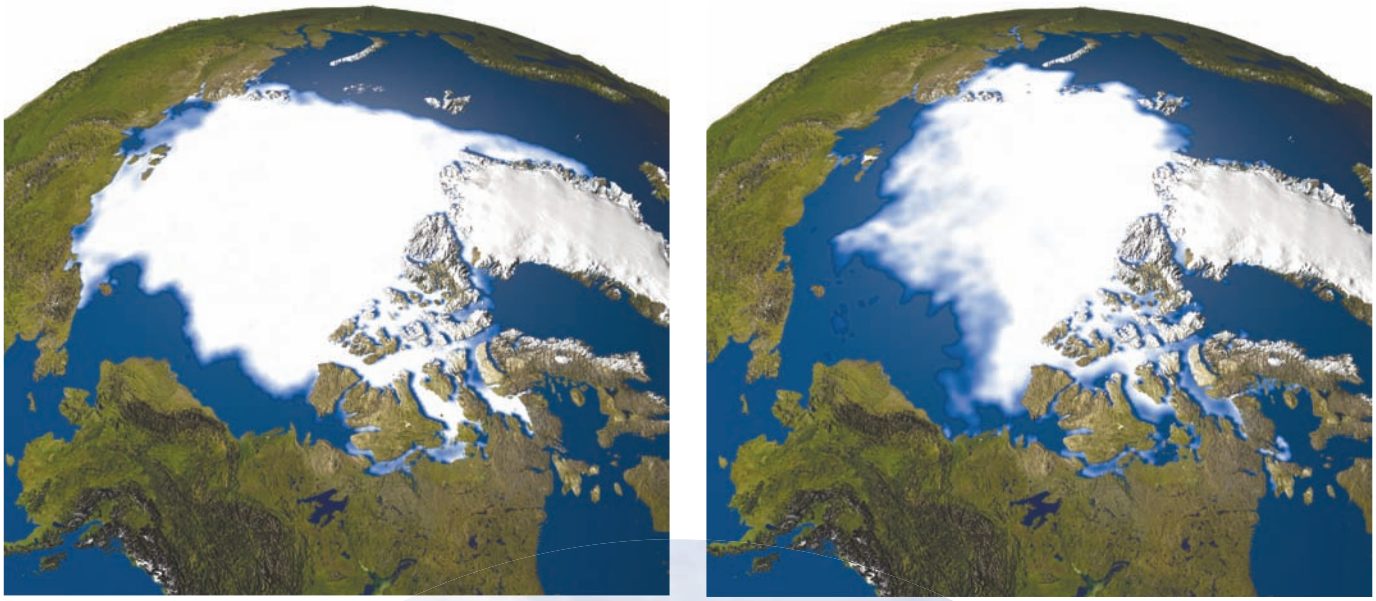


NASA Defense Meteorological Satellite Program

Arctic perennial sea ice has been decreasing at a rate of 9 percent per decade. The first image shows its minimum sea ice concentration for the year 1979, and the second image shows the minimum sea ice concentration in 2003.

Strategies Sweeping and Small Being Formed to Face Global Emergency

Transportation Planning Warms Up to Climate Change

By Josh Stephens

Relatively speaking, Sisyphus had it easy: one boulder, one route, up and down, with zero emissions. But for contemporary planners worried about climate change, an even more formidable task is emerging. It involves America's billion or so wheels, infinitely chaotic movements, and a stew of gases that threatens the biosphere.

The chain of events leading from transportation planning to rising oceans, crop failure and eternal spring is long and tortuous. Though tailpipe emissions have long been identified as a leading emitter of carbon dioxide, the enormity and diversity of the problem means the most direct solution—simply burning less fossil fuel—poses a challenge that is as monumental as it is ironic: The same freedom that allows American drivers to cross the continent has also given them the freedom to destroy the environment, one gallon at a time.

Nearly every sector of American industry expects to adapt itself to both ward off and come to grips with climate change. In the transportation sector, cleaner fuels and more efficient engines may cut down on emissions per mile. And yet, transportation planners are not waiting for the lab results to come in.

