

**Sustainable Transportation:
Developing a Framework for
Policy Innovation**

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Summary of Proceedings

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**Transportation Strategic Planning
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John A. Volpe National
Transportation Systems Center**

INTRODUCTION AND SUMMARY

Every nation faces a challenge to identify and implement policies that will meet the needs of the present without compromising the future.

**President Bill Clinton
On the announcement of the President's Council on
Sustainable Development, June 14, 1993**

If there is any doubt about the support of the United States for that commitment [Agenda 21], let me lay it to rest right here and now. This Administration not only supports that commitment, we intend to join with all those determined to demonstrate real leadership.

**Vice President Al Gore
Before the U.N. Commission on Sustainable
Development, June 14, 1993**

You know the demands pressing on our transportation system as well as I do....We can meet these challenges by providing "sustainable transportation"—transportation that meets the needs of this generation without compromising the ability of future generations to meet their needs.

**The Honorable Federico Peña
U.S. Secretary of Transportation
Transportation Research Board, January 12, 1994**

The 1992 Earth Summit in Rio de Janeiro, the formation at the summit of the United Nations Commission on Sustainable Development, and the announcement in 1993 of the President's Council on Sustainable Development have sparked an interest among transportation policy makers in the concept of "sustainability." At Rio, nearly 180 nations committed themselves to policies that would enable them to develop their economies while preserving the environment and the natural resources on which future prosperity depends. The U.N. Commission on Sustainable Development was created at the Earth Summit to implement "Agenda 21," the comprehensive international policy declaration to which nations of the world agreed as a pledge to global environmental action. On the first anniversary of the Earth Summit, President Clinton named the President's Council on Sustainable Development to help craft U.S. policies that will encourage economic growth, job creation, and environmental protection. The President's Council will respond to the recommendations in Agenda 21 and contribute to the U.S. plan to be submitted to the U.N. commission.

Sustainable development is development that meets the needs of the present without compromising the future. How can sustainable development be linked meaningfully to transportation planning and policies? On December 14, 1993, the Department of Transportation's Volpe National Transportation Systems Center in Cambridge, Massachusetts, held a one-day workshop to enhance the Department's understanding of the meaning, dimensions, and likely policy implications of "sustainable transportation." At the workshop, approximately 50 representatives from the research community, industry, state and local governments, environmental interests, transportation user groups, and the Department participated in a series of round-table discussions designed to identify and address key issues that underlie the new policy directions. The workshop was chaired by Richard R. John, Director of the Volpe Center.

In his opening remarks, Dr. John discussed how the Clinton Administration is reallocating some of the resources formerly devoted to defense and space research to the commercial sector. The Department's goal, he said, is to direct a portion of this funding to transportation research and development, particularly in areas such as system assessment and modeling and infrastructure renewal. He added that although the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) and other legislation has shifted much of the decision-making authority from the Federal to state and local governments, policy makers at these levels frequently lack adequate data and tools needed to evaluate policy alternatives.

Discussion leaders moderated each of the workshop's three round-table sessions: Michael Replogle, Environmental Defense Fund—*Definitions and Dimensions of Sustainable Transportation*; Daniel Sperling, University of California, Davis—*Technological Solutions for Sustainable Transportation*; and Arnold M. Howitt, Harvard University—*Institutional and Market Approaches to Sustainable Transportation*. (See Appendix A for biographies of discussion leaders and other workshop participants.) The views of the discussion leaders and participants on sustainability as it applies to transportation are summarized in the sections that follow.

DEFINITIONS AND DIMENSIONS OF SUSTAINABLE TRANSPORTATION

The nation's transportation system affords most Americans with a standard of mobility far greater than that of many in the world. Yet this mobility has come at a cost. In particular, our reliance on the automobile has had challenging consequences, including a high level of petroleum consumption, greenhouse gases and the possibility of global warming, a range of injurious health effects, land-use controversies, and a significant waste-disposal problem. These and other issues have led many to argue that our current approach to transportation is not sustainable in the long run. Of the seven goals named in the Department's Strategic Plan, issued in January 1994, one is to "actively enhance our environment through wise transportation decisions." As stated in the plan, a key departmental objective is to work with the Environmental Protection Agency, Department of Energy, state

and local governments, and metropolitan planning organizations to harmonize transportation policies with environmental concerns.

The concept of sustainable transportation embodies a constellation of values such as environmental quality, social equity, and energy efficiency. In the session on defining sustainability, participants discussed how these values might affect the ways in which transportation policy alternatives are developed, selected, and implemented. They suggested definitions of sustainable transportation that could be used to cast a policy framework and talked about the capacity of governmental institutions to develop and administer such a transportation policy. The views expressed by the workshop participants in this session reflected a number of common themes:

"Sustainability" Unites Concerns for Mobility and the Environment

One of the useful things about discussing sustainability is...that this paradigm gives us a framework in which to discuss our common interests.

