

INFRASTRUCTURE 2009

PIVOT POINT



INFRASTRUCTURE 2009

P I V O T P O I N T



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COVER: Mockingbird Station in Dallas, Texas, is surrounded by shops, restaurants, offices, and loft apartments built by Hughes Development. A prime example of transit-oriented mixed-use development, Mockingbird Station connects with the Dallas Area Rapid Transit system. (Dallas Area Rapid Transit)

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**I N F R A
S T R U C T U R E
2 0 0 9
P I V O T
P O I N T**

WHY INFRASTRUCTURE? IN EARLY 2006, when Ernst & Young first teamed up with ULI to create a series of annual reports on infrastructure, images of the collapsed levees in New Orleans and ongoing cleanup from Hurricane Katrina were still prominent in our minds.

In the fall of 2007, as work on the second report started, television screens were filled with images of the tragic collapse of the bridge on Interstate 35 West in Minneapolis. Unfortunately, it took a disaster to get the public's attention.

Today, newspapers the world over are again filled with tales of disaster. In this case, however, the disaster is economic, and infrastructure is being presented by many as a potential savior. Employment and job creation are the cornerstones of financial stimulus packages being adopted today in countries around the world. At the heart of these packages are thousands of "shovel-ready" infrastructure projects for road improvements, bridge retrofits, courthouse and school renovations, sewage pipe repairs, mass transit systems, new power and water treatment plants, and alternative energy grids, to name just a few. From Mumbai to New York, infrastructure is front and center in the public debate about the global economic recession and how getting public works projects moving can stimulate the economy. **Even with the stimulus spending, however, more is needed.**

In the United States, the road, public transit, and aviation systems have gotten worse, and U.S. water and sewage systems are in the worst shape in 100 years. Repairs are estimated at approximately \$2.2 trillion. Developing countries around the world also will need huge amounts of capital for infrastructure to support their expanding economies.

Infrastructure plays a pivotal role in the economic fabric of regions, countries, states, cities, and towns. It is the underlying physical framework of any society, and its types are as wide ranging as its uses. Roads and bridges, high-speed rail, irrigation systems, sanitation systems, energy grids, schools, and hospitals: these are all examples of the infrastructure we depend on to travel, to transport our goods, and to provide access to efficient energy and clean water resources that enable our businesses and communities to survive.

It is virtually impossible for any business sector or community to succeed without the right infrastructure in place. **Infrastructure is so inextricably linked to the world of business and to our real estate industry that we ignore it at our own peril.** Bottom line: to be competitive in today's world, it is imperative to invest in infrastructure.

With this in mind, we hope you find the third annual report on global infrastructure informative, enlightening, and thought provoking.



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IN THE MIDST OF A GLOBAL ECONOMIC meltdown, this year saw infrastructure take the stage. Suddenly, it seemed that everyone—from political leaders to columnists to casual observers—was talking about the role that infrastructure can play in promoting prosperity and laying the foundation for a better future.

The U.S. economic recovery bill signed into law by President Barack Obama on February 18 included over \$132 billion for infrastructure of all kinds—roads, transit, a smart energy grid, and even an \$8 billion downpayment on high-speed passenger rail. Around the globe, other countries are using stimulus bills to increase their own spending on infrastructure. And yet most recognize that these investments—large as they are—are simply downpayments on the world’s vast infrastructure needs. Population growth, demographic changes, and years of deferred investment mean that demand for new infrastructure—and the need for upgrades and improvements on existing systems—seem almost insatiable in many parts of the globe.

The need is vast, but resources are dwindling. Designed primarily to create new jobs and stimulate private sector activity, the public sector economic recovery infusions will help fill the global economic hole, at least in the short term. Over the long term, however, the prospects are less certain. Public/private partnerships, a promising source of capital for infrastructure projects, are facing challenges in the current economic climate. Everywhere, governments are grappling with how to raise revenues for infrastructure without burdening an already overstretched citizenry. There seems to be hard choices wherever one turns.

Indeed, the United States and the world are at a pivot point, presented with thorny choices about the direction of infrastructure and development and presented—by the marketplace, by stark financial reality, and by environmental and security imperatives—with the challenge of changing course and building the infrastructure of the future, linking land use and transportation, and doing a better job of prioritizing the investments that really matter. These are difficult times, and hard choices are coming. But if we do the hard

work of reforming our decision-making processes at the federal and local levels and everywhere in between, and making the investments that are really needed, a brighter future is possible.

This *Infrastructure 2009* report, completed with the generous support of Ernst & Young, builds on the 2007 and 2008 reports, which explored infrastructure challenges and shortfalls in the United States and around the globe. This report lays out strategies and solutions for remaking infrastructure and rethinking how to build the communities it serves. It showcases creative and innovative approaches that communities have used to address infrastructure challenges, from reducing the land use impacts of parking in Atlanta and Boston, to moving many people for less money using bus rapid transit in Guangzhou, Bogota, and soon Chicago. The 2009 report has benefited from input from numerous interviews as well as two forums: one held in Paris to focus on the role of infrastructure in economic recovery efforts in Europe, and the other in Guangzhou to examine that city’s efforts to create a cheaper, faster transportation alternative for its citizens.

Times are tough, but infrastructure forces us to take the long view. **By its very nature, infrastructure is a long-term proposition.** Its impacts and benefits are measured not in years, or even decades, but over the course of generations. The United States has pivoted before, ushering in the era of the freeway with our massive investment in the interstate highway system after World War II. Now we must pivot again, building the infrastructure that will help achieve energy independence, ease the combined burden of housing and transportation on the pocketbooks of American families, and create the resilient, sustainable communities of the future.



Rick Rosan
President, Urban Land
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Urban Land Institute

Executive Summary

“The occasion is piled high with difficulty, and we must rise to the occasion So we must think anew, we must act anew, we must disenthrall ourselves and then we shall save our country.”

—Abraham Lincoln

Confronted by severe recession and economic breakdown, the United States reaches a pivot point for overhauling its dilapidated and outmoded infrastructure. The nation can either leverage crisis into opportunity for future growth by developing a new 21st-century infrastructure model, or backslide into more of the same: greater congestion, deteriorating road and transit networks, and the heightened probability of systemic water system failures.

Infrastructure 2009 warns that short-term stimulus funding for various road, transit, rail, and water projects offers no substitute for a concerted long-range U.S. effort to maintain national prosperity in a rapidly evolving and more competitive global marketplace. The report recommends a total revamping of how the country plans, funds, and implements infrastructure programs, using the following four-pronged approach:

SET A NATIONAL STRATEGY: The United States hasn't initiated a national infrastructure plan since the 1950s, when interstate highway construction began. Today, the country's challenges appear more complex and daunting, and many systems are either obsolete or crumbling and require rebuilding and reinvention. New transport networks must interconnect more efficiently to move goods and people through increasingly gridlocked global pathway cities. New corridors for passenger and freight rail must link to surrounding regional markets and merge into cross-national networks. Innovative new transit schemes, connected to airports and train stations, must help reduce car dependence, prevent bottlenecks in commercial centers, and decrease pollution. The country also needs to plan for 110

million more people by 2050, including provision for water and power in more densely populated metropolitan areas and regions. The President and Congress should move expeditiously to develop a bold national infrastructure agenda for implementation beginning in 2010.

PLAN HOLISTICALLY: Imperatives for reducing congestion, cutting carbon footprints, decreasing foreign oil dependence, and ensuring water supplies require thoughtful integration of transportation, energy, and environmental programs with land use planning and housing policy. Where people choose to live and work and how they travel will often be determined by the cost and convenience of various transport options. Planners need to encourage development of more compact, pedestrian-friendly neighborhoods tied into transit networks, connecting to commercial hubs. Road systems alone can no longer handle traffic volumes from spread-out suburbs, many of which develop their own urban nodes.

REVAMP GOVERNMENT: Federal, state, and local governments must restructure transportation, housing, water, and energy agencies to manage and execute infrastructure policy in concert. The White House should develop a national infrastructure strategy, working with a high-level commission of policy experts to select merit-based projects that fit objectives. States must break down silos and impasses between various transport agencies and land use authorities to formulate effective long-range regional plans, which coordinate with federal programs and tie into national networks.

CHANGE FUNDING APPROACHES: New infrastructure networks and necessary repairs will cost trillions of dollars to complete over the next two decades. The United States should establish an American Infrastructure Bank to help finance national networks, attract more private capital, and advance public/private partnerships. In addition, funding burdens must shift from taxpayers to users since depleted government coffers will not sustain initiatives. There's no alternative: gas taxes must increase and innovative user fee approaches adopted, including vehicle miles traveled charges. Smart metering technologies must be installed in homes and businesses for power, heating, and water. These approaches not only raise revenues, but also help people adjust behaviors to realize more economically efficient travel and use of resources. Future federal funding to states and local governments must link more directly to carrying out national objectives for infrastructure policy.

The report also recommends:

- **Focus stimulus funds on repairs**—Fix-it-first programs can prevent major breakdowns and costly dislocations. It's better to spend these monies on averting catastrophes than on new projects before the government has established a national plan. Candidates for funding range from rusting bridges and overpasses to outmoded water treatment plants and structurally deficient levees. And repair needs dwarf stimulus allocations—much more funding will be needed.
- **Direct infrastructure planning and funding at global pathway cities**—These gateways concentrate the nation's economic activity and must have the capacity to accommodate increasing populations as well as greater volumes of travelers, cargo, and goods.
- **Invest in national assets**—The country's major ports and international airports need upgrading to meet standards set by facilities in other world markets. The nation must also refashion its freight networks serving ports and airports and finally enter the age of high-speed rail, which could help reduce road and airport congestion.
- **Reconfigure suburbs**—Urbanizing suburbs in major metropolitan areas require new planning frameworks that can help reduce car dependence and accommodate more compact communities. Transportation and land use planning must integrate on a regionwide basis to serve multinucleated urban centers and manage future growth.
- **Borrow from global competitors**—The United States could benefit by adopting strategies implemented by its global competitors to improve connectivity, create efficiencies, and fund projects. Among concepts worth studying and applying: the European Union's integration of transport networks, the European Investment Bank, Germany's freight tolling system, Canada's federal funding of provincial and local projects to promote national goals, Bogota's fast buses, as well as Europe's and Asia's high-speed rail.

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Lower Project Costs



Part One: Pivot Point





“IT’S TIME TO BREAK THE MOLD.”

CRISIS CAN RAISE AWARENESS, FOCUS ATTENTION, AND EVEN SPAWN OPPORTUNITY. FOR THE UNITED STATES, 2009 COULD MARK a pivot point where financial emergency helps steer the nation toward reengineering aging and deteriorating infrastructure. “It’s an incredible opportunity to get things right.”^{1*} The country faces a stark choice—either avert its slide from prosperity through greater investment and innovation or hurtle into more gridlock, congestion, and potential systemic failure. “If we continue to run our infrastructure into a ditch, we won’t be able to get our economy out of its hole.”

^{1*} All quotes in this report are from interviews conducted with industry experts. The list of interviewees can be found on page 68.

After 30 years marked by general political indifference and funding myopia, some leaders in Washington, including President Barack Obama, talk of taking action. U.S. stimulus money targets infrastructure projects as the federal government prints dollars for jobs programs to help shock a distressed economy from deep recession. But the billions of dollars targeted for roads, bridges, mass transit, water projects, and high-speed rail in 2009 fall far short of what the country needs to ensure its economic competitiveness and vitality over the next half century.

The 2007 and 2008 *Infrastructure* reports detailed not only the dilapidated condition of U.S. infrastructure compared to that in European and Asian nations, but also how insular local planning and lack of cohesive national policy result in congenital congestion and diminishing capacity to meet increasing population demand. Transportation bottlenecks—road, freight, and airport—worsen while water supplies in many regions diminish, the country’s dated power grid looks more suspect, and lowering carbon footprints becomes a necessity.

Besides repairing its crumbling existing infrastructure from dams to overpasses, the United States desperately “needs to break the mold” and develop a strategic plan for funding and creating new transportation networks and establishing cogent land use policy that fits 21st-century realities, including the challenges of expanding population and climate change. The infrastructure problems facing the country cannot be solved just by shoveling more money at one-off light-rail systems or constructing more ring roads and highway bypasses.

Concerted responses by federal, state, and local governments must confront much tougher, more sensitive, and potentially disruptive issues and upend existing paradigms. “It’s time for a whole new approach.” In fact, the nation needs to reformulate dramatically how government plans, funds, and implements infrastructure policy to ensure national prosperity and boost productivity for future generations. *Infrastructure 2009* calls for action on four fronts:

DEVELOP A NATIONAL STRATEGY.

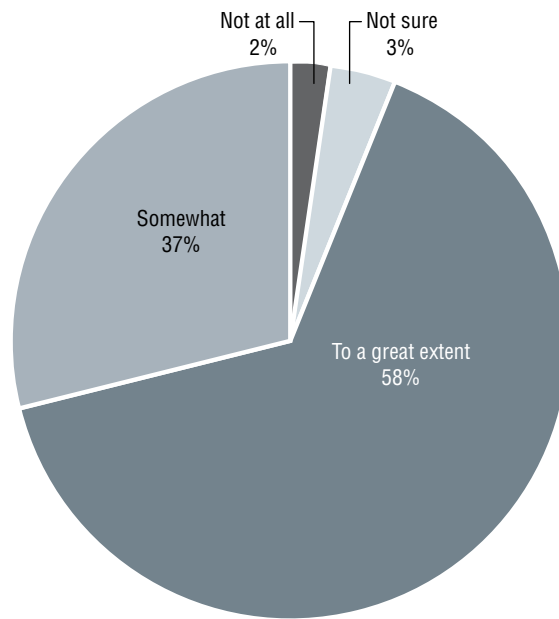
for interconnecting gateway cities and regional centers to integrated networks of high-speed passenger and freight rail, roads, and mass transit. These systems must link to ports and airports as well as to central business districts and suburban nodes. The federal government also must ensure that regions can provide enough water and power to meet expected population growth.

PLAN HOLISTICALLY.

Integrate and coordinate national policies for reducing congestion, lowering carbon emissions, improving efficiency of transport systems, and decreasing dependence on foreign oil. To achieve success, the country’s infrastructure, energy, and environmental imperatives must synch with land use and housing policies.

Figure 1:
Ninety-five Percent of U.S. Developers in Survey Expect the Financial Crisis to Diminish State and Local Governments’ Ability to Provide Infrastructure

Source: ULI Member Survey, 2008.



Question: To what extent do you anticipate that the financial crisis will diminish the ability of states and localities to finance and provide infrastructure?

Figure 2:**Incentives and Spending Related to Infrastructure in the U.S. Economic Recovery Bill***Source: American Recovery and Reinvestment Act of 2009.*

Transportation	Billions
Surface Transportation (roads, bridges, and related facilities)	27.5
Intercity Rail	9.3
Transit	8.4
Aviation	1.3
Supplemental Discretionary Grants	1.5
<i>Subtotal</i>	48.0
Energy	
Tax Incentives for Renewable Energy Facilities	14.0
Electric Grid	11.0
Energy Efficiency Grants to States and Local Governments	6.3
Innovative Energy Loan Guarantee Program	6.0
Building Efficiency	16.6
Alternative Vehicles	4.8
Other Renewable Energy, Conservation, or Clean Energy	6.7
Research	4.5
<i>Subtotal</i>	69.8
Water	
Water State Revolving Funds	6.0
Army Corps of Engineers	4.6
Rural Water and Waste	1.4
Rural and Western Water Projects	1.0
Other Water Projects	1.6
<i>Subtotal</i>	14.6
TOTAL	132.4

REINVIGORATE AND REVAMP AGENCIES AND AUTHORITY.

Realizing integrated solutions necessitates restructuring and reorienting federal and state agencies responsible for managing and executing infrastructure-related policies. On the federal level, the White House should consider setting national goals and managing objectives through a high-level infrastructure czar and/or commission. The departments of Transportation, Hous-

ing and Urban Development, Energy, as well as the Environmental Protection Agency should be reorganized to facilitate planning and implementation across disciplines. State and local governments need to revamp highway, transit, and other transport agencies and coordinate their activities closely with housing, planning, zoning, and water/sewage treatment authorities. “It’s time to break down the silos.”

CHANGE HOW WE PAY.

Costs for utilizing and maintaining infrastructure systems must become more transparent to the public—shifting more of the financial burden to users and away from taxpayers. The United States should establish an Infrastructure Bank to help finance national network projects and attract more private capital.

Inevitable Change

These new approaches and policies will likely transform the economics for how and where people choose to live and work. But that’s happened before. Only 100 years ago, the world was still in the horse-and-buggy era. There were no airports, trucks, or even many paved roads. Less than 60 years ago, President Dwight Eisenhower embarked on interstate highway construction that enabled prodigious suburban expansion and jump-started an enduring car culture. Only then did today’s fastest-growing metropolitan areas—in the nation’s previously underpopulated Sunbelt—begin mushrooming into subdivision agglomerations amid webs of blacktop strips. Even as recently as 1960, most people who ventured to Europe crossed by boat and nonstop transcontinental jet travel had just started. Sleeper railway cars and grand center-city train stations were still in vogue. Indeed, so much has changed so fast—literally in a blink of a baby boomer’s lifetime.

Now, substantial transformational change again looms—shaped by the collapse of financial markets, cratered housing values, the U.S. auto industry’s tailspin, strategic and economic imperatives to reduce dependence on foreign oil, and growing

concern about global warming. A sobered America considers how infrastructure bears on an eventual recovery and national renaissance. That's a start.

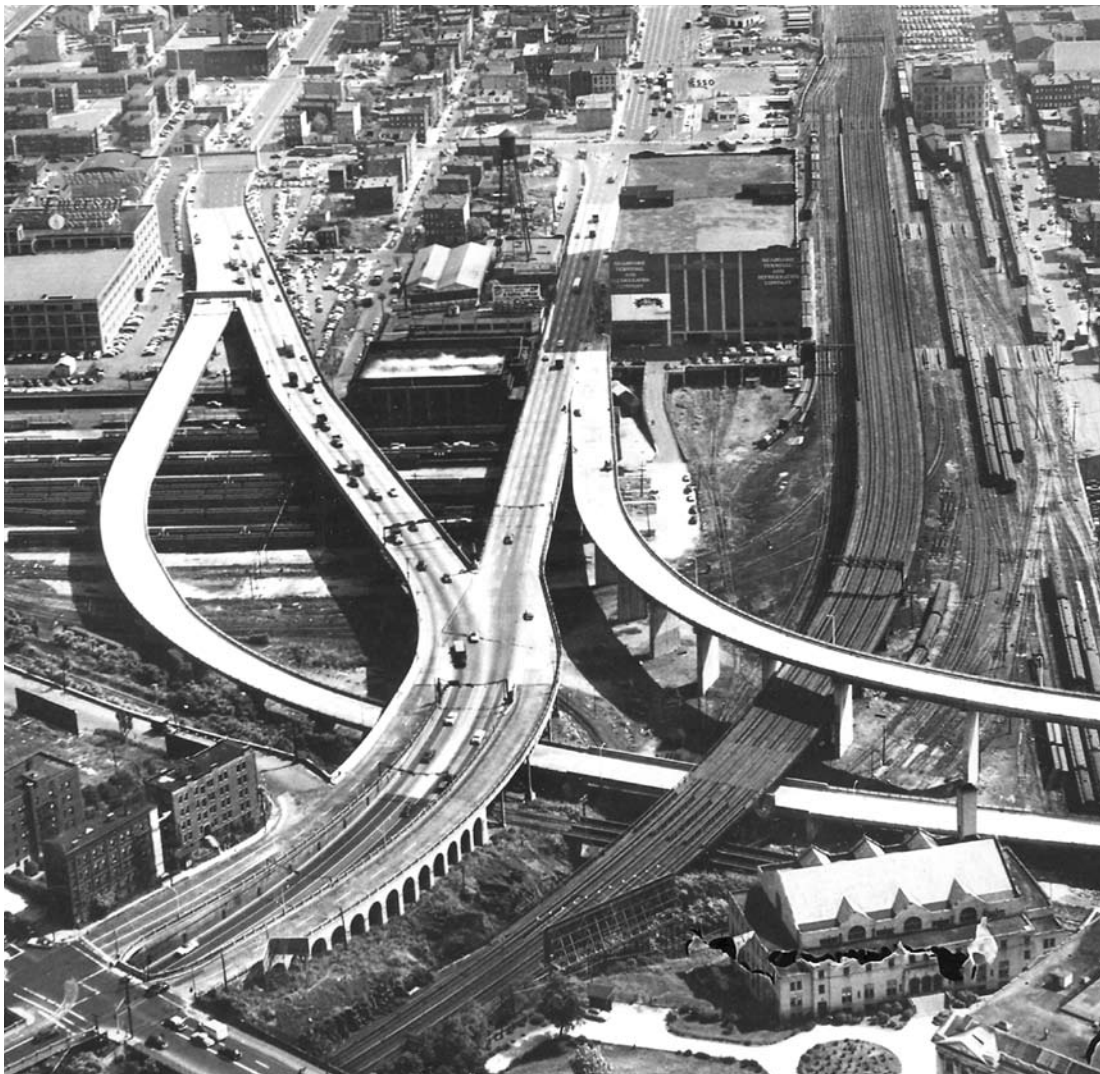
Shaping the New Model

The concepts for the new 21st-century American infrastructure model have only begun to take shape, but will likely involve urban innovations and some back-to-the-future approaches. The objectives will seek to shorten commuting and cut energy consumption; integrate rail, roads, and transit with more pedestrian-friendly communities; build compact, mixed-income housing in transit hubs closer to commercial districts; and set aside common space for parks and public recreation areas.

The nation's primary global pathway cities—large ports and strategically positioned interior cities with major international airports—should expand and modernize their transport corridors

to accommodate increased international trade and travel. More freight should be shipped by rail, utilizing regionally located transfer hubs outside population centers. And true high-speed passenger rail lines should be developed in regional networks to connect to global pathway cities and reduce airport and road congestion.

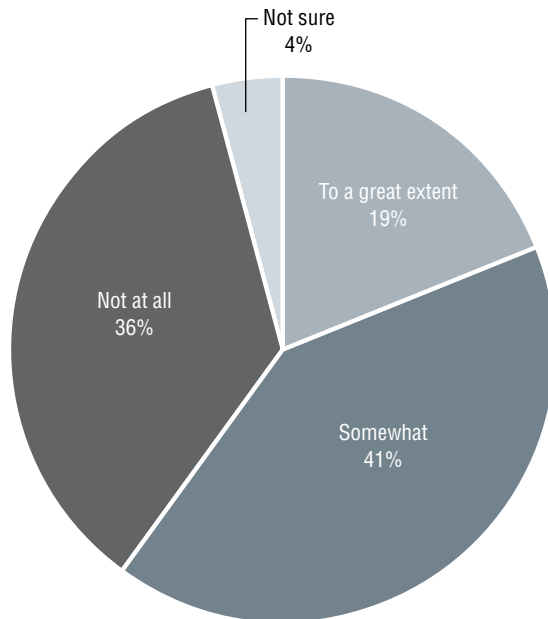
In 2009, the U.S. government runs up deficits to fight a sharp economic slide, spending stimulus outlays on infrastructure for public works employment. But these seemingly generous funding allocations represent only a small fraction of what will be needed over the next two decades. And the current fiscal morass presents longer-term hurdles for how to pay for literally trillions of dollars in new networks and systems when other essential programs like defense, health care, Social Security, and education compete for what's left in government coffers drained by increasing debt service. State and local governments, meanwhile, confront “a perfect storm of credit crunch, revenue shortfalls, and deferred maintenance.”



A sign of change taking hold in America: in 1956, a newly built 8.2-mile (13.2-km) four-lane highway connects New Jersey and New York. (AP)

Figure 3:
Sixty Percent of U.S. Developers in Survey Feel That Their Projects Have Been Constrained by a Lack of Spending on Infrastructure

Source: ULI Member Survey, 2008.



Question: To what extent have your development projects been constrained by decreased state funding of infrastructure?



Electricity smart meters allow residents to monitor their usage, saving up to 6 percent off of regular electric bills. (AP)

The funding realities will require an extremely rational, integrated infrastructure plan to achieve successful outcomes across regions, states, and local communities all grabbing for a piece of what could become a shrinking funding pie. A majority of developers in ULI's survey, meanwhile, indicate that their projects have been constrained by a lack of infrastructure spending.

Much of the future financial burden likely will shift from taxpayers to users in the form of more tolls, higher transit fares, congestion pricing schemes, and bigger water and utility bills. In particular, car ownership and driving will continue to become more expensive regardless of fuel prices. But higher costs could translate into faster travel on less congested, better-maintained roads if user fees are appropriated properly. People can adjust behaviors to drive more economically while the government raises revenue to fund new multimodal transport networks and partners more with private operators to gain efficiencies.

Likewise, smart meters for electricity will encourage bill payers to develop strategies for greater conservation and avoiding higher charges at peak-use times, as power companies revamp technologies to cleaner fuels and more efficient power distribution. In many parts of the country, water also will become more precious and expensive—growing regions must provide ever-larger populations with an increasingly limited resource. Americans will learn to use less—oil, power, and water—and conserve more, to save money.

If paying for monumental needs isn't enough, planning and then actually retrofitting a new infrastructure model onto heavily built-out metropolitan areas presents mind-numbing hurdles and complexities, setting the stage for political infighting. The era is long past when new highways and exit cloverleaves could be fashioned across wide-open stretches of green fields, farms, and forests without significant eminent domain challenges. Negotiating rights-of-way across suburban neighborhoods for high-speed rail and creating wider freight corridors through ports in urban centers could take decades without convincing leadership and adequate compensation for property owners. Incentives will be necessary to forge regional and local consensus for where to locate mass transit lines and stations. Just as the interstates left bypassed towns and villages to wither, new networks will determine winners and losers, too. Some states and cities could be left behind as

projects concentrate in the country’s key global pathway markets and connections to strategic secondary commercial hubs.

