

Practical or Pork Barrel: The Potential Impacts of Bicycle Infrastructure in America

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Introduction

In the debate over the 2009 American Recovery and Reinvestment Act, Republicans blasted Democratic authors for inundating the bill with alleged “pork barrel” spending. One of the provisions which many conservatives felt epitomized the bill’s “wasteful” spending was an 825 million dollar provision of the 27.5 billion dollars of highway funds to Transportation Enhancements, which would primarily consist of bicycle and pedestrian projects. As one of the most prominent Republican leaders, House Minority Leader John Boehner (R, Ohio), explained:

I think there’s a place for infrastructure, but what kind of infrastructure? Infrastructure to widen highways, to ease congestion for American families? Is it to build some buildings that are necessary? But if we’re talking about beautification projects, or we’re talking about bike paths, Americans are not going to look very kindly on this. (qtd. by League of American Bicyclists)

Senator Jim DeMint (R, South Carolina) echoed this sentiment, calling the stimulus bill a “sham.” He went on to explain:

We must stop wasteful earmarks for bike paths and museums that divert critical funding away from priority roads and bridges (qtd. by L.A.B.)

And:

When people see bike trails and hiking trails and golf courses, they know this is not designed to stimulate the economy and create jobs. It's just basically special-interest pork barrel spending. (qtd. by L.A.B.)

The arguments of both Representative Boehner and Senator DeMint rest on the assumption that investments in bicycle infrastructure are not in American’s best interest. They contend that

Americans need practical infrastructure spending which will immediately jumpstart local economies and relieve congestion, such as new roads and bridges, not leisurely “beautification projects” like “golf courses,” “museums,” or “bike paths” (qtd. by L.A.B). Yet Boehner and DeMint ignore that 97% of the highway funds in the stimulus plan already were slated to be spent on these projects, on top of and that 70% of our oil use and 1/3 of our emissions come from a transportation network already dependent on the automobile (Energy Information Administration). Boehner and DeMint also ignore the potential market for bicycling, given that 48% of everyday trips are three miles or less and within a 20 minute bike ride, yet 90% of these trips are taken by car (Federal Highway Administration, National Household Travel Survey, 2001). On the surface, this controversy over \$825 million of the \$787 billion stimulus bill might seem silly, but it speaks to a broader issue: America’s prejudices regarding bicycling (ARRA).

The automobile-centric view of Congressmen Boehner and DeMint illustrates Americans’—Democrats’, Republicans’, and Independents’— cultural bias toward driving and against bicycling. Americans raise their children to view bicycles as a toy which provides for mobility and recreation until one is old enough to obtain his or her driver’s license. So, from an early age, most Americans perceive bicycling as a form of leisure rather than a legitimate form of transportation. This perception even extends into the United States Code. Subsection 101 (35) of title 23 defines Transportation Enhancements as:

The term ‘transportation enhancement activity means, with respect to any project or the area to be served by the project, any of the following activities as the activities relate to surface transportation:

- (A) Provision of facilities for pedestrians and bicycles.
- (B) Provision of safety and educational activities for

pedestrians and bicyclists.

(C) Acquisition of scenic easements and scenic or historic sites (including historic battlefields).

(D) Scenic or historic highway programs (including the provision of tourist and welcome center facilities).

(E) Landscaping and other scenic beautification.

(F) Historic preservation.

(G) Rehabilitation and operation of historic transportation buildings, structures, or facilities (including historic railroad facilities and canals).

(H) Preservation of abandoned railway corridors (including the conversion and use of the corridors for pedestrian or bicycle trails)...

While one would expect the United States Code to be unbiased, by equating investments in bicycle infrastructure with luxuries such as the preservation of “historic battlefields,” “tourist welcome facilities,” and “landscaping and other scenic beautification,” it essentially restates, and therefore validates, the biased claims regarding the superfluous nature of bicycle investments made by Boehner and DeMint. Although Transportation Enhancements may make valuable contributions to our transportation network, they are still “enhancements,” and therefore not necessary, even in the eyes of the law.

American’s lackluster perception of bicycling proves noteworthy because as we face 21st century problems that in part derive from our automobile-dependent transportation system, such

as Climate Change, rising energy prices, dependence on foreign oil, strained and outdated infrastructure, and a struggling healthcare system, we can no longer afford to perpetuate the 20th century infrastructure model which helped cause these issues in the first place. To meet these new challenges, the federal government will need to shift its transportation policies toward a more diversified model which increases the shares of public transit, walking, and bicycling. Bicycling is currently out of favor in America not because of a lack of practicality, but because of a lack of government support and funding to make it a viable mode of transportation. Studies which demonstrate the potential benefits of bicycling, as well as successes from cities such as Amsterdam, Copenhagen, Davis, Portland, and Boulder, prove that bicycle infrastructure is not just a luxury or “enhancement” to America’s automobile-oriented transportation system, and that modest increases in bicycling can have sizeable impacts in addressing Climate Change, oil dependence, congestion, and declining public health.