Lisa Wormser, Surface Transportation Policy Project

We do need to try to find a way to build some bridges across what appear to be fairly dissimilar arguments over values and what's important....The concept of sustainability is, I think, perhaps a uniting concept that we can use to find that "win/win."

Michael Replege, Environmental Defense Fund

We clearly have to do a better job of managing the tradeoffs that are implicit in [meeting] transportation and environmental goals, and sustainability could be a very useful way of doing that.

Stephen R. Godwin, Transportation Research Board

The way we travel may need to change, but it doesn't necessarily need to mean that the level of mobility has to change.

Ross Capon, National Association of Railroad Passengers

A number of the workshop participants expressed the belief that old adversarial attitudes are starting to break down: that the differences between mobility proponents and environmentalists can indeed be resolved. As one put it, "It is not true that we must disagree." Participants felt that sustainability could be a uniting concept, one that provides a new framework for discussing common interests, such as clean air, and for managing the

tradeoffs implicit in meeting both transportation and environmental goals. Some participants stated that the United States will not necessarily have to sacrifice mobility to achieve a sustainable transportation system. Although the ways in which we travel may need to change—for instance, greater use of trains, buses, walking, car pools, and small vehicles—this does not mean that mobility will have to suffer.

Global Issues Must Be Brought Down to the Local Level

Global discussions are not going to be worth much until you can bring them down to the level at which individual communities can deal with them.

Robert T. Dunphy, Urban Land Institute

Sustainable transportation is different in different parts of the country.

Lucy Edmondson, Northeast States for Coordinated Air Use Management

Everybody has the same sort of basic human needs, but you very soon part company over what works for Cambridge and what works in a small community in Montana.

Stephen C. Lockwood, Parsons Brinckerhoff

If we link [sustainability] to a sense of community, then we start developing a policy hierarchy that says how transportation is going to contribute to improving the character of our communities and the quality of life for people.

Elizabeth Kline, Tufts University

Because many environmental problems will be resolved only through local action, participants said, policy makers should focus on bringing global and national environmental issues, such as global warming and petroleum use, down to the local level. A vision and direction are needed from the Federal Government; however, states, regions, and communities across the country are grappling with different transportation and environmental problems, and thus will require unique policy solutions. Several participants stated that, in fact, "sustainable transportation" means something different in each part of the country: What is sustainable for a community in Montana is not so for Los Angeles or Boston. One participant suggested that a sustainable transportation policy could be grounded in efforts to improve and empower local communities—to link the transportation system to improving our overall quality of life.

The Best Approach to Sustainability Is Multiple Approaches

We can't solve any of these problems with magic bullets....We need to pursue a multiplicity of strategies...dealing with technological innovation and smart systems...but at the same time applying old tried and true low-technology strategies like simply making it easier to walk and to ride bicycles.

Michael Replogle, Environmental Defense Fund

What we need to do is define levels of approaches. There are things that we can do today that don't require a paradigm shift.

Mark Primack, Commonwealth of Massachusetts

We ought to be realistic in what we can do with the infrastructure that we have in place today, because it's not going away.

Michael T. Saunders, Connecticut Department of Transportation

We are not going to be able to impose upon society what society does not want to do. We have to do those things to try to improve the environment, to try to improve transportation, but in the final analysis, it is the customers out there, the consumers, who are going to decide.

Wendell Cox, Highway Users Federation for Safety and Mobility

Participants in the workshop were almost unanimous in their agreement that it would be a mistake to pursue just one route to sustainability, for example, by focusing on demand management or on technology alone. What is needed, they said, is a broad approach, or a "matrix of approaches," that weighs the benefits of and the tradeoffs among demand management, technological improvements, land-use controls, and other strategies. Some pointed out that approaches that are often thought of as contradictory, such as advanced technology and demand management, could be in fact complementary. For instance, Intelligent Vehicle Highway System (IVHS) technologies could enable behavioral strategies such as road pricing. Another participant suggested that there is a great deal of uncertainty about the effects of the tools that we currently possess—advanced technology, market intervention, and government regulation—and that all are "relatively blunt instruments" for solving environmental problems.

Participants emphasized the need for policy makers to define "levels of approaches" to sustainability: to distinguish among what can be accomplished today, within the next several years, and over the long term. One participant pointed out that, unlike developing countries, the United States has a mature transportation infrastructure that is not likely to change very much over the next several decades. Thus, policy makers should not look to such changes for near-term improvements. Others stated that changing behavior is at best a long-range strategy and proposed that we focus instead on technology improvements and other measures that can be accomplished right away. Still other participants suggested that we not simply assume that human nature can't be changed—that although such changes may be difficult, there is still a need for such a long-term perspective.

