Transportation Policies for America's Future

Strengthening Energy Security and Promoting Economic Growth

FEBRUARY 2011

ENERGY SECURITY LEADERSHIP COUNCIL

Securing America's Future Energy

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Statement of Purpose

Hostile state actors, insurgents, and terrorists have made clear their intention to use oil as a strategic weapon against the United States. Steadily rising global oil prices add to the danger by exacerbating tensions among consuming and producing nations. Even in the absence of full-blown geopolitical crises, oil dependence, with its incumbent exporting of American wealth, exacts a tremendous financial toll on our country. Excessive reliance on oil also constrains the totality of U.S. foreign policy and burdens a U.S. military that stands constantly ready as the protector of last resort for the vital arteries of the global oil economy.

The Energy Security Leadership Council believes that America's energy security can be fundamentally improved through major reductions in oil demand. More stringent fuel efficiency standards and the rapid expansion in the use of alternative fuels are just two critical components of an overall strategy. The third is our surface transportation infrastructure itself. Our transportation network exists almost in a vacuum, with virtually no connection between how it is designed, how it is funded, and how American families and businesses use it every day. The result is an inefficient system in which system needs are out of alignment with investment, cost is out of alignment with usage, and congestion is threatening to undermine the potential gains associated with recent improvements in vehicle technology and fuel diversification. We require a system based more closely on a true supply and demand model, in which assets are allocated based on needs, and costs are aligned with use, helping to restore the mobility upon which our dynamic economy depends.

Our mission is to secure the support of a bipartisan coalition that is committed to strengthening and revitalizing the nation's transportation system.

U.S. Oil Consumption

70% Transportation Sector | 30% Other Sectors

The United States transportation sector consumes 14 million barrels of oil per day, more than any other nation's entire economy. The cars and trucks that form the core of our surface transportation system are almost completely dependent on petroleum, with no readily available substitutes.

Source: Annual Energy Outlook (AEO) 2010; BP Statistical Review of World Energy 2010.

Introduction

Oil dependence represents a profound threat to American economic and national security.

Almost 40 percent of total U.S. primary energy demands are met by oil, giving it an economic significance unmatched by any other fuel.[1] Oil dependence constrains our foreign policy, forcing the U.S. military to accept the responsibility of securing the world's oil supply. Sending almost $1 billion abroad each day to pay high and volatile oil prices drains our economic resources and strengthens countries that are often hostile to U.S. interests. In 2010 alone, American businesses and consumers are estimated to have spent more than $700 billion on gasoline, diesel, and other refined petroleum products.[2] This expenditure represents approximately 5 percent of the nation's total gross domestic product.[3]

Despite transportation accounting for 70 percent of U.S. oil consumption, energy and transportation policy have historically been devised and implemented in wholly disparate spheres. Transportation projects, whether highways, public transit, or port upgrades, are neither developed nor operated with any consideration for energy use. In fact, our transportation infrastructure policy today is at odds with efficient energy consumption objectives.

The United States has made genuine progress toward advancing energy security in the last decade. The Energy Independence and Security Act of 2007 and subsequent rulemakings in 2009 and 2010 marked the first substantial improvement to the nation's fuel economy standards in more than 30 years. The American Recovery and Reinvestment Act of 2009 directed significant investment towards the development of alternative fuel vehicles and the technologies and infrastructure necessary to profitably build and deploy those vehicles.

However, vehicle technology (e.g. fuel economy standards) and fuels (e.g. alternative fuel subsidies and mandates) represent just two pillars of the transportation equation. The third pillar—infrastructure—is also critical to addressing our energy challenges. Infrastructural improvements do not in and of themselves offer the opportunity to reduce oil consumption by a similar quantity as the other two pillars, but absent them, congestion could otherwise prevent the realization of gains associated with better vehicles and fuels. Under the current policy path, millions of efficient vehicles powered by a more diverse set of fuels will still waste countless barrels of oil sitting idle in gridlock and operating in inefficient stop/start driving conditions. Substantial reform of how we fund and operate our transportation infrastructure is the only way to alter this dangerous course.

The nation's current federal surface transportation legislation—which funds more than $50 billion a year in highway and transit programs—expired in September 2009, and is currently operating under its sixth short-term extension, which expires on March 4, 2011. A growing confluence of factors makes the next surface transportation reauthorization bill a unique opportunity to improve our country's transportation strategy and to bring it into alignment with our national strategic energy interests. Those factors include: a growing bipartisan policy consensus that status quo solutions are incapable of producing positive results; the fiscal collapse of the federal Highway Trust Fund (HTF), which has focused policy attention on alternative funding mechanisms; growing public discontent with deteriorating transportation performance; and advances in information technology.

Through a relatively small set of specific reforms, we can reduce our oil dependence, restore the mobility to which we aspire, and sustainably fund our transportation system to ensure that it can meet the needs of a growing and economically vibrant nation for years to come. Equally important, we can begin to restore public confidence that taxpayer dollars will be spent on projects that make economic sense.

Reforms should address two key areas. First, they should establish a measurable and accountable national transportation objective to reduce our system's dependence on oil. Second, reforms should lead to smarter capital investments in highways, transit systems, and advanced technologies that encourage higher operating efficiency. Successful measures can: empower transportation system users by giving clear signals of the cost of their travel decisions; expanding the menu of travel options; and promoting competition in the provision of infrastructure and related services. The transportation system can and should attempt to unleash many of the same competitive market forces that have driven innovation in other major sectors of the economy to the dual benefit of system users and the nation's energy security.

1 BP Statistical Review of World Energy 2010, at 41.

2 Energy Information Administration (EIA), Short Term Energy Outlook (STEO), and Weekly Petroleum Status Report.

3 United States Bureau of Economic Analysis (BEA).

Summary of Recommendations

The recommendations outlined in this paper will transform the nation's transportation policy, introducing a more market-oriented model and instituting oil consumption as a key metric by which decisions are made and evaluated. These recommendations will replace the existing indirect fees, inefficient investments, misaligned incentives, and overburdening regulations with a system that relies on market signals, offers more consumer choices, and ultimately provides Americans a more efficient, more effective network of roads and rails.

RECOMMENDATIONS

Establish national standardized system performance metrics within the Department of Transportation, and at the state level where projects receive federal funds, with reducing oil consumption as a principal performance metric. Elements of this recommendation include:

a. Ensuring that federally-supported programs and projects implement standardized performance metrics with clear objectives and comprehensive cost-benefit analysis forming a foundation. Performance metrics include projected fuel savings, travel delay reductions, increases in travel reliability, state of good repair considerations and reductions in fatalities; and
b. Enhancing USDOT's data and analytical capacity to support real performance metric setting.

Create a new federal formula program funded—by consolidating and eliminating duplicative programs—equal to 25 percent of total annual federal transportation funding, and focused on improving transportation system performance in metropolitan areas specifically (including urban and suburban locations). The program's elements include:

a. Reducing highway congestion (as opposed to simply slowing growth) within five years through the deployment of leading technologies, operational/pricing strategies, and targeting new capacity investments toward acute bottlenecks;
b. Encouraging economically justifiable alternatives to single-occupant travel in internal combustion vehicles; and
c. Dedicating any surplus revenues generated beyond those needed to fully cover allocated system costs for reinvestment in projects tied directly to the achievement of overall performance objectives.

Create a $5 billion-per-year competitive program that makes funds available to congested metropolitan areas for comprehensive proposals that seek to design and deploy:

a. Dynamic tolling projects that reduce congestion;
b. Performance-based technology investments that target a range of operational improvements, including advanced traffic signals, interoperability of electronic payment systems, quick clearance of accidents and improved driver information;
c. Public transportation solutions that can be quickly deployed and are part of an overall system performance strategy; and
d. Other travel demand management initiatives.

Establish a Freight and Intercity Infrastructure Enhancement Program to maintain and improve highway and passenger rail capacity outside of metropolitan areas and along major freight corridors. Up to 10 percent of total annual federal transportation funding would be allocated as follows:

a. 80 percent of funding would be distributed by formula directly to states in the form of block grants that could be used for any transportation investments that have a substantial impact on interstate commerce and energy savings and are consistent with overall performance objectives established in statewide transportation plans.
b. 20 percent of funding would be invested on a discretionary basis to nationally significant and meritorious intercity highway and rail projects with a clear emphasis on those that specifically improve the efficiency of freight and goods movement.

Remove federal legal restrictions on state tolling/pricing of new road capacity and any existing road where it can be shown that such pricing would bring about congestion relief, and help improve the ability of state and local governments to finance transportation improvements.

Actively promote the long-term deployment of a comprehensive, privacy-protective VMT fee that adequately accounts for fuel consumption externalities. This should include cost sharing with states for system infrastructure, and funding for a limited number of promising demonstration projects and technological research.

Pilot new approaches to pre-development regulations for projects that are expected to achieve substantial and ongoing oil savings.

The Energy Security Leadership Council's sole policy purpose is to mitigate the threats posed by American oil dependence, and the recommendations in this report are specifically intended to reduce sectoral oil consumption. Transportation issues in general and the reauthorization of the surface transportation bill in particular will involve a wide-ranging debate among a significant number of different stakeholders. The Council takes no formal position on those topics, issues, and policies for which oil savings play little to no role.

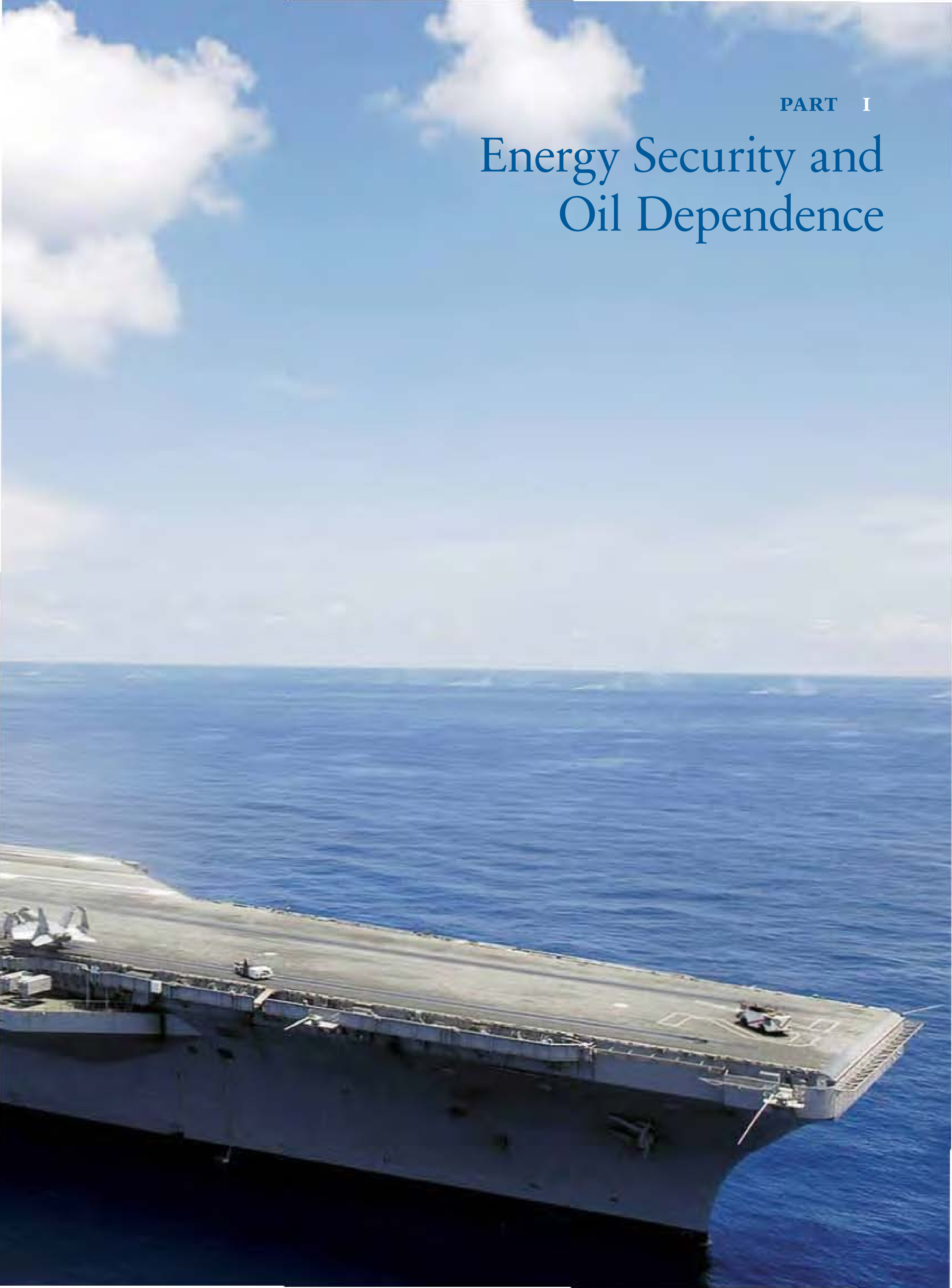
Projected Oil Savings

		BARRELS PER DAY (Thousands)		CUMULATIVE BARRELS (Millions)	
		2020	2035	2020	2035
Urban-Area/Cordon Pricing Program (2012-2035)	Total	96-532	133-752	233–1,280	860-4,789
Travel Demand Management Programs (2012-2035)	Carpooling	35	97	64	433
	Alternative Work Weeks	8	22	14	96
	Telecommuting	9	21	16	96
	Total	51	140	94	626
Tolling Program Alternatives (2012-2035)	Total	123-167	149-201	307-416	1,055-1,425
VMT Fee Alternatives (2020-2035)	Revenue Neutral Total	0	13-16	0	39-53
	Above Revenue Neutral Total	0	45-188	0	192-844

Note: Ranges represent high and low cases used in modeling scenarios; these cases are explained in more depth in Policy Modeling sections A through D.

PART I

Energy Security and Oil Dependence



A Decade of Instability and Rising Oil Prices

Each day, Americans consume nearly 20 million barrels of petroleum—more than one-fifth of total global oil demand.

Through 2007, imports accounted for more than 12 million barrels per day (mbd) of U.S. petroleum supplies. Even today, following a recession that depressed economic activity and oil demand, more than 50 percent of the oil we consume is imported.[1] Since early 2007, oil prices have risen from $50 per barrel to almost $150 per barrel, back down under $40 per barrel, and back up once again above $90 per barrel.[2] In this era of high and volatile prices, such a level of consumption is extremely costly, both for the economy and the broader national interest.

Global oil production is increasingly concentrated in the hands of a small number of nations, many of which are hostile to U.S. interests and afflicted by some combination of extreme poverty, rampant corruption, and political instability. These localized factors can have a significant impact on the price of oil paid by consumers around the world, because oil is a fungible, global commodity and a change in supply or demand anywhere generally affects prices everywhere.

In recent decades, oil price spikes were most often the result of sudden changes in oil supply caused by geopolitical crises. For example, between 1978 and 1981, Iranian oil production fell by 74 percent—from 5.2 mbd to 1.4 mbd—as the Iranian revolution and subsequent war with Iraq decimated the domestic oil industry.[3] As a result, the price of oil more than doubled from $14 per barrel to around $36 per barrel (over $90 per barrel in today's prices).[4] Though these types of price spikes could and often did inflict significant global economic damage, they also were temporary.

More recently, high and volatile oil prices have been the result of factors that should be considered structural as opposed to transitory. Strong economic growth in developing countries like China and India has added a new component to the world oil demand picture. In total, world demand for oil increased by 10 percent between 2000 and 2009, and fully 100 percent of this growth occurred in developing nations.[5] In fact, demand in the world's most developed nations—the 32 members of the Organization for Economic Cooperation and Development (OECD)—fell over this period.

The transportation sector is the main driver of future oil demand growth, accounting for 97 percent of the projected increase through 2030.[6] China and India are forecast to increase oil consumption in their transportation sectors alone by more than 8 mbd between 2007 and 2030.[7] While some concerns regarding the sustainability of economic recovery in rapidly developing nations have been raised, it is notable that oil demand growth does not seem to have been significantly affected.

As a result of this rising demand in emerging markets and the inability of suppliers to meaningfully expand production capacity, the global oil market operated on thin margins throughout the period from 2003 to 2008. Spare capacity—OPEC's surplus production capacity—was above 6 mbd as recently as 2002, equal to 7 percent of global daily demand.[8] By mid-2008, however, spare capacity dwindled to 1 mbd, only slightly more than 1 percent of daily demand.[9]

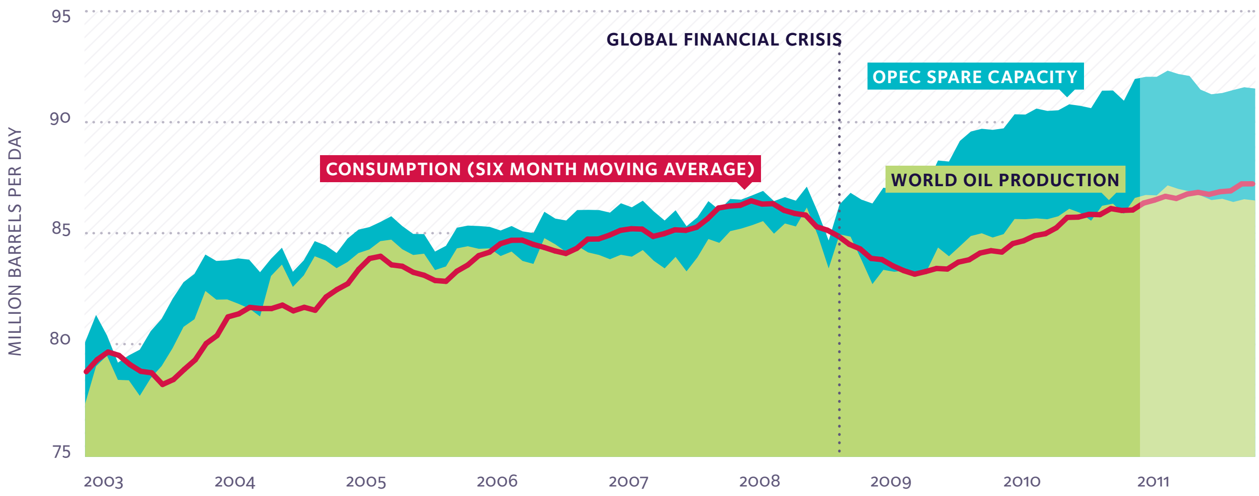
In such an environment, even small perturbations in supply or demand could cause large price swings. A hurricane in the Gulf of Mexico, violence in the Niger Delta, or an oil worker strike in Venezuela—any one of these could lead to sudden and potentially calamitous spikes in the price of oil as markets adjust their expectations about the supply-demand balance and risks to future crude oil deliveries. This market tightness, combined with a period of heightened global instability, drove oil prices steadily, almost relentlessly higher for nearly a decade. In 2003, real oil prices averaged $32.94 per barrel. The annual average price per barrel rose every year afterward, reaching $70.31 in 2007 and $93.17 in 2008.[10]

Despite the current economic environment, the underlying factors that led to record oil prices in 2008 have not substantially changed. Demand growth for oil

1 EIA, Weekly Petroleum Status Report.
2 EIA, Petroleum Navigator, Spot Prices.
3 EIA, Annual Energy Review (AER) 2009, Table 11.5.
4 BP Statistical Review of World Energy 2010, at 16.
5 EIA, STEO.
6 International Energy Agency (IEA), World Energy Outlook (WEO) 2009, at 82.
7 Ibid.
8 EIA, STEO.
9 EIA, STEO, October 2009.
10 Ibid.

FIGURE I.I

World Oil Production Capacity and Demand



Source: EIA.

products—particularly in the industrialized world—has temporarily subsided, to be sure.[11] But this reduction was not the result of any fundamental change in technology, policy, or infrastructure. Rather, it was simply the result of reduced economic activity. As this activity has resumed, demand for all energy—including petroleum—has increased, particularly in emerging economies, some of which subsidize the purchase of petroleum products, and all of which require high rates of economic growth to accommodate population growth. Having fallen from more than 86 mbd in 2008 to 85 mbd in 2009, global consumption is forecast to have exceeded 87 mbd in 2010 and average 88.8 mbd in 2011.[12] Assuming no changes in government policies, by 2030 the International Energy Agency (IEA) expects that world demand for petroleum will increase to 105.2 mbd. Of the growth, fully 100 percent is forecast to occur in the developing world, with 61 percent expected in China and India alone.[13]

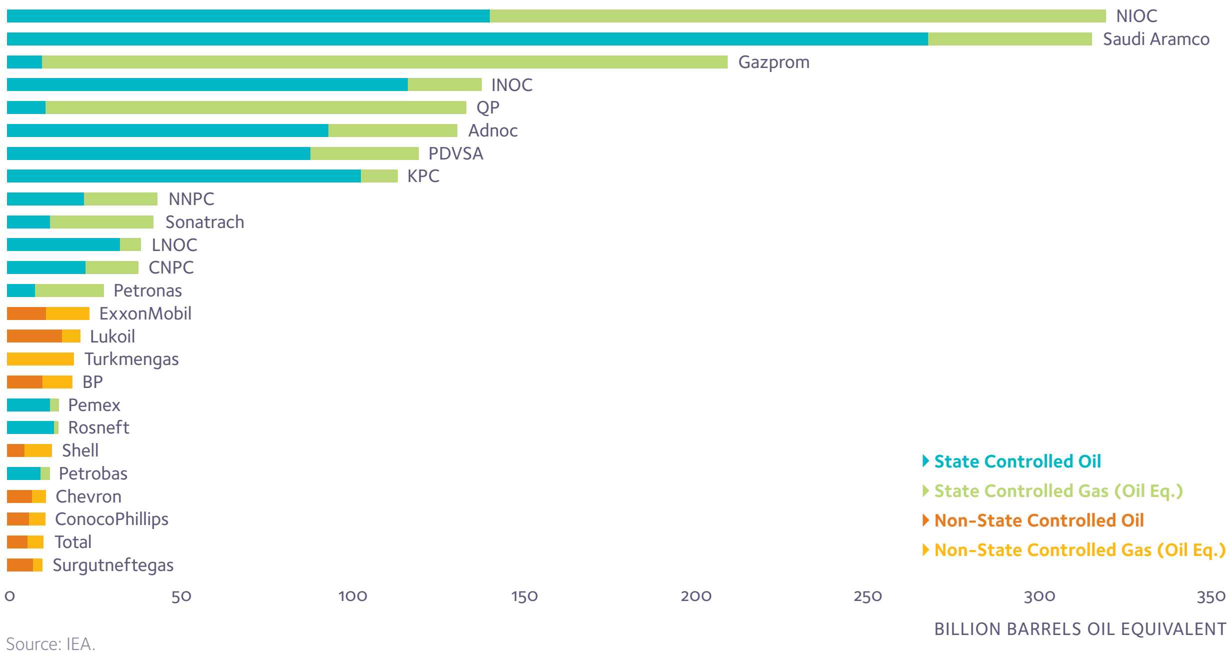
Oil prices may be a function of the laws of supply and demand, but oil markets do not operate freely. At least 78 percent—and by some estimates as much as 90 percent—of global oil and gas reserves are held by national oil companies (NOCs) that are either fully or partially controlled by foreign governments.[14] NOCs often do not have the same incentives as privately-owned companies. They do not necessarily operate as profit maximizing firms. Many function essentially as branches of their respective central governments, depositing oil revenues into the treasury, from which they are often diverted to other government programs instead of being reinvested in new energy projects.[15] This process stunts expansion of production capacity in favor of other government spending.

As a result of their reserve dominance, NOCs will increasingly determine the fate of world oil production. In order to meet expected demand growth, the IEA now forecasts that nearly all the growth in future oil supplies will need to come from NOCs, both within OPEC and beyond. By 2030, well over 60 percent of global oil supplies are forecast to originate with NOCs, but only if adequate investments are made in expanding production capacity.[16] More likely, the status quo trend of constrained supply growth is likely to continue over the long term.

Meanwhile, the fraction of global oil reserves that is accessible to international oil companies (IOCs) is growing increasingly complex and costly to produce.[17] In addition to the typical costs for pipelines, tankers, and refineries, IOCs must now invest significant additional capital per barrel of oil produced for specialized drilling equipment, oversized offshore platforms, and advanced upgrading facilities. As a result, the marginal cost of production for a barrel of non-OPEC oil has increased

11 EIA, AER 2008, at 152-157.
12 IEA, Medium Term Oil Market Report, December 2010.
13 IEA, WEO 2009, at 81.
14 EIA, Energy in Brief, "Who Are The Major Players Supplying The World Oil Market?"
15 Valerie Marcel, "States of Play," Foreign Policy, (September/October 2009).
16 IEA, WEO 2008.
17 WEO 2008, at 343-353; Bernstein Research, "Global Integrated Oils: Breaking Down the Cost Curves of the Majors, and Developing a Global Cost Curve for 2008," at 14-34, (February 2009).

FIGURE 1.2 Proved Oil and Natural Gas Reserves



Source: IEA.

rapidly in recent years.[18] Currently, the break-even price for Canadian oil sands is estimated at between $60 and $80 per barrel.[19] For projects in the Gulf of Mexico, marginal costs are estimated to be around $73 per barrel.[20] Drilling delays and new regulatory costs—a potential consequence of the Gulf of Mexico oil spill—could raise the marginal cost of new deepwater production by an additional 10 percent.[21] Promising basins off the coast of Brazil and in the North Caspian near Kazakhstan are even more complex and costly.[22]

With these factors in mind, a strong case can be made that relatively high oil prices are here to stay. Political instability, resource nationalism, and geological challenges will likely continue to constrain oil supply growth for the foreseeable future. Moreover, the recent economic recession—partially triggered by high oil prices—has compounded the problem. Falling oil prices in late 2008 led to widespread investment deferrals, and while some projects have been advanced on the back of higher crude prices, lower costs, and an uptick in spending, extended project lead times endure. In its 2010 Medium Term Oil and Gas Markets Report, the IEA forecasts that a strong economic recovery would decrease OPEC spare capacity beginning in 2011. IEA estimates place spare capacity at 3.5 mbd by 2015, but analysts note that the declining trend itself suggests that more nervous markets could re-emerge.[23]

It remains, however, impossible to forecast with absolute certainty that oil prices will remain high. Advances in technology and ambitious upstream investment programs could keep oil prices closer to their long-run average. More likely, prices could continue to follow a pattern of high volatility: sharp spikes followed by periods of relative calm, consistent with the pattern since the early 1970s.

