A Better Way to Go

Meeting America's 21st Century Transportation Challenges with Modern Public Transit

CALPIRG Education Fund

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Executive Summary

America's automobile-centered transportation system was a key component of the nation's economic prosperity during the 20th century. But our transportation system is increasingly out of step with the challenges of the 21st century. Rising fuel prices, growing traffic congestion, and the need to address critical challenges such as global warming and America's addiction to imported oil all point toward the need for a new transportation future.

Rail, rapid buses and other forms of transit must play a more prominent role in America's future transportation system. Clean, efficient transit service already saves billions of gallons of oil each year, reduces traffic congestion in our cities, and curbs emissions of pollutants that cause global warming. Transit also generates a host of other economic and quality-of-life benefits for our communities—indeed, every dollar we invest in transit generates approximately two dollars in these benefits.

Every American can benefit if we expand the reach and improve the quality of transit in the United States. By making a bold, national commitment to expand and improve transit, the United States can address many of our greatest challenges and create a transportation system built for the needs of the 21st century.

America's transportation system is in trouble.

America has grown more dependent on car travel with each passing year. America has more cars per capita than any other nation in the world. The number of miles driven on America's highways has doubled in the last quarter-century, and our reliance on cars for transportation is at the root of many of America's most intractable problems.

- **Oil dependence**—Two out of every three barrels of oil the United States consumes each year are used to fuel our transportation system. Personal cars and trucks account for 40 percent of our oil consumption. The United States remains by far the world's largest consumer of oil, leaving our economy vulnerable to oil price spikes and our national security vulnerable

to dependence on unstable nations for critical energy supplies.

- **Traffic congestion**—Gridlock on America's highways gets worse with each passing year. The average American living in an urban area spent 38 hours—nearly a full work week—stuck in traffic delays in 2005, twice as much time as in 1982. Traffic congestion costs America's economy approximately $78 billion and results in 4.2 billion lost hours each year.

- **Global warmin**g – America's transportation system produces more carbon dioxide—the leading global warming pollutant—than the *entire economy* of any other nation in the world, except China. America must reduce emissions from its transportation system if the world is to avoid the most catastrophic impacts of global warming.

Other problems caused by our current transportation system include:

- The extraordinary expense of building and maintaining highways, which requires more than $150 billion in government expenditures each year, and the cost of owning and operating private vehicles, which costs American households $900 billion annually.

- Damage to the environment from air pollution, water pollution, and fragmentation of wildlife habitat.

- Damage to public health from air pollution, traffic accidents and sedentary, car-dependent lifestyles. Traffic accidents alone claim more than 40,000 American lives each year, more American lives than were lost in the Korean War.

- Isolation for the growing elderly population in areas not well served by transit, as well as the disabled, children and others who cannot operate or afford to own vehicles.

- Encouragement of sprawling development patterns that consume open space and increase the cost of providing public infrastructure and services.

Transit already plays a key role in addressing the serious problems facing America.

- In 2006, transit saved an estimated 3.4 billion gallons of gasoline in the United States—enough to fuel 5.8 million cars for a year. In monetary terms, transit saved more than $9 billion that would otherwise have been spent on gasoline.

- In 2005, transit prevented 540.8 million hours of traffic delay, according to the Texas Transportation Institute, equivalent to more than 61,700 people sitting in traffic for an entire year. The monetary value of those savings was $10.2 billion.

- Transit reduced global warming emissions by nearly 26 million metric tons in 2006. In New York state alone, transit avoided 11.8 million metric tons of carbon dioxide pollution—more than was produced by the entire economies of Rhode Island, Vermont or the District of Columbia.

- Transit also delivers a range of other benefits, including opportunities for economic development, mobility for those without access to cars, public health benefits, and reduced household expenditures on vehicles and fuel.

States and communities that invest more in transit enjoy greater benefits.

- The 14 cities that have built wholly new light rail transit systems since 1980 saved more than 200 million gallons of gasoline through those services in 2006. These cities span the nation, from Baltimore to Sacramento and from Dallas to Minneapolis-St. Paul, showing that rail transit can work in a variety of cities.

- Thirty-seven states and the District of Columbia reduced their oil consumption with transit in 2006. States that have invested aggressively reaped greater benefits. The 10 states that made the greatest financial investments in transit in 2004 accounted for 85 percent of the oil savings delivered by transit service in 2006.

For every dollar invested in transit, America receives nearly two dollars in economic benefits.

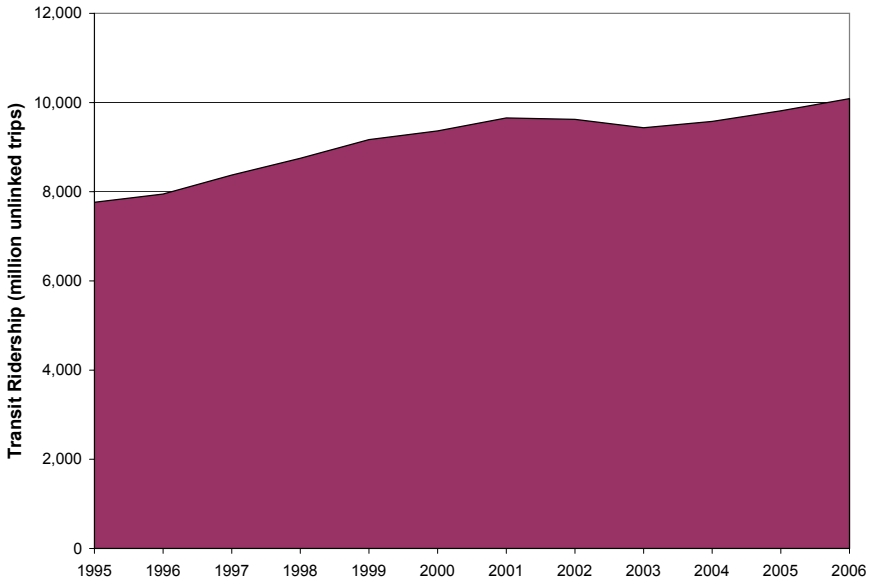
- In 2005, federal, state and local governments spent $30.9 billion to provide transit services (not including fares). These investments yielded at least $60 billion per year in benefits from reduced vehicle expenses, avoided congestion, global warming emission reductions, reduced road expenditures, reduced spending on parking, and avoided traffic accidents. In other words, investment in transit more than pays for itself.

- Transit investments are potent job-creators. Investments in transit produce 19 percent more jobs than equivalent investment in new road and bridge projects.

Americans support expanded transit and desire more transportation alternatives.

- Transit ridership increased by 30 percent between 1995 and 2006, reaching the highest ridership level since the late 1950s. Since 1995, public

Fig. ES-1. Transit Ridership Is on the Rise



transportation ridership has been increasing at a faster rate than vehicle travel.

- Approximately three out of four Americans now believe that improving transit and building communities that require less driving are the best solutions for reducing traffic congestion. Many cities nationwide are considering new or expanded commuter rail or light rail networks.

Despite transit's many benefits, America has historically underinvested in transit.

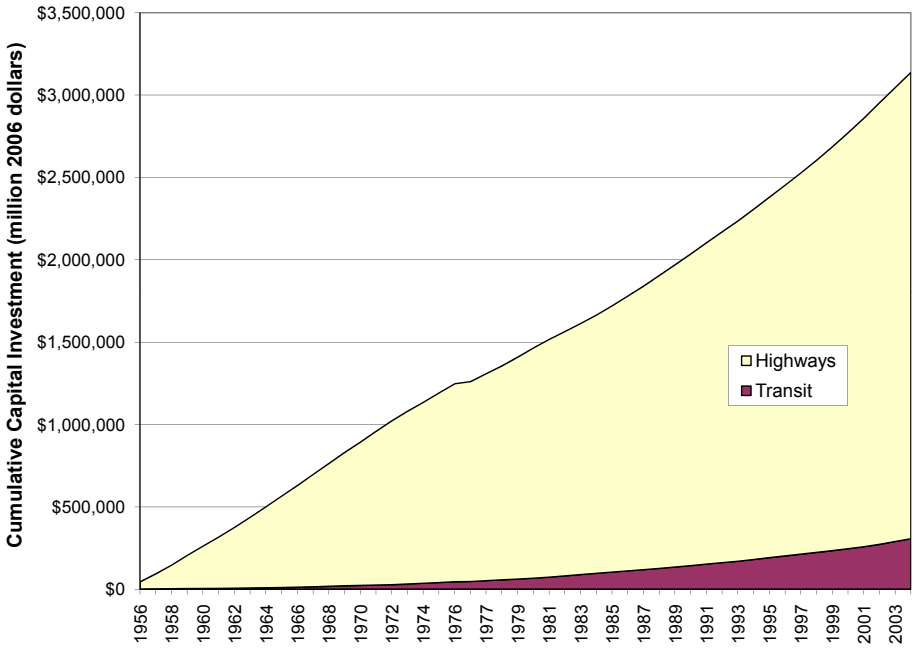
- Highways have received the vast bulk of public investment over the last half century. Since 1956, federal, state and local governments have invested nine times more capital funding in highway subsidies than in transit.

- While the federal government invests more in transit than in the past, the process for securing funding for new transit lines is far more onerous and less certain than for highway projects, with the federal government generally picking up a smaller share of the tab for new transit lines than for new highway projects.

- State funding is even more out of line with 21st century transportation priorities. In 2004, state governments spent nearly 13 times more public funds on highways than on transit.

- A lack of federal and state investment has left local governments to pick up the tab for transit investments—with voters approving approximately 70 percent of transportation referendums appearing on ballots between 2000 and 2005. But an overreliance on local funding can make financing projects more difficult. It also allows people living outside of the local area to benefit from transit without paying their fair share of the costs.

Figure ES-2. Cumulative Government Capital Investment in Transit and Highways Since 1956[1]



America must move toward a new transportation future for the 21st century, with clean, efficient public transit at its core. To get there, America needs to make transit a national priority, articulate a roadmap for the future of transit, and commit the resources necessary to build a 21st century transportation system.

The vision: Transit as a national priority. Policy-makers at the state and federal level must realize that transit doesn't benefit only those who ride it. *Transit benefits all Americans* through improved energy security, reduced pollution and reduced traffic congestion, among other benefits.

The plan: A roadmap for transit. Policy-makers must develop and articulate a bold plan for the expansion of transit in the 21st century. That plan could include a commitment to:

- Build or expand rapid transit networks in every American city with a metropolitan population of 1 million or more by 2020. Twenty-eight of America's 50 largest metropolitan areas have some form of rapid transit service in operation or under construction.

- Expand transit options in small and medium-sized cities, as well as in rural areas.

- Link cities via high-speed rail. The United States should commit to building high-speed rail along the 11 federally designated high speed corridors and increasing regional rail links elsewhere.

- Improve the transit experience through upgraded amenities on trains and buses, including on-board wireless Internet service; technology to provide real-time information about pickup times; giving transit vehicles priority in mixed traffic and creating more dedicated lanes for transit vehicles; and providing on-time service and clean, comfortable vehicles.

- Serve suburban users through infrastructure investments—such as ring lines and commuter rail extensions—as well as through flexible transit services such as vanpools and community shuttles.

- Serve the transportation disadvantaged through affordable and convenient bus and demand-response services.

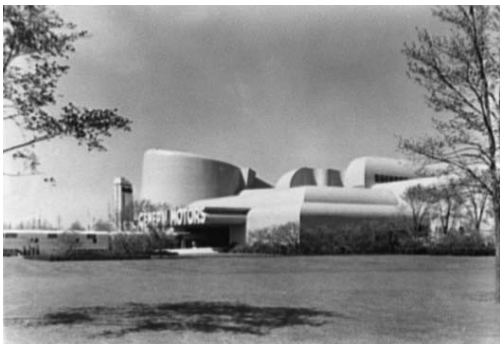
- Keep fares affordable, match transit investments with appropriate land-use planning, and promote other transportation alternatives, such as bicycling, walking, carpooling and telecommuting.

The resources: Pay for a 21st century transportation system by more efficiently allocating costs. Federal and state governments should dedicate a greater share of transportation funding to transit. States with anachronistic prohibitions on the use of fuel tax revenue for transit should remove those restrictions. In addition, governments should identify a portfolio of funding sources—including highway taxes and user fees, and general state and local taxes—to fairly allocate the costs of transit system expansion among those who will reap the benefits.

Introduction

At the 1939 World's Fair in New York City, visitors were treated to a glimpse of the future, courtesy of General Motors. It was "Futurama," a scale-model exhibit of the America of the future, circa 1960. Visitors were whisked through a land of broad superhighways, on which cars moved speedily and efficiently through the heart of clean, uncongested, modern cities, and out to the vast new suburbs beyond.

The vision presented at the World's Fair was immensely appealing to an America that was just then emerging from the Great Depression. The nation's first superhighway—the Pennsylvania Turnpike—would not open for another year. Conditions in many American cities were crowded and difficult. And ownership of a personal vehicle was a dream out of reach of most Americans.



The General Motors pavilion at the 1939 World's Fair. Credit: Gottscho-Schleisner, Inc.

Upon leaving the exhibit, visitors were issued a button reading, "I have seen the future." And they had. For while the vision of transportation and the American city presented in Futurama didn't pan out exactly as planned, that vision did inspire and motivate many of the decisions that have come to shape America: the construction of the Interstate Highway System and the development of sprawling suburbs linked to cities by highways.

While automobiles did provide mobility and opportunity to Americans, we now know that the vision of an automobile-centered transportation system was not a utopia. With the shift to an automobile-centered transportation system came crushing traffic congestion, increased dependence on oil, health-threatening air pollution, traffic accidents, and a host of other negative consequences—including some that could not have even been

Drivers enter the Pennsylvania Turnpike, America's first superhighway, at its opening in 1940. Credit: Pennsylvania Turnpike Commission

dreamed of in the late 1930s, such as global warming.

Over time, America has taken action to reduce the impacts of automobiles on our environment and our health. We've made vehicles more fuel-efficient. We've made them safer. We've even made them cleaner. But our dependence on automobiles for transportation has only grown. And if vehicle travel continues to increase at the rate it has over the past several decades, even the most aggressive efforts to increase vehicle fuel economy and reduce carbon dioxide emissions from vehicles will have little impact on the problems they are designed to solve.

The challenges facing America's transportation system today are large, and they will only grow larger over time. America's population is projected to increase by nearly 50 percent between 2000 and 2050, adding more than 110 million people between now and mid-century.[2] Continuing along our current transportation path is all but certain to lead to more congestion, more pollution, greater oil dependence and more expense in the years ahead. Because transportation investments take years to plan and implement, the transportation decisions we make today will shape America's transportation future for decades to come.

The time has come to do what visitors to the 1939 World's Fair did—to imagine a new transportation future for America and harness the resources to achieve it.

Clean, efficient public transit must and will be a large part of that future. Rail, rapid bus and other forms of transit already deliver large benefits to the American people—saving energy, reducing pollution, curbing congestion, saving money and enriching our communities. Demand for improved transit is growing nationwide as Americans tire of painful commutes, high gasoline prices, pollution and the dependence of the United States on foreign nations for oil.

What might that new transportation future look like?

It might look like the new light rail

lines in cities such as Dallas and Salt Lake City—places where critics said that modern transit would never work—but which are now attracting large numbers of riders and sparking new forms of urban development. These large benefits are now driving these and other cities to expand their transit systems in order to create more transportation options for their residents.

It might look like the urban corridor between Boston and Washington, D.C., where Amtrak's high-speed rail service is experiencing booming ridership—reducing delays at congested airports and on packed highways, and curbing oil consumption and global warming emissions.

It might look like the transit-oriented communities popping up in places like Portland, Oregon, where expanded transit and thoughtful land-use planning are resulting in lively new walkable neighborhoods that are an attractive alternative to suburban sprawl and avoiding costly new investments in other infrastructure.

It might even look like the small towns of the upper Connecticut Valley region of New Hampshire and Vermont, where a unique partnership of major institutions, town and state governments has enabled the local transit agency to provide service free of charge—boosting ridership and making transit a pillar of community development.

America needs a transportation system that can meet the needs of the 21st century. By investing in clean, modern transit, we can address some of America's most pressing challenges and improve our environment, our economy, and our quality of life.

America's Transportation System Is in Trouble

Since World War II, America has relied on personal cars and trucking as the mainstays of our transportation system, investing trillions of dollars to build highways, parking lots and other forms of infrastructure to support our car-centered transportation network. Now, as America enters the 21st century, our automobile-centered transportation system, once a key element of America's prosperity, is increasingly becoming a burden.

The nation faces billions of dollars in expenditures just to maintain the safety of our current transportation infrastructure, never mind expanding that infrastructure to accommodate new needs. Our traditional system of financing transportation investments no longer brings in enough money to pay the bills. And our dependence on cars and trucks leaves us increasingly reliant on oil from unstable foreign regimes, and makes America's transportation system a leading contributor to global warming.

The vast and growing problems in America's transportation system require that we move toward a new transportation future—a future that has rail, rapid buses and other forms of public transportation at its core.

America's Transportation System Is Too Reliant on Cars

Americans have historically loved their cars, and for good reason. The automobile has represented freedom and flexibility, opening up new opportunities for employment, housing and recreation.

But America's dependence on automobiles has increasingly become a costly and time-consuming burden—forcing people to drive long distances and leaving most of us without alternatives.

America Is Uniquely Reliant on Cars

America's automobile-dependent transportation system is unique in the industrialized world. Other industrialized

Americans travel more than twice as far by car each year as their European counterparts.

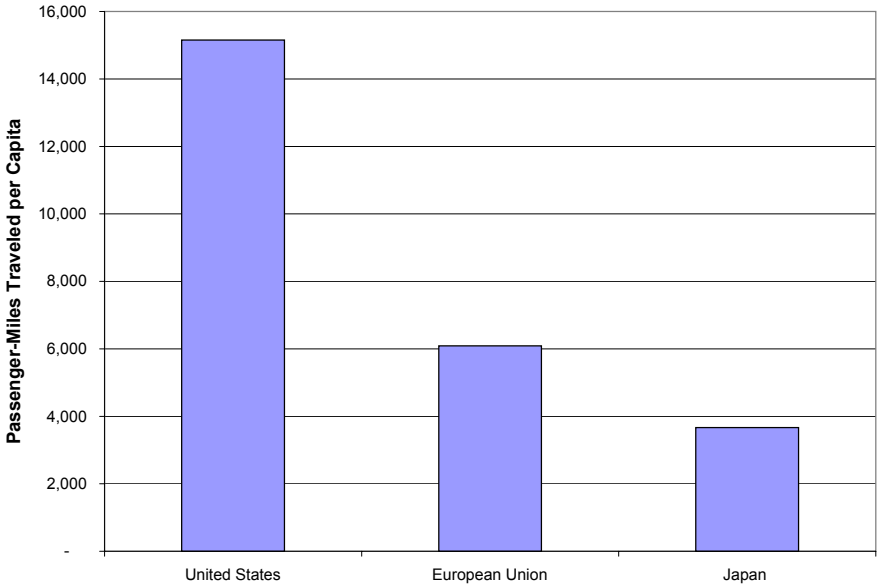
nations—ranging from Canada to Europe to Japan—have built more balanced transportation systems, in which cars, trains, buses and other forms of transit each play an important role.