To Be Useful, "Sustainable Transportation" Needs Some Measures

Talk without measurement is cheap.

Stephen C. Lockwood, Parsons Brinckerhoff

The notion of sustainability...is a bit amorphous and has a lot of baggage. It means to different people what they want it to mean.

Steven A. Morrison, Northeastern University

We really have to be focusing not on the end state that works, and the end state that's good, and the end state that's not bad, but [on] how...poor our tools of observation are.

Matthew A. Coogan, Independent Consultant

In suggesting a couple of metrics that we could start with, there are two things that we can do. One is that we can focus a lot more on identifying decisions that we are making by default....Another...is identifying inherently perverse decisions that don't make any sense at all.

Louis S. Thompson, The World Bank

Workshop participants concluded that there is no single, simple definition of sustainable transportation that local areas, states, or the Federal Government can use to cast a policy framework. Participants felt that the concept of sustainability is too vague, with many different meanings but no metrics. Emphasizing that "everything isn't an issue of sustainability," one participant stated that sustainable transportation means simply that we not sacrifice for today's mobility some irreversible impact on the resources available to future generations. Thus, said this participant, we need specific measures of the resources that must be sustained, at what scale, and on what timetable. Another participant agreed, suggesting

that policy makers focus on identifying and quantifying the "primary unsustainables" rather than on whether the present transportation system is good or bad.

An alternative measure of sustainability was proposed by yet another participant: the ability to choose among different modes of transportation. As this participant put it, many people who currently can't afford to drive are excluded from the transportation system; therefore, the system is not sustainable. Another participant suggested two metrics "that economists and technologists and environmentalists can agree on." The first is identifying tradeoffs that are being made. Another is identifying decisions, such as subsidized employee parking, that do not fit "anyone's definition of sustainability."

TECHNOLOGICAL SOLUTIONS FOR SUSTAINABLE TRANSPORTATION

As stated in the White House's October 1993 statement, *Technology and Economic Growth*, technology is a powerful tool for harmonizing our economic growth and environmental objectives and for making more efficient use of energy resources. Electric and hybrid vehicles, IVHS, high-speed guided ground transportation systems, and other transportation technology innovations can all contribute to a more economically productive, energy efficient, and environmentally benign transportation system.

The Department of Transportation's Strategic Plan calls for a new alliance between the nation's transportation and technology industries to accelerate technological advances that will make our transportation system more environmentally sound. Among other actions, the Department plans to accelerate the IVHS program, promote high-speed rail as a viable transportation option in select corridors, and work with auto makers and government agencies to commercialize new "clean" automobile technologies.

In this workshop session, participants discussed which technological solutions they felt would offer immediate or long-term benefits for transportation. A wide range of views was expressed on the potential of technology to solve transportation's environmental problems and lead us toward sustainability:

Sustainability Requires a Process of Continuous Innovation

An important point to keep in mind with sustainability is [that] we're not talking about a particular end state....sustainability really should be a process moving toward, in the direction of, something that's more benign, more acceptable—that is sustainable on a long-term basis.

Daniel Sperling, University of California, Davis

One of the problems with technology is [that] we look for revolutions....most of the technology areas...are going to contribute through incremental, piece-by-piece changes and benefits. And they're not revolutions.

John B. Heywood, Massachusetts Institute of Technology

Several participants emphasized that sustainable transportation does not refer to a particular end state or set of technologies. Rather, it should be viewed as a continuous process of innovation and improvement, leading to a transportation system that gradually becomes more sustainable. One participant stated that it is a mistake to look to technology for "revolutions" in transportation; that although technologies can bring incremental improvements, they are seldom revolutionary. Moreover, many participants saw a need to distinguish between immediate and long-term technology goals. Some felt that since vehicles are the element of the transportation system with the greatest turnover, immediate improvements will come from new vehicle technologies using the existing infrastructure. One participant proposed that alternative fuels, particularly natural gas, offer a specific near-term solution to many of transportation's environmental problems. As stated by this participant, natural-gas technology could be a "bridge" to hydrogen technology, which many felt held the greatest long-term potential. Another participant said that small vehicles would be key to transportation system sustainability, starting with battery-powered electric and hybrid vehicles and ultimately leading to hydrogen vehicles powered by solar energy.

It Is Technology's Impact That's Important, Not Technology Itself

[It] isn't the technology, it's the impact of technology on how you live, how you work, when you do things.

Stephen C. Lockwood, Parsons Brinckerhoff

When we focus our technology effort, we ought to be very careful to identify those technologies that support better policies and better decision making and better implementations.

Louis S. Thompson, The World Bank

Before we have the technology to measure the impacts of what we're doing, we're not going to get very far.

Lisa Wormser, Surface Transportation Policy Project

The role of technology in really changing the transportation system is vastly overrated....technology can give you a sizeable piece of what you want. But it really isn't the big piece. The big piece is...very different and has very little to do with technology.