A furious, though still fledgling, effort has commenced to help America's drivers curtail their trips, burn less fuel and, ultimately, emit less CO^2. It involves a marriage of transportation planning, land use planning, engineering and public policy to

Josh Stephens *is a freelance journalist based in Los Angeles*

implement everything from smart growth to congestion pricing to increased use of mass transit. And if that wasn't complicated enough, it will involve every level of government, from town hall to the United Nations.

What form it will take, and what good it will do, remains to be seen. Ultimately, America's 200 million drivers and their 10 trillion annual vehicle miles traveled pose possibly the greatest collective action problem in human history. Transportation thus may be the great untapped resource—the Saudi Arabia of climate change mitigation.

NASA

Some researchers believe carbon dioxide emissions are causing the upper atmosphere to cool and contract, reducing the density of gases in the thermosphere, the layer spanning from 60 to 400 miles above the surface. According to a study by the Naval Research Laboratory, the density of the thermosphere has decreased about 10 percent over the last 35 years.

A Problem on the Move

In light of a torrent of now well-known scientific studies predicting climatic changes and social, economic and ecological tumult as a result of humans' release of CO^2 into the atmosphere, everything from legislation to moral obligation to sheer terror has focused attention on ways to avert what might be an ecological disaster.

CO^2 is by far the most prominent greenhouse gas. It accounted for 84 percent of all greenhouse gas emissions in 2005, according to the Environmental Protection Agency's annual greenhouse gas inventory. The vast majority emanates from burning fossil fuels. Of the 8 billion metric tons of annual greenhouse gas emissions in the U.S., roughly 75 percent stem from stationary sources—power plants, factories and residential and commercial buildings. The other 25 percent is literally on the move.

Among all major contributors, only transportation and electricity generation have increased since 1990, while emissions from industrial, agricultural, commercial and residential uses have remained largely flat. But whereas electricity generation is considered an indirect source—the user does not actually burn the fuel—transportation, and especially the private automobile, puts climate change in the hands of the average American.

Transportation planners used to strive for less congestion or faster flows, but overall traffic volume was a fact of life. Now the focus is shifting into reverse.

"[Transportation planning] has to be very important [in reducing CO^2]," former Clinton administration Energy Secretary Bill Richardson told *InTransition*. "You can't have a planet without energy-efficient transportation systems that emphasize commuter rail, light rail, open space and land use policies that protect quality of life."

While strategies to reduce the impact of stationary sources, mainly coal-fired power plants, are well underway, transportation's share of the problem has posed a particular challenge, which transportation planners and planning agencies have only recently begun to address but which may fundamentally change the field of transportation.

"I think it's going to be the dominating, policy-shaping issue for several decades, undoubtedly for the rest of my lifetime and for the coming generation," said Martin Wachs, director of the RAND Corporation's Transportation, Space, and Technology Program.

The magnitude of the problem, and the swiftness with which it has captured the public consciousness, is at odds with the more deliberative pace at which public policy, and even technology, tends to develop. The major economic impacts of climate change are still massing on the horizon, and the market has not yet begun to force the behavioral and technological changes needed to reduce the world's greenhouses gases.

Other Governments Not Waiting for D.C.'s Lead

By Josh Stephens

Local governments cannot secede from the planet, but many have broken ranks with Washington, D.C., in the effort to stem climate change.

Despite the near consensus on both the certainty and severity of global climate change, the federal government has issued what has been criticized as a passive response to it. The Bush administration has, until recently, cited scientific uncertainty and economic hardship as reasons for resisting the sort of nationwide action that many other countries have adopted.

"I think the United States is the only major industrialized country in which the leadership on these issues is coming from local governments and states," Martin Wachs of the RAND Corporation said. "The federal government is lagging. I do anticipate that that will change. I have to believe it will, or else we'll be in really deep trouble."

While the federal government maintains its cautious approach, more local entities are implementing their own plans. Though their individual impacts may be small, this collective effort may offer some hope.

"Any metropolitan area in the context of a global event or issue will probably have a fairly minimal effect in terms of what's going on," Georgia Tech Professor Michael D. Meyer said. "That's not to say that we shouldn't do it, because how we deal with things globally is how we deal with individual things on our own turfs."

