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Energy Reduction and Environmental Sustainability

Highways and Transit Subcommittee
Transportation and Infrastructure Committee

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Mr. Chairman, Members of the Subcommittee, thank you for the opportunity to discuss with you the important and timely topic of energy reduction and sustainability in the transportation sector. My testimony will cover various issues:

1. A Snapshot: What is Transportation's Energy and Environmental Footprint?
    a. Energy and Climate
    b. Conventional Air Pollution
    c. Water Quality
    d. Wildlife Habitat
2. A Context That Would Welcome New Policy: Some Evidence of Shifts in Transportation and Development Demand
3. Useful Policy Solutions
    a. Evidence That Policy Can Make a Difference
    b. Policy Solution #1: Regional Blueprints
    c. Policy Solution #2: Road Pricing
    d. Policy Solution #3: Increased Investment in Transportation Alternatives
4. Setting National Objectives and Assessing the Technical Potential for Energy Savings and Carbon Pollution Reduction

<u>Energy and Climate</u>

One of the most pressing issues on the national agenda – including President Obama's agenda as evidenced by its prevalence on the whitehouse.gov web site – is energy

security. Small wonder. We import ten million barrels of oil day, sending $240 billion out of the country in 2007 alone.[1] Since at least three-quarters of the world's oil is in the hands of national oil companies, several of which are unfriendly to the U.S. and its interests (as in the cases of Russia and Venezuela), this historically unprecedented transfer of wealth is a threat to national security.[2] This is what the President was referring to in his Inaugural address when he state that "…each day brings further evidence that the ways we use energy strengthen our adversaries and threaten our planet."[3]

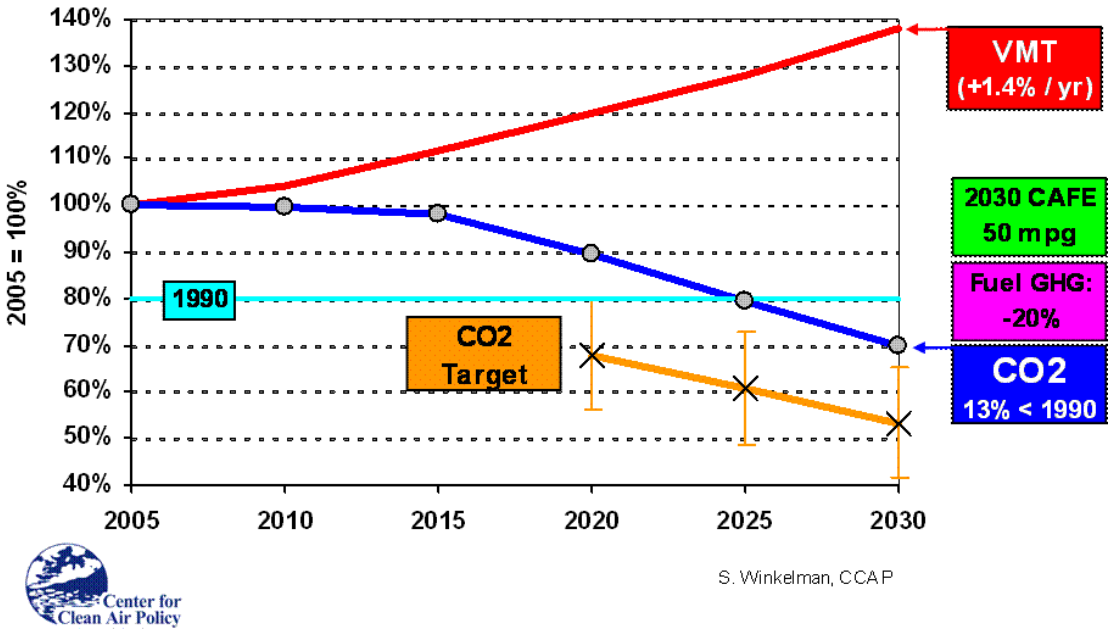
Transportation drives this dangerous dependence on oil, and surface transportation accounts for the lion's share. Surface transportation is 95 percent dependent on petroleum-derived products (primarily motor gasoline) and is responsible for more than 11 million barrels of oil consumption daily. This consumption, and the pollution that comes from combustion, is basically the product of three factors:

Vehicle fuel-efficiency (miles per gallon) * Gallons of gasoline or diesel (as opposed to alternatives) * vehicle miles traveled, or VMT

The first has received a great deal of attention from the press and policymakers. Improvements in efficiency as a means to reduce U.S. vulnerability to oil import dependence in the 1970s led to the enactment of the Corporate Average Fuel Economy program (CAFÉ).[4] This program doubled car fuel economy in a decade, and increased light-truck fuel economy 50 percent in the same time span. Then when oil prices collapsed in 1986 the standard was relaxed and fell into disuse as a policy tool. The remarkable oil price runups of the past several years spurred Congress to raise the bar further in the 2007 energy bill, raising the standard 40 percent to at least 35 miles per gallon by 2020.[5]

The second factor has received substantial focus outside of the U.S., most notably in Brazil, until the enactment of the last two energy bills. Commercial viability of energy substitutes is a challenge for transportation. Alcohol fuels, specifically ethanol and methanol, are possibilities. But scaling them to dent our oil consumption, avoiding unintended social and environmental consequences, will be difficult. The 2007 energy bill included laudable requirements and safeguards such as an increasing mandate for cellulosic ethanol and sustainability standards to address this problem.

The third of these factors has received less attention, yet as the graph below from my colleague Steve Winkelman at the Center for Clean Air Policy makes clear, it is a sine qua non component of a strategy of reducing carbon dioxide emissions as much as the science tells us we must achieve (80 percent reduction from 1990 level by 2050). I will focus on it in my testimony since its trendlines are most directly affected by policies under this Committee's jurisdiction.