18 Bernstein Research, "Global Integrated Oils: Breaking Down the Cost Curves of the Majors, and Developing a Global Cost Curve for 2008," at 34, (February 2009).

19 Marianne Stigset, "Production Costs Climb for Canadian Oil Sands, Companies Say," Bloomberg Businessweek, (June 2, 2010).

20 Energy Information Administration, "Performance Profiles of Major Energy Producers 2008," Table 11.

21 Anna Driver, "Spill may cut world oil supply 500,000 bpd-report," Reuters, (May 28, 2010).

22 See, e.g. Bernstein Research, "Global Integrated Oils: Kashagan - Better Late Than Never - Our Annual Update & Implications For The Owners," (October 1, 2008).

23 IEA, Medium-Term Oil and Gas Markets 2010, at 15 (June 2010).

National Security

Throughout the 20th century and into the 21st, the United States remains the only nation with the capacity to protect vulnerable energy infrastructure and supply routes.

This capability, combined with the critical importance of oil to the U.S. economy, has forced the nation to accept the burden of securing the world's oil supply. Much of the infrastructure that delivers oil to the world market each day is exposed and susceptible to attack in unstable regions. More than 50 percent of the world's oil supplies must transit through one of six maritime chokepoints, narrow shipping channels like the Strait of Hormuz between Iran and Oman.[24] Even a failed attempt to close one of these strategic passages could cause global oil prices to rise rapidly from current levels. A successful and extended closure could result in severe economic consequences.

To mitigate this risk, U.S. armed forces expend enormous resources patrolling oil transit routes and protecting chronically vulnerable infrastructure in hostile corners of the globe. This engagement benefits all nations, but comes primarily at the expense of the American military and ultimately the American taxpayer. A 2009 study by the RAND Corporation placed the cost of this defense burden at between $67.5 billion and $83 billion annually, plus an additional $8 billion in military operations.[25] In proportional terms, these costs suggest that between 10 and 13 percent of the current defense budget is devoted to guaranteeing the free flow of oil. And that is to say nothing of the grave responsibility of putting American military personnel in harm's way.

Fuel consumption by the armed forces has also increased substantially over time. Between the Vietnam War and the 21st century conflicts in Iraq and Afghanistan, there has been a 175 percent increase in fuel used per U.S. soldier per day. Today's consumption of 22 gallons per day represents an average growth rate of 2.6 percent in the last 40 years, and 1.5 percent annual growth is expected through 2017.[26] In 2009, the Department of Defense spent $9.6 billion on fuel for vehicles and other equipment (approximately three-quarters of total department energy expenditures).[27] Jet fuel was the military's largest fuel requirement at $7.3 billion.[28]

Patrolling oil transit routes and protecting infrastructure is estimated to cost the U.S. military between $67.5 billion and $83 billion annually.

24 EIA, World Oil Transit Chokepoints, http://www.eia.doe.gov/cabs/World_Oil_Transit_Chokepoints/Background.html.

25 RAND Corporation, "Imported Oil and U.S. National Security," at 71 (2009).

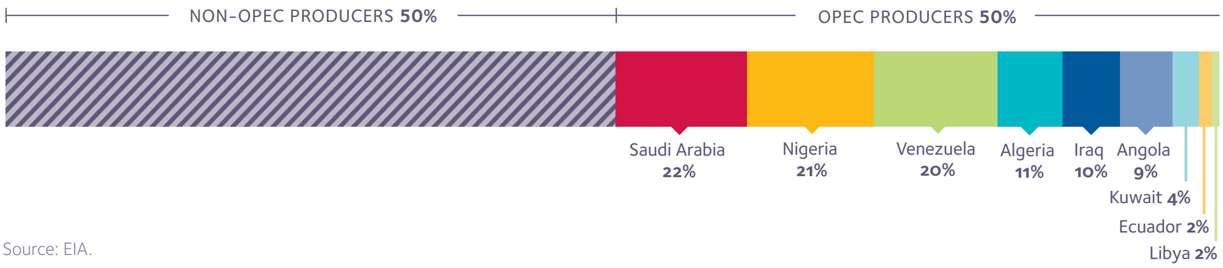
26 Deloitte, "Energy Security America's Best Defense," (2009).

27 Department of Defense, "Annual Energy Management Report Fiscal Year 2009," (May 2010).

28 Ibid.

U.S. Oil Imports by Origin

FIGURE 1.3



Source: EIA.

Economic Security

American businesses and consumers are estimated to have spent approximately $750 billion on gasoline, diesel, and other refined products in 2010—up from less than $600 billion in 2009.

Though the United States remains the world's third largest petroleum producer, U.S. oil production has decreased dramatically from its peak in 1970 as the size of new discoveries has fallen and the productivity of new wells has declined.[29] As a result, America now imports more than 50 percent of the oil that it consumes, at tremendous cost to the current account balance.[30] In 2008, when oil prices peaked, the United States sent $388 billion—56 percent of the total trade deficit—overseas to pay to import crude oil and petroleum products.[31] In the midst of our nascent economic recovery, expenditures for imports of crude oil and petroleum products are estimated to be over $300 billion in 2010.[32] Our dependence on oil, and the need to import it in vast quantities, means that we essentially begin every year with a trade deficit of several hundred billion dollars, undermining the strength of our currency and our economy.

With oil prices averaging nearly $100 per barrel, OPEC earned a record $971 billion in net oil export revenues in 2008, a 42 percent increase from 2007. Saudi Arabia earned the largest share of these earnings, $288 billion, representing 30 percent of total OPEC revenues.[33] Based on November 2010 oil price projections, the Department of Energy (DOE) forecasts OPEC net export revenues to be $750 billion in 2010 and $847 billion in 2011.[34] OPEC is expected to provide more than half of the world's oil supplies by 2030, significantly increasing the net oil trade surplus in the Middle East.[35]

Direct wealth transfer is but one of the many economic costs of U.S. oil dependence. Researchers at the Oak Ridge National Laboratories (ORNL) have shown that significant economic costs stem from the temporary misallocation of resources that occurs as a result of sudden price changes. Specifically, budgeting and financial decisions for both businesses and households become more difficult, affecting long-term economic activity. ORNL has also shown that the existence of an oligopoly inflates oil prices above their free-market cost, which reduces economic activity by forcing the diversion of resources to cover the cost of oil. In total, they have calculated that oil dependence cost the nation almost $5 trillion between 1970 and 2009.[36] Since 2005, these costs, which include wealth transfers, potential GDP loss, and macroeconomic adjustments, have risen to an average of more than $350 billion a year, and topped $480 billion in 2008.[37] This burden is simply unsustainable.

Notably, every recession over the past 35 years has been preceded by—or occurred concurrently with—an oil price spike. In general, recessions are caused by a myriad of factors and are damaging to nearly all sectors of the economy. And yet, oil price spikes tend to exact a particularly heavy toll on fuel-intensive industries like commercial airlines and shipping companies. Automobile manufacturers suffer disproportionately as well, as consumers scale back large purchases. The most fundamental impact is on consumer spending. When oil prices spike, consumers must spend more on gasoline, leaving them less to spend on everything else. Because consumer spending accounts for approximately 70 percent of U.S. economic activity,[38] sharp increases in the price of petroleum therefore represent a significant threat to the health of the U.S. economy.

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29 AER 2008, Tables 5.1 and 5.2.

30 EIA, Weekly Petroleum Status Report.

31 AER 2008, Table 3.9; "U.S. International Trade in Goods and Services Highlights," U.S. Census Bureau, Foreign Trade Statistics, February 2010.

32 U.S. Census Bureau, International Trade in Goods and Services.

33 "OPEC Revenues Reduce," Forex & Currency Trading, (February 13, 2009).

34 EIA, OPEC Revenues Fact Sheet , Short Term Energy Outlook, December 2010.

35 IEA, WEO 2009, Table 1.4, at 83-84.

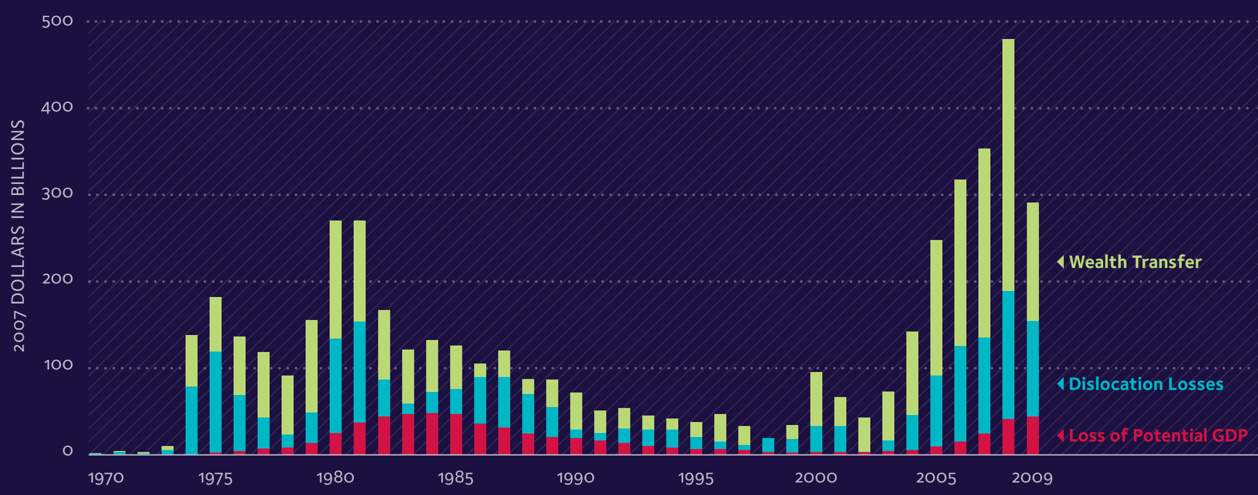
36 David L. Greene and Janet L. Hopson, "The Costs of Oil Dependence 2009," Oak Ridge National Laboratory, U.S. Department of Energy.

37 Ibid. Wealth transfer is the additional cost of sending U.S. dollars abroad to pay for foreign oil over and above the competitive price. Other GDP losses represent the cost imposed on the economy by the market failure in the world oil market. The macroeconomic adjustment costs of adjusting to volatile prices reflect the fact that as household (and business) expenditures on oil products rise, there is less disposable income to spend on other things, a significant problem in an economy that is driven largely by consumer spending.

38 Bureau of Economic Analysis, National Income and Product Accounts, Table 1.1.5.

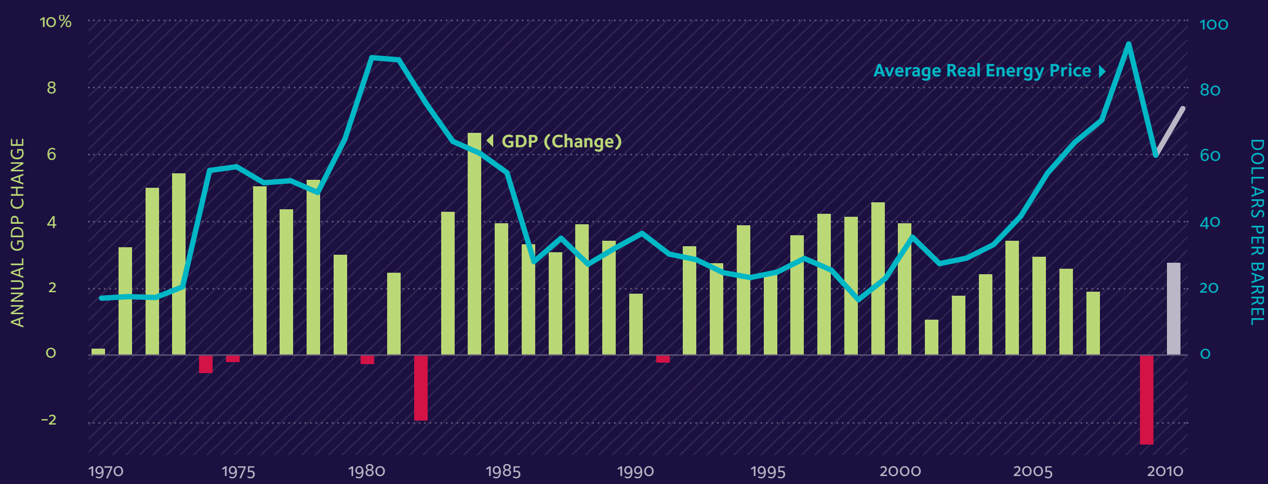
Economic Costs of U.S. Oil Dependence

FIGURE 1.4



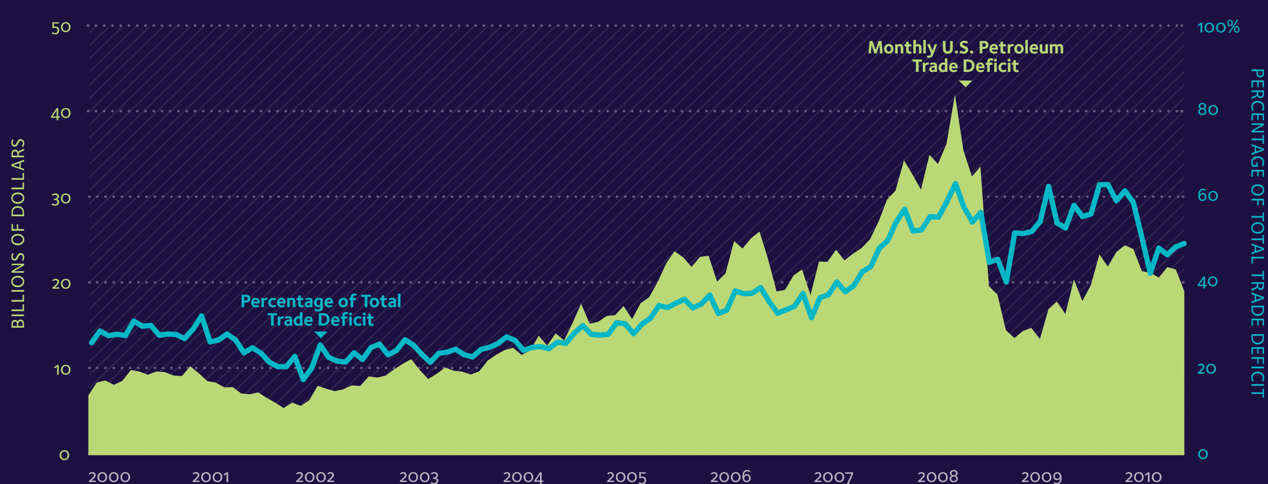
Oil Prices and Economic Growth

FIGURE 1.5



Monthly U.S. Petroleum Trade Deficit

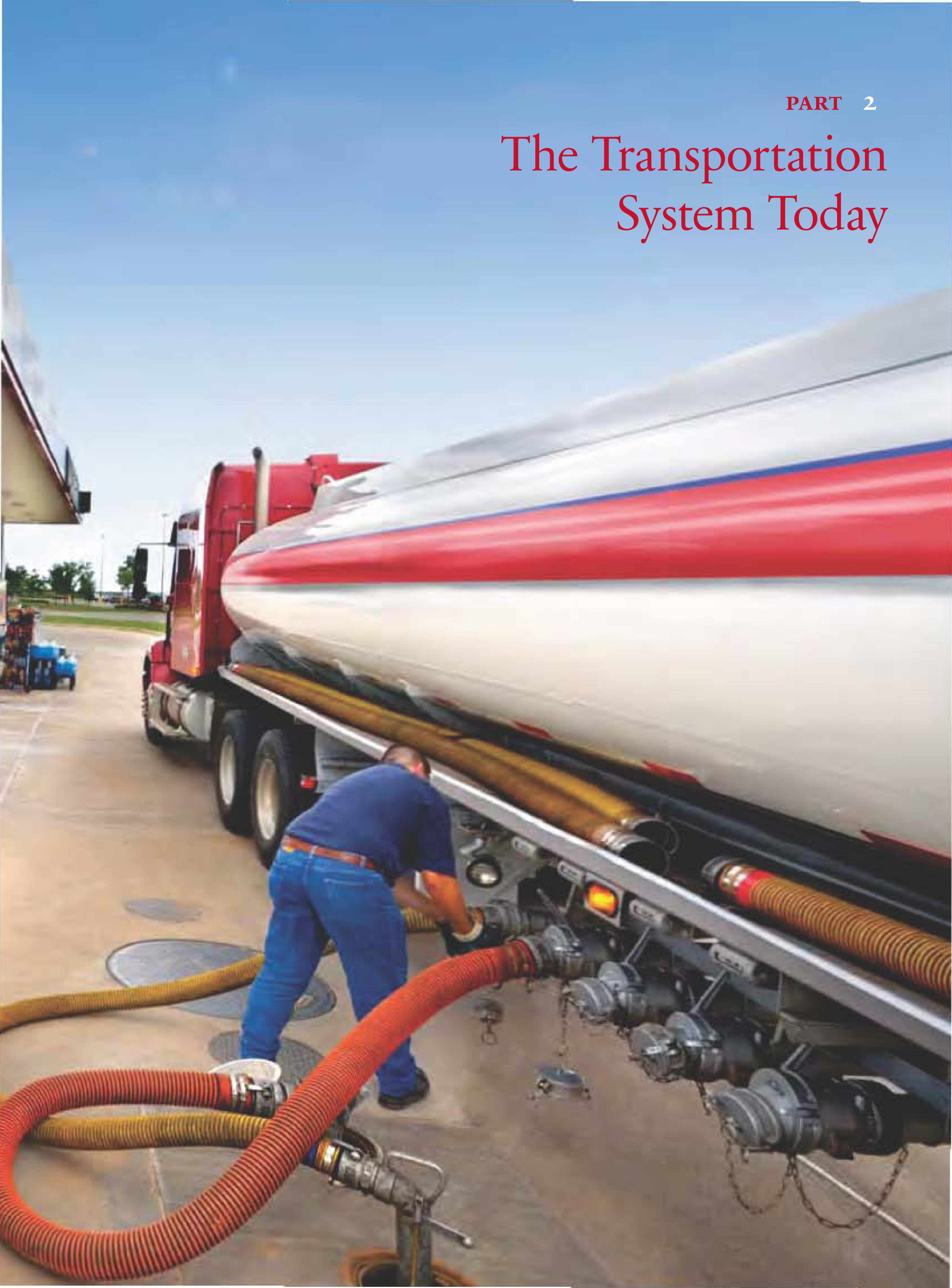
FIGURE 1.6



Sources: Figure 1.4 — ORNL; Figure 1.5 — EIA, BEA; Figure 1.6 — U.S. Census Bureau.

PART 2

The Transportation System Today



A Brief History

The last time the nation had a unified transportation policy it was motivated by both national and economic security interests. President Eisenhower's push for the Interstate and Defense Highways Act in 1956 was partly related to his view that a network of highways was vital to the movement of American military personnel and material. That original bill—also called the 1956 Federal-Aid Highway Act (Interstate Act)—was the largest single public works project in American history and represented a revolutionary new national strategy for transportation.[1] In 1956, Congress approved $25 billion[2] (about $197 billion in 2009 dollars) in loans to start construction of the interstate highway system—approximately 160,000 miles of roadway critical to the nation's economy, mobility, and defense—which was ultimately to be paid for with fuel taxes through the Highway Trust Fund (HTF).[3] Despite having a clear national security nexus, there is little doubt that the lasting legacy of the interstate system is its fundamental re-shaping of the way the American economy functions.

1 U.S. Department of Transportation (USDOT), Federal Highway Administration (FHWA), "History of the Interstate Highway System."

2 USDOT, FHWA, "Highway History: Federal-Aid Highway Act of 1956."

3 USDOT, FHWA, "The National Highway System."

The Interstate Act's success at massively expanding U.S. highway capacity produced an environmental and community group backlash in the 1970s, particularly in metropolitan areas where growing populations brought with them concerns over pollution, noise, and land impacts. This backlash contributed to the enactment of major environmental laws designed to expand the consideration of environmental impacts in connection with federal decisions. Very little attention was paid, however, to the overall performance of the U.S. transportation system during this era.

The enactment of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) represented the first meaningful transportation policy discussion in connection with federal legislation since 1956. ISTEA placed an increased emphasis on metropolitan transportation planning, non-highway travel alternatives, and diversification of federal transportation investments. The Transportation Equity Act for the 21st Century (TEA-21), enacted in 1998, largely continued the ISTEA construct and made little or no new policy contribution. In some ways, TEA-21 represents the beginning of the end of a lost transportation era. Funds were flush, congestion was viewed largely as an unsolvable irritant as opposed to a crisis, "performance" measures were largely irrelevant, and transportation did not represent a top-tier domestic policy issue.

Construction of the New Jersey Turnpike in the 1950s.

Aerial view of a four-deck, three-lane highway interchange in southern California.

By the time it came to reauthorize TEA-21 in 2003, cracks in the system were becoming clear and a relatively minor reform movement had begun. Unfortunately, a focus on overall spending, state-by-state distribution of funds, and tax levels dominated the political discussion. The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), enacted on August 10, 2005, limped across the finish line after multiple extensions. SAFETEA-LU expired in September 2009, and funding today (allocated under the authority of temporary extensions) is supported by repeated infusions from the general fund. According to the Congressional Budget Office (CBO), this system, combined with expected fuel tax revenues, will support existing transportation programs through FY 2013.[4]

4 Congressional Budget Office (CBO), Highway Trust Fund Projection, Spring FY 2010.

How the System Performs

The nation's transportation system increasingly suffers from debilitating congestion that wastes fuel, increases delays, and ultimately raises costs for private individuals and businesses.

Highways and Automobiles

Today, a large number of our roads and bridges are in increasingly poor condition, with many dating from the 1950s and 1960s. USDOT categorizes more than a quarter of our bridges as either structurally deficient or functionally obsolete.[5] According to the Federal Highway Administration (FHWA), 62 percent of roads in rural areas can be classified as "good." Yet 66 percent of all vehicle miles traveled occur on urban roads, the condition of which are significantly worse, with just 38 percent classified as "good."[6] The relative condition of national interstates is just as disparate: 79 percent of rural interstates were considered to be in "good" condition versus only 53 percent of urban interstates.[7]

Transportation sector supply and demand imbalances have created widespread congestion across America's major metropolitan areas, adversely affecting business activity, negatively impacting quality of life and substantially distorting development patterns.

Highway congestion is either classified as recurring or non-recurring, with each contributing to approximately 50 percent of overall congestion based on USDOT data.[8] Recurring congestion is the result of peaking in demand (common "rush hour"-style congestion), while non-recurring congestion is typically caused by weather, accidents or construction during limited periods of time. Congestion is strongly non-linear; small increases in traffic once volumes are at capacity can lead to significant increases in delay, and vice versa.

In general, highway use can be examined in terms of basic supply and demand forces, where demand for a facility increases as the facility's price decreases. Because there is no direct price for traveling on most roads, the "price" is partly born in the form of delay, which is a function of traffic volume to available traffic capacity.

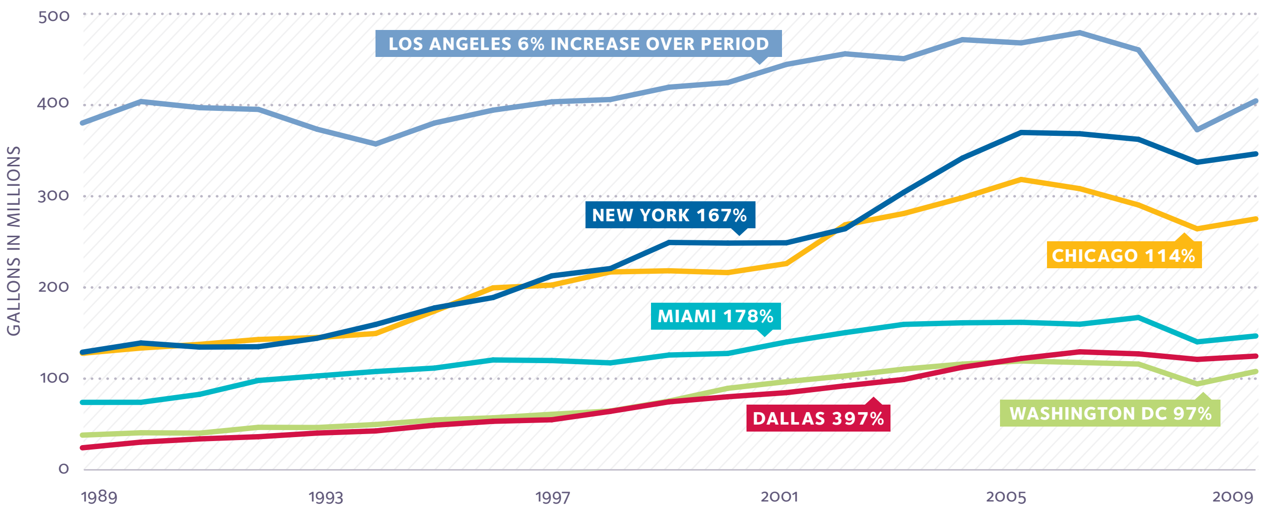
5 USDOT, Status of the Nation's Highways, Bridges and Transit: 2008 Conditions and Performance, Chapter 3: System Conditions: Highways and Bridges, Exhibit 3-17.
6 Ibid, Exhibit 3-7.
7 Ibid, Exhibit 3-8.

8 Although the two are obviously related, a highway with reduced capacity due to lane construction is a far less costly occurrence in low demand areas.

Morning traffic crossing the Potomac River into Washington, D.C.. The city is considered one of America's most congested.

Wasted Fuel in Selected Cities, 1989-2009

FIGURE 2.1



Source: TTI, Urban Mobility Report, 2010.

According to USDOT statistics, physical highway capacity since 1980 has remained essentially unchanged while total miles traveled on the U.S. highway system have almost doubled. The Texas Transportation Institute reports that drivers in metropolitan areas experienced 4.8 billion hours of delay in 2009, wasting 3.9 billion gallons of fuel (Figure 2.1).[9] These figures are likely conservative as they do not account for fuel losses in acceleration, deceleration and idling. However, even these estimates, which take into account the cost of the hours and purchase of additional fuel, amount to a total annual congestion cost of $115 billion nationwide,[10] with 58 percent of the total cost occurring in the nation's largest 15 metropolitan areas.[11]

It is important to recognize that although 2008 appears to be the best year for congestion in recent times, that was due to the unique circumstances surrounding the economic recession. Prior to the slowdown, congestion levels had been rising steadily higher for more than a decade. Congestion once again rose in 2009, and conditions are expected to worsen as the economy strengthens.