Twenty-eight states have adopted climate change action plans, and twelve have set targets. The most ambitious goals are those mandated by California AB 32, which calls for the nation's largest state to reduce GHG emissions to 1990 levels by 2020—a reduction of about 25 percent—and then to reach a point 80 percent below 1990 levels by 2050.

Climate change has also inspired a host of nontraditional pacts and voluntary agreements. Over 200 cities have signed on to the U.S. Mayors Climate Protection Agreement, a nonbinding pact in which cities pledge to abide by the goals of the international Kyoto Accord, which the U.S. has refused to join. Meanwhile, ICLEI, an international nonprofit that helps cities achieve climate change goals, has been working with over 300 U.S. governments.

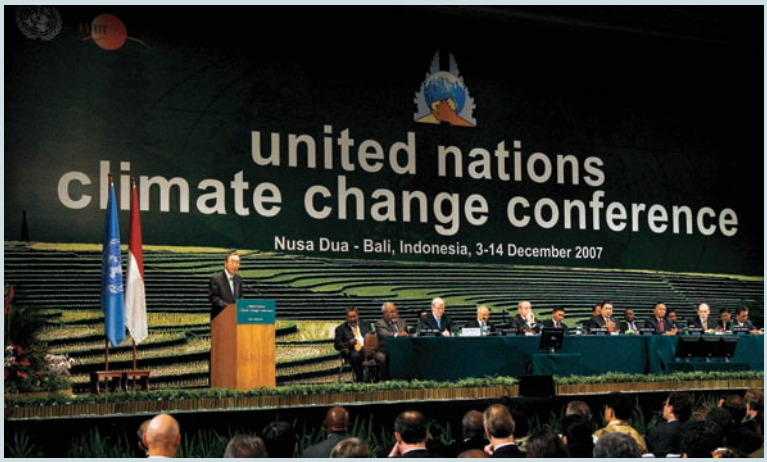
There are also no fewer than six regional multi-state pacts, such as that of the Western Governors' Association, which spans 16 states west of the Mississippi, and the Regional Greenhouse Gas initiative, which extends from Maryland to Maine. Some states have even embarked on their own independent foreign policy initiatives through international greenhouse gas accords and informal partnerships.

California Gov. Arnold Schwarzenegger discusses AB 32, a state law that mandates greenhouse gas emission standards stricter than the federal government's.

Meanwhile, at the regional level, many metropolitan planning organizations, especially on the West Coast, have begun to incorporate climate change into their planning documents because of either state mandates or simply popular pressure.

The global response has been similarly vigorous. The United Nations reaffirmed its commitment to mitigating climate change at its December Climate Change Conference in Bali. Representatives of over 180 countries, including the U.S., created a "roadmap" that will guide the creation of policy, although it will not be actionable until 2012. The Bali roadmap addresses a wide range of issues, including the reduction of greenhouse gas emissions, and is especially concerned with the effects of climate change on less developed countries. The participation of China and India was a key to generating bipartisan support among U.S. lawmakers.

"Without China and India, any global warming treaty would simply be an invitation for manufacturers to move their operations to these unregulated economies. And then where would our economy and our environment be?"



UN Photo/Evan Schneider

Dignitaries from around the world met in Bali in December to discuss global climate change.

Continued on page 29

"I think it's going to be the dominating, policy-shaping issue for several decades, undoubtedly for the rest of my lifetime and for the coming generation."

The Legislative Patchwork

Thanks in part to high-profile campaigns such as Al Gore's movie "An Inconvenient Truth," public outcry and a patchwork of state and local legislation have spurred a haphazard early effort to translate scientific consensus into action. Among the thousands of jurisdictions and public agencies responsible for transportation planning nationwide, climate change has inspired everything from passion to disinterest.

"A lot of people in the country are concerned about global warming, but I just don't think from a policy perspective a lot of areas have started to think about what to do about it," said Charlie Howard, transportation planning director at the Puget Sound Regional Council in Washington State. "There have been some early adopters that are mostly large cities."

To an extent, those early adopters are fulfilling the notion that states and local governments are supposed to be the "laboratories of democracy," and it is hoped that their actions are just a prelude to a broad federal policy, whenever it arrives.