The United States has 1.9 vehicles per household on average—more vehicles than there are drivers to drive them.[3] With about 830 automobiles per 1,000 people, America has by far more vehicles per capita than any other nation in the world—over one-third more than Western Europe.[4] We also travel more miles in our cars per year than residents of other industrialized countries. The average American travels more than twice as far by car each year as his or her European counterpart and more than four times as far as the average resident of Japan.[5] (See Figure 1). Cars account for 86 percent of passenger travel in the U.S. compared with 76 percent in Europe and 58 percent in Japan.[6]

America's dependence on cars has grown with each passing year. Between 1970 and 2001, the number of cars on America's roads and streets increased by 60 percent.[8] And the number of miles driven on U.S. roads has nearly doubled over the last quarter-century—increasing at a rate three times faster than population growth.[9]

The result is that more of us are spending more time in our cars than ever before. Between 1980 and 2006, the proportion of workers driving alone to work increased from just under two-thirds to more than three-quarters.[10] The average commuter spent six minutes longer driving to or from work in 2001 than he or she did in 1983. That may not sound like a lot of time, but over the course of a full year, that amounts to 50 hours per year—or more than a full work week—of additional time spent commuting for a full-time worker.[11]

Figure 1. Annual Passenger-Miles of Travel per Capita in Passenger Cars[7]



The average commuter spent six minutes longer driving to work in 2001 than in 1983—a loss of 50 hours, or more than one full work-week, per year.

America's dependence on cars is more than just costly and frustrating to the nation's drivers. It is also linked to many of the nation's most difficult and intractable problems.

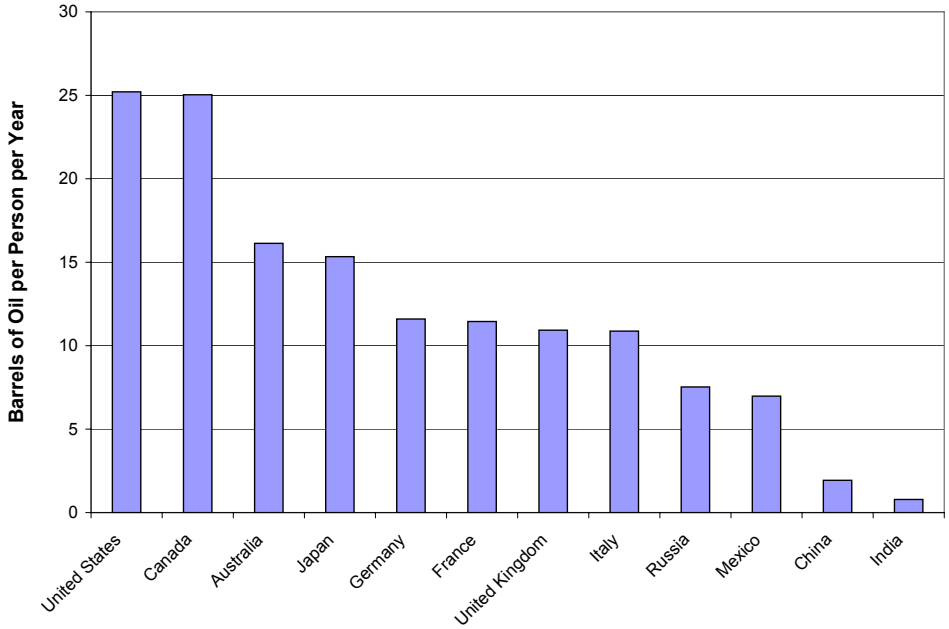
America's Transportation System Consumes Too Much Oil

With more cars on the road traveling more miles, America becomes more dependent on oil with every year. Our transportation system consumes more than two-thirds of the oil America uses each year, with more than 40 percent of the oil we consume used in the gasoline tanks of our personal vehicles.[12]

Our car-dependent transportation system is the main reason why America consumes far more oil than any other nation on the planet. In 2006, the United States was responsible for 24 percent of global consumption of oil.[13] The average American consumed 25.2 barrels of oil in 2006, more than the average citizen of any country outside of the Middle East.[14] (See Figure 2.)

Our dependence on oil is responsible for several increasingly intolerable problems. First, it leaves America's economy vulnerable to volatile oil prices. The price of a gallon of gasoline more than doubled between 1990 and 2007. In constant dollar terms, the price of gasoline increased

Figure 2. Barrels of Oil Consumed per Capita, 2006[15]



from $1.73 to $2.69 per gallon—an increase of 55 percent.[16] Oil resources across the globe are increasingly strained as a result of stagnant production and booming demand in developing nations such as China. Discovery of new oil fields peaked in the 1960s and has declined since. Indeed, the world now consumes about four barrels of oil for every barrel we discover.[17] Whether or not we have reached "peak oil"—the point of maximum production of oil worldwide—the days of cheap oil are likely gone forever.

The price of a gallon of gasoline, adjusted for inflation, jumped 55 percent between 1990 and 2007.

Traffic congestion costs America's economy $78 billion per year. Credit: Chris Schmelke, istockphoto.com

America's dependence on oil also leaves us reliant on unstable or unfriendly nations. As of 2005, the United States controlled only 2 percent of global oil reserves.[18] Nearly one-third of the world's oil production comes from the Middle East.[19] And OPEC nations control 78 percent of the world's oil reserves.[20]

There are several ways to reduce our reliance on oil for transportation. We can build more efficient cars and use alternative sources of energy to power them. But as long as we continue to drive more miles in our cars, our transportation system will remain addicted to oil and "energy independence" for the United States will remain a distant dream.

America's Car-Centered Transportation System Does an Increasingly Poor Job of Getting People Where They Need to Go

Gridlock on American highways is getting worse, as more of us drive more cars longer distances to get where we need to go.

Traffic congestion has increased dramatically over the past three decades in lockstep with the dramatic growth in vehicle-miles traveled. According to the Texas Transportation Institute (TTI), the average rush hour traveler in an urban area spent 38 hours in traffic delays in 2005—a full day longer than in 1982.[21]

Traffic congestion is more than just an annoyance; it also imposes large economic costs. In 2005, traffic congestion created an estimated $78 billion drain on the economy in the form of 4.2 billion lost hours of time and 2.9 billion gallons of wasted fuel.[22]

In the past, transportation planners believed that there was a simple solution to traffic congestion: build more roads. But recent research shows that adding more lanes of highway has only a temporary effect on congestion. Over time, new highways generate new traffic, either by sparking new development in far-flung suburbs or by encouraging people who had taken other forms of transportation to drive instead.[23] The result is that the highway becomes congested, typically setting off another round of calls for highway expansion.

Moreover, highways are a very costly investment. The TTI estimates that, if we were to rely on highway expansion alone to keep congestion levels constant, we would need to spend twice as much on highway expansion projects as we do today. The authors of the TTI's 2007 report concluded that, because of the expense and the increasing difficulty of finding areas to expand road capacity, it would be "almost impossible to attempt to maintain a constant congestion level with road construction only."[24]

America's Transportation System Is a Key Contributor to Global Warming

Global warming is real, is happening now, and will have devastating effects on the environment and our economy. Transportation is the leading contributor to global warming in the United States.

In 2005, the United States was responsible for approximately 22 percent of the world's emissions of carbon dioxide, the leading global warming pollutant.[25] America's transportation system produced one-third of those emissions.[26] Indeed, our transportation system produced more carbon dioxide than *the entire economy* of any other nation in the world, other than China.[27] (See Figure 3, next page.)

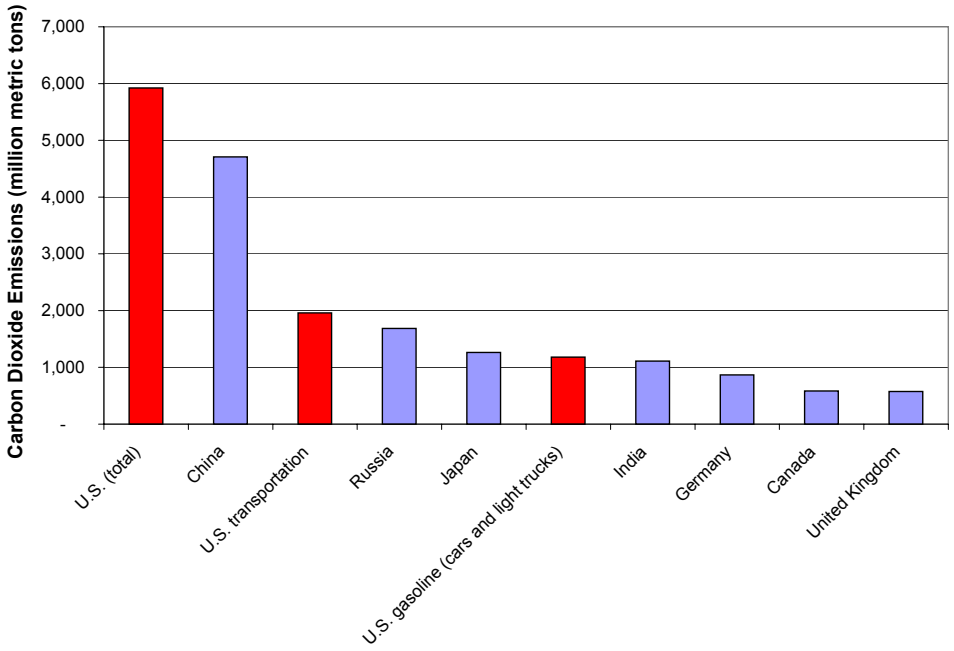
The U.S. Energy Information Administration projects that America's transportation system will consume 24 percent more energy to power light-duty vehicles by 2030; emissions of carbon dioxide could be expected to increase at a similar rate.[29] The most recent science, meanwhile indicates that the world will need to achieve dramatic reductions in emissions—on the order of a 20 percent reduction by 2020 and an 80 percent reduction by 2050 in the United States—in order to avoid the worst impacts of global warming.[30] Allowing for further increases in emissions from transportation in the United States would make it virtually impossible for the world to achieve the emission reductions needed to prevent the worst impacts of global warming.[31]

America's Transportation System Creates a Host of Other Problems

Addiction to oil, growing congestion, and global warming are among the biggest impacts of America's car-centered transportation system on the United States and the world. But these are by no means the only problems caused by our current reliance on automobiles.

America's transportation system produces more global warming pollution than the entire economy of any nation other than China.

Figure 3. Carbon Dioxide Emissions, 2004[28]



America's Transportation System Is Extraordinarily Expensive

America's local, state and federal governments spend more than $150 billion annually on expanding, maintaining and operating the nation's highway network.[32] But that figure doesn't begin to account for the large expenses American households face in owning and maintaining vehicles. In 2005, American consumers spent more than $900 billion on vehicles, fuel and other vehicle-related expenditures.[33] Vehicle and related expenses accounted for 17 percent of total household expenditures—more than households spent on food and clothing, combined.[34] (See Figure 4.)

Transportation is the second-largest expense for American households, ahead of food, clothing and health care.

The more automobile-dependent the metropolitan area you live in, the more money you are likely to spend on transportation. Residents of areas with robust transit networks spend approximately 10 percent of their income on transportation, compared to as much as 25 percent in auto-dependent areas.[36]

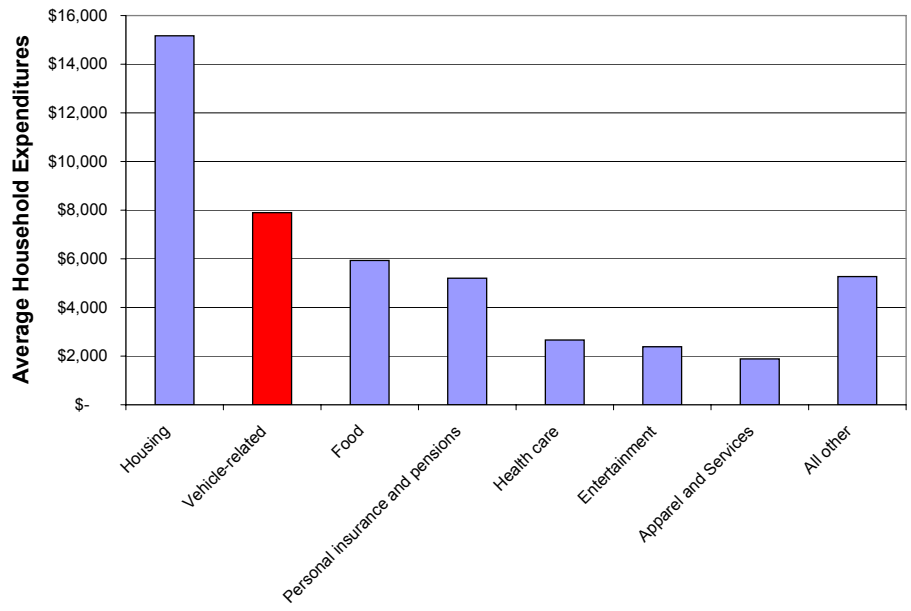
The more than $1 trillion spent by households and governments on highways and automobiles does not include hundreds of billions more spent by businesses on facilities for cars—particularly parking. The annual cost of providing parking has been estimated to be as high as $500 billion per year, including the value of the land on which those parking lots sit.[37]

America's Transportation System Harms Public Health and the Environment

Accidents and Sedentary Lifestyles

Highway accidents claimed more than 43,000 lives in 2005 and injured more than

Figure 4. Average Household Expenditures, 2005[35]



2.7 million Americans.[38] By contrast, only 185 people died in accidents with transit vehicles. Each year, more Americans die on highways than were killed in the entire Korean War.[39] Motor vehicle accidents are the leading cause of death for Americans aged 5 to 44.[40] Traffic accidents also impose massive costs on the economy—more than $300 billion per year.[41]

Recent studies suggest that our automobile-dependent transportation system also contributes to health problems such as obesity and heart disease.[42] One study found that a typical white male living in a compact, mixed-use community weighs on average 10 pounds less than a similar male living in an auto-dependent subdivision where residents must drive to stores and employment.[43] Another recent study estimated that additional walking associated with taking public transit could save $5,500 per person in medical costs over a lifetime by reducing rates of obesity.[44]

Air Pollution

Exhaust from cars and trucks is a leading contributor to air pollution that harms public health. More than 130 million Americans live in counties where they are exposed to dangerous levels of air pollution.[45] Automobiles are major contributors to ozone smog, while diesel trucks are large sources of particulate soot. A number of studies, including one released jointly by the Johns Hopkins School of Public Health and the Pew Environmental Health Commission, have found clear links between smog created by car exhaust and increasing incidence of asthma, especially in children.[46] The American Lung Association similarly connects transportation's denigrating effect on air quality to a number of other public health risks, including chronic pulmonary lung disease.[47]

Water Pollution

Americans have long been aware of the impact of cars on air quality, but fewer are aware of the impact on America's rivers, streams and lakes. Rainwater that falls on roads and parking lots often flows into

Commercial parking lots cover between 2,000 and 3,000 square miles of the United States, an area larger than the state of Delaware.

waterways, either directly or via storm drains, carrying with it oil, grease, road salt, metals and other contaminants.[48] Runoff pollution is currently the number one threat to water quality in the United States, and runoff from transportation facilities can make a significant contribution to local pollution problems.[49]

Land and Wildlife

Highways and transportation infrastructure consume vast amounts of land.

Commercial parking lots cover between 2,000 and 3,000 square miles of the United States, an area larger than the state of Delaware.[50] Road rights-of-way cover an even greater area, approximately 20,000 square miles, almost twice the land area of Massachusetts.[51] Automobile-dependent cities devote three to five times more land to transportation than cities with robust transit networks because transit can carry far more people with far less dedication of land than highways.[52]

Highways and automobile infrastructure can destroy lands that are important for wildlife, including wetlands. Highways also fragment wildlife habitat—creating barriers that make it difficult for species to reach food, water or shelter.

America's Transportation System Leaves the Elderly, the Disabled and the Poor Behind

There are millions of Americans for whom owning and operating a car is simply not an option. The elderly, the disabled and children are among those who cannot (or, in some cases, should not) operate motor vehicles. And for many low-income households, the cost of owning, operating, maintaining and insuring a vehicle is simply too expensive to sustain. In areas where transit service does not exist or is inconvenient, the lack of a vehicle can isolate "transportation disadvantaged" people—cutting them off from jobs, educational opportunities, or important public services. With the population of older Americans rising dramatically as the "Baby Boomers" near retirement, the need for alternatives to driving will grow.

America's Transportation System Encourages Wasteful Sprawl

America's auto-centered transportation system and wasteful sprawl-style development are intertwined. The more we invest in new highways, the more we open up formerly rural areas to sprawling development. And the more we sprawl, the more intense is the demand for new highways. Sprawling development causes an array of serious problems, ranging from increased costs for public infrastructure to the loss of important natural and agricultural lands.[53]

Public Policy Decisions Have Driven America's Overreliance on Cars

America's car-centered transportation system is often thought to be the result of individual tastes. But for at least the last half-century, public policy has played a major role in shifting the United States toward a car-centered transportation system.

The decision by the federal government in the 1950s to build the Interstate highway system—considered by some the largest public works project in history—is among the most important public policy decisions that shaped our current transportation system. The Interstate highway system cost more than $400 billion to build (in 2001 dollars) and reshaped American life, opening vast areas of previously rural land to suburbanization.[54] The decision to build more than 40,000 miles of Interstate highways also imposed future costs on the American people due to the ongoing obligation to maintain those highways and construct other infrastructure to connect sprawling developments.

Public policy intervention on behalf of the automobile doesn't stop with highway construction. Planning and zoning regulations often mandate how communities must accommodate automobiles while discouraging other transportation choices—requiring, for example, minimum amounts of parking as a precondition of development, or requiring the separation of residential and commercial uses into different sections of a town, making walking between destinations difficult or impossible. In addition, all Americans pay for our car-centered transportation system—whether they drive or not—both directly through taxes and indirectly by absorbing the costs in pollution, accidents, congestion and other negative "externalities" imposed by automobiles.

A New Transportation Future for the 21st Century

Citizens, businesses and transportation planners across the United States are coming to the realization that a highway-centered transportation system no longer suits the needs of the 21st century. America can do better than a transportation system that reinforces our dependence on foreign oil, accelerates global warming, imposes significant damage on public health and the environment, and increasingly fails to do what it was built to do: move Americans quickly, efficiently and safely from place to place.

Instead, America should build toward a cleaner, more efficient and more effective transportation system—one that provides a range of transportation options to Americans. Automobiles will have an important role to play. But achieving balance in our transportation system will require new investments in transit and other transportation alternatives.

Transit already delivers a host of benefits for the United States—despite a history of underinvestment in transit services that continues, in many parts of the country, to the present. The benefits of transit service in America more than outweigh its costs. And the benefits of transit will only become greater in the years to come.

The Benefits of Transit for America

Rail, bus and other forms of transit in the United States save oil, reduce congestion, and curb emissions of global warming pollution. At the same time, transit provides a wealth of other benefits to American communities.

Transit Provides a Wide Range of Benefits

Transit riders aren't the only people who benefit from transit service. Indeed, transit benefits all Americans, even those who never set foot on a bus or train.

Some of these benefits are obvious—for example, reduced rush-hour traffic. Others are less apparent. When a new transit line helps revitalize a struggling downtown area, or reduces health care costs related to air pollution, all citizens benefit.