“We Need a Strategy”

So, for the sake of gross understatement—conceptualizing, planning, designing, paying for, and executing an ambitious and necessary infrastructure makeover won’t be easy. While it’s heartening to see U.S. government leaders take an interest in infrastructure issues for the first time in a generation, policy considerations still get muddled in talking points about creating jobs, resuscitating the economy, potholed roads, and building a new future.

In the absence of a national infrastructure master plan for guidance, the raft of promised 2009 federal infrastructure dollars will funnel through to states, cities, and towns, which undertake ad hoc projects often lacking attention to regional or national priorities. “It’s what the country has been doing for decades. We fund a collection of projects. The jobs program just pumps more dollars into the same broken system. It’s not a strategy. We need a strategy.”

One Step at a Time

The consensus among *Infrastructure 2009* report interviewees and survey respondents sends one clear message—now that U.S. government leaders have begun to focus on the ramifications of the country’s infrastructure breakdown, we must not waste the opportunity to fashion a definitive reengineering strategy and implement rational solutions.

Here is a step-by-step approach:

Face reality: “As a country, we’re deluding ourselves if we think we have put enough into infrastructure. We’ve been underinvesting for 30 years.” As a percentage of gross domestic product, infrastructure spending actually has been declining since 1959 “and we are all paying the price now. It’s time to face the cold hard fact that it’s going to cost money to get us out of the hole we’ve dug.”

Figure 4:
Infrastructure Is Expensive:
Indicative Project Costs

Various sources.

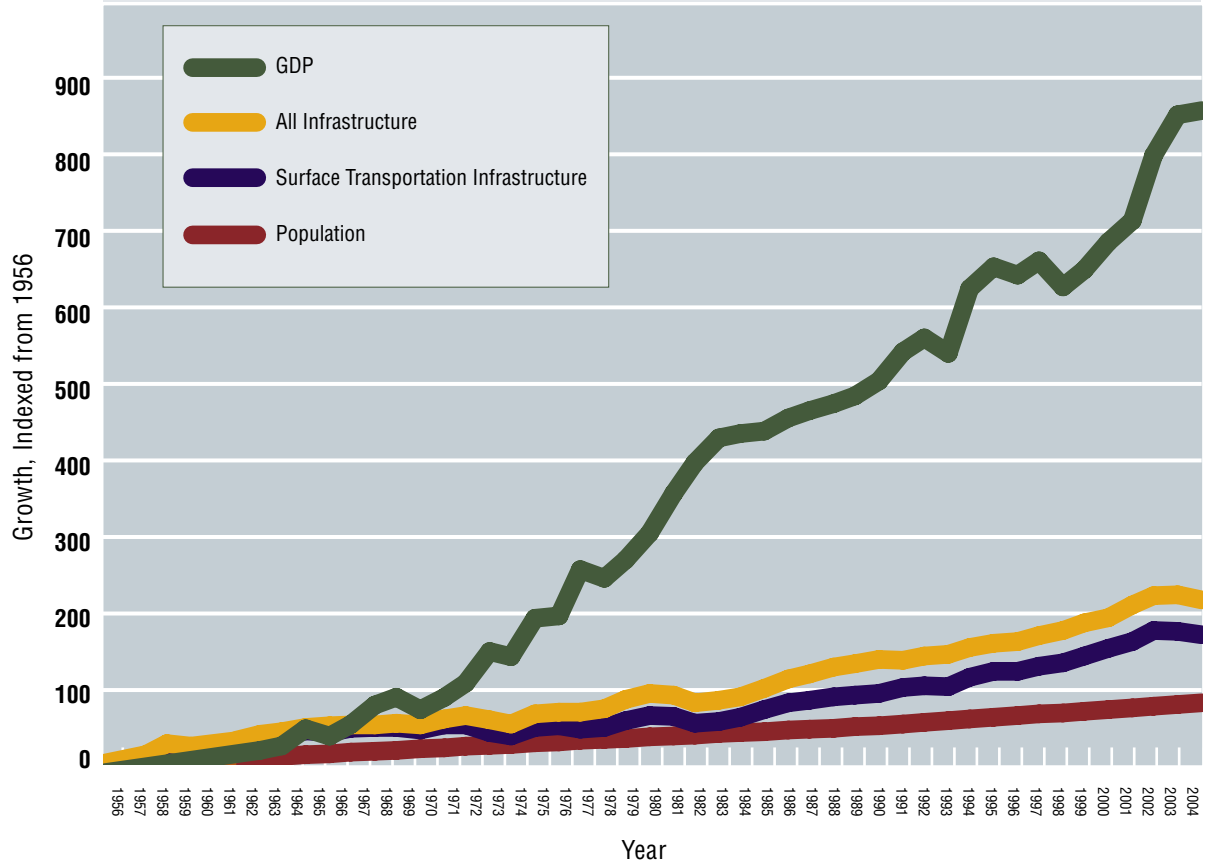


Tappan Zee Bridge Rebuild (Planned)	\$6.4 billion
*With a high-speed bus lane	\$9.3 billion
*With connecting rail	\$13.1 billion
Minneapolis I-35 West Bridge Replacement	\$234 million
Seattle Light-Rail Extension (Planned, 17 miles/27 km)	\$2.4 billion
Austin, Texas, Route 183A Tolled Expressway (Completed, 12 miles/19 km)	\$238 million
Maryland Purple Line Light Rail (Planned, 16 miles/25.7 km)	\$1.2 billion
California High-Speed Rail Network (Planned, 800 miles/1,287 km)	\$45 billion
Seattle Alaskan Way Viaduct (Planned replacement of viaduct with tunnel and roadway)	\$4 billion

Recognize stimulus as a downpayment: Injecting \$40 billion—plus into U.S. roads and mass transit and tens of billions more into electric grids and sewer projects will help ramp up temporary employment, but the stimulus will not redress years of inattention to infrastructure. To put funding needs in perspective, a 2009 American Society of Civil Engineers (ASCE) assessment calculates that deteriorating conditions and inflation have escalated costs for infrastructure repairs and upgrades to \$2.2 trillion over the next five years, a \$600 billion increase over its 2005 report. The ASCE minces no words, calling the nation’s infrastructure “poorly maintained and unable to meet current and future demands, and in some cases unsafe.” The engineers’ survey analyzed highways, transit, rails, airports,

Figure 5:
Growth in Gross Domestic Product (GDP) Far Outpaces Infrastructure and Surface Transportation Spending, as Well as Population

Sources: Congressional Budget Office, U.S. Census Bureau.



drinking water, sewage treatment, dams, and levees, and gave U.S. infrastructure overall a grade of D.

Focus short-term stimulus on repairs: “Fix it first” should trump building new, especially since the government has not determined a long-term framework for planning national networks or funding them. “The last thing we should do is build new, when what we have is falling into ruin. You could spend all allocated dollars just on repairing and replacing failing bridges, and still need much more.” After the 2007 Minneapolis I-35 West bridge collapse, many states identified what needs repair, but don’t have the revenues to fix structures and avert possible future catastrophes. Restoration projects may be unsexy, but what good is a new connector road when a rusting overpass collapses on the interstate? And

once disaster strikes, the costs—liabilities, reclamation, reconstruction, and dislocation—can increase exponentially.

Formulate a 21st-century national infrastructure plan: U.S. leaders should move expeditiously to establish a long-term federal policy for planning and investment in new national transport networks and corridors, integrating infrastructure decision making with housing policy as well as providing water and energy resources. Objectives should include increasing economic productivity and efficiency, reducing congestion and per-capita vehicle miles traveled, accommodating the 110 million in population growth projected by 2050, and decreasing pollution, notably carbon emissions. Changing land use patterns is essential to promote and develop compact,

Figure 6:
American Society of Civil Engineers
2009 Infrastructure Report Card

Source: American Society of Engineers.

Aviation	D
Bridges	C
Dams	D
Drinking Water	D-
Energy	D+
Inland Waterways	D-
Levees	D-
Rail	C-
Roads	D-
Transit	D
Wastewater	D-

A = Exceptional; B = Good; C = Mediocre; D = Poor; F = Failing

mixed-use communities, which provide the more convenient and efficient lifestyles that people increasingly demand. National policy must finally connect the dots between global economic competitiveness, land use, transportation, and sustainability. Infrastructure isn't just about building highways and subways. The authorization of the next surface transportation bill offers a good starting point to revamp planning and funding.

Provide national vision, encourage regional/local implementation: While America's global competitors impose more top-down, nationally directed infrastructure mandates, the United States has left most infrastructure planning to state and local agencies. Federally organized nations like Australia and Canada exert considerably more top-down guidance and direction through funding carrots and sticks. The United States now needs to follow suit, with regions and cities orienting their planning to link to national networks and meet national priorities. Disconnected, bottom-up planning leeches dollars for shortsighted local projects like highway exits to shopping centers, while China builds high-speed rail lines between airports and center cities, and Europe plans cross-continent freight systems.

Change leadership and management structure: Developing a rational vision, galvanizing political



Construction projects create jobs in the short term, but roads and pipelines last for generations.

Figure 7:
Population Growth Adds to Infrastructure Pressures: The United States Will Add 110 Million People between 2010 and 2050

Source: U.S. Census Bureau.

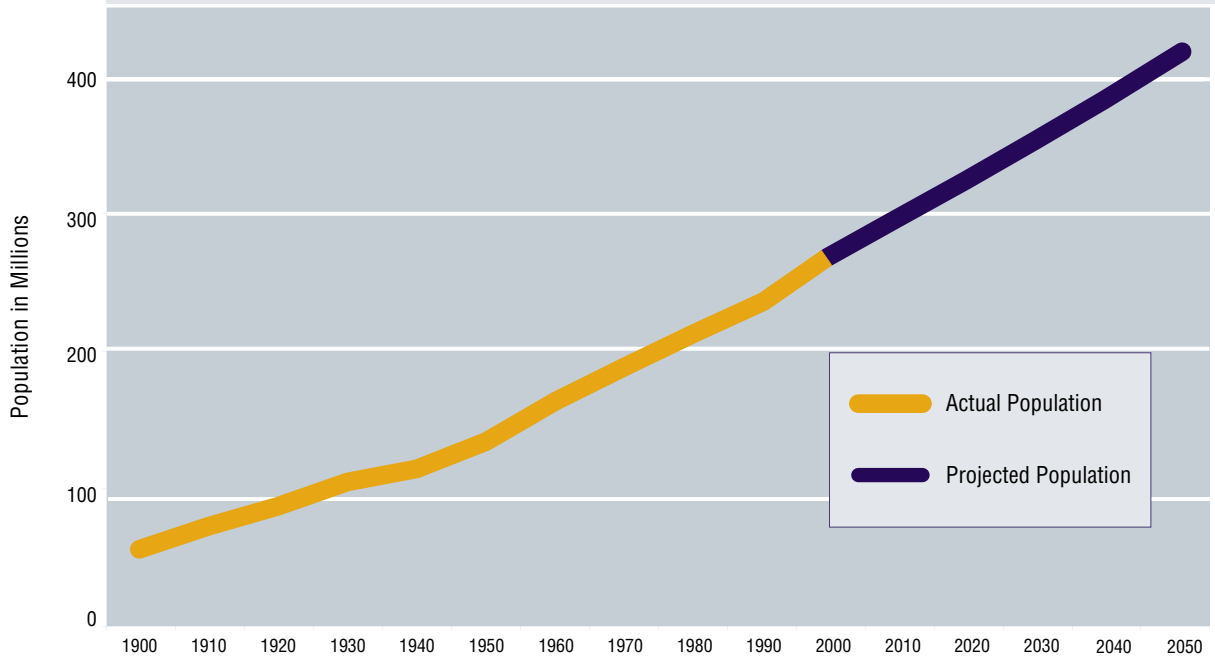
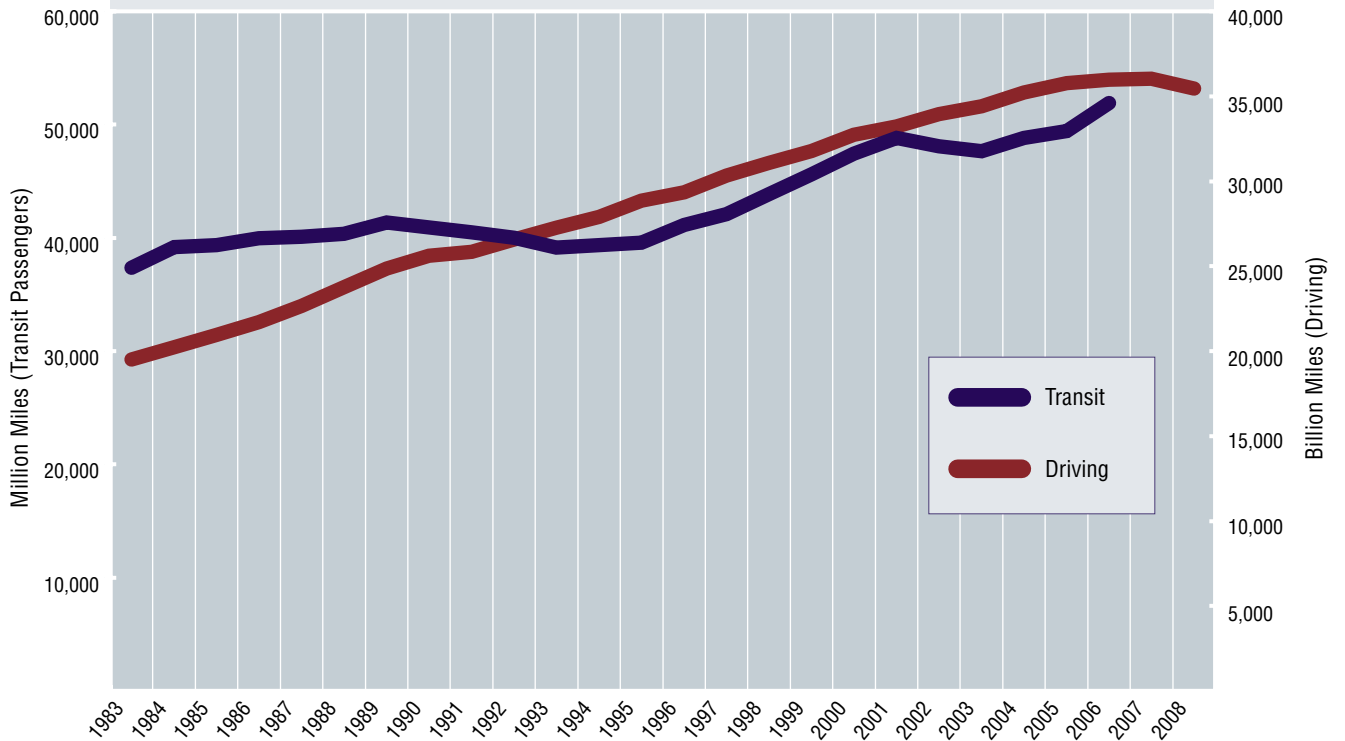


Figure 8:
Multimodal Solutions Are Key: Driving Consistently Trumps Transit Use; in Recent Years, Transit Use Is Climbing While Driving Declines

Sources: Transit Use: American Public Transit Association; Driving: Department of Transportation.
 2007 and 2008 transit data not yet available.



support, and coordinating state and local schemes into a national infrastructure framework will require focused leadership and comprehensive direction. Advocating government “czars,” national commissions, or consolidation of existing bureaucracies can induce angst and provoke reflexive opposition. But transportation, housing, energy, and environmental policies need to be integrated and coordinated much more closely than ever before to achieve national productivity and sustainability goals. A fractured approach handicaps any chance for success and may waste limited resources. If the nation’s economic future depends so critically on revamping infrastructure policy and strategy, can the country afford to let its management continue to languish across an interagency morass?

Deliver multimodal solutions: The last national infrastructure foray—Eisenhower’s interstate highway system—was a one-trick pony, building a network of interconnecting highways to link cities and facilitate cross-country vehicle travel. Today’s task presents considerably more complex challenges. Radically changed circumstances—a population that has doubled since 1950, with 110 million more people on the way over the next 40 years; reordered world markets and industrial centers; clogged global pathway cities; and global warming concerns—force planners to rethink how to move people and products, using all transport modes in innovative configurations. Convenience and efficiency mean providing people and business with pedestrian-friendly access to multiple forms of mass transit as well as housing alternatives to help relieve car dependence. Air, freight, and road systems need to connect more seamlessly. Government agencies can no longer develop schemes for roads and subways without regard to community planning. The concept of road-only places built out to the horizons is no longer sustainable.

Let merit and objectives drive decision making: The President and Congress should set clear objectives, parameters, and guidelines, but infrastructure project priorities should be made by a nonpartisan

Figure 9:
Land Use Links Infrastructure, Housing, and Sustainability



“blue-ribbon task force or commission of experts” composed of policy experts, planners, engineers, and business leaders. Otherwise, powerful politicians cut deals to favor local constituencies at the expense of national interests. “Republicans who tend to favor roads will fight it out with Democrats who tend to favor mass transit, and we’ll get nowhere.” The 1990s’ military base closing commission could serve as a model to overcome political infighting. “We should have clear-headed professionals making these decisions.”

Transform the funding system: Emblematic of current, splintered U.S. infrastructure policy, most state road and local mass transit projects are funded through scores of disaggregated federal programs, many supported by the archaic Highway Trust Fund. The Trust Fund, a relic of interstate building days, now faces shortfalls, because the paltry federal gas tax that finances the fund has not been raised in 16 years. A new federal funding scheme should orient states and regions to plan projects around multimodal concepts and connections into national networks. Funding guidelines need to give states “more tools and license” to plan and capitalize larger, more impactful regional projects. Says a state transportation official: “Funding needs to be more predictable—there’s too much starting and

stopping because we run out of money, so we focus instead on smaller earmark projects rather than the ones that can make a difference as part of a long-term strategy.” Formation of an American Infrastructure Bank could help set priorities by focusing its financing on big-ticket projects that tie into national networks.

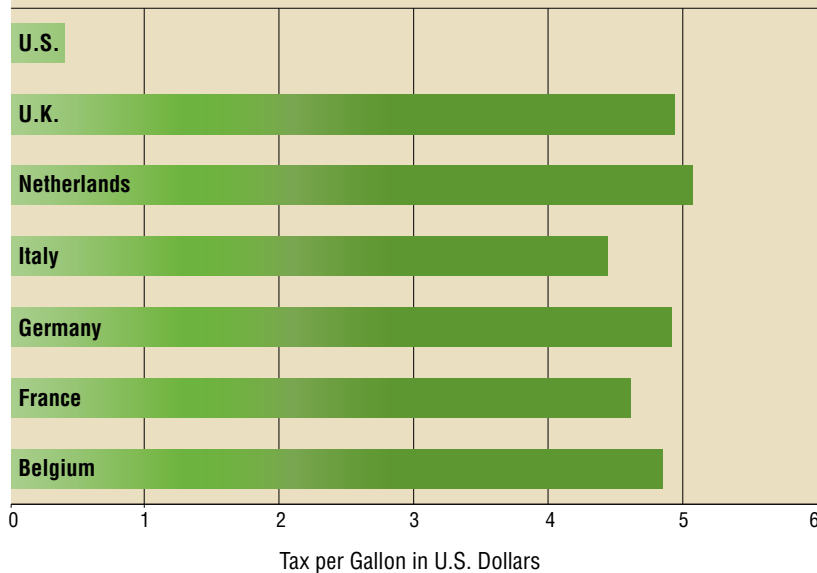
behaviors based on a calculation of rational economics and lifestyle choices (witness what happened when gas prices hit \$4 a gallon—more people used mass transit). Once the average driver comprehends his fully loaded transportation costs, then he may consider living closer to work, riding more mass transit, driving less during rush hours, and possibly ditching the big home on the big lot in the exurbs. Over time, demand should grow for more convenient infill housing near commercial centers, transit hubs, and public recreational amenities. It’s about making trade-offs—paying more and living differently to gain more efficient systems, which help improve productivity and sustain prosperity.

Enable more public/private partnerships: Private infrastructure investor-managers are “no panacea” for cash-strapped state and local governments, but “they can offer tools” to help with funding shortfalls, shift risk away from taxpayers, and implement better service. Properly structured concession agreements with experienced operators can finance new projects and repairs, provide greater management efficiencies, and apply innovations. The United States continues to lag Europe, Australia, and Canada in harnessing partnership opportunities. Residents of New Jersey and Pennsylvania are the latest to raise hackles over state government’s giving concessions away to the private sector, which they fear rightly will raise user fees. “There needs to be greater assurance that the state or city is getting a good deal for taxpayers and is well protected if something goes wrong.” Managers, meanwhile, require assurances that “returns will be there for investors.”

Educate the public: The how-to-pay quandary gets to the heart of explaining choices to people. In the United States, leaders have sloughed off leveling with constituents about the true costs of essential services and systems they take for granted. “It’s hard for people to understand how behind in funding we are when they can keep driving over the same bridge every day.” They don’t see leaking underground water mains, rusting underpass sup-

Figure 10:
The U.S. Gas Tax Is Substantially Below That in European Countries

Source: Energy Information Agency, February 2008.

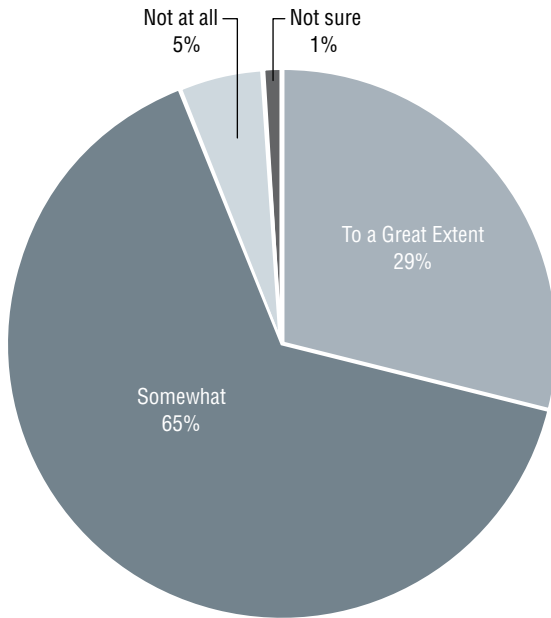


Raise the gas tax, adopt more user fees:

“We need to invest more—that’s a no-brainer.” But the national debt will exceed \$12 trillion by year-end and the government’s stressed fiscal condition will constrain future spending. That leaves a choice of treading water once fiscal stimulus ends or raising user fees to fund necessary projects. These fees could include combinations of higher gas taxes, more tolls, congestion pricing, extra levies on trucks/heavy cars, vehicle miles traveled charges, metered parking, or all of the above. Mention of higher gas taxes and user fees can antagonize voters and strike fear in the hearts of politicians, but the alternative means falling into further ruin. When properly considered, implementing these charges not only raises revenues to provide well-maintained, safer road systems and more diverse transit options, but also helps change users’

Figure 11:
Ninety-four Percent of U.S. Developers in Survey Say Gas Price Trends Will Drive Future Development Patterns

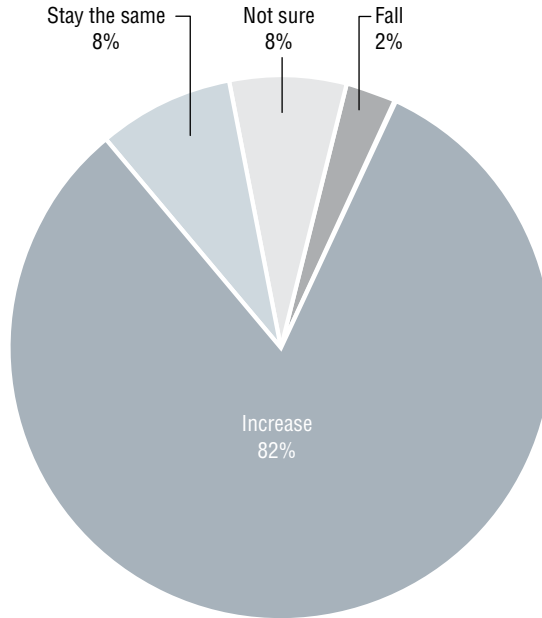
Source: ULI Member Survey, 2008.



Question: To what extent do you expect development patterns to be influenced by long-term gas price trends?

Figure 12:
Eighty-two Percent of U.S. Developers in Survey Expect Gas Prices to Increase

Source: ULI Member Survey, 2008.



Question: In November 2008, gas prices in the United States averaged \$2.20/gallon. Over the next five years, how will gas prices change?

ports, or a cracked wall on an upriver dam. Rhetoric about how big government and higher taxes are uniformly bad hasn't helped either. Citizens obviously like the idea of having more money in their pockets, but they also want safe, congestion-free roads and on-time trains. Politicians need to explain to voters how assessments for infrastruc-

ture not only support jobs, but also sustain economic productivity and a high standard of living. "You can't get something for nothing." Recent ballot approvals for rail and mass transit in California, Phoenix, and Denver underscore that voters will support infrastructure initiatives when the issues are well understood.



California voters approved funding in 2008 for the first phase of an 800-mile (1,287-km) high-speed rail system, which will reach average speeds of 170 miles (273 km) per hour. (NC3D)

Follow the leaders: Once an exemplar for other nations, the United States finds itself in a role reversal. The country needs to consider borrowing and adapting successful infrastructure programs and initiatives from its competitors in order to catch up. In fact, Americans have begun to swallow their pride and look elsewhere for solutions and ideas. Congress considers an infrastructure investment bank modeled after Europe's. Cities like San Francisco and New York have contemplated

London's congestion pricing scheme and Oregon tries to initiate mileage-based user fees. California moves forward with planning high-speed intercity rail lines and more cities look to implement South American-style fast bus programs. U.S. companies might also ponder entering the infrastructure management game to provide operations and management services, since national security concerns have nixed private management of U.S. airports and ports by offshore operators.