"There's no question in my mind that local communities from coast to coast are ready to step up and meet whatever the challenge the federal government can give them," said U.S. Rep. Earl Blumenauer (D-Ore.), a former member of the House Transportation Committee and current member of the House Select Committee on Climate Change. "In fact, these communities are already ahead of the federal government. Over 750 cities have said, 'We're not going to wait for the federal government.'" (See related story on page 5)

A range of nongovernmental organizations have weighed in on climate change, and national groups such as the American Association of State Highway and Transportation Officials and the Association of Metropolitan Planning Organizations, in addition to activist organizations such as the Sierra Club, have issued warnings, reports and nonbinding recommendations relating to transportation. Legislative mandates are in the mix as well, and virtually every greenhouse gas initiative includes an explicit or implied mandate for the transportation sector to do its part to curb greenhouse gas emissions. Yet climate change mitigation is still a young field, and for all the publicity, it has only begun to seep into the consciousness of the transportation community.

"We're in that transition period of acknowledgment of the issue, integrating it into some early planning, and that's compared to actually doing something about it," said Scott Johnstone, executive director of the Chittenden County (Vermont) Metropolitan Planning Organization. "I don't think we're there yet. It takes some time to move from acknowledgement to having good plans to making different decisions."

Steve Heminger, executive director of the San Francisco Metropolitan Transportation Commission (MTC), underscored the improvisational nature of these early efforts.

"It does strike me that in this debate we're in this sort of 'ready, fire, aim' phase where people are very anxious about the subject and want to do something but don't quite know what it is," he said.

The Threefold Path

As the search for concrete strategies and proven tactics continues—almost all climate change legislation sets targets without necessarily specifying methods for achieving them—many in the transportation sector see the need for a threefold approach: improving fuel economy, lowering the carbon content of fuels and decreasing aggregate vehicle miles traveled. These

Dwight Hiscano

Transportation accounts for roughly one-quarter of carbon dioxide emissions in the U.S.

"It does strike me that in this debate we're in this sort of 'ready, fire, aim' phase where people are very anxious about the subject and want to do something but don't quite know what it is."

elements have been compared to a three-legged stool, all necessary to support an effective response to the problem.

The first two depend, in large part, on chemical and mechanical engineers, whose ingenuity, it is hoped, will lead to technological solutions that will allow current driving patterns to continue with far lower levels of carbon emissions. More strict federal standards, such as the modest corporate average fleet efficiency (CAFE) increase just signed into law, and a sorting out of the debate over appropriate alternative fuels hold promise.

Because engines and fuels are not place-based, they can have nearly universal impact, especially in a society accustomed to rapid adoption of new technologies. By contrast, any policy dealing with transportation planning and the behavior of drivers presents a challenge that would need to be replicated and tweaked thousands of times as jurisdictions devise policies to fit their respective populations and urban footprints. Georgia Tech Professor Michael D. Meyer feels that the latter solution would be "almost impossible."

"I think the real significant impact will come on the technology side, through fuels and engines," Meyer said. "If the fuels and vehicles were made cleaner and everyone would be using them, it really wouldn't be up to the individual metropolitan areas to deal with that issue."

However, others see a key role for the transportation planner in dealing with the third leg of the stool, reducing vehicle miles traveled. According to Daniel Sperling, director of the Institute of Transportation Studies at the University of California, Davis, the first substantive steps toward the planning approach have revolved around quantitative analysis, which may ultimately reveal the most efficient strategies and, in any event, may be crucial to the success of any strategy.

"There are new models and new analyses being developed that actually can measure greenhouse gases based upon floor space and traffic investments, and so on," Sperling said. "You can't do anything unless you can measure it."

Sperling said that measurement techniques may be one of the few things that localities and agencies can share as they devise plans to curb greenhouse gas emissions. Otherwise, the inherently place-based nature of transportation planning means localities will have to fend for themselves as they devise unique strategies.