John B. Heywood, Massachusetts Institute of Technology

Participants agreed that it is the impact that a technology has on transportation system sustainability, and not the technology itself, that is of interest to policy makers. According to one participant, technologies that facilitate better policies and decision making, for example, advanced information systems, will have a more lasting effect than "hardware"-related technologies such as alternative fuels or new vehicle designs. Another felt that one of our primary needs is for technologies that help us to evaluate the consequences of past decisions. And still others argued that technology's role in changing the transportation system is overrated: that most benefits will come from institutional or behavioral approaches, and that technological "fixes" may actually undermine efforts to change travel behavior.

The majority of workshop participants felt that information and communication technologies would make the greatest contribution to sustainability, because they would enable strategies to manage demand and to monitor transportation's environmental and energy impacts. As stated by some, advanced information and communication systems could be used to support transportation policies such as congestion pricing and telecommuting. They also would facilitate decision making through real-time management of operations, efficient maintenance of the infrastructure, and onboard and roadside pollution monitoring. One participant felt that very small vehicles could be an enabling technology that provides a catalyst for reshaping our transportation system and our communities.

There Is a Need for Greater Diversity Among Transportation Technologies

We've become fixated on a model and a certain set of technologies,...mostly an automobile-based system, which has restricted experimentation...with not only different types of automobiles—small or large or different propulsion systems—but which restricts us from moving also into new modes of...transit technologies.

Daniel Sperling, University of California, Davis

While the majority of the people drive to the plant in one person per car, a brave few are coming in eight persons per car. And I think as we create something called the gas-powered vehicle or a special vehicle...with special communications or special energy...let's keep in synch and remember we're still trying to encourage those brave people who are willing to come in a car pool.

Matthew A. Coogan, Independent Consultant

The case for transit is that when you add capacity, you do it in a way that gives more people more choices and is the least environmentally damaging.

Ross Capon, National Association of Railroad Passengers

It is a real leap of faith to presume that building a rail line next to a freeway adds capacity.

Wendell Cox, Highway Users Federation for Safety and Mobility

Most participants felt that there is a need for far greater diversity among the types of transportation technologies that are available. For instance, according to some, there is today an opportunity and a market for an alternative to the large automobile, namely, for small, lightweight, low-speed, low-performance neighborhood electric or hybrid vehicles used for shopping or commuting. Other participants proposed alternatives to this small-vehicle vision. One suggested that emphasis also be placed on redesigned multipassenger vehicles powered by natural gas or other clean fuels. Another emphasized technology improvements that would allow vehicles to be easily disassembled and adapted to new uses or recycled. And still others stated that transit and rail technologies are just as important to sustainability as automobile technologies, because they provide people with greater choice and are less environmentally damaging. One participant suggested that high-speed rail, for example, has great potential in certain corridors to reduce the growth in air traffic for short distances, a source of rising energy use. Another, however, argued that a high-speed-rail system would not increase capacity, because it would not attract enough riders.

Transportation Technologies Should Follow a "Soft Energy" Path

I think it's important that if everyone looks at the electric vehicles and sees nothing coming out of a tailpipe, or [they] don't see any tailpipe at all...somewhere there's usually a smoke stack or nuclear plant or some hydro plant that's damaging the pristine wilderness up in Canada.

Robert E. Nyman, Brooklyn Union Gas Company

If you look 20 and 30 years out, and we're really talking a billion or more motor vehicles on the earth, we clearly can't sustain that with petroleum. That then begins to lead to the concept, in 20-30 years, of a hydrogen society.

Richard R. John, Volpe National Transportation Systems Center

You have to believe that the market has made some very sound choices, that today's propulsion systems and fuels are by far the easy economic winners in today's market conditions.

John B. Heywood, Massachusetts Institute of Technology

Are you sure that production of hydrogen and the handling of hydrogen is not going to have major impacts that nobody has thought about?

Louis S. Thompson, The World Bank

Electric technologies will be key to reducing transportation-related air pollution, greenhouse gases, and petroleum use. However, several participants questioned what the source would be of the electrical energy needed for a non-carbon-burning transportation system. As one participant put it, electric vehicles will not lead us any closer to sustainability than we are now if their electrical power comes from plants burning fossil fuels: Electric vehicles will not be pollution-free until they rely on solar or some other nonpolluting technology.

Many participants felt that the most critical new technologies would be those that follow a "soft energy" path, ultimately leading to hydrogen or electric technologies that capture energy from wind, wave, or solar power, or from some other renewable source. However, at least one participant disagreed, stating that because petroleum is by far the cheapest fuel on the market, we are not likely to accept alternatives. Another participant countered that alternatives to petroleum only appear to be expensive because we're not currently paying the full price of our heavy petroleum use. And yet another participant

questioned the possible unforeseen consequences of producing hydrogen or solar cells on a massive scale.