Filling the Scorecard

Over the course of 2009, Americans will come to terms with whether government has moved from lip service to concerted action in meeting its infrastructure challenges. Here's a way to keep score:

WIN	LOSE
Stimulus monies channel into refurbishment and repair projects—primary roads, transit systems, levees and dams, as well as water lines and sewage treatment plants.	Stimulus pays for “vanity projects,” anything that can be labeled “pork” or “needs a ribbon cutting.”
Congress votes to increase the gas tax in phased hikes and passes legislation allowing states to toll interstates and encouraging the use of innovative revenue-generating schemes for transportation, like congestion pricing and distance charging.	The Highway Trust Fund continues to sink deeper into insolvency and the government fails to set the stage to develop new infrastructure funding sources.
The President, working with Congress, assembles an interdisciplinary group of experts—transport, energy, housing, demographics, planning—into a national commission and appoints high-level policy advisers to formulate a long-term national infrastructure strategy by year-end, setting the stage for launching a next-generation program during 2010.	Policy formulation is pushed back into the Department of Transportation, other federal agencies, and various Congressional subcommittees.
Leaders start linking transport policy to energy, environmental, housing, and land use initiatives, putting exciting new holistic paradigms in play. The President and Congress consider reorganizing federal departments to enable cohesive implementation and execution of infrastructure initiatives.	Silo-think continues to segregate projects for transit, roads, rails, and airports, keeping transport planning stuck in yesterday's dimension. States fail to integrate land use decision making with regional planning for future transport, water, and sewage treatment needs.
Congress enacts legislation for an Infrastructure Bank to help states and cities fund transformational projects that can tie into national networks.	Leaders conclude that rising deficits and other priorities mean delaying a major push in infrastructure planning and investment.
The next U.S. surface transportation bill fundamentally revamps planning and funding for transportation infrastructure, creating multimodal programs and instituting new links between transport and land use.	Congress enacts legislation that tinkers around the edges and funds more of the same, continuing the tradition of pork-barrel decision making.

The Promise of Bus Rapid Transit

The concept seems low tech and somehow too retro. But buses may offer a game-changing solution to easing congestion and speeding commuting times in some major urban centers, especially in cities where monumental costs for rail and subway enhancements appear fiscally untenable. This updated mass transit model does not involve garden-variety buses that stop every few blocks and get stuck in street traffic and at red lights. These buses are much different—high-capacity articulated vehicles, they can carry as many as 160 passengers. In fact, they operate more like surface subways with dedicated rights-of-way, stations for off-vehicle vending, floor-level loading with multiple doors, and technologies to adjust traffic signals to allow uninterrupted transit. In addition, satellite systems signal arrival information and commuting times for riders en route and at stations.

Pioneered in Ottawa, Canada, and Adelaide, Australia, so-called bus rapid transit (BRT) systems or fast buses caught on in some South American cities and more recently have been exported to burgeoning population magnets like Guangzhou, China; Bangalore, India; and Mexico City. In the United States, Los Angeles (Orange Line) and Boston (Silver Line) have adopted BRT concepts. Chicago plans to inaugurate BRT service in 2010, spurred by a \$150 million federal grant, hoping to enhance its 2016 Olympics bid. Projects also exist in Las Vegas, Nevada; Hartford, Connecticut; Cleveland, Ohio; Miami, Florida; Tempe, Arizona; and Eugene, Oregon. Fast buses may catch on in many other metropolitan areas to link into existing mass transit systems or substitute for higher-cost alternatives, which can't get off drawing boards because of budget cutbacks.

The expense differentials between full-scale BRT systems like Bogota's TransMilenio and subways can be compelling. The U.S. Department of Transportation (USDOT) projects costs for the fully built-out 241-mile (388-km) Bogota system at \$3.3 billion, similar to the costs of an 18-mile (30-km) heavy-rail system also considered by the city. TransMilenio ridership on

its existing 52 miles (84 km) exceeds 1 million daily passengers. That compares to Atlanta's 230,000 daily passengers on a 48-mile (77-km) subway system. Time savings for commuters look impressive, too. TransMilenio service has increased average public transit travel speeds in Bogota from just nine miles (14.4 km) per hour to more than 16 miles (25.6 km) per hour, for a 32 percent reduction in travel times.

The new 14-mile (23-km) line in Guangzhou, costing about \$140 million, initially will serve about 600,000 daily passengers, shaving an estimated one hour off round-trip commutes. That translates into a projected savings of 36 million passenger hours annually. The Guangzhou BRT will have more than double the one-way direction capacity of any other Asian BRT system and operate at higher speeds. Guangzhou will also integrate dedicated bike lanes and high-quality pedestrian facilities through new BRT corridors. Tunnels at three stations will connect BRT directly to subways.

System design is critical to achieving BRT efficiencies—the buses ideally require exclusive, double-lane configurations, allowing express buses to pass local buses; high-capacity station design for off-board fare collection with level boarding onto high-capacity buses; and centralized, satellite tracking to coordinate services, reduce bunching, and maximize service frequency. BRT passenger capacity and volumes are comparable to light rail when taking into account the small headways between buses in high-tech managed systems. Until recently, fast bus schemes had been slow to catch on in the

United States. Some planning experts point out that more expensive subways provide superior networks where stations act as catalysts for residential and commercial development. Too often, local transportation planners adopt cheaper and less effective "BRT-lite" programs—dedicated lanes without the side-loading buses and stations or high-tech traffic navigation systems.

Chicago's recent embrace of a ten-mile (16.1-km) pilot program for BRT service on several high-congestion corridors into the Loop business district may help win more converts. Over time, the city targets implementing a 100-mile (161-km) fast bus system that supplements existing bus, commuter rail, and subway lines. In conjunction with the BRT program, the city will apply peak period pricing surcharges on downtown parking through a concession agreement, encouraging more drivers to use the new mass transit option, which will employ hybrid vehicles to reduce pollution and carbon emissions. "It's a way to provide speed and reliability closer to rail service without the costly infrastructure," explained Chicago Mayor Richard Daley. Any concept like BRT that reduces congestion, shortens commuting times, and lessens budget stress promises to win increasing support from politicians and their constituents.

The Guangzhou Bus Rapid Transit system will service 600,000 passengers daily, shaving one hour off round-trip commutes. (Institute for Transportation and Development Policy/Guangzhou Municipal Technical Development Corporation)





Part Two: Global Update



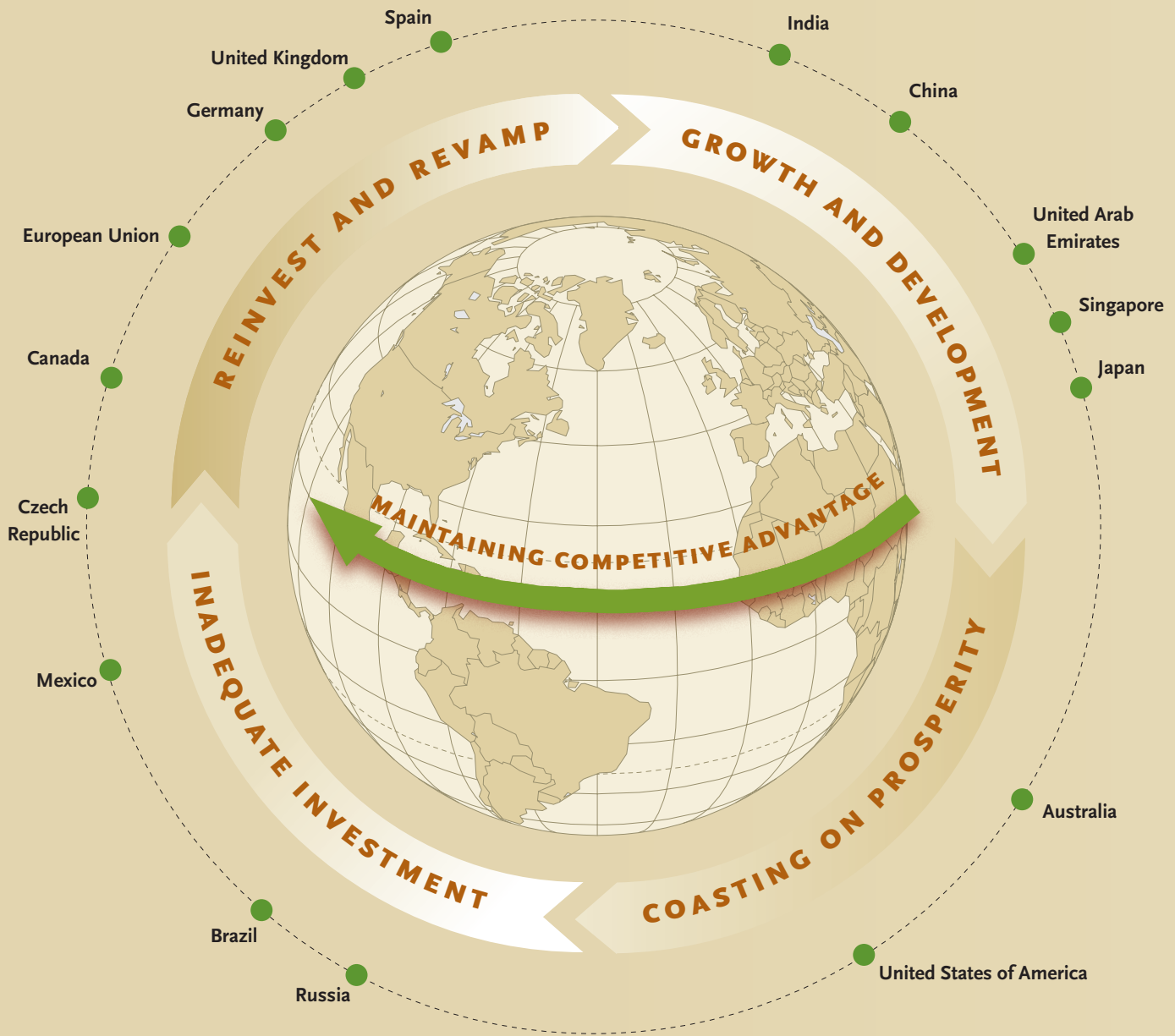


Figure 13: Infrastructure Life Cycle

Countries continuously need to invest in and retool infrastructure to remain economically competitive. Transport networks require constant maintenance—the average life span for road beds, bridges, and tunnels is about 50 years. Population shifts and demographic changes, changing technology, and new logistics force change.

Infrastructure investment positions countries along four stages of the infrastructure life cycle, determining where they stand in terms of infrastructure quality, condition, and growth.

Growth and development. A high percentage investment as share of GDP builds out innovative networks and systems to replace inadequate or nonexistent infrastructure, enhancing economic competitiveness.

Coasting on prosperity. In the post-development phase, government reduces relative infrastructure spending and reaps economic benefits from high-quality systems, focusing on maintenance over capital projects.

Inadequate investment. Insufficient funding for infrastructure maintenance and recapitalization leads to economic weakness from lowered productivity and efficiency. Costly system breakdowns occur and delays and safety problems increase.

Reinvest and revamp. Infrastructure spending increases to avoid or stem declines. New infrastructure is planned and built to sustain and improve economic competitiveness.

THE GLOBAL ECONOMIC TURBULENCE WREAKS HAVOC ON STRESSED GOVERNMENT BUDGETS

AND ENGENDERS VARIOUS NATIONAL STIMULUS AND RECOVERY PLANS, many of which include infrastructure outlays for jobs programs. Facing widening funding shortfalls, governments in every region struggle to boost employment and maintain momentum for ventures that buttress long-term prosperity. Some countries accelerate infrastructure programs, spending future allocations sooner. Others must delay or stop projects as tax and permitting revenues decline and financing sources dry up.



Figure 14:
Comparison of International Economic Rescue Efforts

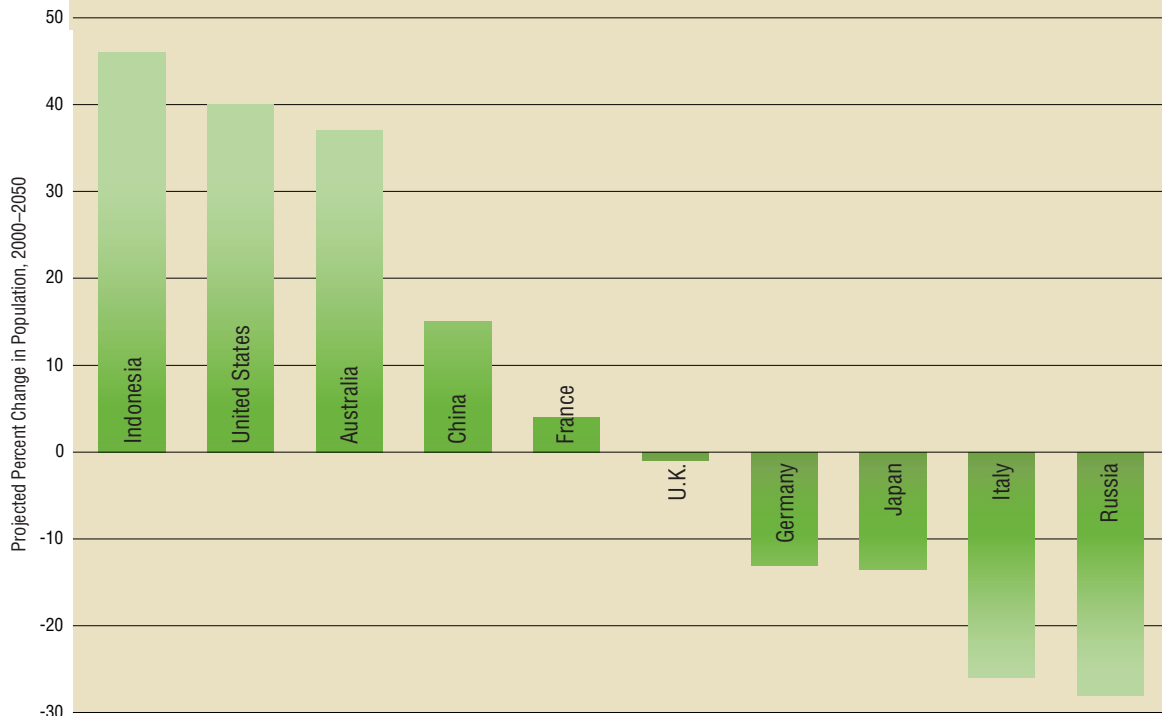
Source: The Economist, January 29, 2009.

	Announced Figure as Percentage of GDP	Estimated Actual Impact as Percentage of GDP
China	15.0	6.0
United States	5.8	5.8
Italy	4.3	0.5
Germany	3.1	2.4
Canada	2.0	2.0
Japan	2.0	2.0
France	1.5	0.4
India	1.3	1.3
Britain	1.1	1.1
Russia	1.1	1.1
Brazil	0.2	0.2

It's hard to calculate exactly how much various countries are actually investing in infrastructure, especially when factoring in recent stimulus packages and trying to parse definitions for infrastructure spending. Without a doubt, the world gap between spending and need remains huge, and many countries attempt to catch up. Some cost estimates peg global infrastructure requirements at more than \$50 trillion over the next 25 years. Emerging market countries—particularly China, India, and Brazil—continue to lead in attempts to modernize systems and vault their economies into global leadership positions. They have an advantage over North America and Europe in building from scratch, using state-of-the-art technologies, rather than refashioning and upgrading old and outdated systems. China surpasses the rest of the world in infrastructure investments, targeting more than \$9 trillion for projects over the next ten years, according to analysts. During the same time period, India forecasts infrastructure investments of \$2.8 trillion, Russia \$2.2 trillion, and Brazil \$1.1 trillion.

Figure 15:
International Population Growth: The United States Is Among the World's Fastest-Growing Countries; Many Countries in Europe, as Well as Japan and Russia, Will Experience Population Declines

Source: United Nations.



European Union countries focus efforts on connectivity projects as part of their Trans-European Networks (TEN) program, tying together goals for greater cross-border economic productivity and sustainability. The Canadian government moves ahead with “Build Canada” initiatives. In stark contrast, the United States appears to have no national infrastructure strategy. Japan, meanwhile, may be the one global power that can afford to slow down its infrastructure spending.



CHINA keeps investing in infrastructure and building it on a grand, if not unprecedented, scale, priming the country for greater global competition while attempting to stave off employment dislocation from sharp declines in factory orders and exports. The government announced a supercharged \$600 billion stimulus plan heavily weighted to new transport projects—including railways, airports, and roads—as well as sewage treatment plants and water delivery systems. These prodigious plans may actually have accelerated projects already on drawing boards.

After building 30,000 miles (48,280 km) of new highways in the last decade, China’s transport infrastructure agenda tilts away from roads to railroads, allocating \$248 billion through 2020 on a track-laying blitz. The government wants to reduce growth in car use and odious pollution choking its cities, and improve train capacity. In the four years prior to the Olympics, the Asian power constructed as many high-speed passenger rail lines as Europe completed in the past 20 years, and the pace of railway construction now intensifies further. Plans call for building a 7,500-mile (12,070-km) high-speed rail network by 2020. Rail projects underway include a \$23 billion high-speed line between Shanghai and Beijing, a \$22 billion network of freight lines in Shanxi province, a \$24 billion high-speed line from Beijing to Guangzhou, and an \$18 billion passenger line through the northwest desert. Another \$88 billion has been designated for intercity rail lines. About 110,000 workers rush to complete the Shang-

hai–Beijing high-speed railway—China’s labor costs are less than those of most Western nations and the government uses megaprojects to create vast numbers of jobs. The Chinese haven’t stopped building highways either—they want to add another 20,000 miles (32,187 km), comfortably surpassing the length of the U.S. interstate system (47,000 miles/75,639 km).



JAPAN is an anomaly. Not only does the country boast some of the world’s most finely engineered and best-performing infrastructure, notably its signature high-speed trains and ultra-modern airports, but it also doesn’t need to start any more major transport projects for a while. After years of borrowing and facing significant population declines, Japan ranks as the world’s most indebted major economy, partly the result of using infrastructure

A variable message sign in Beijing warns drivers of heavy traffic.



spending to build the country out of a lengthy recession through the 1990s. And when the economy improved after 2001, the country kept right on building more roads and new airports, even though many of these public works projects haven't been needed. As an example, Osaka had one airport in 1993. Today, four airports operate in and around its metropolitan area, battling to attract air carriers and flights to underutilized facilities. And unlike in the United States, use of roads and rails won't be increasing. Japan's low birth rate and stringent immigration policies lead to a shrinking population—forecasters predict a dramatic population plunge by 2050. Japan's experience offers guidance for policy makers in the United States and Europe on how and when to use infrastructure spending to stimulate an economy.



INDIA brims with aspiration and potential to transform into a world economic power. But the country continues to struggle with modernizing backward infrastructure while coping with prodigious population growth, cows, rampant poverty, expanding industries, and the propensity of a burgeoning middle class for buying cars. Despite the government's budgeting \$500 billion for infrastructure improvements in its latest five-year plan, cows still block roads with impunity, confounding planners and frustrating drivers. More than 100,000 people are killed in traffic accidents each year, gruesome evidence of unsafe conditions and general chaos brought on by legions of new and inexperienced drivers cramming their vehicles onto inadequate motorways. The World Bank estimates that traffic accidents cost India about 3 percent of its gross domestic product annually.

Bangalore's new state-of-the-art airport should provide a boost for software companies that have turned the city into India's version of Silicon Valley. But clogged roads from business districts mean a 21-mile (34-km) taxi ride to the airport can take 90 minutes. Without sufficient water lines from the city, a planned office and retail complex

around the airport can't begin construction. In New Delhi, recent openings of a high-speed bus route and highway toll plaza turned into traffic mayhem, because overwhelming numbers of cars outpace planners' growth forecasts for accommodating them. Lawsuits and graft contribute to delays and increase costs on projects, including a national highway system linking major cities.



UNITED ARAB EMIRATES Real estate development suddenly hit the skids in Dubai after oil prices

tanked amid the worldwide energy demand funk. But the government pushes ahead with construction of an extensive 46-mile (74-km), \$4.2 billion light-rail system in this sprawling metropolis, which morphed out of desert sands in less than two decades. A swelling population and heightened visitor travel upended officials' best-laid plans for efficient highway networks. Dubai's congested roads cannot handle volumes of car traffic snaking through its dazzling new skyscraper district, recently completed high-fashion shopping centers, and quarters for glittery hotels and apartment towers. Two additional light-rail lines are planned, including nonstop service between Dubai International Airport and Al Maktoum International Airport in Jebel Ali.



UNITED KINGDOM The national Department of Transport pushes ahead to begin Europe's largest construction project—the \$22.7 billion (£16 billion)

Crossrail. The 73-mile (117-km) passenger rail line will link Heathrow Airport west of London to Canary Wharf, the city's second-biggest business district, and extend to Shenfield and Abbey Wood in the eastern suburbs. The massive undertaking, scheduled for completion in 2017, will require tunneling underneath and through one of the most densely developed world capitals. Preparation in London also continues for the 2012 Olympics, which will leave behind a massive urban regeneration project. The Olympic site

ultimately will provide 9,000 new homes, acres of green space, as well as new cycling and recreation paths. In addition, the city uses the Olympic Games as a catalyst to build or upgrade ten transit lines, serving various venues.

The United Kingdom's longstanding road-based transport policy reaches its limits—freeways have encouraged increased driving, but the government essentially can no longer build new roads due to a shortage of land and environmental issues. “We have a small country with a large population.” Transport officials try widening gridlocked motorways like the M25, which rings London. Interviewees expect a move to “more demand management”—charging for roads either through tolls and or implementation of pay-as-you-go technologies. The country has only one toll road and London's new mayor has pledged to remove part of the city's congestion pricing cordon despite recognized success in reducing traffic in the center city area where the program will remain in place. Two other local congestion pricing schemes were rejected by voters in other cities. “We won't have any more single-city schemes—road pricing will only be possible when it's based on national policy.” For now, transportation managers depend on Motorway signage to direct drivers away from jams using real-time information. Rail also reaches “a saturation point.”

The British government approved a multibillion-dollar proposal to build a third runway at Heathrow, which would allow 125,000 more flights to take off and land each year. Heathrow, one of the world's busiest airports, approaches 100 percent capacity. Small delays can disrupt airport schedules throughout the day and back up flights at other airports. Other European hub airports threaten to take business from Heathrow—in Germany, plans move forward to add a fourth runway at Frankfurt Airport. But the Heathrow project points to problems with expanding key airports, freight corridors, and port facilities in major metropolitan areas. An entire village, including 700 homes, will be razed in constructing the new runway and area residents are determined to fight the project.



Street signs within the London congestion charging zone alert drivers of the charge. (AP)



Adding the T3 Paris Tramway Line in 2006 required significant reworking of the surrounding road network and took space from vehicle traffic lanes, but ridership has exceeded expectations. (Phil Beard)



EUROPEAN UNION

The EU plans to speed up infrastructure investments, concentrating on environmentally friendly transport modes, improvements to the pan-Europe electricity grid, and broadband projects. “Speed is critical—plan today, award tomorrow, construct the day after.” But governments do not want to sacrifice long-term sustainability and connectivity objectives. The depth of the crisis “may allow projects to get done which were not possible in better times.” Approaches include “smart and easy” initiatives—like retrofitting housing in Eastern Bloc countries with energy-saving windows and heating/cooling systems—and segmenting larger projects (a major rail line construction) into “bite-sized chunks.” The EU also works with the European Investment Bank to attract and leverage private investments.



GERMANY The government weights a \$70 billion stimulus program heavily to infrastructure projects in

attempts to halt sharp increases in unemployment.



FRANCE As part of a \$34 billion (€26 billion) stimulus, the Sarkozy government pledged \$5 billion (€4 billion)

to infrastructure, research, and military projects and tapped state-owned companies like the national railways, the Paris urban transport network, and Electricité de France to advance another \$5 billion (€4 billion) for various infrastructure-related investments. In all, the government accelerates about \$14 billion (€10.5 billion) in public infrastructure spending.



AUSTRALIA allocates \$3 billion (AU\$4.7 billion) for new infrastructure including roads,

rails, and schools, hoping to jump-start the flagging economy by creating more than 30,000 new jobs. A \$27 billion (AU\$42 billion) Nation Building and Jobs Plan follows on the infrastructure program’s heels, with these funds focused on building and upgrading homes and schools. The infrastructure monies will be distributed between new and previously announced projects that will be fast tracked. Prime Minister Kevin Rudd said a

\$770 million (AU\$1.2 billion) allocation marks the country's largest investment ever to the rail sector, with an objective to double coal export capacity from the Newcastle port.



CANADA appropriates \$9.4 billion (C\$12 billion) for new infrastructure spending

from its \$24 billion (C\$30 billion) "Economic Action Plan." This stimulus funding augments and accelerates the nation's "unprecedented" \$29 billion (C\$37 billion) seven-year infrastructure program, called Building Canada, to reconstruct and expand the country's infrastructure. The plan provides predictable annual base funding allocations to each province for seven years, which can be pooled with provincial and municipal outlays to finance major, long-term projects. About half of Building Canada's revenues derive from the country's Gas Tax Fund, which is focused on supporting environmentally sustainable projects including mass transit, water, and wastewater. The Gas Tax Fund also helps municipalities develop mandated Integrated Community Sustainability Plans, which require setting out long-term approaches to dealing with mobility, housing, water, sewage treatment, and pollution issues. Local governments can pool, bank, and borrow against Gas Tax funds to gain additional financial flexibility.