America’s Current Funding Structure

For the past half century, America has almost exclusively poured its transportation infrastructure resources into building roads, bridges, and highways. In 2006, federal, state, and local governments spent \$175 billion on road and highway projects alone, which would put America’s total investment in automobile infrastructure trillions if not tens of trillions of dollars in the past 60 years. (U.S. Census Bureau qtd. by Sourcebook, U.S. DOT). This spending is compounded when combined with the cost of automobiles, fuel, insurance, maintenance, fees, parking, congestion, pollution, and other expenses, costing America between \$3.5 and \$4 trillion in 2008 (or a whopping 24-28% of America’s GDP)¹. While roads and highways receive

¹ This estimate is taken by multiplying the annual vehicle miles traveled, given by the Bureau of Transportation statistics, by the cost per mile of driving, given by the Santa Cruz County Regional Transportation Commission

substantial government taxpayer funding, other forms of transportation, such as public transit, walking, and bicycling, receive comparatively little. Even with public transportation ridership and bicycle use reaching record highs in 2008 as a result of rising gas prices, the federal government continued its trend of first and foremost funding automobile infrastructure, which accounted for approximately 79% of federal funding (40.1 billion), leaving public transportation (20%) and biking/walking (1% combined) to compete for the rest of funds (US Department of Transportation). This funding structure serves as the template for which state, regional, and local governments follow when creating their budgets and prioritizing projects. While combined federal spending for bicycle and pedestrian projects reached its second highest total ever of \$541 million in 2008, this investment is less than the cost of just four of California's current highway widening and reconstruction projects, which total \$583.9 million (FHWA, McGraw Hill Construction)². The current federal funding structure demonstrates a completely lopsided approach to transportation, investing the vast majority of funds into highway projects and giving walking and bicycling mere leftovers.

In spite of the massive investment in highways in the past decades, congestion in American cities continues to worsen as the government has fallen behind on maintenance and accommodating future growth. America's investment in roads and highways provided enormous benefits to our nation, helping it achieve unparalleled economic development and become the world's most prosperous nation. However, in terms of efficiency, energy use, congestion relief, and sustainability, an overreliance on driving has left America with numerous problems. As a result of the phenomenon of induced demand, the expansion of highways has consistently been

using data from AAA, the Victoria Transport Policy Institute, the USDOT, and the Texas Transportation Institute, then comparing the data to the U.S. GDP, given by the IMF.

² Federal spending peaked in 2007 at \$564 million. When the program began in 1992, spending was \$22.7 million, and it has averaged approximately \$400 million for the past decade (FHWA).

met with an increase in driving because it makes driving more convenient and results in sprawling automobile-oriented development. No region better exhibits induced demand than Los Angeles, where in spite of hundreds of billions of dollars of investments in highways in the past sixty years, it still consistently earns the title of “Most Congested City in America” (Forbes Magazine). Another consequence of America’s expansive road system is its high cost of maintenance. Despite the hundreds of billions spent every year on highways, according to the American Society of Civil Engineers, highway maintenance and congestion relief currently faces a \$90 billion shortfall in federal funding just to bring the system up to date. The infrastructure spending in the American Reinvestment and Recovery Act reflects an attempt to close this funding gap and upgrade America’s highway system.

The American Reinvestment and Recovery Act and its Role in Reshaping America

As the first major bill passed by the Obama administration, the American Reinvestment and Recovery Act of 2009 sets the tone for how the Obama administration will address the crucial issues facing the nation in the 21st century. Obama has made a commitment to solving Climate Change and our energy crisis, pledging to cut emissions 80% below 1990 levels by 2050 and to eliminate all oil consumption from Venezuela and the Middle East (approximately 17% of total use) in ten years (Organizing for America). At the same time, Obama seeks to modernize our infrastructure to help stimulate the economy and provide the framework for sustained long-term growth, as well as reform the inefficiencies of America’s healthcare system to curtail unnecessary costs on both the government and individual citizens. Together, these issues garner 3/4 of the 355 billion dollars of spending in the stimulus bill (American Recovery and Reinvestment Act). The solution to these problems rests in a mixed approach which will necessitate a break from the government’s policies of the past 60 years.

America must improve upon our current system by investing in cleaner fuels and vehicles and bringing our current road infrastructure up to standard; however, the potential impact of investing in automobiles alone is limited. A huge component of Obama's goals is addressing America's reliance on inefficient automobiles, which account for approximately 20% of our emissions and 40% of our oil consumption (U.S. EIA). While Obama pledges to raise fuel economy and put one million plug-in hybrids on the road by 2015, investments solely in automobiles inevitably will fail to make an immediate impact on our emissions and oil consumption because of the sheer number of cars in America (Obama). To replace even one quarter of America's approximately 250 million registered automobiles with more efficient hybrids would take decades and cost Americans trillions of dollars (U.S. DOT). Furthermore, with our current growth paradigm, as population grows and regions become more spread out, driving is projected to increase 48% between 2005 and 2030, which, even with the most aggressive proposals for increasing fuel economy standards, will increase emissions 34% over 1990 levels (Urban Land Institute, qtd. by Smart Growth America). Investing in more efficient cars is important to prevent further increases in emissions, but these investments alone will not solve our energy and emissions problems.

To truly make an impact at reducing automobile energy use and emissions and improving public health, America must reduce the number of miles driven by redefining its land use patterns and investing in alternative modes of transportation, such as public transportation, high speed rail, bicycling, and walking. The most effective way to curb automobile emissions and live a healthier lifestyle is to drive less and walk and bike more, but currently new development in America encourages driving by promoting sprawling, single family home development on the outskirts of cities. Government land use policies must shift to "Smart Growth," which focuses

on compact, walkable, transit-oriented development wherein most everyday destinations are accessible without driving. America must shift a significant portion of its highway investments into strengthening our current public transit network and expanding light rail, commuter rail, bus rapid transit, and other types of transit. Yet, while public transportation is an essential component of this solution, its high cost and need for high density hinders many low density and/or cash strapped cities from making an investment. In addition, public transit is limited in its number of destinations and cannot always take everyone exactly where they wish to travel. So, the bicycle will play a crucial role in completing the new transit network, extending the coverage of the rail and bus network and connecting neighborhoods of all densities without increasing congestion.