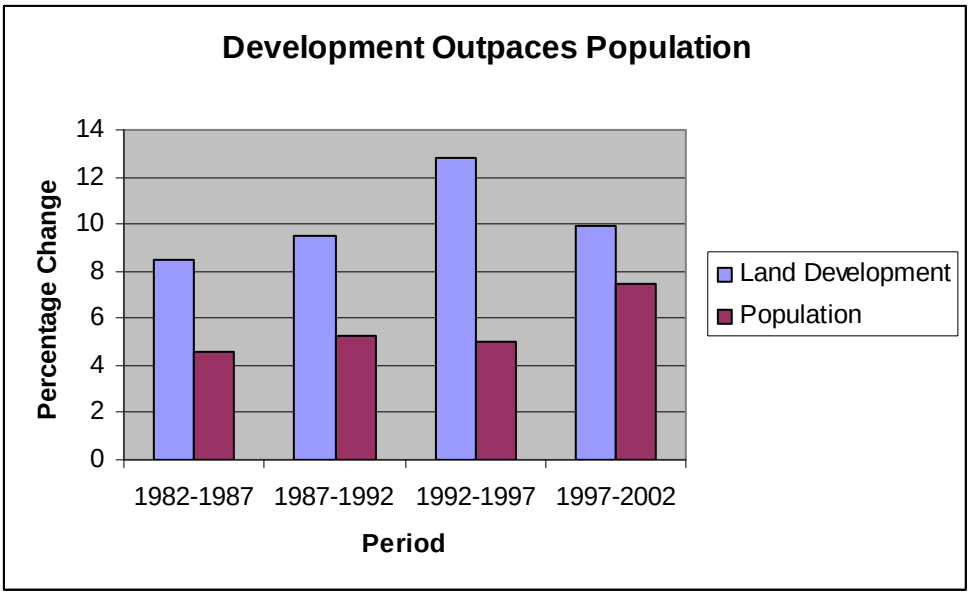


Growth in VMT has tracked growth in the economy and personal incomes, and exceeded that of population, for decades. Highway capacity expansion has enabled this linkage, a policy choice lamented by visionary Transportation Secretary John Volpe 40 years ago:

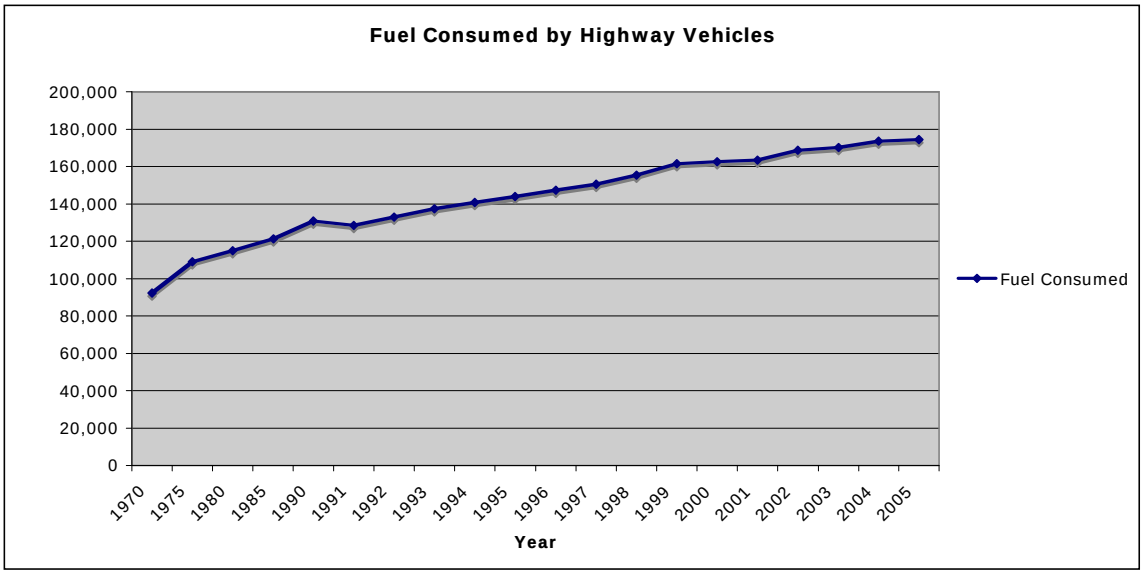
> The federal government spends as much money on highway construction in six weeks as it has put into urban transit in the last six years…Unless we intend to pave the entire surface of the country—and no one wants that—we have to stop this trend. We already have one mile of highway for every square mile of land area in the U.S.A.[6]

Forty years later we have almost two-and-a-half lane miles per square mile of territory.[7] The environmental impacts are significant. In spite of the fact that roads, roadsides and corridors take up about two percent of the U.S. land base, one recent estimate finds that effects of roads stretch far beyond them in the forms of fringe noise, air, and water pollution, affecting ten times an area.[8]

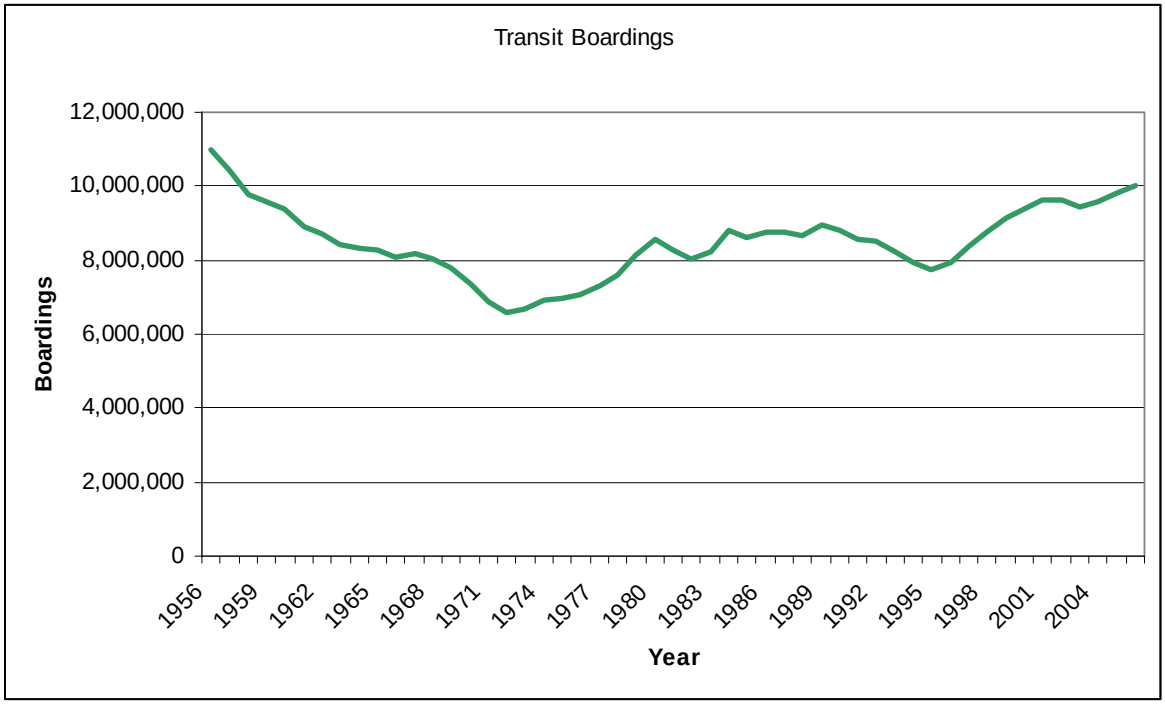
These effects of our growing road network are complemented by effects of the sprawling development they support. As my colleague and friend Chris Leinberger of the Brookings Institute puts it, “Transportation drives development.” Transportation investments have opened up new places for development at and beyond the fringes of metropolitan areas, spurring land-development to exceed population growth as shown in the graph below.[9]