Road congestion in general, especially in metropolitan arterials, is projected to increase. Unlike many other industrialized countries, the United States is expected to experience population growth between 2010 and 2030, with total population increasing by 20 percent, from 310 million people to a projected 374 million.[12] Highway vehicle miles traveled (VMT) is expected to increase more than twice as fast as population over this period.[13]

U.S. urbanization increased at an annual rate of 1.3 percent between 2005 and 2010, and is expected to continue on a gradual upward trend through 2035.[14] Total VMT is also forecast to increase by 56 percent between 2010 and 2035.[15] There is currently not a single major metropolitan area in the United States that is projecting a reduction in congestion in its long-range transportation plans. In the absence of action, between 2010 and 2020 the nation is projected to waste a total of more than 1.6 billion barrels of oil in the top 90 urban areas[16]—more than 300 times the quantity of oil that spilled into the Gulf of Mexico as a result of the Deepwater Horizon disaster and almost eight times the daily rate.[17]

9 Texas Transportation Institute (TTI), Urban Mobility Report, 2010.
10 These cost estimates also exclude supply chain impacts on shippers, the costs of unreliability and a variety of other indirect costs.
11 TTI, Urban Mobility Report, 2010.
12 U.S. Census Bureau, "U.S. Population Projections," National Population Projections, 2008.
13 EIA, AEO 2010.
14 CIA World Factbook; UN World Urbanization Prospects: The 2007 Revision, Table A.2, February 2008.
15 EIA, AEO 2010, Table 7.
16 SAFE/PB Analysis.
17 Washington Post, "Oil spill dumped 4.9 million barrels into Gulf of Mexico, latest measure shows," (August 2010).

Mass Transit and Passenger Rail

MASS TRANSIT

Mass transit plays an important role in facilitating oil savings in some U.S. metropolitan areas. Because of the ubiquity of cars and the flexibility they provide drivers, transit is more likely to have a positive return on investment where demand already exists, such as in dense metropolitan areas where people can live close to fixed bus and rail stops. In these locations, effectively expanding transit capacity can improve quality of life and the economy while reducing per capita oil consumption dramatically. A 2008 study by ICF International found that transit reduced VMT by 102 billion miles in 2007, or 3.4 percent of the total. The gasoline equivalent of those annual VMT savings was 1.4 billion gallons. According to ICF, when reduced congestion and changes in land use patterns are also taken into account, 4.2 billion gallons of gasoline per year are saved through transit use.[18]

Even though more than 80 percent of Americans live in cities, only around 53 percent have access to transit.[19] Particularly outside urban areas, the convenience of cars will continue to make them the primary travel mode for many drivers. However, in certain places there are sound reasons for drivers to switch to public transit, including lower costs, reduced commute times, greater personal productivity, improved safety, and increased leisure time.

Americans have in the past responded to higher gasoline prices with higher transit demand. During the third quarter of 2008, transit ridership increased 6.5 percent compared to 2007, while VMT dropped 4.6 percent.[20] Both 2007 and 2008 saw the highest levels of public transit ridership in more than 50 years (Figure 2.2). According to the American Public Transit Association, over the past three years an increasing number of Americans, motivated by a renewed interest in urban lifestyles, concern for the environment, and rising fuel costs, have begun using public transportation instead of automobiles. Between 1995 and 2008, transit use increased by 32 percent—a faster rate of growth than any other mode of transportation, and indeed faster than the rate of population growth.[21] Despite these developments, in certain locations, or at certain times of the day or week, buses and trains are plagued by low load factors (percentage of filled seats). These transit

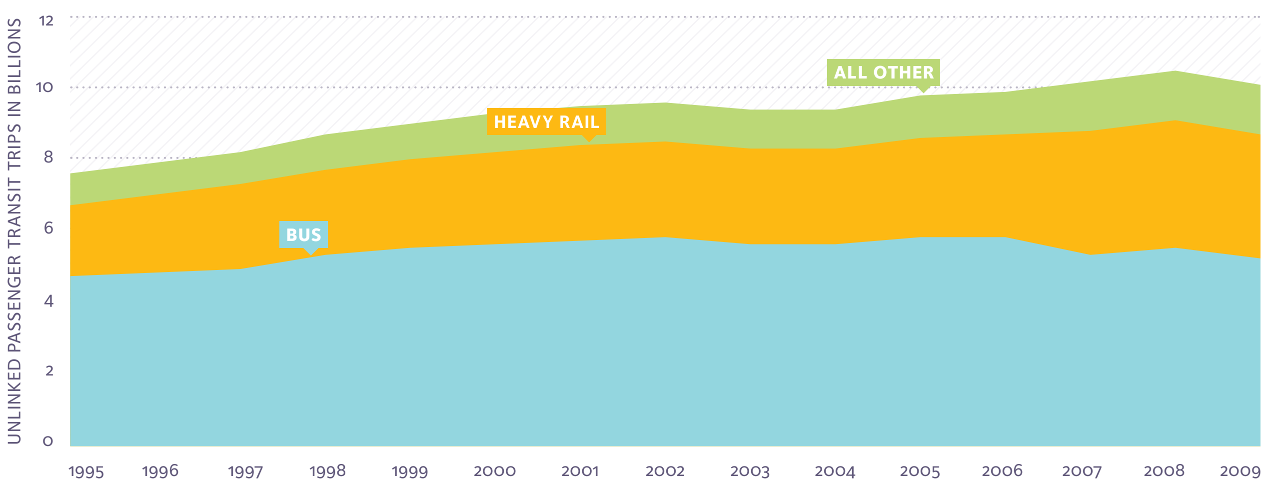
18 Linda Bailey et al, "The Broader Connection between Public Transportation, Energy Conservation and Greenhouse Gas Reduction," ICF International, (February 2008).

19 American Public Transportation Association (APTA), "Changing the Way America Moves: Creating a More Robust Economy, a Smaller Carbon Footprint, And Energy Independence," Discussion Paper, 2009. Access is defined as living within one-quarter mile of rail and one-tenth of a mile from a bus stop, whereas limited or no access is living within 3 miles of rail and ¾ of a mile of bus - "The Broader Connection between Public Transportation, Energy Conservation and Greenhouse Gas Reduction", ICF, February 2008.

20 APTA, "Public Transportation Ridership Surges As Gas Prices Decline," News Release, December 8, 2009.

21 APTA, Changing the Way America Moves: Creating a More Robust Economy, a Smaller Carbon Footprint, And Energy Independence, Discussion Paper, (2009).

FIGURE 2.2 Transit Trips, 1995-2009



Source: APTA, 2010 Public Transportation Fact Book, 61st Edition (April 2010).

The New York City transit subway system—the nation's largest—carries over 5 million riders on a typical weekday.

services are both energy- and fiscally-inefficient and can result in higher energy consumption per passenger-mile traveled than traditional automobiles.[22]

The recent growth in demand for transit has done little to change the deteriorating fiscal trajectory of public transportation agencies around the country. A survey of 151 transit systems (responsible for 80 percent of rides) found that 84 percent of the systems were cutting services or raising fares in order to reduce budget deficits during 2009.[23] Major agencies nationwide, including the nation's largest Metropolitan Transportation Authority (MTA) in New York, face multibillion dollar shortfalls. As a result, they must redirect funds from important capital projects, particularly the replacement of an aging transit vehicle fleet, to meet operating costs. Other improvements, such as station rehabilitation, lighting and track replacement, and signal, radio and ventilation upgrades, are often passed over or delayed. In some places, networks are simply ending service on selected routes.

In 2009, the level of investment in the rehabilitation, replacement and improvement of existing transit assets was less than the amount required to address normal replacement needs. This suggests that the investment backlog for the nation's transit agencies is increasing. The Federal Transit Administration (FTA) estimates the current backlog at $78 billion.[24]

PASSENGER RAIL

Currently, rail passengers are served by the National Railroad Passenger Corporation, better known as Amtrak, a government-owned corporation that operates more than 7,000 route-miles of railroad carrying approximately 1.7 million riders each day. Many Amtrak trains, especially outside the Northeast Corridor, run on rail owned and operated by private freight lines. Amtrak receives annual operating and capital subsidies from the federal government. Amtrak's funding and often precarious financial position has been the subject of political controversy, with some arguing for increased public support and others believing that public subsidies have been excessive.

As fuel prices rose in 2008, Amtrak reached new records for both ticket sales revenue and number of passengers. Company executives complained that Amtrak's aging and insufficient fleet of rail cars prevented them from meeting demand.[25] In response, Congress increased Amtrak's appropriations. The Passenger Rail Investment and Improvement Act of 2008 authorized nearly $10 billion over the five-year life of the bill (FY 2009 to FY 2013) specifically for Amtrak. It also established a procedure for public or private entities to submit proposals for financing, design, construction and operation of 11 separate high-speed rail (HSR) corridors.[26] The American Recovery and Reinvestment Act of 2009 provided $8 billion in funding for HSR projects. While Congress has provided funding to ensure the continued operation of Amtrak services, it has so far declined to provide the additional funding required for backlogged system maintenance projects.

22 DOE, Transportation Energy Data Book: Edition 29, Table 2.12, Passenger Travel and Energy Use, (2010).

23 APTA, Impacts of the Recession on Public Transportation Agencies: Survey Results, March 2010.

24 Federal Transit Authority, National State of Good Repair Assessment 2010, (June 2010).

25 Matthew L Wald, "Travelers Shift to Rail as Cost of Fuel Rises," New York Times, June 21, 2008.

26 John Frittelli and David Randall Peterman, Amtrak: Budget and Reauthorization, Congressional Research Service, February 6, 2009.

FREIGHT

According to USDOT, total freight traffic nearly doubled between 1980 and 2003, and is expected to increase a further 70 percent by 2020.[27] Despite this, no coherent national policy is in place to maintain or improve the operation of the system. In fact, USDOT has little authority to identify specific transportation facilities or regions as having national economic significance, and even limited efforts to do so have been met with political criticism.

Freight demand has increased at a faster rate than both general transportation demand and economic growth, but also responds more negatively when the economy slows. Since 1980, passenger-car VMT has increased by 50 percent while VMT by commercial trucks has increased by nearly 100 percent.[28] Between 1999 and 2004, gross domestic product (GDP) increased 13 percent in constant dollars while container traffic increased 44 percent.[29] Between 1993 and 2007, total ton-miles of freight increased by 38 percent. This increase was driven by greater use of trucking and rail, as waterborne freight traffic experienced a 42 percent decline over the same period.[30] Despite being just 12.5 percent of the total in 2007, intermodal freight shipments have undergone the fastest rates of growth over the period—the combination of truck and rail freight, for example, has increased by more than 400 percent.[31]

The FHWA estimates that highway bottleneck delays accrue 243 million hours annually.[32] At an estimated delay cost of $32.15 per hour, this equates to a direct user cost of approximately $7.8 billion each year.[33] The vast majority of these bottlenecks occur at interchanges, lane drops, steep grades, and signalized intersections. Eighty-six percent of bottleneck delays are found in urban areas.[34] After years of decline, logistics costs today are increasing amidst increased delays and volatile fuel costs.[35]

Moreover, globalization has caused international trade to grow considerably faster than the overall economy. Partly due to the increasing share of foreign trade in U.S. GDP, freight transport growth at the nation's gateways and internal networks has been strained by increasing demand for the movement of goods. The relationship between the growth of U.S. trade and freight is shown in Figure 2.5.

Trucks have become a major, and sometimes dominant, part of the traffic flow on many roads, but especially interstates. The interstate system, despite representing less than 5 percent of all highway miles, handles nearly half of all truck miles traveled in the United States.[36] On the National Highway System, trucks accounted for at least 25 percent of average daily traffic in 2002, a figure that has likely risen.[37] Because trucks are considerably longer than automobiles, they take up much more room and thus contribute more to congestion on a per-vehicle basis. They also impose more wear-and-tear on the roads.

Waterborne shipping can be an energy efficient method for transporting goods. However, like other parts of the transportation system, U.S. waterways also suffer from congestion, typically attributable to either the slow and inefficient operation or unscheduled maintenance of aging locks. Insufficient modernization has also rendered some areas unable to accommodate today's larger vessels. As a result, 34 percent of commercial vessels traveling through federal and state locks experienced delay in 2009. In addition, federal regulatory requirements such as the Jones Act—which requires all goods transported between U.S. ports be carried in U.S.-flag ships that were constructed in the United States, and owned and crewed by U.S. citizens—increase ship construction and operational costs relative to those in other countries. These factors have prevented U.S. waterways from realizing their full potential for freight transport.[38]

> Over the next 20 years, the volume of freight transport at the largest international gateways may triple or quadruple.

27 FHWA, Improving Freight Transportation, (January/February 2006); See also American Trucking Association, ATA U.S. Freight Transportation Forecast to 2021, (2010).

28 Tony Furst, Freighted with Urgency, Public Roads Volume 70, Number 4, (January/February 2007).

29 FHWA, Freight Story 2008.

30 Bureau of Transportation Statistics (BTS) 2008, Table 1-52.

31 Ibid.

32 Cambridge Systematics for the FHWA, Estimated Cost of Freight Involved in Highway Bottlenecks, November 12, 2008.

33 Other researchers have suggested higher rates, typically between $60 and $70 per hour, implying total direct costs of at least $14.6 billion annually.

34 Cambridge Systematics for the FHWA, Estimated Cost of Freight Involved in Highway Bottlenecks, November 12, 2008.

35 William J. Mallet, Surface Transportation Congestion: Policy and Issues, Congressional Research Service, (February 6, 2008).

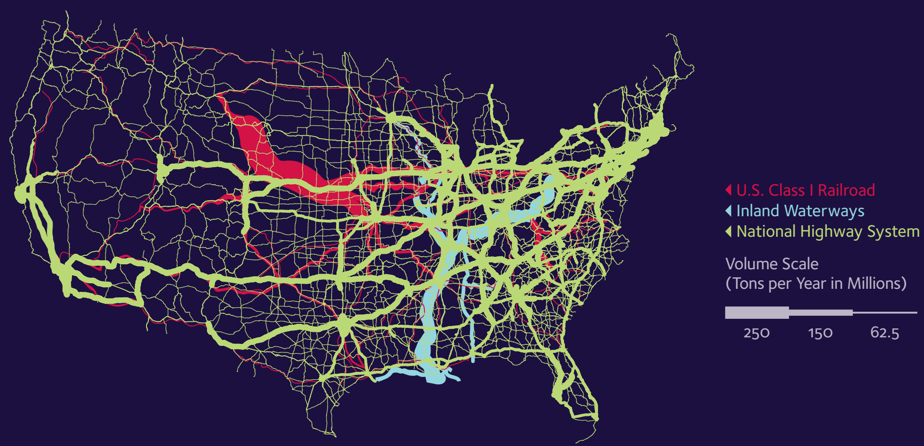
36 FHWA, Freight Story 2008.

37 Ibid.

38 U.S. Army Corps of Engineers, "Lock Use, Performance, and Characteristics," (2010).

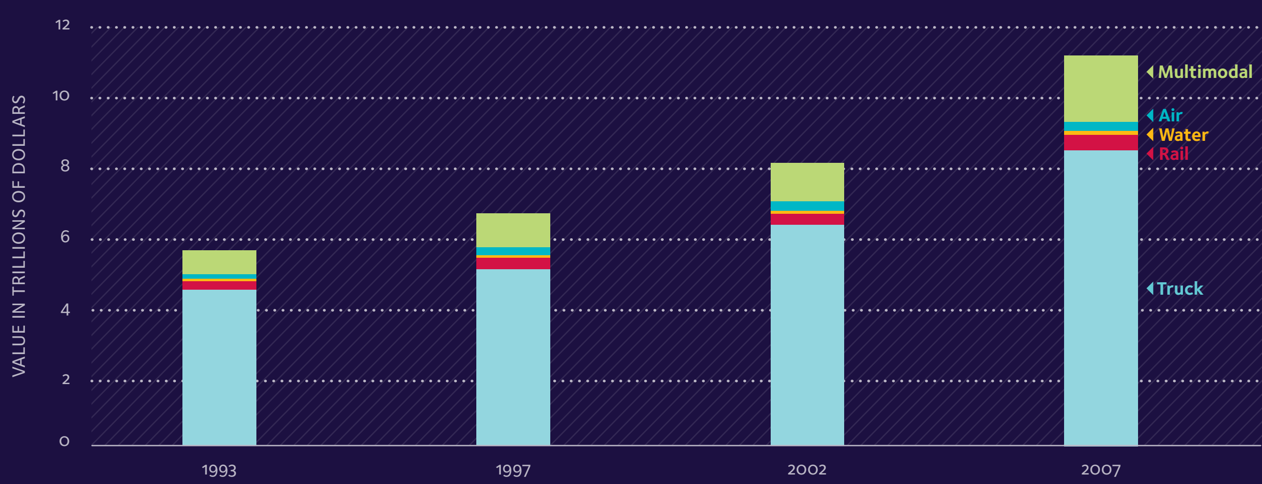
Freight Tonnage on Highways, Railroads and Inland Waterways, 2002

FIGURE 2.3



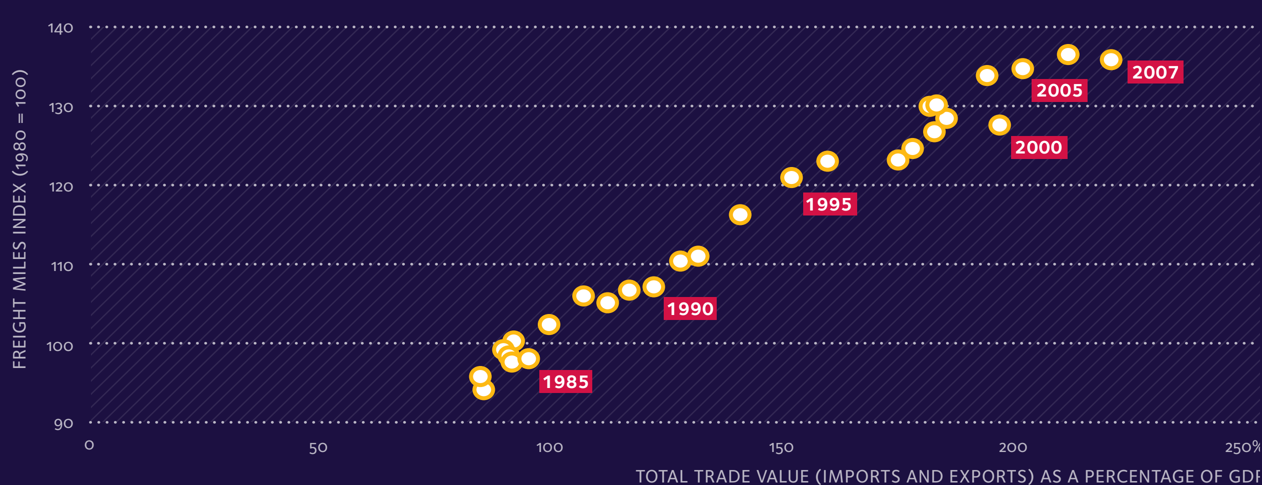
Value of Freight by Mode, 1993-2007

FIGURE 2.4



Total Trade Value and Freight Miles Traveled, 1980-2007

FIGURE 2.5



Sources: Figure 2.3 — FHWA, Freight Story 2008.; Figure 2.4 — BTS, National Transportation Statistics; Figure 2.5 —BTS, National Transportation Statistics.

How Policy is Funded

As the government mandates more stringent fuel economy standards, and consumers continue to shift to more efficient and alternatively-fueled vehicles, the outlook for U.S. transportation system funding—90 percent of which comes from fuel taxes—is becoming increasingly unsustainable.

Outlays Exceed Revenues

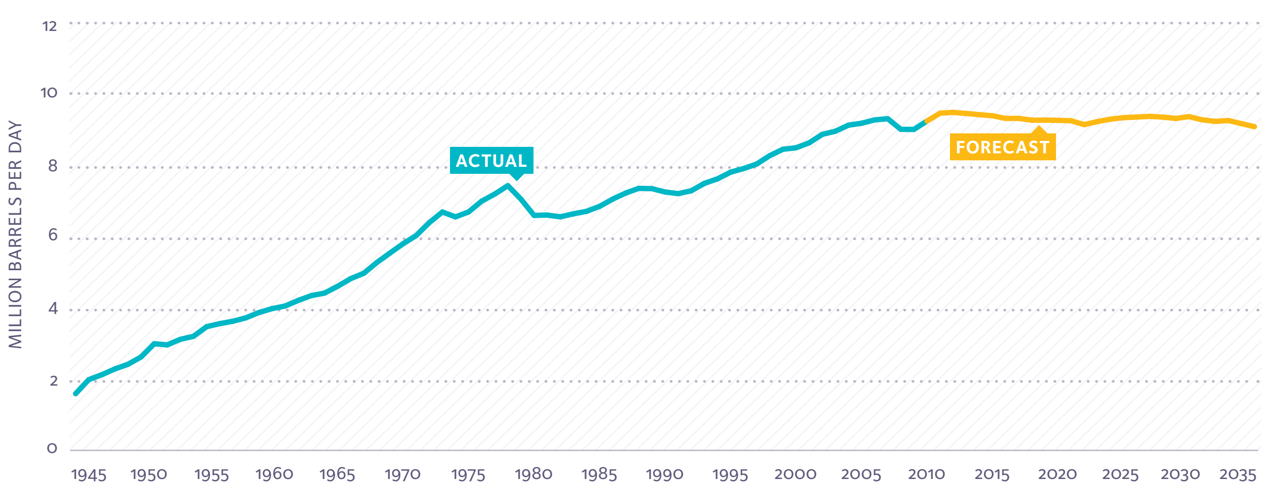
The present federal funding mechanism for highway and transit programs—the HTF—is different from most federal spending in that the bulk of the revenues come from people who pay fuel taxes. Because federal fuel taxes are levied on a per-gallon basis and have not been increased since 1993, their real value has declined by around one-third. This, combined with the fact that spending has climbed steadily, has necessitated infusions from the general fund of $34.5 billion over the past three years (with more bailouts expected to be necessary until the system is restructured).

The primary revenue sources for the Highway and Mass Transit Accounts are an 18.4-cent per gallon tax on gasoline and 24.4-cent per gallon tax on diesel fuel. The Mass Transit Account now receives 2.9 cents per gallon of those fuel taxes.[39] Although there are other sources of HTF revenue, such as truck registrations and surcharges on truck tires, fuel taxes provide about 90 percent of the revenue to the funds.

Therefore, the current federal transportation funding regime must rely on continually rising gasoline consumption to support increased spending. As shown in Figure 2.6, with the exception of the late 1970s and early 1980s, consumption has in fact risen steadily. In recent years, however, it has flattened out (and actually declined temporarily as oil prices spiked and the global financial crisis took hold), and the EIA—which does not assume significant fleet penetration of alternative fuel vehicles—expects that it will decline only slightly

39 Additionally, 0.01 cents per gallon goes to the Leaking Underground Storage Tank Trust Fund.

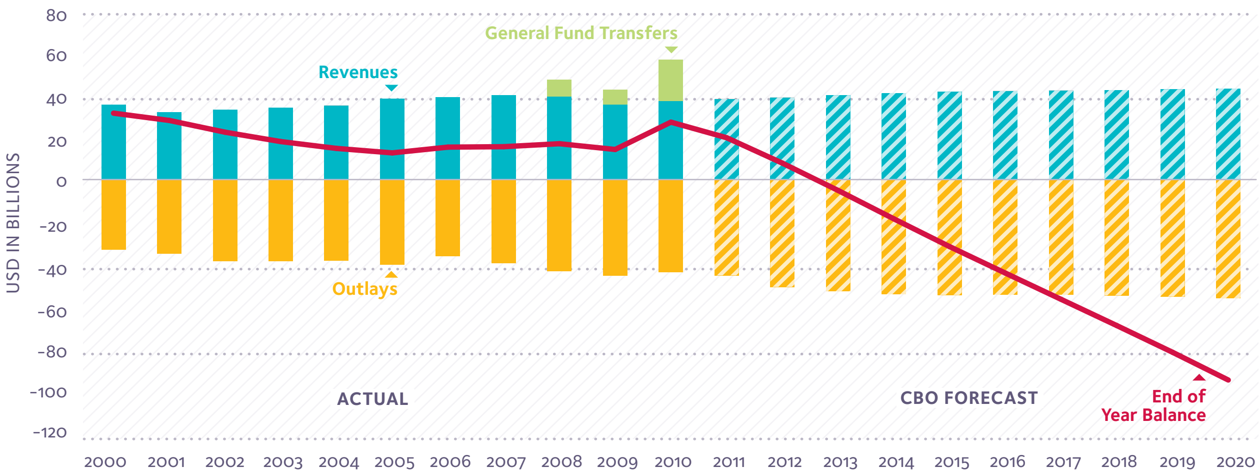
FIGURE 2.6 Annual U.S. Motor Gasoline Consumption, 1945-2035



Source: EIA.

Highway Trust Fund Revenues, Outlays and Year-End Balances, 2000-2020

FIGURE 2.7



Source: FHWA; CBO.

through 2020. More stringent fuel economy standards announced in 2009 and 2010, as well as the push for revolutionary technologies such as electric vehicles, mean that fuel consumption—and fuel tax revenue—may continue to decline more rapidly in the future.