The American Recovery and Reinvestment Act primarily funds the automobile portion of this approach, with more limited provisions for alternative transportation. The stimulus bill invests \$27.5 billion into highways, as well as tens of billions which could potentially be used for developing alternative fuels and more efficient automobiles. While the provisions for alternative intercity transit—high speed rail (eight billion) and Amtrak (1.3 billion)—are dramatic improvements from the status quo, local transit alternatives, such as public transit, bicycling, and walking, do not receive significant increases (ARRA). With only \$8 billion going to public transit and approximately \$500 million of the \$825 million provision for Transportation Enhancements going to bicycle and pedestrian infrastructure, the stimulus bill does little to break away from the status quo funding approach for urban transportation (ARRA, L.A.B.). In contrast, America Bikes member organizations identified \$1.2 billion worth of bicycle projects that have been awaiting funding, most of which will receive nothing (L.A.B.). While the automobile will always play a role in transportation, to obtain real change, a share of simple neighborhood and commute automobile trips must be replaced with bicycling in order to reach Obama's goals of

80% reduction of 1990 level emissions by 2050, an immediate 17% reduction in oil use, and a reformed healthcare system.

The Potential Impacts of Bicycling

Although bicycling represents only a fraction of American's current trips, a moderate increase could immediately cut back energy use, emissions, congestion, and obesity while saving America billions of dollars. It is hard to pinpoint the exact mode share (proportion of use) of bicycling and walking due to a number of factors in government surveys which lead to chronic underestimates, including the time of year the survey takes place, the language of the survey (reliable data by city is only available for commute trips), underrepresentation of people of lower incomes, and the omission of multiple modes in a trip, such as walking and public transit. Nevertheless, according to the 2001 National Household Transportation Survey, bicycling represents 0.9% of all trips, and walking represents 8.5% of all trips in America. While outdated, this figure is the closest estimate of the total mode share of walking and bicycling for all trips (the 2008 figure is most likely around 12-15%). For commuting trips, the 2000 census reports that 0.4% of Americans bike to work. This figure is also clearly outdated, and the consensus estimate tends to be at least 1% for 2008 by a number of smaller surveys. In contrast, bicycling accounts for over 20% of commute trips in Germany and Denmark, and over 30 percent in the Netherlands (Block).

With these low figures in mind, an increase in bicycling and walking and a decrease in driving would have an immediate impact on public health by combating obesity, saving America billions of dollars and thousands of lives every year. Obesity, a disease caused in large part by a lack of daily physical activity, has more than doubled in the past 30 years. The U.S. Center for Disease Control estimates that 34% of adults are obese and 63% of adults are overweight, and

that 32% of children are overweight or obese (US CDC, qtd by Chlapowski). Obesity is a significant disease in that it takes a toll on the entire healthcare system because it contributes to numerous other health conditions such as type 2 diabetes, heart disease, hypertension, stroke, and certain cancers. The total cost of obesity totals approximately 300,000 deaths and 117 billion dollars per year (which now costs more money and lives than smoking), not to mention the hundreds of billions of dollars more spent by overweight Americans on weight-related health problems (US CDC, qtd by Chlapowski). In comparison, estimates for the savings of individuals who exercise for the CDC recommended minimum of 30 minutes per day totals around 130 dollars per capita (the cost of well-funded bicycle infrastructure totals less than ¼ of this cost, or around 30 dollars per capita). One of the CDC's principle recommendations to achieve this minimum amount of exercise is routinely walking and bicycling.

The leading cause of obesity is an inactive lifestyle linked to high levels of driving and low levels of biking and walking. A 2004 study entitled "Obesity Relationships with Community Design, Physical Activity, and Time Spent in Cars," published in the *American Journal of Preventative Medicine*, finds that every additional hour (over the mean) that one spends driving per day is strongly correlated with a 6% increase in the likelihood of obesity. Conversely, each additional kilometer (over the mean) walked or biked per day results in a 4.8% reduction in the likelihood of obesity. Other studies have corroborated these findings that obesity is linked to driving too much and walking and bicycling too little. In response to these studies, along with the environmental and energy crises, in 2008 the Rails to Trails Conservancy released a highly-acclaimed report entitled "Active Transportation for America: The Case for Increase Investment in Bicycling and Walking," which seeks to quantify the impact of an

increase in walking and bicycling on trips less than three miles long. The report is based around the following findings of the 2001 NHTS:

1. More than half of cars trips made by Americans would take less than 20 minutes on a bike
2. 90% of all trips of between one and three miles are taken by car
3. 59% of trips less than one mile are made by car
4. 48% of trips were three miles or less, and 24% were one mile or less

The report’s findings are quantified below:

Table 1—The Impact of Increasing Mode Share for Trips Under Three Miles

Factor of Interest	Current: 9.6%	Modest: 13%	Substantial: 25%	40%**
Miles Avoided per year	23 billion	69 billion	199 billion	492 billion
Tons of CO2 Avoided Per Year	12 million	33 million	91 million	219 million
% CO2 Emissions Avoided*	1.0%%	2.7%	7.4%	18.0%
Gallons Fuel Saved Per Year	1.4 billion	3.8 billion	10.3 billion	24.6 billion
Percent gas saved*	1.1%	3.0%	8.1%	19.3%
Fuel Cost Savings @ \$3.00/gal	4.2 billion	11.4 billion	31 billion	73.8 billion
Fuel Cost Savings @ \$5.00/gal	7 billion	19 billion	51.5 billion	123 billion
Average Physical Activity per person	3 minutes	5 minutes	9 minutes	13 minutes

*For emissions by passenger vehicles

Source: Rails to Trails Conservancy, EIA

**Note: 40% figures are based on extrapolations of data from the study. These figures are approximations and not actually included in the Active Transportation for America Report

It is important to note that these scenarios do not represent total mode share; rather, a 25% mode share for trips less than three miles would likely represent approximately a 16-20% mode share

for both biking and walking, and a 40% mode share would represent a 25-32% mode share for both biking and walking. As mode share increases, bicycle use (rather than walking) would likely increase as well, since a greater proportion of trips would be made in the 1-3 mile range.

