXECUTIVE SUMMARY

Public transit is frequently depicted as both a more environmentally friendly and cheaper alternative to our everyday reliance on the automobile. Almost every major city in the United States, including those in Tennessee, has launched its own public transit system – complete with buses, trains, trolleys, and more. However, these large transportation networks rarely stay out of the red and end up costing taxpayers billions of dollars every year. In Tennessee alone, the gap between transit expenditures and revenue collected from riders totaled $112 million in 2008.

The negative impact of these transit systems is not just limited to the state budget; it spills over into the environment as well. Mass transit simply fails to live up to its promise of being a greener alternative. Tennessee buses emit almost 50 percent more $CO_2$ per passenger mile than the average car, while their carbon footprint is nearly three times that of a Toyota Prius.

The keys to improving public transit lie in free market reforms. The process of raiding highway funds to keep these systems afloat should be halted. Local governments should explore privatizing or contracting out all or parts of their transit routes to firms that can make them profitable and create competition in the market. If governments plan to keep their transit systems intact, they must look into smaller vehicle sizes to minimize the number of empty seats, thus lowering costs and providing a per passenger environmental benefit over regular automobiles. In the end, only free market reforms will save Tennessee taxpayers hundreds of millions of dollars while truly improving transit services for most people.

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## *Introduction*

Public transit is often portrayed as a low-cost, energy-efficient alternative to auto driving.[1] In reality, transit is much more costly than driving and requires huge subsidies to attract any riders at all. Moreover, transit systems in the vast majority of American cities use more energy and emit more greenhouse gases than the average car.[2]

For every dollar collected in fares from transit riders, the average transit system in America requires more than $2 from taxpayers for operating subsidies, plus more than $1 for capital improvements and maintenance.[3] So it is not surprising that transit systems in Tennessee require large subsidies. What may be surprising is that most are far less environmentally friendly than a typical sports utility vehicle.

## *The Cost of Driving*

Americans drive for 85 percent of their travel not because we are somehow addicted to the automobile, but because automobiles are both more convenient and less expensive than the alternatives. Unlike transit buses, trains, or airplanes, automobiles make it possible for people to go wherever they want when they want to go there.

According to the Bureau of Economic Analysis, Americans spent $950 billion buying, operating, and maintaining their cars and light trucks in 2008.[4] That's a lot of money, but those cars and light trucks also carried us nearly 4.5 trillion passenger miles, for an average cost of less than 22 cents per passenger mile.[5]

Contrary to popular belief, there are no federal subsidies to highways and few state subsidies. Since at least 1956, almost all federal highway funds have come from federal gas taxes and other highway user fees.[6] Moreover, since 1982 Congress has diverted billions of dollars of highway user fees to transit and other uses each year. Recent appropriations of general funds to the highway trust fund were needed only because Congress diverted more gas taxes to transit than were being collected. In 2007, the federal government collected more than $935 million in user fees from Tennessee highway users.[7] But it only returned $581 million to the state for highways.[8] The remainder went to other states' highways and even their public transit systems.

State subsidies to highways are also limited. Unlike some states, Tennessee has no constitutional restriction dedicating gas taxes to highways, so it typically diverts about 10 percent of those taxes to transit and other uses. In 2007, $157 million in Tennessee state gas taxes and motor vehicle fees were diverted to non-highway uses, while the state spent $85 million in general funds on roads.[9]

The main subsidies to highways come from local governments, few of which collect gas taxes or other highway user fees. In 2007, Tennessee local governments spend nearly $485 million in general funds on highways and streets.[10]

Adding the federal, state, and local numbers together, Tennessee highways received a net subsidy in 2007 of about $58 million. Since Tennessee motorists drove about 71 billion vehicle miles in 2007, and the average car has about 1.6 people, that works out to a subsidy of about 0.1 cent per passenger mile.[11] This means the total cost of driving in Tennessee is still under 23 cents per passenger mile.

### *The Cost of Transit*

By comparison, the national average cost of public transit is more than 90 cents a passenger mile, more than 70 cents of which is subsidized by non-transit users. In Tennessee, the costs are higher: nearly $1.20 per passenger mile, more than a dollar of which is subsidized by taxpayers.[12]

Most transit agencies do not even pretend to try to cover their operating costs, much less their capital costs, with passenger fares. Tennessee transit agencies, for example, spent $138 million operating transit lines in 2008, but collected only $26 million in fares.