As recently as 1998, the HTF was running such a large surplus that Congress transferred $8 billion from it to the general fund. In 2001, the HTF reached a cash balance historical high of around $20 billion. Since then, however, the balance has steadily declined simply because annual outlays are exceeding receipts collected from federal gas taxes and other HTF revenue sources.[40] In 2005, estimated outlays exceeded estimated revenues, and it was forecast that if realized over the FY 2005 to 2009 authorization period, the balance would fall to approximately $400 million by the end of FY 2009. Actual revenues for FY 2008 were about $4 billion lower than expected due to fewer purchases of trucks and motor fuel, and USDOT received indicators that the Highway Account balance was declining faster than expected.[41]

In 2009, the Highway Account ran a deficit of $7.3 billion after outlays of almost $38 billion.[42] The Transit Account is smaller, but is also running deficits, with revenues of about $4.8 billion and outlays of $7.3 billion in FY 2009.[43] Due to the injection of stimulus funds, the Transit Account ended FY 2009 with a closing balance of $5.2 billion, but within a few years this balance is expected to once again go negative without further injections (Figure 2.7).[44]

Recent actions taken by Congress have only provided a temporary solution. Over the last three years, Congress has enacted emergency legislation to support the HTF using general fund transfers. In 2008, $8 billion was transferred, followed by another $7 billion in 2009, and then another $19.5 billion in March 2010, which extended funding for formula programs through to December 31, 2010. The Congressional Budget Office (CBO) expects this transfer to support the existing contractual obligations of the highway and transit programs through 2013.[45]

Many potential solutions have been proposed to address the funding deficiencies of the system. In September 2010, for example, a permanent infrastructure bank that would leverage public and private capital to invest in projects with national and regional significance was proposed. A similar idea was first advanced in the Senate, and legislation based upon the concept has also been introduced in the House of Representatives. Other policymakers have also recently pushed for greater investment in transportation infrastructure.[46]

40 FHWA, Policy Information, Highway Statistics 2008, Table FE-10, October 2009.

41 Government Accountability Office (GAO), Highway Trust Fund: Improved Solvency Mechanisms and Communication Needed to Help Avoid Shortfall in the Highway Account, February 2009.

42 CBO Highway Trust Fund Projection, Spring FY 2010.

43 Ibid.

44 Ibid.

45 Ibid.

46 "Expand Investment in Infrastructure," Governor Ed Rendell and Senator Jim Inhofe, POLITICO, July 19, 2010.

Perverse Incentives

While system users bear some of the costs associated with highway use (directly through fuel taxes and also in the form of congestion, leading to increased travel time and higher total fuel costs), they do not typically pay for the use of the facilities themselves and are generally unaware of the delays their use of the system imposes on others, the damage posed to the environment, national security externalities, or system wear-and-tear. A market failure therefore exists, and although increased fuel taxes could support energy policies to account for the external costs of fuel consumption, they are at best an indirect user fee and only a weak proxy for capturing the varied impacts that vehicles have on the transportation system as a whole.[47]

Today for example, road travel is severely under-priced. While drivers pay approximately 2 cents per mile in fuel taxes, the fully-burdened cost of driving in many urban areas easily exceeds 25 cents per mile according to some estimates.[48] This combination of free roads and low fuel taxes has created a system with weak incentives for efficient infrastructure use and the need for federal fuel economy regulations to encourage fuel-efficient vehicles. And yet, federal programs allocate money to state DOTs using formulas that are functions of VMT and highway lane-miles. By linking VMT and highway mileage to funding (rather than, say, a measure of congestion or need), the current system is actually designed so that increased fuel consumption generates more highway funding.

47 A point that the GAO, CBO, two congressionally chartered commissions and a variety of other policy experts have acknowledged in the last five years.

48 Ian W. H. Parry, "Pricing Urban Congestion," Resources for the Future, Discussion Paper, November 2008.

FIGURE 2.8 Energy Intensity of Different Modes of Transport

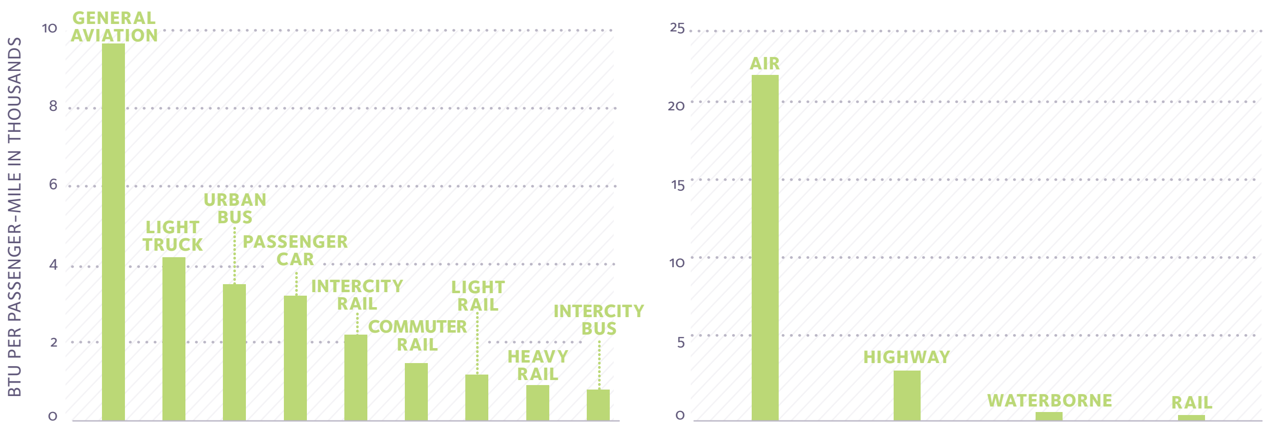
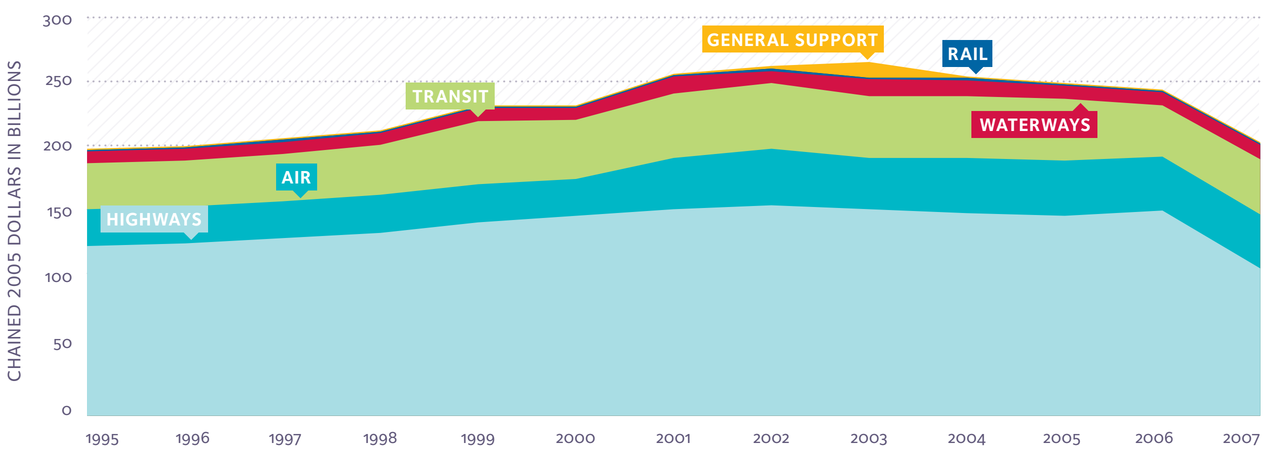


FIGURE 2.9 Total Government Transportation Expenditures by Mode, 1995-2007

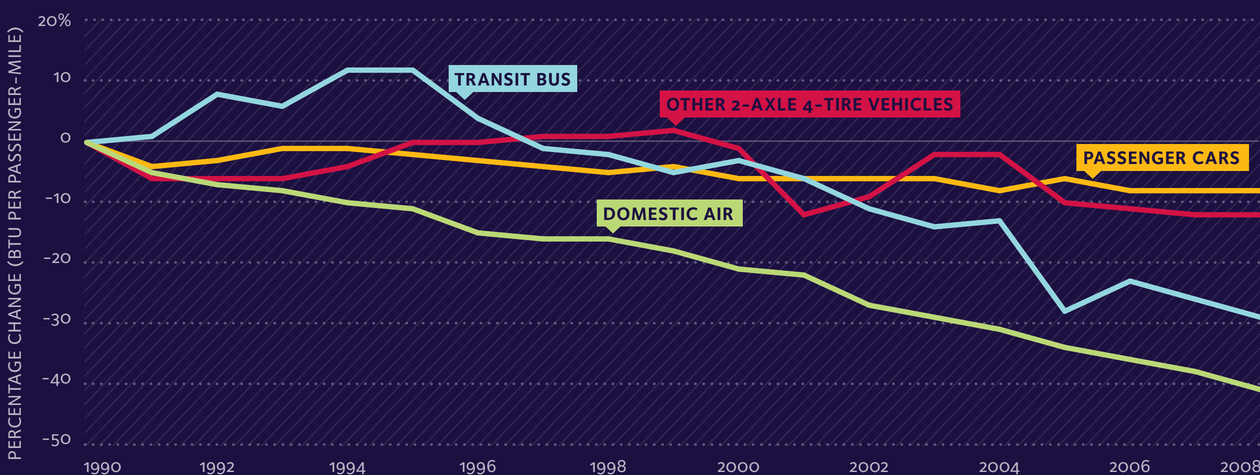


Note: 'General Support' represents administrative and operating expenditures of the USDOT.

Sources: Figure 2.8 — Transportation Energy Data Book, Edition 29, Table 2.12. DOE, Energy Efficiency and Renewable Energy, Energy Intensity Indicators in the U.S.; Figure 2.9 — BTS National Transportation Statistics 2009 and Pocket Guide to Transportation 2010.

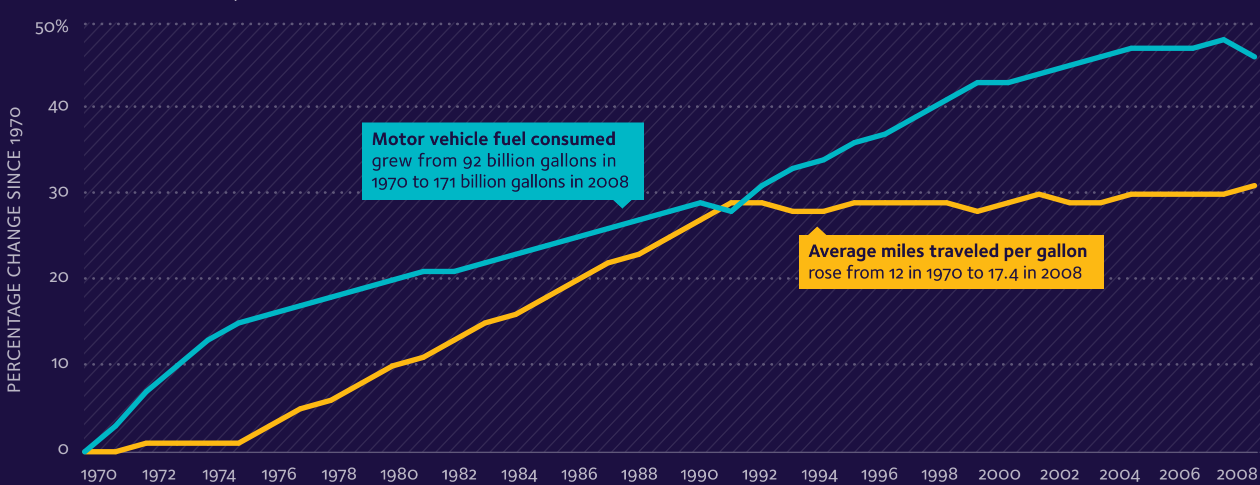
Change in Energy Intensity of Passenger Transportation Modes, 1990-2008

FIGURE 2.10



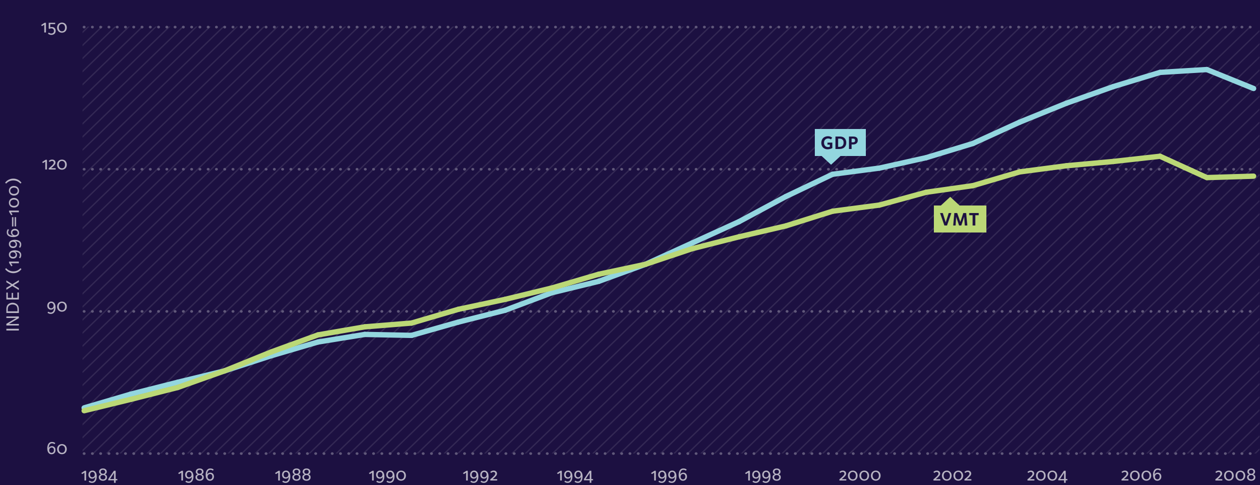
Fuel Consumption and Miles Per Gallon, 1970-2008

FIGURE 2.11



Growth in VMT and GDP in the United States,1984-2010

FIGURE 2.12



Sources: Figures 2.10 and 2.11— BTS, National Transportation Statistics 2010; Figure 2.12 — FHWA, Historical Monthly VMT Report (March 2010), BEA.

How Decisions Are Made

A wide range of stakeholders at all levels and limited control over spending decisions at USDOT characterize a decision-making system that lacks a unified focus on national goals and priorities.

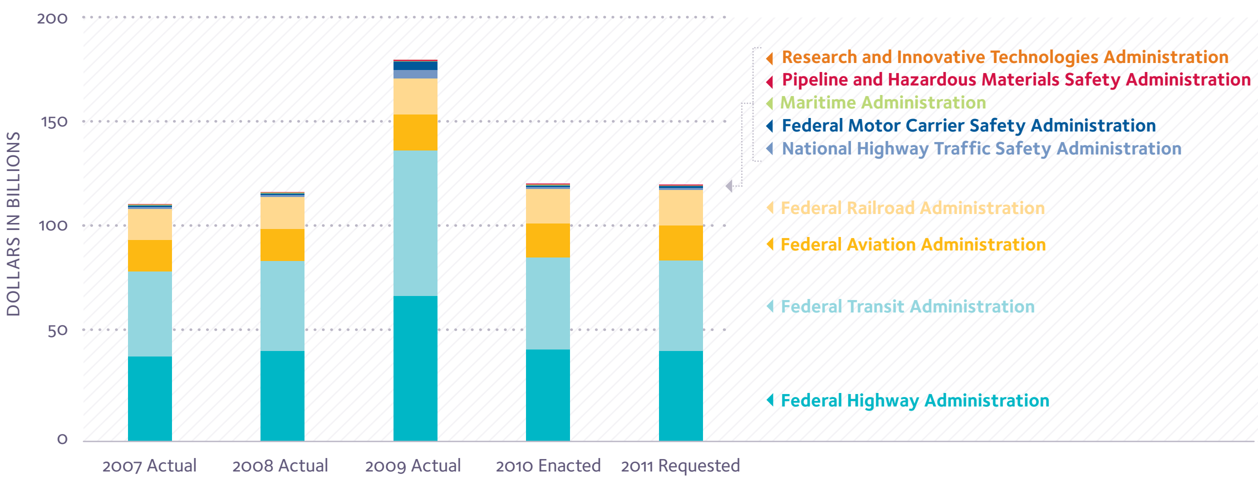
Today, surface transportation policy in the United States consists of a complicated array of federal, state, and local programs. Stakeholders tend to perceive "modal advocacy" as an important part of their mission. Some flexibility exists to shift funding across modes and between institutions, but control over funding is often considered a primary "performance" metric by each participant. As a result of institutional complexity and weak overall transparency, agencies are often judged by the amount of money they spend, the number of capital investments they can make, or how much control they can manage to assert over a process. This institutional structure drives an excessive focus on specific projects at the expense of overall system performance.

With the exception of the air traffic control system, USDOT has little control over the spending decisions related to the programs it administers. Instead, it distributes funds, mostly to state departments of transportation and metropolitan planning organizations (MPOs), which help plan transportation policy in all urban areas of more than 250,000 people. The programs that different administrations oversee are funded either by formula ("apportioned") or through discretionary processes ("allocated").

In recent years, virtually all allocated programs have been earmarked by Congress, effectively eliminating any USDOT discretion. In SAFETEA-LU (2005), more than 6,000 earmarks accounted for around $24 billion of authorized spending. This represented approximately 12 percent of the $199.5 billion highway construction title of the bill—a substantially higher percentage than in earlier reauthorizations.[49] The result is a policy process focused primarily on two fronts: states trying to re-work formulas to benefit themselves in apportionment calculations, and specific project sponsors lobbying aggressively for earmarks. Consideration for overall system outcomes has been virtually non-existent.

49 Greg Gordon and Erika Bolstad, "Alaska Lawmaker Promoted Earmarks, Raked in Cash," McClatchy Newspapers, November 11, 2007; FHWA, SAFETEA-LU, Summary Information; National Park Service, "A Few Facts About Earmarks in SAFETEA-LU."

FIGURE 2.13 USDOT Budget, FY 2007-2011

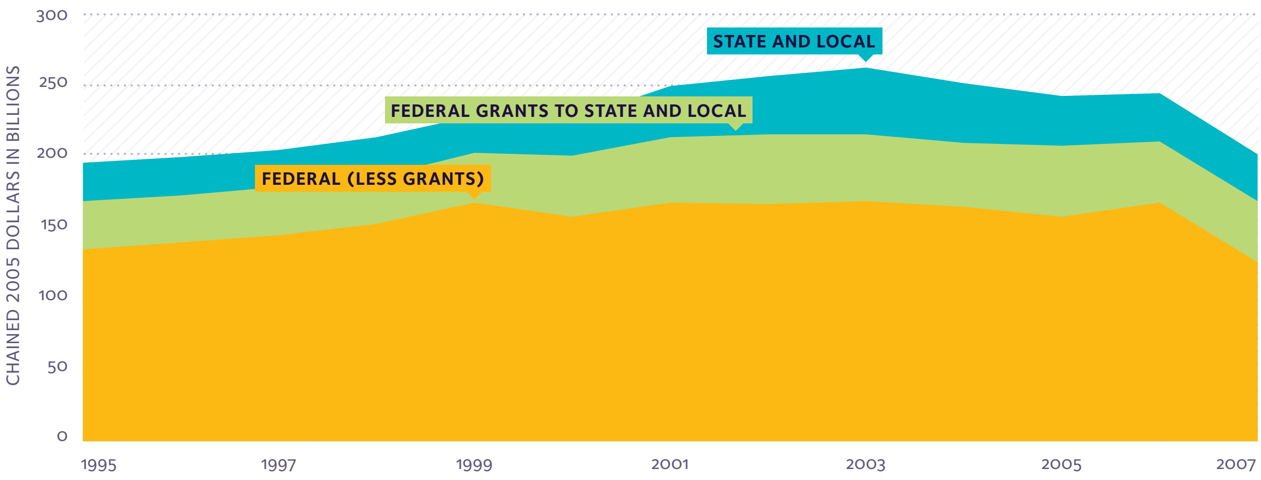


Note: Excludes the Office of the Secretary and the Transportation Research Board.

Sources: 2009, 2010, and 2011 U.S. Department of Transportation budget requests.

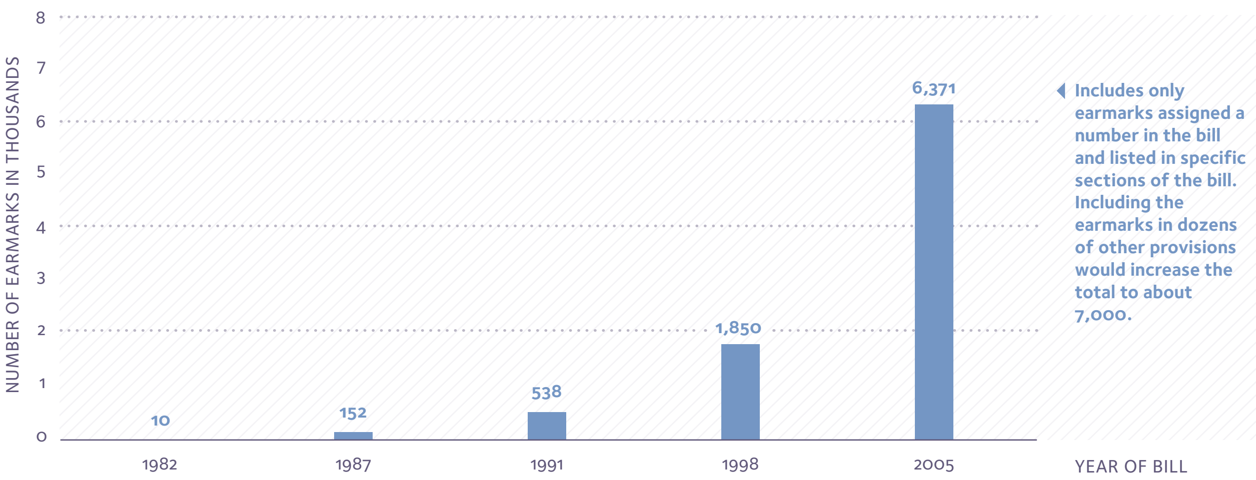
Total Transportation Spending, 1995-2007

FIGURE 2.14



Earmarks in Highway Reauthorization Bills, 1982-2005

FIGURE 2.15



Sources: Figure 2.14 — BTS, National Transportation Statistics 2009, Table 3-25b; Figure 2.15 — Ronald Utt, "A Primer on Lobbyists, Earmarks, and Congressional Reform," The Heritage Foundation, 2006.

Apportioned funds typically permit recipients to exercise substantial flexibility to utilize federal funds on a broad range of transportation projects. Indeed, current law concentrates the majority of decision-making authority for projects at the state level. Unfortunately, many of the same forces that undermine an emphasis on performance at the federal level do the same at the state and local level.

Within states, enormous institutional battles rage between state DOTs, transit agencies, governors, mayors, MPOs, USDOT, and city DOTs, among others. Each of these entities claim important responsibilities, but no single entity is fully accountable for the success or failure of the entire transportation system in their region. Many of the most significant transportation challenges are located in metropolitan areas, and local officials may differ from their state counterparts on how best to address them. States and metropolitan areas are each required to develop transportation plans that identify specific projects and their relative priority. While these plans must be consistent, metropolitan areas that are not direct recipients of federal capital funding have limited leverage to alter priorities.

Equally important, there is no accountability for outcomes; once federal dollars are outlaid, there is no analysis as to whether a project actually improved the system in any measurable way. Instead, as long as a project appears on a plan, regardless of its rationale, it is considered an acceptable use of federal funds, assuming the project is eligible under Title 23 (Highways) or Title 49 (Transportation) of the United States Code.

PART 3

Energy Security and Oil Dependence

Rerouting Our Transportation Future

Introduction

The United States enjoys the largest and most well-developed surface transportation system in the world. Over the past hundred years, the nation has built a transportation network that includes 994,515 miles of federal-aid highways, 140,134 miles of railroads, and 11,000 miles of navigable inland waterways.[1] This network has helped support a dramatic improvement in the quality of life for the typical American and enormous productivity improvements for U.S. businesses. Today, however, significant changes are required in how that system is funded and managed, or the United States risks losing the mobility that for decades has helped make it the strongest and most dynamic economy in the world.

1 FHWA, "Highway Statistics 2008" Table HM-18; FHWA, "Freight Facts and Figures 2009" Table 3-1.

Policy Recommendations

The policy proposals that follow provide a vision for the future of the U.S. transportation system that recognizes and emphasizes the importance of oil consumption as a guiding principle for reforming project selection and federal regulation.

Establishing Mode-Neutral Performance Metrics

Transportation policy must advance energy security goals along with economic growth. Funding of the transportation system should be closely tied to the achievement of realistic performance goals, with less emphasis on funding specific projects and more emphasis on overall system outcomes. Experience has shown that without careful planning and measurement, investments in transportation can lead to sub-optimal outcomes in system durability, user mobility, and energy use. Measurement and evaluation of project performance should be based on a consistent set of metrics aligned with national transportation priorities, which in turn will aid policymakers in the analysis of existing and future projects.

RECOMMENDATION

Establish national standardized system performance metrics within the Department of Transportation, and at the state level where projects receive federal funds, with reducing oil consumption as a principal performance metric. Elements of this recommendation include:

a. Ensuring that federally-supported programs and projects implement standardized performance metrics with clear objectives and comprehensive cost-benefit analysis forming a foundation. Performance metrics include projected fuel savings, travel delay reductions, increases in travel reliability, state of good repair considerations and reductions in fatalities; and
b. Enhancing USDOT's data and analytical capacity to support real performance metric setting.

A national oil savings performance metric would establish an important policy link between energy use and the transportation system. Large projects, especially new capacity, should be required to assess oil consumption impacts. By including the costs of oil consumption—and by extension, oil dependence and its negative consequences—into cost-benefit analyses (CBAs), evaluations of potential projects will more accurately embody the overall impact of oil use.

A critical step towards a performance-driven transportation program is data collection that is much broader, timelier, and more detailed than the current system employs. Implementing metrics by which to choose and evaluate projects will require considerably upgrading USDOT's data and analytical capacity. It is vitally important that the federal government begin to research and collect much more detailed and textured data on traffic, energy, freight movement, household travel, and infrastructure conditions. The expanded use of advanced technologies in the transportation system, as well as available analysis software, could greatly aid in the collection of useful data.

Current performance measures, including total cost of construction, lifecycle cost and transit fare box recovery, look only at financial costs and do not factor in externalities such as noise, air pollution, delay, and oil use. Common approaches should be developed to address these costs at a programmatic level as well as at a project level. At a programmatic level, this analysis would assist policymakers in determining how transportation funds are allocated by program and by region. At the project level, they could assist planners in making better project selection decisions.

Fix It First

The nation's substantial investment in transportation infrastructure over the past 60 years marks a tremendous achievement, but much of that infrastructure is now deteriorating. Given the needs of existing infrastructure, too much federal transportation funding continues to flow to one-off projects that add capacity to existing facilities or "greenfield" projects of questionable value.

Meanwhile, deferred maintenance costs for infrastructure are accelerating. Around half of all states were categorized as "falling behind" in infrastructure maintenance by a 2008 Pew Center study. In that year, New Jersey had a $12 billion transportation maintenance backlog, Florida, a $40 billion bill, and Oklahoma $583 million.