“Active Transportation for America” goes on to compare this impact with the equivalent impact through hybrid cars. To achieve the same results with regards to emissions and oil use, hybrid market share would have to increase nationally from less than 0.5% to 8% under the Modest Scenario and 20% under Substantial Scenario (ATFA, 3). Furthermore, the cost on American consumers under the modest scenario of 19 million new hybrids at \$25,000 per car would total \$475 billion worth of new automobiles, and the cost of 50 million new hybrids for substantial scenario would reach 1.25 trillion dollars. Therefore, a small to moderate increase in bicycling would be equivalent to hundreds of billions if not a trillion dollars worth of new hybrids. So, while Obama’s goal of putting one million plug-in hybrids on the road by 2015 represents a step toward reducing our energy use and emissions, its effects are easily dwarfed by increasing walking and biking for shorter trips.

While “Active Transportation for America” provides a valuable insight into the potential impacts of bicycling, it underestimates many of these impacts. First, ATFA uses figures from the 2001 NHTS survey, which chronicles transportation choices for a nation that hadn’t yet experienced September 11th, the War in Iraq, rising awareness about climate change, increased investment in bicycle and pedestrian infrastructure, and oil above \$2.00/gallon (let alone, \$4.00/gallon). Without a doubt, current mode share for bicycling and walking has greatly increased since 2001. Second, although the proposal demonstrates the potential impacts of bicycling on local trips under three miles, it neglects to consider the impacts of combining bicycling with other modes. When combined with rail and bus transit, the range of bicycling is

extended considerably, especially for daily commutes. Third, the estimates for monetary savings on healthcare appear unrealistically low in the report, giving the rapidly growing costs of obesity in America. Finally, other effects, such as fuel savings as a result of congestion relief (which amounts to 2% of our vehicle oil consumption) are not considered either (FHWA). The effect of these shortcomings is that the “substantial” scenario of 25% mode share is not all that substantial of a goal, and America can strive toward a mode share of 40% or beyond.

Overall, “Active Transportation for America” and various public health studies demonstrate the tangible impacts that bicycling and walking can make on energy use and emissions. A 10-15% increase in bicycling and walking for short everyday trips would reduce our emissions from passenger vehicles by 7.3% and our oil consumption 8.1% while tripling the average amount of exercise per person, and a 25-30% increase would make reductions of 18% and 19.3%, respectively, and quadruple the average exercise per person. These reductions would put America well on its way to achieving Obama’s goals (ATFA, 4). Between bicycling and walking, bicycling shows the greatest room for improvement, given its lower mode share and lack of cultural acceptance. However, a number of obstacles must be overcome to make bicycling appealing in America.

Why Most Americans Don’t Cycle

Americans’ lack of enthusiasm for bicycling derives from two primary concerns: convenience and safety. Already battling a cultural bias which considers bicycling as recreation, many Americans have little reason to cycle when the government’s policies subsidize all aspects of driving: roads, gas, and parking. Federal, state, and local governments have taken some steps to make bicycling more appealing, but (with a few exceptions) these efforts have been inconsequential. For example, after much controversy, congress finally passed a \$20 monthly

commuter credit for bicyclists to be used for maintenance, storage, and other expenses in 2008. While passing this provision sent a message that congress now accepts bicycling as a commuting option, they clearly consider it a much less effective option in comparison to those who ride public transit, and receive \$115 per month for fares, and those who drive, and receive \$230 per month for parking. (League of American Bicyclists). So, drivers receive \$2,760 per year in benefits, or ten times that received by bicyclists, just on direct parking subsidies (on top of fuel, infrastructure, and other subsidies). Although the direct costs for drivers (such as purchasing the vehicle, gas, parking, and maintenance) are significantly higher, this unequal subsidy is yet another example of the federal government making driving convenient at the expense of other modes of transportation.

Americans also find bicycling inconvenient because of a lack of infrastructure, which speaks to the second issue: lack of safety. Distance clearly only plays a minor role in discouraging bicycling, since nearly $\frac{1}{4}$ of trips by car are less than a mile and $\frac{1}{2}$ are less than 3 miles. Therefore, Americans simply do not want to make short trips by bicycle because safe and easy routes simply do not exist. After studying this sense of fear to cycle even for short trips, Roger Geller, the director of Portland's bicycle program, created a model for defining the different types of cyclists in Portland. Geller breaks down bicyclists in Portland into four demographics: the Strong and Fearless, who represent less than 0.5% of the population and will ride in nearly all conditions; the Enthused and Confident, who represent 7% of the population and will comfortably ride in low to moderate traffic conditions; the Interested but Concerned, who represent 60% of the population and may ride on occasion recreationally, but do not feel comfortable on regular roads; and the No Way No How, who represent the remaining 33% and are actually not cyclists because they refuse to ride no matter what (Portland BOT). While the

Four Types of Transportation Cyclists in Portland By Proportion of Population

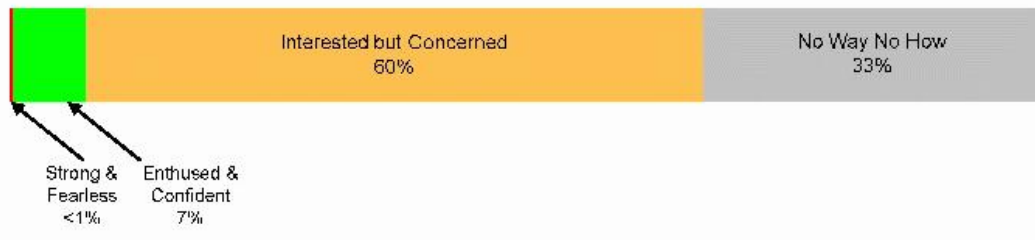


Figure 1—Geller’s Model of the Four Types of Transportation Cyclists

Source: Portland Bureau of Transportation

actual percentages of demographics in this model will vary from city to city, Geller’s model gives great insight into why Portlanders (and Americans as a whole) choose to cycle or not cycle, and what measures are needed to encourage cycling.