INSTITUTIONAL AND MARKET APPROACHES TO SUSTAINABLE TRANSPORTATION

The traditional approach to mitigating transportation's effects on the environment and energy use has been to pursue technological solutions. However, many feel that given the complexity and scope of today's problems, technology alone will not be enough to solve them. Institutional and market approaches seek to modify travel behavior by levying the true costs of automobile use and other transportation modes. Policies such as congestion pricing, parking restrictions, and high-density land use aim to stop environmental degradation while redistributing transportation costs and benefits throughout society.

Issued in October 1993, the Clinton–Gore *Climate Change Action Plan* includes initiatives to "curb growth in transportation sector emissions by slowing the growing demand for vehicle travel and enhancing the market for more efficient technology and cleaner fuels." The Administration is preparing legislation that gives workers the option of receiving the cash value of employer-paid parking; has directed the Environmental Protection Agency, in consultation with the Department of Transportation, to identify the air-quality benefits of strategies to reduce vehicle-miles traveled; and has asked the Department of Transportation to institute a tire-labeling program to help consumers identify tires that improve fuel economy. Moreover, as stated in its Strategic Plan, the Department will "promote congestion reduction and demand management strategies in metropolitan areas and on our nation's highways" and "encourage and reward efforts by state and local governments to integrate transportation and surrounding land uses."

Participants in this workshop session discussed a range of market-based policies that promote the values embodied in sustainable transportation. They addressed the potential cost of these policies to mobility and the barriers and opportunities presented by existing institutions. The following themes summarize participants' views on institutional and market approaches:

Market Approaches Face Tough Political Obstacles

For about 30-odd years we've been talking about pricing policies, and we still haven't figured out a way to actually get them on the road in the United States.

Arnold M. Howitt, Harvard University

With congestion pricing, we can all probably agree around the table here...that this is a great thing. If we go out to the general public, we get 100 people in a room, 100 people will reject the idea. We're talking to ourselves.

Michael T. Saunders, Connecticut Department of Transportation

We need to figure out a way of...cashing out the dividends by distributing them back to the community to everybody, regardless of whether they drive or not, and then charging those who do drive more.

Michael Replegle, Environmental Defense Fund

Several participants felt that market-based incentives aimed at internalizing transportation's social and environmental costs are among the most powerful tools at our disposal for moving toward a sustainable transportation system. Fees and incentives such as congestion pricing, higher gasoline taxes, and employee-parking cashouts, they said, would still give people the freedom to make choices while sending clearer signals about the implications of these choices. However, many at the workshop pointed out that despite these benefits, there are formidable political obstacles to adopting and implementing pricing policies. States and metropolitan areas have shied away from such strategies, except as a source of revenues. Concern about inequitably placing a burden on lower income people is one reason for this reluctance. Moreover, as some participants put it, although transportation economists may agree that pricing strategies are a good thing, they are not plausible politically because the public sees them as "punishment." One participant felt that people must be given adequate information and time to adjust to such policies. Another stated that people's objections could be overcome by redistributing the dividends gained to everyone who lives in a community. In this way, a political constituency could be created in favor of market-based strategies.

Pricing Strategies Need Local Support

This is going to have to proceed in fairly small steps, and it's going to have to come from local areas working through public outreach programs to develop some consensus about these kinds of strategies. And they are going to be incremental. They are not going to be...mandated from the Federal level.

Gary E. Maring, Federal Highway Administration

There are a lot of problems which we really shouldn't solve at the national level. We must solve [them] at the local level because that's the only place that you can really make rational decisions.

Louis S. Thompson, The World Bank

To say that these are things that are going to have to be done locally, which means idiosyncratically, and incrementally is to say we don't have the faintest idea how this is going to work.

Arnold M. Howitt, Harvard University

Some participants felt that since regions' and cities' infrastructure and travel demands vary so greatly, it is likely that any pricing strategies would have to be initiated at the regional level. One participant stated that, because ISTEA gives local areas flexibility to design their own solutions, pricing policies will not be mandated at the Federal level but will proceed in small steps through local outreach efforts. Another participant suggested that an insistence on uniformity undercuts the needs of regions to experiment. And yet another proposed that the local level is the only level at which reasonable political decisions can be made and consensus reached on transportation policies.

At least one participant disagreed with the emphasis on local initiative, however, stating that to insist that things be done "locally" or "incrementally" is to say that we have no strategy for success. Another participant noted that ISTEA actually calls for a two-way flow in terms of decision making: not either local control or Federal control, but both. As explained by this participant, different policy directions come from local areas into the "center," where a consensus may be reached and the policies imposed. ISTEA thus sets the stage for the political acceptability of pricing policies.