Transit provides three types of benefits to America: it enhances the mobility of our population (particularly those who do not or cannot drive), it improves the health and welfare our communities, and it bolsters the efficiency of our transportation system.[55]

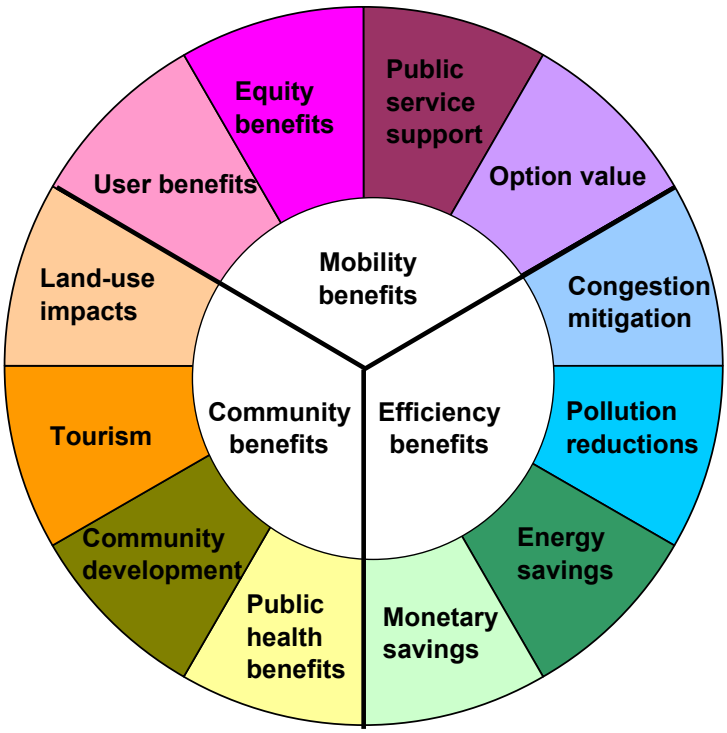
Mobility Benefits

Transit provides basic mobility to thousands of residents of the United States who either do not own a car or are unable to drive. For these Americans—who include many elderly people, low-income families, teenagers and the disabled—transit is a lifeline connecting them to education, jobs, medical care, shopping and other important services.

For other Americans, transit represents an easier, cheaper or less stressful way to get to work, school or other destinations. And for still others, transit represents a safety net, providing transportation options during inclement weather or when their vehicles are being repaired.

The Victoria Transport Policy Institute, a Canadian transportation think tank, lists four categories of mobility benefits provided by transit:

Figure 5. Benefits of Transit



- **User benefits** – These are the direct benefits enjoyed by transit riders. An urban light-rail rider, for example, might benefit by being able to get to work more quickly, more pleasantly, or more inexpensively than by driving.

- **Equity benefits** – These are benefits provided to the "transportation disadvantaged"—people who cannot afford to own a car or cannot (or should not) drive. Transit ensures that the elderly, the disabled, children, and other non-drivers benefit from transportation system investments and can fully participate in the economy and society.

- **Public service support** – Transit often plays an important role in the delivery of important public services. Transit networks may help bring children to school or carry the elderly to medical appointments. If transit did not exist, social service providers would need to invest in alternative forms of transportation (for example, school buses or ambulance service) to ensure that their clients could access necessary services.

- **Option value** – Option value is the value provided to people who might use transit as a "backup" form of transportation. Even if a person rarely or never rides transit, the availability of transit service may provide benefits—for example, by enabling them to avoid the cost of owning or renting a second car when their primary vehicle is in the shop or otherwise unavailable. Transit also provides option value to communities, providing a valuable backup in the case of a systematic failure of other transportation systems, such as major construction, major accidents or large storms that make automobile

travel difficult or impossible. Transit also plays an important role in many communities' disaster preparedness plans.

Community Benefits

Transit can also deliver important benefits to the entire community. The existence of high-quality transit reduces dependence on cars and makes more compact development patterns possible. In doing so, transit also increases the value of nearby properties and can even help increase tourism.

- **Land-use impacts** – Transit allows for the creation of more compact communities in which a greater variety of locations can be reached by transit, on foot or by bicycle. Transit uses far less land than automobile transport and requires far less space for parking.[56] As a result, transit can play an important role in preventing suburban sprawl-type development that eats up open space and increases public costs for infrastructure.

- **Community development** – Transit is an important asset in economic development. Studies have shown that land in immediate proximity of transit stops is generally more valuable than land farther away.[57] Transit can support compact commercial districts, link workers with available jobs, and enable people to save money on transportation, thereby providing them with more money to spend at local businesses.

- **Public health benefits** – Transit (particularly when provided by clean, low-emitting vehicles) can reduce emissions of pollutants that cause or exacerbate a range of health problems, from asthma to heart disease. Transit accommodates the creation of communities where walking and biking—rather than sedentary, car-centered lifestyles—are more common.

- **Tourism** – Finally, some forms of public transportation can help to draw tourists, giving a further boost to local economies. Heritage trolleys, historic railways and some ferry services are tourist attractions in their own right. In addition, transit can play an important role in getting large numbers of tourists to and from popular destinations, festivals and sporting events.

Efficiency Benefits

Transit also makes our transportation system more efficient—saving money, saving energy and saving time. These benefits include:

- **Monetary savings** – Transit service can reduce a host of public and private costs, including:

  - The cost to individuals of owning or operating a vehicle. Cities with vigorous transit networks have lower levels of car ownership, and residents spend less on transportation than in other cities.[58]

  - The cost of expanded highways and parking facilities. It is a commonly held myth that road users pay for the cost of highway infrastructure via user fees such as fuel taxes. In fact, governments subsidize highway travel through expenditure of general fund revenue and spending on services such as highway law enforcement. Meanwhile, private businesses in auto-dependent areas must pay to provide and maintain large parking areas to accommodate people who travel by car. Transit re-

duces these public and private costs by reducing demand for highway expansion and reducing the need for large parking areas.

- **Congestion mitigation** – Transit systems reduce the number of vehicles that travel on highways, particularly during peak hours, thus reducing congestion. Highway congestion is costly, wasting time, wasting fuel, and causing increased emissions of health-threatening pollutants.

- **Energy savings and pollution reductions** – Transit can contribute in a number of ways to the goals of saving energy and reducing pollution. Transit often delivers energy savings directly—by replacing inefficient car trips with trips on higher-efficiency transit modes—and indirectly, by reducing traffic congestion and encouraging land-use patterns that lead to further reductions in vehicle travel.

Quantifying the Benefits: Oil Savings, Congestion Relief and Global Warming Emission Reductions

In this report, we focus on three important ways transit service benefits the United States: by saving oil, reducing traffic congestion, and curbing emissions of pollutants that cause global warming. The following analysis is based on 2006 data on transit use and energy consumption by 503 transit systems that report to the Federal Transit Administration's National Transit Database, as well as congestion information from the Texas Transportation Institute's *2007 Urban Mobility Report*.

We focus in this analysis on transit services that are provided by, or under contract to, public agencies, and that are designed to carry more than one person per trip. In addition, we estimate energy savings and global warming emission reductions from transit services based on three impacts of transit: the direct replacement of automobile trips, reductions in congestion experienced by non-transit users, and "leveraged" energy savings resulting from more compact land-use patterns and reduced vehicle ownership in communities with robust transit networks.

A full and detailed discussion of the methods we used in this analysis can be found in the "Methodology and Technical Discussion" in Appendix A of this report. Detailed data on transit energy savings and global warming emission reductions—broken down by state, metropolitan area, and transit agency—can be found in Appendix B.

Transit Reduces Oil Consumption

Transit service significantly reduces the nation's consumption of fossil fuels. In 2006, transit saved more than 3.4 billion gallons of gasoline in the United States—enough to fuel 5.8 million cars for a year.[59] In monetary terms, public transit saved Americans more than $9 billion that would have been spent on gasoline.

Transit's oil conservation benefits are not evenly distributed across the country. The New York City metropolitan

In 2006, transit saved enough gasoline to fuel 5.8 million cars for a year, averting $9 billion in spending on gasoline.

area—with its massive transit infrastructure and dense population—accounts for approximately half of the oil savings delivered by transit. The top 10 metropolitan areas accounted for 91 percent of the nation's oil savings from transit. (See Table 1.)

Comparing Estimates of Gasoline and Global Warming Pollution Savings from Transit

The estimates of gasoline savings and global warming emission reductions presented in this report are significantly higher than those in recently published estimates. Separate reports produced in 2007 estimated that transit saves approximately 1.4 billion gallons of gasoline per year in the United States and reduces global warming pollution by approximately 6.9 million metric tons.[60] By contrast, in this study we estimate gasoline savings of 3.4 billion gallons per year and global warming pollution reductions of 25.8 million metric tons of carbon dioxide per year.

There are several important differences in assumptions and methodology between the earlier studies and this report that result in the greater savings reported here.

1) The analysis in this report does not include demand response (or "paratransit") service. Generally speaking, demand response service – which tends to use passenger vans to transport small numbers of riders on non-fixed routes – is designed to provide basic mobility to the elderly and disabled, not to improve the efficiency of the transportation system. As a result, these services frequently do not result in net energy savings or emission reductions. Including these services in the analysis would mask the significant benefits delivered by other, mainly fixed-route transit services.

2) This report includes a conservative estimate of oil savings and emission reductions from changes in land-use and vehicle ownership patterns that accompany transit networks. Both the ICF International study of gasoline savings and the SAIC analysis of global warming pollution reductions acknowledge that transit also delivers these "leveraged" reductions in vehicle travel, but neither study includes an estimate of these reductions.[61]

3) The SAIC estimate of global warming pollution reductions from transit uses a national average emission factor for emissions from generation of electricity, a prime source for propulsion of transit systems. However, three-quarters of the electricity used in America's transit systems is consumed in New England, the Middle Atlantic region, and the Pacific coast states – each of which have electric grids that are less carbon-intensive than the national average. This analysis uses regional estimates of emissions from electricity generation that reflect these differences.

Table 1. Top 10 Metropolitan Areas in Terms of Gallons of Gasoline Saved and Avoided Gasoline Expenditures from Transit Service

Urban area	Oil savings (million gallons)	Gasoline cost savings (million dollars)
New York-Newark, NY-NJ-CT	1,772	$4,639
Chicago, IL-IN	276	$723
Washington, DC-VA-MD	254	$666
San Francisco-Oakland, CA	243	$637
Los Angeles-Long Beach-Santa Ana, CA	168	$439
Boston, MA-NH-RI	154	$403
Philadelphia, PA-NJ-DE-MD	116	$303
Atlanta, GA	88	$230
San Diego, CA	44	$116
Baltimore, MD	36	$94

Transit Reduces Global Warming Pollution

Transit reduced global warming pollution by nearly 26 million metric tons nationwide in 2006—the equivalent of taking 4.9 million cars off the road.[62] Transit contributes to reducing global warming emissions in 28 states and the District of Columbia. The heavy use of carbon-intensive diesel fuel in many transit vehicles erodes the global warming benefits of transit in some cases, while the use of electricity and alternative fuels such as natural gas can boost the global warming benefits of other transit systems.

As with oil savings, New York state led the way in reducing global warming emissions, avoiding 11.8 million metric tons of carbon dioxide pollution in 2006—more carbon dioxide than was produced by the entire economies of Rhode Island, Vermont, or the District of Columbia in 2004.[63] (See Table 2.)

Why Do the Rankings for Oil Savings and Global Warming Pollution Reductions Differ?

One key difference between transit vehicles and cars is that many transit vehicles —particularly buses and trains – use diesel fuel rather than gasoline. Diesel engines are typically more fuel-efficient than gasoline engines, and therefore get more work done with less fuel, contributing to the oil-saving benefits of transit. However, diesel fuel also contains more carbon per gallon than gasoline, meaning that diesel engines are less effective at reducing emissions of carbon dioxide than they are at conserving oil. Transit agencies can further reduce their carbon dioxide emissions by switching to lower-carbon fuels such as natural gas and (in some parts of the country) electricity.

Table 2. Top 10 States – Carbon Dioxide Emissions Reductions from Transit

State	Carbon dioxide emission reductions (thousand metric tons)
NY	11,796
CA	3,597
IL	1,975
NJ	1,895
MA	1,191
MD	960
PA	755
GA	664
VA	650
DC	532

Transit Reduces Traffic Congestion, Saving Time and Money

Transit plays a key role in keeping cars off of congested roads, particularly during peak travel periods.

According to the Texas Transportation Institute's *2007 Annual Urban Mobility Report*, over 51 billion passenger miles were traveled on public transit in 2005, which prevented 541 million hours of delay—or more than 61,700 person-years of sitting in traffic.[64] This amounted to a total of $10.2 billion in congestion costs saved by public transportation in 2005.[65] Were transit service not available, drivers in the 85 urban areas studied by TTI would have spent approximately 13 percent more time in traffic.[66]

In the New York City metropolitan area alone, public transit avoids more than 216 million hours of traffic delay —the equivalent of more than 24,000 person-years of sitting in traffic.

Understanding Transit's Benefits: Who Gains and Why?

States that Invest More in Transit Reap Greater Benefits

Not every city or state achieves large benefits from transit service. There are many reasons why states might vary in the benefits they derive from local transit systems. But, in general, states that invest in transit reap rewards. Those that don't, miss out. And those that invest more reap greater rewards.

Table 3. Increased Hours of Delay if Public Transit Were Eliminated[67]

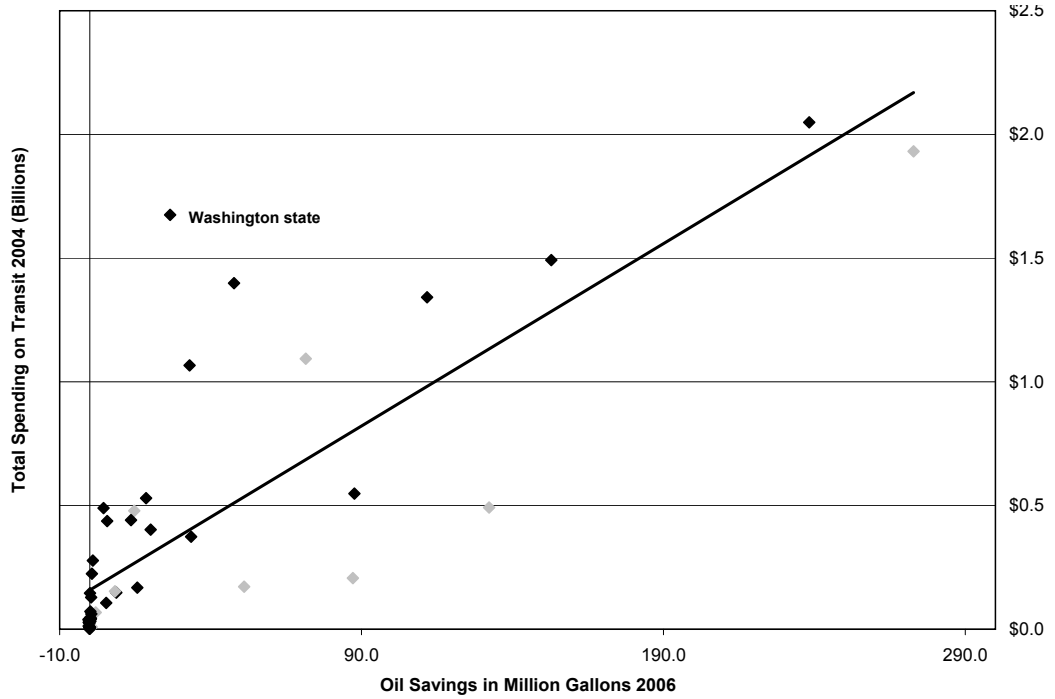
Urban Area	Increased Hours of Delay if Public Transit Were Eliminated (thousand hours)
New York-Newark NY-NJ-CT	216,431
Chicago IL-IN	39,554
Los Angeles-Long Beach-Santa Ana CA	28,494
San Francisco-Oakland CA	26,263
Washington DC-VA-MD	25,655
Boston MA-NH-RI	21,441
Philadelphia PA-NJ-DE-MD	19,155
Seattle WA	12,661
Atlanta GA	12,542

States vary widely in the amount of public resources (not including fares) that they invest in transit. But their level of investment in transit generally correlates with the amount of benefits they receive. Figure 6 below shows the variation in oil savings from transit during 2006 by level of transit spending in 2004, the most recent year for which data are available. (California and New York are excluded from the graph to allow other states to be seen on a meaningful scale.)

The data in Figure 6 are imperfect indicators of the connection between transit spending and benefits for two reasons. First, some states (marked in the chart by gray diamonds) share transit agencies with neighboring states. The estimates of oil savings are split between states based on ridership, but the spending estimates are attributed to the state in which the transit agency is headquartered. As a result, some states' transit systems may receive credit for oil savings that occur in neighboring states, or be assigned costs for providing transit service to their neighbors. Second, since the figure includes both capital and operating spending, states that are in the midst of a major capital investment campaign (such as Washington) will appear

The 10 states that made the greatest investments in transit accounted for 85 percent of the oil savings delivered by transit in the United States.

Figure 6. Oil Savings from Transit in 2006 versus Transit Spending in 2004 by State (New York and California Excluded)[68]



to be spending more and saving less than other states, since the investments that are being made today will not result in oil savings until future years.

In general, however, states that invest more in transit—regardless of the source of that funding—tend to reap greater benefits. Indeed, the 10 states that made the greatest investments in transit in 2004 accounted for approximately 75 percent of transit spending nationwide and 85 percent of the oil savings delivered by transit service in the United States in 2006.

Additional evidence for the benefits of transit comes from the 14 cities—from the Rust Belt to the Sun Belt—that have invested in new light rail systems over the past several decades.

Cities That Have Recently Expanded Transit Are Reaping the Benefits

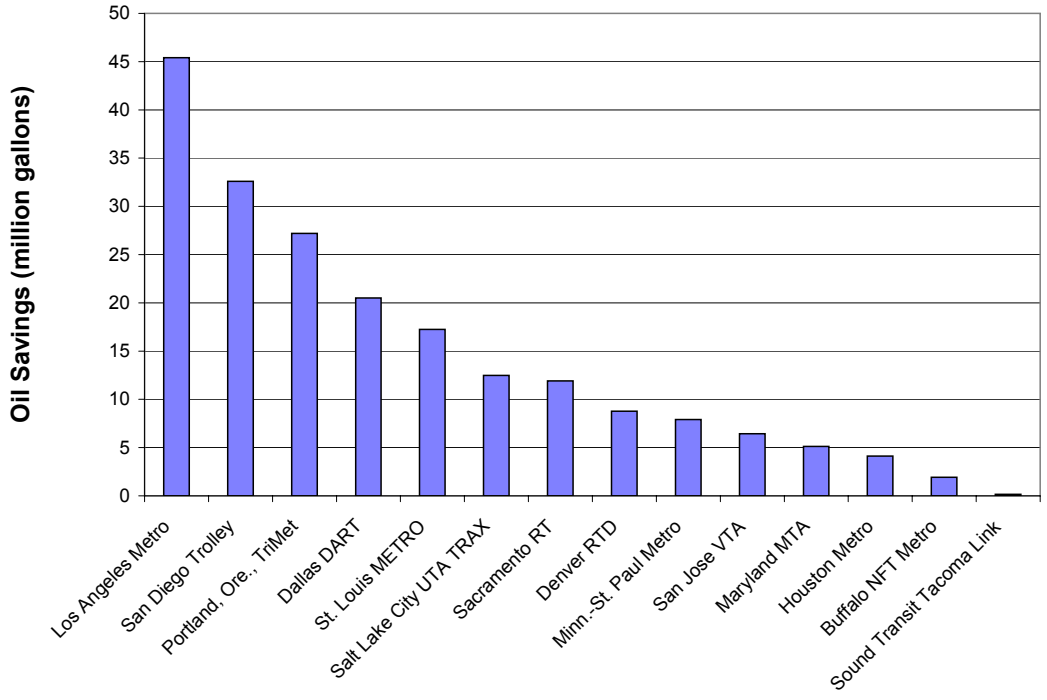
The early 1980s saw the beginning of a building boom of light rail transit systems across the United States. Since 1980, 14 cities have built wholly new light rail transit systems, while several other cities have extended previously existing systems or initiated service on streetcars or "heritage trolleys" that serve downtown areas. The 14 cities with new light rail systems saved more than 200 million gallons of gasoline in 2006 and averted more than 1.6 million metric tons of carbon dioxide pollution. (See Figure 7.) This figure underestimates oil savings and emission reductions because it excludes transit agencies with light rail service prior to 1980, even if service has been expanded significantly since that time.[69]

Sacramento is one of many cities that have built light rail transit systems in recent years.Credit: istockphoto.com

At the same time, light rail development in many of these cities has taken cars off the road, reducing congestion pressure, while sparking "transit-oriented" development characterized by compact areas of shops and residences that are easily navigated on foot, by bike, or via transit. Cities such as Portland, Oregon, are using transit and transit-oriented development to promote a more efficient and sustainable alternative to traditional suburban sprawl. (See "Transit and Land-Use Planning in Portland, Oregon," page 54.)