Geller explains that the four types of cyclists require different types of infrastructure to reduce their fear and grant them the sense of security and confidence they need to ride. The Strong and Fearless require no infrastructure, because they are confident enough to ride on any road with the flow of traffic. The Enthused and Confident are comfortable on most roads, but desire infrastructure such as designated bike lanes or bicycle boulevards, to make riding more convenient. The Interested but Concerned do not feel safe riding around fast-moving traffic, and require bike paths or cycle tracks to be physically separated from cars in high volume corridors, as well as colored pavement and road signage to increase visibility. Concerns over safety also manifest themselves in bicycle parking, since a portion of potential bicyclists will not ride simply because they are afraid that their bikes will be stolen when parked. Good bicycle parking facilities, in the form of bike racks, lockers, or guarded storage facilities (at places like transit stations) are an essential component of promoting bicycling, and are often overlooked by businesses which focus on car parking and view purchasing bike racks as a waste of money.



Figure 2—A Bicycle Boulevard in Berkeley, California. Bicycle Boulevards are low-traffic streets which are prioritized for bicyclists. They are a low-cost, highly effective way for a city to immediately integrate bicyclists into its street network.
Source: Streetsblog

Even with these elements, good infrastructure fulfills only the engineering component of fostering a bicycling culture. City Planners refer to the five Es: Engineering, Enforcement, Education, Encouragement, and Evaluation as essential for a city to achieve a high bicycling mode share (L.A.B.). Enforcement and Education go hand in hand, because bicyclists (and drivers) need to be educated on how to ride safely, and held accountable when their behavior endangers others (L.A.B.). Simple measures such as the dissemination of bike lights and maps can help bicyclists ride safely and comfortably. Encouragement involves the issues discussed above, such as commuter rebates and rewards by employers, as well as public awareness campaigns like Bike to Work Day (L.A.B.). Once a city undertakes these four measures, the fifth, Evaluation, examines their effectiveness and helps cities improve upon their methods (L.A.B.). With sound adherence to the Five E's, American cities can break the cultural bias and foster a new culture in support of bicycling. While some American cities have attracted a portion of the Enthused and Confident and Interested but Concerned by finding success in one or

two of these areas, Amsterdam and Copenhagen have become world-renown for excelling at the four Es.

Amsterdam and Copenhagen—What Bicycling Can Mean for a City

At first glance, Amsterdam and Copenhagen seem like unlikely cities to lead the post-industrial world in bicycling. Both of these cities are located in Northwest Europe, a region which has both a high standard of living and cold and rainy weather nearly year round. Nevertheless, Amsterdam and Copenhagen enjoy some of the highest mode shares for bicycling in the world, which have resulted from governments and cultures which promote bicycling as the preferred mode of transportation. Yet bicycling was not always a fundamental part of the identities of Amsterdam and Copenhagen; their governments had to fully commit to funding and promoting bicycling to achieve success.

Until WWII, bicycling was an integral part of the cultures of Amsterdam and Copenhagen; however, like many American cities, these cities experienced suburbanization and growth of automobile use in the Postwar period. In the first half of the 20th Century, bicycling was the most popular mode of transportation in Amsterdam and Copenhagen, accounting for as much as 75% of trips in Amsterdam (Langenberg, 2). Nevertheless, in the years after WWII, Amsterdam and Copenhagen experienced massive increases in automobile ownership, along with increases in traffic congestion and pollution. Because Amsterdam and Copenhagen have very low road capacities coupled with very high population densities (comparable to cities such as London, Chicago, and Boston), the infrastructure of these cities simply could not support this growth in automobile ownership. As a result, residents began to move out to the suburbs, leaving the urban cores in decline. By the 1970s, Amsterdam and Copenhagen were well on the way to becoming like other European and American cities, with bicycling dropping to all-time

lows—25% in Amsterdam and less than 10% in Copenhagen (City of Copenhagen, Langenberg, 2). But, as Amsterdam and Copenhagen faced the 1973 oil crisis, as well as necessary redevelopment of their historic centers to expand road capacity and parking, these cities began to rethink and reshape their policies.

Having realized automobile-oriented growth was not sustainable, in the late 1970s and early 1980s, leaders of Amsterdam and Copenhagen shifted their investments into bicycling, walking, and public transportation. The results of these massive infusions of capital into bicycle infrastructure and promotion are staggering. Over the past three decades, bicycling has quadrupled in Copenhagen and grown by over 50% in Amsterdam. Today, 35-40% of all trips in Copenhagen and Amsterdam are made by bicycle, with the remaining balance split between public transit, cars, and—to a lesser extent—walking (City of Copenhagen, Langenberg, 2). To handle this massive volume of cyclists and ensure that all cyclists feel safe when riding, Amsterdam and Copenhagen have helped pioneer some of the most advanced bicycle infrastructure in the world. In recent years, both cities have reshaped their traffic management schemes to specifically promote bicycling, using high gas prices and strict parking programs to discourage driving and limit congestion. These factors, plus a lack of automobile infrastructure in the central city, automatically allowed many low speed, low traffic streets to be taken over by bicyclists (similar to some American cities' bicycle boulevards). For high volume, high speed (25-30mph) traffic corridors, bicyclists ride on the cities' distinct cycle tracks: fully separated, designated bicycle lanes, often with colored pavement and specialized traffic lights and signage. Unlike American bike lanes, cycle tracks offer bicyclists the added security of being removed from moving traffic and parked cars along with added visibility because of bicyclists' own specific infrastructure. This sense of safety has been supported by data showing that in spite of

the high number of cyclists, Amsterdam and Copenhagen are also among the safest cities to cycle in the world (City of Copenhagen, Langenberg, 3).