In addition to the annual operating costs, transit subsidies include the capital costs of buying buses and other facilities. Capital costs fluctuate tremendously from year to year as transit agencies receive federal grants to replace large segments of their bus fleets in some years and make few capital purchases in other years.

The Federal Transit Administration has published cost data for every transit agency from 1992 through 2008, providing 17 years' worth of capital cost data.[13] After adjusting for inflation, the average of these 17 years provides a reasonable approximation of annual capital costs for bus transit. In the case of the Memphis trolley and Nashville Music City Star, actual capital costs were depreciated over 30 years at seven percent, as directed by Federal Transit Administration accounting rules.[14] Annual capital costs and depreciation add another $43 million to the cost of running Tennessee transit, meaning taxpayers lose $155 million per year on transit systems in seven Tennessee cities.

Rail capital costs do not end after the initial construction costs are paid for; rail systems must be completely rebuilt or replaced about every 30 years, and the costs of doing so are a significant fraction of the original construction costs. The failure of agencies to budget for such reconstruction has led to an infrastructure crisis in the transit industry, which currently has a $78 billion backlog of deferred maintenance, leading Federal Transit Administrator Peter Rogoff to publicly ask why transit agencies continue to build new rail lines when they can't afford to maintain the ones they already have.[15]

**Table One**

2008 Costs and Subsidies Per Passenger Mile and Per Trip

| | Cost/Mile | Subsidy/Mile | Cost/Trip | Subsidy/Trip |
|---|---|---|---|---|
| **Bus** | | | | |
| Chattanooga | $1.52 | $1.36 | $6.25 | $5.61 |
| Clarksville | 0.92 | 0.81 | 5.12 | 4.51 |
| Jackson | 1.11 | 0.97 | 5.08 | 4.48 |
| Johnson City | 0.99 | 0.91 | 3.70 | 3.40 |
| Knoxville | 1.25 | 1.15 | 4.96 | 4.59 |
| Memphis | 0.86 | 0.71 | 4.67 | 3.87 |
| Nashville | 0.95 | 0.79 | 4.33 | 3.62 |
| *BUS AVERAGE* | *1.00* | *0.86* | *4.78* | *4.10* |
| **Paratransit** | | | | |
| Chattanooga | 3.00 | 2.66 | 18.14 | 16.09 |
| Clarksville | 4.66 | 4.39 | 33.21 | 31.30 |
| Jackson | 2.71 | 1.71 | 19.81 | 12.50 |
| Johnson City | 3.23 | 2.95 | 13.02 | 11.86 |
| Knoxville | 3.46 | 3.22 | 30.55 | 28.47 |
| Memphis | 2.42 | 2.23 | 27.30 | 25.14 |
| Nashville | 3.02 | 2.39 | 37.26 | 29.45 |
| *PARATRANSIT AVERAGE* | *2.89* | *2.46* | *28.77* | *24.44* |
| **Other** | | | | |
| Chattanooga Incline | 3.75 | -1.31 | 3.75 | -1.31 |
| Memphis Trolley | 16.95 | 15.91 | 13.70 | 12.86 |
| Nashville Rail | 2.62 | 2.41 | 45.40 | 41.71 |
| Nashville Vanpool | 0.08 | 0.05 | 2.46 | 1.49 |
| **Comparison** | | | | |
| *TRANSIT AVERAGE* | *1.21* | *1.04* | *5.96* | *5.09* |
| *DRIVING* | *0.23* | *0.01* | *1.13* | *0.06* |

*Sources: Transit from 2008 National Transit Database, operating expense, capital cost, and service spreadsheets; driving from Bureau of Economic Analysis, "Personal Incomes Expenditures by Type of Expenditure," table 2.5.5 and Highway Statistics 2008, table VM-1. For comparability, per-trip numbers for driving assume trip lengths of 4.9 miles, equal to the average for Tennessee transit. In reality, auto trips tend to be longer than transit trips.*

Table one shows that the tourist-oriented Lookout Mountain Incline Railway is the only Tennessee transit system in the National Transit Database that pays its own way. Other than vanpools, the least-subsidized transit systems are Memphis and Nashville buses, which cost taxpayers between 70 and 80 cents per passenger mile. The largest subsidies per passenger mile go to the Memphis trolley, while the largest subsidies per trip go to the Music City Star.