The urgency and magnitude of the challenge has inspired experimentation and a host of strategies that may or may not prove to be effective in the long run. But according to Professor Reid Ewing of the University of Maryland's National Center for Smart Growth, driving habits do require attention, lest the stool topple. As work proceeds on biofuels, hybrids, natural gas, hydrogen cells and other technologies, Americans are driving more and more. Some estimates suggest that even with improved fuel economy, the continued increase in vehicle miles traveled will, by 2020, account for more than 90 percent of the nation's increase in petroleum consumption, to 19.9 million barrels per day from 13.7 in 2001.

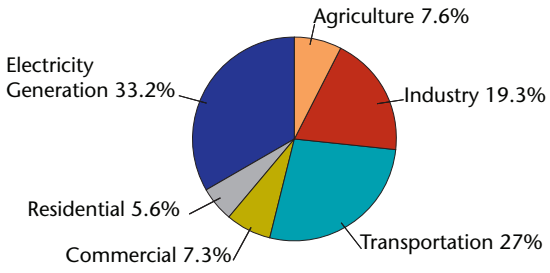
The Center for Clean Air Policy estimates that vehicle miles traveled may grow as much as 60 percent by 2050 and that even with improvements in fuels and engines, greenhouse gas emissions from cars and light trucks will grow by 12 percent in a world already producing enough to choke the planet. Therein lies the role of planners, local governments and the numerous agencies that control the nation's roads, highways and transit systems.

The Global Consequences of Sprawl

The great advantage of addressing climate change through behavior is that many of the tactics that would reduce vehicle miles traveled are the same ones urban planners have been touting as ways to make cities more functional and livable.

Continued on page 29

Sources of Carbon Dioxide Emissions in U.S.



Source: USDOT

Other Governments not Waiting, *continued from page 5*

Rep. F. James Sensenbrenner, Jr. (R-Wis.), a member of the House Select Committee on Energy Independence and Global Warming, said. "I opposed the Kyoto treaty from the start because I knew what we were getting into with that flawed agreement. Hopefully, this roadmap from Bali can start us on the path towards a more realistic and effective global emissions reduction solution."

Federal Action May Be Coming

At present, these efforts may amount to little more than experiments. They may, however, portend crucial federal legislation and a comprehensive, nationwide plan to reduce the nation's greenhouse gas emissions. U.S. emissions are currently estimated to account for 25 percent of the world's total, though analysts are wary of China's and India's growing contributions.

"This is an area that cries out for federal leadership," said Steve Heminger, executive director of the San Francisco Metropolitan Transportation Commission.

"Until that occurs, the efforts we make around the United States are going to be sporadic and unpredictable."

So far, the U.S. Department of Transportation has established a Web site discussing climate change in the broadest of terms, and the Environmental Protection Agency (EPA) maintains a greenhouse gas inventory that accounts for emissions through 2005. The recent energy bill, which Congress and the president approved at the end of last year, marks the federal government's most significant efforts to combat climate change. The far-reaching bill includes standards of 35 miles per gallon by 2020 and calls for development of alternative fuels (In nearly the same breath, the EPA denied California the right to set its own, tougher emissions standards. California filed suit against the EPA in January).

More substantive measures, however, may be in the offing. By some accounts, up to 100 pieces of legislation are under consideration in Congress, seven of which are considered truly comprehensive. Most notably, the Warner-Lieberman bill would cut national greenhouse gas emission by 70 percent by 2050 through methods such as cap-and-trade and reduced carbon content of fuels. It has already passed out of the Senate Environment and Public Works Committee.

Moreover, the next reauthorization of the federal surface transportation law (most recently incarnated as SAFETEA-LU in 2005) may include numerous provisions linking transportation funding to curbs on greenhouse gas emissions.

"The same way that in the last century, from the late 1950s well into the 1980s, the federal government was heavily subsidizing the construction of freeways and beltways that dispersed populations and drove up [vehicle miles traveled], we have an opportunity with the next reauthorization and other federal possibilities to provide federal support for projects that reduce the carbon footprint," Rep. Earl Blumenauer (D-Ore.) said.