Roads and bridges with outdated design, poor pavement conditions, or inferior safety are, according to the FHWA, factors in 30 percent of all fatal highway accidents.[2] Even more common are non-fatal accidents, which in addition to their human and financial costs cause hazardous road conditions and generate congestion. Moreover, according to the American Association of State Highway and Transportation Officials (AASHTO), extra vehicle repair and operating costs add $335 annually to a driver's typical vehicle operating costs. It is unlikely to be purely coincidental that three states with especially high maintenance backlogs, New Jersey, California, and Oklahoma, were ranked 1, 2 and 5 respectively in terms of additional operating cost due to rough roads. In New Jersey, the additional operating costs amount to $596 per driver.[3]

A "fix it first" approach to the nation's transportation infrastructure can help reduce the existing political and funding incentives to build new projects instead of addressing the maintenance backlog. Any and all funding must be prioritized to the most important repair and upgrade projects based on comprehensive CBAs that take into account the importance of oil consumption, as recommended above.

2 American Association of State Highway and Transportation Officials, "Rough Roads Ahead: Fix them Now or Pay for It Later," (May 2009).
3 Ibid.

Reducing Congestion and Promoting Energy Efficient Solutions

Today, the efficiency of the U.S. transportation system is declining and our energy security vulnerabilities are becoming more acute. Our network of highways, railroads and transit systems is now congested, deteriorating and inefficient. These challenges occur across the country and are particularly severe in metropolitan areas. Despite covering just 20 percent of U.S. land, metropolitan areas contain more than 80 percent of the nation's population, and account for the majority of both vehicle miles traveled and gross domestic product (Figure 3.1).[4]

RECOMMENDATION

Create a new federal formula program funded—by consolidating and eliminating duplicative programs—equal to 25 percent of total annual federal transportation funding, and focused on improving transportation system performance in metropolitan areas specifically (including urban and suburban locations). The program's elements include:

a. Reducing highway congestion (as opposed to simply slowing growth) within five years through the deployment of leading technologies, operational/pricing strategies, and targeting new capacity investments toward acute bottlenecks;
b. Encouraging economically justifiable alternatives to single-occupant travel in internal combustion vehicles; and
c. Dedicating any surplus revenues generated beyond those needed to fully cover allocated system costs for reinvestment in projects tied directly to the achievement of overall performance objectives.

PROGRAM STRUCTURE

Funds from this program should be distributed to states by a formula that would be adjusted every two years. Formula components would include: a) the extent of congestion; b) the amount of fuel wasted in traffic; c) the extent to which jurisdiction was making improvement toward achievement of performance objectives; d) the degree to which an integrated, multi-modal strategy was being pursued; and e) the need for recapitalization of transit systems that carry substantial numbers of riders.

RECOMMENDATION

Create a $5 billion-per-year competitive program that makes funds available to congested metropolitan areas for comprehensive proposals that seek to design and deploy:

a. Dynamic tolling projects that reduce congestion;
b. Performance-based technology investments that target a range of operational improvements, including advanced traffic signals, interoperability of electronic payment systems, quick clearance of accidents and improved driver information;
c. Public transportation solutions that can be quickly deployed and are part of an overall system performance strategy; and
d. Other travel demand management initiatives.

PROGRAM STRUCTURE

Funds would be allocated based on non-political investment criteria with heavy emphasis on relative cost-benefit ratios of submitted projects, the scale of the proposals, the committed timeframe for implementation, and the degree to which best-available technology solutions are utilized. The efficiency of energy use (and particularly oil use) would be an important metric in proposal selection. The minimum project size would be $100 million. Grant agreements executed in connection with the program's implementation would ensure that project sponsors utilize any excess revenues generated from the program to support projects with clear links to specific overall transportation system performance commitments. The models for this program could be the "Race to the Top" program used for education investments, and the Urban Partnership Program used by USDOT in 2007-2008.

BACKGROUND

Transportation administrators frequently seek to alleviate congestion by building more capacity. This effectively lowers the price of driving (reducing time delay) and thus meets the demand curve at a lower price, where the volume of traffic (demand for the facility) will be higher. When the level of demand for use is low relative to the capacity of the road, it will be uncongested, and prices will

4 BEA; Census Bureau; FHWA.

FIGURE 3.1 Metropolitan and Non-Metropolitan GDP, Population and VMT

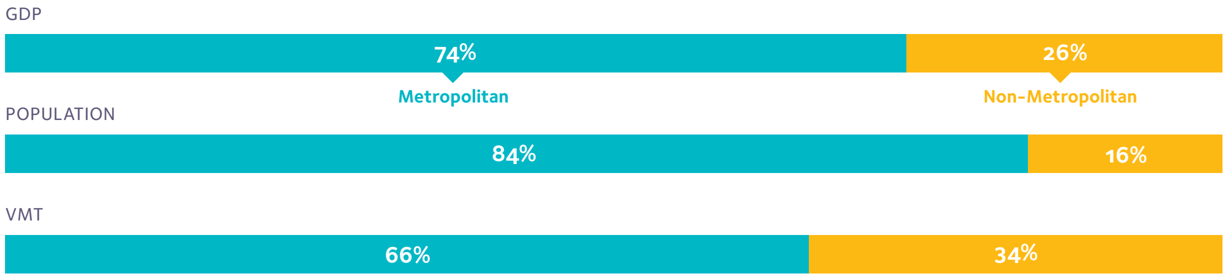
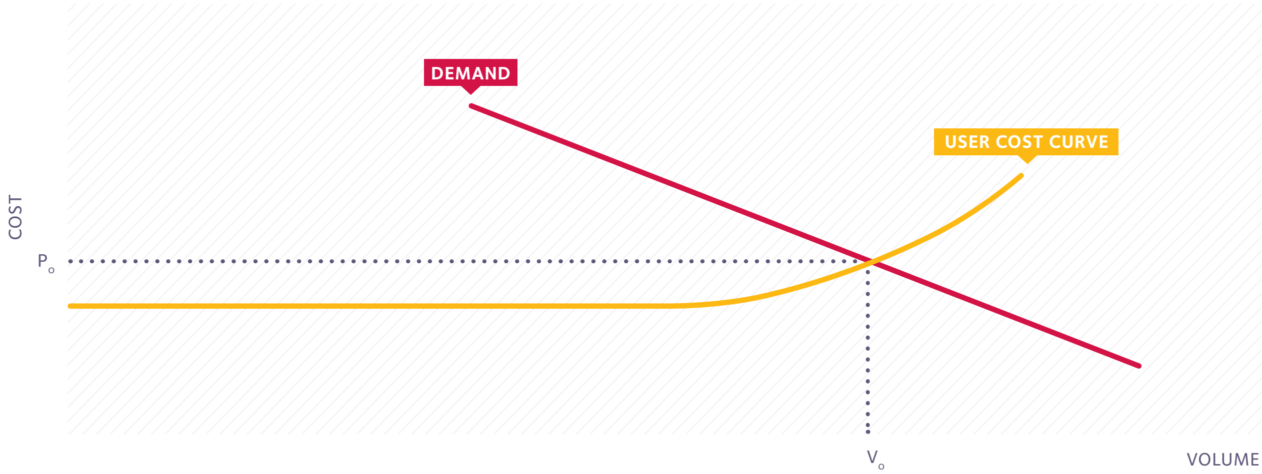


FIGURE 3.2 Equilibrium User Costs and Traffic Volumes



Sources: Figure 3.1 — BEA, Census Bureau, and FHWA; Figure 3.2 — FHWA.

be relatively constant even as volumes increase (the "flat" part of the user cost curve in Figure 3.2). When demand increases and the road becomes congested, both user costs and traffic volumes will be higher, potentially rising sharply as demand continues to increase.

Thus, building new, un-priced highway lane-miles can have a diminishing long-term effect on congestion levels. The new capacity encourages travelers who had previously avoided congestion through alternative modes or travel times to take the highway, a phenomenon called "induced demand." Over the long run, this induced traffic is estimated to fill at least 40 percent of added urban road capacity.[5]

Direct road pricing, on the other hand, is a highly underutilized though proven near-term tool to reduce congestion. Compared to fuel taxes, road prices are a much more visible signal regarding the costs they are imposing on roads and other users, and therefore more powerful in influencing driver behavior. Critically, road prices can capture the different costs imposed at different times of day. Prices can be varied to incorporate the costs of providing, maintaining, and operating the infrastructure as well as roadway damage associated with vehicle weight, congestion impacts, and vehicle emissions. This, in turn, can better inform individuals about the true costs of their travel choices. Travelers will then be able to make more efficient decisions about how and when they use existing transportation infrastructure.

Yet it is slightly misleading to say that society is not pricing highway travel today. Rather, drivers are subject to an indirect array of "prices" in the form of taxes, delays, wasted fuel and unreliable systems. Congestion pricing would replace this indirect "price" system with one that is both direct and more efficient. In certain cases, users would pay more than they pay today. In other cases they would pay less. Importantly, cross subsidies that pervade the current system would be substantially reduced.

5 Kent M. Hymel, Kenneth A. Small and Kurt Van Dender, "Induced Demand and Rebound Effects in Road Transport," May 1, 2009; Victoria Transport Policy Institute, "Rebound Effects: Implications for Transport Planning", TDM Encyclopedia, Updated May 2010, www.vtpi.org/tdm/tdm64.htm; Clifford Winston and Ashley Langer, "The Effect of Government Highway Spending on Road Users' Congestion Costs," AEI-Brookings Joint Center for Regulatory Studies, Working Paper, May 2006.

Studies have shown that congestion pricing has alleviated the strain of traffic on central London roadways, and shown commercial service industries to be net beneficiaries of the practice.

Pricing travel directly, as opposed to indirectly, has been demonstrated to positively influence driver decisions in a number of ways. Effective pricing will make off-peak travel cheaper and will encourage drivers to reschedule some discretionary trips or even change their commute times. Drivers have also shown a willingness to combine trips (running several errands per trip rather than taking several trips) or plan their trips more carefully (considering closer destinations). Pricing can lead drivers to choose different modes of travel, including carpooling, transit, or telecommuting.[6] Even pricing part of the network through a traditional turnpike or a high occupancy toll (HOT) lane network can create a congestion-free route or network that allows buses, freight and emergency vehicles to avoid traffic and provide higher-quality service, and generally reduces journey times for remaining drivers.[7]

A congestion charge works to decrease demand for the facility during the periods of the day that it is most important to have stable flow conditions. A comprehensive pricing approach that incorporates variable pricing tied to travel demand levels could provide significant congestion benefits to transit riders, carpoolers, businesses, and other drivers. Some travel, such as commutes for people with rigid work schedules, is inelastic. However, as USDOT's National Household Travel Survey confirms, a large and growing percentage of drivers during rush hour are non-commuters.[8] In fact, the majority of rush hour trips in the morning (56 percent) and evening (69 percent) are now made by non-commuters.[9] And because traffic functions nonlinearly, reductions in peak period highway traffic levels of as little 10 percent could all but eliminate recurring system congestion.[10]

Although not its primary purpose, congestion pricing also provides the additional benefit of increasing revenues to state and local governments while reducing or delaying the need for certain capital expansion projects.[11] It also shortens the incident response time for emergency vehicles, and improves the service quality of surface mass transit and commercial operations. While road pricing could add to the direct cost of commercial travel (depending on the relative prices paid through road pricing versus current fees and fuel taxes), improved infrastructure and reduced congestion would likely more than offset these added costs through higher productivity. The Eddington Commission in the United Kingdom estimated the effects of congestion pricing on freight, and found commercial services industries would be net beneficiaries.[12] After its initial implementation in 2003, the London congestion charge reduced traffic delays by an average of 30

6 The Eddington Commission found that the London cordon pricing led to substantial mode shifts; Eddington Commission, Transport Demand to 2025 & the Economic Case for Road Pricing and Investment (December 2006).

7 Robert W. Poole, Jr., and Ted Balaker, Virtual Exclusive Busways: Improving Urban Transit While Relieving Congestion, Reason Foundation Policy Study No. 337 (Los Angeles, CA: September 2005); Kenneth A. Small, "Road Pricing and Public Transport," in Georgina Santos, ed., Research in Transport Economics, Vol. 9: Road Pricing: Theory and Evidence, (Amsterdam: Elsevier, 2004), 133–58.

8 FHWA, "Congestion: Who is Traveling in the Peak?" (National Household Travel Survey, August 2007).

9 Ibid.

10 Transportation Research Board, Highway Capacity Manual 2000.

11 FHWA, "Congestion Pricing: A Primer," (December 2006).

12 Eddington Commission, Executive Summary: The Case for Action: Sir Rod Eddington's Advice to Government, op. cit. p.5.

percent,[13] allowing faster and more dependable deliveries. More recently, maintaining lower levels of congestion was cited by business groups that supported the removal of a charge exemption for small cars.[14] A 2008 analysis of sales and profit performance showed stronger absolute and relative growth—compared to outer London, and other areas of inner London—in the central London charging zone than there was prior to the introduction of charging.[15]

A number of effective facility-specific congestion pricing projects already exist in the United States, though they are small in scale.

The American public is acutely aware that many of our transportation investments are based on one-off earmarks at all levels of government. According a recent poll, 85 percent of Americans agree with the statement, "transportation infrastructure funding decisions are based more on politics than need."[16] Pricing a specific piece of infrastructure and using the revenue to pay back its construction costs and support maintenance, on the other hand, elicits a positive reaction. Fifty-nine percent of car commuters feel that it is "totally acceptable" to charge motorists a toll for using a new road, bridge or tunnel.[17]

The State Route 91 Express Lanes Project in Orange County, California, which included the addition of two toll lanes in each direction parallel to existing non-tolled lanes, exemplifies the successful use of variable tolls to add new capacity to existing routes. The first privately-financed toll road in more than 50 years in the United States and the world's first fully-automated toll facility, the new Express Lanes opened in 1995. Rush hour traffic on the lanes travels at over 60 miles per hour while traffic in adjacent, unpriced lanes crawls at average speeds of 15 miles per hour or less.[18,19]

Today, Orange County Transportation Authority (OCTA) owns the road, which it purchased from the California Private Transportation Company (CPTC). It has continued the congestion pricing policy, ensuring free-flowing traffic conditions.Tolls are varied by time of day based on a printed schedule that is regularly adjusted. In the summer of 2010, tolls ranged from $1.30 to $10.25 for a one-way 10 mile trip.[20] Every day, thousands of drivers experience a free flowing trip along one of the most constrained travel corridors in the United States. Also importantly, the road is more than self-financing. The 40,000 trips per day generate $25 million dollars in annual toll revenues.[21] In FY 2009, OCTA netted $18.7 million in operating income (after expenses), proving that congestion pricing can be a win-win policy, improving customer satisfaction with better system performance and generating revenues for re-investment in the transportation system.[22]

13 Transport for London, "Impacts Monitoring," Second Annual Report, April 2004, at 13.

14 London First, "Business community relieved as Boris scraps C-charge exemption on small cars," July 2008.

15 Transport for London, "Central London Congestion Charging - Impacts Monitoring," Sixth Annual Report, July 2008, http://www.tfl.gov.uk/assets/downloads/sixth-annual-impacts-monitoring-report-2008-07.pdf.

16 Public Opinion Strategies and Greenberg, Quinlan Rosner Research for Building America's Future, "An In-depth Look at Opinions Regarding the Nation's Transportation Infrastructure," (presented at briefing December 17, 2009).

17 Ibid.

18 FHWA, "Congestion Pricing, A Primer: Overview," at 9-10.

19 A "non-compete" agreement made between the state and the private developer, California Private Transportation Company (CPTC), became controversial after the state began a project to widen a freeway interchange at State Route 241.

20 Orange County Transportation Authority, 91 Express Lanes, "Summer 2010," Newsletter, http://www.octa.net/91_publications.aspx.

21 Cofiroute USA, OCTA - 91 Express Lanes.

22 Orange County Transportation Authority, 91 Express Lanes, "Innovation that Works," 2009 Annual Report.

EQUITY AND PRICING

One of the popular misconceptions about congestion pricing is that it is unfair to lower income people. The question of whether a system of widespread congestion pricing is fair must be answered in comparison to alternatives. Major parts of current transportation policy strategy are highly regressive, including: the emphasis on regressive taxes; the ability of higher income communities to access lobbying and other resources to win subsidies through the political process; and the impact of congestion on job access and housing affordability.

Travel preferences are extremely diverse, and the value people place on time and reliability can vary both within and across income groups. It is demonstrably incorrect to assume that lower income people always have lower values of time and reliability, or that they do not value the ability to make a speed/price tradeoff just like all other income groups.

Research has in fact shown that all users, including low-income people, are better off under congestion pricing with specific redistribution packages that include new transportation services and commuting allowances.[23] For example, according to a report on equity in congestion pricing prepared for the Transportation Research Board, express lanes help working parents avoid late fines at their childcare centers or reach urgent appointments. Unlike the regressive fuel tax system, road pricing can actually benefit low-income people when it reduces negative effects—such as pollution—in disadvantaged neighborhoods, and improves transit and other alternative travel options for non-drivers.[24] On the I-15 High Occupancy Toll (HOT) lanes in southern California, single-occupant vehicles pay a per-trip fee that varies depending on traffic demand. Half of this tolling revenue is used to support San Diego's transit service. Although using toll revenue to support nearby transit may appear to deviate from the principle of directly improving the priced infrastructure, in fact facility users directly benefit from improved nearby transit: many road users also often use bus or train networks, and enhanced transit service takes vehicles off the road, reducing congestion for those who choose to pay the tolls.

23 Kenneth A. Small, "Using the Revenues from Congestion Pricing," Transportation, Vol. 19, No. 4, 1992.

24 John Kain, "Impacts of Congestion Pricing on Transit and Carpool Demand and Supply," in Curbing Gridlock, Vol. 2 Transportation Research Board, (Washington, D.C.: National Academy Press, 1994).

In an effort to reduce heavy traffic congestion on the Golden Gate Bridge, cars with three or more people qualify for a lower rate—at least 40 percent lower than the standard toll.

AREA/CORDON/NETWORK PRICING

Many U.S. experiments with congestion pricing to date have taken place on single facilities in congested corridors, such as a single toll road or HOT/HOV lane. While these projects are meritorious, the ultimate objective should be to price the majority of the road network in a geographic area, not just isolated facilities. "Cordon pricing" or "area wide pricing" is designed to reduce traffic congestion either into or within a specific central business district (as opposed to targeting a specific traffic corridor). The fee charged to drivers ideally would vary by time of day and would similarly be designed to encourage people to travel in off-peak hours, use public transport, or increase trip chaining (e.g. running two errands on the same trip), thereby reducing traffic, emissions and fuel use.

This type of congestion pricing has been used successfully in a number of cities around the world. Singapore, the first city to implement such a charge in the early 1970s, now uses a fully electronic pricing program to charge motorists (who are required to have in-vehicle transponders) based on location, vehicle type, and time of day at 50 charge points around the city. The city now experiences average speeds of 25 to 28 miles per hour, and studies have consistently shown that the charge produced net economic and productivity benefits.[25] Singapore, in fact, ranks second in the World Bank's 2010 Logistics Performance Index report, which provides a measure of how efficient a jurisdiction's transportation systems are.[26] For businesses that rely on timely delivery or services around the city, the charge is lower than the costs of having to factor in uncertain traffic delays. Further, as Singapore's zone expanded and charges increased over the years, the city vastly expanded the quality and service of its public transit system. Today 63 percent of total trips are taken on public transit.

25 Foo Tuan Seik, "An Advanced Demand Management Instrument in Urban Transport: Electronic Road Pricing in Singapore," Cities, 17(1), p. 33-45 (2000); FHWA, "Lessons Learned from International Experience in Congestion Pricing," Tolling and Pricing Program, December, 2008.

26 According to the measure, the United States ranks 15th, down from 14th in 2007. See, The World Bank, "Connecting to Compete 2010: Trade Logistics in the Global Economy," viii, (2010); and, The World Bank, "Connecting to Compete 2007: Trade Logistics in the Global Economy," at 2, (2007).

FIGURE 3.3 Logistics Performance Index Ranking and Scores, 2010

Economy	Rank	Score	% of Highest Performer
Germany	1	4.11	100.0
Singapore	2	4.09	99.2
Sweden	3	4.08	98.8
Netherlands	4	4.07	98.5
Luxembourg	5	3.98	95.7
Switzerland	6	3.97	95.5
Japan	7	3.97	95.2
United Kingdom	8	3.95	94.9
Belgium	9	3.94	94.5
Norway	10	3.93	94.2
Ireland	11	3.89	92.9
Finland	12	3.89	92.6
Hong Kong SAR, China	13	3.88	92.4
Canada	14	3.87	92.3
United States	**15**	**3.86**	**91.7**
Denmark	16	3.85	91.4
France	17	3.84	91.3
Australia	18	3.84	91.2
Austria	19	3.76	88.7
Taiwan, China	20	3.71	86.9

Source: The World Bank, "Connecting to Compete 2010: Trade Logistics in the Global Economy," viii, (2010).

In Stockholm, a time-of-day based fee to enter the city center has, since its inception in 2006, reduced traffic by 18 percent.[27] "Green" vehicles, including electric vehicles, are exempt from the charge.

To make such a system work effectively in the United States, Electronic Toll Collection (ETC) technologies will have to replace manual toll booths, enabling electronic payment as vehicles pass tolling stations at near-highway cruising speeds. ETC uses recently-developed vehicle-to-roadside communication technologies, and requires onboard units. Vehicle detection and classification, and enforcement technologies are also used. ETC offers advantages in terms of lowered toll collection costs, fuel savings, expanded data and revenue collection capacity without requiring more infrastructure, faster services, and reduced mobile emissions. Driver use of these systems is increasingly widespread. On the four toll routes operated by the Illinois State Toll Highway Authority, 82 percent of tolls are paid electronically every day (using the I-Pass system), and almost 4 million transponders are currently being used by drivers.[28] I-Pass, along with other electronic toll collection systems like Fast Lane in Massachusetts, M-Tag in Maryland, Smart Tag in Virginia, and i-Zoom in Indiana, have been integrated into the E-ZPass system, allowing interoperability across 24 agencies and 14 states.[29] This technology quickly identifies vehicle classes and assigns them differentiated tolls according to several criteria, which also gives policymakers flexibility to minimize any specific impacts on low-income drivers or any other target population.[30]

In the United States, some metropolitan areas have considered whether to implement cordon pricing systems. The most well-known plan was for a congestion zone in Manhattan, first advanced in 2007 by New York City Mayor Michael Bloomberg. The proposal received a pledge of $354 million in financial support from USDOT during the Bush Administration as a part of the Urban Partnership Program, but was abandoned in April 2008 after the New York legislative leadership refused to allow a vote on whether to authorize the plan.[31]

Although New York did not ultimately adopt congestion pricing, and the proposal was a somewhat crude form (using a non-variable fee), the lessons learned from the policy experiment are quite important. In part due to federal incentive funds, the New York proposal went from having little support outside policy circles to gaining the diverse political support of the mayor of New York City, the governor of the state of New York, the U.S. Secretary of Transportation, the New York City Council, and major business groups. Moreover, other federal grants allocated to metropolitan areas in the Urban Partnership Program had similar effects, helping convert ideas that were politically challenging into real and actionable proposals in cities such as Los Angeles, Atlanta, Seattle and Miami.

These lessons provide confidence that more permanent and competitive federal incentive grant programs with a clear policy purpose to drive metropolitan transportation efficiencies will have a powerful effect.

> Technologies available today that provide an alternative to existing toll booths promote fuel savings, reduce mobile emissions, and offer faster services at lower collection cost.

27 IBM, "IBM Brings 50% Reduction in Waiting Time to the Morning Commute in Sweden's Capital," press release, September 23, 2009.

28 Illinois Tollway, "Facts Figures & History."

29 E-ZPass Interagency Group, "About Us."

30 California Center for Innovative Transportation. University of California Institute for Transportation Studies, "Intelligent Transportation Systems – Electronic Tolls Collection", 2007; World Bank, "Toll Roads and Concessions."

31 See, NYC.gov, "USDOT awards $354.5 million to implement congestion pricing plan or other alternative pricing mechanism," August 14, 2007; and New York Times, "U.S. Offers New York $354 Million for Congestion Pricing," August 14, 2007.

POLICY MODELING A

Congestion and Pricing

Today, more than 350,000 barrels of oil per day are wasted due to congestion across the nation.[32] At current prices, this represents an expenditure of approximately $28 million each day (or $1.3 billion on an annual basis).[33] By 2035, modeling forecasts these losses to approach 640,000 barrels per day (Figure M.1) or 232 million barrels per year—equivalent to more than 10 percent of forecasted U.S. domestic production.[34]

In order to accurately model oil savings due to congestion relief, it is first necessary to create a baseline by modeling the increase in oil consumption caused by expected congestion. This report analyzes two measures of congestion's effect on fuel economy. The first is concerned with the impact of congestion on expected savings from new fuel economy standards, the second with the overall fuel losses from congestion in the top metropolitan areas over the next decade.

The Energy Independence and Security Act of 2007 legislated new fuel economy standards for the first time since 1975. These standards require fleet fuel efficiency for all domestically sold passenger cars to reach 39 miles per gallon (mpg) and light trucks and sport utility vehicles (SUVs) to reach 30 mpg by 2020.[35] In May 2009, President Obama directed the Environmental Protection Agency (EPA) to bring these goals forward to 2016. The 2011 fuel economy requirements are 30.2 mpg for cars and 24.1 mpg for light trucks.[36]

Entry into London's congestion charging zone is identified by street signs and surface markers.

EPA and NHTSA have estimated that the more stringent standards will "save 1.8 billion barrels of oil over the life of the program."[37] Reaching this figure requires considering the total vehicle lives of all passenger vehicles purchased in the years 2012 through 2016. Assuming that the average life of a passenger vehicle is 145,000 miles, new sales follow the EIA's projections, and comparing the new standard against the assumption that 2010 fuel efficiencies would otherwise remain flat, it is possible to closely mimic the 1.8 billion barrels estimate for the purposes of modeling.