Overall, the subsidies average more than $1 per passenger mile. Tennessee transit riders pay an average of less than 70 cents every time they board a bus, while taxpayers pay an average of more than $4 to support that trip. Users of paratransit—the door-to-door services many transit agencies offer to disabled and senior citizens—also receive large subsidies. But paratransit accounts for less than three percent of Tennessee transit trips.

### *Transit's Environmental Costs*

The environmental benefits of transit hardly make up for its costs. In most cases, there are no environmental benefits, only costs. As shown in table two, driving is more energy efficient and less polluting than almost any transit system in Tennessee. The only truly energy efficient transit system in Tennessee is vanpools, which is the closest thing public transit offers to actual cars. Those who want to save energy and reduce pollution would do better encouraging people to drive more fuel-efficient cars than encouraging cities to expand transit service.

**Table Two**
Energy Consumption and Carbon Dioxide Emissions
(Per Passenger Mile)

| | BTUs | Pounds of $CO_2$ |
|---|---|---|
| **Bus** | | |
| Chattanooga | 6,261 | 1.00 |
| Clarksville | 6,670 | 1.08 |
| Jackson | 6,484 | 1.05 |
| Johnson City | 3,539 | 0.21 |
| Knoxville | 6,555 | 0.93 |
| Memphis | 4,910 | 0.79 |
| Nashville | 4,340 | 0.70 |
| *BUS AVERAGE* | *5,070* | *0.80* |
| **Paratransit** | | |
| Chattanooga | 22,279 | 3.67 |
| Clarksville | 21,268 | 3.43 |
| Jackson | 11,937 | 1.93 |
| Johnson City | 13,026 | 1.12 |
| Knoxville | 19,291 | 2.92 |
| Memphis | 21,643 | 3.49 |
| Nashville | 13,113 | 2.12 |
| *PARATRANSIT AVERAGE* | *15,517* | *2.45* |
| **Other** | | |
| Chattanooga Incline | 2,599 | 0.33 |
| Memphis Trolley | 21,964 | 2.83 |
| Nashville Rail | 9,444 | 1.52 |
| Nashville Vanpool | 630 | 0.10 |
| **Comparison** | | |
| *TRANSIT AVERAGE* | *5,761* | *0.91* |
| *AVERAGE LIGHT TRUCK* | *4,016* | *0.69* |
| *AVERAGE CAR* | *3,514* | *0.55* |
| *TOYOTA PRIUS* | *1,659* | *0.26* |

*Source: Transit BTUs calculated from 2008 National Transit Database, energy consumption spreadsheet; car and light truck BTUs from Stacy C. Davis and Susan W. Diegel, Transportation Energy Data Book: Edition 28 (Oak Ridge, TN: U.S. Department of Energy, 2009), table 2.13, tinyurl.com/ykhfvvu; Toyota Prius from Environmental Protection Agency, Model Year 2008 Fuel Economy Guide (Washington: EPA, 2007), tinyurl.com/25y3ce; $CO_2$ calculated from same sources plus Energy Information Administration, "Fuel and Energy Emission Coefficients," (Washington: Department of Energy), tinyurl.com/smdrm.*

Other than vanpools and the Lookout Mountain Incline, the only Tennessee transit system that is reportedly more energy efficient than the average light truck (a category that includes pickups, SUVs, and full-sized vans) is the Johnson City bus system. Johnson City buses run on biodiesel, which helps explain the low carbon emissions, but not the low energy requirements. Strangely, Johnson City Transit reported that it used 12 percent less fuel in 2008 than 2007, even though its buses traveled 19 percent more miles. In other words, the very same buses suddenly got 35 percent more miles per gallon in 2008 than in 2007. It is possible that Johnson City Transit misreported the number of gallons of fuel used in 2008.