Climate Change, *continued from page 7*

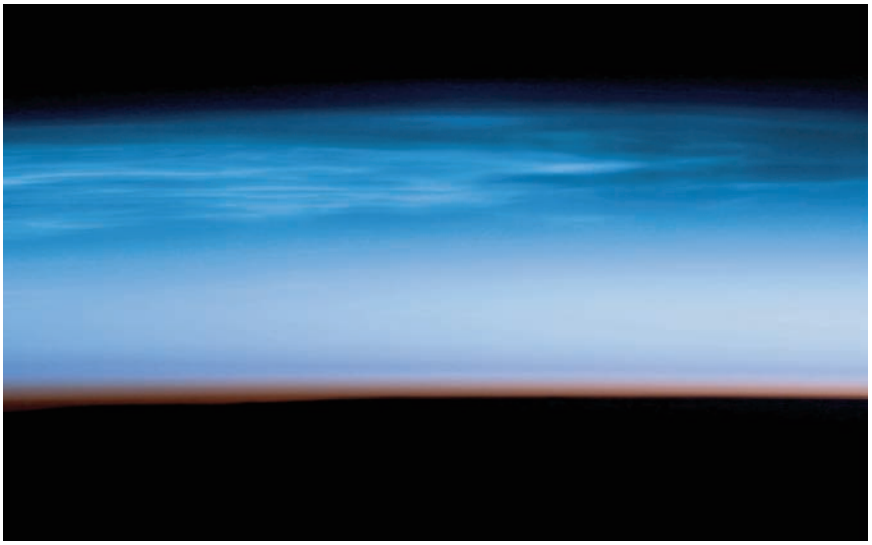
While concepts such as smart growth and its conerstones of compact development, walkability and transit-oriented development (TOD) have been goals in their own right, transportation planners are finding that they can also be invaluable tools to reduce greenhouse gas emissions.

"Smart growth/compact development is a fairly painless way of meeting climate objectives," said Ewing, who is a co-author of the recent report "Growing Cooler: The Evidence on Urban Development and Climate Change."

Transportation planners have described climate change as the force that may once and for all bring about the merger of land use planning and transportation planning; the places and the routes to them can no longer be separated now that sprawl and segregated land uses are considered one the greatest enemies of the polar bear.

"People have gotten smarter about land use planning to reduce the need to get in a car to get something done," said Norman Mineta, former transportation secretary in the administration of George W. Bush. "That's also been very slow to come about. But I think from a development perspective and from a community perspective, they're starting to come to terms with how to do it."

Studies indicate that suburban residents drive more than those in urban cores, and that a disproportionate share of the growth in aggregate vehicle miles traveled has been due to continued suburbanization. Drivers in the nation's 10 most sprawling metro areas travel an average of 27 miles per day, compared to 21 in the 10 least sprawling metros.



NASA

High in the Earth's atmosphere, thin, silvery clouds sometimes become visible just after sunset in the summer in the far northern and southern latitudes. These clouds, occurring at altitudes of about 50 miles, are called polar mesospheric clouds (PMCs). In recent years, PMCs appear to be occurring more frequently and at lower latitudes than they have in the past, and studies are underway to determine whether their occurrence is related to global climate change.

Policies aimed at cutting down on those miles, whether through transit, carpooling or development that brings homes closer to jobs, will inevitably cross jurisdictional boundaries. Building those compact cities and suburbs may require a shift away from the compartmentalized mentality that often isolates jurisdictions and bureaucracies from one another and toward a more regional one.

"Municipalities are in a position to enact policies, specifically land use and zoning policies," said Ben Rasmussen, a senior program officer with ICLEI-Local Governments for Sustainability, a nonprofit that consults local governments on mitigating climate change. "But that's only one piece of the puzzle. If you have one city enacting these policies, cities and suburbs right on their borders can have different policies that are not in line with what the city is trying to accomplish. Ideally, you get these other suburbs and cities on board to get in line with what the inner city is doing."

That often means bringing together a wide range of stakeholders, as in California's "blueprint" regional planning process, which attempts to dismantle bureaucratic walls and take a holistic look at all aspects of land use.

"It's scenario-based planning," said Gregg Albright, deputy director of the California Department of Transportation. "[Stakeholders] listen to each other's needs, which used to be adversarial, and look for some common ground and complementary areas."