Americans have made good use of increases in pavement. U.S. vehicle miles traveled (VMT) climbed steadily throughout the second half of the twentieth century, with billions of gallons of fuel consumed annually to fuel this growth, as seen in the graph below.[10]



Driving more and more miles has meant turning away from other modes of transportation, such as public transportation which has only just returned to the level of boardings enjoyed fifty years ago. [11]

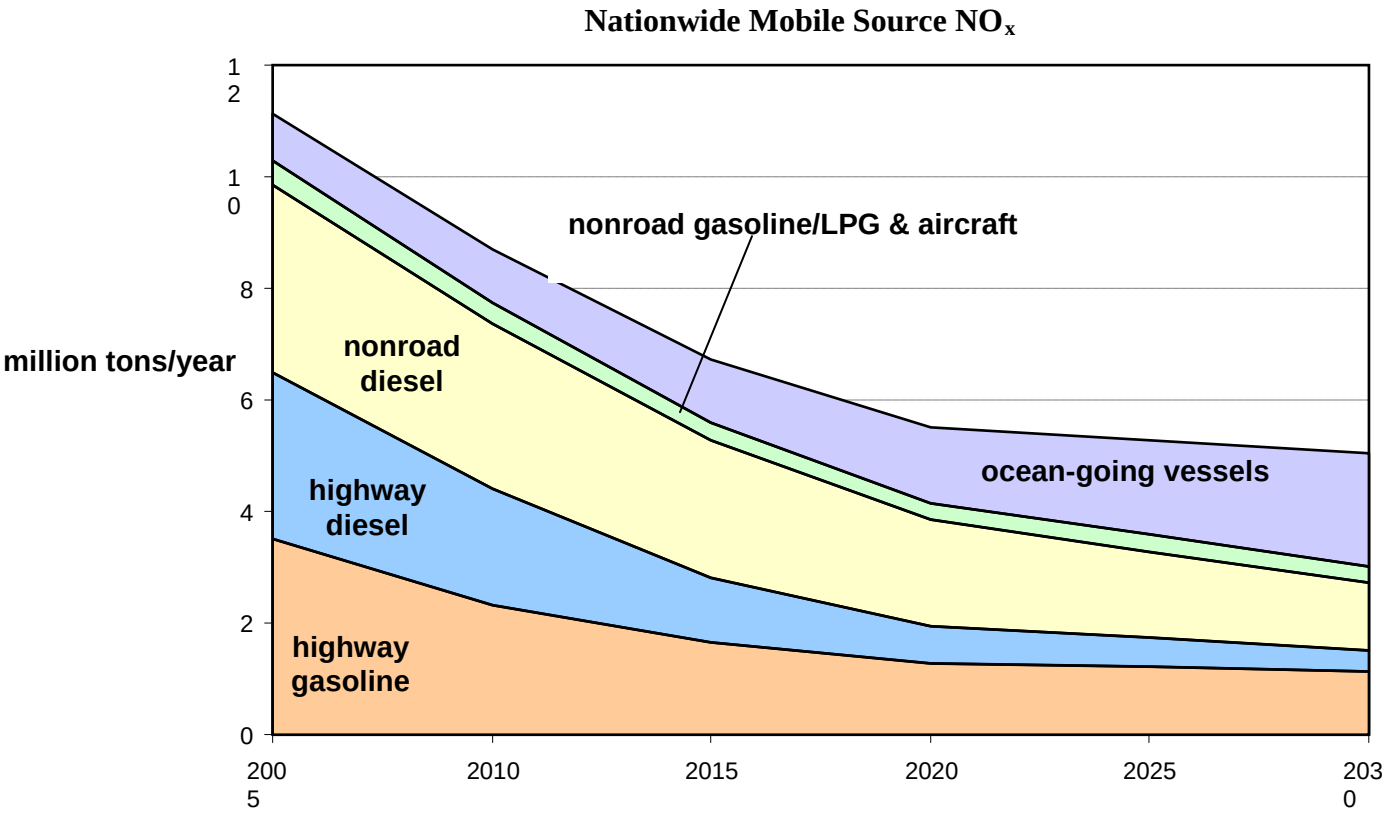


These trends lead us to the situation today, with per capita driving at nearly 10,000 miles a year.[12]It has also led to a wild imbalance in mode share for public transportation, especially compared to other OECD countries. According to a 2001 study, for every transit trip there are 44.5 auto trips.[13] By contrast in Canada, Great Britain, and Germany the ratio is a much less lopsided 7.6, 4.6 and 3.1 respectively.[14]

This overdependence on a vehicle fleet capable of running only on petroleum-derived fuels exacerbates the twin challenges of energy insecurity and transportation's contribution to global warming.