A crucial part of energy efficiency is filling seats. The average transit bus in Tennessee fills only about a quarter of its seats, and counting standing room they operate an average of less than one-fifth full. The Music City Star operates less than one-seventh full and the Memphis trolley fills an average of just 5 percent of its seats.[16]

While urban transit buses tend to be less energy efficient than light trucks, intercity buses are among the most energy-efficient vehicles in America. They pay slightly lower fuel taxes than auto users, but otherwise require little or no subsidy. They tend to be at least as energy efficient and emit as little pollution per passenger mile as the most efficient cars on the road.[17]

Intercity buses are energy efficient because they are private and operate where people want to go, tending to fill at least half to two-thirds of the seats. Urban buses are public and operate where the taxpayers are, even if that means running buses to neighborhoods that have few potential riders.

### *Fixing Public Transit*

This data should provide important lessons for Nashville, which is currently contemplating up to three new rail lines in addition to the Music City Star.[18] Many other urban areas that have built extensive rail networks have ended up committing half or more of their transportation funds to transit systems that typically carry less than 10 percent of commuters to work and less than three or four percent of regional passenger travel.[19] Since Tennessee gets more than 60 percent of its electric power from fossil fuels, substituting electric rail transit for petroleum-fueled vehicles will not even do much to reduce greenhouse gas emissions.[20]

Transit agencies could do several things to provide better transit at a lower cost. One of the major obstacles to change is that Congress has, intentionally or not, given transit agencies incentives to choose high-cost forms of transit. Once these incentives are changed, it will be easier for transit agencies to adopt some or all of the following policies.[21]

***End highway subsidies:*** Taxpayers and highway users would both be better off if highways were funded exclusively out of tolls, vehicle-mile fees, or some other user fee. While ending subsidies would only increase the cost of driving by a few pennies per mile, it would take

away the excuse rail advocates use for diverting billions of dollars of highway user fees to pay for the construction of expensive rail lines, which is "highways are subsidized, so therefore we need to subsidize rail transit as well."

***Smaller vehicles**:* A major urban area sees millions of passenger trips each day from hundreds of thousands of different origins to hundreds of thousands of different destinations. No more than a tiny fraction of these trips will ever be taken by "big box" forms of transit such as trains or large buses. The average Tennessee transit bus has 33 seats and room for 18 people standing, yet carries an average of less than eight people. Smaller vehicles can save energy and nimbly serve more parts of each urban area.

***Contracting out**:* Hiring private companies to operate buses and other transit vehicles can save taxpayers millions and/or spread available resources to more transit routes. Denver contracts out half of its bus services, and it pays only 52 percent as much per vehicle mile for the contracted service as it spends on buses it operates itself.[22] The main obstacle to contracting out services is generally union opposition, even though some contracting companies are unionized and pay scales are comparable.

***Jitneys**:* Also known as shared taxis, jitneys are a combination of taxis and buses. They tend to be privately owned vehicles operating on fixed or semi-fixed routes. The airport shuttles found in most American urban areas are a form of a jitney, but one that can only start or end at the airport. Opening up urban areas to competitive jitney services would allow more people to take advantage of door-to-door or near-door-to-door services at a lower cost than taxis. The main opponents are taxi companies, but they could in fact become major jitney operators. A private party in Houston has recently started a jitney service called the Wave.[23]

***Privatize:*** Transit agencies could take the ultimate step of selling their assets to private operators, restoring the system that prevailed in most American cities before Congress gave cities incentives to take over private transit companies in 1964. The private operators would have incentives to find the optimal sized vehicle for each route and to run transit where people want to use it, not in every suburb that pays taxes to the transit agency. The United States still has a few private transit services that operate largely without subsidies, including the Atlantic City Jitney Association, New York Waterway, and *publicos* (jitneys) in Puerto Rico.

***Vouchers:*** Transit is important to people who have no access to cars. But such people are rare: more than 92 percent of Tennessee households have at least one car, so even people who cannot drive usually have someone in the household who can drive for them.[24] Instead of funding expensive transit agencies to serve those few who still lack automobility, state and local governments could give transportation vouchers or stamps to people who are too young, too old, or otherwise unable to drive. These vouchers could be applied to any public conveyance: taxis, private shuttle buses, intercity buses, Amtrak, or the airlines. This would give people the mobility they need at a much lower cost to taxpayers.

### *Conclusion*

Many people think that a major goal for transit is to persuade people to get out of their cars and drive less. Considering that the transit systems we know today are more expensive, less convenient, and have greater environmental impacts than driving, this goal is self-defeating. The changes described above could save Tennessee taxpayers hundreds of millions of dollars while truly improving transit services for most people.