At more intimate scales, local land use and transportation planning may take a page from urban planning, in which efforts to promote infill, mixed-use, TOD and walkable, bikeable development have long been underway. It is hoped this sort of development would compel residents to walk rather than drive and focus their attention on their immediate communities, whose charms will make freeway trips and gridlock less appealing.

The Enigma of Behavioral Change

The notion of quaint town centers and friendly neighborhoods that developers and planners have been espousing for years may have less resonance in a field whose primary goal has traditionally embodied the most American of American freedoms.

"The hardest part is to do anything that changes behavior, that changes human travel patterns or decisions people make to use public transit versus cars … or to use land in such a way as to encourage people to walk or bicycle and not to drive," RAND's Wachs said.

Nonetheless, the urgency of climate change has caused many planners to conclude that restrictions on mobility may be called for. Some individual state DOTs, MPOs and municipalities are considering a range of options like shifting funds to public transit, new zoning laws and limits on highway funding.

"Urban planners have been hearing about neotraditionalism and walkable communities and anti-sprawl for 20 years. They've been educated in these issues already," Ewing said. "Transportation planners are a little different. They are mostly engineers rather than planners, but they are beginning to get it."

Some agencies are pursuing market-based approaches to behavioral change, such as congestion pricing in urban cores and high-occupancy toll lanes on highways. Others believe that concerted public relations efforts would be the most efficient way to reduce the distances people drive without pouring an ounce of concrete or concocting a single regulation.

"I'm not a scientist, but if you take what they're telling us, what we need are not long-term strategies but faster-acting ones," said the MTC's Heminger. "And that's where you get into the area of transportation pricing."

But no matter how behavioral changes are pursued—pricing, market incentives or mandates—they present one of the greatest opportunities for and greatest impediments to a curb on greenhouse gas emissions.

"If we can embed behavior changes and make them the norm, and do that in increments across the country we can start chipping away at this problem," said Johnstone, of the Vermont MPO. "And people can be happier. People realize they can get to work without the stress of driving." ❑

Probes, *continued from page 18*

Dash Express has over its competitors stems from its ability to create a powerful network in which each device acts like an anonymous probe that automatically reports traffic conditions back to the Dash Driver Network," company spokeswoman Gina Aumiller Bender said.

By sharing traffic information with the Dash Driver Network, Dash can calculate travel times and speeds and provide detailed information about specific routes, she said. The Dash Express, she said, shifts the benefits from the public agencies and authorities directly to its customers by providing them with real-time traffic data. The Dash customer then has the ability to predict accurately travel times, evaluate the road conditions on alternate routes and make smarter decisions, she said.

This information aims to help ease congestion and normalize the flow of traffic by prompting drivers to take advantage of timesaving tips that promote the efficient allocation of the road. While the strength of the Dash system relies on the number of users that transmit data back to the network, it also incorporates available historical travel data to supplement the gaps in its growing network, according to the company.

As the use of transportation probe technology grows, experts say planners will have access to vast quantities of accurate and current information without having to rely on flawed and outmoded data collection practices. Government officials will be capable of providing detailed statistics to draw support for transportation projects by clearly demonstrating the need for added capacity, and drivers will be able to accurately predict when they'll arrive at their destination and see if a faster route exists. Combined, all of these advantages may enable officials to target the projects most in need of the limited funds available and generate meaningful savings by reducing overall travel times.

"DOTs can now use this data for planning purposes," Bouwer said. "Where do we see congestion increasing? Where should we build a new highway? How can we change our infrastructure to accommodate the needs of today's drivers?" ❑

Historic District, *continued from page 16*

parking garage, you're looking at the topiary," Cary said.

Cary said a little taste of the "real world" can help anyone see why historic districts deserve constant transportation improvements.

"When you spend an afternoon driving around downtown Miami, and then you come back to Miami Beach, suddenly you're back among two-, three-, four-story buildings. The trees are standing higher than the buildings. There is lots of light, lots of big sky. That's when you begin to appreciate the value of historic preservation to create livable communities," Cary said. ❑

Passengers wait to board a Miami-Dade Transit bus in Miami Beach, Fla.