Ottawa concentrates a major portion of infrastructure funding directed to provinces and local governments on larger strategic projects of national and regional significance. All projects will be cross-shared with federal contributions capped at 50 percent. Attention focuses on enhancing strategic gateways and border crossings—national highways affected by international trade volumes, intermodal connectors and facilities, international bridges and tunnels, rail and road separations, short sea shipping and marine ports, and intelligent transportation systems. The federal government also looks to foster more public/private partnerships for building infrastructure projects. Any project seeking more than \$40 million (C\$50 million) in federal funding must con-

sider the viability of PPP options and the Ottawa government establishes the federal PPP Canada, Inc., office to coordinate initiatives.



BRAZIL Global credit market contagion hamstrings Brazil's efforts to ramp up public and private infra-

structure investments. In 2007, the country launched a four-year effort to spend \$300 billion on various road, power, and port projects, but now declining tax revenues threaten to defer funding as the government temporarily retrenches. Private investors have delayed major port projects and the government postponed an auction to build a \$3.5 billion power line from São Paulo into the Amazon. Despite dramatic economic gains from commodities exports, the country lags in housing and sewage treatment. Roads and airports also struggle to handle increased traffic, creating transport bottlenecks.

Vendors in São Paulo take advantage of inevitable traffic jams during rush hours, selling cold drinks and snacks to drivers, as Brazil's largest city suffers from policies that previously expanded road systems at the expense of subways. In response, local officials finally ready a \$600 million Metro expansion, which eventually will double subway lines to nearly 80 miles (129 km) of track.



MEXICO The country slows down plans to build a \$5 billion port facility in Baja California, which could compete

for Asia shipping traffic against major Pacific ports in the United States, particularly Los Angeles/Long Beach. Expected funding from U.S. banks short-circuited in the financial crisis. The port will be located in Punta Colonet, about 150 miles (241 km) south of the U.S. border. The project envisions a facility employing more than 80,000 workers. Goods would be transported north via new roads and a rail corridor, creating opportunities for establishing a southwestern distribution hub in the United States.



Part Three: Solutions





“THE WAY WE HAVE BEEN DOING THINGS
PROBABLY NO LONGER WORKS.”

HUMANS CHARACTERISTICALLY RESIST CHANGE,
BUT A CASCADE OF INTERRELATED PREDICAMENTS FINALLY BEGINS
to focus Americans' attention on finding solutions to mounting problems arising from increasingly
uneconomical lifestyles and immoderate use of resources, including energy, water, and land. A legacy
of late-20th-century prosperity—big cars lining driveways of big suburban houses on big suburban lots—

does not make sense anymore. Many people across all income strata overborrowed to buy houses and all the stuff they put in them, helping send not only their savings, but also the country's fiscal health, into a downward spiral. They also slowly come to realize suburban car dependence is increasingly expensive—everyone needs a car to get anywhere, and mounting car expenses—fuel, debt service on multiple auto loans, repairs, maintenance costs, and insurance—strain family budgets further.

More cars on the roads create greater congestion and more pollution, including carbon emissions. Traffic jams rob people of their time, increase fuel consumption, and reduce economic productivity. Despite recent pump price declines, experts expect that oil costs will escalate over time as worldwide demand steadily increases for a diminishing resource, pushing up driving costs further. Electric cars certainly won't resolve

congestion issues or necessarily reduce fuel costs—batteries and electric charges won't be bargains.

In addition, water supplies diminish and become more susceptible to degradation—reservoirs and aquifers can't keep up with mushrooming population growth in many regions, especially in arid Rocky Mountain states, the Southwest desert, and southern California. Global warming directly contributes to water shortages, melting snow packs and increasing the pace of evaporation in reservoirs. Aging sewage treatment plants reach overcapacity and require costly retooling, while increased storm runoff from developed tracts sends pollutants into surface and underground water sources. And the United States needs to prepare to accommodate an additional 110 million people by 2050—the equivalent of the population of nearly three new California states or 13 new New York Cities.

Figure 16:

The United States Leads Most of the World in Per-Capita Carbon Emissions

Source: U.S. Energy Information Agency, International Energy Agency.

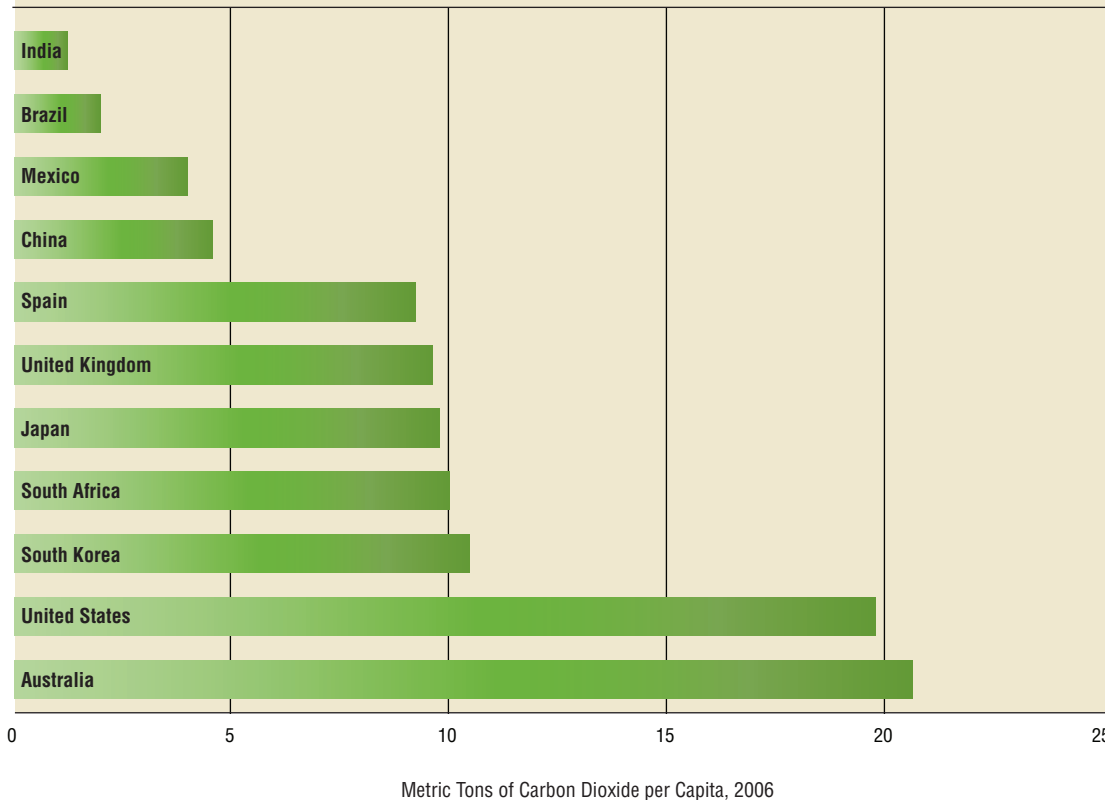
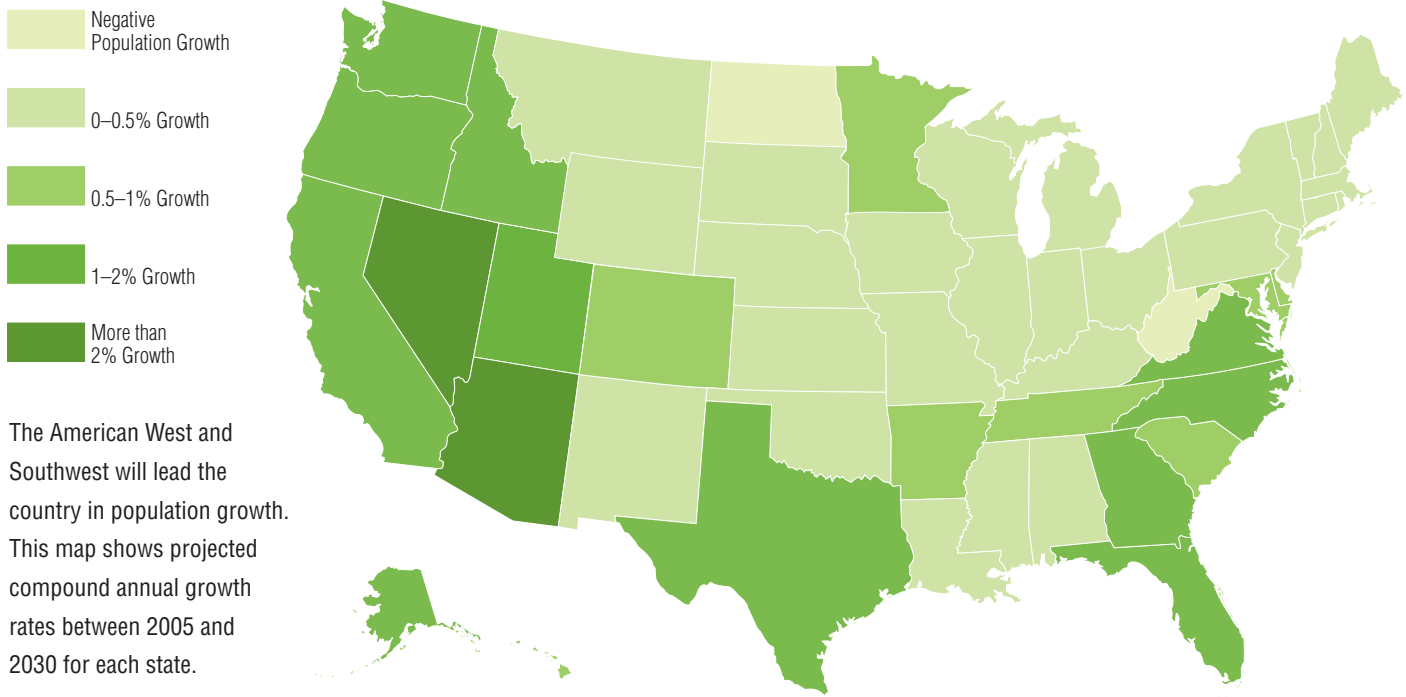


Figure 17: Map of Population Growth Projections in the U.S. by State

Source: U.S. Census Bureau.



A Thirsty World

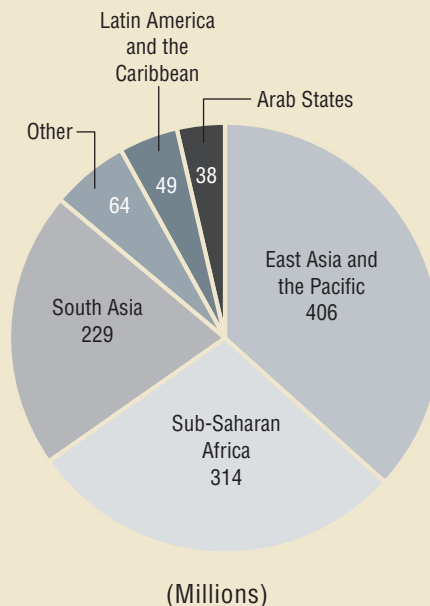
“We tend to take water infrastructure for granted. It’s out of sight, out of mind.”

Fresh water—it’s a finite, absolutely essential resource that people cannot survive without. But population growth, pollution, and climate change combine to threaten water sources in all corners of the world . . . Emerging economic powers—India and China—struggle to provide potable water to much of their vast populations. In the Middle East, countries flush with oil money face chronic water scarcity and ecosystem degradation from lack of sewage treatment capacity. “Half of Oman’s piped-in water is lost en route.” Drought-plagued Australia installs cisterns on buildings and homes to capture rain from fleeting storms. Melting glaciers in Europe and South America threaten some regional water supplies.

The United States, meanwhile, cannot escape its own serious water problems:

Figure 18:
1.1 Billion People Had No Access to Improved Water in 2004

Source: UNICEF.



- Grim Reaper forecasts predict that rapidly expanding population centers in the Southwest and parts of southern California could run out of water if an extended regional drought and global warming continue to parch the Colorado River watershed.
- After a nasty scare in 2007, Georgia officials realize the state’s reservoir network may be dangerously insufficient to support Atlanta’s continuing breakneck growth, especially during recurring droughts.
- Many older cities must replace worn-out, leaking water mains and pipes, or face increasing service breakdowns and shutoffs. A tunnel that delivers half of New York City’s water from upstate reservoirs leaks 20 million gallons a day and requires hundreds of millions of dol-

Together, these trends and conditions will force Americans to think and act differently over the next generation. Many suburban areas will become more urban and dense. The country's primary metropolitan centers will require interconnected, multimodal transport systems in order to absorb millions of new residents who will concentrate in them. Transit-oriented and town center development will gain further traction as apartment buildings and retail centers rise up around subway and light-rail stations. Regional planners will need to set aside more infill sites for parks, public recreation areas, and green space to replace lost backyards.

Regional planning also must synch with a national infrastructure framework for moving people and goods as efficiently as possible into and out of primary gateways. Integrated freight, air, road, and passenger rail networks must link primary 24-hour coastal and interior cities to each other as well as to key regional popula-

tion centers. Better regional rail service can take pressure off road systems and reduce short-hop flights, which add to airport congestion. But that means establishing separate tracks along freight and high-speed intercity passenger rail corridors, facilitating connections between airports and mass transit hubs serving commercial and residential centers. Roads and cars will remain part of the mix, but vehicle miles traveled per capita must be substantially reduced, helping decrease fuel consumption, emissions, and traffic jams.

In sum, strategies for housing, transportation, land use, energy, and the environment must be managed holistically if the United States has any chance of sustaining productivity, reducing congestion and pollution, cutting energy costs and consumption, and ensuring long-term prosperity. Twentieth-century habits won't survive 21st-century realities, and 21st-century innovations can and will transform how we live and work.

lars in repairs. The less extensive New Orleans water system loses 50 million gallons daily. Cast iron pipes, installed in city systems during the late 19th century, have average useful lives of about 120 years; pipes installed after World War II wear out after 75 years. In other words, water delivery in many metro areas lives on borrowed time.

Washington, D.C.'s 150-year-old sewer system requires a \$2.2 billion upgrade to reduce rainwater runoff to meet federal standards for preventing raw sewage pollution to regional waterways like the Potomac River and Chesapeake Bay. The average homeowner's annual sewer bill could triple to over \$100 with additional sizable stormwater runoff fees tacked on based on the property's paved area.

Nationwide, the U.S. Environmental Protection Agency (EPA) projects a \$224 billion funding gap



Marshland forms in Newburgh, New York, the result of a cracked underground concrete tunnel that is leaking millions of gallons per day. (AP)

(more than \$11 billion annually) during the 2000–2019 period for states and localities to meet existing federal mandates on water quality, as existing infrastructure proves outmoded or insufficient to handle demand.

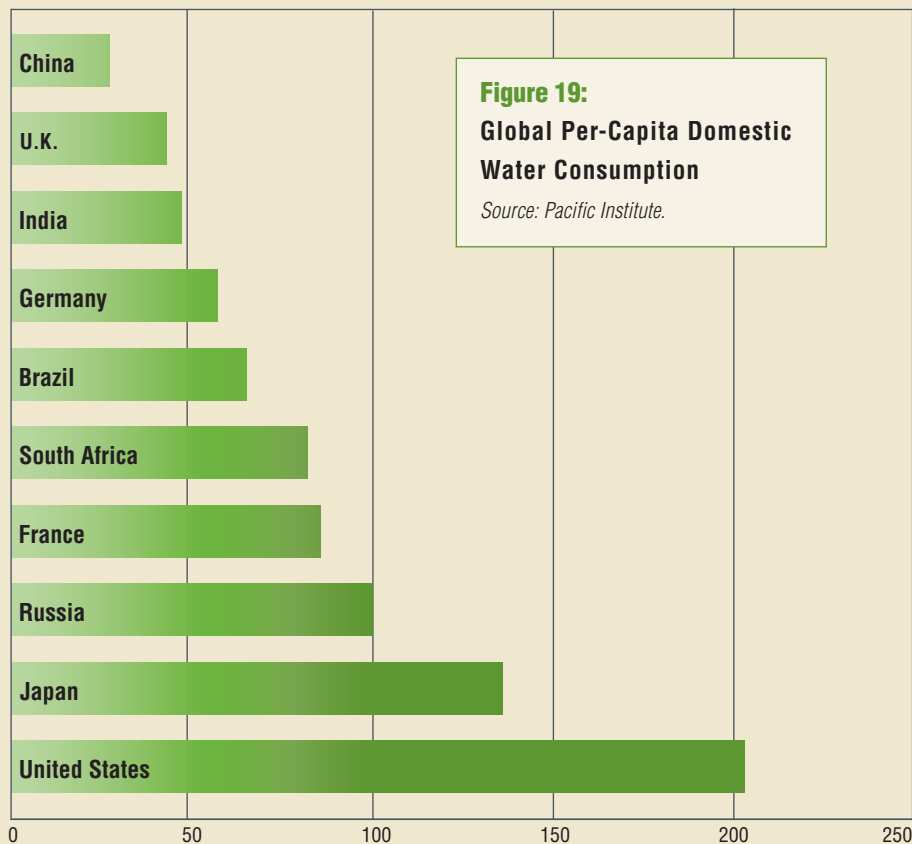
Even in damp Seattle, local leaders encourage homeowners to use specially designed barrels to harvest rain and cut their water bills. Barrel water can be used for gardens in drier summer months and helps control stormwater from flooding over-matched sewers during wet winters.

America's mounting water-related dilemmas offer a microcosm for approaching and finding solutions to the nation's infrastructure problems, including integrating systems, using less, and charging users more.

For starters, most Americans take water for granted—it rushes out of the taps in unending quantities for drinking, clothes washing, and long, hot showers. "Nobody notices half-filled

Figure 19:
**Global Per-Capita Domestic
 Water Consumption**

Source: Pacific Institute.



2000 Per-Capita Annual Domestic Water Consumption, Cubic Meters

reservoirs way out of town or water leaking underground.” When water mains burst, they seem to get patched quickly. Occasionally, stormwater runoff closes a beach during the summer when bacterial counts get too high. Drought problems in many areas have been sporadic and seemingly temporary—the mayor orders lawn watering restrictions and restaurants stop serving tap water unless it is requested. Many people in the Southwest assume that recent years of subpar mountain snows and higher annual temperatures will be transitory. They don’t factor in demand on limited resources from an ongoing population boom. “Water tends to be out of sight, out of mind, while our problems are building.”

But collecting and managing water delivery from rivers and far-flung reservoirs requires extensive and complex infrastructure, which needs massive overhaul in many regions. And

water infrastructure also extends to overtaxed systems for controlling stormwater and sewage treatment to protect the environment and ultimate water sources—rivers, streams, lakes, and aquifers. Many sewage treatment plants built 30 and 40 years ago in the wake of the Clean Water Act approach the end of their life cycles. Ensuing population growth, moreover, begins to overextend their capacities to ensure safe drinking water. Literally thousands of local water and sewer districts nationwide grapple to maintain stressed and increasingly dilapidated facilities, using decades-old technologies, while federal funding support cuts back for replacement and upgrades.

Battles between states, cities, suburbs, farmers, fishermen, utilities, and environmentalists ratchet up over coveted water resources—not just in arid western regions dependent on Rocky Mountain snowpack melt into the Colorado River,

but also in the more fertile Southeast, where various factions in Georgia, Florida, Alabama, and Tennessee duke it out to control the Chattahoochee-Apalachicola watershed. In the Midwest, Great Lake states have banned exporting water out of their region.

Tackling water issues will require greater federal involvement, integrated cross-region solutions addressing all stages of the hydrological cycle, increased conservation and land management controls, and innovative approaches by planners and developers. “Water really is the new oil, it just hasn’t entered public consciousness yet,” says an interviewee. “Government needs to come clean—water is not free” and will become much more expensive. “We need to acknowledge we have problems and the federal government needs to incentivize communities to manage their growth wisely and sustainably.” The “biggest challenge will be providing infrastructure that coexists with the natural environment.”

Greater coordination: At present, some 50,000 water districts exist across the 50 states in addition to 30,000 wastewater districts and many special districts. In many areas, these districts work at cross purposes without plans for managing watersheds. “Conflict is the norm, hurting everyone—the only way to coordinate is to sue.” Many local officials lack the expertise to deal with complex water management issues and deteriorating systems. They cannot apply economies of scale and don’t know best practices. Districts must consolidate and coordinate to share resources better on a regional basis. “Water requires more coordination than other infrastructure. Water follows the hydrologic cycle. One community’s wastewater becomes the next community’s water.”

Integrated management: New realities also require regional interdisciplinary planning that addresses drinking water sources, sewer treatment, recycled water, flood control, and stormwater capture in the context of population growth

and overall land management. Recent EPA studies show more-compact development generates less stormwater per household than lower-density development. Runoff rates per house decrease 74 percent on eight-house-per-acre developments compared to one-house-per-acre developments. Low-impact development techniques—rain gardens, bioretention areas, and grass swales—as well as site design practices—less parking and narrower streets—also help reduce runoff and associated pollutants. Graywater from sinks, showers, and washing machines can be recycled for landscaping, irrigation, industrial uses, and even recharging depleted aquifers.

Increased conservation: Saving water has come a long way since TV public service commercials reminded people to keep taps from dripping and report leaking fire hydrants. Planning codes in many water-challenged areas begin to mandate low-flow plumbing, waterless urinals or double-flush toilets, water-efficient appliances, graywater recycling, and low-impact landscaping. In California, where some water bills can approach \$500 a month, jurisdictions begin to require retrofitting homes on resale; and in Palm Springs, golf courses must use recycled water. Las Vegas's grandiose outdoor fountain displays also spray graywater to stay operational. Innovative green roof technologies can reduce stormwater runoff and capture water for landscaping and nonpotable uses. Cisterns—a throwback to ancient civilizations—make a comeback in new developments and farmers in parts of California and Arizona utilize drip irrigation techniques to stay in business.

Conjunctive use: Water-starved areas need to implement conjunctive use systems, which provide access to both surface and groundwater where possible. “Use them alternatively and strategically, and develop systems for storing rainwater when it comes.” In California, where winter

rains concentrate often all at once from a spate of Pacific storms, “we need to be able to collect for the dry summer months.”

Balance local property rights: States need to clamp down on localities and developers to protect and ensure water supplies. “In Arizona, we need the right regulatory framework that concentrates development where water is more plentiful and implements effective water management plans.” Developers continue planning projects, including golf courses, in areas without water. “They say people won’t come unless we build golf courses. It will be too late when homeowners start to realize they are running out of water.” California now requires developers of more than 500-unit subdivisions to verify that sufficient water exists for at least 20 years to support inhabitants.

Federal funding incentives: The U.S. government regulates water quality through the Clean Water Act, but Congress has sharply curtailed funding to local authorities as costs for maintaining systems rise sharply, and historically the Feds have been hands-off on many local planning issues. In ramping up local aid for water/sewage system upgrades, Washington needs to advance interstate cooperation on watershed disputes. Future federal funding allocations should mandate regional planning as well as encourage water district consolidation, the integration of water and land use strategies, and conservation initiatives. Of course, political challenges abound. “Many people think that limiting development in water-scarce areas is a good idea. But most acknowledge that water still flows uphill to the money.”

Rate hikes: Everyone needs to prepare for paying higher water bills—federal subsidies won’t cover the necessary funding for deferred maintenance and needed improvements. But higher charges will focus ratepayers’ attention on conservation and achieving greater operating efficiencies. More local governments will consider

turning water management over to private operators, which can help finance upgrades and implement innovations. “Only about 20 percent of U.S. water is privatized, because regulators have not allowed a sensible return.” But local governments may have no choice, if it means providing reliable water supplies and sewage treatment in a fiscally challenging environment.

Desalinization offers tantalizing possibilities for overcoming future water shortages in places with dry climates near oceans. In the United Arab Emirates, 80 percent of residents rely on water from desalinization plants. For oil-rich Middle East countries located in deserts, desalinization may be the answer, but the technology is enormously expensive, using “a ton of electricity.” Delivering desalinated water costs about \$1,500 per acre-foot or more than 15 times the cost of delivery of reservoir water (\$80/\$90 per acre-foot) without factoring the pollution toll/carbon footprint of related electricity production.

In the meantime, desert centers like Las Vegas plan extensive and expensive pipelines to new water sources, hoping to ensure future growth. New York City negotiates with landowners around upstate watersheds to provide buffers against agricultural runoff and other pollutants that could mar water quality.

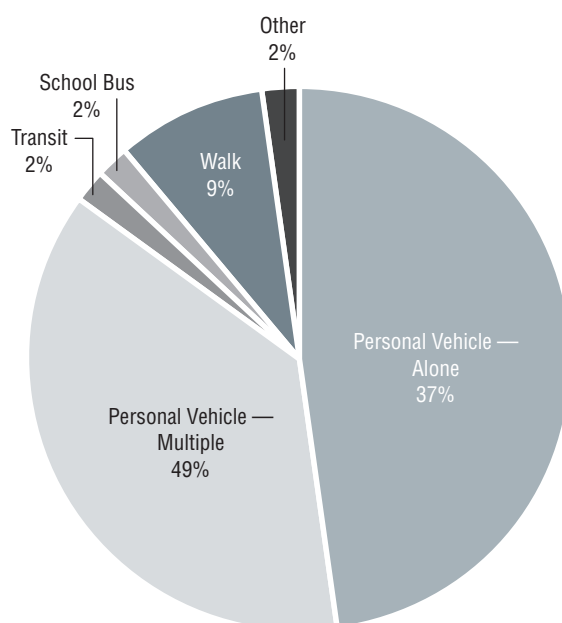
“We won’t run out of water,” says an interviewee confidently. “Through better management, conservation, and various technologies we will have enough. But it will cost more.”