The experiences of the new light rail cities demonstrates that transit works in many kinds of cities—not just densely populated, congested cities such as New York, but also rapidly growing, traditionally automobile-dependent cities such as Dallas and Salt Lake City. Moreover, the benefits enjoyed by these cities are just the tip of the iceberg of what is achievable. Many of these light rail systems are relatively immature—consisting of one or two lines that serve a limited number of destinations. As these cities expand their light rail networks—and most of them have expansion projects either underway or in the early stages of development—they will succeed in attracting even more riders, leading to even greater benefits in the years to come.

Figure 7. Gasoline Savings in 2006 from Light Rail Systems Built Since 1980 (Heritage Trolleys Excluded)



Streetcars and Heritage Trolleys

Streetcars and trolleys are often considered vestiges of an earlier era of transit. But many cities are finding that streetcars and refurbished "heritage" trolleys can play an important role in revitalizing urban areas in the 21st century.

Streetcars serve a different purpose than other forms of transit – rather than bringing large numbers of commuters *to* an urban area, they help travelers make their way *around* and *through* urban areas. Streetcars typically travel on short lines, at low speeds, and with frequent stops.[70] Downtown streetcar and trolley lines are urban amenities that help pedestrians navigate urban areas quickly and conveniently.

In 2000, Portland, Oregon, and Kenosha, Wisconsin, became the first American cities to revive or rebuild dormant streetcar lines. In Portland, more than 7,000 new housing units have been built within three blocks of the streetcar line since it was announced a decade ago. And in Little Rock, Arkansas, the city's streetcar line has been a factor in more than $300 million in new construction that has taken place in the city since the line was built.[71]

Streetcar projects are also attractive to many cities because they are relatively inexpensive—costing about one-third as much as light rail per mile.[72]

Rail Systems Deliver the Bulk of Energy Savings, But Bus Services Make Important Contributions

Rail transit is responsible for the majority of oil and global warming emission savings from transit in the United States. "Heavy rail" systems—which include subways and above-ground rail networks with subway-like service—accounted for nearly two-thirds of the oil savings delivered by transit nationwide. Commuter rail and light rail systems also accounted for significant oil savings.

While New York City's subway system was responsible for a large share of the savings delivered by heavy rail systems, subways in Washington, D.C., San Francisco-Oakland, Chicago, Boston, Atlanta and Philadelphia also saved significant amounts of oil (and, by extension, achieved significant reductions in global warming pollutant emissions.) (See Table 4.) In part, the high level of savings from rail systems is due to the documented link between the presence of heavy and light rail service and "leveraged" reductions in vehicle travel—those that result from more compact land-use patterns and reductions in vehicle ownership made possible by transit. In part, it is due to the fact that subway service is generally electrified, very efficient in moving large numbers of people in densely populated areas, and does not consume oil.

The list of major heavy rail agencies includes a mix of older, established subway networks with systems that have been built from the 1970s onward, such as those in the San Francisco Bay area, Atlanta, Los Angeles and Miami—once again demonstrating that cities that

Commuter rail trains, like this one in the Boston area, carry suburban commuters quickly and efficiently to downtown jobs.

Table 4. Oil Savings from Top 10 Heavy Rail Transit Systems, 2006

Heavy Rail Agency	Oil Savings (million gallons)	Gasoline Cost Savings (million dollars)
MTA New York City Transit	1,242.1	$3,252
Washington Metropolitan Area Transit Authority (Metro)	239.1	$626
San Francisco Bay Area Rapid Transit District (BART)	199.3	$522
Chicago Transit Authority (CTA)	173.3	$454
Massachusetts Bay Transportation Authority (MBTA)	81.8	$214
Metropolitan Atlanta Rapid Transit Authority (MARTA)	74.9	$196
Southeastern Pennsylvania Transportation Authority (SEPTA)	56.1	$147
Port Authority Trans-Hudson Corporation (PATH)	49.6	$130
Los Angeles County Metropolitan Transportation Authority (L.A. Metro)	30.5	$80
Miami-Dade Transit (Metrorail)	20.0	$52

Table 5. Oil Savings from Top 10 Bus Systems, 2006

Bus Agency	Oil Savings (million gallons)	Gasoline Cost Savings (million dollars)
Los Angeles County Metropolitan Transportation Authority (L.A. Metro)	56.1	$146.8
MTA New York City Transit	39.2	$102.7
New Jersey Transit Corporation	17.3	$45.3
Metro Transit (Minnesota-St. Paul)	11.7	$30.7
King County Department of Transportation - Metro Transit Division	9.3	$24.4
Metropolitan Atlanta Rapid Transit Authority	9.3	$24.4
Metropolitan Transit Authority of Harris County, Texas	8.7	$22.8
Academy Lines, Inc. (NJ)	8.4	$22.1
City and County of Honolulu Department of Transportation Services	8.0	$21.1
Chicago Transit Authority	7.9	$20.8

have invested in transit service in recent years are reaping the benefits of that decision.

Bus transit services—while much more extensive in the United States—do not provide the same level of oil savings or global warming emission reductions. In some cities, however, particularly those without rail transit, buses do play an important role in improving the efficiency of the transportation system and saving energy. (See Table 5.)

The role provided by bus service varies considerably in different circumstances. In some areas, bus networks provide express service to suburban areas similar in many ways to commuter rail. In others, they are used as part of "bus rapid

Efficient bus rapid transit systems, like the EmX system in Eugene, Oregon, have provided a low-cost option for transit expansion in cities both large and small. Credit: Lane Transit District

transit" systems similar to light rail. In still other areas, buses play an important role as "feeders" to light rail and heavy rail networks. And in still other areas, buses serve as a basic mobility lifeline for the poor, the elderly, the disabled and other transit-dependent populations. Larger metropolitan areas may have bus services that serve all of these functions, while small cities may operate skeletal bus services that provide for basic mobility only.

Bus service nationwide does contribute to energy savings, global warming emission reductions and congestion relief—particularly in congested urban corridors. The scale of those benefits varies from place to place depending on the efficiency of bus services and their role within a community's transportation system. In some locations, buses provide valuable community benefits—such as basic mobility—even if they do not directly contribute to oil savings or emission reductions.

Suburban Transit Contributes Important Benefits

Transit services that operate in suburban areas can also deliver important benefits. The largest benefits come from commuter rail services that bring commuters from suburban areas into central cities. The commuter rail systems that deliver the greatest oil savings are those serving the nation's busiest cities and urban corridors: New York City, Chicago, Philadelphia, Boston, Los Angeles, the Bay Area, and the Baltimore-Washington corridor. (See Table 6.)

Over the last several decades, however, sprawling development patterns have made the outskirts of many American cities increasingly unfriendly to traditional modes of transit. Transit operators have experimented with a variety of approaches to provide transportation alternatives to residents of those areas, ranging from shuttle bus services linking residential areas with transit stops to vanpool services.

Table 6. Oil Savings from Top 10 Commuter Rail Systems

Commuter Rail Agency	Oil Savings (million gallons)	Gasoline Cost Savings (million dollars)
MTA Long Island Rail Road	134	$350
New Jersey Transit Corporation (NJ Transit)	123	$321
Metro-North Commuter Railroad Company	107	$281
Northeast Illinois Regional Commuter Railroad Corporation (Metra)	82	$216
Massachusetts Bay Transportation Authority (MBTA)	36	$94
Southeastern Pennsylvania Transportation Authority (SEPTA)	31	$82
Southern California Regional Rail Authority (Metrolink)	22	$58
Peninsula Corridor Joint Powers Board (Caltrain)	14	$36
Maryland Transit Administration (MARC)	13	$34
Northern Indiana Commuter Transportation District (South Shore Line)	8	$20

Table 7. Oil Savings from Top 10 Vanpool Systems, 2006

Vanpool Agency	State	Oil Savings (million gallons)	Gasoline Cost Savings (million dollars)
San Diego Association of Governments	CA	3.2	$8.3
Utah Transit Authority	UT	2.0	$5.2
Metropolitan Transit Authority of Harris County, Texas	TX	1.8	$4.7
King County Department of Transportation - Metro Transit Division	WA	1.3	$3.4
Pace - Suburban Bus Division	IL	1.0	$2.6
Pierce County Transportation Benefit Area Authority	WA	0.9	$2.4
Phoenix - VPSI, Inc.	AZ	0.9	$2.3
Greater Hartford Ridesharing Corporation - The Rideshare Company	CT	0.8	$2.2
New Jersey Transit Corporation	NJ	0.8	$2.1
Ben Franklin Transit	WA	0.7	$1.9

Vanpools are a non-traditional form of transit service, in which a transit agency supplies a van to a group of commuters who then use it to commute to and from work. Vanpool participants typically pay a flat monthly fare for the service, with the volunteer driver (a vanpool member) receiving a discount. Vanpools have proven to be a successful way to bring transit to difficult-to-serve suburb-to-suburb commutes.

While vanpools do not provide as much total oil savings as bus and rail systems, part of the reason is that they serve far fewer people. On a per-passenger basis, however, vanpool programs are very effective at conserving oil. Vanpool networks in San Diego and Salt Lake City save the most oil, while three vanpool agencies in Washington state appear within the top 10.

Of the 51 vanpool programs reporting to the National Transit Database, all 51 provided significant savings in oil.

Small Transit Agencies Provide Benefits As Well

Transit agencies serving small metropolitan areas often do not have the same advantages as those serving larger metropolitan areas. The downtown areas they serve are less dense with jobs than those of major urban areas, traffic congestion—which is a major motivating factor for many people to choose transit—is usually less severe, and transit agencies may not be as well funded as those in larger cities.

Yet, there are many examples of small transit agencies that deliver significant oil savings and carbon dioxide emission reductions. Table 8 below shows the top 15 urbanized areas for oil savings from transit among those with a population of less than 500,000. Of these 15 urbanized areas, six are in California, two are in Washington state, and four others (Eugene, Syracuse, State College and South Bend) are areas with major universities.

Summary

Without transit service, America would find itself more dependent on foreign oil, with more traffic congestion, and emitting even more global warming pollution than we do today. Cities and states that have invested in rail, clean buses and other forms of public transportation are reaping the benefits of those investments. Yet, as will be discussed in the next section, America has historically invested less in transit than we should, missing opportunities to address the nation's largest challenges.

Table 8. Top 15 Urbanized Areas for Oil Savings, Population Under 500,000

Urban Area	Oil Savings (million gallons)	Gasoline Cost Savings (million dollars)	Carbon Dioxide Emission Reductions (thousand metric tons)
Stockton, CA	1.46	$3.8	10.7
Bakersfield, CA	0.86	$2.3	-1.7
Olympia-Lacey, WA	0.85	$2.2	2.5
Kennewick-Richland, WA	0.85	$2.2	6.8
Kingston, NY	0.82	$2.1	6.8
Santa Clarita, CA	0.75	$2.0	4.1
Indio-Cathedral City-Palm Springs, CA	0.71	$1.9	1.1
Lancaster-Palmdale, CA	0.66	$1.7	3.4
Syracuse, NY	0.65	$1.7	-3.4
Portland, ME	0.57	$1.5	1.3
Eugene, OR	0.56	$1.5	3.9
Santa Barbara, CA	0.45	$1.2	3.1
State College, PA	0.41	$1.1	0.3
South Bend, IN-MI	0.40	$1.1	-0.8
Poughkeepsie-Newburgh, NY	0.37	$1.0	2.5

America's Underinvestment in Transit

America's current transit services deliver significant reductions in oil consumption and global warming pollution while curbing traffic congestion and providing a host of other benefits to American communities. The large benefits America receives from transit are even more surprising given that, in many parts of the country, transit receives only marginal levels of public support.

Investing in transit makes economic sense, yielding (conservatively) about two dollars in benefits for every dollar of investment. America's underinvestment in transit has deep roots in our nation's history and has adverse consequences for our economy, environment and communities. Despite growing demand for alternatives to automobile travel across the country, current levels of transit investment are insufficient to meet transit's full potential.

Tallying the Dividends from America's Investment in Transit

America's current investments in transit more than pay for themselves. As noted above, transit provides a range of benefits to American communities. A conservative count includes the following:

- **Reduced vehicle expenses**: People who live in cities with robust transit networks experience reduced costs for owning and maintaining vehicles. A 2004 study estimated the consumer cost savings in cities with large rail transit systems to be $22.6 billion per year.[73] In addition, the analysis conducted for this report estimates that transit services in other cities saves $1.6 billion in avoided gasoline expenditures, leading to aggregate savings

of at least $24.2 billion in avoided vehicle expenses. These figures likely understate the actual present benefits given the significantly higher cost of gasoline.

- **Avoided traffic congestion**: The Texas Transportation Institute estimates that transit service in the 85 U.S. metropolitan areas it studied saved approximately $9.6 billion in avoided congestion costs, including the cost of wasted fuel.[74] This figure understates the savings because it does not include any congestion relief provided by transit in other cities.

- **Carbon dioxide emission savings**: Currently, there is no cost to emitting carbon dioxide into the atmosphere. But that may change soon as the U.S. Congress and various states consider proposals to put a price tag on carbon dioxide emissions. Assuming a cost per ton of carbon dioxide of $25 per metric ton—approximately the current cost of carbon dioxide emissions in Europe's emission trading program—transit service saved approximately $575 million worth of carbon dioxide pollution in 2006.[75]

- **Reduced road expenditures**. Rail transit is estimated to avoid approximately $8 billion per year in expenditures in road facilities.[76]

- **Reduced private and public costs for providing parking**, which amount to approximately $12.1 billion per year.[77]

- **Reduced costs from traffic accidents**, which amount to approximately $5.6 billion per year from rail transit alone.[78]

Totaling these benefits leads to an estimate of transit cost savings of approximately $60.1 billion per year. This is a very conservative estimate of transit benefits. For one thing, several of the cost savings described above only relate to rail transit—bus, vanpool and other modes of transit likely deliver even greater savings for which data are unavailable. Second, costs for several of the items mentioned above—including vehicle fuel and construction materials—have increased sharply in recent years. Finally, and most importantly, this estimate does not include the value of several important benefits delivered by transit, including:

- Reduced impact of congestion on commercial vehicles.
- Increased access to jobs and workers.
- Increased mobility for children, the elderly and the disabled.
- Reduced health costs from air pollution-related illnesses and, possibly, obesity and heart disease.
- Reduced costs for providing public services due to the more compact land-use patterns that transit makes possible.
- Local economic stimulus from jobs, increased investment near transit and tourism.
- Emergency response capability and "option" value for occasional transit users.

Transit provides at least $60 billion in public benefits annually, compared to just under $31 billion in public investment.

Table 9. Estimated Annual Cost Savings from Transit (billion dollars)

Reduced consumer transportation expenditures	$ 24.2
Avoided congestion	$ 9.6
Carbon dioxide emission reductions	$ 0.6
Reduced road expenditures	$ 8.0
Reduced parking expenditures	$ 12.1
Reduced accidents	$ 5.6
TOTAL	**$ 60.1**

America's total public investment in transit—including all capital expenditures (which includes investments in systems that have not yet begun operation and are not yet yielding benefits), and all federal, state, local and other contributions, but not including fares paid by transit riders—amounted to approximately $30.9 billion in 2005.[79] ***As a result, each dollar America invests in transit yields approximately two dollars in cost savings.***

In addition to providing direct economic benefits, investments in transit also create more jobs than investments in highways. The Surface Transportation Policy Project estimates that investments in transit produce 19 percent more jobs than an equivalent investment in new road and bridge projects.[80]

Investments in transit produce 19 percent more jobs than equivalent investments in new road and bridge projects.

Dollar-for-dollar, transit is a wise investment for the United States. Indeed, with the growing need for America to address its addiction to oil and the contribution it makes to global warming, combined with rising congestion on our highways, transit investments will make increasing sense in years to come.

America's History of Underinvestment in Transit

America's underinvestment in transit has deep roots in the nation's history. The United States has historically followed different models for investing in transit and highways. In the mid-20th century, the nation engaged in a highway building spree that was matched by widespread disinvestment in transit infrastructure. The modest increase in investment in transit that has occurred over the last several decades has not been enough to make up for the earlier shortfall.

In the early 20th century, most American cities had extensive streetcar networks, operated by private companies, which negotiated franchise agreements with local governments in order to provide streetcar service along public rights-of-way. Later, as buses came to replace streetcars, transit typically remained a privately owned and operated service. Local and state governments sometimes invested public resources for particularly important transit projects—such as the construction of subways in cities such as Boston and New York. But, for the most

Transit vs. Highway "Subsidies"

One of the most persistent myths of transportation finance is that transit users are subsidized, while highway users pay their own way through fuel taxes and other fees on motor vehicles. In fact, both transit riders and drivers are subsidized, with all taxpayers, even non-drivers, subsidizing drivers to the tune of billions of dollars a year. In 2005, federal, state and local governments spent more than $39 billion in non-user fee revenue on highways, accounting for more than one-quarter of total spending.[81] According to one recent study, fees and taxes paid by drivers cover only 74 to 93 percent of the annual governmental investment in highways.[82]

Even if drivers were to pay the full cost of government's investment in highways, they would not come close to paying for the costs driving imposes on other members of society. These "externalities" – including health care costs from air pollution and highway accidents, congestion, and noise—represent a major portion of the cost of driving, and are paid for by the rest of society, not drivers. One recent study estimated the cost of these negative impacts at more than $2 per gallon of gasoline.[83]

Most other industrialized countries require drivers to pay fuel taxes that are significantly higher than the cost of providing highway infrastructure. Every European nation except Hungary charges fuel taxes, tolls and user fees that more than cover the cost of providing highways, and in several countries highway users pay enough to cover the social costs of driving as well.[84]

part, government had a limited role in the development and financing of transit systems.