Figure 3—A Cycle Track in Copenhagen. Cycle tracks dramatically improve a bicyclist’s sense of safety by physically separating him or her from automobile traffic.

Even with this already excellent infrastructure and culture, Amsterdam and Copenhagen continue to invest in bicycling. Amsterdam is currently in the middle of a five year, \$160 million campaign to upgrade bicycle infrastructure, especially on the city’s outer edges (City of Amsterdam). Also included in this campaign is a brand new 10,000 space bicycle parking garage at the city’s central train station. Copenhagen, too, has increased funding for bicycle infrastructure to \$15 million per year to help carry out their ambitious plan to increase bicycling to 50% of all trips by 2015 (City of Copenhagen). With this increase, Copenhagen also seeks to decrease bicycle travel times by 10% as well as decrease the number of accidents (City of Copenhagen). While a 39% increase in the next six years might seem crazy for a city that already has an extremely high mode share, Copenhagen has developed two measures that will likely allow them to meet these goals. Copenhagen is currently building a network of greenways

which will essentially act as highways for bicycles, minimizing traffic crossings and allow for speedy bicycle travel directly across the city. Furthermore, the greenways will bridge Copenhagen's canals and travel through parks where automobiles cannot, ensuring that bicycling remains the easiest and most efficient mode of transportation in the city. The second measure is Copenhagen's free bicycle sharing system, in which, for a reasonable deposit, anyone can rent a bicycle whenever he or she needs it, and later return it at a designated sharing station. This project will allow residents and visitors alike to have free on-demand access to oil-less, emissions-less transportation, further increasing bicycle use.

By encouraging a culture of bicycling and providing safe, convenient means for cycling, Amsterdam and Copenhagen's policies have fulfilled the needs of the Five E's and attracted a huge proportion of the Interested but Concerned cyclists to cycle on a daily basis. As other cities struggle with increasing pollution, energy costs, and congestion, the bicycle-first policies of Amsterdam and Copenhagen have left these cities nearly immune from these issues. These examples clearly demonstrate that even in highly dense and congested urban areas, bicycling can serve as a significant and viable mode of transportation.

America's Three Platinum-Rated Bicycling Cities

Like European cities, bicycling was immensely popular in America in the late 1800s and early 1900s, but considerably declined as the automobile gained popularity. While one of America's most automobile dependent cities, Los Angeles, had as much as a 20% bicycle mode share in 1900, the automobile almost completely replaced bicycling since then, and no American city has even come close to the postwar reinvestment in bicycling that Amsterdam and Copenhagen have undertaken (Colville-Andersen). Nevertheless, three cities, Davis, Portland, and Boulder, have shown significant progress in changing cultural attitudes and attracting more

people to bicycle through investments in infrastructure and educational programs. It is no coincidence that these three cities are the only ones which received a “platinum” rating by the League of American Bicyclists. The history of cycling in each of these cities, as well as the measures they have taken to earn the platinum rating, are very different; yet each city has achieved an unparalleled level of success (and potential future success) at promoting bicycle use compared to their American counterparts.

Considered the epicenter of America’s bicycle movement, Davis, California made a full commitment to bicycling from early in its history, earning it the highest bicycling mode share in America until recently. When the University of California—Davis was founded in 1959, Davis was a small town of less than 9,000 residents. Facing enormous growth projections over the next few decades which would turn the intimate town into a sprawling small city, residents and university leaders sought to find a way to grow while preserving the town’s character and preventing congestion. They decided to try something which had never been done before in postwar America: invest a significant amount of transportation funds into bicycling. Between 1967 and 1972, Davis developed the most advanced bicycle network in the nation, essentially inventing infrastructure such as bike lanes and bike racks. This initial investment established the framework for future bicycle-oriented development within the context of an expanding, semi-suburban college town. Although Davis has grown to approximately 65,000 residents plus an additional 31,000 students, the city has maintained its character along with a fairly compact form, while achieving a 17% mode share for bicycling—exponentially greater than the national average of less than 1% (City of Davis, US Census). In spite of an increase in population, bicycling in Davis has remained extremely safe, with nearly half the injuries per capita compared with California’s next best bicycling city, Palo Alto, which has 1/3 the mode share of Davis (City

of Davis). Because bicyclists in Davis feel safe riding on the city's bike paths and bike lanes, Davis has been able to attract a number of Interested but Concerned cyclists, and the majority of Davis' students—elementary through college—bike or walk to school. While bicycling has declined in recent years down from its peak commuting mode share of 25%, Davis seeks to regain this mode share by 2012, investing an average of 1.4 million dollars per year into bicycle infrastructure (City of Davis).