Land-Use Policies Have Political and Institutional Barriers

In thinking about specific policies to regulate land use...there's a clear tradeoff between policies that would have substantial impacts and [the] political feasibility of those policies. The easiest ones to do politically are likely to be the ones that are going to have the least impact.

Arnold M. Howitt, Harvard University

One important dimension to the land-use issue is where you're going to accommodate the growth. Where will you accommodate the first[-time] home buyer, for example?

Robert T. Dunphy, Urban Land Institute

We are always discussing land-use controls in terms of imposing land-use controls in order to get what we want...in many cases, we're already imposing many more land-use controls than we need to. It's not so much a matter of imposing higher densities in many areas as removing the prohibitions to higher densities.

Lisa Wormser, Surface Transportation Policy Project

Many participants agreed that land-use controls that encourage denser development and limit urban sprawl would contribute to sustainability by making alternatives to the private automobile more feasible. However, as suggested by some, such controls may be difficult to implement for several reasons. For one, land-use controls, such as zoning regulations, are dependent on changing people's attitudes regarding where they live, work, and shop. Moreover, because land-use authority is decentralized and fragmented, such policies would involve a multitude of individual decisions by numerous local government bodies. One participant questioned the feasibility of increasing city densities when most affordable housing is located several miles away. Another pointed out the problem of crime in many city centers.

Other workshop participants were more optimistic about land-use strategies. As many of them stated, land-use "control" doesn't necessarily mean imposing greater restrictions on land use than there are today. In fact, said these participants, we are already imposing more controls than we should: What's needed is not to impose requirements for higher densities but to remove restrictions on them. One participant suggested that there are changes in land-use policy that could be made easily within the next 5 years, such as allowing accessory apartments in single-family homes and removing restrictions against small retail stores in residential neighborhoods. Other participants agreed, proposing that the most successful land use is generally mixed land use.

APPENDIX A – PARTICIPANT BIOGRAPHIES

Steven J. Allard

Director, Utilities and Transportation Group, Public Finance, Financial Guaranty Insurance Company

Steven J. Allard has an extensive background in the areas of transportation and utility analysis and is Financial Guaranty's lead analyst, and a recognized industry expert, on transportation and solid waste/resource recovery financing.

Mr. Allard joined Financial Guaranty Insurance Company in 1984 as an Associate in the Risk Management Department and was named Assistant Vice President in 1986. He was promoted to his current position of Vice President in 1988.

From 1980 until 1984, Mr. Allard was an energy analyst with the New Jersey Department of Energy. He has also held positions with the New York City Legislative Office of Budget Review and the Center for Urban Policy Research.

Mr. Allard holds a B.A. degree in environmental studies from the State University of New York at Stony Brook and a master's degree in city and regional planning from Rutgers University.

Ross Capon

Executive Director, National Association of Railroad Passengers

Ross Capon joined the staff of the National Association of Railroad Passengers in 1975 and became executive director in 1976. He edits the association's monthly newsletter, testifies before Congressional committees, and regularly talks with the news media about the United States' need for a balanced transportation system that takes much greater advantage of the rail mode than does our present system. He contributed the chapter, "New Directions in Transportation Policy," to a book, *Winning America: Ideas and Leadership for the 90s*, published in 1988 by South End Press and the Institute for Policy Studies. In November 1989, he testified in Ottawa before the Standing Committee on Transport of Canada's House of Commons; a month later, he addressed a conference on rail passenger service sponsored by Canada's mayors. He has appeared on NBC's *Today*, ABC's *Good Morning America*, the *CBS Evening News*, and the *McNeill/Lehrer Newshour*.

From 1971 to 1975, Mr. Capon worked on rail matters as a special assistant to Massachusetts Secretary of Transportation and Construction Alan Altshuler (who served under Governor Francis W. Sargent). During this period, he devoted considerable time to helping make the case for retaining Greater Boston's commuter rail system, whose future was then a subject of much debate.

Mr. Capon holds a B.A. in history, with minors in economics and music, from the University of Illinois (Champaign-Urbana), from which he graduated in 1969.

Matthew A. Coogan

Independent Consultant

Matthew A. Coogan is currently a consultant in transportation specializing in the planning and management of large-scale projects, with particular focus on multimodal and intermodal issues. He graduated from Harvard College in 1969 and later served as a Loeb Fellow in Advanced Environmental Studies at Harvard's Graduate School of Design. He has been a frequent lecturer at Harvard, the Massachusetts Institute of Technology, and Boston University. Mr. Coogan's career started in the Massachusetts Bay Transportation Authority (MBTA), where he rose to become Assistant Secretary for MBTA Planning for the Commonwealth of Massachusetts. Between 1970 and 1972, he helped to establish and served on the Boston Transportation Planning Review, the first major multimodal transportation study in the United States.