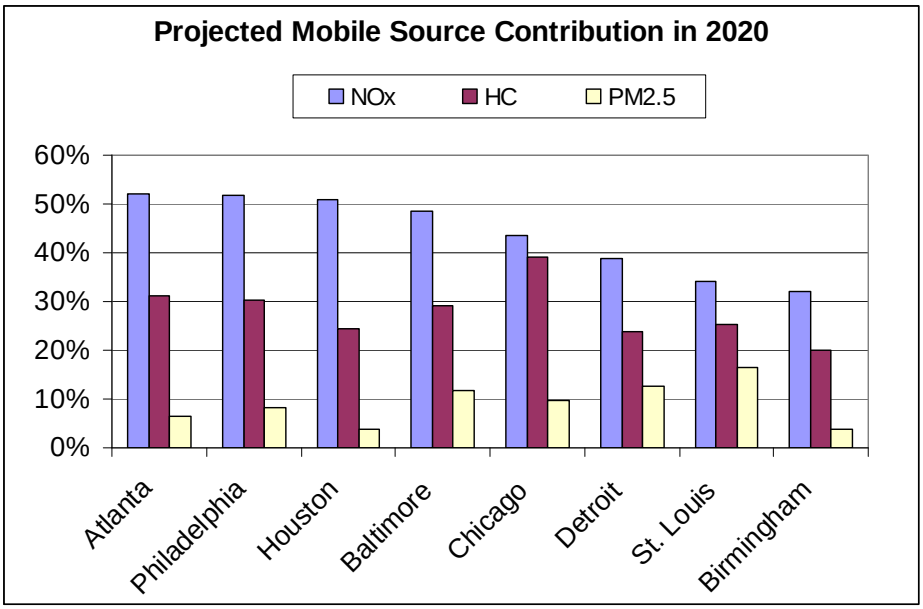
Conventional Air Pollution

Some trends have been more positive in terms of reductions of emissions of traditionally regulated emissions such as carbon monoxide, ozone precursors (oxides of nitrogen, or $NO_{x,}$ and volatile organic compounds, or VOCs) as well as coarse and fine particulate matter. Improving emissions control technology is responsible for the impressive gains, and these improvements are driven by policy, specifically by a host of emission standards that apply to different vehicle classes and technologies and to gasoline and diesel fuels.[15]The graph below from the Office of Transportation and Air Quality shows the progress, for example, in lowering NO_x pollution from mobile sources.[16]



Continued progress is needed, however, since mobile sources still account for substantial portions of conventional pollution levels, most notably the ozone precursors (58 percent of NO_x and 35 percent of VOCs).[17] Ground-level ozone, a contributor to smog, is generated by a combination of NO_x, VOCs and sunlight. Recent studies have found that that short-term exposure to concentrations of ozone increases morbidity and mortality, especially among vulnerable populations such as asthmatics, children and the elderly. As a reviewer of the studies concluded, "Ozone is capable of causing inflammation in the lung at lower concentrations than any other gas. Such an effect would be a hazard to anyone with heart failure and pulmonary congestion, and would worsen the function of anyone with advanced lung disease."[18]

According to EPA 144.8 million Americans remain live in regions that fail to meet the federal health-based standard for ozone.[19] Given this fact, and that mobile sources are projected to account for a substantial proportion of ozone precursors and other pollutants in many metropolitan areas, as shown in the graph from EPA below,[20] it seems clear that regulatory standards and other policy tools must continue improving our vehicle fleet. Reductions in VMT achieved as part of a climate strategy can and must also contribute to conventional pollution reductions.



Water Quality

Stormwater runoff is one of the largest sources of water pollution in the country. Polluted runoff from impervious surfaces (parking lots, roads, rooftops, etc.) grows along with sprawling development, and science has identified a "tipping point" beyond which water bodies become seriously degraded. When ten percent of a watershed is covered with such surfaces, the rivers and streams in that watershed become seriously degraded. Due to the tremendous variety in aquatic ecosystems, this is not an ironclad rule and may be higher or lower depending on location.[21]Nonetheless, it is a useful rule-of-thumb which shows that transportation infrastructure and other development have real consequences for water quality.

Runoff from highways washes a variety of pollutants, including oil, sediments, asbestos brake dust, salt and other road treatment chemicals directly into adjacent water bodies and the receiving waters of storm sewers. This is carried by runoff into water bodies, and the volume of runoff is increasing. One study found that an acre of parking lot yields 16 times as much runoff as an acre of open meadow.[22] Another found that a storm producing one inch of rain will lead to 55,000 gallons of polluted stormwater runoff for every mile of highway that rain falls on. Due to its speed and higher temperature gradient, runoff also affects the very shape and temperature of streams, harming vegetation and wildlife habitat.[23]

Studies show that increasing traffic yields increasing pollution. One example of the striking findings of one of these reports is described by my colleague Dana Beach in a recent report on coastal sprawl:

> A study of the lower San Francisco Bay found that half of the cadmium and zinc in the bay came from tire wear. Lead came primarily from diesel-fueled vehicles. Half of the copper in the bay arrived via stormwater from brake pad wear. An

> additional 25 percent of the copper arrived in the form of atmospheric deposition, ultimately from motor vehicles. Copper contamination contamination is a major concern because copper is toxic to marine organisms at extremely low concentrations (Santa Clara Valley Nonpoint Source Control Program, 1992).

A group of analysts at the U.S. Geological Survey found that growing concentrations of a group of suspected carcinogens, polycylic aromatic hydrocarbons (PAH), can also be traced to growing traffic. They examined ten lakes across the country and found that six of them had concentrations high enough to harm aquatic life. These "concentrations in U.S. watersheds had reached a low point in the 1970s and 1980s due to improvements in technology**,** by the 1990s this trend had turned around...[due] to the increase in the miles traveled by automobiles and trucks, due to 'tire wear, crankcase oil, roadway wear, and car soot and exhaust.'"[24]

Wildlife Habitat

As noted above, the extensive U.S. road network impacts about one-fifth of the country, directly and indirectly. This infrastructure can be especially damaging for wildlife and habitat. Direct effects include mortality due to road construction and vehicle collisions and modification of animal behavior.[25]Indirect effects include alteration of the physical environment (for example, the "heat island" effect of dark pavement and the spread of dust stirred up by traffic), alteration of the chemical environment (deposition and runoff of pollutants including those described in the section on water above) and the spread of invasive species.[26]

The cumulative effect of road construction and land-development are devastating for wildlife. Thirty percent of U.S. species are a risk of disappearing, and for 85 percent of them loss or degradation of habitat is the biggest threat.[27]If current trends continue, suburban sprawl threatens many more species in its path, since three-fifths of our rarest and most imperiled species are located in metropolitan areas.[28]