Consistently rated as the most sustainable city in America, Portland has made enormous strides in to encourage bicycling in the past twenty years, giving it the highest commuting mode share for a large city in America. Like Davis, Portland has a progressive and environmentally-conscious ethos which lends itself to supporting alternative modes of transportation. In spite of its wet climate, Portland has been labeled “the Amsterdam of North America” because of its \$55 million investment since 1980 into bicycle infrastructure, creating over 270 miles of bike paths, bike lanes, and bicycle boulevards (Geller, Portland BOT). As a result of infrastructure expansion, educational programs, a free bike program to schoolchildren, wide dissemination of bike maps, and an extensive bicycling website, cycling has tripled since 2001 alone, with 8% of Portlanders primarily commuting by bicycle, as well as an additional 10% which sometimes bike to work (City of Portland Auditor's Office). However, with all these successes, Portland still has enormous potential to capture a greater number of the Interested but Concerned cyclists, given that only approximately \$1.75 million (1%) of the \$150-200 million budget of Portland's Bureau of Transportation goes to bicycle infrastructure (in comparison, Copenhagen allocates 8.5 times more money to bicycling than Portland, and Amsterdam allocates 18 times more money than Portland). This potential could be realized if Portland reconfigures its funding structure closer to that of Boulder, America's newest platinum rated bicycling city.

Boulder, Colorado has experienced one of the greatest transformations as a result of sizeable investments in bicycle infrastructure, demonstrating the true potential of bicycling. While Boulder is considered to be the birthplace of Bike to Work Day in 1977, before the 1980s Boulder was a sprawling automobile-oriented city with very little bicycle infrastructure in place. Since then, Boulder's commitment to bicycling has grown exponentially, reaching as much as 4.5 million dollars in a single year (more per capita than even Amsterdam), or 19% of its total transportation budget (L.A.B.). The results of this high investment have been extraordinary. Boulder enjoys a total of 381 miles of bikeways—108 more miles than Portland even though it has less than one fifth of the population—the majority of which are bike trails that have 74 underpasses to separate cars from bicyclists and pedestrians and make it unnecessary to ever cross a street. In addition, Boulder has in place an extensive bicycle promotion and education system, including the nation's first online bicycle trip planner. These measures have made Boulder an ideal city for bicycling, strongly appealing to even the Interested but Concerned cyclists because of the extensive network of separated bikeways. By appealing to all types of bicyclists, Boulder's bicycle commuter mode share has more than tripled in the past decade, achieving the highest percentage in America at 21.3% in 2008 (City of Boulder, qtd. by Buehler, slide 37). This figure clearly shows that Boulder's innovative government investments into bicycle infrastructure have made an immediate and significant impact on the way its residents travel, dramatically improving the quality of life and lessening the environmental impact of the city.

The success of cycling in cities such as Davis, Portland, and Boulder prove that America's cultural bias against bicycling is not a genetic trait; rather, it results from a complete lack of investment in bicycling by the federal, state, and local governments. Given a safe,

convenient, and attractive option, many more than 1% of Americans will bicycle. Yet, the investments of these cities are moderate at best, which shows that America is much closer to approaching Amsterdam and Copenhagen than one would think.

The Path to a Cycling Society

When examining the investments into bicycling of Davis, Portland, and Boulder, it is important to keep the costs of these projects in perspective. As Roger Geller points out, “The total three-decade investment in Portland’s 300-mile network of bikeways would not fund the construction of even half of one modern freeway interchange,” and the return of these investments, increasing commuting mode share from less than 1% up to as high as 8% mode share, is nothing short of “extraordinary.” In 2008, Geller coauthored a study with the Rails to Trails Conservancy and other local government officials entitled “The Case for Federal Support for Bicycle and Pedestrian Improvements in the City of Portland and Portland Metropolitan Region.” This study seeks to quantify the investment needed to begin to attract the all-important 60% of Interested but Concerned cyclists, including the development of cycle tracks, bicycle boulevards, safer street crossings, colored bikeways (especially in key right turn locations), and network connectivity. Geller concludes that \$100 million--50 million for the city and 50 million for the region--could increase mode share 25% in the city and 8.5% (from about 3%) in the region in just 15 years. Portland’s path to a 25% mode share is likely much less costly than that other cities, but this example shows that a nationwide campaign to invest in bicycling would be relatively inexpensive.

For a good estimate on what it would cost to raise bicycle commuter mode share to 25% nationwide in 10-15 years, America must follow Boulder, Amsterdam, and Copenhagen’s model

of around \$30 per capita, which translates to \$9 billion per year (a tenfold increase in funding)³. These funds would be spent on a variety of improvements, from bicycle boulevards, the most cost effective bicycle infrastructure at 20,000-200,000 per mile, to bike trails and cycle tracks, the most appealing bicycle infrastructure at around one million per mile⁴ (L.A.B.). Many cities would have to start from scratch, but with the appropriate funds, nearly all cities could potentially attain a platinum bicycle rating. However, as Geller shows, improvements for cities like Portland which have already invested in bicycling would cost much less.