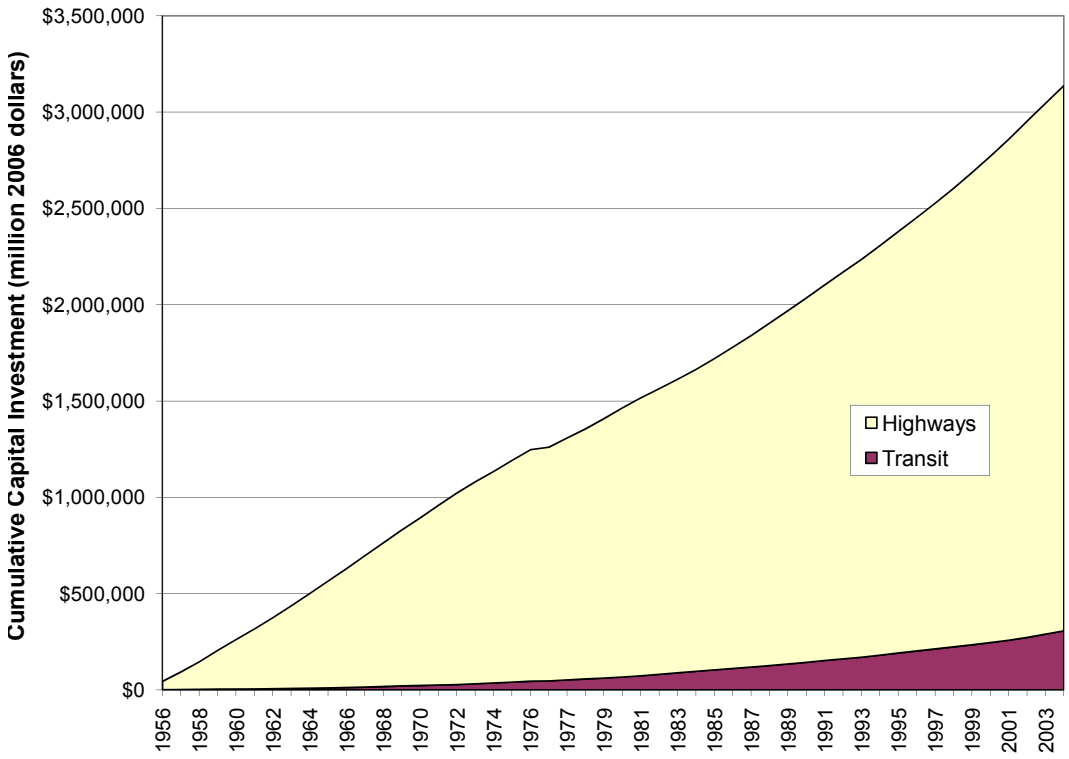
By contrast, government played an early and active role in the construction of the nation's highway system and promoting automobile travel. Indeed, the construction and maintenance of highways has largely been seen as a government enterprise since the beginning of the 20th century. In addition to state and local capital investment in highway improvements, the federal government has played a substantial role in building highways since the 1910s.

By the middle of the 20th century, federal and state governments were investing massive amounts of capital in the construction of new highways, including the Interstate highway system. The Interstate system was built using a 90:10 federal-to-state match. In other words, for every 10 cents state governments invested in Interstate highways, 90 cents was invested by the federal government.

Transit, on the other hand, did not benefit from such state or federal largesse. Until the early 1960s (with a brief exception during the Great Depression) the federal government provided *no* capital or operating assistance to transit systems. And it wasn't until the early 1970s that transit received substantial capital investment from the federal government.

The result was a capital investment "hole" from which transit is still trying

Figure 8. Cumulative Government Capital Investment in Transit and Highways Since 1956 (2006 dollars)[86]



to emerge. Figure 8 shows the cumulative local, state and federal capital investment in highways and transit from 1956 to the present. Between 1956 and 1968, governments at all levels invested 40 times more capital funds in highways than they did in transit service. And, while investment in transit has begun to catch up, highways have still received over nine times more cumulative investment since 1956.[85]

It was not until the enactment of the Intermodal Surface Transportation Efficiency Act (ISTEA) in 1991 that states were given the flexibility to use highway funds for transit projects—no matter how beneficial earlier transit projects might have been in reducing congestion on highways. Since the early 1990s, federal investment in transit has increased substantially, doubling (in nominal terms) between 1985 and 2005 to approximately $7 billion per year.[87]

The federal government has invested nine times more in highways than in transit since the late 1950s. State governments currently spend 13 times more on highways than on transit.

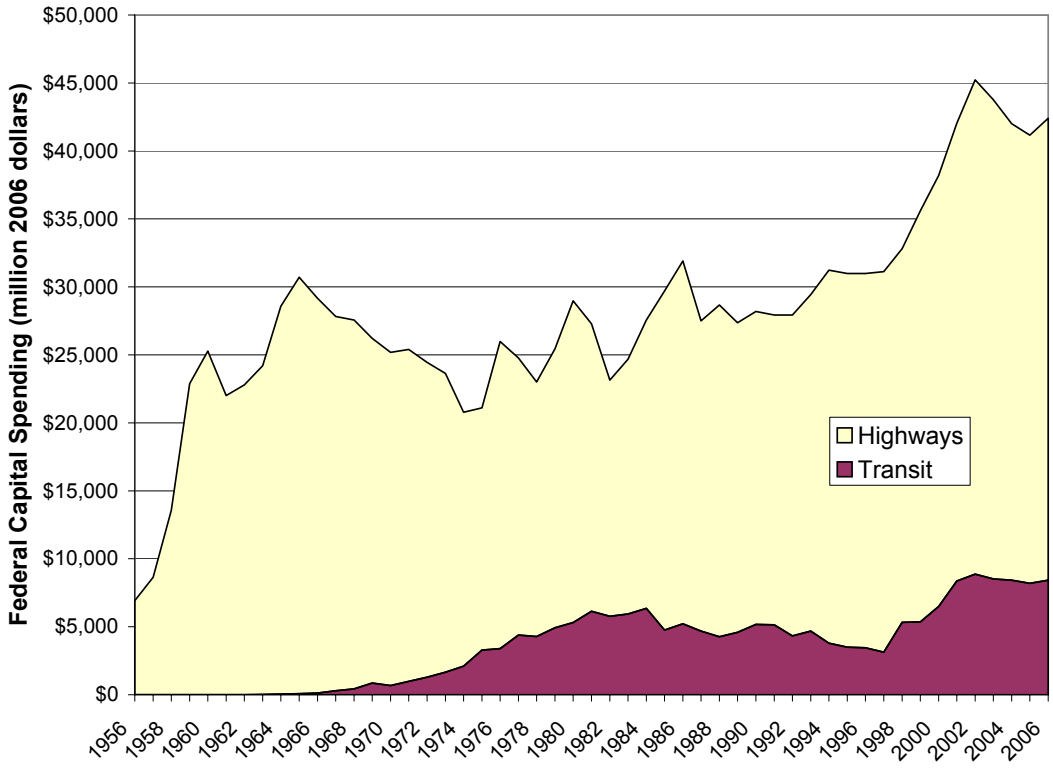
However, the recent renewed federal investment in transit still pales in comparison with the annual $33 billion federal investment in highways.[88] And it has not been enough to compensate for decades of underinvestment in transit.

The differential in direct government capital investment between highways and transit is only the tip of the iceberg when comparing the difference in capital investment between these modes in the United States over the last half century. Government investment in highways has leveraged even greater capital expenses by businesses and individuals. Businesses —motivated either by the desire to attract customers and workers or by legal requirements—have invested hundreds of billions of dollars to provide parking for vehicles. And while the figures cited above for transit capital investments include the cost of transit vehicles, they do not include the trillions of dollars Americans have invested in the purchase and upkeep of private cars and trucks.

Funding Transit Today: Federal and State Efforts Fall Short

The federal government provides significantly more resources for transit than it did a few decades ago, and some states have followed suit by making substantial investments in transit. But transit projects still face a more difficult path to funding—at both the federal and the state level—than projects to expand highway capacity.

Figure 9. Annual Federal Capital Investment in Highways and Transit



Federal Funding: Smooth Sailing for Highways, High Hurdles for Transit

The federal government funds transit and highway expansion projects in very different ways. The result is a bias in federal policy that makes it harder for cities and states to move forward with transit projects than to move forward with proposals for new or expanded highways.

Federal highway funds are allocated to states based on funding formulas. Once a state has received funding, it may spend the money on whatever projects it chooses, so long as they meet federal environmental and engineering guidelines and planning requirements. In other words, if a state decides to build a highway and use federal money to do so, it can go ahead with the project with (virtually) no questions asked from federal officials. Highway projects receive an 80-20 federal to state match, with 80 cents of every dollar spent on a project paid for by the federal government.

The federal government handles proposals for new transit projects very differently. States and transit agencies do receive some formula funding, but the amount of funding is typically not large enough to finance the construction of entirely new or expanded transit systems.[89] The primary source of funding for new "fixed guideway" (rail or bus rapid transit) transit projects is known as the New Starts program. New Starts is a "discretionary" program—in other words, the Federal Transit Administration, not states, has final discretion over which projects receive funds.

To receive New Starts funding, transit projects must go through a rigorous process in competition with proposed projects from around the country. New transit projects must progress through a regional review of alternatives, develop preliminary engineering plans, and meet FTA's approval for final design before approval is given and the project is recommended for a multi-year funding grant agreement.[90] In addition to considering environmental impacts, New Starts proposals must be reviewed on the basis of their impacts on employment, operating efficiency, cost effectiveness, land-use impact, and level of local funding commitment.[91] By contrast, proposals for new or expanded highways do not need to justify themselves on the grounds of economic impact, efficiency, cost-effectiveness or land-use impacts.

The New Starts program gives preference to transit projects that have a higher local funding share, meaning that the projects rarely receive the 80-20 federal-to-state match received by highway projects.

Another severe disincentive for transit is the difference in the federal "match" for highway and transit projects. In theory, both types of projects are supposed to receive an 80-20 federal-state match. In practice, however, the New Starts program gives preference to new transit projects that have a much higher local funding share—forcing state and local governments to scramble for sources of local funding in the hopes of receiving federal support. In 2002, Congress went so far as to instruct the FTA not to sign any new grant agreements that have a maximum federal share of higher than 60 percent.[92] All of the projects currently in the New Starts "pipeline" have a federal share of 61 percent or less.[93]

The difficulty of the New Starts process, coupled with the requirement for a larger local financial match, have caused backers of some transit projects to eschew the program—and the promise of federal funding—entirely. A 2007 survey of transit project sponsors conducted by the Government Accountability Office (GAO) concluded that many sponsors found the New Starts process "complex, time-consuming and costly." Two-thirds of project sponsors surveyed said that their most recent transit project was eligible for New Starts, but one-fourth of them decided not to apply to the program.[94]

The tougher road to funding for new transit projects skews transportation decision-making. For state and local officials, pursuing federal funding for worthwhile transit expansion projects means committing to a long and arduous process with no certainty of success and having the ultimate "pay-off" in federal dollars being limited. By contrast, officials pursuing funding for highway projects are guaranteed a generous federal match and need only convince their own local and state officials to invest formula funds in the project. The end result is a process that encourages highway projects over transit.

The challenges of receiving federal funding for new transit projects are replicated at the state level. In many states, there is a strong and continuing bias toward funding highway projects over transit projects.

State Funding: The Missing Link

While the federal government has begun to gradually increase its investment in transit, many states remain primarily (and in some cases, nearly exclusively) focused on building highways to serve transportation needs. Given existing rules, this may make sense as a way to maximize a state's federal transportation dollars; but it makes no sense for meeting long-term transportation needs.

In 2005, states spent more than $100 billion on highways and highway-related expenditures.[95] Yet, they spent only approximately $7.8 billion on transit capital and operating expenses in 2004—a highway-to-transit ratio of more than 13-to-1.[96] Of the 50 states, 12 spent less than $1 million each in 2004 on transit operating and capital assistance.[97] (See Figure 10.) In other words, more than one-fifth of states make only token investments or no investments at all in providing transit service.

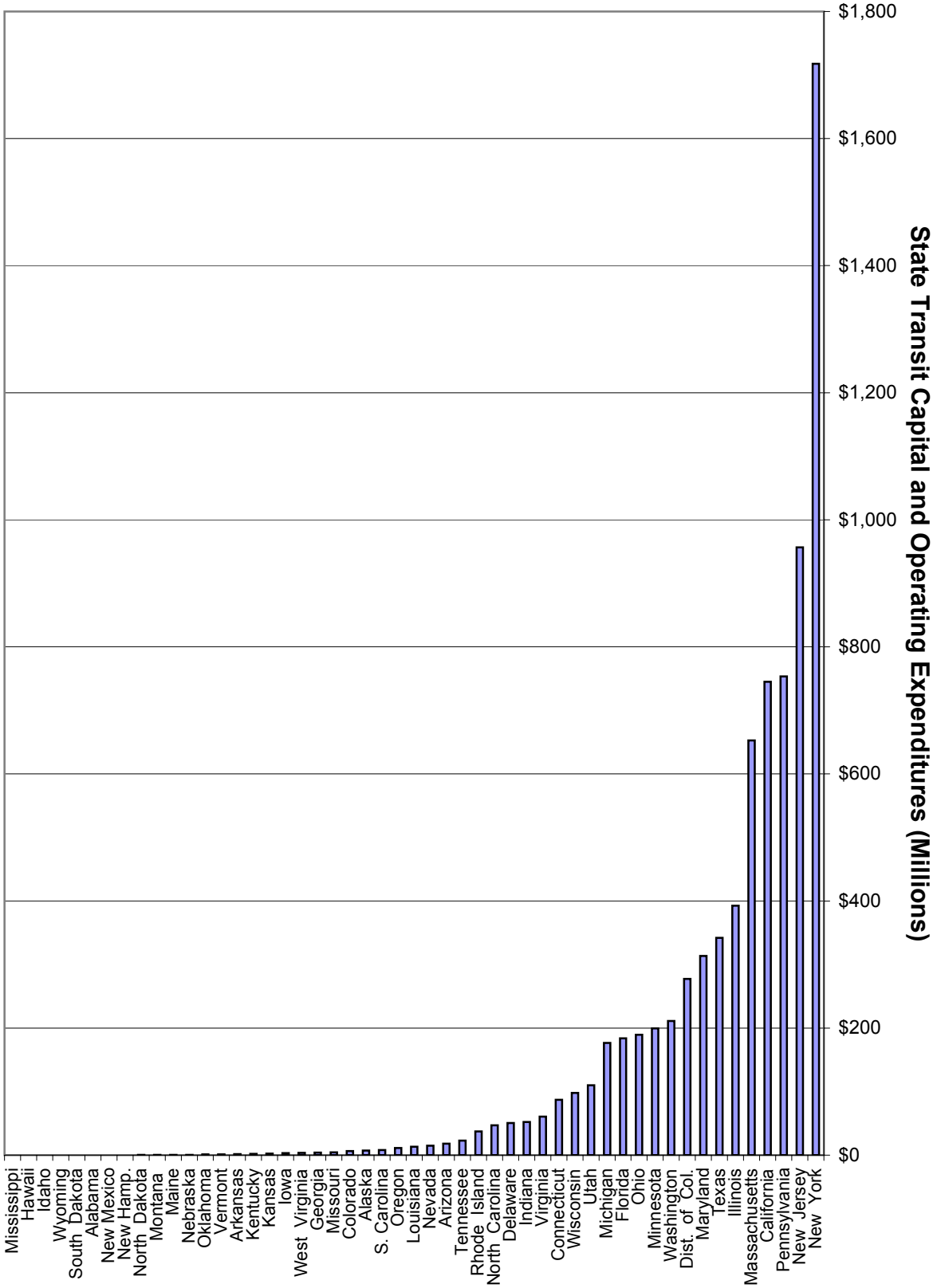
The mechanisms for financing roads and transit are vastly different in many states. Some states have constitutional or statutory provisions that prohibit the use of fuel tax revenue for anything other than roads and bridges. In other words, highway projects have a built-in source of funding that is sometimes augmented with money from state general funds. On the other hand, transit projects are often forced to fight with other projects for a meager share of a state's general funds.

States that limit fuel tax revenues to road and bridge projects do the public a disservice. First, fuel taxes should be high enough to net revenue for a state's general fund, on the theory that driving imposes large negative impacts on society as a whole—for example, through air pollution, noise, and congestion—and drivers should compensate non-driving taxpayers for those losses. Instead, as discussed above (see "Transit vs. Highway 'Subsidies,'" page 36), non-driving taxpayers currently subsidize drivers through the diversion of general funds to highway purposes.

Second, transit projects have distinct benefits for highway users—reducing traffic congestion and reducing the need for costly highway improvements.

Some states and localities have compensated for a lack of statewide funding

Figure 10. State Operating and Capital Expenditures for Transit, 2004[98]



Between 2000 and 2005, voters in 33 states approved approximately 70 percent of proposed transportation referendums. But transit projects too often are forced rely on heavy local funding to compensate or a lack of state and federal investment.

by creating local funding mechanisms, such as local-option taxes in counties served by transit agencies or funding from general local revenues. Local governments fund transit primarily through general revenue and sales taxes.[99] Local residents are often enthusiastic about transit service and willing to spend local funds, even if it requires an increase in taxes. Between 2000 and 2005, voters in 33 states approved approximately 70 percent of proposed transportation referendums.[100]

But the reliance on local funding, while important for keeping existing transit systems running and expanding those systems, is also a symptom of state officials' frequent failure to provide adequate funding for transit. Because transit service delivers oil savings, global warming emission reductions and other values that benefit all state residents—whether they are urban, suburban or rural dwellers—all state residents should pay for at least some share of the cost of operating transit systems.

While most states do a poor to fair job of providing adequate funding for transit, a few states do better. These states, by and large, have dedicated funding sources that provide a reliable stream of revenue

The Proper Role of Transit Users in Financing Transit

The use of fuel tax revenue to support road construction and maintenance has long been justified on the basis that it is a "user fee." Some economists and highway advocates argue that the same principle should be applied to transit – that is, that transit users should pay most, if not all, of the expense to operate and maintain transit systems.

The "user fee" concept, however, is a limited and inappropriate way to think about transportation finance. A better way to allocate the costs of transportation systems is to allocate costs based on who benefits from a given investment.

Highway users, for example, pay most (though hardly all) of the costs of operating and maintaining highways. They do not, however, currently pay for the costs of other public resources they consume – for example, clean air. It is perfectly justified to require drivers to pay for their use of these public resources.

On the other hand, transit systems provide benefits to a much wider slice of society than those who ride the train or bus. Moreover, society may decide that transit investments serve social objectives – for example, mobility for the transportation disadvantaged and economic development aims – that justify a net investment of public funds.

for transit, either via a share of fuel tax revenues, a share of motor vehicle fees, a dedicated tax (such as a portion of a state sales tax), revenues from highway tolls, or other dedicated revenues. Across the nation, sales taxes, general revenue and "other funds" each account for between 25 and 33 percent of state transit funds, with fuel taxes accounting for less than 10 percent.[101]

Booming Demand for Transit: Will America Miss the Opportunity?

Transit has the potential to benefit a wide range of communities. Cities that have taken the plunge and built new transit lines over the last several decades are enjoying the benefits of reduced oil consumption, reduced congestion levels, and rejuvenated urban areas.