Thankfully, if a project must be built there are ways to minimize damage to wildlife by designing projects such that they are sensitive to their context (aptly called "context-sensitive design"). For example, a stretch of Interstate Highway running through a portion of the Everglades in Florida so heavily populated by alligators that it is dubbed "Alligator Alley" was designed – thanks to environmental review requirements under the National Environmental Policy Act – to accommodate wildlife. The project includes 24 underpasses for wildlife, 12 bridge extensions, extensive fencing along a 40-mile stretch as well as habitat restoration after construction.[29]

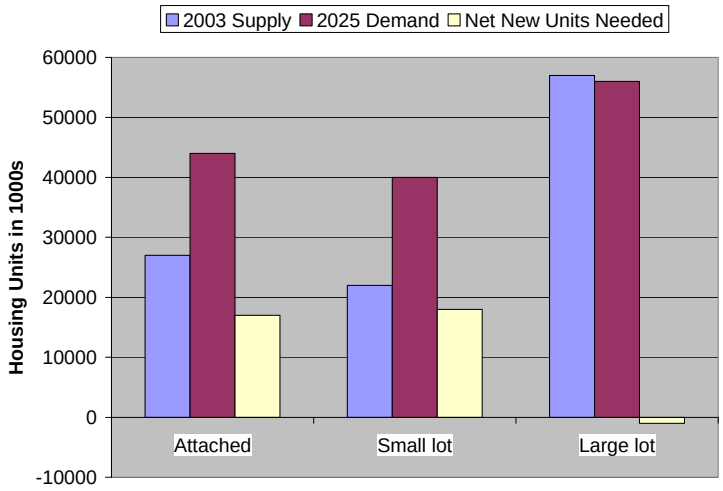
Evidence of Discontinuity in the Development Marketplace

In terms of overall land-development, trends are not destiny. There is evidence of that as the United States grows in the next few decades, the development industry will have to offer a fundamentally different product mix given two demographic factors: The aging of the boomers and the decrease in the size of the average household. For example, as

Professor Chris Nelson of Virginia Tech has documented, the number of people turning 65 will increase yearly and then jump so that from 2012-2025 the ranks of senior citizens will grow by about 1.5 million people annually.[30] And from 2000 to 2025, only one-eight of households added to the nation will have children.[31]

There will be implications for the housing market. Chris Nelson of Virginia Tech claims that (assuming current consumer preferences, which as some have pointed out may or may not hold true for aging Baby Boomers) there are already more than enough large-lot detached units to meet demand and the development industry would do well to focus instead on providing different products, ones suitable for smart-growth neighborhoods. His findings are shown in the graph below.

2003 Housing Supply vs. 2025 Housing Demand[32]

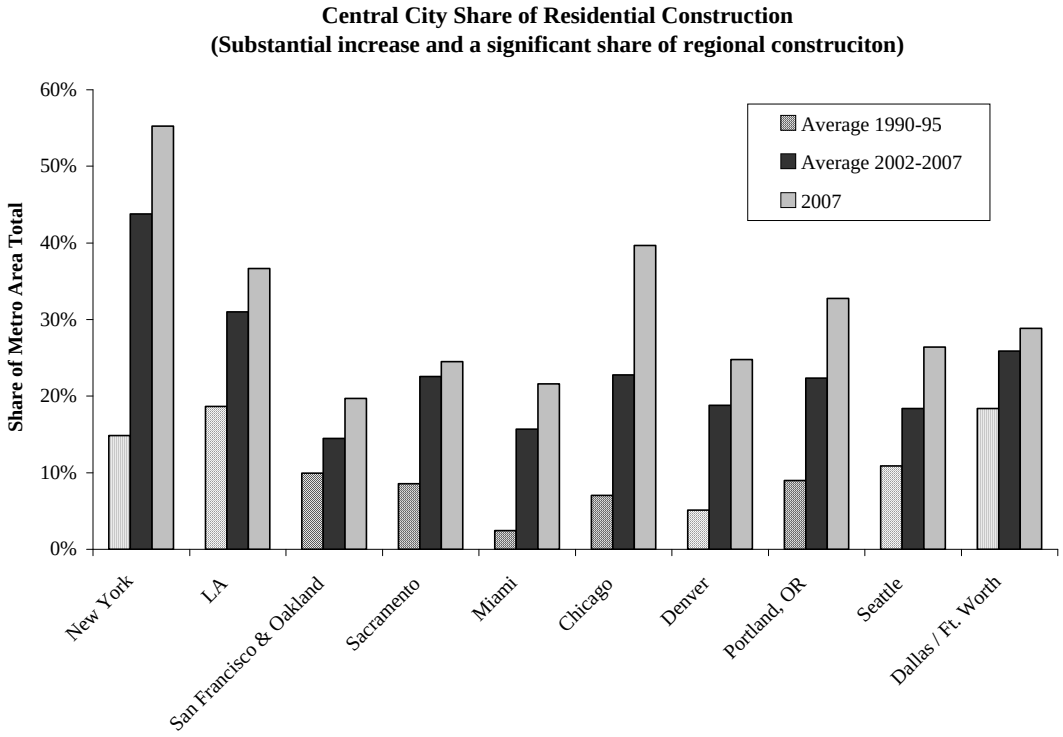


Some recent analyses find that there is already a mismatch between what the marketplace provides and consumer preferences. One analysis looked at Atlanta households and found that "the segment of the housing market that is interested in these alternatives is underserved—that is, there is unmet demand for alternative development in the Atlanta region."[33] Another analysis compared Boston and Atlanta, finding that 70% of Bostonians who wanted to live in a walkable suburb actually did while only 35% of the same in Atlanta did.[34]

Another compelling piece of evidence of unmet demand for alternatives to sprawl-type development is a recent national survey of developers, which found that more than 60% agreed with the statement ''In my region there is currently enough market interest to support significant expansion of these alternative developments," with a high of 70% in the Midwest and a low of 40% in the South Central region. In terms of location within metropolitan regions (central city, inner suburb, outer suburb, or rural) the highest percentage (80%) reported an intent to develop more densely in inner suburbs.[35]