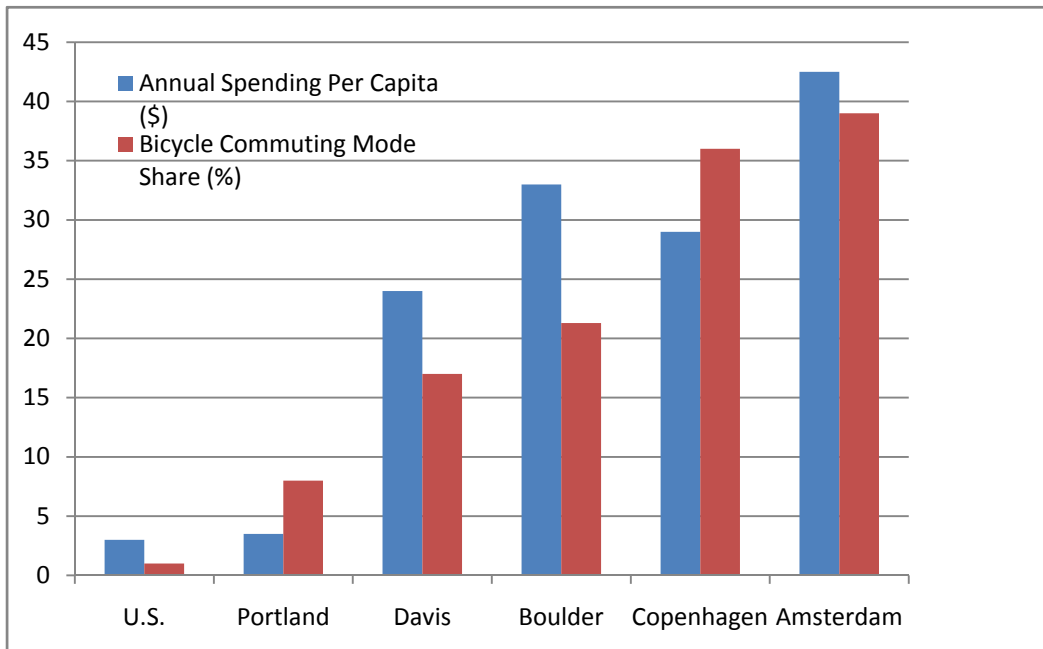


Figure 4—Bicycle spending per capita compared with commuting mode share for America’s three “platinum” rated bicycling cities, as well as Amsterdam and Copenhagen⁵. Sources: Portland BOT, Amsterdam DITT, Copenhagen DOT, US DOT, City of Davis, City of Boulder

\$9 billion per year for bicycle infrastructure may seem like a lot of money, but put into context with total highway spending and the potential benefits, this cost is extremely cheap.

³ This estimate is made by multiplying \$30 per capita by the approximate population of the U.S. of 300 million people

⁴ A single mile of a new highway generally costs between \$20 and \$80 million per mile (ATFA)

⁵ While commuting mode share does not explain people’s full transportation patterns, it serves as a helpful metric to compare cities’ bicycle use.

Figure 4 compares the per capita spending of various cities with their bicycle mode share. While Boulder, Colorado spends the most per capita on bicycle infrastructure improvements in the U.S., its 30 dollars per capita is dwarfed by the approximately \$580 per capita spent by Americans on road and highways. Considering road and highway spending totals approximately 175 billion per year for federal, state, and local governments (not including an additional 27.5 billion from the stimulus package), \$9 billion in bicycle spending would account for only 5% of total road spending, rather than the current less than 1% (US Census qtd. by Sourcebook, ARRA). However, the environmental, energy, congestion, and health benefits would be even greater. A 25% bicycle mode share would mean a nearly 25% reduction in emissions, oil consumption, and congestion from automobiles, as well as a nearly 25% increase in the number of Americans who actively commute everyday. These benefits, combined with measures to improve automobile efficiency, lower carbon content in fuels, and expand public transit, would put America well on its way to achieving Obama's environmental and energy goals in the transportation sector. Furthermore, when comparing this cost of nine billion to the aforementioned cost of trillions of dollars for better cars and new infrastructure for an equivalent result, bicycle spending proves to be over a thousand times more cost effective than automobile spending and could take effect decades sooner. Factoring in health savings, congestion savings, fuel savings, and emissions savings, a \$9 billion investment in bicycling would be among the most cost-effective investments America could make.

Conclusion

America in the 21st Century faces a multitude of problems which directly relate to our transportation choices, ranging from Climate Change to oil dependence to increasing congestion to worsening public health. The solution to these problems lies in a mixed approach. America

cannot continue the status quo of relying solely on the automobile for transportation—no matter how efficient—and still expect measureable reductions in emissions, energy use, traffic, and obesity. Federal, state, and local governments must invest in a variety of modes of transportation, including automobiles, public transportation, bicycling, and walking. The automobile will always play a role in transportation in America, but it is time to stop pouring all of our transportation resources into a single mode, especially as volatile gas prices cause many Americans to desire alternative forms of transportation.

A modest investment in bicycling would result in a significant mitigation of the problems created by the automobile. Investments in bicycling are a proven success because of their low cost and numerous benefits to both the individual and the country. America by no means must become a nation of bicyclists; rather, incremental improvements, such as achieving a 25% mode share for bicycling and walking for short trips, can have immediate and tangible effects in both fostering healthier and more livable communities locally and decreasing pollution and oil consumption nationwide. Bicycling can work in America; like investing in highways, investing in bicycle infrastructure also creates induced demand, shown through the increase in cycling in cities such as Davis, Portland, and Boulder after modest investments in infrastructure. American cities lag behind cities with considerable bicycle mode share such as Amsterdam and Copenhagen not because of a lack of public will, but because of a lack of government investment. The biggest challenge in achieving a higher mode share in America is developing a sufficient amount of safe and convenient infrastructure to attract all Four Types of Cyclists.

The only way to overcome this challenge is to overcome the unfounded, nonsensical, and biased claims of leaders such as House Minority Leader Boehner and Senator DeMint and fund bicycle infrastructure. The federal government, including the Obama administration, must face

the facts that investments in bicycling have enormous practical value and are not wasteful “pork barrel” enhancements or beautification projects. If America truly wants to realize Obama’s imperative goals of reducing emissions, achieving energy independence, relieving congestion, and improving public health in a timely and cost-effective manner, the federal government must usher in a new era of sustainable transportation funding in which bicycling, along with public transportation and walking, plays a major role. As Mia Burk, Portland’s former city bicycle coordinator explains: “There is no better investment that the city has made than in bicycle infrastructure and promotion. It has been an incredible bang for the buck.” (Democracy Now!).

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