Land Use and Transportation

The nexus between land use and transportation is nothing new. When ships dominated the movement of goods, big cities grew up around ports at strategic harbors. Later, rail and transit lines built by developers helped foster early suburbs, and most recently interstate and highway construction precipitated vast suburban sprawl. Americans' love affair with cars—their flexibility, mobility, and freedom to move from point to point—distracted state and regional planners from considering what happens when population overwhelms road capacity. Their initial response was to build more roads and expand the suburban envelope to absorb in-migration and population growth. “Transportation has always been a catalyst to development—but most states get an F on integrating transportation and land use.”

Figure 20:
Our Auto-Dependent Society: Over 86 Percent of U.S. Trips Are Made by Automobile, Either Alone or with Others; 9 Percent of Trips Are Done on Foot

Source: U.S. Department of Transportation, latest National Household Travel Survey (2001).



Until recently, many regions had dropped the ball when it came to providing mass transit alternatives. Los Angeles abandoned an extensive transit system for freeways, while burgeoning metropolitan areas like Dallas, Atlanta, Houston, and Phoenix pinned their futures almost exclusively on cars, roads, and laissez-faire edge development. As the federal government funded interstates, passenger train companies went kaput, leaving behind only truncated service provided by Amtrak and a handful of commuter carriers in established pre-car era cities like New York, Philadelphia, and Chicago. Hot-growth Sunbelt metropolitan areas became expansive suburban agglomerations, experiencing sharp increases in commuting times, lost hours in traffic congestion, and pollution.

Pre-car era metro areas like Boston and Chicago confront their share of congestion and car pollution too, but gain a huge leg up with established mass transit networks that help invigorate their denser 24-hour cores, keeping housing close to jobs and services. These cities' problems center on keeping transit competitive. They face huge costs for maintaining, upgrading, and expanding deteriorating subway tunnel and track systems, some of which are more than 100 years old. Roads and water tunnels also show greater wear and tear in these older cities, and the repair costs can be daunting.

So what are some solutions? Here are simple principles to follow:

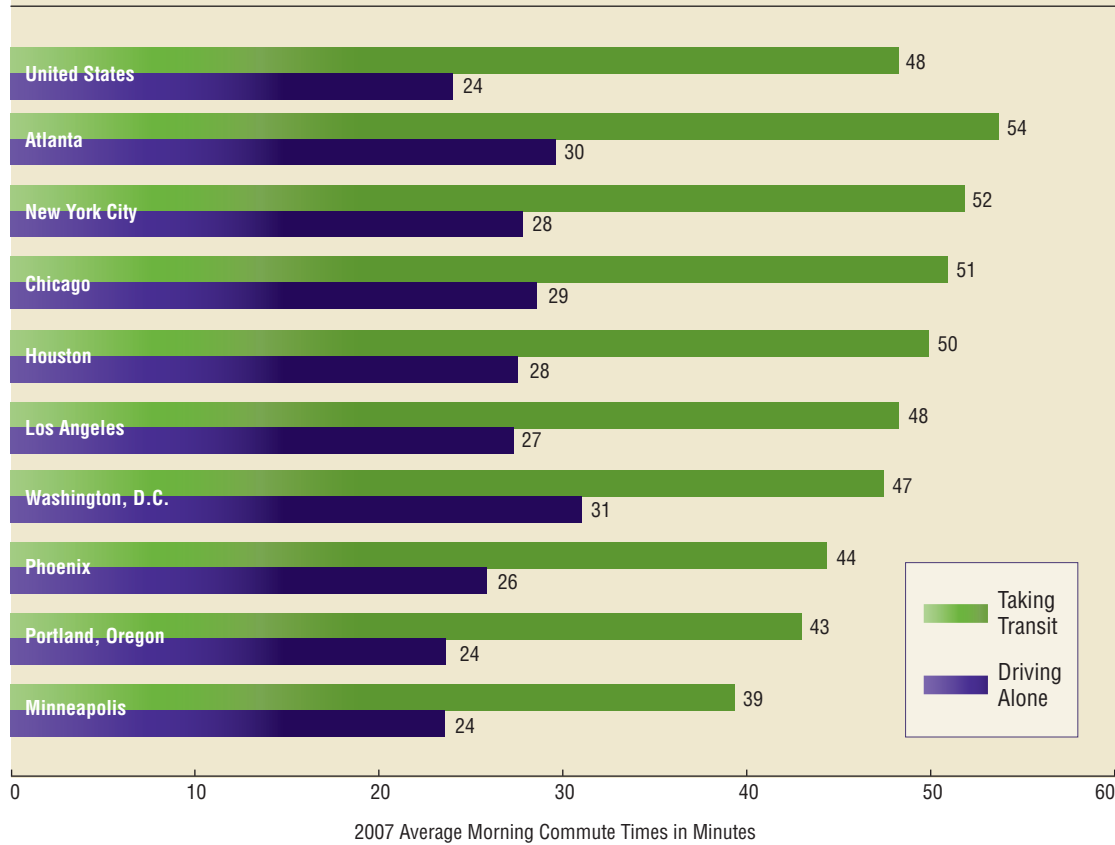
ABANDON OLD-SCHOOL PARADIGMS.

“You can’t build your way out of congestion” with new road projects, or expect to reduce carbon footprints by simply transferring highway budgets into funding mass transit lines. These silo approaches just won’t work. Blacktopping more highways and adding more lanes just precipitate greater car dependence and increase auto use. But plopping down light-rail lines through suburban districts won’t get people out of cars and reduce traffic, if the only way people can get to stations is by driving to them.

Figure 21:

**Significant Improvements Are Needed to Make Transit More Competitive with Driving:
Transit Consistently Takes More Time Than Driving for Commuting Trips**

Source: U.S. Census Bureau.



As a first step to help reorient regional planners and transport officials, the federal government should modify current funding formulas, which allocate more monies to states based on higher total vehicle miles traveled (VMTs) on their roads. New funding allocations should be calculated to help states achieve other performance goals like reducing car use. This approach will help galvanize thinking toward multimodal solutions instead of chasing dollars for more asphalt. The Feds also need to consolidate myriad funding programs and revamp sclerotic regional planning schemes, which together lead to a profusion of disconnected, insular projects.

ADOPT INTEGRATED, INTERDISCIPLINARY STRATEGIES.

Regions need to integrate land use and transport planning with energy and housing policy.

Reducing carbon emissions, alleviating car congestion, providing more mass transit options, decreasing commuting times, cutting transport costs, and improving productivity integrally depend on where people work, live, and shop. “Mass transit doesn’t work unless you have dense development.” If people can’t easily walk to stations, let alone stores or worksites, they will drive. “Only when mass transit is convenient will it be used.” New transit schemes in car-dependent areas must link residential and retail development around new transit stations. Federal and state funding should be conditioned on synergistic housing and transport planning that provides incentives to developers for transit-oriented development projects. Funding support should be curtailed to end the effective subsidizing of new road and sewer line-dependent projects at the fringes of metro areas. If suburban developers pay these

Parking Innovations

Vast blacktopped expanses, marked by rows of white lines . . . dimly lit, low-ceilinged undergrounds . . . hulking concrete appendages . . . often underutilized or empty space . . . it's expensive for developers to provide; limits building more compact, mixed-use projects; and is emblematic of car dependence and sprawl. The subject is plentiful free parking, which most car-dependent Americans crave like freeways and low gas taxes. In fact, cheap parking is very much part of the equation that subsidizes and distorts the economics of driving, discouraging lifestyle choices that could be more efficient, eco-friendly, and arguably less costly. "Drivers rarely pay for parking, so that means somebody else has to pay for it."

Cars need space wherever they go—at the apartment garage, in the office parking deck, at the strip center, around the sports stadium, or

on a downtown street. And because automobiles require multiple spaces for back and forth, valuable land set aside for them lies empty and unused much of the time. "The total value of parking [sites] is greater than all the vehicles and all the roads put together." As a result, parking becomes a substantial embedded cost for urban projects—zoning in many municipalities requires two spaces per apartment unit; structured parking can add up to \$30,000 or more per space in total development costs, compared to surface parking, which typically costs about \$2,000 per space.

In fact, development costs for providing parking can radically influence housing affordability, especially in more densely populated areas with premium land values. A San Francisco study shows that 24 percent more households could afford houses and 20 percent more could pur-

chase condominiums if developers weren't faced with parking requirements and had greater flexibility in site design. In Los Angeles, requirements for off-street parking mean the number of garage spaces necessary for a building directly controls the number of dwelling units. On a smaller scale, suburban homesites increasingly must devote more space to parking as families require three, four, or more cars to move everyone around in different directions. That translates into less yard or living space. About 74 percent of respondents in a ULI survey of developers cited minimum parking requirements as a significant burden on typical projects, and most would reduce parking if given the option.

While structured parking is particularly expensive, surface parking—often mandated in local zoning guidelines—can absorb sizable swaths of land around shopping centers, office parks, sports stadiums, and transport hubs like airports and stations. Parking lots could be parks, recreation areas, or higher-use real estate improvements, but their inefficiencies are accepted to help make car-oriented lifestyles possible. In turn, the ready availability of parking encourages increased car use and congestion.

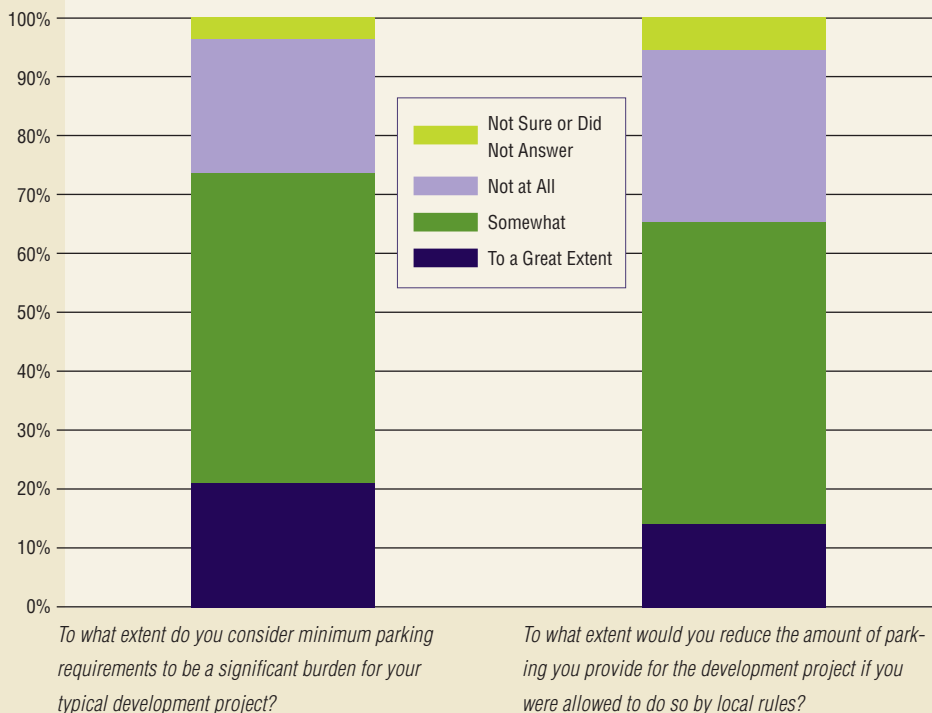
Cities have begun to realize and confront the oft-hidden and insidious consequences of policy that provides more parking than may be beneficial to urban sustainability. Of course, officials have greater flexibility and opportunity where people have transportation alternatives to driving—mass transit tempers parking needs.

Eliminate or reduce parking minimums:

In Manhattan and elsewhere, minimum parking requirements have been eliminated. San Diego reduces them in designated transit areas. Boston and Portland, Oregon, actually impose parking caps. Seattle and San Francisco also impose parking maximums to promote more efficient land use. Even Atlanta and Houston look to relax

Figure 22:
If They Had It Their Way, Most U.S. Developers in Survey Would Reduce Required Parking; Most Consider Minimum Parking Requirements a Significant Burden

Source: ULI Member Survey, 2008.





A sea of parking translates into lost land use opportunities.

minimum parking mandates for downtown high-rise projects near new transit lines.

Shared parking: Some planners look to devise parking strategies around neighborhoods or campuses instead of project by project, building by building. In mixed-use developments, retail or office parking for shoppers and commuters during the day can be used for apartment parking for residents at night. These shared parking concepts can reduce parking by 30 percent or more.

Shared cars: Apartment managers provide shared cars as an amenity for residents to rent on an as-needed basis. The concept can effectively reduce parking by five to ten spaces for every share car, according to one study.

Automated parking elevators: Cramped urban landscapes in Europe and Asia have inspired innovations in cramming more cars into smaller garages, dramatically reducing space requirements. Hydraulic lifts may cost \$12,000 to \$15,000 per space, but that's less than structured parking, and they enable car stacking—allowing parking of two or more cars in a space that otherwise could take only one car. More expensive (\$30,000–\$35,000) automatic, owner keycard-operated systems speed access and retrieval. These systems permit developers to devote less space to meeting parking minimums and provide greater amenities in their projects.

Parking rates and sophisticated metering: “Cities need to price curb parking right.” Some municipalities increase parking rates to dis-

courage congestion, automating parking meters and charging higher rates, based on location and time of day. In Washington, D.C., curbside meters charge \$18 per hour around the new ball park. Chicago turned over its parking concession to a private operator that will institute state-of-the-art metering and escalate charges. New York and San Francisco reduce on-street parking and levy hefty parking taxes.

Converting parking lots: Parking lots provide vast expanses of developable land in many densifying suburban nodes. Redeveloping parking lots in suburban business districts is a key part of the strategy for reurbanizing Tysons Corner in northern Virginia, Perimeter Center north of Atlanta, and elsewhere.

fully loaded costs to build out single-family land tracts, the economic advantages of edge subdivision homebuying diminish. Over time, more people will embrace more economic infill lifestyles, close to the new mass transit options. In turn, they will drive less, which reduces congestion and emissions.

CONNECT THE DOTS TO ACHIEVE SUSTAINABILITY GAINS.

Enabling greater use and acceptance of mass transit through integrated housing strategies should have significant impacts on reducing energy use and carbon emissions. “A significant correlation exists between transit availability and reduced auto travel,” says a recent ICF International study, which recommends aligning climate change strategies with lowering car usage. Exist-

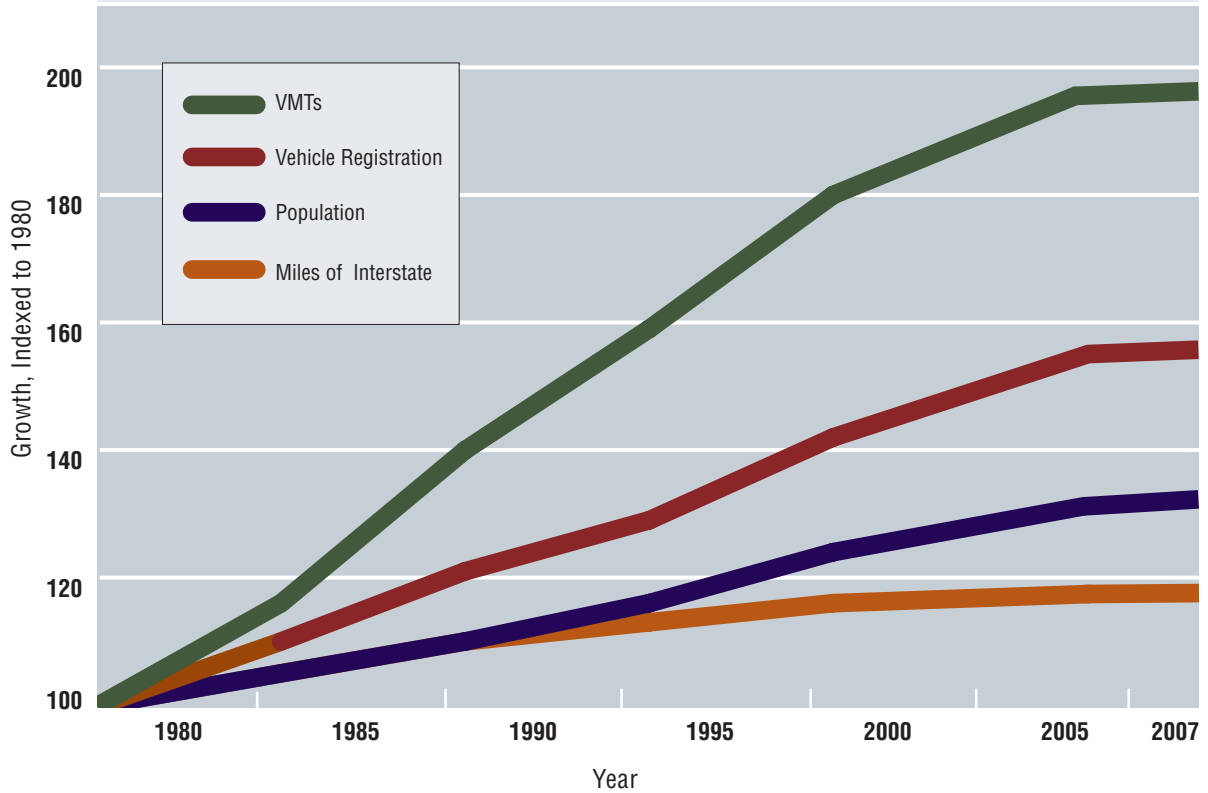
ing mass transit options decrease gasoline consumption by 4.2 billion gallons annually and lower transport sector emissions by 37 million metric tons. If people gain more options to drive less, carbon footprints can be lowered more substantially. And by the way, studies show that reducing car travel not only relieves congestion and reduces carbon emissions, but also decreases driving deaths and car-related property damage.

FOCUS PLANNING AND DOLLARS ON GLOBAL PATHWAY CITIES.

Who can fault congressmen for championing infrastructure projects that “bring home the bacon” to their constituents? That’s how they make a case for reelection. To garner legislative support, the interstate program built roads through all 48 continental

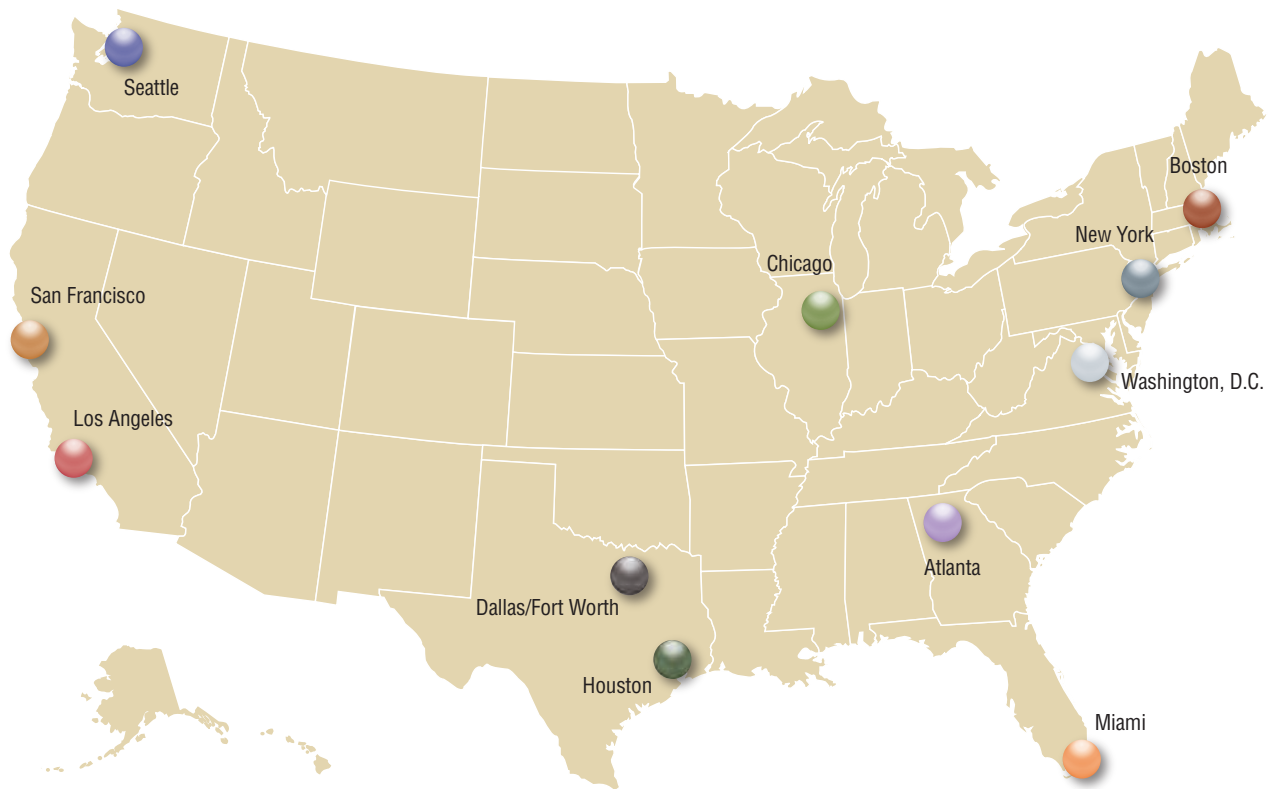
Figure 23:
The Land Use/Transportation Mismatch

Sources: Bureau of Transportation Statistics, U.S. Federal Highway Administration, U.S. Census Bureau.



Vehicle miles traveled (VMTs) have grown faster than population, vehicle registration, and miles of interstate since 1980. After years of steady growth, VMTs taper off in 2007.

Figure 24: America's Global Gateways



These population and business centers comprise America's primary links to the international marketplace for business and tourist travel as well as cargo and goods movement. Not coincidentally, major corporations, cultural institutions, and universities cluster in these metro areas, attracting outsized commercial enterprise and driving the national economy. Maintaining their economic vibrancy and enhancing their connections to important regional markets should guide future infrastructure spending.

New York

World culture center, with a nexus of finance, media, and tourism industries
 Major port and international airport
 Key Regional Links:
 Boston, Providence, Philadelphia, Washington, D.C.

Washington, D.C.

World political power center
 Defense, high tech, biotech, telecom industries
 Key Regional Links:
 Richmond, Baltimore, Philadelphia, New York

Boston

World education center
 Finance and biotech industries
 Key Regional Links:
 Portland, Concord, Providence, New York

Atlanta

Jackson-Hartsfield is world's busiest airport
 Southeast's regional transport center
 Key Regional Links:
 Birmingham, Charlotte, Raleigh

Miami

Gateway to Latin America with a major port and international airport
 European tourist destination
 Key Regional Links:
 Palm Beach, Orlando, Tampa

Chicago

Global commodities market trading center and Midwest regional transport center
 Chicago O'Hare is world's second-busiest airport
 Key Regional Links:
 Milwaukee, Indianapolis, St. Louis

Dallas/Fort Worth

Major international airport and cargo hub
 Links to Central American trade
 Key Regional Links:
 Austin, San Antonio, Houston

Houston

Global energy center and growing port
 Medical, biotech, space industries
 Key Regional Links: Austin, San Antonio, Dallas

Los Angeles

Largest U.S. port, major international airport, key Pacific gateway
 World entertainment capital; defense, finance, media industries
 Key Regional Links:
 Riverside, Orange County, San Diego, Phoenix, Las Vegas

San Francisco

High-tech, finance center, and trade industries, and primary tourist destination
 Major Pacific port, international airport with links to Asia and Pacific Rim economies
 Key Regional Links:
 Sacramento, San Jose

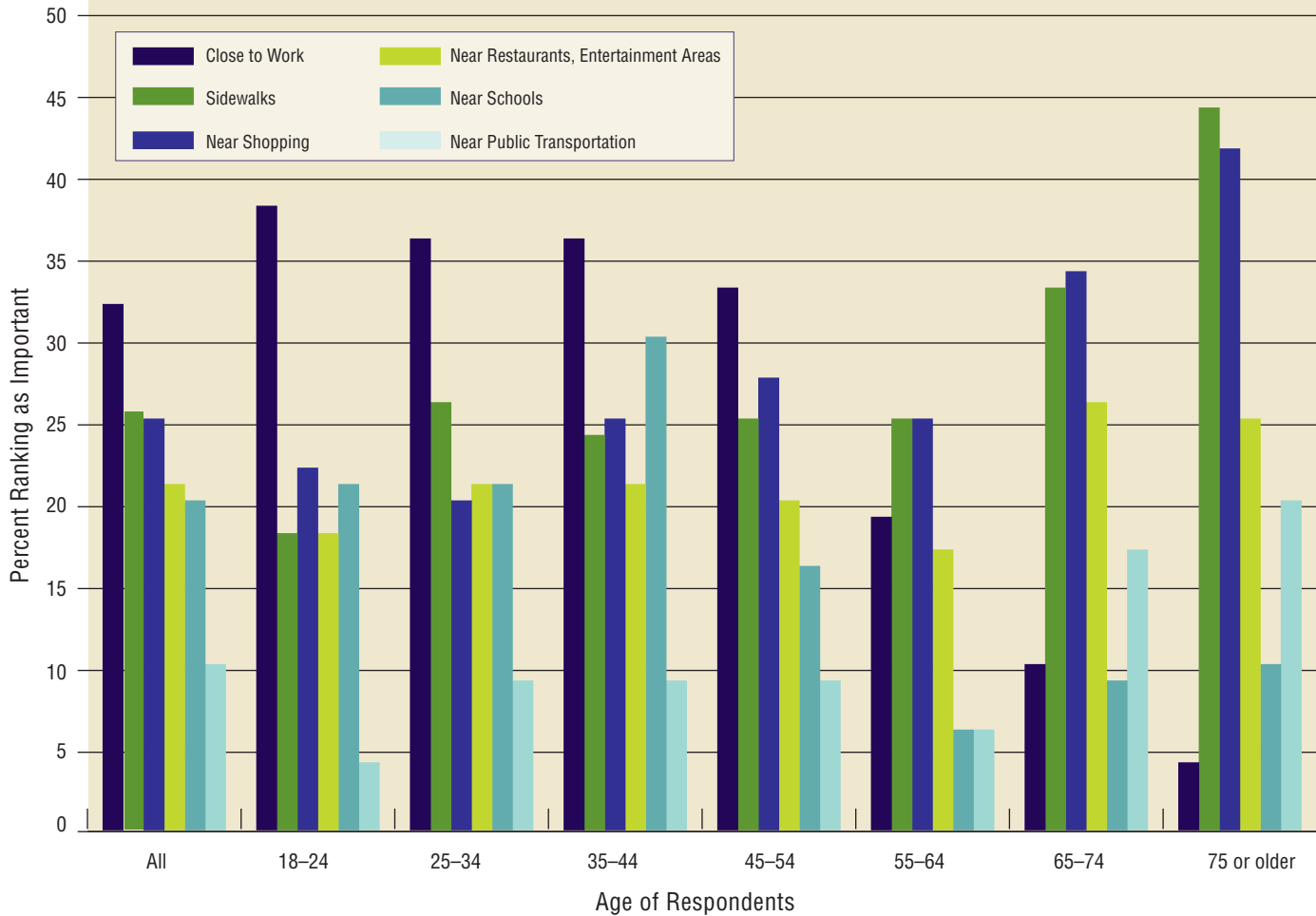
Seattle

Growing port and international airport, with links to Pacific Rim economies
 High tech, software center, aerospace industries
 Key Regional Links: Portland, Vancouver, B.C.