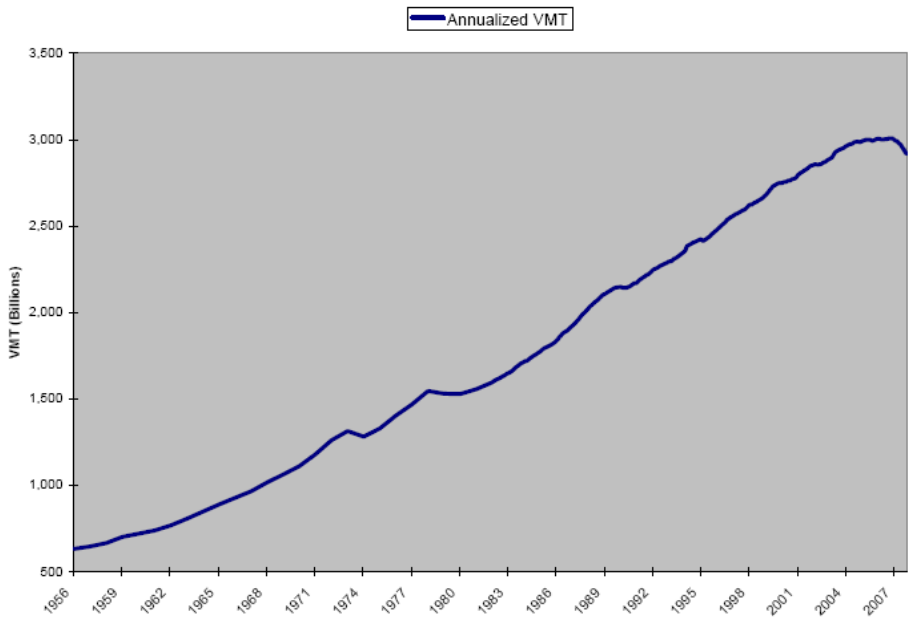
Of course, one of the best ways to gauge development trend is to review building permits: Where, and how many, are being granted? Thankfully, Dr. John Thomas at EPA has been

doing just that, and EPA just published his analysis of residential construction trends based on this data. His report covered the nation's 50 largest metropolitan regions, finding that there is a measurable trend in increased building in central cities. He highlights three groups: Those with minimal changes, those with a substantial increase in central city growth but with still a relatively small share of total regional growth, and those with a real boom happening. The latter category is shown in the graph below.[36]



Evidence of Discontinuity in Travel Demand

Many in the news media as well as outgoing Transportation Secretary Mary Peters have noted publicly that VMT trends appear to be undergoing a historic change. Rob Puentes of the Brookings Institution has actually crunched the numbers, and created the following graph showing the slowdown and reversal of VMT growth in recent years.[37]There is a body of literature that attempts to grapple with reasons why the nation may be reaching a saturation point for VMT growth, at least on a per capita basis.



Source: 1956–1982: Highway Statistics, Table VM-201; 1983–September, 2008: Traffic Volume Trends

As the report sums it up:

> Driving, as measured by national VMT, began to plateau as far back as 2004 and dropped in 2007 for the first time since 1980. Per capita driving followed a similar pattern, with flat-lining growth after 2000 and falling rates since 2005. These recent declines in driving predated the steady hikes in gas prices during 2007 and 2008. Moreover, the recent drops in VMT (90 billion miles) and VMT per capita (388 miles) are the largest annualized drops since World War II.[38]

Policy Reform Can Meet Growing Demand for Development and Transportation Choices

If there is a gap between consumer preferences in housing and transportation, why is this the case? And what is to be done about it?

Rules that govern development must be reformed to allow for the development of more compact, transit-friendly, walkable neighborhoods. In spite of the intense media coverage of the smart growth issue in recent years, surprisingly few jurisdictions have adopted smart-growth rules. For example, a recent study found that local jurisdictions in Illinois have adopted some policies yet a low-level of implementation prevails.[39]

There is even evidence of government intervention in the marketplace that not only exacerbates sprawl but deprives consumers of housing choices, effectively excluding them from many communities. Regulatory tools, most notably low-density zoning which mandates separation of land uses (so that the corner store is illegal across the country, as former Maryland Governor Glendening is fond of quipping) are actually associated with more sprawl can be racially and economically exclusionary, in part because they are invariably implemented only in certain jurisdictions within a metropolitan region.[40]

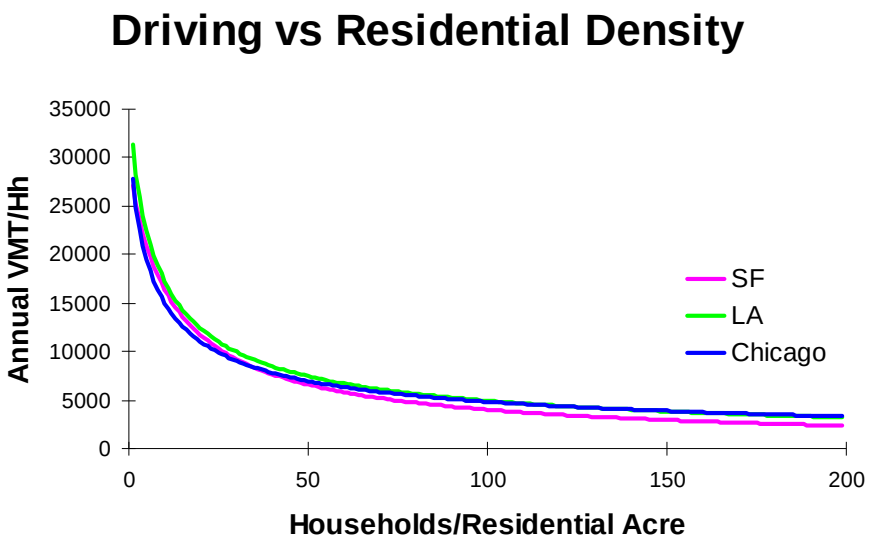
As Anthony Downs of the Brookings Institution has noted

> …[N]o metropolitan area has anything remotely approaching a free land use market because of local regulations adopted for parochial political, social and fiscal purposes. Most suburban land use markets are dominated by local zoning and other regulations that are aimed at excluding low-income households and that distort what would occur in a truly free market.[41]

Evidence of VMT Savings

There is substantial evidence that, should consumers be given adequate choices, vehicle miles traveled per household would drop. This effect is not captured in the Annual Energy Outlook BAU baseline, which is modeled with quite a simplistic approach. It does not account for land use or modal competition with transit. The model calculates VMT per driver as a function of income per capita and the cost of driving per mile as the only independent variables – the results are then scaled to account for gender and aging.