It is no surprise, then, that dozens of American communities are planning to expand and modernize their transit infrastructure. The recent GAO survey of transit project sponsors found that the sponsors had more than 140 projects eligible for funding under the New Starts program and planned to seek federal funding for three-fourths of those projects.[102] And as noted above, in recent years, voters have approved more than two-thirds of proposed transportation referendums, in many cases voting to increase or extend local-option taxes specifically devoted to transit programs.[103]

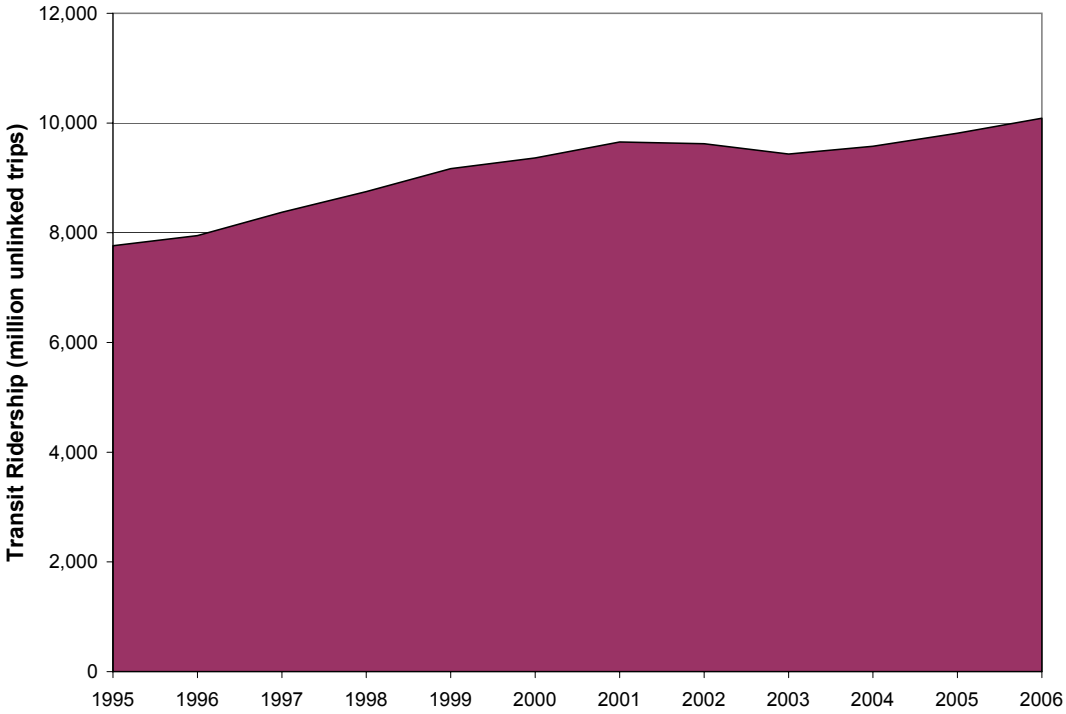
The rising cost of owning and operating a vehicle, coupled with increasing congestion, has driven many Americans to desire new transportation choices. According to one recent poll, 75 percent of those surveyed believed that improving public transit and building communities that require less driving are the best solutions for reducing traffic, while only 21 percent—one in five—believed that building new roads was the best solution.[104]

75 percent of Americans believe that improving public transit and building communities that require less driving are the best solutions for reducing traffic. Only 21 percent believe that building new roads is the best solution.

Americans' desire for better transportation alternatives isn't just reflected in their decisions at the ballot box, or their responses to opinion surveys, but in their

In recent years, several cities have added downtown trolleys and streetcars—like this one in Portland, Oregon—which enable riders to get around town quickly and inexpensively and bring new life to urban centers. Credit: Cosmonaut Creative Media, istockphoto.com

Figure 11. Transit Ridership Trends, 1995-2006[108]



actual traveling behavior. Between 1995 and 2006, the number of trips taken on transit increased by 30 percent—a rate faster than the growth of automobile travel over the same period.[105] Through the first three quarters of 2007, transit ridership had increased by another 1.75 percent nationwide.[106] In 2006, transit ridership surged beyond the 10 billion trip mark—the highest transit ridership since 1957.[107]

Even more Americans would take transit if they had access to it. In a recent poll, 53 percent of respondents—including 47 percent of solo car commuters—said that they would take mass transit if it were easily available where they live and work.[109]

Other demographic, economic and cultural factors are also driving increased demand for transit. The retirement of the "Baby Boom" generation will lead to a surge in the number of older Americans, with one in five Americans projected to be 65 years old or older by 2030.[110] Transit plays an important role in the lives of many older Americans, providing mobility to those who cannot or should not drive. Demand for transit services among older Americans can only be expected to increase as the nation's population continues to age.

At the same time, younger Americans are also driving demand for transit through changes in consumer preferences. Many younger Americans, for example, are coming to prefer the variety and convenience of living in compact, mixed-use urban and suburban neighborhoods. Cities across the country have seen an explosion of urban condominium and loft-style developments to address pent-up demand. In 2003, for the first time in American history, the cost per

square foot of attached housing exceeded that of detached single-family homes.[111]

Rising demand for transit is leading many cities and transit agencies to consider expansion of existing transit networks. Figure 12 below shows some of the American cities that are considering or proposing new or expanded light rail or commuter rail systems, according to the American Public Transportation Association. This does not include cities that have proposed bus rapid transit or other transit systems.

America's transportation system faces dramatic challenges—the need to deal with rising congestion, continued dependence on oil, and the urgent need to reduce global warming pollution among them. Transit has shown that it can help the United States address each of these challenges. The American people are demanding more transportation alternatives and are enthusiastic about the prospect of transit to make a positive contribution.

In short, all the elements are in place for America to move toward a new transportation future that is cleaner, safer, more secure and friendlier to the environment and our communities. All the elements, that is, except for the political will and the financial commitment.

Figure 12. Cities Considering New or Expanded Commuter Rail or Light Rail Systems (partial list)[112]

A 21st Century Vision for Transit in the United States

Every American—from city dwellers to those living in rural areas—has a stake in reducing America's dependence on oil, our contribution to global warming, and the traffic on our roads. The politics of transportation funding in America have historically pigeonholed transit as an urban concern—something for metropolitan areas to finance out of local tax revenues or as a bargaining chip to gain the support of urban lawmakers for increased state or federal highway funding.

To address the serious challenges facing our transportation system, the politics of transportation funding must change. States and the federal government must recognize that the nation's transportation future does not lie in ever-expanding highway networks, but in a robust, varied and flexible transportation system in which clean, efficient transit plays an increasingly important role.

The following is a vision for what a new transportation future for America might look like … and what it will take to get there.

A Bold, National Agenda

In the mid-1950s, the federal government took a bold step in shaping America's future by committing to build the Interstate highway system. American taxpayers spent $400 billion to make that vision a reality.

The Interstate highway system is now completed. A similar long-term national vision is needed for transit in the United States, accompanied by a similar commitment of public resources. The following should be part of that commitment:

Build or Expand Rapid Transit Networks in All Major American Cities

Metropolitan areas are America's economic engines. More than half of all Americans live in a metropolitan area of 1 million people or more.[113] These metropolitan areas also account for approximately one-third of the number of vehicle-miles traveled on American highways annually.[114] Large metropolitan

areas also tend to face the greatest impacts from traffic congestion, making them perfect candidates for expansion of transit service.

Federal and state governments should set a goal of ensuring that every metropolitan area of 1 million or more people has a viable rapid transit network—consisting of subways, light rail, bus rapid transit or other modes, depending on the city—within the next decade. The success of light rail in Salt Lake City, a fast-growing metropolitan area of just over 1 million people, suggests that any city of 1 million or better can make rapid transit work.

Table 10. Top 25 U.S. Metropolitan Areas and Transit Infrastructure

Metropolitan Area	Population	Transit Availability
New York-Northern New Jersey-Long Island, NY-NJ-PA	18,818,536	CR, HR, LR, Bus
Los Angeles-Long Beach-Santa Ana, CA	12,950,129	CR, HR, LR, Bus
Chicago-Naperville-Joliet, IL-IN-WI	9,505,748	CR, HR, Bus
Dallas-Fort Worth-Arlington, TX	6,003,967	CR, LR, Bus
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	5,826,742	CR, HR, LR, Bus
Houston-Sugar Land-Baytown, TX	5,539,949	LR, Bus
Miami-Fort Lauderdale-Miami Beach, FL	5,463,857	CR, HR, Bus
Washington-Arlington-Alexandria, DC-VA-MD-WV	5,290,400	CR, HR, Bus
Atlanta-Sandy Springs-Marietta, GA	5,138,223	HR, Bus
Detroit-Warren-Livonia, MI	4,468,966	Bus
Boston-Cambridge-Quincy, MA-NH	4,455,217	CR, HR, LR, Bus
San Francisco-Oakland-Fremont, CA	4,180,027	CR, HR, LR, Bus
Phoenix-Mesa-Scottsdale, AZ	4,039,182	LR (under const.), Bus
Riverside-San Bernardino-Ontario, CA	4,026,135	CR, Bus
Seattle-Tacoma-Bellevue, WA	3,263,497	CR, LR, Bus
Minneapolis-St. Paul-Bloomington, MN-WI	3,175,041	LR, Bus
San Diego-Carlsbad-San Marcos, CA	2,941,454	CR, LR, Bus
St. Louis, MO-IL	2,796,368	LR, Bus
Tampa-St. Petersburg-Clearwater, FL	2,697,731	LR (heritage trolley),Bus
Baltimore-Towson, MD	2,658,405	CR, HR, LR, Bus
Denver-Aurora, CO	2,408,750	CR (planned), LR, Bus
Pittsburgh, PA	2,370,776	LR, Bus
Portland-Vancouver-Beaverton, OR-WA	2,137,565	CR (under const.), LR, Bus
Cleveland-Elyria-Mentor, OH	2,114,155	HR, LR, Bus
Cincinnati-Middletown, OH-KY-IN	2,104,218	Bus

CR=Commuter Rail; HR=Heavy Rail; LR=Light Rail

The United States is already well on its way to achieving this target. Nine of America's 10 largest metropolitan areas have some form of rapid transit (all except Detroit). Of the 50 metropolitan areas with a population of 1 million or more, 28 have some form of rail or bus rapid transit, three more have new rapid transit systems under construction or nearing construction, and several more have proposed transit systems on the drawing board.[115] (See Table 10.)

In addition to building new transit systems in cities that do not have them, the United States should invest in expanding existing systems. Transit system expansions create a whole that is greater than the sum of its parts. The more extensive a metropolitan area's transit network, the more residents can conduct their day's commute and errands without getting into a car; the more households will choose not to purchase a second car; and the more each portion of the transit network will generate riders transferring from other areas in the system.

Expand Transit Options in Small and Medium Sized Cities

Large metropolitan areas may experience the greatest benefits from transit investments, but small and medium-sized cities also gain from the mobility improvements provided by transit service. Cities with large institutions—such as major colleges, medical centers and government offices—have particular potential to use transit to reduce traffic congestion and parking needs. Creation of a signature trolley, light rail, or other transit system can also be a way that cities create an identity for themselves, and thereby draw tourists, investment and skilled workers. Coupling improvements in transit service with transit-oriented development can maximize the potential of transit to provide benefits in smaller cities.

Improve the Quality of the Transit Experience

Americans will choose transit if it is clean, safe, comfortable, convenient, reliable and efficient. Unfortunately, in many parts of America, transit service has few or none of these qualities. But Americans do not need to settle for poor quality transit—indeed, in European countries (and some parts of the United States), transit agencies have found ways to make the transit experience more attractive for travelers.

Some of these improvements can be made at relatively low cost. For example, one of the inherent advantages of transit is that travelers are not occupied with driving—they can safely read, work, chat or carry on other activities. Providing free wireless Internet service on transit vehicles, for example, can provide an inducement for commuters to leave their vehicles at home and take transit instead.

Providing better information to transit riders and making transit easier to use can also lure more riders. Drivers have access to many tools to make travel easier: on-line mapping services like Mapquest; on-demand traffic information via cell phone, Internet or media; and electronic tolling systems such as EZ-Pass that work in multiple states. While many transit agencies have begun to use tools like on-line trip planners and automatic cell phone alerts regarding transit delays, there is little to no coordination across transit agencies.

Federal and state governments should work with transit agencies to provide better and more information to commuters—using on-line mapping, electronic timetables at transit stops, standardized fare cards that can work on multiple transit systems, better coordination of schedules to avoid layovers when switching transit lines, and other tools to make using transit easier and more accessible.

Finally, simple steps can make transit more convenient and comfortable. Low-floor buses, which are being adopted by many agencies, make it easier and faster for passengers to board transit vehicles (especially for the disabled and elderly). Giving transit vehicles traffic signal priority over private vehicles can speed trips. And getting the basics right—on-time service, clean vehicles and friendly operators—is also important to ensure that once riders try transit, they keep coming back.

Serve the Suburbs

Suburban residents are often stuck with few transportation choices. They may live in dispersed communities or work in suburban areas that are poorly served by traditional "hub-and-spokes" transit systems, and where the only form of transit available may be a once- or twice-a-day bus to the central city. With rising gasoline prices and increasing congestion, many suburban residents would welcome additional transportation choices.

Thankfully, there are several ways that transit agencies can effectively serve suburban travelers and weave suburban areas into transit networks.

Ring Lines

Unlike most American transit systems, which are built on a hub-and-spokes model, many transit systems in other parts of the world have a peripheral component or "ring line" that allow travelers to travel around the city center without having to go through it. Using commuter rail or rapid transit service to serve suburban areas can have important benefits, making it easier for suburban residents to reach jobs in outlying areas and reducing crowding and congestion in the central city's transit network, thereby improving the efficiency of transit operations for all customers.

Commuter Rail

Commuter rail lines, as discussed above, provide significant savings in oil consumption and global warming emissions while addressing congestion problems. Every commuter rail service in the United States provides a net savings in oil consumption and all but one deliver net reductions in global warming pollution. Cities with growing suburban populations should consider creation or expansion of commuter rail networks (though such expansion should also be accompanied by the creation of transit-oriented development in suburban communities linked by rail).

Vanpools and Community Shuttles

In some sprawling suburban areas, fixed route transit service will always be difficult to provide. However, there are other options. Vanpool services offered by transit agencies, state agencies, or private-sector companies can link suburban commuters and deliver significant savings in energy consumption and emissions. In some areas, most notably New Jersey, states, towns and transit agencies have

Community shuttles, like this one in Maplewood, New Jersey, can link residents with transit stations and provide an important community service. Credit: NJTransit

teamed up to provide community shuttles that link residents with nearby transit stops during rush hours and can be used for other community needs during the rest of the day. Through the innovative use of small vehicles, transit agencies can ensure that suburban residents are able to reap the benefits of transit.

Serve the Transportation Disadvantaged

America's elderly population is on the rise. Rising oil prices are making transportation even more expensive for low-income families. America and the states should respond to these challenges by continuing and improving transit services that provide mobility to those who cannot or should not drive. Demand response service, while not discussed in this report, provides a critical lifeline to the elderly and disabled. Much the same role is played by many bus services. As America invests in a 21st century transit system, the states and federal government must ensure that the benefits of that investment are shared with all Americans.

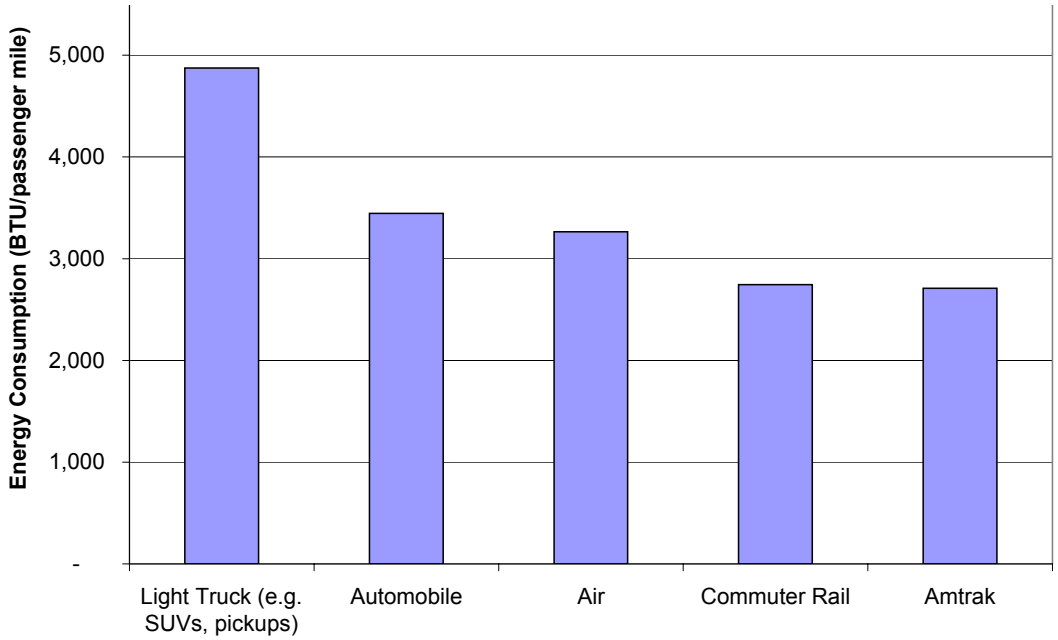
Link Cities via Rail

Just as America's highways are increasingly congested, so are our airports and the skies over America's cities. Air travel is an expensive, energy-intensive and (in global warming terms) highly polluting way to transport people.

There is no convenient substitute for air travel for long-distance flights—from coast to coast, for example, or overseas. But for short-haul flights (those of 500 miles or less), intercity rail travel could provide a more efficient and, in some cases, more convenient, mode of travel.

Europe and Japan have extensive high speed rail networks, where trains regularly travel at 125 miles per hour or faster, with the fastest trains approaching speeds of 200 miles per hour. Spain, for example, is planning to build a rail line that will

Figure 13. Transportation Energy Efficiency (BTU/passenger mile)[116]



High-speed rail provides clean, fast and efficient travel in Europe and Japan. The United States, however, currently has only one high-speed rail line, linking Boston and Washington, D.C. Credit: Remus Eserblom, istockphoto.com

cover the distance between Madrid and Barcelona—a trip of approximately 375 miles—in two-and-a-half hours.[117]

While high-speed trains are not as fast as airplanes, the time required to travel to and from the airport and pass through airport security can make high-speed rail competitive with air travel in terms of travel time over short to medium distances.

The United States currently has only one high-speed rail line—the Amtrak Acela service between Boston and Washington, D.C. Even though the Acela is barely a "high-speed" train by international standards, it has become increasingly popular, with ridership increasing by 20 percent in fiscal year 2007 alone to 3 million passengers.[118] A similar phenomenon occurred when Amtrak electrified its Keystone Corridor route connecting Harrisburg, Pennsylvania, Philadelphia and New York. The boost in travel speeds led to a dramatic increase in ridership, with a 20 percent year-over-year increase.[119]

Ridership on Amtrak's high-speed Acela service increased by 20 percent in 2007 to 3 million passengers.

The examples of the Acela and the Keystone Corridor suggest that when high-speed rail options are made available, Americans will use them. There are many other corridors in the United States in which high-speed rail could prove successful. In the early 1990s, the federal government began to identify corridors for the development of high-speed rail. Thus far 11 high-speed rail corridors have been identified from coast-to-coast that would link many of the nation's largest metropolitan areas. Despite action by several states to advance high-speed rail, a lack of federal investment has held back the development of faster rail service.

In addition to a long-term commitment to high-speed rail, federal and

state governments should take steps to improve the quality of rail service in the near term—for example, by expanding rail capacity and improving rail operations (thereby reducing conflicts between passenger and freight rail) and by restoring regional rail links in areas that have lost train service over the last several decades.

Over the next decades every major intercity corridor in the nation of 500 miles or less should be connected with high speed rail. Doing so will not only produce large oil savings and avert global warming pollution; it will also avoid the need for expensive expansions of airports.