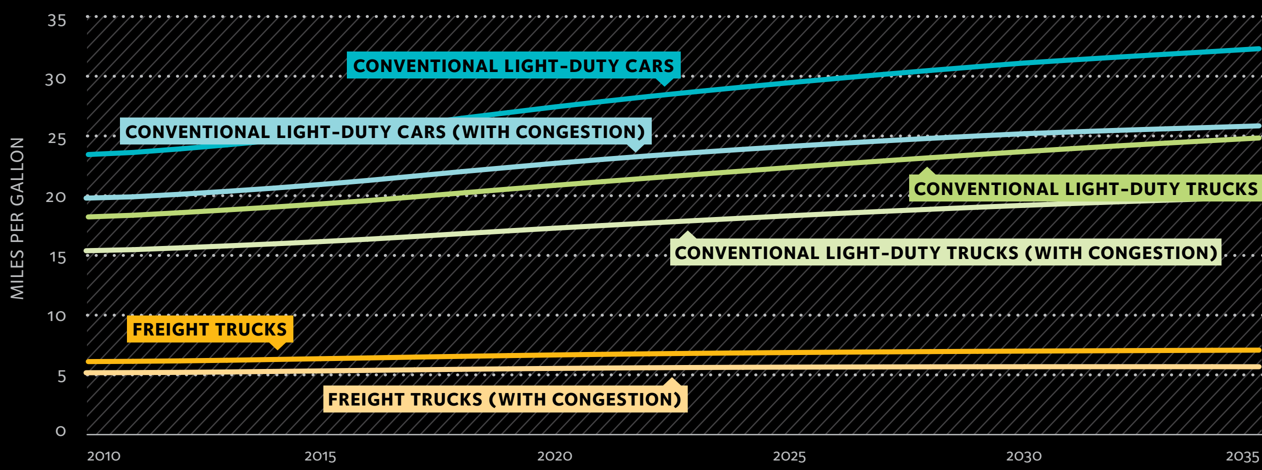
These savings however, are also dependent on EPA's laboratory-conditions testing environment for fuel efficiency. On-road conditions can result in dramatically decreased efficiency. The EIA provides an estimate of the fuel economy degradation factors for cars and light trucks on the road.[38] When these are applied to the new Obama administration standards, the estimated savings through the lifetime of the vehicles are reduced to about 915 million barrels.

To account for annually increasing congestion, peak-period VMT (estimated to equal 50 percent of all VMT) was isolated for the top 90 urban centers in the country.[39] Congested roadway conditions reduce baseline 2007 on-road fuel efficiency for light-duty stock by approximately 15 percent, according to TTI data (Figure M.1).[40] A number of sources provide varying estimates of congestion growth, ranging from 0.4 percent to 3.10 percent; 1 percent was assumed for the purposes of modeling.[41]

32 SAFE/PB analysis.
33 WTI spot prices averaged $80.61 per barrel through Q3 and Q4 2010.
34 EIA, AEO 2010, Table 11 Liquid Fuels Supply and Disposition.
35 In May, 2010, President Obama announced that his administration would seek to extend these rules past 2017. See: Carol E. Lee, "White House to Expand Federal Emissions Standards," Politico, May 20, 2010.
36 NHTSA, Average Fuel Economy Standards, Passenger Cars and Light Trucks, MY 2011.
37 The White House Office of the Press Secretary, "President Obama Announces National Fuel Efficiency Policy," Press Release, May 19, 2009.
38 EIA, "Transport Demand Module," Table 7.3. Car and Light Truck Degradation Factors, April 2010.
39 TTI 2009 Urban Mobility Report.
40 TTI 2009 Urban Mobility Report, See Equation A-9. It can also be noted that this reduction in fuel efficiency of 15 percent for the on-road light-duty stock represents a 30 percent reduction in fuel economy when compared to the fuel economy for new light-duty stock.
41 See FHWA Average Annual Delay from 1997-2005 at http://www.fhwa.dot.gov/policy/2008cpr/chap4.htm, Exhibit 4-7; FHWA Projected Growth in Urban Freeway Congestion at http://ops.fhwa.dot.gov/congestion_report_04/chapter3.htm, Figure 3.6; and TTI 2009 Urban Mobility Report, Exhibit 2, Travel Time Index between 1997 and 2007.

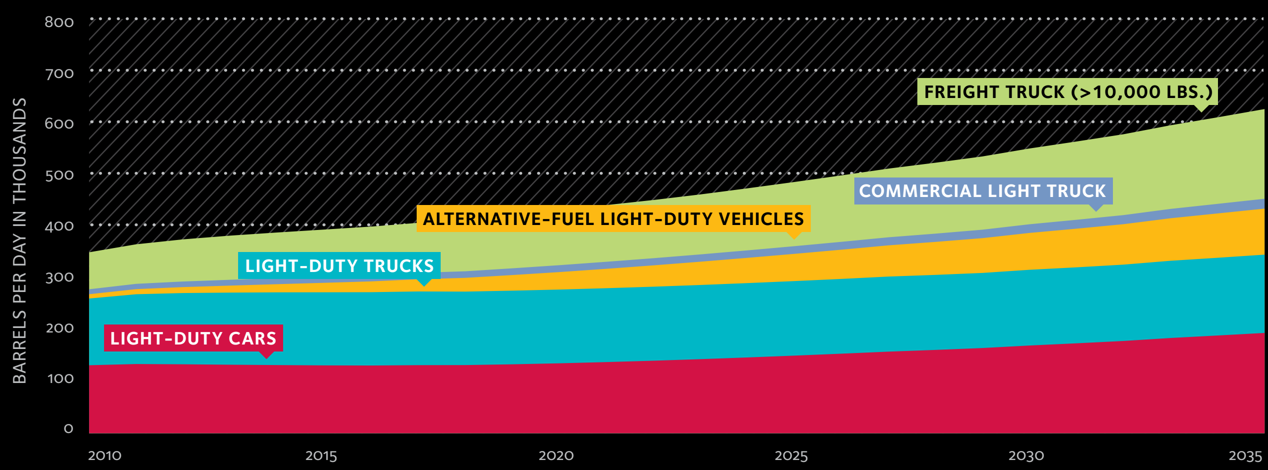
Forecast Effective On-Road Fuel Efficiency (with CAFE) for Different Vehicle Classes, 2010-2035

FIGURE M.1



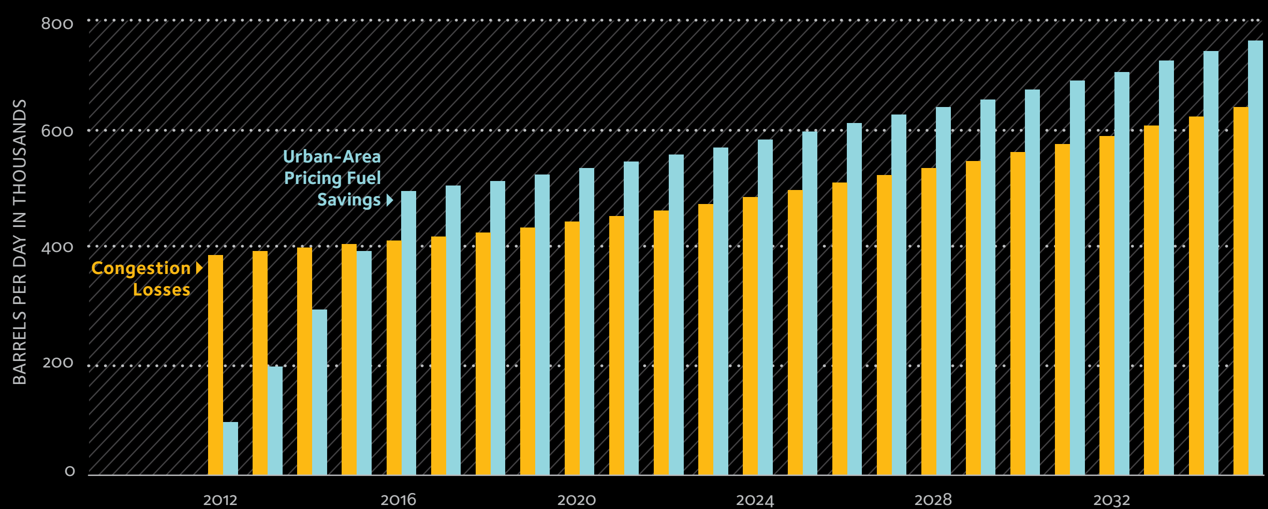
Forecast Daily Fuel Losses Due to Congestion, 2010-2035

FIGURE M.2



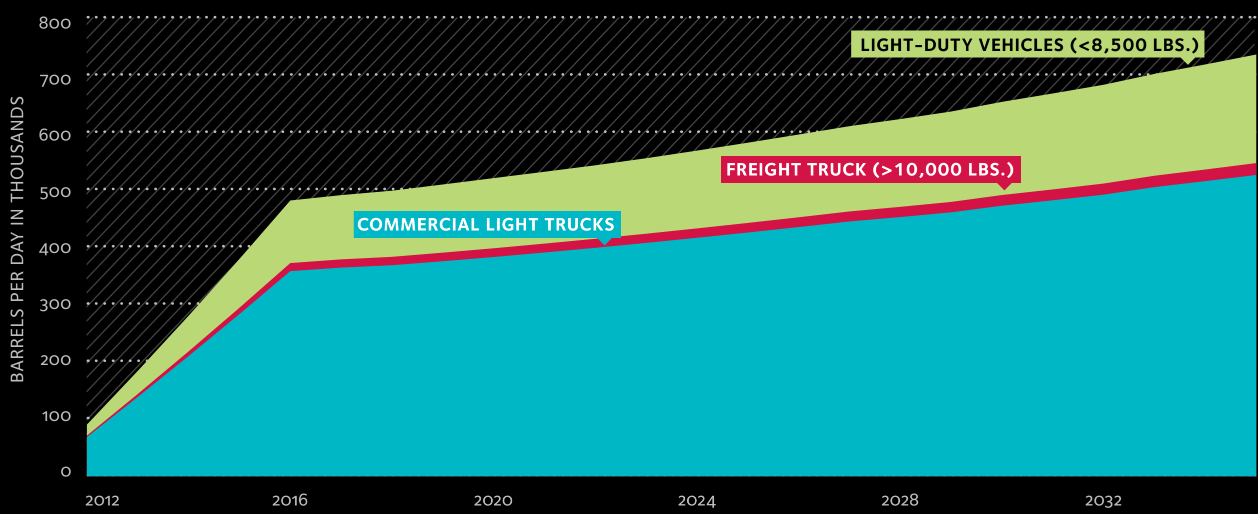
Congestion Losses and Fuel Savings From Urban-Area Pricing, 2012-2035

FIGURE M.3



Sources: Figures M.1, M.2, M.3 — SAFE/PB analysis.

FIGURE M.4 Oil Savings through Congestion Pricing (by vehicle type), 2012-2035



Source: SAFE/PB analysis.

It was further assumed that VMT will continue to grow as EIA has forecasted, and that there will be an annual increase in urbanization of 0.65 percent.[42] As a result, congestion is likely to further reduce the oil savings over the program period (2012-2016) to 886 million barrels.

An expanded analysis examined the overall wasted fuel due to congestion in the top 90 urban areas between 2010 and 2035. This analysis used the same method as above to calculate congested fuel economy, but examined the effect of congestion against on-road fuel economy over a longer period of time. The baseline on-road fuel economy is the EIA projection, further subdivided into conventional light-duty cars, conventional light-duty trucks, alternative fuel light-duty vehicles, commercial light trucks, and freight trucks. It was found that congestion will cumulatively waste 1.6 billion barrels of oil between 2010 and 2020.

Of all of the modeled policies, urban-area (or cordon) pricing is forecast to have the greatest impact on oil consumption in the U.S. transportation sector. The urban-area pricing model was applied to the top 43 urban areas during peak-travel times (6:00-10:00 a.m. and 3:00-7:00 p.m.), starting in 2012. These 43 "very large" and "large" urban areas account for almost 80 percent of the nation's travel-delay hours and costs associated with congestion. This makes them comparable in jurisdiction to the area covered by the congestion losses calculation described above. Congestion is forecast to waste over half a million barrels of oil per day by 2030 (Figure M.3). An urban-area pricing program can eliminate this waste. If implemented, congestion pricing in urban areas that results in free-flowing traffic conditions could save more than 750,000 barrels per day by 2035 (Figure M.4). Oil savings for light-duty vehicles will account for approximately 70 percent of the total savings. It is estimated that a total of 4.8 billion barrels of oil could be saved over the period 2012 to 2035.[43,44]

42 This is likely a conservative estimate, as the CIA World Factbook reports that urbanization in the United States occurred at a rate of 1.3 percent between 2005 and 2010. However, the growth rate of urbanization and the growth rate of vehicle use in urban areas are unlikely to be a 1-to-1 relationship—hence a lower factor assumed for modeling purposes.

43 TTI data for facility congestion levels and speeds were used to estimate the quantity of VMT per lane that would need to be removed from urban freeways and arterials during peak periods to obtain uncongested roadway levels for all 43 areas. It was calculated that to achieve a weighted average of no congestion on freeways and arterials, a total of 16.74 percent of peak VMT must be eliminated. It is assumed that half of this VMT is shifted to non-peak times. The other half shifts to other modes of transportation (such as public transit), carpooling, or is foregone entirely through telecommuting, trip-chaining, and other means of reducing discretionary trips.

44 TTI 2009 Urban Mobility Report, Appendix A, Exhibit A-6.

TRANSIT SYSTEMS

Properly designed, transit is a key way to address oil dependence. Heavy rail systems, like the Boston, New York, and D.C. subways, run on electricity, and are therefore completely delinked from oil. In 2007, transit reduced national gasoline consumption costs by $13.7 billion and decreased delays by 610 million hours, or 15 percent.[45] A 2007 analysis estimated oil savings attributable to transit use at approximately 33 million barrels per year and concluded that expanded public transportation could double these savings.[46] Another analysis found that for every additional billion transit trips, oil consumption is reduced by at least 420 million gallons (more than 10.3 billion trips are taken annually in the United States).[47]

New formula and discretionary programs should aim to support projects that yield oil savings. They should also favor delinking from oil, where possible. For example, buses can exploit their fleet economies of scale and transition to electric, hybrid electric or natural gas power. Currently, 18.5 percent of transit buses are fueled by compressed natural gas (CNG) or liquefied natural gas (LNG) and total transit use of natural gas has increased by 27 percent since 2004, when the surface transportation authorization bill (SAFETEA-LU) provided a credit for transit agencies to buy CNG/LNG vehicles.[48] Transit buses typically have highly routinized travel patterns. This provides an opportunity to 'right size' batteries, and refuel centrally, making the shift entirely to electric power an increasingly viable option.

Through these programs, the federal government should refocus its transit investment strategy on three broad objectives: improving operating efficiencies of existing rail and bus systems; recapitalizing the largest transit systems that are now facing an urgent need to bring existing assets up to a state of good repair; and expanding systems where it makes the most economic sense based on objective, quantifiable criteria. Just as a more robust highway finance model is needed, so too is a more robust transit finance model. Properly focused, these programs can help reduce chronic operating losses that negatively impact the performance of transit systems and their ability to reinvest in needed capital improvements.

45 David Schrank and Tim Lomax, 2009 Urban Mobility Report, Texas Transportation Institute, Texas A&M University, 2009.

46 Linda Bailey, "Public Transportation and Petroleum Savings in the U.S.: Reducing Dependence on Oil," ICF International, January 2007.

47 APTA, "Changing the Way America Moves: Creating a More Robust Economy, a Smaller Carbon Footprint, And Energy Independence," Discussion Paper, 2009.

48 William Millar, "Letter to Chairman Baucus and Senator Grassley," APTA, January 27, 2010.

In areas with high travel demand and heavy road congestion, efficient transit systems can provide an effective alternative for commuters while decreasing oil consumption.

High-Speed Rail

Today, the Acela Express is the only high-speed rail (HSR) service in the United States. Operated by Amtrak, it runs multiple times daily between Boston and Washington, D.C., via New York, Philadelphia and Baltimore, at an average speed of approximately 70 mph (its maximum is 150 mph). It saves travelers 1.5 hours end to end over the regular service. By contrast, HSR development in other nations has expanded rapidly in recent years. France, Japan, Germany, Spain and China each already have more than a thousand miles of HSR services (and more under construction or planned) connecting major economic centers, with average speeds in excess of 140 mph.

These projects are increasingly providing travelers with a viable alternative to road and even air travel over distances up to several hundred miles. In February 2009, the American Recovery and Reinvestment Act set aside $8 billion in capital assistance for the implementation of HSR service.[49] USDOT followed this up in April 2009 with its High-Speed Rail Strategic Plan, which outlined a vision for HSR passenger rail corridors across the nation. In response, the Federal Railroad Administration has received applications from 24 states seeking $50 billion for HSR projects—more than six times the pledged amount.[50] As of November 2010, $7.9 billion has been awarded to 79 projects across the nation.[51]

Critics of HSR development have raised concerns regarding high infrastructure costs and possible environmental damage. Supporters, in response, point to additional benefits of HSR, including job creation, improved connectivity between metropolitan centers, reduced energy consumption, enhanced mobility, and increased economic growth. It is clear, however, that like other transit investments, the deployment of HSR systems should be limited only to areas with proven levels of traveler demand. Without this demand, HSR is unlikely to be a cost effective investment or result in reduced overall energy use—although there would still be some shifting from oil to electricity generating fuels. Several other variables will ultimately enter into this equation including; accessibility, service frequency, and train capacity.

Existing intercity passenger rail, mostly powered by diesel locomotives, consumes 30 percent less energy per passenger mile than automobiles, and 20 percent less than air carriers.52 Due to its higher speeds over longer distances, fewer stops, higher transport capacity, and use of electricity for propulsion, HSR is even less energy intensive in comparison to other passenger modes—and of course, consumes zero oil. As a result, expanded and improved rail services (including HSR) in corridors between high-density population centers currently burdened with road and air traffic congestion would reduce energy consumption in the transportation sector. It is important that any project be selected based on competition and strong business models rather than politics. Every effort should be made to ensure the quality of the investment and minimization of operating subsidies.

49 Public Law 111-5, 123 STAT. 208, (February 2009).
50 "Ticket for Train Companies is U.S. Jobs," Associated Press, (December 4th, 2009).
51 White House, High-Speed Rail, Jobs, and the Recovery Act, http://www.whitehouse.gov/high-speed-rail, last accessed January 7, 2011.
52 U.S. Department of Energy, Transportation Energy Data Book (TEDB), Edition 29, Table 2.12.

TRAVEL DEMAND MANAGEMENT

Travel demand management (TDM) practices, which promote alternatives such as carpooling (ridesharing) and telecommuting, have been in use since the 1970s. These programs aim to reduce road traffic congestion by encouraging commuters to take advantage of alternatives to single-occupancy vehicle travel. There are three broad TDM categories. First, policies can offer travelers alternative transportation modes or services that lead to higher per-vehicle occupancy, such as carpooling. Second, travelers can be incentivized through congestion and other charges to reduce travel or push trips to off-peak hours. Third, travelers can be encouraged to accomplish the trip purpose through non-transportation means, such as substituting the use of telecommuting or the internet for work or shopping trips (an example of the latter is the zero sales tax that many states have implemented for sales that occur over the internet).

Carpooling is currently utilized by around 15 million drivers in the United States each year—77 percent in a 2-person carpool, 14 percent in a 3-person carpool, and 10 percent in a 4-or-more-person carpool[53]—and can be an effective way to reduce oil consumption and the cost burden of travel for drivers (particularly with respect to fuel and maintenance). Assuming an average daily commute of around 14 miles and a 50-week working year, every 300,000 additional cars taken off the road and into a carpool would save approximately 1 million barrels of oil per year.[54] This does not take into account the additional oil savings attributable to any resulting reductions in system congestion. Total gasoline costs for drivers will also be lowered by several hundred dollars based on current and forecast prices.

Adding an hour to the workday and then allowing employees to take off a day every two weeks is also an effective way to reduce trips and save energy. A generally more flexible approach that allows employees to vary their working hours to some degree can also deliver similar benefits—by, for example, enabling workers to avoid driving at congested times. The only barrier to doing so is cultural; many workplaces have simply not internalized alternative work weeks as a possibility.

A third TDM strategy, telecommuting, is a powerful mechanism for reducing trips and improving both productivity and quality of life. With so much of modern work occurring on computers and over the phone, people who typically waste time commuting can instead use that time to work. They also have more available time to achieve non-work goals. In 2008, 5.7 million people worked from home and 10.8 million people telecommuted once a week.[55]

TDM strategies go hand-in-hand with congestion pricing and tolling. For example, many express lanes also act as high-occupancy vehicle lanes, a program known as HOT/HOV lanes. At Orange County's SR 91 Express Lanes, the private consortium at first charged a lower toll for vehicles with more than 3 occupants (3+ ridesharing). When the lanes were de-privatized, the Orange County Transportation Authority (OCTA) permitted all 3+ ridesharing vehicles to travel on the express lanes for free. In a five-year impact assessment, California Polytechnic State University found that this type of toll incentive was accompanied by a long-term increase in 3+ ridesharing.[56]

The new program should specifically target TDM as a low-cost alternative to expensive commuter rail and bus systems. Nonetheless, TDM tools and congestion pricing obviously must co-exist with expansion of the roads and transit systems that people and freight in metropolitan areas require.

Carpooling is utilized by around 15 million drivers in the United States each year.

53 American Community Survey 2008, Table B08301. Percentages are rounded up to the nearest whole percentage.

54 SAFE analysis; FHWA, National Highway Transportation Statistics (NHTS) Survey 2009; AEO 2010, Table 59.

55 U.S. Census Bureau, American Community Survey 2006-2008, Table B08301.

56 Edward C. Sullivan, "A Look Back: California State Route 91," presented at International Symposium on Road Pricing, Key Biscayne, Florida (2003).

POLICY MODELING B

Carpooling, Flex Time, and Telecommuting

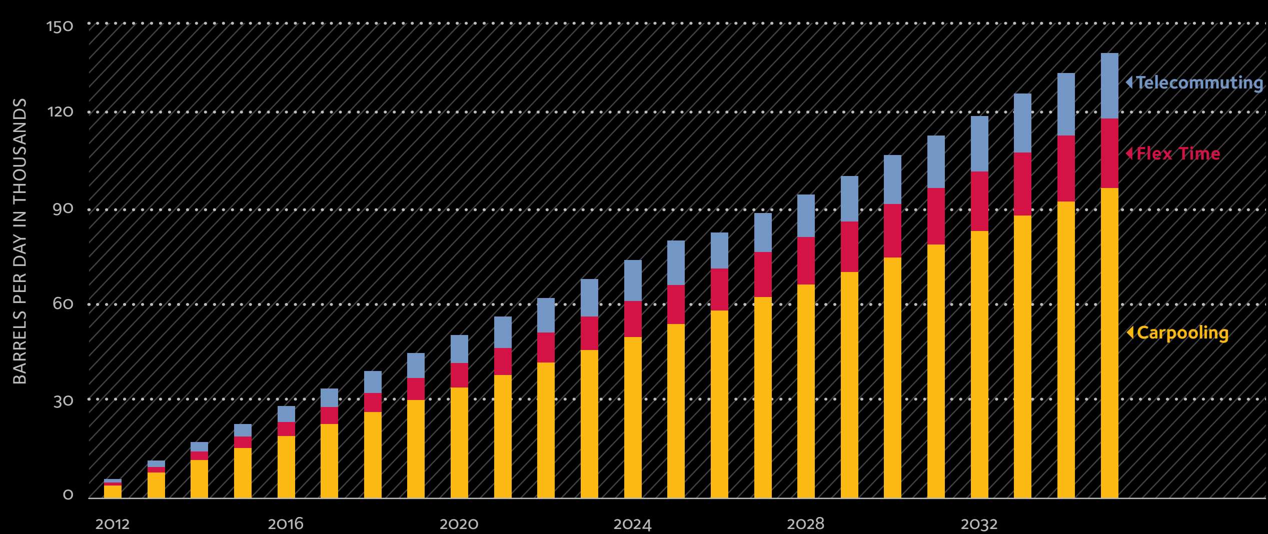
In 2008, approximately 15 million drivers carpooled to work.[57] This represented just over 12 percent of the estimated 121 million people who drive to work.[58] Assuming a target 50 percent increase in the number of drivers carpooling to work by 2030 (over the baseline)—with a gradual increase to this level between 2012 and 2030—a policy that incentivizes this activity could save approximately 100,000 barrels of oil per day by 2035 (Figure M.5). A more ambitious increase of 100 percent would double these oil savings for a cumulative saving of more than 850 million barrels between 2012 and 2035. Even under these conditions, less than one-quarter of all drivers would carpool to work by 2035.

The oil savings attributable to a 50 percent increase in the prevalence of both flex time (0.5 days per week) and telecommuting (1 day per week) across the working population of the United States are, in comparison, relatively small. Combined, these two strategies would save 2,000 barrels per day in 2012 and approximately 40,000 barrels per day by 2035.

57 American Community Survey 2008.

58 Ibid.

FIGURE M.5 Oil Savings from TDM Strategies, 2012-2035



Source: SAFE/PB analysis.

Improving Freight Infrastructure and Commercial Corridors

RECOMMENDATION

Establish a Freight and Intercity Infrastructure Enhancement Program to maintain and improve highway and passenger rail capacity outside of metropolitan areas and along major freight corridors. Up to 10 percent of total annual federal transportation funding would be allocated as follows:

a. 80 percent of funding would be distributed by formula directly to states in the form of block grants that could be used for any transportation investments that have a substantial impact on interstate commerce and energy savings and are consistent with overall performance objectives established in statewide transportation plans.
b. 20 percent of funding would be invested on a discretionary basis to nationally significant and meritorious intercity highway and rail projects with a clear emphasis on those that specifically improve the efficiency of freight and goods movement.