Figure 25:

Neighborhood Features Valued by Home Searchers Change Over Time: Proximity to Work Matters Most for Younger Buyers; Sidewalks and Shopping Increase in Importance as People Age

Source: National Association of Realtors, Profile of Buyers' Home Feature Preferences, 2007.



states and opened many still underpopulated and off-the-beaten-track areas to four-lane freeways. Some underutilized Amtrak routes through backwaters stay funded, too. But given the country's budget deficits and dire national debt, lawmakers today need greater prudence and discipline in determining investment allocations. To get a better return on infrastructure investment over the next 25 years, the United States arguably needs to concentrate infrastructure spending in important gateway centers, located along global pathways, and the secondary markets that connect into them. These key metro areas, which disproportionately underpin the nation's economic growth, must have the

capacity to accommodate growing populations as well as increasing volumes of business travelers, tourists, cargo, and goods. Otherwise, they could become dysfunctional bottlenecks, hampering economic growth throughout the entire nation.

INVEST IN NATIONAL ASSETS.

Operating state-of-the-art ocean ports and airports will be essential for lubricating an economy more dependent on international trade and global access. The country's primary global pathway cities not coincidentally comprise complex metro areas with typically aging infrastructure. Residential neighborhoods crowd around ports

and airports, constricting access by high-speed transit and limiting freight corridors. Air terminals and port docking facilities lack innovations and efficiencies found in more modern facilities recently built in Asia, the Middle East, Europe, and even India. Travelers to major EU capitals, Tokyo, Shanghai, Beijing, and Singapore relish high-speed rail service between air terminals, center cities, and other regional destinations. In the United States, only a handful of airports offer local-stop subway service into center cities. High-speed rail networks in the Northeast corridor or along the California coast could transport many tens of thousands of travelers daily, reducing airport congestion and car traffic in two of the nation's busiest and most populous regions. Building a rural highway or that infamous bridge to nowhere may increase accessibility for some people and provide welcome convenience, but these projects won't advance global trade or reduce carbon emissions. It's a choice between advancing commerce and industry at the country's

important economic hubs or just spreading taxpayer dollars around.

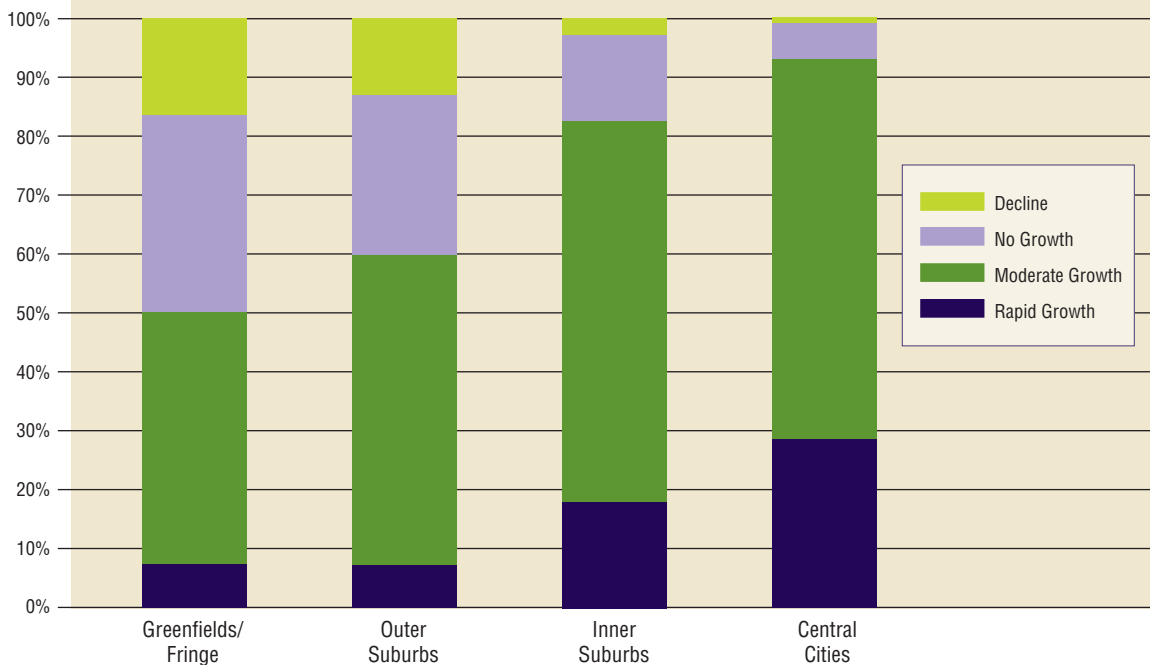
RECONFIGURE URBANIZING SUBURBS.

Suburban landscapes—home to more than 50 percent of Americans—could undergo wrenching change in managing future growth and adopting models for more efficient lifestyles. Slowly and inevitably, many suburbs have been transforming into more urban places. Suburban agglomerations like southern California, metro Atlanta, and Dallas/Fort Worth reformulate gradually into 21st-century configurations of multinucleated urban centers. These urbanizing suburbs require planning acumen and funding to transform failed malls and lagging commercial boulevards into pedestrian-friendly town centers linked to each other by new transportation patterns with networks of transit options—light rail, bus rapid transit, and even bike lanes.

Transportation and land planning should occur within regional frameworks and employ

Figure 26:
U.S. Developers in Survey Predict Strong Growth in Inner Suburbs and Central Cities

Source: ULI Member Survey, 2008.



Question: Please evaluate the following locations in your region for their growth potential over the next ten years.



Rockville, Maryland, is reconfiguring low-density strip development into walkable, mixed-use suburban villages. (City of Rockville, Maryland/ACP Visioning and Planning)

guidelines preempting internecine battles over tax base and control by various county, municipal, and town jurisdictions. Zoning should allow for multifamily residential and multiuse commercial redevelopment to replace parking lots and strip malls in nodes served along the new transit corridors. In fact, new approaches take root. In suburban Maryland outside Washington, D.C., planners envision building four new village centers along Metro stops to create a grand pedestrian thoroughfare out of Rockville Pike, a typically cluttered six-lane thoroughfare. Denver builds out a light rail and commuter rail system called FasTracks to buttress its downtown while linking surrounding suburban nodes.

DON'T FORGET GREEN SPACE.

As suburbs become more compact, planners can't ignore the need to set aside space for greenbelts, parks, and recreation areas readily accessible to neighborhoods by foot and bike. Parks have been hallmarks of the world's great cities, providing open space in and relief from constricted environments. To China's credit, that country's new cluster urban models take pains to integrate ample park areas around high-rise development projects in burgeoning cities. But many hot-growth suburban metro areas in the United States forgot to plan for extensive parks in headlong expansions over the past 50 years. In the suburban paradigm,

parks weren't that important since homeowners' backyards would provide personal green space instead. If some suburbs transform into more full-fledged urban centers, planners must consider reserving infill areas—maybe a dead mall or an abandoned industrial site—for new parkland. Lacking suburbs with mass transit options and creating attractive streetscapes will not suffice to create more livable communities.

THINK BIG, SET PRIORITIES, FIX IT FIRST, HAVE PATIENCE.

The parameters and dimension of the nation's infrastructure challenge become clear for anyone involved, whether at the national, regional, or local level. Revamping suburbs, implementing new regional transport networks, and achieving sustainability and productivity (reduced congestion) goals will require holistic planning and big thinking. The Feds need to set priorities for interlinked national networks—road, freight rail, high-speed passenger rail, ports, and airports. Then they must help orient regional and local officials to synch their planning into the national framework through funding incentives for multimodal schemes and integrated land use. Funding methods must encourage “centralized analysis,” long-term solutions, and large-scale projects “based on demographic trends” and “tying networks together.” Multimodal, holistic, and integrated

Denver Moves Fast

Since post-World War II interstate construction, America's population growth has concentrated in suburbs and Sunbelt cities, which have sprawled well beyond their original centers along highway exits and around interchanges. In the 1960s and 1970s, planners and developers designed subdivisions and communities based on access by cars to freeways. In their conception, people would drive to work into the center city from suburban homes—office districts, residential areas, and retail strips were separated along serpentine road systems. They discounted mass transit and often left sidewalks out of street designs. In their conception, the car was and would always be king.

The Sunbelt idyll—warm climes tempered by air conditioning in summer months and cheaper cost of living—attracted in-migration to expanding suburban agglomerations in the South and Southwest. Atlanta, Houston, Dallas, and Phoenix, as well as centers throughout southern California, have doubled, tripled, and even quadrupled their populations in recent decades. Mounting traffic congestion now overtaxes many key arterials, despite construction of additional lanes and new ring roads. Commuting times mushroom and rush hours expand, but most residents have no choice in these metropolitan areas except to move around by car. Suddenly, local leaders realize the difficulty in accommodating projected population growth comfortably without providing mass transit options and encouraging denser, more traditionally urban development schemes. But how does a car-dependent metropolitan area introduce mass transit solutions rationally and cost effectively? The challenge is daunting.

Of all expanding Sunbelt cities, Denver makes the greatest strides—reclaiming its downtown and planning a hub-and-spoke light-rail system reaching into surrounding suburbs with new development concentrated around transit stations. The Rocky Mountain gateway

has some advantages—it's smaller and has more surrounding wide-open space to fashion rights-of-way than other Sunbelt peers. But local, regional, and state leaders also recognized the signs of looming problems earlier—an alarmingly comatose central business district, sharply rising traffic congestion, rush hour gridlock, and concerning “brown cloud” pollution levels. By the mid-1990s, they began put-

ting together an integrated program that entails zoning the successful LoDo (Lower Downtown) sports stadium-entertainment-restaurant district on the edge of downtown, restoration of the adjacent historic Union Station rail hub, further development of the downtown pedestrian shopping mall, design of a 122-mile (196-km), high-speed light-rail system, and introduction of a bus rapid transit route linking to nearby

Figure 27:
Denver FasTracks System Map



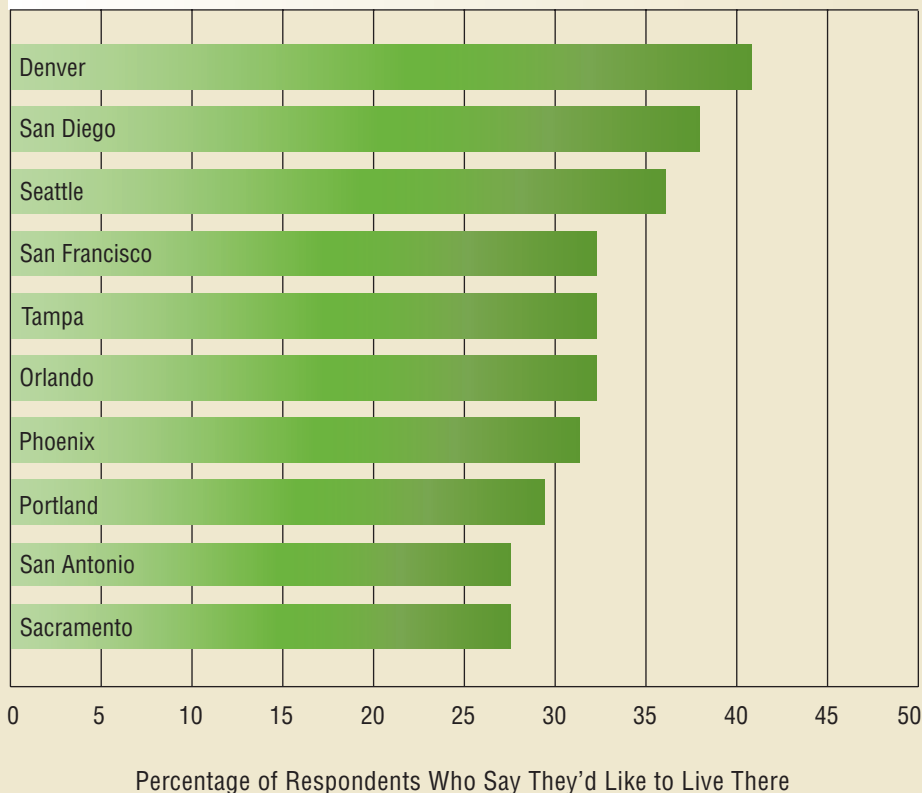
FasTracks is Denver's 12-year program to build light-rail lines, expand bus service, and create park-and-ride facilities throughout the region.



A Central Corridor Line train crosses the intersection at 26th and California streets in Five Points, Colorado. (RTD FasTracks)

Figure 28:
Does Transit Draw Them? Denver Tops the List of Where Most Americans Say They Want to Live

Source: The Pew Research Center, 2009.



Boulder. In 2004, voters approved a sales tax increase to help pay for the train system.

Denver's six planned lines will weave through major suburban corridors and connect to satellite cities, emerging town centers, and the city's airport. In addition to park-and-ride facilities, bus lines will serve stations, pedestrian access will be featured from surrounding housing and retail projects, and accommodations for bike lanes, bike storage at stations, and bike racks on trains will be priorities.

Advocates of the new rail system, which is called FasTracks, contend that it will encourage transit-oriented, high- and mid-rise residential and commercial development around transit stations; help decrease vehicle miles traveled, driving costs, and commuting times; and reduce the rate of increased car emissions. Opponents argue that the rail system will cost more than advertised and not make a significant dent in car use.

It's premature to judge whether FasTracks can meet its potential. The network is scheduled to open in stages between 2013 and 2016. Existing Denver rail lines have surpassed ridership forecasts, but the limited scale of current lines cannot achieve synergies of a metropolitan-wide network. Local developers have piled into transit-oriented development, in some cases getting ahead of the growth curve. Naysayers were right about costs—the original 2004 budget has escalated from \$4.7 billion to \$8 billion. Planners did not adequately take into account rising construction costs in their projections. Recessionary impacts may deflate future raw material expenses, but sales tax revenues may not keep up with overly optimistic projections. In addition, inevitable legal donnybrooks occur over use of eminent domain to clear paths for some lines. Construction may be delayed or modified, depending on the length of the economic downturn.

While other cities grapple with developing a mass transit plan to serve 21st-century needs, at least Denver has one to implement.



Figure 29:
**For the Full Picture, Many Different Types
of Infrastructure Are Needed**

programs cannot be realized in piecemeal bursts of roads and transit lines funded in five- and six-year increments. “We need to start spending time on the bigger picture,” planning and funding infrastructure in multiyear phases like landing on the moon. But big-picture, long-term planning cannot distract attention from identifying and fixing existing infrastructure. “Long-term solutions will keep us from running into the ground in the future, fixing-it-first prevents scary things from happening right now.” The whole process requires patience and staying power.

Complicated schemes take time to plan and execute. People will adapt and change behaviors

slowly and the most costly programs take years to build and won’t result in immediate benefits. America’s once-modern, now-tired infrastructure took decades to build and provided many more decades of dividends. Now it’s time to set goals intelligently and work to achieve them so the country can reap future prosperity and productivity, and short-circuit decline.

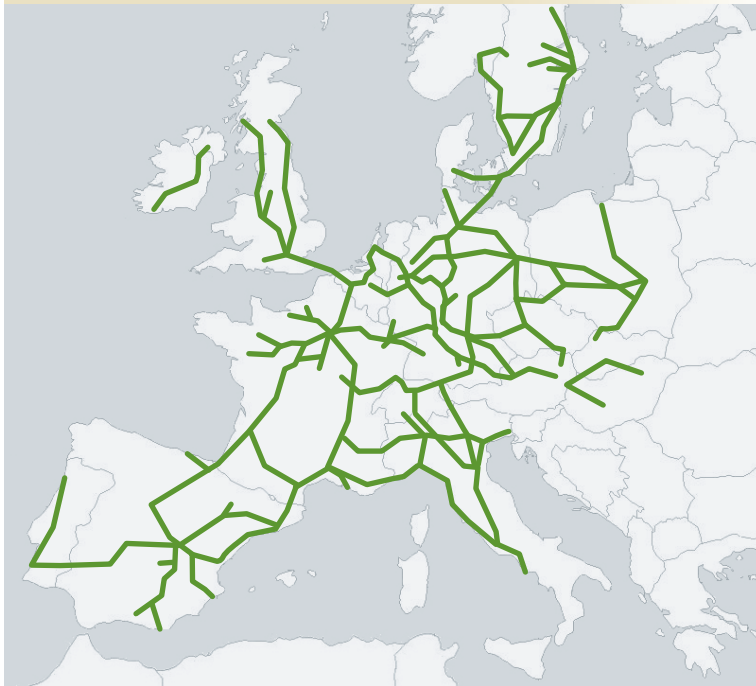
NATIONAL NETWORKS

Without exception, America’s primary global pathway cities reach capacity in their road systems and face major congestion issues at their ports and airports. Interviewees warn that future population

Figure 30:

**Europe's Trans-European Network Plans:
New and Upgraded Railway Lines**

Source: International Union of Railways.



increases and augmented shipping levels promise to worsen gateway bottlenecks, threatening economic productivity and wealth generation unless the country takes concerted action to expand and modernize its national transportation networks.

U.S. planners and state agencies could take a cue from the European Union, where countries collaborate to develop the \$758 billion (€600 billion) Trans-European Transport Network program of interconnected networks for freight rail, high-speed passenger rail, and truck corridors, as well as sea “motorways” and inland ship channels. Member nations have identified a series of 30 transnational axes and prioritized projects for reducing congestion and CO₂ emissions. The EU views this program as essential for achieving a true single market and regional integration. Funding challenges may delay execution of some projects, especially in the global economic downturn, and cost overruns have proven problematic, but at least Europe has mapped out an infrastructure strategy designed to handle

an expected doubling of traffic on its systems by 2020. And the EU has managed to implement this regional, cross-border planning process between disparate countries, whereas the U.S. federal government has failed to undertake a similar effort in league with the states.

The connectivity of the U.S. interstate road system remains unparalleled and stands as a testament to Eisenhower-era planning. Europe still copes with some major national highways running into narrow roads at border crossings. But the EU surpasses the United States in its initiatives to decrease road congestion through expanded rail freight, passenger rail, and new shipping corridors. “The ideal is a big network with multiple paths for every major destination—a grid of roads, fixed rails, and transit.” America should set priorities and goals for its national transport infrastructure networks:

- Expanding and building new dedicated freight train corridors from its key East and West Coast ports to new interior distribution centers outside of densely populated gateway metro areas to alleviate truck traffic and congestion.
- Developing separately dedicated high-speed passenger rail lines in regional corridors serving global gateways to take pressure off roads and airports.
- Facilitating the implementation of innovative management strategies and technologies at primary ocean ports to speed distribution, and determining strategies for handling new larger draft post-Panamax ships.
- Identifying sites and facilitating development of new airports and airport expansions at key global gateways.
- Interconnecting high-speed rail and mass transit in global gateway centers to link business and residential districts to rail stations and airports.
- Maintaining and enhancing interstates, bridges, and tunnels that serve global gateway markets.

All of these potential gateway projects must contend with existing infill development in large population centers. “If you get your planning wrong in the first place, turning it around can be horrendous and that’s what the U.S. faces today,” says an interviewee. “Germany and Japan started with a clean slate after World War II. Starting more from scratch, China has a much easier time—it’s quicker and easier to tear down than remodel. Like American cities, London can’t just rip up and start again. Any remediation costs multiples and cities built off of road systems are particularly troubled.” Many neighborhoods and communities will need to make sacrifices for new rights-of-way. Fifty years ago, farms morphed into suburban tracts and regional malls; now, subdivisions and shopping centers may need to make way for rail corridors and stations.

THE POTENTIAL OF HIGH-SPEED RAIL

“We can’t replicate Europe, but intercity rapid rail could make a huge difference versus airports,” says a U.S. transportation official. In 2008, California voters approved initial funding for an 800-mile (1,287-km) high-speed rail system that could link downtown Los Angeles to the San Francisco financial district (at average speeds of 170 mph/273 kph) in two hours and 40 minutes door to door. As part of the plan,

cities from San Diego to Sacramento would be connected, with annual ridership projected at upwards of 100 million by 2030. Forecasts suggest that the California rails project could attract one-third of airline passengers now traveling between cities, and cut auto travel by 6 percent. Without undertaking the estimated \$45 billion rail project, necessary expansion of state highways (2,900 lane-miles) and airports (five new runways) could cost more than \$80 billion to meet expected demand. Over time, high-speed rail could connect southern California centers to Phoenix and Las Vegas, boosting commercial synergies between these fast growing western cities.

Besides California, the Northeast megalopolis cries out for true high-speed rail service between Boston and Washington, D.C. Amtrak Acela trains, billed as “high speed,” actually average only 80 miles (128 km) per hour. They must share lines with freight haulers and current track systems can deliver maximum speeds of only 120 miles (193 km) an hour over short distances. Japanese and European high-speed trains routinely cover intercity routes at average speeds exceeding 180 miles (289 km) per hour. Other attractive possibilities for high-speed rail include connections between Seattle and Portland, Oregon, in the Northwest; a Texas four-stop between

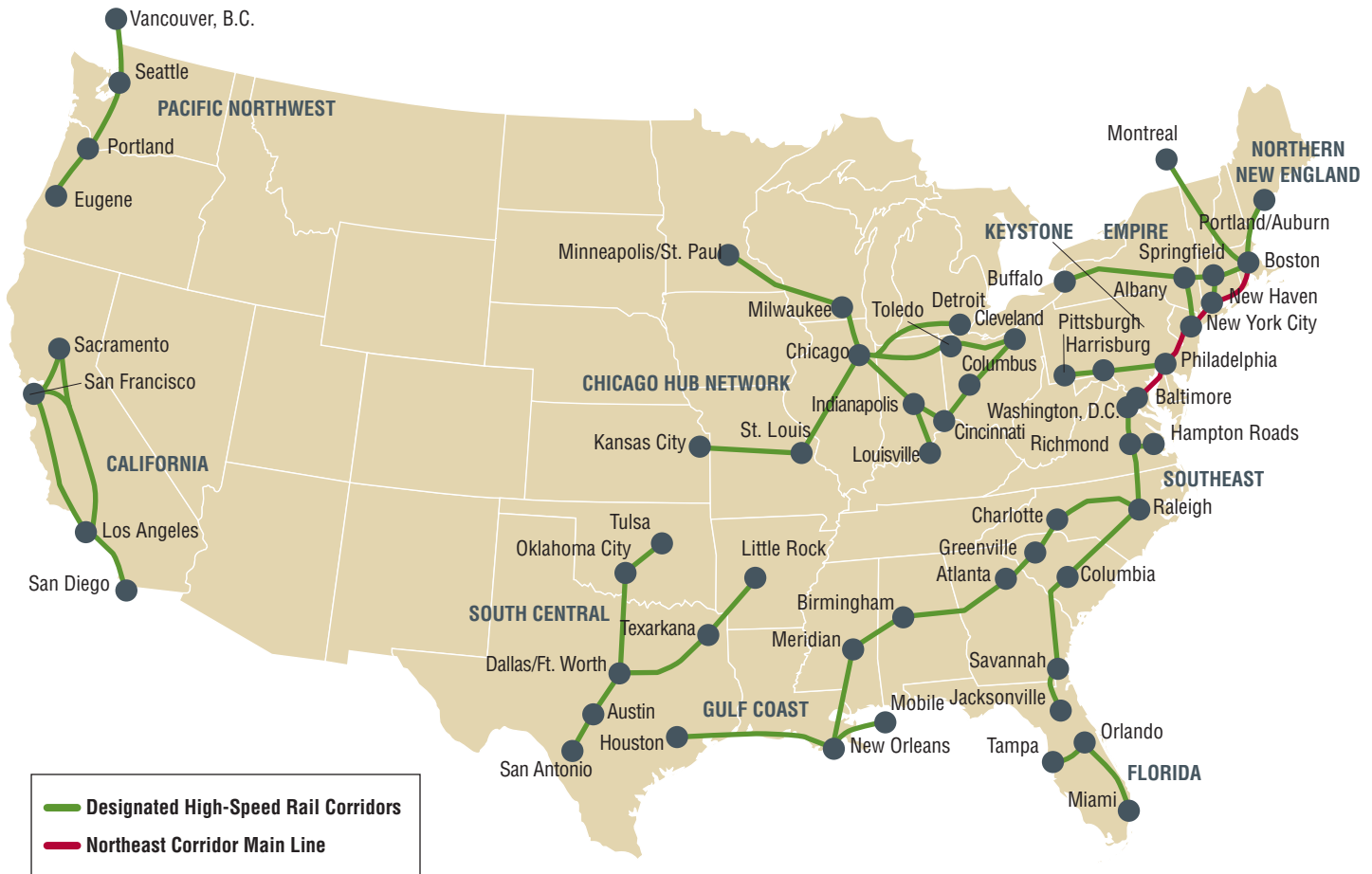
The port of Los Angeles is among the world’s busiest, but it requires new investment to keep up with shipments from Asia. (AP)



Figure 31:

Potential U.S. High-Speed Rail Corridors

Source: U.S. Department of Transportation.