Yet more than 100 studies have been performed on this topic, the vast majority showing a significant relationship between development patterns and travel demand.[42] There is also evidence of reduced vehicle ownership in denser communities, and one recent study found a strong relationship between vehicle choice (light-duty truck vs. passenger sedan) and neighborhood choice.[43] The graph below based on habits in neighborhoods in three major cities shows the relationship between density and VMT.[44]

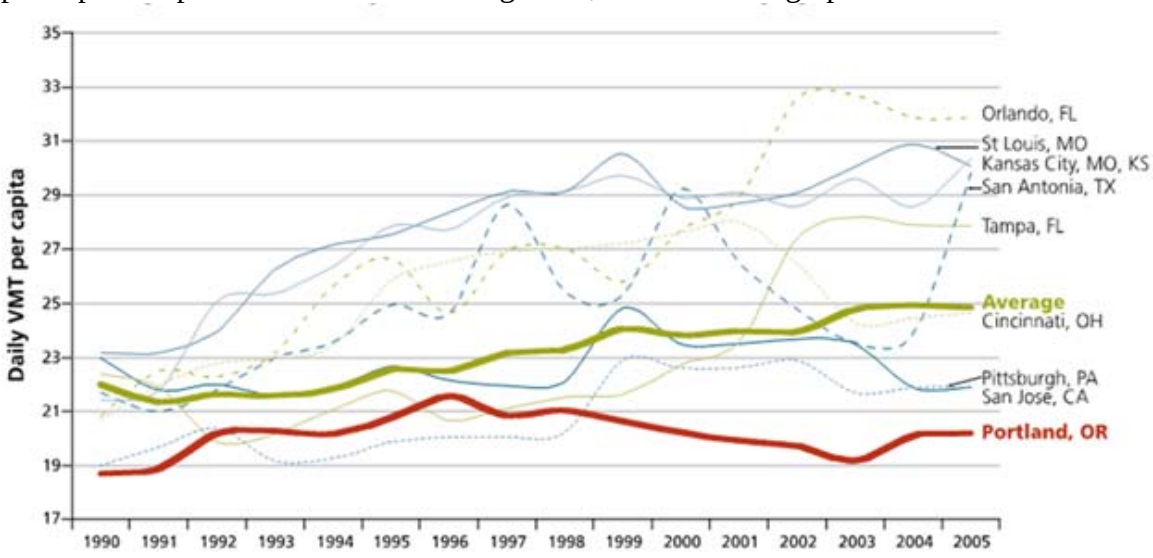


There is also a growing body of literature regarding the other two "Ds" of development patterns (in addition to density): Diversity of land uses and design of actual structures. A recent synthesis shows that each has an effect on VMT and vehicle trips, with especially strong cumulative effects.[45]

Blueprints as a Condition of Receipt of Federal Transportation Assistance

One way to encourage coordination between transportation policy and land use planning to in order to moderate travel demand and save oil is to require metropolitan areas – particularly those with 200,000 or more people and therefore greater planning capacity – to engage in participatory scenario-planning. This will better meet consumer preferences and match the projected increase in demand for smart-growth-style development.

Pioneered by Portland, Oregon with its LUTRAQ (Land Use, Transportation and Air Quality) study, scenario planning is increasingly "state-of-the-practice" among metropolitan planning organizations.[46]Thanks in part to LUTRAQ, Portland has opted to invest in transportation alternatives, encourage transit-oriented development and manage travel demand.[47]One outcome of this and other innovative policies has been lower VMT per capita despite continued economic growth, as seen in the graph below.[48]



All cities shown are within +/- 600,000 of Portland's 2005 population.
The average shown is for the 25 U.S. urban areas with the exception of Portland, that have 2005 populations of over one million and less than three million.

Source: U.S. Federal Highway Administration, *Highway Statistics*, Table IM-72, "Urban Areas – Selected Characteristics," 1990 – 2005.

A mandate for more widespread use is reasonable, given growing use of this key planning tool as well as interest in smart growth among planners concerned about energy use. In fact, a recent national survey of local and state planners found that more than any other issue, "reducing sprawl" was the top issue connected to energy in their practice.[49]

Scenario-planning is already proving to be a useful tool for addressing this concern. One recent analysis of 40 growth scenarios found that VMT savings over the next 20 years would range from 10% to 20%, compared to projected trends.[50]Another analysis reviewed 23 plans and found a more modest median 5.7% reduction in VMT, however the authors noted that the scenario plans did not adequately account for changes in density, diversity of uses and development design and estimated that doing so would boost the VMT reduction to 20% or more.[51]

Putting a Price on Road Use

When combined with policies linking development and transportation planning and policy, changing price signals received by drivers could achieve dramatic VMT savings. Generally, road pricing measures are an established and growing means to address both congestion and financing issues in transportation. These measures can be sub-divided into the following categories:[52]

- Congestion pricing – Generally comprised of dynamic pricing on metropolitan radials and orbitals. High Occupancy/Toll (HOT) lanes are included in this category. Many examples are now operating in the US.[53]
- Area/Cordon Pricing – Pricing in a downtown or central business district, so far with simplified (static) congestion pricing. It has been implemented in London, Stockholm, Singapore, Oslo, Bergen and Trondheim. San Francisco studying the concept (see www.sfmobility.com) and New York City is still interested in implementation in spite of rejection by the state legislature. The topic has been broached many times, is being examined by the NY Metropolitan Transportation Council and receives regular coverage in NY newspapers.
- Toll roads – intercity highways are increasingly being tolled in the US, recent federal legislation now permits tolling of some previously untolled Interstate highways. Increasing public-private partnerships to build privately financed and operated toll roads (such as the Dulles Greenway near Washington DC) are expected to spread considerably, significantly increasing the number of tolled intercity highways.

One key issue to be aware of is that there are very substantial energy savings and greenhouse gas reductions from improved traffic flow, roughly equal to those from reduced VMT:

- In London, total CO_2 reductions have been estimated as 19.5% within the zone, split evenly between personal vehicle trip reduction and congestion reduction improving fuel economy. Total CO2 reductions are in the neighborhood of 37,000 tonnes/year.
- In Singapore, total CO2 reductions are calculated at 67,000 tonnes/year, with approximately two-thirds coming from trip reductions/mode shifts, and the remainder from speed improvements inside and outside the zone.
- San Diego's I-15 HOT Lanes provide total CO2 reductions calculated at 2,100 tonnes/year, with approximately 40% attributable to improved fuel economy of SOV vehicles in the HOV lanes, and the remainder to improved fuel economy of vehicles in the general purpose lanes. In this implementation, there is NO reduction in VMT (and in fact, a very small increase) as traffic is merely shifting which lanes are used.