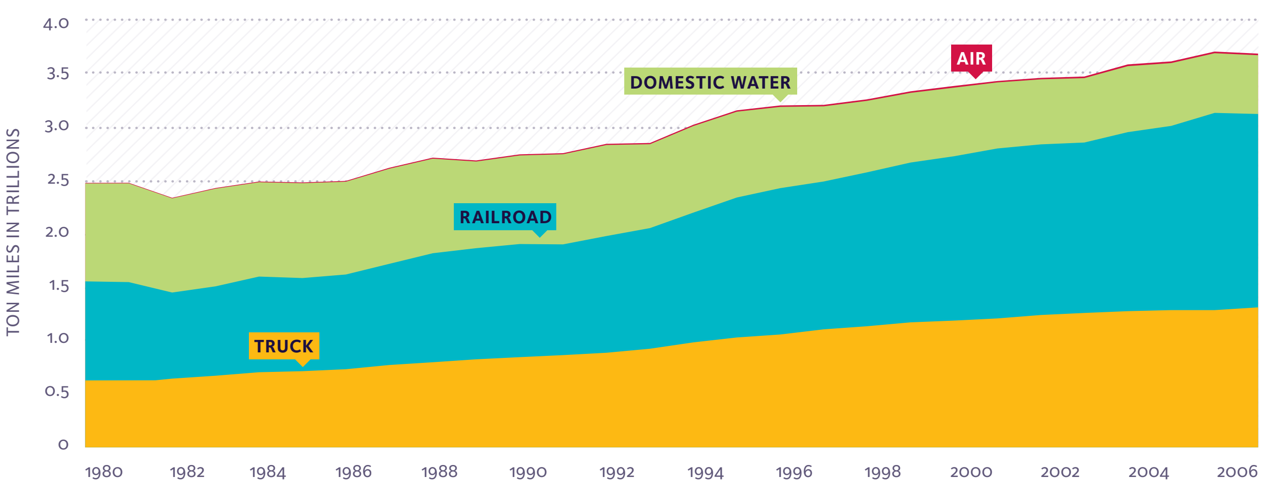
The Freight and Intercity Infrastructure Enhancement Program should be mode-neutral, and distribute funds to states apolitically. The program would ensure that the vast sums of money already invested in the highway and rail systems are not wasted, but rather used in a cost-effective manner that reflects a new prioritization of oil savings—a requirement not originally considered when much of the system was built.

A specific focus of a newly created program would be on freight system infrastructure. In 2007, there were more than 4.6 trillion ton-miles of freight carried by air, truck, railroad, ship and pipeline in the United States—up almost 30 percent in the past 20 years.[59] After decades of investment in the transportation system, freight transport has become a complex, multimodal network that moves more than 50 million tons of freight valued at $36 billion dollars each day.[60] But the nation's road, rail, and port freight infrastructure was mostly built prior to 1960, when the geography and nature of the economy was quite different than today. Pervasive just-in-time logistics and the economy's shift from heavy industries to services have changed the necessities of freight movement. The freight sector as a whole accounts for approximately 20 percent of total U.S. transportation sector energy consumption—a number forecast to rise through 2035.[61]

59 BTS, National Transportation Statistics 2010, Table 1-46b.
60 FHWA, Freight Story 2008.
61 AEO 2010, Table 7.

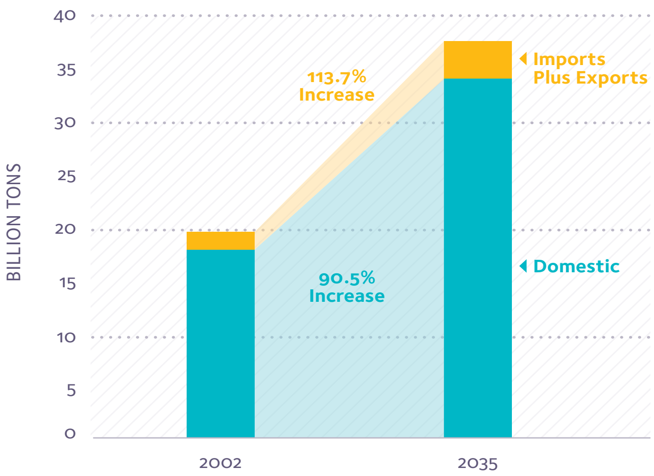
Ton-Miles of Freight, 1980-2007

FIGURE 3.4



Source: BTS, National Transportation Statistics.

FIGURE 3.5 Total Freight Transport Forecast, 2002 and 2035



Source: FHWA, Freight Story 2008.

The number of medium- and heavy-duty vehicles, in addition to the VMT attributable to them, has grown substantially in recent decades—energy consumption by heavy-duty trucks increased by 3.7 percent annually between 1970 and 2003.[62] By contrast, energy consumption in automobiles rose only 0.3 percent annually over that period.[63] Today trucks carry more than 70 percent of freight by value and are responsible for almost 20 percent of total U.S. transportation oil consumption.[64,65]

While truck VMT increased more than 90 percent between 1980 and 2002, road lane-miles only increased 5 percent.[66] The three metrics of capacity utilization—traffic density, average freight speed, and freight rates—all imply a growing long-term freight congestion problem regardless of the short-term congestion reprieve created by the recession.

Congestion in the nation's privately owned freight railroad networks presents different policy issues than those on the publicly owned and operated highway system, but there is little question that the railroad sector will struggle to keep up with demand. Between 1990 and 2009, freight rail transport increased from approximately 260 billion to over 400 billion revenue ton-miles.[67]

Freight congestion is likely to spread over the coming years from metropolitan areas and major interstate corridors to a large portion of mid-sized cities and non-interstate routes between major cities. Between 2002 and 2035, the constant dollar value of goods moved is expected to increase by more than 190 percent, twice the expected growth of tonnage, increasing the cost of congestion to shippers (and by extension, consumers).[68] Unlike traditional freight transport for heavy industry and bulk agricultural products, these high-value goods and just-in-time systems depend on fast and reliable transportation.

Beyond congestion, freight transport often suffers from conflicting stakeholder interests at the local and regional levels. Many freight corridors pass through residential communities and areas of high-density commuter traffic. The noise, pollution, and congestion from freight have engendered some public support for "getting trucks off the road."[69]

USDOT has noted that as freight becomes an increasingly large share of total transport and relies on multimodal facilities, initiatives to improve passenger travel are less likely to have substantial freight co-benefits.[70] While most passenger travel occurs locally, freight transport often occurs over long distances. In fact, two-thirds of the value of all freight crosses a state or international border.[71]

Additionally, there is a significant regulatory mismatch between carrier networks and state DOT and EPA areas of jurisdiction. A train or truck may travel through a number of jurisdictions, each of which has different requirements and investment priorities. Yet states are often unwilling to invest in freight corridors that principally serve other states. This necessitates funding nationally-significant, freight-related initiatives that cut across state boundaries for which individual states rarely have a strong enough incentive to carry out under current operating constraints.

62 Committee to Assess Fuel Economy Technologies for Medium- and Heavy-Duty Vehicles, "Technologies and Approaches to Reducing the Fuel Consumption of Medium- and Heavy-Duty Vehicles," Transportation Research Board, National Academies Press, 2010.
63 Ibid.
64 BTS, National Transportation Statistics 2010, Tables 1-52, 4-1, and 4-5.
65 In October 2010, the federal government, as part of continued efforts to reduce carbon emissions and fuel consumption, proposed regulating medium- and heavy-duty truck fuel efficiency. (EPA)
66 USDOT, "Transportation Vision for 2030," (January 2008).
67 BTS, Key Transportation Indicators, Rail Freight Revenue Ton-Miles, February 2010.
68 FHWA, Freight Story 2008, at 8.
69 AASHTO Standing Committee on Highway Transport, "Highway Freight Bottom Line Report, Progress Report," June 2006.
70 FHWA, Freight Story 2008, at 27.
71 Ibid.

Truck Size and Weight Regulations

In November 2010, the Environmental Protection Agency (EPA) and the National Highway Traffic Safety Administration (NHTSA) began advancing efforts to reduce oil use in the heavy-duty vehicle fleet with a joint proposed rulemaking for greenhouse gas and fuel efficiency standards. The agencies are, for example, proposing differentiated standards for nine subcategories of combination tractors based on three attributes: weight class, cab type, and roof height. The standards would affect model year 2014 through 2018 vehicles, phase in over time, and achieve from 7 to 20 percent reductions in emissions and fuel consumption over the 2010 baselines.[72]

Another potential area for energy savings from the freight sector relates to changes in the current federal legislative freeze on states expanding carrier flexibility under their commercial truck size and weight laws. Federal law currently addresses the following:

- The maximum weight on any single axle (20,000 pounds) and on any tandem axle (34,000 pounds), for vehicles on interstate highways,
- The maximum weight on any group of axles on a vehicle (for example, the last four axles of a five-axle tractor-semitrailer), as a function of the span of the axle group and the number of axles, on interstate highways (the Bridge Formula),
- The maximum weight of the entire vehicle (80,000 pounds) on interstate highways—states cannot impose lower weight limits than the federal limits on interstate highways,
- The width of vehicles—federal law requires states to allow vehicles 102 inches wide on the National Network for Large Trucks, a federally-designated network that includes the interstates and 160,000 miles of other roads, and
- Trailer length and numbers—federal law requires the states to allow single trailers at least 48 feet long and tractors pulling two 28-feet trailers on the National Network.[73]

States in which vehicles exceeding a federal limit were in operation before the law was enacted may continue to allow the vehicles to operate indefinitely. The exemption applies to state permit operations as well as to general state limits. No state that did not allow operation of longer combination vehicles (LCVs, defined in general as multi-trailer combinations having any trailer longer than 28 feet, having more than two trailers, or weighing more than 80,000 pounds) on the National Network before June 1991 may legalize operation of such vehicles on the National Network.[74]

This topic has been the subject of much controversy over the years with safety, energy, industry, and other stakeholders being unable to reach any consensus on a different approach. USDOT and studies by others have shown that while the use of larger and heavier trucks reduces unit fuel economy, fewer trucks are required to transport the same total quantity of freight—with reduced congestion as a secondary benefit. This results in total VMT savings that more than offset the diminished vehicle fuel efficiency. A University of Michigan study, for example, found that if an 8,000 pound additional cargo weight allowance (91,000 pound GVW) and interstate usage of twin 53-foot trailer LCVs were permitted, the national annual diesel fuel reduction would be 2.6 billion gallons (or approximately 60 million barrels).[75]

To more effectively balance energy security and safety objectives, a variety of approaches could be pursued to make this regime more efficient, including:

- Piloting more flexible size and weight requirements along certain major interstate corridors where the probability of any increase in fatality rates is low,
- Tying more flexible size and weight requirements to trucks deploying leading-edge safety technologies and undergoing more rigid safety testing than required under the current regime,
- Increasing the maximum allowable weight of truck tractor-semitrailer combinations that have a supplementary sixth axle installed, replicate current stopping distances, and do not fundamentally alter current truck architecture,
- Allowing certain states in a region of the country to harmonize size and weight requirements with each other so long as the states desire to do so (most applicable in western states),
- Require states to allow for 33-foot truck tractor-semitrailer-trailer combinations (or twin trailer combinations), and
- Piloting more flexibility in length requirements for smaller commercial trucks that do not present significant safety risks (such as those weighing less than 40,000 pounds).

72 EPA, NHTSA, EPA and NHTSA Propose First-Ever Program to Reduce Greenhouse Gas Emissions and Improve Fuel Efficiency of Medium- and Heavy-Duty Vehicles: Regulatory Announcement, (October 2010).

73 Transportation Research Board (TRB), Regulation of Weights, Lengths, and Widths of Commercial Motor Vehicles: Special Report 267, (2002).

74 Ibid.

75 University of Michigan, Transportation Research Institute, Analysis of the Potential Benefits of Larger Trucks for U.S. Businesses Operating Private Fleets, (May 2009).

Unburdening Restrictions from Projects that Aid Oil Security

RECOMMENDATION

Remove federal legal restrictions on state tolling/pricing of new road capacity and any existing road where it can be shown that such pricing would bring about congestion relief, and help improve the ability of state and local governments to finance transportation improvements.

In the last decade, more than one-third of all new limited-access lane miles built in the United States were tolled.[76] Since the enactment of ISTEA in 1992, Texas, Florida and California in particular have made a large number of tolling improvements (57 percent of the total). Yet overall, just 32 states have advanced toll improvements and many have done so only to a very small degree.[77] Targeted tolls have mostly been used to pay for construction, operation, and improvement of individual facilities, but increasingly states are combining the concept of variable pricing into a greenfield highway financing strategy.

Clearer legal signals from the federal government can aid in the timely deployment of meritorious transportation projects, particularly with respect to the use of toll facilities.

Unfortunately, the federal government is sending mixed legal signals to state and local governments regarding the use of tolling to both finance and improve operating efficiencies of their transportation systems. Federal law generally prohibits tolling on the interstates, but then provides a complex array of pilot exceptions that are not well understood by potential project sponsors and have a limited number of slots.[78] Many willing states have found ways to navigate the federal tolling approval process, but it is difficult to see what public policy objective is being served through the complexity. The reality is that Congress has added new pilot programs in each of the last three reauthorization cycles, but has not reassessed the fundamental prohibition in light of changing technology and financial needs.

In addition, the federal government is encouraging state and local governments to provide more funding than the statutory minimum 20 percent for most federal transportation programs. Such encouragement, while well-intentioned from a policy perspective, is not consistent with a simultaneous discouragement to generate those revenues from the actual users of the transportation systems. To clarify these mixed policy signals, the federal government should reform its tolling rules to specifically allow states and localities to implement direct road pricing systems on any congested or soon-to-be congested roadways, regardless of their type.

Federal legal changes and new programs can only do so much, however. Institutional capacity at the state and local level to implement successful pricing programs must be improved to reduce delays and enhance public outreach. Because the concept of pricing remains relatively new in the United States, sharing lessons learned and best practices must be a fundamental part of any national pricing strategy. USDOT can and should play a much more active role than it is playing today to help build capacity and maintain momentum.

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76 Benjamin Perez and Stephen Lockwood, "Current Toll Road Activity in the U.S.: A Survey and Analysis," Office of Transportation Studies, FHWA, January 2009, at 2.

77 Ibid, Table 6, at 12.

78 Those programs include: the Value Pricing Pilot Program; the Express Lanes Demonstration Program; the Interstate Rehabilitation and Reconstruction Program; the Interstate Construction Program; and conversion of HOV to HOT under Section 161 of Title 23.

POLICY MODELING C

Tolling

Targeted tolling is increasingly being incorporated into highway financing strategy, particularly at the state level. Specifically, variable (or dynamic) tolling systems—systems that charge different users different prices at different times—can promote more efficient driving behavior and reduce oil consumption.

A tolling scenario that assumes the approximate U.S. average toll at non-peak times—10 cents per mile for light-duty cars, 15 cents per mile for commercial light trucks, and 25 cents for freight trucks—and twice the rate for peak times, could save more than 100,000 barrels of oil per day once fully implemented (Figure M.6).[79] (Peak periods are estimated to be between 6:00 a.m. and 10:00 a.m., and 3:00 p.m. to 7:00 p.m.) Despite the lower toll rates on light-duty vehicles, because these vehicles account for the vast majority of total highway VMT, they also account for the bulk of oil savings derived from roadway tolling.

This pricing is estimated to decrease peak VMT of light-duty vehicles by less than 5 percent. Importantly, not only would it reduce oil consumption, but it would provide an important source of revenue. If such policies were in place in 2012, for instance, an urban-rural program (tolling 70 percent of urban VMT and 30 percent of rural VMT) would be expected to generate off-peak-time revenues of approximately $30 billion and peak-time revenues of approximately $60 billion in urban areas, plus an additional $4 billion from tolled roadways in rural areas.[80] Under this scenario, a cumulative 2 billion barrels of oil could be saved over the period 2012 to 2035.

Under a less aggressive tolling scenario—in which both urban and rural tolls are 5 cents per mile for light-duty vehicles, 7.5 cents per mile for commercial light trucks, and 12.5 cents for freight trucks respectively[81]—total revenues and oil savings would both decrease by approximately 50 percent.

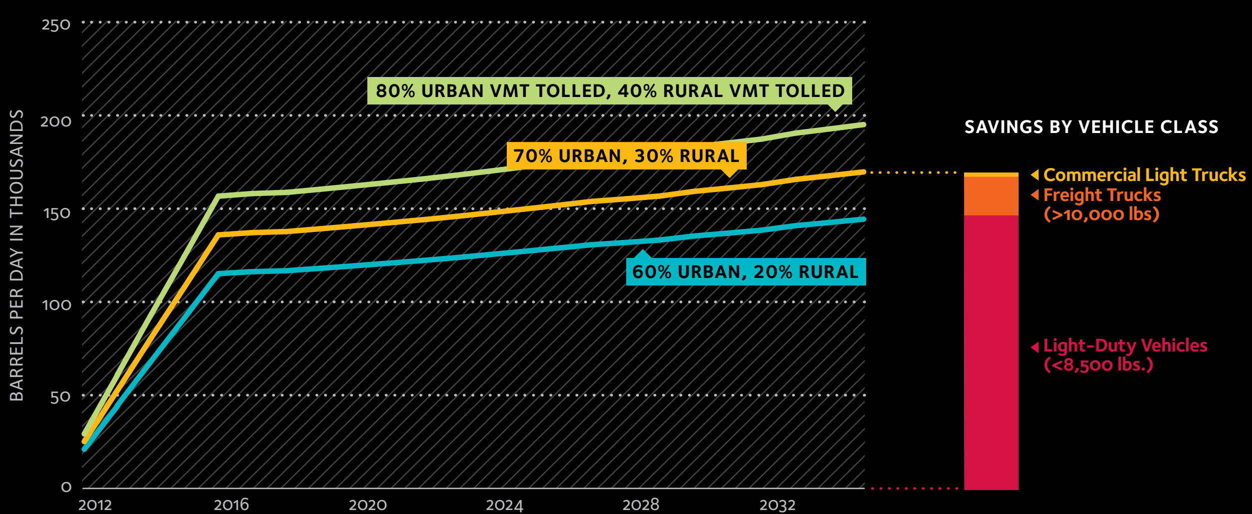
79 More than 95 percent of these oil savings come from tolling urban VMT. The remainder is contributed by tolling rural VMT.

80 Tolls on rural VMT are estimated to be one-half of those assigned to urban VMT.

81 Peak urban tolls would be 10 cents, 15 cents and 25 cents for light-duty vehicles, commercial light trucks, and freight trucks respectively.

Estimated Oil Savings Based on Extent of Tolling Program, 2012-2035

FIGURE M.6



Source: SAFE/PB analysis.

Note: These savings are derived under a scenario where 70 percent of urban VMT and 30 percent of rural VMT are tolled.

Stable Funding that Enhances Energy Security

RECOMMENDATION

Actively promote the long-term deployment of a comprehensive, privacy-protective VMT fee that adequately accounts for fuel consumption externalities. This should include cost sharing with states for system infrastructure, and funding for a limited number of promising demonstration projects and technological research.

Transitioning from failed, frozen, and inadequate fuel taxes for transportation financing to a 21st century, technology-enabled and privacy-protective vehicle miles traveled (VMT) charging system that provides sufficient and consistent revenue to adequately fund meritorious transportation project investments brings multiple benefits. A properly-constructed VMT system can better account for externalities and provide users with more precise price signals than the current tax-dependent approach. Such a system would not simply supply revenues, but would in fact accomplish multiple policy objectives simultaneously, including: optimizing system performance and reducing congestion; promoting efficient investments; reducing capital needs; and improving overall system fuel economy.

For optimal system efficiency, a VMT regime would be most logically administered at the national level, with the distribution of funds governed by the combination of formulas and competitive programs outlined in earlier recommendations. Such a system would need to acknowledge the variety of transportation fees already collected by state and local governments. Privacy and political concerns, however, may dictate that VMT systems develop at the state and regional level over time and are ultimately knitted together in a federal "system of systems."

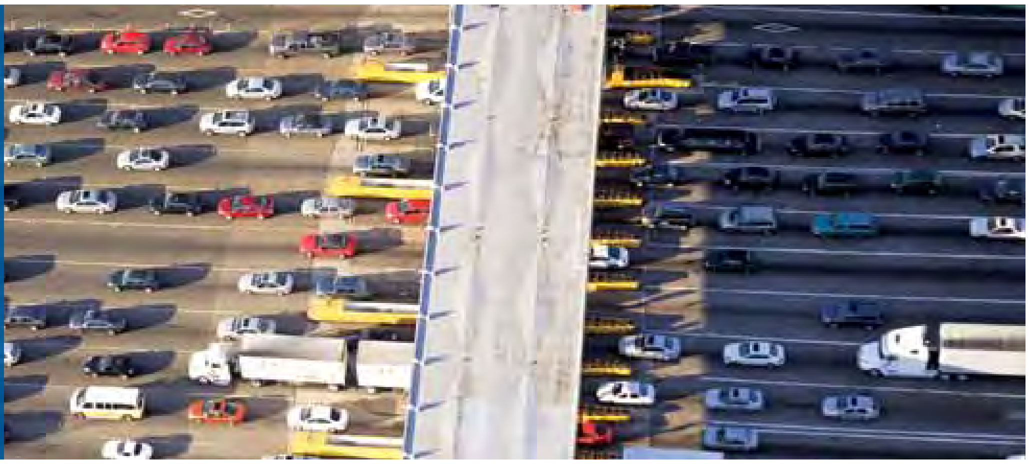
Such an incremental approach does, however, pose a potential threat to freight vehicles, which state governments may consider the most politically viable candidates for the rollout of a VMT program. Commercial vehicles should of course be included, but the focus of any initial large-scale pilot demonstrations or state-level implementations must also focus on the larger light-duty passenger market. This would ensure that the oil savings are greatest, a useful quantity of data is available for troubleshooting and improving system operation, and user concerns (including privacy) and technical challenges (such as simplicity in payment processing, transparency in fee changes etc.) can be comprehensively addressed.

A logical extension of the congestion pricing policies recommended in this report, this VMT system could be in place across the country by 2025. Whether a VMT system, or "system of systems", is managed by the federal or by state governments is less critical than meeting several principles or design criteria.

First, existing and emerging state and local systems must be interoperable and technologically linked so that the system user is required to install only one interface device no matter where he or she travels. An example of this development occurred with the growth of the E-ZPass Interagency Group. Started by the Port Authorities of New York and New Jersey and the Metropolitan Transportation Authority of New York with the conversion of one toll plaza in 1993, the system today covers toll facilities in 14 states north to Maine, south to Virginia and west to Illinois.[82]

82 E-ZPass Interagency Group Map, 2010.

Started in 1993, the E-ZPass road tolling system now covers 14 states and includes approximately 20 million registered drivers.



The system contains approximately 20 million registered drivers. Even though some of these states maintain their own brand names on their electronic tolling systems and utilize different lane configurations, user interoperability is seamless. In addition to E-ZPass, the Alliance for Toll Interoperability (ATI) has recently been formed with the purpose of "promoting and implementing interstate interoperability for the benefit of customers and member agencies." This group includes tolling systems across the country, not solely within the E-ZPass system.

Far from being an obstacle, growing tolling interoperability will actually ease the transition to more sophisticated VMT systems by reducing administrative complexities associated with cross-state collection and establishing working relationships among the tolling entities.

User interoperability is not only important for consumer convenience; it will be crucial to ensure maximum logistical flexibility in the commercial sector. At its heart, a national transportation system must be designed to ensure the free flow of goods and services across the U.S. economy. It would be ironic if efforts to modernize revenue collection to support the system created new bottlenecks. At a minimum, the federal government has a strong role to play in helping with standard-setting and providing regulatory and technical assistance to the states.

It is important to note that privacy concerns become more prominent as a VMT system becomes widespread and national in scope. While consumers appear comfortable with GPS and other locator systems they choose to purchase, government mandates associated with such systems may prove to be more problematic. Today's and tomorrow's technologies are and will be more than capable of addressing these underlying concerns, but policymakers must fully address them as part of the system design, not as an afterthought.

Political support for a VMT regime will also require protecting all existing state and local revenues and pricing policies. The development of a new funding regime should seek to minimize the tug of war for funding among the states as much as possible. It will reduce the likelihood that individual states will oppose the development of the VMT if the federal government ensures adequate financial support for system planning and development. Ultimately, outlier states that remain dependent on fuel taxes will continue to see their investment ability erode as biofuels, hybrids, and electric vehicles proliferate, and will also be unable to compete for shares of the new, non-formula funding outlined above.

For participating states, the transition to a new VMT regime must result in no reduction in current funding levels, with new expenses fully paid for. At the same time, system users must be assured that they are not paying for the same service twice. Different levels of charges, and even different sources of charges—for example, those related to system maintenance versus congestion mitigation—must be transparent and clearly accounted for to avoid the appearance of redundancy. It is clear that such transparency is well within the capability of existing technology (and represents one of the greatest failings of the current tax-based approach), and the opportunity for additional funding based on the competitive programs should serve as a powerful inducement to participate in the program.

> The transition from the current fuel tax regime to a national VMT fee is critical for the long-term funding of the U.S. transportation system.

An additional consideration is how new vehicle technologies affect transportation funding. Vehicle electrification clearly represents a critical part of any comprehensive plan to reduce U.S. oil dependence. Unlike oil, electricity is a diverse, domestic, stable, and fundamentally scalable energy fuel source. Even today, enough spare generating capacity exists in the sector to power more than one hundred million vehicles. All levels of government have recognized electrification as a critical initiative and are attempting to speed up adoption with a variety of incentives for advanced batteries and other components, the vehicles themselves, and associated infrastructure. Leading automakers are already expanding production of both plug-in hybrid vehicles (PHEVs) and electric vehicles (EVs) at significant scale. Although this transformation is crucial component for decreasing U.S. oil dependence, it will also by its very nature exacerbate the transportation system's funding problems at the state and national levels. Increasingly stringent fuel economy regulations have a similar effect, driving the need to ultimately transition to a user-pays, VMT-based system.

The transition to a VMT also provides an opportunity to address the gap between the number of meritorious national investments and the adequacy of revenues available to support such investments. Total VMT revenues, however collected, should be adjusted so as to equal current fuel tax levels had they been indexed to inflation when last authorized in 1993. Any increases in VMT fees above inflation must be fully justified based on the costs of system maintenance, repair, and improvement. Doing so will begin to close the funding gap in a way most readily explainable and acceptable to the American public.

POLICY MODELING D

Vehicle Miles Traveled (VMT) Fees

The simplest VMT fees to implement would charge drivers a fixed amount per mile traveled, regardless of when or where the travel occurs. Such a fee might require all registered car owners to submit an annual odometer reading for which they would pay a lump sum fee based on a per-mile rate. A VMT fee of this type would not be expected to yield significant oil savings in comparison to the status quo.