Keep Fares Affordable

Building new, modern transit infrastructure will not address America's most important challenges if people do not ride it. Improving the quality of transit service is one way to attract riders, but it is also important to keep fares affordable. Research suggests, for example, that a 10 percent increase in bus fares leads to a 4 percent reduction in ridership.[120] Fare hikes can lead to a downward spiral in which ridership decreases, causing a reduction in revenue for a transit agency, which causes another round of fare hikes, triggering additional ridership reductions.

In some cases, transit agencies should seek to reduce fares or eliminate them altogether. Lower fares during off-peak periods can attract riders at times when transit systems are not used to their full capacity. Many transit agencies have used partnerships with universities and other large institutions to provide free or discounted fares to students or employees. In a few cases, transit agencies have been able to eliminate fares entirely. (See "Free Fares and the Benefits of Transit in Small Town New England," next page.)

Maintaining affordable fares can both attract new riders to transit and ensure that transit fulfills its historic role of providing basic mobility to all segments of the population.

Set Goals and Hold Transportation Agencies Accountable

If Americans are to invest in a 21st century transportation system, they deserve to know if they are getting their money's worth. All levels of government, along with transit agencies, should set measurable goals for what they hope to achieve from new transportation system investments, including goals related to energy savings, global warming pollution reductions, and long-term costs. Transportation investments should be compared according to these criteria, so that the public can effectively evaluate the transportation choices facing a given state or metropolitan area.

Transit agencies should also provide detailed, up-to-date information on transit service indicators such as on-time performance and ridership, with comparisons to established benchmarks and goals. Transit performance information should be available to the public via the Internet, thereby giving transit users and public officials the ability to gauge the effectiveness of transit service and advocate for changes that improve performance.

Couple Transit Investments with Appropriate Land-Use Planning

Transit investments have the potential to catalyze forms of development that are less dependent on automobiles. However, that potential can only be realized if transit investments are paired with smart land-use planning that encourages compact, mixed-use neighborhoods oriented toward the use of transit.

America knows how to build these types of communities; we have been building them for hundreds of years.

Free Fares and the Benefits of Transit in Small Town New England

The Upper Connecticut Valley region of New Hampshire and Vermont, centered on the town of Lebanon, NH, is one of many small urban and rural areas with transit service. However, the local transit agency, Advance Transit, is unusual.[121] Thanks to partnerships with Dartmouth University, Dartmouth-Hitchcock Medical Center and local towns, Advance Transit provides fare-free transit service throughout its service area. Partly as a result, Advance Transit has experienced massive growth in ridership; the number of trips taken in 2005 was two-and-a-half times greater than the number taken a decade earlier.[122] Despite a population of only 45,000 in the six towns served by the agency, Advance Transit accounted for 1.5 million passenger-miles of travel in 2004.[123]

Providing multiple fixed bus routes and free fares costs money. Advance Transit's fixed-route bus service had a $1.4 million budget in 2005. But the benefits of the service exceed the costs.

A 2005 study by the Upper Valley Transportation Management Association estimated that Advance Transit provided the following economic benefits to the region:

- An estimated $1.2 million paid in wages to workers who depended on the bus for transportation to and from work.
- Approximately $375,000 in avoided transportation expenses for private vehicle owners who took the bus instead.
- At least $16,000 per year in avoided need for new parking spaces.
- At least $170,000 in avoided taxi trips.
- Additional, unquantified benefits for quality-of-life improvements, avoided local traffic congestion, avoided pollution, and land-use impacts.[124]

By building partnerships with major local institutions and experimenting with free fares, Advance Transit has made transit an important part of community life in small-town New England, showing both the potential benefits of transit in rural areas and the importance of affordable fares in attracting ridership.

But zoning regulations that require large minimum lot sizes, segregation of uses and large parking lots encourage sprawling development that is dependent on automobiles—even if there happens to be a transit stop in the neighborhood. Indeed, in large parts of the country, traditional, mixed-use neighborhoods are virtually illegal.

The past decade has seen a re-emergence of interest in traditional neighborhood development, often called "new

Transit-oriented developments, such as this one in Sacramento, California, make it easier for people to get around by car, on foot, or via transit. Credit: Caltrans

urbanist" development. Many Americans are looking for an alternative to sprawl and automobile dependence. Governments and transit agencies should work together to maximize transit's potential as a catalyst of sustainable development patterns by integrating land-use planning with the design of new transit infrastructure.

Promote Other Transportation Alternatives

Transit is not the only ingredient in a new transportation future for America. Other

Transit and Land-Use Planning in Portland, Oregon

In recent years, the Portland, Oregon, metropolitan area has made a consistent and concerted effort to encourage compact land-use planning and to expand transit infrastructure. The Portland region has had an urban growth boundary since 1980 that has limited suburban sprawl. The city's transit agency, TriMet, has built an extensive light rail network with four lines since the mid-1980s.[125] Portland has also encouraged bicycling, earning recognition as one of the most bicycle-friendly cities in the United States.

Portland's efforts are beginning to reap rewards. For example:

- Transit ridership increased by 41 percent between fiscal year 1998 and fiscal year 2007. Light rail ridership more than tripled over this time period, while bus ridership gained slightly.[126]
- The number of bicycle trips taken over the city's major bridges more than doubled between 2000 and 2006, to more than 14,000 trips per day.[127] Bicycle use in downtown Portland has increased by more than 150 percent since 2000-2001.[128] A total of 6 percent of Portland residents now commute to work by bike, twice as many as a decade ago. [129]
- Per-capita vehicle-miles traveled has declined 6.5 percent from its 1996 peak in the city of Portland and by 7.5 percent in the broader Portland-Vancouver, WA, urbanized area—at the same time that per-capita vehicle travel was rising nationwide.[130] The percentage of Portland residents driving to work alone is the same as it was a decade ago.[131]

Portland's efforts to accommodate rapid population growth with land-use planning, transit investments, and the expansion of bicycle lanes are working, and can serve as a model for other American cities.

transportation alternatives—including bicycling, walking, telecommuting and carpooling—can play an important role in reducing our dependence on single-passenger automobile travel.

Cities such as Portland, Oregon (See "Transit and Land-Use Planning in Portland, Oregon," previous page), Copenhagen and Amsterdam have used public policy tools to carve out areas for bicyclists in congested urban centers, and experienced great success in shifting a large number of trips to bicycling. Walking and cycling account for one-third of all urban trips in Germany and half in the Netherlands, compared to less than a tenth in the United States.[132] Transit investments can encourage bicycling by providing bike racks on buses, bike lockers at transit stations, and easy connections with bike paths and bike lanes.

Telecommuting and carpooling are also tools that can reduce single-passenger commutes. Employers should be required to offer incentives to their employees designed to decrease the number of single-passenger commuters and increase the number of workers using transportation alternatives.

Getting There: Achieving a New Transportation Future

Building a modern, efficient transit system for the 21st century isn't going to happen overnight and it is not going to be easy. It will take vision, resources, public support and political will. To get there, transit advocates must create a vision of transit as a national priority, present a roadmap for future transit expansion to the American people, and identify the resources it will take to make that vision a reality.

The Vision: Transit as a National Priority

Transit has long been seen as primarily a local issue—something of concern to city-dwellers and some suburbanites. In many states—even some with robust transit systems—there is still little or no investment of state government resources in transit systems. And at the federal level, transit advocates have often felt compelled to accept greater spending on highways as a means to achieve greater investment in transit.

The consequences of our automobile-centered transportation system, however, are national in scope. Traffic congestion, oil dependence and global warming pollution are issues that affect all Americans and deserve a national response.

A wide variety of constituencies have a potential interest in expanding transit infrastructure in the United States. This "grand coalition" potentially includes the following:

- Metropolitan area residents, who represent more than 80 percent of the American population and who would benefit most directly from reduced congestion and the ability to use transit.[133]

- Businesses—both those located in metropolitan areas that would benefit from their employees' and customers' access to transit and those that rely on the shipment of goods and would benefit from reduced highway congestion.

- Property owners in corridors to be served by transit, who would likely see property values increase.

- Construction firms and organized labor, which would benefit from the jobs created in transit system construction, operations and maintenance.

- Environmentalists, who would support reductions in global warming emissions and other forms of pollution.

- Low-income, elderly and disabled people, who would benefit from an increased range of transportation choices. The elderly could represent an especially important constituency, as the population of Americans ages 65 and older is projected to increase by 20 million between 2000 and 2020.[134]

- Individuals concerned with national security, who would support reductions in America's dependence on foreign oil.

As long as the transit debate is about one transit line or one city at a time, there will be little hope of mobilizing a wide range of interests behind a major commitment to transit. To generate excitement and widespread support, there must be a compelling vision for what an expansion of transit service would look like and how it would benefit the United States—in short, a national roadmap for transit.

The Plan: A Roadmap for Transit

The signal success of highway advocates in the early 20th century was to create a compelling vision of an automobile dominated future and a roadmap for getting there. Visions such as those put forward by General Motors in its "Futurama" exhibit at the 1939 World's Fair created an appealing vision for America's future with automobiles at the center of that vision. Beginning in earnest in the 1940s, federal officials laid out detailed plans for what would become the Interstate highway system, specifying the routes for the new highways.

As a result, when Congress voted to build the Interstate highway system in 1956, it was voting on a specific map of highway projects. And Americans had a clear vision of the promise held by the automobile age and knew exactly what their federal tax dollars were paying for.

Advocates for a 21st century transit system can learn from that experience, both by detailing a vision of how a new transportation future will improve life in America and by laying out specific, detailed plans for what a 21st century transit system would look like.

Transit advocates have recently learned the importance of placing specific transit proposals on the table for public consideration. In the Denver-area, for example, a major transit investment proposal was defeated on the ballot in 1997. In 1999, Denver-area voters approved construction of a single light-rail line in the city's southeast section. In 2004, transit advocates tried again to win approval for construction of a large light-rail system in the city. This time, however, they proposed a specific map of projects to link all parts of the metropolitan area. The result was that 57 percent of Denver-area voters approved the new transit plan and the tax revenue to pay for it.[135]

A specific "roadmap" for transit may be more difficult to complete than the map of the Interstate highway system. But, at minimum, state and federal policymakers should lay out a set of principles covering an expansion of transit service nationwide. Those principles could include the construction of rapid transit networks in all large cities, the linking of cities by efficient (and in many cases, high-speed) rail service, improvements in transit service quality for all riders, and more.

With a compelling vision for how transit will improve America—backed up by a set of specific proposed investments—transit advocates can then confidently ask the American people to

provide the resources needed to achieve that vision.

The Resources: Paying for a New Transportation Future

Building a 21st century transportation system in the United States is going to require investment—billions of dollars of it. At a time when transportation trust funds at the federal and state level are facing increasing strain—and in which vast investments are needed to maintain and reconstruct the bridges and highways built during the mid-20th century—it may seem impossible to raise the revenues needed to build new transportation infrastructure.

However, those obstacles, while real, do not have to stand in the way of a 21st century transportation system—as long as the nation makes two important commitments.

Shift Transportation Investments from New Highways to Transit

In the 20th century, the United States invested hundreds of billions of dollars in a massive network of highways, with the Interstate highway system as the centerpiece. The Interstate highway system is now completed. And we simply do not need, and cannot afford—either financially, environmentally, or in terms of energy security—to continue to make massive investments in new highway infrastructure.

The time has come for the United States to prioritize the modes of transit that were neglected during the highway building boom of the mid- to late 20th century—transit, inter-city rail, bicycling and walking, among others. State and federal leaders should shift their priorities for new transportation infrastructure investment away from highways and toward clean transportation alternatives.

In the case of federal policy, the reauthorization of the six-year federal transportation bill, which expires at the end of 2009, creates an opportunity for this realignment of priorities. The funding formula for highway and transit projects should be shifted so that transit projects account for a larger share of the transportation funding "pie." At the same time, highway investments should be targeted toward the repair and replacement of existing infrastructure—a "fix it first" policy—before financing new highway expansion projects. Congress should ensure that new transportation projects—both highways and transit projects—be scrutinized according to the same criteria. Those criteria must include an assessment of a project's impacts on energy dependence, global warming pollution, and land-use development patterns.

States, meanwhile, must realize that transit systems bring broad benefits—not just to residents of communities with transit service, but to all the residents of a given state. Transit investments are therefore worthy of support by all state taxpayers and deserve significant and stable investments of state funds. States with anachronistic prohibitions on the use of fuel tax revenues for transit projects should remove those prohibitions or, if that is impossible, develop other dedicated funding sources for transit.

Finally, it should be noted that while transportation projects have always represented a partnership among federal, state and local governments, the federal government has long used its funding policies to leverage policy or investment choices by the states. For example, by agreeing to fund 80 percent of the capital cost of new highways, but only 50-60 percent of the capital cost of new transit builds, the federal government has sent a strong (if unintended) message that states looking to address pressing transporta-

tion needs should consider highways first. Any new federal transportation program should eliminate these inequities and put a "thumb on the scale" that encourages states to consider transit projects and other transportation alternatives as a primary means to address transportation problems.

Transit Expansion Should be Paid for by* All *Those Who Benefit

Transit critics frequently complain that transit riders do not pay the full cost of transit service. As discussed earlier, highway users also do not pay for the full cost of highways. But in either case, the notion that "user fees" should pay for 100 percent of the cost of transportation investments is an outmoded way of thinking about transportation finance.

Transportation investments have a wide range of impacts on the rest of society—benefiting some sectors of society and harming others. Transportation investments would ideally be paid for by those who *benefit* from those investments, whether they are users of the service or not.

Transit investments provide a wealth of benefits to a broad segment of the American people. In funding the construction of a 21st century transportation system, policy-makers should develop a portfolio of funding sources that recapture some of those benefits. Such funding sources could include:

- Drivers, who benefit from reduced congestion and can be asked to help pay for transit investments through fuel tax revenues, other automobile user fees, revenues from congestion pricing, or tolls.

- All taxpayers, who benefit from transit in terms of reduced pollution, enhanced energy independence, and enhanced economic opportunity, and can contribute through general state or federal revenue or through revenues from cap-and-trade programs designed to reduce global warming pollution.

- Metropolitan area residents, who are most likely to use transit and to benefit from transit investments on a personal or community level, and who can contribute through local-option or property taxes.

- Property owners in areas to be served by transit lines, who could share some of the benefits of increased property values through "tax-increment financing," in which a share of the increased property taxes generated from proximity to a transit line are used to help finance the service. However, tax-increment financing schemes must be well-designed to ensure proper funding for general public services.[136]

- Businesses, who will benefit from increased access to employees and customers, and who could be asked to provide incentives for the use of transit (thereby increasing ridership) or by investing in transit infrastructure at their facilities.

Funding transit through a portfolio of dedicated funding sources can ensure that the costs of transit service are spread fairly among those who benefit from it, and provide stable, continuous funding for transit system expansion and operation.

Conclusion

Rail, bus and other forms of transit benefit the American people in many ways—reducing our impact on the

global climate, saving oil, curbing congestion and improving mobility and the quality of life in our communities. Investing in transit yields large returns for the United States, and Americans are demanding more and better transit service—both as an alternative to commuting and as a catalyst for more efficient forms of development.

The time has come for a dramatic shift in America's transportation priorities away from further investments in expanded highway infrastructure and toward investments in clean, efficient modes of transportation, with transit at the core.

Appendix A: Technical Discussion and Methodology

The analysis in this report focuses on two important benefits of transit: oil savings and reductions in global warming pollution. The Texas Transportation Institute recently estimated a third set of important benefits attributable to transit: those tied to congestion relief.

The energy and global warming benefits analysis is based on 2006 data collected by the Federal Transit Administration from 503 transit systems nationwide. In order to arrive at our estimates of benefits, we first had to answer two important questions. First, what is transit? And second, what would energy use and global warming emissions be like if today's transit services did not exist?

Defining "Transit"

Public transit can be defined as any publicly operated transportation system (or any system that is privately operated under contract to a government entity). For the purposes of this report, we have chosen a narrower definition of transit as being transportation service that:

- Is primarily intended to transport more than one rider at a time.
- Is operated by a government agency or operated privately under contract to a public agency.
- Uses vehicles not owned by the users.

To be included in this report, a transit service also had to meet a fourth criterion: it must collect or report enough data to allow for evaluation of energy consumption from transit operations. This meant that the transit service had to have data available through the National Transit Database (NTD).

As a result, our analysis includes the following transit services:

- Bus, subway, light rail, streetcar and commuter rail services reporting to the NTD.
- Government-coordinated or government-subsidized vanpool services reporting to the NTD.

We exclude the following:

- Transit services that do not report to the NTD (generally those operated by small transit providers in rural areas).
- Privately operated intercity bus services (such as Greyhound or Trailways), except in rare cases when those services report to the NTD.
- Privately operated vanpool services (except when they report to the NTD).
- Demand response or "paratransit" service, which often transports one or a small number of riders at one time. Demand response is a vital service linking the elderly and disabled to important services. It is not, however, designed to deliver reductions in energy consumption, emissions or congestion and is not evaluated in these terms in this report.
- Carpools arranged through government-operated rideshare matching programs.
- Ferry service, for which accurate comparison with automobile trips is impossible. Ferries generally serve areas that are either inaccessible by car or for which an automobile trip would require a much lengthier trip than the "as the crow flies" distance traveled by the ferry. As a result, any emission comparison for ferry service must be done on a case-by-case basis, which is beyond the scope of this report.

Accounting for the Benefits of Transit

Evaluating the energy savings and global warming pollution reductions delivered by existing transit services requires one to ask several "what if" questions. If transit did not exist, how would transit riders travel instead? How much would highway congestion increase and how would that affect energy consumption and pollutant emissions? What would land-use patterns look like?

Transit saves energy and reduces global warming pollution in several ways.

Direct Replacement of Vehicle Trips

First, and most obviously, transit replaces trips that would otherwise be taken in automobiles. Were transit service to cease, not every trip would be replaced by an automobile trip—some trips might be taken on foot, while others might not be taken at all.[137] For the sake of this analysis, however, we assume that trips not taken via transit would be made via some other vehicle.[138]

In this analysis, we assume that each passenger-mile traveled via transit replaces 0.676 miles of travel in an automobile. This reflects an estimated average vehicle occupancy for replaced vehicle trips of 1.479 passengers per vehicle, based on Linda Bailey, ICF International, *Public Transportation and Petroleum Savings in the U.S.: Reducing Dependence on Oil*, January 2007.

To estimate gasoline consumption for vehicle travel replaced by transit, we relied on data for overall and city on-road vehicle fuel economy from U.S. Environmental Protection Agency, *Light-Duty Automotive Vehicle Technology and Fuel Economy Trends: 1975 to 2007*, September 2007, using data for model year 2006 vehicles (20.2 miles per gallon average,

17.1 mpg city) as a proxy for the entire vehicle fleet. For urbanized areas included in TTI's *Urban Mobility Report*, we assumed that vehicles that would travel during congested periods would achieve the lower "city" fuel economy value. To calculate the amount of travel that would have occurred during congested periods, we multiplied TTI's estimate of the percentage of congested vehicle-miles of travel during peak periods by the 60 percent of transit trips that took place during peak periods.[139] The result was an urbanized area-specific estimate of the fuel economy of vehicle travel replaced by transit for the 85 metropolitan areas included in TTI's report. For other urbanized areas, we relied on the average 20.2 miles per gallon fuel economy figure from the EPA report.