[1]. See, for example, "Penny Wise, Pound Fuelish: New Measures of Housing + Transportation Affordability," Center for Neighborhood Technology, Chicago, IL, 2010, p. 7, tinyurl.com/yl38cec.
[2]. See table 6 of Randal O'Toole, "Does Rail Transit Save Energy or Reduce Greenhouse Gas Emissions?" Cato Institute Policy Analysis no. 615, April 14, 2008, tinyurl.com/kpaw7r.
[3]. "2008 National Transit Profile," Federal Transit Administration, 2009, p. 1, tinyurl.com/2cmnujk.
[4]. Bureau of Economic Analysis, "Personal Incomes Expenditures by Type of Expenditure," table 2.5.5, bea.gov, tinyurl.com/y89ajej.
[5]. *Highway Statistics 2007* (Washington, DC: Federal Highway Administration, 2009), table VM-1.
[6]. *Highway Statistics 2007*, table HF-10.
[7]. *Highway Statistics 2007*, table HDF.
[8]. *Highway Statistics 2007*, table SF-1.
[9]. *Highway Statistics 2007*, tables SDF and SF-1.
[10]. *Highway Statistics 2007*, table LGF-1.
[11]. *Highway Statistics 2007*, table VM-2.
[12]. Calculated from *2008 National Transit Database* (Washington, DC: Federal Transit Administration, 2009), operating expense, capital cost, and service spreadsheets.
[13]. *National Transit Database Historical Datafiles* (Washington: Federal Transit Administration, 2009), "Capital Expenditures Time-Series" spreadsheet, tinyurl.com/yhubppv; *2008 National Transit Database* (Washington: Federal Transit Administration, 2009), "capital expense" spreadsheet, tinyurl.com/yeuucn8.
[14]. *New Starts Handbook* (Washington, DC: Federal Transit Administration, 2002), section 3.4, "Cost Effectiveness," tinyurl.com/ylrjevl. The handbook actually specifies 25-year depreciation periods for rail cars, 20 years for parking lots, 100 years for rights of way, and 30 years for all other rail infrastructure. This analysis used 30 years as a reasonable average. For a complete description of how rail capital costs were calculated, see Randal O'Toole, "Defining Success: The Case Against Rail Transit," Cato Institute Policy Analysis no. 663, March 24, 2010, pp. 20–22, cato.org/pubs/pas/pa663.pdf.
[15]. Peter Rogoff, "Remarks at the Federal Reserve Bank of Boston," May 18, 2010, tinyurl.com/28km9vs.
[16]. Calculated from the *2008 National Transit Database* by comparing seats and standing room in "revenue vehicle inventory" spreadsheet, with average occupancy (passenger miles divided by vehicle revenue miles) from "service" spreadsheet.
[17]. M. J. Bradley & Associates, "Comparison of Energy Use & CO2 Emissions From Different Transportation Modes," American Bus Association, Washington, DC, May 2007, p. 4, tinyurl.com/mztgq3.
[18]. "Mass Transit Choices for a Growing Cumberland Region," Nashville Area Metropolitan Planning Organization, 2010, p. 2, tinyurl.com/27gqwdo.
[19]. Randal O'Toole, "Roadmap to Gridlock: The Failure of Long-Range Metropolitan Transportation Planning," Cato Institute Policy Analysis no. 617, May 27, 2008, p. 15, tinyurl.com/djckjw.
[20]. See, for example, table 3 of Randal O'Toole, "Does Rail Transit Save Energy or Reduce Greenhouse Gas Emissions?" Cato Institute Policy Analysis no. 615, April 14, 2008, tinyurl.com/kpaw7r.
[21]. For a detailed description of these incentives, see Randal O'Toole, "Defining Success: The Case Against Rail Transit," Cato Institute Policy Analysis no. 663, March 24, 2010, pp. 17–18, cato.org/pubs/pas/pa663.pdf.
[22]. *2008 National Transit Database*, "operating expense" and "service" spreadsheets.
[23]. "The Washington Wave," thehoustonwave.com.
[24]. *2000 Census*, table QT-H11, "Vehicles Available and Household Income in 1999," tinyurl.com/22pq2kb.

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