Between 2020 and 2035, a revenue-neutral, flat VMT fee—one that is the same across all vehicle types—could save approximately 53 million barrels of oil. Adjusting the VMT charges to vary based on average fuel efficiency within each vehicle class is estimated to save 39 million barrels over the same period (Figure M.7). Estimated savings from these two VMT fees are in large part a result of inflation-indexing. Light-duty trucks and light-duty cars in particular, account for a very large proportion of total national VMT—an estimated 87 percent in 2010.[83] In order to remain revenue neutral, a flat VMT is proportionally more expensive for this largest group of drivers, while being proportionally smaller for commercial and freight trucks. It therefore has a greater effect on total aggregate fuel consumption than a revenue neutral fee that varies according to fuel efficiency.

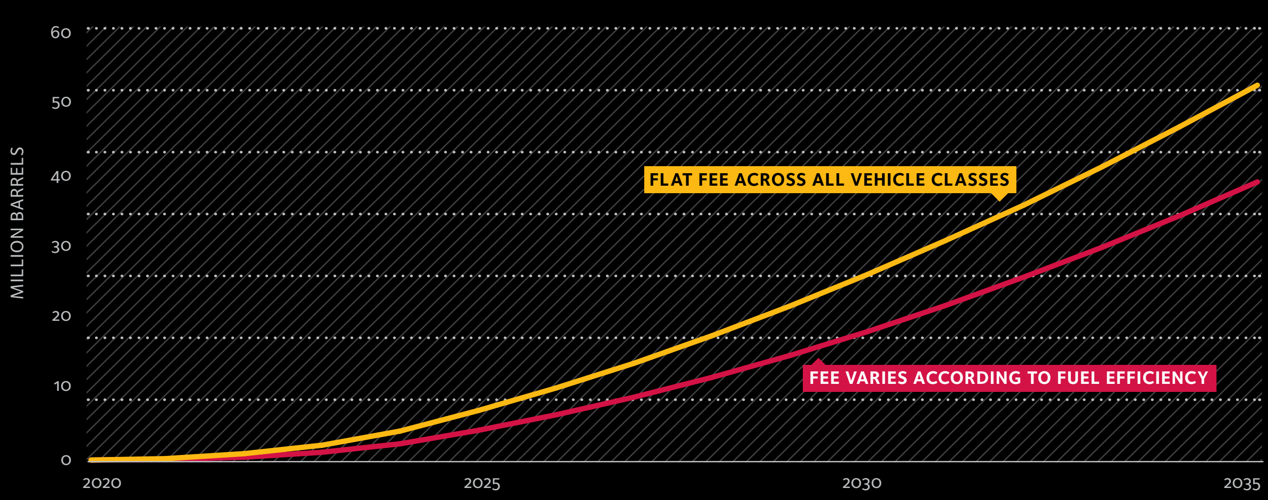
Much like the existing fuel tax regime, it is clear that fees of this magnitude—even under a different system of implementation—are insufficient to meaningfully affect driver behavior. As a result, the aggregate fuel savings are very low indeed.

Modifying VMT charges by adding an extra fee above revenue neutrality would induce larger oil savings (as well as extra revenues). Two alternatives were modeled. In the first, increases in the VMT fee above neutrality are small ("Fee Level 1")—0.5 cent, 1.5 cents, 2 cents and 3 cents for light-duty cars, light-duty trucks, commercial light trucks and freight trucks respectively. In the second, these increases are more sizable ("Fee Level 2")—1 cent, 3 cents, 4 cents and 6 cents respectively. It is interesting at this point to note that today's gasoline tax of 18.4 cents per gallon equates to per-mile costs of approximately 0.8 cents and 1 cent for light-duty cars and light-duty trucks respectively. Freight trucks meanwhile, with an average fleet-wide fuel efficiency of approximately 6 miles per gallon, already pay the equivalent of 4 cents per mile in diesel taxes.

Figure M.8 shows the cumulative savings attributable to these VMT fees. Between 2020 and 2035, Fee Level 1 and Fee Level 2 are estimated to save 192 and 345 million barrels of oil respectively. Even for Fee Level

83 AEO 2010, Tables 7, 58, and 60.

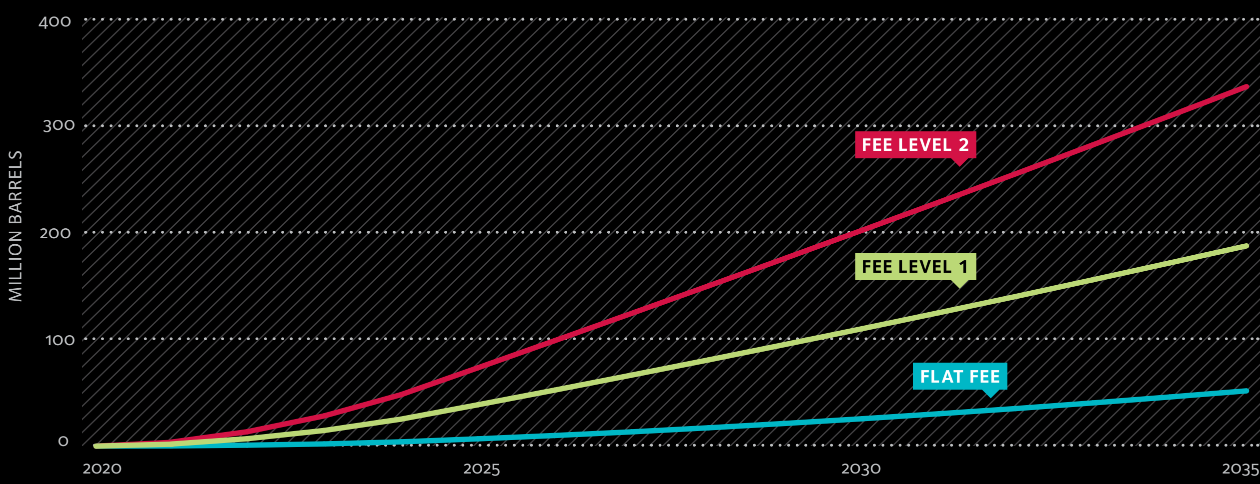
FIGURE M.7 Estimated Cumulative Oil Savings from Revenue Neutral VMT fees



Source: SAFE/PB analysis.

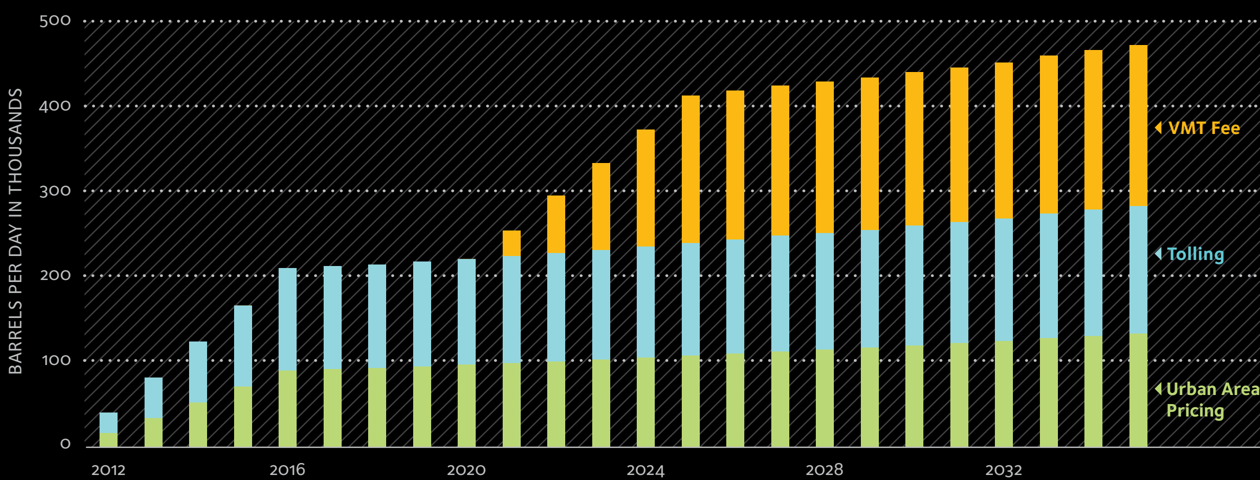
Estimated Cumulative Oil Savings from VMT Fees Above Revenue Neutrality

FIGURE M.8



Estimated Oil Savings from a Comprehensive Pricing Program that Includes VMT Fees Above Revenue Neutrality

FIGURE M.9



Sources: SAFE/PB analysis.

1, these estimated savings would be substantially higher than for the flat VMT fee (shown again for comparison).

By taking into account additional variables, VMT fees can capture more of the costs and externalities imposed on the system by drivers. A fee can be variable based on time and place of travel, congestion level, vehicle fuel economy, vehicle weight, etc. and therefore can, for example, as outlined earlier, be combined with an urban-area pricing program or tolling program. Thus, the VMT fees with charges above neutrality can be seen as approximations to a comprehensive pricing program.

To better understand how a more dynamic VMT fee would affect oil consumption, it can be merged with analysis on urban-area pricing and tolling. In Figure M.9, pricing intended to reduce peak VMT by approximately 3.5 percent (a 'medium' level of congestion, from today's existing heavy level of congestion) is combined with the VMT fee (Level 2) outlined above. Also included is level of tolling shown in Policy Modeling section C. These three illustrative pricing policies combine for almost half a million barrels of oil saving per day by 2035.


Portland, OR, home to the ODOT VMT Pricing Pilot Program.

Vehicle Miles Traveled Pricing Pilot: Workable, Effective, and Popular

In April 2006, the Oregon Department of Transportation (ODOT) launched a 12-month pilot program to test the administrative and technological feasibility of a mileage-based fee using 285 volunteer vehicles, 299 motorists, and two service stations in Portland. Each vehicle was fitted with an odometer-reading meter that recorded miles driven using GPS technology and transferred the mileage data to point-of-sale systems at the participating gasoline stations. Here, the mileage data was used to calculate a total bill and the state gasoline tax was removed. This allowed part or all of motorists' VMT payments to be pre-paid to the ODOT in the form of the fuel tax by the gasoline distributor at the point of wholesale distribution in the state. The retailer remitted the difference between the pre-paid fuel tax and the VMT fee in a periodic reconciliation with the ODOT. Some drivers (the 'VMT' group) paid 1.2 cents per mile—calculated based upon Oregon's existing state gasoline tax; others (a 'rush hour' group) paid 10 cents per mile within the congestion zone and 0.43 cents per mile for regular travel; a 'control' group continued to pay state fuel taxes. The key findings included the following:

- The concept is practically viable and can be implemented and administered at low cost,
- Different pricing zones could be established electronically,
- Integration with current payments systems can be achieved with minimal difference in the process or administration for motorists,
- By using satellite GPS tracking, an extension of the system to congestion pricing and/or highway tolling could be achieved without toll booths (which slow traffic) or cameras (which can be expensive and unreliable),
- The mileage fee can be phased in gradually alongside fuel taxes initially.
- Personal privacy can be effectively protected,
- The potential for evasion through device tampering or refueling at stations not configured for mileage-based fees is minimal, and
- Area pricing affected driving patterns and fuel consumption. For example, those in the 'rush hour' group reduced peak travel miles by 14 percent and those in the 'VMT' group reduced total miles by more than three miles per day—12 percent.

Most tellingly, 91 percent of the participants said they would agree to continue paying the VMT fee if the program were extended state-wide. Large majorities of the participants were also found to be satisfied on a number of different criteria, both during and at the completion of the study, including: privacy associated with the equipment, having to purchase gasoline at participating stations, where the display was positioned in the vehicle, and receiving reimbursement for receipts.[84]

84 "Oregon's Mileage Fee Concept and Road User Fee Pilot Program," Final Report, Oregon Department of Transportation, November 2007.

Streamlining the Project Review Process

A vitally important, though often neglected, area requiring reform is the regulatory review process by which projects are deemed to have met the requirements of the National Environmental Policy Act of 1969, or NEPA. In order for the new set of programs outlined above to be effective in reducing fuel consumption—and for performance metrics to be meaningful—project approval must be focused and streamlined. The NEPA process should not be a multi-year conduit for general assessment of project worth, but rather an efficient and timely evaluation of its environmental impact.

RECOMMENDATION

Pilot new approaches to pre-development regulations for projects that are expected to achieve substantial and ongoing oil savings.

The current NEPA process requires an exhaustive analysis of alternative projects with little regard for their underlying funding mechanisms. The Council on Environmental Quality (CEQ) specifically demands that all environmental impact statements "rigorously explore and objectively evaluate all reasonable alternatives."[85] This review process—from the date that the Notice of Intent is signed to the signing of the Record of Decision—typically takes longer than five years to complete (Figure 3.6) for major projects. Given the current resource constraints at the state level, many projects either must finance themselves from project-related revenues or not proceed. Analyzing an array of financially unviable alternatives to a self-financing project makes little sense and wastes resources. Therefore, the government should give statutory recognition to this reality and reduce the range of alternatives that sponsors must consider if they are pursuing a project that is self-financing or largely self-financing. This will provide a regulatory incentive for project sponsors to support projects financed with user fees.

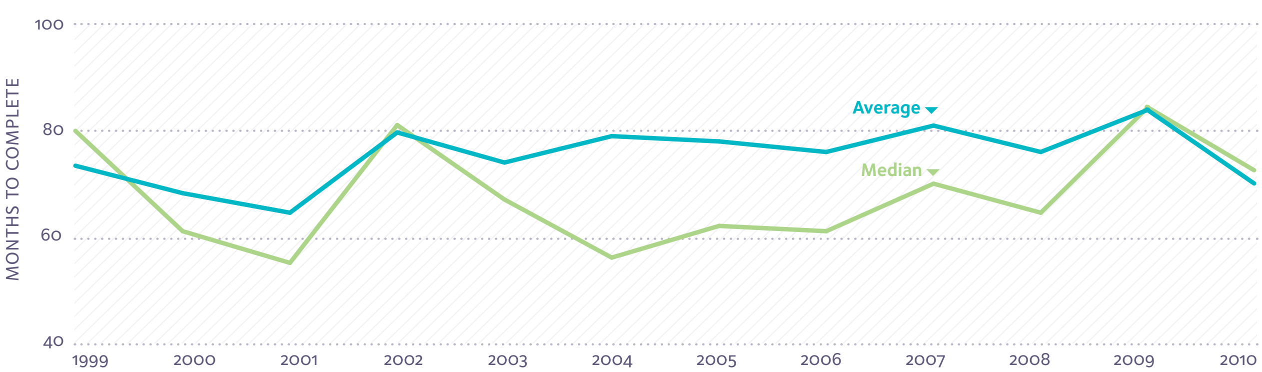
In addition, the current NEPA approach does not recognize pricing as desirable from an environmental perspective. This should change. In particular, projects that price existing roads without adding new capacity should be exempted from the requirement to assess environmental impacts under NEPA. There should not be any NEPA uncertainty about converting "unpriced roads" to priced roads, particularly since this conversion is likely to lead to reduced fuel consumption, decreased emissions, and a more efficient transportation system. While most of these projects have moved forward to date as categorical exclusions, it has been only by exercise of agency discretion, not because Congress has sent a clear signal that making this type of efficiency investment need not navigate the full complexities of NEPA (as has been done with bicycle path investments, for instance).

One potential solution for overhauling the existing highly cumbersome review process is to move to an alternate negotiation-based process for project review in which key stakeholders, including public interest groups, would reach a negotiated agreement after taking into account the environmental impacts and analysis of alternative options. If stakeholders are given actual negotiating rights—as opposed to only the power to delay—they can negotiate better up-front mitigation packages by reducing the enormous costs associated with any delays. It is key, however, that an agreement reached through this type of negotiated rulemaking process be binding on all parties.

85 Council on Environmental Quality (CEQ), Regulations for Implementing NEPA, Section 1502.14.

Time Required to Complete the NEPA Process, FY 1999-2010

FIGURE 3.6



Source: FHWA.

Conclusion

Reliance on petroleum has created unsustainable risks to American economic and national security. Much of the oil we consume is produced in hostile nations and unstable regions. Its price is increasingly volatile. As a result, the economy is left at the mercy of events and actors beyond U.S. control.

Seventy percent of U.S. oil consumption is attributable to the transportation sector. And yet, despite this, transportation and energy policy have historically been debated in two entirely separate spheres in American politics, and a coherent, unified strategy for the federal surface transportation system has largely been absent since the construction of the interstate highway system. In fact, in many ways, we now have the worst of all worlds—an array of complicated programs, each with their own procedural requirements, disconnected from any broader policy objectives. The result is a system of indirect fees, misaligned incentives, overburdening regulations, and inefficient capital investments, in which growing road congestion severely threatens the potential oil savings associated with more efficient vehicles and more widespread use of alternative fuels.

The U.S. transportation system and U.S. energy use are, to a very significant extent, irrevocably linked. Efforts must therefore be refocused on developing transportation policies that transform the way projects are funded and chosen, using oil consumption as a principal metric. Reforms are also required to promote smarter, more cost-effective capital investments in highways, transit systems, and advanced technologies that encourage higher operating efficiency and lower energy use. Policies to promote more stable road speed conditions in particular are crucial to lowering sectoral oil consumption. Urban congestion pricing programs, an expansion of tolling projects, and alternatives to the current fuel tax regime will help address efficiency and funding challenges, in addition to ongoing performance-related concerns.

The current approach is unsustainable for the U.S. transportation system, national energy security, and the growth of the American economy. It is time for policymaking that emphasizes the crucial interaction between transportation policy and U.S. oil dependence.

APPENDIX I

Modeling, Methodology and Data Sources

Using baseline forecasts from the U.S. Department of Energy's Annual Energy Outlook 2010, this report presents oil savings estimates for an urban-area congestion pricing program, traffic demand management initiatives, a nationwide tolling program, and a VMT pricing program.

OIL SAVINGS ESTIMATES

The recommendations in this report are intended to have a substantial and sustained impact on the use of oil in the U.S. transportation sector.

The reform of U.S. transportation policy is an important step towards reducing our dependence on oil. This is not only because it can directly reduce oil consumption in the sector, but because it is the only method for addressing growing congestion of the transportation system that will, without effective policy change, undermine the realization of oil savings gains associated with improvements in vehicle technology and the continued shift towards vehicles powered by fuels that are not derived from oil.

In this report, Securing America's Future Energy (SAFE) presents oil savings estimates derived from several of its recommendations using a forecasting tool developed by Parsons Brinckerhoff (PB). This tool enabled SAFE to develop annual oil savings estimates for the period 2010 to 2035 (although no policy was assumed to be implemented until 2012 at the earliest) under a variety of different scenarios. This allowed SAFE to present a range of possible oil savings for each policy that was modeled. These estimates are illustrated in more detail in Policy Modeling sections A through D. This modeling was also used as the basis point for the revenue calculations presented.

In addition to creating the tool used by SAFE, PB assisted SAFE in identifying third-party sources for baseline data and assumptions from transportation- and energy-industry sources. PB also verified that all modeling outcomes are accurately represented in all material respects.

Specifically, SAFE modeled the potential outcomes for four of its recommendations; a tolling program, a congestion pricing program (urban-area pricing), a VMT fee, and three travel demand management (TDM) programs—carpooling, telecommuting and flex time. The initial year of implementation varies for each of the policies listed. The three congestion pricing programs are all phased in to their peak level five years after implementation begins.

DATA SOURCES

Each modeled recommendation uses baseline VMT forecasts for 2010 to 2035 from the Annual Energy Outlook 2010 (AEO 2010) published by the U.S. Energy Information Administration (EIA). This source provides a breakdown of total U.S. VMT into several specific categories: light-duty cars, trucks, and alternative-fuel vehicles weighing less than 8,500 pounds; commercial light trucks weighing between 8,500 and 10,000 pounds; and freight trucks weighing more than 10,000 pounds.

Forecast fuel efficiency for these vehicle classes over the period is also collected from the AEO 2010. These average vehicle fuel efficiencies are adjusted for existing and anticipated changes in Corporate Average Fuel Economy (CAFE) standards. Specifically, for years 2012-2016, the EIA projection includes the EPA/NHTSA proposed standards and yields a light-duty vehicle combined fuel economy of 35.2 mpg in 2020. The EIA uses a cost-benefit analysis to raise fuel economy slightly between 2021 and 2035. The urban-area pricing program also includes a degradation factor to account for the decrease in fuel economy typically experienced when comparing CAFE testing procedures to actual driving conditions.

Other forecasts—from 2010 to 2035—used in the model are also found in the AEO 2010. These include: the stock of vehicles by class, the annual purchases of vehicles by class, the motor fuel price, and driving population.

Other major sources of data and inputs used to develop the estimates include the Congressional Budget Office (CBO), the U.S. Census Bureau, the Federal Highway Administration (FHWA), the Texas Transportation Institute (TTI), the American Automobile Association (AAA), and the Victoria Transport Policy Institute.

Acronyms

APPENDIX 2

AASHTO	American Association of State Highway and Transportation Officials
ARRA	American Recovery and Reinvestment Act of 2009
Btu	British Thermal Unit
CBA	Cost-Benefit Analysis
CBO	Congressional Budget Office
CEQ	Council on Environmental Quality
CNG	Compressed Natural Gas
EIA	Energy Information Administration
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
GAO	Government Accountability Office
GDP	Gross Domestic Product
GVW	Gross Vehicle Weight
HOT	High Occupancy Toll
HOV	High Occupancy Vehicle
HSR	High-Speed Rail
HTF	Federal Highway Trust Fund
ISTEA	Intermodal Surface Transportation Efficiency Act
ITS	Intelligent Transportation Systems
LNG	Liquefied Natural Gas
MPO	Metropolitan Planning Organizations
NEPA	National Environmental Policy Act
OCTA	Orange County Transportation Authority
ODOT	Oregon Department of Transportation
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
TDM	Travel Demand Management
TEA-21	Transportation Equity Act for the 21st Century
TTI	Texas Transportation Institute
USDOT	United States Department of Transportation
VMT	Vehicle Miles Traveled

APPENDIX 3

Glossary of Terms

British thermal unit (Btu)
The quantity of heat required to raise the temperature of 1 pound of liquid water by 1 degree Fahrenheit at the temperature at which water has its greatest density (approximately 39 degrees Fahrenheit).

Compressed Natural Gas (CNG)
Natural gas which is comprised primarily of methane, compressed to a pressure at or above 2,400 pounds per square inch and stored in special high-pressure containers. It is used as a fuel for natural gas-powered vehicles.

Congestion Pricing
Congestion pricing is the practice of charging motorists to use parts of the transport network in periods of heaviest use, with the objective of shifting discretionary, peak-period travel to other transportation modes or to off-peak periods.

Cordon Pricing
Under this pricing system each vehicle is charged a fixed toll when it passes through the specified cordon surrounding the designated area targeted for congestion reduction, typically the central area(s) of a city.

Free-Flow Tolling
Also known as open road tolling or all-electronic tolling; the collection of tolls on toll facilities without the use of toll booths for cash toll collection. This enables users to drive through toll collection zones at or near highways speeds.

Fuel Efficiency
Measures a vehicle's efficiency in achieving mileage per unit of fuel. It is expressed as the ratio of range units (miles) per fuel unit (gallon).

Gross Vehicle Weight (GVW)
The weight of the vehicle (empty) plus the maximum anticipated load weight (carrying capacity).

Heavy-Duty Vehicle (HDV)
Large, typically long-haul trucks, large buses, and other vehicles that have a gross vehicle weight in excess of 26,000 pounds.

Heavy Vehicle Use Tax
Annual federal tax between $100 and $550 due on all vehicles with a gross weight of 55,000 pounds or greater travelling on the public highway system.

High Occupancy Toll (HOT) Lane
High occupancy vehicle lanes accessible to single occupancy vehicles paying a toll.

High Occupancy Vehicle (HOV) Lane
A special lane reserved for the use of carpools, vanpools, and buses usually located next to regular, or unrestricted, lanes.

High-Speed Rail (HSR)
A type of passenger rail transport that operates at significantly faster speeds than normal rail traffic. USDOT defines two forms. Express is frequent rail service between major population centers 200 to 600 miles apart, with few intermediate stops and top speeds of at least 150 mph on completely grade-separated, dedicated rights-of-way. Regional operates less frequently, between less dispersed cities, and at lower speeds.

Intelligent Transportation Systems (ITS)
A range of wireless and wire line communications-based information and electronics technologies integrated into transportation infrastructure and vehicles.

Light-Duty Vehicle (LDV)
An automobile or light truck, including passenger cars, minivans, cross-over vehicles, sport utility vehicles (SUVs) and trucks, with gross vehicle weight less than 8,500 pounds.

Liquefied Natural Gas (LNG)
Natural gas that has been liquefied for storage and transportation purposes by reducing its temperature to -260 degrees Fahrenheit at atmospheric pressure.

Load Factor
A measure of capacity utilization in a transportation vehicle typically calculated as the ratio of filled seats to total available seat capacity. Sometimes also calculated commercially as the ratio of (revenue) passenger miles to available seat miles.

Medium-Duty Vehicle (MDV)
A category of vehicles including everything from large pick-up trucks to sports utility vehicles, cargo vans, and small buses; these vehicles have a gross vehicle weight of between 8,500 pounds and 26,000 pounds.

Metropolitan Planning Organization (MPO)
Local decision making body that is responsible for carrying out the metropolitan planning process. An MPO is designated for all urbanized areas with populations of more than 50,000 people.

Multimodal
Movement of goods from start point to destination using two or more modes of transport.

Revenue Neutrality
Refers to a change in government policy that has no net effect on the federal treasury.

Travel Demand Management (TDM)
Programs aimed at reducing road traffic congestion by encouraging commuters to take advantage of alternatives to single-occupancy vehicle travel, such as carpooling (ridesharing), alternative work weeks, and telecommuting.

Vehicle Miles Traveled (VMT)
The number of miles traveled nationally by vehicles for a period of one year.

Vehicle Operating Costs
The variable costs related to vehicle mileage, such as the cost of gasoline, oil, tire replacement, and other maintenance.

Credits and Acknowledgements

Securing America's Future Energy

Securing America's Future Energy (SAFE) is a nonpartisan, not-for-profit organization committed to reducing America's dependence on oil and improving U.S. energy security in order to bolster national security and strengthen the economy. SAFE has an action-oriented strategy addressing politics and advocacy, business and technology, and media and public education. More information can be found at SecureEnergy.org.

Transportation Policies for America's Future examines the challenges facing the U.S. transportation system in the 21st century and provides a vision for a more efficient, analytically-rigorous, and market-driven approach to national transportation policy. The report outlines a comprehensive framework for policymakers to achieve this vision that emphasizes the crucial interaction between transportation policy and U.S. oil dependence.

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