From 1979 to 1983, Mr. Coogan worked for the Boston Redevelopment Authority on issues of downtown development and seaport access, and served as Project Manager for the South Station Intermodal Transportation Center. Between 1983 and 1991, he served as Undersecretary of Transportation for the Commonwealth of Massachusetts and as Project Director of the Central Artery/Third Harbor Crossing Project, the largest urban highway construction project in the world. In this role, Mr. Coogan was responsible for the design and planning of the highway and the coordination of airport and seaport access planning in the region. During that period, he also helped to establish and served as Co-chairman of the Coalition of Northeastern Governors Task Force on High Speed Rail. He was appointed by the National Academy of Sciences to both the Committee on High Speed Ground Transportation and the Committee to Critique the National Maglev Initiative. He has lectured on transportation issues throughout the United States and in Europe and Asia. He has been featured in *Engineering News Record*, *The New York Times*, and *The Washington Post*, and has appeared on the *Today* show, CBS News, and National Public Radio.

Wendell Cox

Independent Consultant

Wendell Cox is a consultant representing the Highway Users Federation for Safety and Mobility. He has completed transportation projects in the United States, Canada, Europe, Australia, and New Zealand.

From 1977 to 1985, Mr. Cox served as the City of Los Angeles representative to the Los Angeles County Transportation Commission.

He has chaired two committees of the American Public Transit Association.

Robert T. Dunphy

Senior Research Director, Urban Land Institute

Robert T. Dunphy is Senior Director in the Research Department of the Urban Land Institute (ULI), an independent, international nonprofit research and education organization dedicated to improving the quality of land-use planning and development. He is currently directing a ULI research effort evaluating transportation, urban form, and air quality, as well as developing land-use and economic development criteria for new rail systems, to be used by the Federal Transit Administration. His research on best national practices in transportation and land use for growing areas has been widely distributed by ULI as "12 Tools for Improving Mobility and Managing Congestion." Mr. Dunphy was the author of "Myths & Facts about Transportation and Growth," one of ULI's most widely distributed publications. He has held prior positions as a consultant at PRC Engineering, in the public sector at the Metropolitan Planning Organization in Washington, D.C., and in teaching at the University of Maryland.

Mr. Dunphy received a bachelor's degree in civil engineering from the Catholic University of America and an M.S. in civil engineering from Texas A&M University.

Lucy Edmondson

Transportation Planner, Northeast States for Coordinated Air Use Management

As Transportation Planner at Northeast States for Coordinated Air Use Management (NESCAUM), Lucy Edmondson conducts research and analysis in several aspects of transportation and air-quality planning, including trip-reduction strategies, increasing the efficiency of public transportation, transportation conformity, and the long-term coordination of air-quality and transportation plans. One particular area of focus is the implementation of the Federally mandated ECO program.

Before joining NESCAUM, Ms. Edmondson worked with the Union of Concerned Scientists for 4 years, where she managed educational programs regarding national energy and security policy. She received a B.A. from Bowdoin College and a master's degree in environmental policy from Tufts University.

Stephen R. Godwin

Study Director, Transportation Research Board, National Research Council

Stephen R. Godwin has been with the Transportation Research Board (TRB) since 1983, where he has managed and staffed National Research Council policy studies at the request of Congress and the Executive Branch. TRB is a major unit of the National Research Council, which, in turn, is the operating agency of the National Academy of Sciences and the National Academy of Engineering. Mr. Godwin is currently managing a study on urban transportation congestion pricing for the Federal Highway and Transit Administrations. He has directed several TRB policy studies, most recently on airline deregulation and on landside access to U.S. ports. Mr. Godwin has also served as a staff member for policy studies on maximum speed limits, twin trailer trucks, weight limits for heavy trucks, highway design for trucking productivity, and the Federal Employee's Liability Act. Before joining TRB, Mr. Godwin was a Research Associate at the Urban Institute in Washington.

John B. Heywood

Sun Jae Professor of Mechanical Engineering, and Director, Sloan Automotive Laboratory, Massachusetts Institute of Technology

John B. Heywood did his undergraduate work in mechanical engineering at Cambridge University and his graduate work at the Massachusetts Institute of Technology (MIT). He then worked for the British Central Electricity Generating Board on magnetohydrodynamic power generation. Since 1968 he has been on the faculty in the Mechanical Engineering Department at MIT, where he is now Director of the Sloan Automotive Laboratory and Sun Jae Professor of Mechanical Engineering. His current research is focused on the operating, combustion, and emissions characteristics of internal combustion engines and their fuels requirement. He is involved in studies of automotive technology and the impact of regulation. He is also working on issues relating to engine design and manufacture in MIT's Leaders for Manufacturing Program; he was Engineering Co-Director of the Program from 1991 to 1993. He has published over 130 papers in the technical literature and has won several awards for his research publications. He holds an Sc.D. degree from Cambridge University for his published research contributions. He is the author of a recently published major text and professional reference, *Internal Combustion Engine Fundamentals*. In 1982 he was elected a Fellow of the Society of Automotive Engineers. He is a consultant to the U.S. Government and to a number of industrial organizations.