With \$8 billion designated for high-speed rail in the President's stimulus package, proposed U.S. high-speed rail corridors get a boost.

Dallas, Austin, San Antonio, and Houston; a Florida network circling Miami, Palm Beach, Orlando, and Tampa; an Atlanta-centered line including Birmingham, Charlotte, and Raleigh; and a Chicago hub linking Milwaukee, Minneapolis, Indianapolis, and St. Louis.

While U.S. efforts are still in their infancy, France's high-speed network extends to 1,160 miles (1,866 km). Spain has built 971 miles (1,562 km) of high-speed lines, with another 1,118 miles (1,798 km) underway, and plans to connect its largest cities with a 6,200-mile (9,975-km) network by 2020. Japan's signature high-speed

network extends to 1,250 miles (2,011 km) and carries more than 335 million passengers annually. "After the war, the Japanese bet on rails over roads and their roads are relatively car free." So far, China has opened the 70-mile (112-km) Beijing–Tianjin high-speed rail line and is building an 802-mile (1,290-km) line connecting Beijing and Shanghai. Another 7,500 miles (12,067 km) are planned or underway. Korea and Taiwan also construct networks for trains exceeding 200 miles (321 km) per hour. All existing high-speed train systems in Europe and Asia generate enough revenue to cover their operational costs.

Interior Freight Hubs

Decongesting America's gateway ports and airport hubs may create opportunities for new inland distribution centers. Through railroad and

truck corridors, imported goods could be transported from the primary East and West Coast ports to major transfer points in less densely populated areas at key interstate and railroad crossings. These strategies could reduce the

Germany's Hard Look at Freight

Historically, Germany has boasted some of the world's most modern and integrated infrastructure systems—a crisscross of impressive autobahns and efficient railways, as well as state-of-the-art airports and sea and river ports. Its central location puts the country at the heart of Europe's primary east–west and north–south transport routes. Long-distance European freight haulers—whether rail, truck, or boat—typically must factor the logistics of passing through Germany for most efficient goods movement. Exports, meanwhile, constitute nearly one-quarter of Germany's gross domestic product, up from 16 percent in 1995, and the nation is a primary site for processing and assembly of imported intermediate products. Economists and planners have identified optimum use of the nation's transport infrastructure as the “foremost objective” for ensuring that Germany remains internationally competitive as a logistics hub in coming decades.

Not surprisingly, German leaders now focus seriously on upgrading freight and road systems, tying into European protocols for Trans-European Networks and sustainability. Without serious attention, they realize Germany could become a major bottleneck, given projections for drastic increases in haulage across all its networks over the next 20 years—the result of globalization and industrial specialization. In July 2008, the German Federal Government released a high-tech master plan for freight transport and logistics designed to enhance mobility through the country, improve efficiency of transport systems, ensure safety, and reduce CO₂ emissions. It offers a blueprint for how to approach complex infrastructure objectives, including sustainability, and emphasizes “inter-

linking” various “transport modes” to “enhance the capacity” of the overall system.

Among the master plan's objectives:

Optimum use—Ensure that existing networks can be retooled, retrofitted, and maintained to produce maximum efficiency. Prohibitive costs, threats to quality of life, and attention to land conservation for future generations dictate against grand new infrastructure schemes that pave over farms and existing communities. Planners will focus on establishing better links between ports and airports and interurban rail and road networks in efforts to free up additional capacity. Digital traffic control and management systems, including satellite tracking, will be expanded to improve traffic flows and reduce congestion.

Improving mobility—Implement logistics strategies and provide incentives to reduce or eliminate “unnecessary journeys,” keeping empty trucks and freight cars off networks. The government wants to incentivize haulers and businesses to develop “innovative technologies” to create greater efficiencies.

Shifting traffic to rails/waterways—Improve connections to and expand capacity at all logistics hubs, linking them to railways and ports, decreasing road dependence, and helping reduce truck CO₂ emissions. The government must increase cofinancing for combined transport terminals and plans to provide assistance for pilot projects to support development of new handling technologies to speed transfers of shipments at ports and depots.

Upgrading transport arteries/hubs—Concentrate government funding on relieving existing congestion at primary transport centers and identify priorities based on future traffic trends and capacity needs. The plan recommends segregating slow-freight traffic from high-speed passenger trains and widening federal motorways to provide more capacity for trucks.

The federal master plan follows the government's establishing cross-country corridors for trucks and railroads, and implementing a new GPS-based freight tolling system that puts the burden on users for funding roads instead of taxes. The master plan also calls for stepping up public/private partnerships for roadway widening and maintenance, taking pressure off government treasuries; and using the new Transport Infrastructure Financing Company to offer additional funding solutions. Germany has lagged well behind France, Spain, and Italy in utilizing PPPs for infrastructure projects.

Emphasis on strengthening railways and waterways and gaining multimodal efficiencies targets not only reducing road congestion, but also decreasing carbon emissions—70 percent of all European Union transport depends on oil-based fuels, 97 percent for the road sector. Trucks account for about one-third of all CO₂ emissions from road transport.

Planners also count on a robust German logistics sector to increase the country's attractiveness for foreign investors, provide a major jobs incubator, and help propel the country's long-term economic growth. The sector currently comprises about 20 percent of the European logistics market and employs 2.6 million people.

Bikes await checkout at SmartBike D.C.'s Dupont Circle station, one of ten SmartBike stations in Washington, D.C. (Sarah Jawaid)



need for expansive industrial space in crowded residential metro areas that surround key ports and create new jobs and industry for strategically located interior cities, which may have lagging prospects because of declines in manufacturing or agribusiness employment. Centrally situated cities—like Harrisburg, Pennsylvania; Columbus, Ohio; St. Louis, Missouri; Chicago, Illinois; Kansas City, Missouri, and Salt Lake City, Utah—may be well positioned to fill the need for facilitating increasingly complex cross-country shipping logistics.

WALKING AND BICYCLING

While passenger rail atrophied during the post-World War II period, America largely abandoned slower transport options like walking and biking in its suburban development concepts. Many planning boards turned a blind eye as developers neglected to install sidewalks in their subdivisions. Typical tract designs, characterized by dead ends and culs-de-sac, ironically limited safe bike travel. Parents don't comfortably let children ride bikes along busy suburban roads outside their subdivisions. Many arterials were designed exclu-

sively for speed, creating barriers between neighborhoods and discouraging foot or bike trips.

But walking and biking offer three extremely attractive benefits as transportation alternatives—they are free (or nearly so once you buy the bike), clean (no emissions), and healthy (good exercise that burns calories and strengthens hearts). Even a modest shift increasing current bike and pedestrian trips from 10 percent of all trips to 13 percent could reduce vehicle miles driven by nearly 50 billion annually. That goal seems easily achievable considering half of all trips in the United States are three miles (4.8 km) or less (within a 15-minute bike ride) and about 25 percent are less than a mile (within a 15-minute walk).

Investment in pedestrian and bicycle infrastructure can pay off:

- **Portland, Oregon:** 6 percent of commuters and 12 percent of downtown commuters bicycle to work;
- **Minneapolis:** 20 percent of all trips taken are either by bike or on foot; and
- **Boulder, Colorado:** 75 percent of all children walk or bike to school.

In revamping aging road systems, engineers need to consider enabling multimodal use that includes walking paths and bike lanes. Narrowing car lanes, installing high-tech traffic management systems, and providing safe pedestrian crossings can actually improve overall mobility and reduce the number of cars crowding streets.

Bike-sharing programs in European cities have proven successful and popular for errands, visits, and short commutes. In Paris, a public/private partnership managed by an outdoor advertising company makes 20,000 bikes available through 1,200 docking stations—program members are not charged for trips under 30 minutes. Each bicycle averages eight daily users. Washington, D.C., initiates a modest copycat SmartBike program with 120 bikes at ten stations. Well, that's a start!

Full-Spectrum Housing

As America's growing population concentrates in denser metropolitan areas, swelling numbers of elderly and young adults will change the complexion of future housing needs. Suburban empty nesters move closer to 24-hour

cores and downsize to apartments or small-lot townhouses. Likewise, young workers look to find homes near jobs, gravitating to apartments around commercial centers. Families continue to balance greater convenience against better suburban school districts.

Increasingly, successful communities will provide a diversity of housing options—high-rise, mid-rise, and single-family residences catering to different preferences in urbanizing settings. Growing numbers of retirees and young adults, who marry later, will increase demand for smaller, more affordable homes near amenities and services—restaurants, theaters, parks, neighborhood retail, medical care, places of worship, and transit options. People will demand greater convenience and pedestrian access, sacrificing more living space in the bargain. Paying big heating bills and mowing the lawn lose some appeal. Town center living begins to overtake McMansions, backyard pools, and driving lifestyles. New housing forms will provide a broader array of shared facilities—guest apartments, vegetable gardens, fitness centers, child and health care, as well as telecommuting services.



Full-spectrum housing caters to the needs of a diverse population. (Enterprise Community Partners)



Part Four: Paying the Way





“SOMEBODY HAS TO PAY—WE NEED A MORE DIRECT LINKAGE BETWEEN USE AND COST; THAT’S WHEN PEOPLE START PAYING ATTENTION AND BECOME MORE EFFICIENT.”

OBVIOUSLY, NO ONE ANTICIPATES THE NATION’S INFRASTRUCTURE collapsing suddenly in a heap. It’s more death by a thousand cuts—chronically congested arterials, potholed lanes, a rusting trestle, broken track signals, a washed-out dam, sewage runoff into a local reservoir, another busted water main, brown water coming out of faucets, occasional power outages, a subway breakdown, or just one more airport delay. People become inured to inconvenience and lost time. But then ten or 15 minutes a day sitting in traffic or waiting to get somewhere add up to lost hours each week and lost weeks each year. And every year seems just a little bit worse. In fact, average per-capita annual highway delays have increased by more than one hour each year since 1982 in the 14 largest U.S. metropolitan areas, according to the Texas Transportation Institute. Across the United States, congestion consumes 4.2 billion hours and 2.9 billion gallons of fuel annually, and the average American driver spends 38 hours a year sitting in traffic.

People also naturally have trouble making the connection between unrepaired roads and greater driving hazards, which lead to more car accidents, including fatalities. They don't realize that decades-old radar systems force air traffic controllers to space out jets, delaying landings to avoid close calls given increasing congestion in the skies. They don't necessarily link either increasing subway and train derailments to loosened bolts on thousands of miles of aging tracks. And even when tragedy strikes, it's hard for people to relate how paying higher tolls and fares, or more gas taxes, helps ensure safer facilities.

Leaders need to help raise awareness and make the deductive linkages to win public support for augmented infrastructure budgets. Until the 2008 Presidential election, most politicians uttered barely a word about infrastructure and then waited until relatively late in the campaign when some candidates talked about potential jobs programs in the wake of widespread layoffs. "We need to lay the groundwork for educating the public, so Americans understand that their economic future depends on infrastructure spending," says an interviewee. "The reason America has been economically strong is our productivity, and without strong infrastructure we cannot maintain our productivity." In short, jobs, wages, and prosperity all lead back to sound infrastructure.

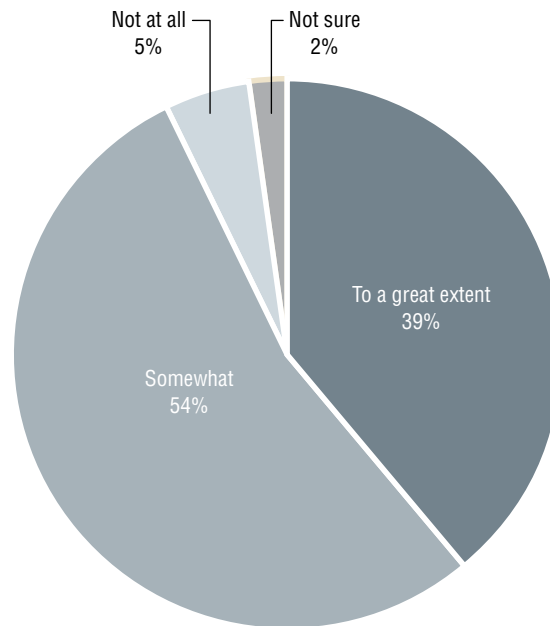
Not coincidentally, federal spending on infrastructure has been reduced over the past three decades against a backdrop of rhetoric to shrink government and reduce taxes so that individuals have more to spend for themselves. Investment success, meanwhile, has been predicated on short-term profit—trading and flipping assets—rather than on long-term gains from patient outlays. "Now we need a cultural shift" that supplants instant gratification with determination for "leaving long-term benefits for future generations." "It's time to put people back to work, move people and make products more cheaply, and relaunch the private sector. We can't do that with crumbling ports and gridlocked airports."

The President and Congress must also be careful not to overplay attention for worthy initiatives

Figure 32:

Ninety-three Percent of U.S. Developers in Survey Say Rising Prices for Infrastructure Have Increased Their Development Costs

Source: ULI Member Survey, 2008.



Question: To what extent have rising commodity and construction prices for infrastructure increased your overall development costs?

like new energy grids, clean fuel technologies, and greater broadband access at the expense of less sexy, more nuts-and-bolts transport systems and land use policy. Building new high-tech projects cannot substitute for more mundane and basic concrete-and-steel repairs. They are both necessary and not mutually exclusive.

When the economy eventually recovers and the government is left with yawning deficits, officials must stand firm and avoid back-burnering infrastructure spending. "Without strong leadership, focused on long-term advantages, public support will recede." Midwestern voters might support high-speed rail corridors and fixing freight bottlenecks in the Northeast and California, if they understood how new networks could relieve air travel delays and streamline commerce across the entire country.

Stimulus: Repairs Best Bang for the Buck

The length and breadth of wish list items for stimulus funding make Santa blanch. For the biggest and most immediate return on investment, stimulus dollars should sidestep grander, big-ticket projects, not to mention typical earmarks. Instead, short-term funding injections should address overwhelming needs to repair corroding and faltering existing infrastructure. It can't be overemphasized: "Our system is worn out; we're holding it together with [bandages]." Fixing before failure prevents incurring huge costs—economic dislocation, deaths and injuries, and significant replacement expenses.

There's another reason to hold back stimulus for build-it-new projects: the United States must first formulate its long-term infrastructure agenda and a financing system for achieving the most cost-effective results for economic gains. "We don't want to just pump money into the current broken process," which fails to integrate land use and transport modes. "More of the same old road-building projects may put people to work, but may not help long-term productivity." That said, no time can be wasted identifying future priorities. "We need to set that agenda now and move forward as quickly as possible with implementation."

Canada's Government Gets Behind Public/Private Partnerships for Infrastructure

Like the United States, Canada has lagged in infrastructure investment since a distant 1950s–1960s spending surge, which financed sleek cross-country motorways and modern subway systems in Toronto and Montreal. Close to two-thirds of the nation's transport infrastructure predates 1960 and many highway bridges and overpasses require near-term overhauling—winter weather takes a significant toll on road beds and supports.

But while the United States has dithered, Canadians have come to recognize liabilities to continued underfunding and in recent years have jump-started national initiatives to revamp road, transit, and water systems, working in concert with provincial and municipal governments and the private sector. Not only do substantial federal government gas taxes (just under 40 cents per gallon) support the Building Canada Plan enacted in 2007, but Ottawa has also embraced initiatives to transform the country into a leader for public/private partnerships.

"Canada and Australia have been proponents of public/private partnerships within a federal system," explains an interviewee who works with funders and governments. "If Canada can do it, so can the U.S. They have a model worth following. The provinces have offices of PPP charged with coordinating different government agencies, determining priorities, identifying solutions for PPP structures, and creating a more transparent process that minimizes costs. The Feds help set guidelines with provinces to get federal funding, and the federal government allocates matching dollars to provincial dollars, helping reduce risk and cost."

Fortifying about \$26.5 billion (C\$33 billion) in direct federal funding initiatives for infrastructure, Canada looks to jump-start public/private financing ventures including establishing a public/private partnership fund and a federal office, PPP Canada Inc., to help local governments engage private partners. PPP Canada Inc. will invest in local PPPs through a \$1 billion (C\$1.25 billion)

fund using a range of financing/credit enhancement instruments including senior and subordinated loans, loan guarantees, nonvoting shares, and zero coupon loans. The office looks to educate and create models for municipalities to join together in regional solutions, helping break down silos and avoid territorial infighting for funding. Instead of adjacent cities working on separate plans for revamped water and wastewater systems, PPP Canada Inc. should be positioned through funding carrots to encourage bundled projects with greater cost and operating efficiencies.

The Canadian approach offers guidance for marshalling federal programs to work with state and local governments in a more unified effort to tackle infrastructure planning and funding on a national basis. "The U.S. can learn from Canada's experience, especially as an incubator for resolving conflicts and providing more uniform procurement arrangements, working within a federal system."

Rebuilding: Requires Transformational Funding Commitment

Rebuilding and transforming American infrastructure can't be accomplished through standard appropriations bills in a Congressional election cycle, let alone over a two-term presidency. It may take several decades to fund and fully implement strategies for streamlining and improving the various interconnected systems that make possible just about everything we do and how we live. It will demand a daring initial vision and concerted commitment from the federal government orchestrating states and local agencies, while teaming up and partnering with an array of private companies, investors, and operators. And it will take trillions of dollars in capital footed ultimately by taxpayers and users, who will need to be convinced that the goals will justify the immense costs.

Given the exigencies, a national Presidential commission should be established as soon as possible to recommend to Congress holistic concepts for integrating national networks—transportation, power, broadband, and water. Regional planning authorities should be charged with developing multimodal transport systems that synchronize with land use schemes for more compact future development, including residential projects in and around commercial centers. Federal funding commitments must match the multiyear time frames of more complicated, larger-scale ventures and should not be constrained by limitations of a Presidential term. A commission-led approach staffed by leading experts and committed to merit-based decision making could help temper inevitable political infighting over funding and deflect lobbyist pressures.

Otherwise, “all you can do with the funding that’s available now is bite-sized projects—replace a bridge, put in a HOT [high-occupancy toll] lane, do a park-and-ride,” says an interviewee. Roads get bigger federal matches than mass transit, so it’s easier for states to build roads. If you work for a state transportation department, “you go after what you can get,” instead of planning

for more visionary, game-changing projects. “We need long-term funding commitments to engage long-term projects.”

American Infrastructure Bank

If enacted by Congress, an American Infrastructure Bank could harness the energies of states, municipalities, and private investment funds to develop and finance in concert nationally significant and large-scale regional infrastructure projects. Besides providing funding support, the bank could help depoliticize decision making and attract private investment.

Like the 50-year-old European Investment Bank, the U.S. version would not attempt to finance the total cost of any project. Rather, its investment would be used to attract and enable other funding sources by lowering investment risk. The bank could also provide the framework for funding more complicated long-term ventures, selecting projects through a cost/benefit analysis rather than a purely political calculus. Transport projects could be evaluated based on meeting national goals for facilitating mobility across national networks, reducing vehicle miles traveled, cutting emissions, providing multimodal options, and encouraging more compact communities. For funding consideration, water and sewage treatment projects would need to consolidate systems and find regional efficiencies for protecting an essential and increasingly more limited resource. The bank could also institute best procurement practices to provide a model for managing private concessions, and leverage more private capital by providing loan guarantees, credit enhancements, and various other financing incentives. “This would help make the private sector a bigger part of the solution to addressing funding gaps, which would be good news.”

Like a national infrastructure commission, the bank would need some degree of independence from the President and Congress to undertake selection of merit-based projects and to short-circuit hijacking funds for earmarks and special interests. With proper guidelines and some level

of essential oversight, a merit-based approach could happen. Seeding the bank with only \$60 billion—the original Senate proposal—sets “the scale for a pilot program, [maybe] not enough to have real impact,” unless this money is leveraged with other funding.

Private Sector Capital

While public funding may be problematic, an impressive coalition of banks and investment funds seeks more traction in gaining concessions for major infrastructure projects. In 2009, they issued a report highlighting how they collectively have \$180 billion available to invest worldwide. Pushed by recessionary realities, fiscally battered U.S. state and local governments may finally engage more private operators to help manage and build some high-profile infrastructure assets. “Where else can they find so much money? Government leaders must be creative

and opportunistic, tax revenues are spiraling down, PPPs seem like good options for them. 2009 should be a good year for us,” says a fund manager.

Public/private partnerships have been reasonably popular and successful in the U.K., Europe, Australia, and more recently Canada—operators provide capital and can bring innovation and private sector management efficiencies. In the United States, private equity managers and operators have set their sights on “monopolistic” highway and bridge tolls along high-traffic corridors, proven and predictable revenue generators. In 2006, Chicago and Indiana signed long-term, multibillion-dollar deals for private operators to manage the Chicago Skyway Bridge and Indiana toll road respectively. But negotiations for state turnpikes floundered in New Jersey and Pennsylvania over legislature concerns that voters would rebel over prospective toll increases. The Trans-Texas Corridor project, ballyhooed to attract pri-

European Investment Bank

The European Investment Bank (EIB) could serve as a model for an American Infrastructure Bank. Still reeling from the after effects of World War II, European countries needed to jump-start their recovery and rebuild broken infrastructure when they formed the EIB in 1958. Today, the bank is the world's largest public financial institution, lending \$52 billion last year alone. The EIB is owned entirely by European Union members and its funding supports EU policy priorities, including economic and social cohesion, improving mobility and connectivity across the continent, and reducing carbon emissions.

Rather than attempting to finance entire projects, the bank acts as a catalyst to attract other capital sources, including local and national governments, public authorities, private banks, and other financial institutions. Project investments are typically capped at 50 percent of total investment cost, but loans can increase to 75 percent

for certain trans-European ventures. For funding, projects must be viable in four fundamental areas: economic, technical, environmental, and financial. In its 51 years, the bank claims to have lost money on only two investments.

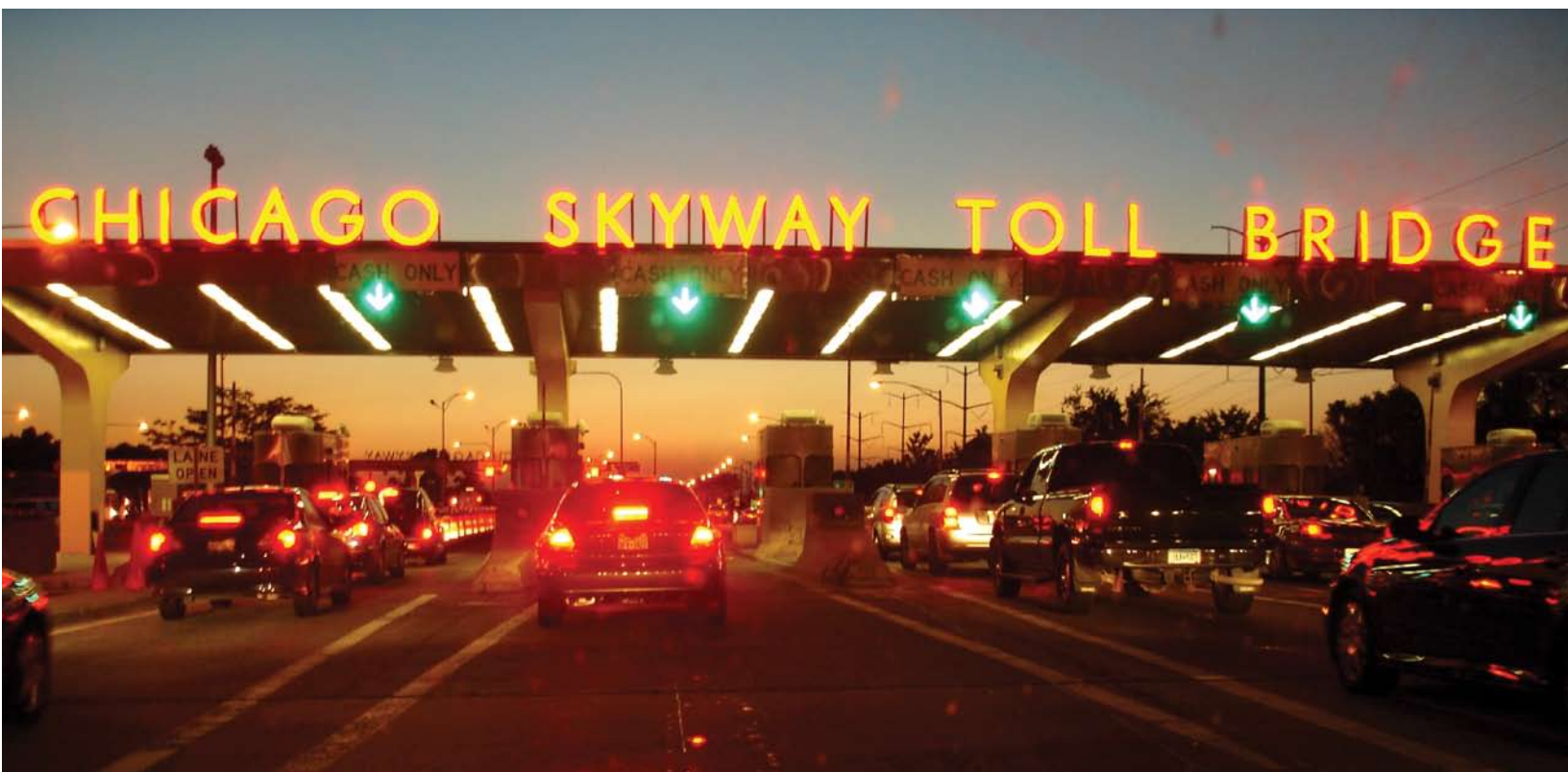
By setting guidelines and providing loan guarantees for infrastructure projects, the EIB helps to lower risk for other investors. Loan guarantees focus on carrying projects through ramp-up stages when revenues may not cover operating costs. The bank underwrites projects based on long-term forecasts—as long as 50 years—taking into account that infrastructure paybacks often are not necessarily immediate.