A private sector program (that could become commonplace with the help of federal policy, whether by mandate, incentives, or both) that could VMT substantially and therefore save energy and cut pollution is "pay-as-you-drive" auto insurance. Progressive

Insurance piloted this measure in Texas in a program called "Autograph" between 1998 and 2001. While there was a range of consumer savings, invariably the figure was about 30% or higher.[54] And a recent report from the Brookings Institution found that it could cut driving by 8 percent if adopted nationwide, with two-thirds of households saving an average $270 per vehicle.[55]

Increasing Investment in Public and Nonmotorized Transportation

Robust linkages between land use and transportation and road pricing will cause some discretionary trips and VMT to simply evaporate. But consumers will also need options for travel beyond driving. Here there is a major role for federal policy.

The evidence is clear: Transportation alternatives save oil. A recent study found that it causes direct savings of 1.4 billion gallons of gasoline annually, and a followup analysis found that when coupled with indirect benefits (fewer and shorter trips due to more efficient land use and more walking and biking) the total savings jumps to 4.2 billion gallons of gasoline per year.[56] Another analysis found that biking and walking avoids 70-200 billion miles of driving annually, saving billions of gallons of fuel and cutting tens of millions of tons of carbon dioxide pollution.[57]

The federal transportation investment portfolio must be modernized, dividing up funding between highways and transit more equitably and intelligently. Targeting federal investments to build out oil-efficient, low-carbon modes of transportation makes good sense in a carbon- and oil-constrained world. Specifically, the ratio of investment of new revenue must be revisited. The 80-20 split was an improvement on the status quo ante when transit share was pathetically meager. It was also created nearly thirty years ago, and as such is an outdated arrangement. Much more investment must flow to transportation alternatives, so that we build out the second half of the transportation system since the Interstate Highway System was completed many years ago.

Set a National Objective for Moderating VMT

VMT is projected to grow 1.5 percent per annum over the next two decades.[58] One possible policy approach for bending this curve downward would be to enact an explicit objective to reduce VMT growth, or VMT growth per capita. Several proposals are already being put forward, for example from the association of state transportation departments:

> In June 2007, the Board of Directors of the American Association of State Highway and Transportation Officials (AASHTO)…adopted a new strategic vision document, called *New Vision for the 21st Century*. The AASHTO report sets out an ambitious goal at no more than five trillion miles by 2055, reflecting a 50 percent cut below the growth in current trends towards seven trillion miles. The adoption of this goal by AASHTO places VMT growth management alongside vehicle efficiency and low-carbon fuels as a co-equal strategy to meet

the transportation industry's obligation to reduce transportation-related carbon emissions.[59]

Kathy Leotta and Cindy Burbank (formerly with Federal Highway Administration) propose a three-pronged strategy for reducing saving energy and cutting carbon pollution from light-duty vehicles: Maintain VMT growth at one percent or less per annum, quickly improve fleet efficiency by as much as 79 percent per vehicle mile (about 100 mpg equivalent) by 2050 and improve the operational efficiency of the transportation system.[60]

These are somewhat ambitious proposals, but less so than at least two others. HB 2815 was enacted in Washington in 2008, and it sets a goal of "…capping and managing light-duty VMT between 2010 and 2020, with effective reductions in total VMT between 2035 and 2050."[61]Michael Replogle and Freda Fung of Environmental Defense Fund propose to shave an additional trillion miles of travel compared to AASHTO's goal, so VMT would be 3.97 trillion by 2050, in their "Climate Sensitive Transportation Policy."[62]

Assessing the Technical Potential

These assessments of what is necessary for the sake of saving energy and reducing carbon emissions beg the question of what is actually possible. This is a challenge for transportation practitioners, because while there are copious analyses of technical potential for improvements in efficient vehicle technology and for alternative energy sources (biofuels, renewable electricity) for vehicles, there's a relative dearth of studies regarding VMT reduction potential.

Reid Ewing, Steve Winkelman and their co-authors helped to remedy this gap by writing *Growing Cooler: The Evidence on Urban Development and Climate Change*, which found that adoption of more efficient land use practices could slow VMT growth 12-18 percent in metropolitan areas, or 10-14 percent nationally, by 2050.[63]The authors concluded that if measures such as transit expansion, slower highway capacity growth and pricing measures were added the reduction potential jumps to a 38 percent reduction.[64]

I commissioned a similar sketch assessment from transportation analyst Bill Cowart, now with Cambridge Systematics. He estimate a potential 21 percent cut in national VMT by 2030 assuming rapid adoption of a basket of more than twenty policies in the land use, pricing and alternative transportation investment categories.[65]

The most ambitious and comprehensive assessment of technical potential for reductions is nearing completion. Produced by a top-notch team of analysts (including Cowart) at Cambridge Systematics, it will be published as a book by the Urban Land Institute in the spring under the title *Moving Cooler*, and will contain:

- Effectiveness and cost-effectiveness assessments of more than forty measures in land use, pricing, transportation alternatives and other categories;

- An assessment of distributive equity effects of the measures;
- Three scenarios, differing in aggressiveness, speed and scale of implementation; and
- Illustrative bundles to clarify potential synergies and tradeoffs entailed by implementing the measures.

The study is being sponsored by a diverse and authoritative set of groups:

- AASHTO;
- APTA;
- Environmental Defense Fund;
- Federal Highway Administration;
- Federal Transit Administration;
- ITSAmerica;
- NRDC;
- Shell Oil; and
- Urban Land Institute.

It is also made possible by the generous support of the Rockefeller and Surdna Foundations. I hope it helps to inform this Subcommittee and other policymakers about the technical potential to save energy and reduce carbon emissions in the surface transportation sector, and make a valuable contribution to the public debate in general.

Thank you for your time.

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[1] Estimated based on EIA data on Petroleum Basics, http://www.eia.doe.gov/basics/quickoil.html.
[2] Marcel, Valerie, John V. Mitchell, *Oil Titans*, Brooking Institution Press, April 1, 2006; and Zubrin, Robert, *Energy Victory*, Prometheus Books, 2007.
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