Finally, we assumed that consumption of one gallon of gasoline produces 19.6 pounds of carbon dioxide.

Reduced Traffic Congestion

Second, transit use reduces traffic congestion on roads, reducing the amount of time that other travelers spend sitting in traffic, idling their engines and wasting fuel. To estimate these benefits, we relied on 2005 data from the TTI, which estimated the amount of gasoline saved by transit through reduced congestion effects in 85 metropolitan areas across the country.[140] We did not include an estimate of energy savings due to reduced congestion in other metropolitan areas.

We allocated gasoline savings (and associated carbon dioxide emission reductions) among transit agencies within an urbanized area based on the agency's share of total passenger-miles traveled on transit within the urbanized area. Transit agencies were assigned to urbanized areas based on the primary areas with which they were associated in the National Transit Database. Because some transit agencies and services cross urbanized area boundaries, this method likely results in some transit agencies receiving too much credit for avoided gasoline consumption and others too little.

Leveraged Vehicle Travel Reductions

Third, the presence of high-quality transit in a community allows for more compact land-use patterns and reduces average vehicle ownership. Research shows that residents of transit-dense communities drive fewer miles each year than residents of more automobile-dependent communities.[141] The reduction in per-capita vehicle travel in transit-dense versus transit-poor communities far exceeds the difference in the amount of miles traveled by transit between the two types of communities.

In other words, the presence of transit service in a community appears to shape households' overall transportation behavior. Communities with transit tend to have more compact land-use patterns, enabling residents to make more trips on foot or by bicycle, rather than by car. They also tend to have fewer vehicles per capita than other communities, reducing the convenience of using a vehicle to complete certain types of trips.

The additional reductions in vehicle travel that are associated with the presence of transit in a community are called "leveraged" reductions. Estimates of the impact of transit on overall vehicle travel in a community vary significantly and there has been little analysis of the differing impacts on land-use and vehicle ownership of various types of transit service (e.g. commuter rail versus urban rail service versus bus service).[142] It is also likely that the level of leveraged emission reductions varies significantly among metropolitan areas.

Clearly, however, the energy savings and emission reductions delivered through "leveraged" reductions in vehicle travel are far greater than zero and should be included in any estimate of the benefits of transit.

For light rail and heavy rail modes, we assumed that each passenger-mile traveled on transit leveraged additional reductions of two vehicle-miles traveled in automobiles. This is at the conservative end of VMT leverage estimates reported in the literature, based on John Holtzclaw, *Does a Mile in a Car Equal a Mile on a Train? Exploring Public Transit's Effectiveness in Reducing Driving*, 2000, and Todd Litman, Victoria Transport Policy Institute, *Rail Transit in America: A Comprehensive Evaluation of Benefits*, 31 August 2006. We assumed that commuter rail had a weaker leveraging effect, based on the notion that, while commuter rail in some locations may encourage more compact land-use patterns and reduced vehicle ownership, this impact is likely far from universal. As a result, we assumed that each passenger-mile traveled via commuter rail leveraged an additional reduction of 0.4 vehicle miles, based on the extreme low end of reported values in John Holtzclaw, *Does a Mile in a Car Equal a Mile on a Train? Exploring Public Transit's Effectiveness in Reducing Driving*, 2000. We assumed no leveraging effect from bus service or other transit modes. While it is likely that bus transit and other transit modes do have some impact on land-use patterns and vehicle ownership trends, there is less certainty about the degree of the impact. These estimates—particularly for light rail and heavy rail, and especially in cities with long-standing transit networks—are likely very conservative and probably understate actual vehicle travel reductions leveraged by transit to a significant degree.

Estimating Oil Consumption and Emissions from Transit Service

Oil consumption of transit service was assumed to be the sum of gasoline, diesel, kerosene and liquefied petroleum gas (LPG) consumed by transit operations, derived from the National Transit Database as described below.

The National Transit Database includes energy consumption figures reported by transit agencies that directly operate their own transit vehicles, as well as passenger-mile and vehicle-mile traveled data for both directly operated and paid transportation services operated under contract with private companies. We used two methods to estimate energy consumption and carbon dioxide emissions from transit operations—one for directly operated transit services and another for paid transportation.

Directly Operated Services

For directly operated transit services, we multiplied the amount of each type of energy consumed by a carbon dioxide coefficient for each fuel to estimate carbon dioxide emissions from transit operations.

Data on energy consumed in transit operations was obtained from the NTD. We then applied a carbon dioxide coefficient based on heat content estimates from U.S. Department of Energy, Energy Information Administration, *Annual Energy Review 2005*, 1 July 2006 and carbon dioxide coefficients by energy content from U.S. Department of Energy, Energy Information Administration, *Documentation for Greenhouse Gas Emissions in the United States 2004*, December 2006. There were a few exceptions to this method:

Heat content estimates per gallon of liquefied natural gas (LNG) were based

on TIAX Inc., *The Transit Bus Niche Market for Alternative Fuels: Module 4: Overview of Liquefied Natural Gas as a Transit Bus Fuel*, December 2003. Heat content estimates per "gallon" of compressed natural gas as reported to the NTD were based on the BTU content of a gallon of diesel fuel, per U.S. Department of Transportation, Federal Transit Administration, *2006 Urbanized Area Reporting Manual*, downloaded from www.ntdprogram.com/ntdprogram/pubs/ARM/2006/html/2006_Reporting_Manual_Table_of_Contents.htm, 12 July 2007.

For electricity consumed in directly operated transit, we calculated carbon dioxide emission factors for each of the Census regions in the United States, based on 2005 data from U.S. Department of Energy, Energy Information Administration, *Electric Power Annual 2005*, State Data Tables, downloaded from www.eia.doe.gov, 22 June 2007. For the Pacific region, we calculated separate figures for the Pacific contiguous region (including California, Oregon and Washington), and the Pacific non-contiguous region of Alaska and Hawaii.

Transit agencies reporting to the National Transit Database appeared to be inconsistent in their reporting of biodiesel use, with some agencies reporting the total quantity of blended biodiesel-diesel fuel used and others reporting only the biodiesel portion. For the sake of conservatism, we assumed that biodiesel fuel emitted the same amount of carbon dioxide as conventional diesel fuel.

Purchased Transportation Services

Transit agencies are not required to report energy consumption data to the NTD for transportation services they purchase from others. To estimate carbon dioxide emissions from purchased transportation services, we calculated the average amount of each fuel consumed per vehicle mile by directly operated transit services nationally for each mode of transit, based on data from the NTD. We then multiplied this figure by vehicle miles traveled by each purchased transportation service to arrive at an estimate of energy consumption by purchased transportation services. Carbon dioxide emissions were then calculated as described above.

Allocating Energy Savings and Emission Reductions Among States

In several cases, transit agency service territories cross state lines. Because the NTD lists transit agencies by the states and urbanized areas in which they are headquartered, this results in some states and urbanized areas receiving too much credit for gasoline savings and emission reductions from transit and others too little.

It was impractical to identify cross-border issues for all agencies reporting to the NTD. Instead, we sought to identify cross-border issues for the top 25 transit agencies in terms of estimated gasoline savings. We handled the cross-border of allocation of benefits in two different ways. First, for agencies in which only a small amount of infrastructure extends across state lines (e.g. NJ Transit's commuter rail tracks into New York City or SEPTA's rail connection with NJ Transit in New Jersey) the "home" state of the transit agency was assigned 100 percent of the benefits. Second, for other agencies, we sought local sources of information that would enable us to estimate the share of ridership taking place in each state. We made adjustments for the following agencies using the following sources of information:

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Appendix B: Detailed Oil Savings and Emission Reduction Data

Table B-1. Oil Savings and Carbon Dioxide Emission Reductions from Transit by State

State	Oil Savings (million gallons)	Gasoline Cost Savings (million dollars)	Carbon Dioxide Emission Reductions (thousand metric tons)
New York	1,494.6	$3,912.9	11,796.2
California	486.4	$1,273.3	3,597.5
Illinois	272.9	$714.4	1,975.1
New Jersey	238.3	$624.0	1,894.9
Massachusetts	152.9	$400.2	1,191.3
Maryland	132.3	$346.3	960.4
Pennsylvania	111.8	$292.6	755.1
Georgia	87.6	$229.5	663.6
Virginia	87.1	$228.1	650.3
District of Columbia	71.5	$187.3	531.7
Connecticut	51.1	$133.9	335.5
Texas	47.8	$125.1	269.1
Oregon	33.6	$87.9	276.4
Florida	33.1	$86.6	173.4
Washington	26.6	$69.6	166.7
Minnesota	20.1	$52.8	81.6
Ohio	18.6	$48.7	74.7
Utah	15.8	$41.2	119.9
Colorado	14.7	$38.5	80.4

Table B-1. (continued)

State	Oil Savings (million gallons)	Gasoline Cost Savings (million dollars)	Carbon Dioxide Emission Reductions (thousand metric tons)
Missouri	13.7	$35.8	87.5
Indiana	8.8	$23.0	48.0
Hawaii	8.3	$21.8	56.5
Arizona	5.8	$15.1	6.7
Nevada	5.4	$14.2	29.5
Michigan	4.5	$11.8	18.2
Rhode Island	1.9	$5.1	13.0
North Carolina	1.0	$2.6	-2.7
Wisconsin	0.7	$1.8	-4.9
Maine	0.6	$1.7	0.8
Delaware	0.5	$1.3	1.8
Tennessee	0.5	$1.2	-3.4
New Mexico	0.4	$1.0	-6.1
Alabama	0.2	$0.7	-4.8
Alaska	0.2	$0.4	0.4
Iowa	0.1	$0.4	-4.6
Kentucky	0.1	$0.4	-2.9
Idaho	0.1	$0.1	-2.0
Louisiana	0.0	$0.0	-5.5
South Dakota	0.0	$0.0	-0.7
New Hampshire	0.0	-$0.1	-0.9
Wyoming	-0.1	-$0.2	-0.7
Vermont	-0.1	-$0.2	-1.1
North Dakota	-0.1	-$0.4	-2.0
Nebraska	-0.2	-$0.4	-5.8
South Carolina	-0.2	-$0.5	-5.7
Montana	-0.2	-$0.5	-2.1
Mississippi	-0.3	-$0.7	-2.6
West Virginia	-0.3	-$0.9	-4.1
Arkansas	-0.4	-$1.0	-4.4
Kansas	-0.4	-$1.0	-5.9
Oklahoma	-0.4	-$1.1	-6.2

Table B-2 Top 50 Transit Agencies for Oil Savings

Agency Name	Agency Abbreviation	State	Oil Savings (million gallons)	Gasoline Cost Savings (million dollars)	Carbon Dioxide Emission Reductions (thousand metric tons)
MTA New York City Transit	NYCT	NY	1281.3	$3,354.5	10,469.9
Washington Metropolitan Area Transit Authority	WMATA	MD	245.0	$641.4	1,852.2
San Francisco Bay Area Rapid Transit District	BART	CA	199.3	$521.7	1,710.5
Chicago Transit Authority	CTA	IL	181.3	$474.6	1,292.9
Massachusetts Bay Transportation Authority	MBTA	MA	153.9	$403.0	1,212.7
New Jersey Transit Corporation	NJ TRANSIT	NJ	151.6	$396.8	1,200.8
MTA Long Island Rail Road	MTA LIRR	NY	133.6	$349.9	949.8
Los Angeles County Metropolitan Transportation Authority	LACMTA	CA	131.9	$345.4	862.2
Metro-North Commuter Railroad Company, dba: MTA Metro-North Railroad	MTA-MNCR	NY	107.4	$281.1	725.2
Southeastern Pennsylvania Transportation Authority	SEPTA	PA	102.5	$268.3	713.4
Metropolitan Atlanta Rapid Transit Authority	MARTA	GA	84.2	$220.5	643.7
Northeast Illinois Regional Commuter Railroad Corporation	Metra	IL	82.4	$215.8	631.5
Port Authority Trans-Hudson Corporation	PATH	NJ	49.6	$129.8	395.3
Maryland Transit Administration	MTA	MD	35.7	$93.4	245.2
Tri-County Metropolitan Transportation District of Oregon	TriMet	OR	32.6	$85.3	273.7
San Diego Trolley, Inc.	MTS	CA	32.6	$85.3	280.9
Dallas Area Rapid Transit	DART	TX	26.5	$69.4	163.7
San Francisco Municipal Railway	MUNI	CA	25.2	$65.9	198.0
Miami-Dade Transit	MDT	FL	22.8	$59.6	130.0
Southern California Regional Rail Authority	Metrolink	CA	22.2	$58.2	178.2
Metro Transit		MN	19.6	$51.4	87.6
Bi-State Development Agency	METRO	MO	17.8	$46.5	125.2
Utah Transit Authority	UTA	UT	15.8	$41.4	121.3
Metropolitan Transit Authority of Harris County, Texas	Metro	TX	14.6	$38.3	103.5
Denver Regional Transportation District	RTD	CO	14.6	$38.2	85.0

Agency Name	Agency Abbreviation	State	Oil Savings (million gallons)	Gasoline Cost Savings (million dollars)	Carbon Dioxide Emission Reductions (thousand metric tons)
Sacramento Regional Transit District	Sacramento RT	CA	14.3	$37.4	98.6
Peninsula Corridor Joint Powers Board	PCJPB	CA	13.4	$35.1	106.3
The Greater Cleveland Regional Transit Authority	GCRTA	OH	13.1	$34.3	73.0
King County Department of Transportation - Metro Transit Division King County Metro		WA	12.5	$32.8	87.9
Port Authority Transit Corporation	PATCO	NJ	12.0	$31.4	87.6
Academy Lines, Inc.		NJ	8.4	$22.1	72.7
City and County of Honolulu Department of Transportation Services	DTS	HI	8.0	$21.1	53.8
Northern Indiana Commuter Transportation District	NICTD	IN	7.7	$20.2	55.6
Orange County Transportation Authority	OCTA	CA	7.5	$19.7	35.4
Santa Clara Valley Transportation Authority	VTA	CA	7.3	$19.1	52.8
Central Puget Sound Regional Transit Authority	ST	WA	6.9	$17.9	49.6
Virginia Railway Express	VRE	VA	6.8	$17.8	52.7
Metropolitan Suburban Bus Authority, dba: MTA Long Island Bus		NY	6.7	$17.6	20.2
Hudson Transit Lines, Inc.	Short Line	NJ	5.6	$14.7	47.3
Port Authority of Allegheny County	Port Authority	PA	5.3	$13.9	21.7
Regional Transportation Commission of Southern Nevada	RTC	NV	5.3	$13.8	31.6
MTA Bus Company	MTABUS	NY	5.2	$13.7	-72.0
Pace - Suburban Bus Division	PACE	IL	5.0	$13.0	32.6
South Florida Regional Transportation Authority	TRI-Rail	FL	4.5	$11.7	24.5
Suburban Transit Corporation	Coach USA	NJ	4.0	$10.5	34.3
City of Detroit Department of Transportation	DDOT	MI	3.9	$10.3	29.4
Southwest Ohio Regional Transit Authority	SORTA / Metro	OH	3.9	$10.3	15.3
North County Transit District	NCTD	CA	3.9	$10.2	23.8
San Diego Metropolitan Transit System	MTS	CA	3.6	$9.4	0.5
Westchester County Bee-Line System The Bee-Line System		NY	3.6	$9.3	22.7

Table B-3. Top 25 Metropolitan Areas for Oil Savings

Urban area	Oil Savings (million gallons)	Gasoline Cost Savings (million dollars)	Carbon Dioxide Emission Reductions (thousand metric tons)
New York-Newark, NY-NJ-CT	1,771.9	$4,638.8	13,973.0
Chicago, IL-IN	276.2	$723.1	2,009.9
Washington, DC-VA-MD	254.3	$665.7	1,898.8
San Francisco-Oakland, CA	243.4	$637.3	2,048.0
Los Angeles-Long Beach-Santa Ana, CA	167.9	$439.5	1,087.3
Boston, MA-NH-RI	154.1	$403.3	1,210.6
Philadelphia, PA-NJ-DE-MD	115.8	$303.0	805.8
Atlanta, GA	88.0	$230.5	669.1
San Diego, CA	44.5	$116.4	333.7
Baltimore, MD	35.8	$93.7	245.8
Portland, OR-WA	33.2	$86.9	277.9
Miami, FL	30.7	$80.3	175.0
Dallas-Fort Worth-Arlington, TX	29.3	$76.6	169.8
Seattle, WA	24.1	$63.0	154.3
Minneapolis-St. Paul, MN	20.4	$53.4	85.8
St. Louis, MO-IL	17.9	$46.9	123.5
Salt Lake City, UT	15.8	$41.4	121.3
Houston, TX	14.6	$38.3	103.5
Denver-Aurora, CO	14.6	$38.2	85.0
Sacramento, CA	14.6	$38.2	96.8
Cleveland, OH	13.2	$34.7	73.1
Honolulu, HI	8.3	$21.8	56.5
San Jose, CA	7.3	$19.1	52.8
Pittsburgh, PA	5.4	$14.2	21.5
Las Vegas, NV	5.4	$14.1	30.3

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135. Center for Transportation Excellence, *November 2004: Record Number of Transit Funding Ballot Initiatives Pass this Year*, downloaded from www.cfte.org/success/2004elections.asp#analysis, 3 January 2008.

136. Tax-increment financing (TIF) has been used for decades to support redevelopment of urban areas. In some areas, poorly designed TIF schemes have diverted important resources from the general tax rolls—where they can be used to support public services for the broader community—to support developments that may have happened anyway or that provide few community benefits. In the case of transit development, TIFs can provide an appropriate way for use some of the increased tax revenue that results from higher land prices near transit to finance the transit expansion. However, TIFs should be used only on a limited basis and designed carefully so as to ensure that the broader community also receives property tax benefits from transit expansion.

137. See note 55.

138. Based on Linda Bailey, ICF International, *Public Transportation and Petroleum Savings in the U.S.: Reducing Dependence on Oil*, January 2007. The question of how many automobile trips are avoided by transit use is a difficult one. On one hand, transit riders who are interviewed about their travel preferences often report that if they did not have access to transit, some trips would take place by walking and others by carpooling, while others simply wouldn't be taken at all. However, the results of surveys cannot be used to directly estimate the number of replacement car trips that would take place if transit service were to cease, for two reasons: 1) some communities would likely react to the end of fixed-route transit service by substituting less-efficient demand response service for transit-dependent consumers, 2) where demand response service is not provided, some trips would likely take the form of chauffeuring, in which for example, a relative might drive to take an elderly person to the doctor. Chauffeuring can also be inefficient in that it requires the driver to make an "empty" return trip or to otherwise waste valuable time. For the sake of simplicity, we assume in this analysis that each trip that would have been made via transit would be made in an automobile, with the average occupancy of private vehicles being slightly less than 1.5 passengers per mile driven.

139. 60 percent based on data from the 2001 National Household Travel Survey, accessed via the online analysis tool at nhts.ornl.gov/tools.shtml.

140. See note 21.

141. John Holtzclaw, *Does a Mile in a Car Equal a Mile on a Train? Exploring Public Transit's Effectiveness in Reducing Driving*, 2000.

142. Studies of transit leverage have tended to focus on cities with rail transit networks. There has been comparatively little study of the potential leveraged vehicle travel reductions from bus transit, though it is unlikely that bus transit has the same degree of leveraging impact. See Todd Litman, Victoria Transport Policy Institute, *Rail Transit in America: A Comprehensive Evaluation of Benefits*, 31 August 2006.