Based on its 2007 policy statement, the bank favors projects that will take pressure off constricted road systems and limit greenhouse gases—passenger and freight railways, inland waterways, maritime projects, urban transit, and intermodal hubs. Road projects can get support

if they have “high economic value” for reducing severe congestion and link into other transport modes. The EIB also focuses on water supply and sewage treatment, championing EU goals of ensuring “good status” water quality by 2015 in rivers and along coasts. The bank also promotes and supports a recent EU initiative to encourage city living and discourage suburbanization by helping create vibrant infill neighborhoods out of former industrial sites and redevelopment areas under public ownership.

Importantly, the EIB has been instrumental in furthering public/private partnerships—more than 50 percent of the EIB's water sector lending is to the private sector.

By helping finance and spearhead major cross-border projects, the EIB fosters cooperation among EU member states and enables programs that individual countries might not undertake otherwise.



vate investors to bankroll 4,000 miles (6,436 km) of new road and rail networks, also died after six years of on-and-off proposals. Private companies are building a handful of new toll roads in other states, but most operators prefer to shy away from more risky development projects and their problematic revenue forecasts.

States, meanwhile, have generally failed at establishing predictable, straightforward bidding and procurement protocols, discouraging some potential bidders. “The negotiation process is much too inefficient and costly. If states would improve the visibility of the outcome, there would be more and better value-added proposals.” “It scares us when decisions get caught in the political process,” says a fund manager.

Private investors tend to look at value and costs over the entire life cycle of infrastructure, while public budgets and politician attention spans are much shorter-term, more typically spanning only an election cycle. “These deals require very sophisticated structures and a high degree of security that returns will be there for investors.” “It’s all a

function of risk and return—investors will provide more lower-cost capital for more mature, predictable assets.” States and cities, meanwhile, must negotiate transactions whose outcomes convince voters that the concessionaires will manage roads “most efficiently at the lowest cost”—improving traffic flows, maintaining safe conditions, and keeping tolls reasonable for the life of their leases. Just selling the turnpike for as many dollars as possible “isn’t going to work,” especially if the primary intent is to close current deficits. “Those scenarios are akin to what happened in many states with tobacco settlement proceeds, where dollars got diverted away from funding future health care programs to balance current budgets.” “We need greater accountability and transparency for how the money is actually invested.”

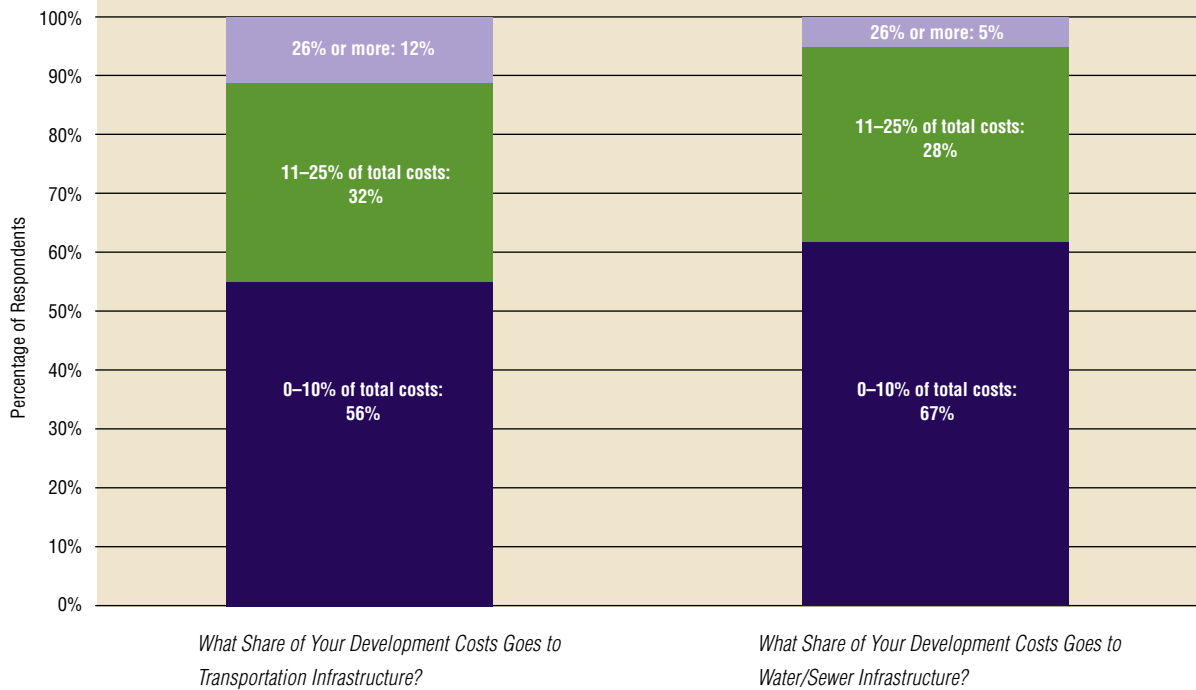
For greenfield infrastructure development projects, states can mitigate risk for operators by entering into profit-sharing arrangements. Some payment schemes in Australia, the United Kingdom, and Canada are based on “availability.” The government guarantees an annual rent to

Cars wait to pay at the Chicago Skyway Toll Bridge. The Skyway Concession Company received a 99-year operating lease for the tollway from the city of Chicago. For \$1.8 billion, the company received the right to toll and concession revenues and is responsible for all operating and maintenance costs. (Thomas Banks)

Figure 33:

Developers Help Fill the Infrastructure Gap: About a Third of U.S. Developers in Survey Say Infrastructure Accounts for 11 to 25 Percent of Total Development Costs

Source: ULI Member Survey, 2008.



the investor-developer-operator, helping reduce the investment's risk profile, in return for more upfront capital to build the project. "Investor-operators want to avoid the winner's curse from overbidding, and governments are better off sharing the risk in these projects and avoiding future defaults." Often in early years, toll road revenues just can't cover costs.

Despite the rocky credit markets and slowed fundraising (investors such as pension funds are retreating in the unsettled environment), private equity-operator consortiums had attracted significant capital in recent years from institutional investors, looking for solid bond-plus-like returns promised by the infrastructure fund managers. As a result, some fund managers still claim sizable bankrolls from backlogged commitments and say they are positioned to do some all-equity deals, absent leverage from traditional lenders. In late 2008, a private investment group agreed to pay \$2.5 billion to run Midway Airport in Chicago, the first time the federal government has allowed a nongovernment operator at a major hub airport.

(More than 100 major airports worldwide are privately operated.) Chicago, the U.S. leader in entering into public/private partnerships, also sold rights to its parking meter concession in 2008.

Investor Hiccups

While investment funds look for new infrastructure deals, the credit crunch and economic downturn have combined to hammer earlier investments and send up red flags. In fact, some infrastructure transactions fall into the same traps that trouble investors in other asset categories, including real estate and corporate finance. "There are a lot of messed-up capital structures." In particular, "fund models dependent on leverage are in trouble and disappearing." Some listed entities have slashed the value of heavily leveraged toll road assets, including highways in Canada, the U.K., and France. In recent years, "managers just took on too much operating risk by overpaying and leveraging up in aggressive debt schemes."

Cash-rich funds will look to pounce on motivated sellers—fund managers who can't meet debt service payments and can't refinance certain assets. "Just because sellers are distressed, doesn't mean the assets are distressed. If the credit crunch persists, there will be bigger problems for some investor-operators. It's a great time to keep your powder dry and wait for opportunities."

Not the Panacea

No doubt, appropriately structured public/private partnerships can provide significant funding and management expertise for governments grappling with maintaining deteriorating infrastructure systems and desperately needing sources of capital. But fund managers readily agree that "we are not the panacea" and realize government needs to supply overall direction for infrastructure policy, planning, and strategy. In reality, they can only be positioned to operate parts of overall systems. Even in the U.K., where PPPs were initiated more than 20 years ago, only about 15 percent of public infrastructure is privately managed—mostly schools, hospitals, and railroads. Importantly, one-off concession agreements to run a toll road, a tunnel, or an airport cannot be allowed to dictate or hamstring future planning for improving overall transport flows through multimodal schemes that might reduce concession revenues. For greatest impact, private sector transactions need to be carefully coordinated in overarching government infrastructure plans.

Somebody Must Pay: The User

Given America's history of sacrifice, competitive mind-set, and propensity for prosperity, odds suggest that the public increasingly will support new infrastructure initiatives that can pay off for future generations and maintain the nation's leadership role. Nevertheless, Americans will struggle to change attitudes and accept realities about increasing charges for habits and lifestyles that seemingly had lower costs in the past. As behaviors adjust to gain economic advantages, people

likely will become more accepting, probably more efficient, and less wasteful, too.

Anticipate deficits, debt, and competing needs to force government into adopting more user fee solutions to pay for infrastructure. Policies to reduce congestion, pollution, and carbon emissions will place higher costs on offending sources—cars of all stripes and particularly larger vehicles with gas combustion engines. People also will pay more for water and sewage treatment. In some places, development may become prohibitively expensive since new roads and sewer lines may no longer be subsidized as liberally by general taxpayer revenues.

Freeways Can No Longer Be Free

For the future, expect driving to become costlier whether oil prices rebound or not. States will need to impose higher gas taxes and/or tolling schemes just to maintain roadways and transit systems, and will require additional funds for new transport projects. Congestion pricing mechanisms—high-occupancy toll lanes on highways and charges for entering urban zones—could gain greater traction, too. Officials will favor phasing in increases to soften the pain on drivers and consider technologies that charge for vehicle miles traveled on all state roads.

MORE TOLLS.

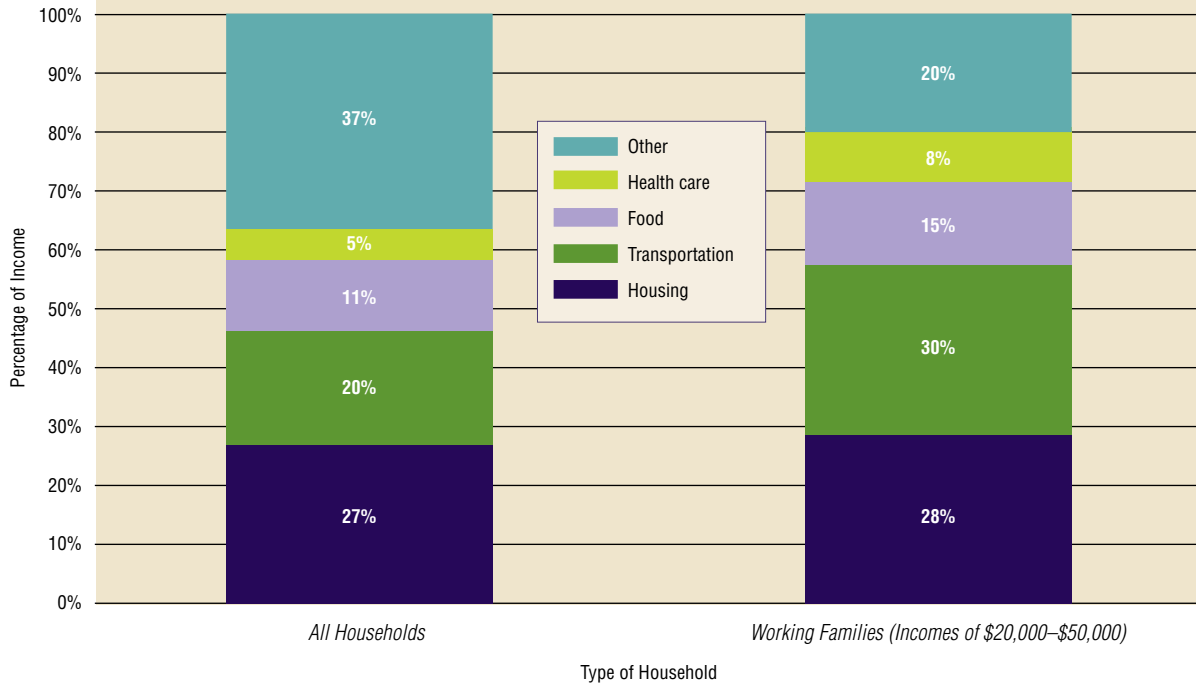
Except for a select few grandfathered highways in the Northeast and Midwest, federal legislation prohibits states from tolling interstates. Congress will need to give all states the option to toll and add congestion pricing along their interstate highways, some of which include the nation's most heavily trafficked sections of road. In the future, many highway projects will be financed through public/private partnerships and/or bond issues, underwritten on prospective toll or user fee revenues.

THE REGRESSIVE DIVERSION.

Opponents of tolls, congestion pricing, and higher gas taxes call the charges "regressive," disadvantaging poor and middle-class people

Figure 34:
Working Families in the United States Spend 30 Percent of Income on Transportation,
Compared to 20 Percent for All Families

Source: Center for Housing Policy.



who they argue can't afford them. But regressive policies are ones that force people into expensive car dependence. Toll costs or added gas taxes are just the tip of the iceberg when it comes to footing bills for car ownership. In fact, auto-related transportation costs exceed housing expenses for many working families. And keeping more people on jammed roads saps time and productivity. If states can raise funds from tolls and user fees, they should be able to finance more mass transit and transit-oriented residential development to help reduce transport costs for people who today have no choice but to drive. Mass transit alternatives should help take cars off roads and improve driving times. Without options, people are stuck driving and probably stuck in traffic.

RAISING FUEL TAXES.

Gas taxes may be one of the biggest political hot potatoes in the United States. Combined federal and state gas taxes average only about 50 cents per gallon, a fraction of gas taxes imposed in most

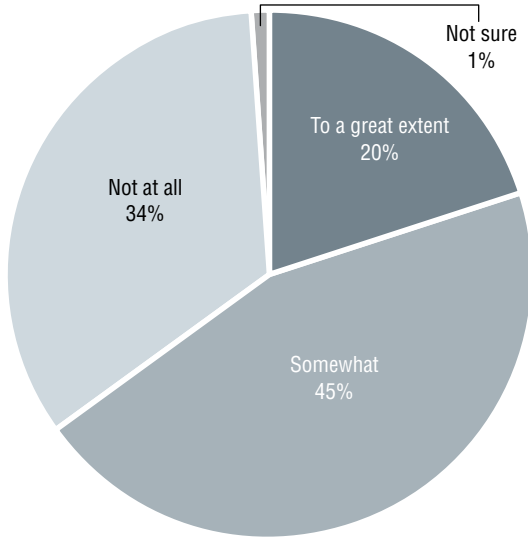
Western countries. Many European governments as well as Canada and Australia use high fuel taxes to discourage car use and foreign oil dependence, while raising money as an alternative to other taxes. Not surprisingly, Americans drive more because gas costs less, and as a result many people live and work where they have no choice but to use a car. Whenever oil prices spike (like in 2007–2008), Americans grit their teeth, cut back vehicle miles, stop buying gas-guzzling cars, and even use more mass transit. But when oil prices inevitably decline, the U.S. government has refused to encourage conservation or raise more money to fund transportation alternatives to driving. Congress has resisted raising the 18.4-cent-a-gallon federal gas tax since 1993.

POLITICAL TEST.

2009 presents another gas tax test for lawmakers, who need an immediate fix to fund shortfalls and then wrestle with a more permanent solution for raising necessary revenues. Since the federal Highway Trust Fund (supported by gas taxes) skidded

Figure 35:
Sixty-five Percent of U.S. Developers Say Recent Increases in Gas Prices Are Influencing Their Decisions About Where to Locate Future Projects

Source: ULI Member Survey, 2008.



Question: To what extent have recent increases in gas prices influenced your decisions about where to locate future projects?

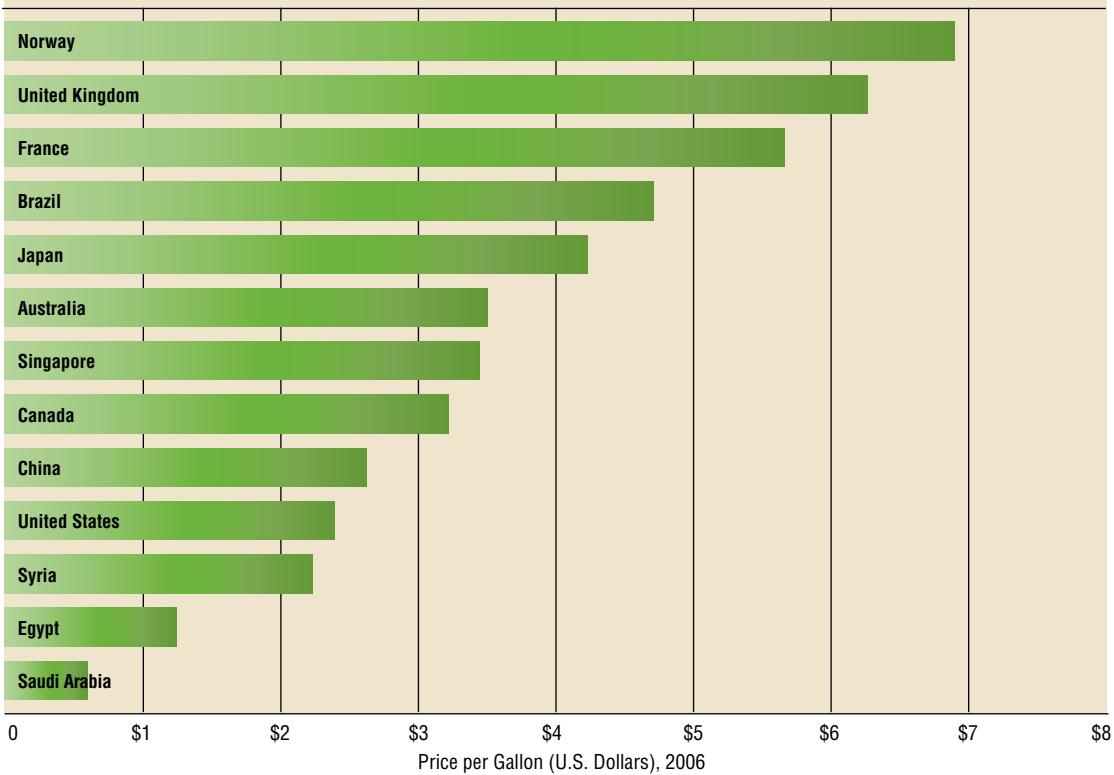
into insolvency in 2008, it needs a gas tax hike just to support states for ongoing road and transit projects. Proponents urge quick action to take advantage of slumping oil prices—they reason that drivers will feel increases less after coping so recently with \$4 per gallon at the pump. Some advocates push the envelope for a major hike of a \$1 or more per gallon. But that may just be too much to stomach for elected officials when their constituents struggle through a recession. A failure to enact any increase would represent an obvious lack of backbone and suggest that federal officials may not be prepared to tackle infrastructure costs. Dropping the “Highway” in “Highway Trust Fund” in favor of “Mobility” symbolically might also help signal an appropriate new direction in how the Trust Fund finances infrastructure.

VEHICLE MILES TRAVELED SCHEMES.

For the long term, it probably makes sense to de-link gas taxes from the Trust Fund—since goals of less driving and more fuel-efficient cars combine

Figure 36:
Because Gas Taxes Are Low, U.S. Retail Gasoline Prices Are Among the Cheapest in the World

Source: Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ).



to decrease revenues over time. Electric cars would escape gasoline taxes altogether—not good public policy for tempering congestion. Interviewees continue to favor adopting some form of vehicle miles traveled user fee that could ultimately replace gas taxes and tolls as well as allow for congestion pricing and higher charges for heavier vehicles, which cause greater road damage. These electronic, pay-as-you-go systems eliminate stops at tollbooths and utilize on-board transponder and satellite monitoring to track charges by the mile for driving on any and all roads. Charges would vary based on place, time of day, and type of vehicle. More environmentally friendly cars could be charged less per mile. Driving in rush hour traffic on primary roads could register higher fees. Billing information could encourage more economically based decision making for when, where, and how to drive, and charges could link more directly to the actual costs for maintaining specific transport systems and roads. Over time, people likely would adjust driving patterns, including where they live and work, to gain economic advantages.

GERMANY'S EXPERIENCE.

Since 2005, Germany has implemented a satellite-based electronic tolling system on trucks using all 7,456 miles (12,000 km) of its motorways as well as parallel highways. The tolls charge by the number of axels and vehicle emission class, and fees were increased in January 2009 to incentivize lower-emission vehicles and raise an additional \$1.3 billion (€1 billion) for the country's transportation infrastructure. Tying into European Union policy, Germany is hoping to shift more freight traffic onto rail lines and waterway corridors. The Netherlands, meanwhile, looks to implement a satellite tracking system on all vehicles over the next decade.

BIG BROTHER.

Two surmountable hurdles stand in the way of adopting these technologies: upfront costs for satellites, transponders, and billing systems and "Big Brother" worries.

Transponders and satellites already beam back and forth into vehicles—radio, GPS traffic information, telephone, and emergency contacts. States have developed electronic toll billing systems, which could be adapted to wider applications. The administrative costs would be a relatively minor expense in such a far-flung system, especially if states adopt uniform national standards. Opponents fixate on intrusive "1984" privacy issues—satellites can track movements, the government will know when and where you go, and information could be accessed to use against you in litigation. Proponents insist safeguards can be instituted to protect against government abuse.

In the United States, Oregon has tested a pilot VMT system that computes mileage through electronic sensors installed in vehicles and then charges drivers at the pump when refueling. But the Oregon system won't accommodate electric cars. And if different states implement different systems, efficiencies could be lost in confusion and extra bureaucracy. For electronic tolling to work, Congress arguably will need to set uniform technology standards and federal levies while states and localities determine their own policies and charges.

LOWER PROJECT COSTS.

The global recession offers some good news on the fiscal front. Costs for concrete, steel, and other construction materials have been sinking as world industrial demand slackens for various commodities. Labor expenses relax, too—contractors cut their bids to get work. Opportunity now exists to complete many infrastructure projects below forecasted budgets.

Report Notes

CURRENCY

All currency is in U.S. dollars, unless otherwise noted. Foreign currencies were converted into U.S. dollars in February 2009.

FORUMS

ULI conducted two forums in preparation for this report. The *Forum on Transportation Infrastructure for Livability and Competitiveness in and around Guangzhou, China*, was held on January 15 and 16, 2009. It was attended by 18 participants. The Institute for Transportation and Development Policy cohosted this event with ULI and Ernst & Young. The *ULI Europe Infrastructure Roundtable: Infrastructure and Economic Recovery* was held in Paris, France, on February 3, 2009, and focused on the role of infrastructure in economic recovery efforts by European governments and the European Investment Bank. It was attended by ten participants. A list of forum participants can be found on page 69.

QUOTES

ULI conducted 19 interviews with industry experts for this report. All unattributed quotes are from these interviews. The list of interviewees can be found on page 68.

DEVELOPER SURVEY

During the months of November and December 2008, ULI conducted a non-scientific survey of U.S. ULI members who had identified themselves as developers in our member database. Three hundred thirty members responded to questions about infrastructure and related issues. Partial results from this survey inform this report.

ACRONYMS

ASCE	American Society of Civil Engineers
BRT	Bus Rapid Transit
CO₂	Carbon Dioxide
EIB	European Investment Bank
EPA	U.S. Environmental Protection Agency
EU	European Union
GDP	Gross Domestic Product
GPS	Geographic Positioning System
HOT	High Occupancy Toll
PPP	Public/Private Partnership
TEN	Trans-European Network
U.K.	United Kingdom
ULI	Urban Land Institute
USDOT	U.S. Department of Transportation
VMTs	Vehicle Miles Traveled

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The Institute maintains a membership representing a broad spectrum of interests and sponsors a wide variety of educational programs and forums to encourage an open exchange of ideas and sharing of experience. ULI initiates research that anticipates emerging land use trends and issues and provides advisory services; and publishes a wide variety of materials to disseminate information on land use development.

Established in 1936, the Institute today has more than 38,000 members and associates from some 92 countries, representing the entire spectrum of the land use and development disciplines. Professionals represented include developers, builders, property owners, investors, architects, public officials, planners, real estate brokers, appraisers, attorneys, engineers, financiers, academics, students, and librarians. ULI relies heavily on the experience of its members. It is through member involvement and information resources that ULI has been able to set standards of excellence in development practice. The Institute is recognized internationally as one of America's most respected and widely quoted sources of objective information on urban planning, growth, and development.

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INFRA STRUCTURE 2009 PIVOT POINT

INFRASTRUCTURE 2009: PIVOT POINT warns that the United States must develop a concerted, long-range infrastructure strategy to maintain national prosperity in a rapidly evolving and increasingly competitive global marketplace. In the midst of a financial emergency, the nation faces a historic opportunity to fundamentally rethink how it plans, funds, and builds infrastructure. Will the country “pivot,” averting a slide from prosperity by making better investment choices? Or will it hurtle into more gridlock, congestion, and potential systemic failure? The choice is ours.

Pulling together survey data from U.S. developers; research on major infrastructure trends, issues, and best practices; and advice from industry experts, *Infrastructure 2009* presents a compelling picture of infrastructure needs and challenges in the United States and globally. It also lays out strategies and solutions for remaking infrastructure and rethinking how to build the communities it serves, showcasing creative and innovative approaches from around the globe.