Arnold M. Howitt

Executive Director, Taubman Center for State and Local Government, John F. Kennedy School of Government, Harvard University

Arnold M. Howitt specializes in state and local public management and intergovernmental relations. He is the author of *Managing Federalism* (CQ Press, 1984), a study of the Federal grant-in-aid system, and co-author and co-editor of *Perspectives on Management Capacity Building* (SUNY Press, 1986). He is also a contributor to *Regulation for Revenue: The Political Economy of Land Use Exactions* (Brookings Institution, 1993). He earned a B.A. from Columbia University (1969) and an M.A. (1971) and Ph.D. (1976) in political science from Harvard University.

Dr. Howitt has written widely about transportation and urban physical development issues. Among current research activities, he is studying transportation and air-quality policy making in the Federal Government and in several metropolitan areas under the 1990 Clean Air Act Amendments. He is also working on a study of innovation in transportation, with a focus on the adoption and implementation of advanced traffic management systems, a component of IVHS, in Los Angeles and Anaheim, California. Recently, Dr. Howitt co-authored a report, *The Prospects for Private Rail*, which examines proposed private sector financing and development of rail transportation infrastructure in Boston, Massachusetts; Fairfax County, Virginia; and Orlando, Florida.

Richard R. John

Director, Volpe National Transportation Systems Center

Richard R. John is Director of the U.S. Department of Transportation's John A. Volpe National Transportation Systems Center. Located in Cambridge, Massachusetts, the Volpe Center supports the Department of Transportation and other Federal agencies, including the Environmental Protection Agency and the Departments of Energy, Defense, and Justice, by providing technical and management support to leading-edge technology development efforts in transportation, logistics, information systems, and related fields.

As Director of the Volpe Center, Dr. John served as the Department's representative on the Source Evaluation for the Technology Reinvestment Project, administered by the Advanced Research Projects Agency. He also directly supported the Secretary of Transportation's National Transportation Policy Initiative. In the late 1970s, he completed a series of ground-breaking studies on the international competitiveness of the American automobile industry. His contributions to the Department have been recognized by three Secretarial and one Presidential Rank Meritorious Executive Awards. In addition, he received the Federal Government's highest civil service award, the Distinguished Presidential Rank Award, from President Bush in a White House ceremony in January 1991. Prior to his Government service, which started at the Volpe Center in 1970, Dr. John was the Director of the AVCO Applied Research Laboratory in Wilmington, Massachusetts.

Elizabeth Kline

Director, Consortium for Regional Sustainability, Center for Environmental Management, Tufts University

Elizabeth Kline joined the Center for Environmental Management (CEM) in January 1992 to establish and become the first director of a new program, the Consortium for Regional Sustainability. The Consortium is an alliance of four organizations (Tufts University/CEM; Northeast States for Coordinated Air Use Management; the Council of State Governments/Eastern Regional Conference; and Atlantic Center for the Environment/Quebec Labrador Foundation) dedicated to creating innovative projects that contribute to a sustainable way of life in the northeastern United States and eastern Canada. The Consortium brings together government officials, environmental regulators, academics, and nongovernmental organizations to promote cooperative and integrated solutions to the region's environmental, energy, transportation, and economic development problems. The Consortium is involved in a variety of projects, such as assisting northeastern state hazardous-waste-siting officials in improving their siting processes, defining the elements of a "sustainable community," and seeking market-based incentives for promoting electric vehicles and alternatives to cars in the northeastern United States.

Prior to joining CEM, Ms. Kline was an Assistant Secretary in the Massachusetts Executive Office of Environmental Affairs. For 12 years, she held top policy positions in this office and was responsible for guiding state policies and programs in the areas of water resources, acid rain, land use/sustainable development, and global climate response.

Ms. Kline is a leading authority on state environmental issues and has spoken extensively on her areas of expertise. She co-taught a course on water resources through the Massachusetts Bay Marine Studies Consortium. She has received numerous awards, including the Environmental Achievement Award (1990), the Distinguished Leadership Award (1990), the WBZ/MAPC Time-to-Care Award (1991), and NEDA's Award for Achievement in Environmental Education (1992).

Ms. Kline has an undergraduate degree in political science from Boston University, a master's degree in urban planning and public administration from New York University, and a master's in geography (water resources emphasis) from Boston University. In addition, she was a Summer Fellow at Manchester University in England.

Stephen C. Lockwood

Vice President, Parsons Brinckerhoff

Stephen C. Lockwood is a Vice President of Parsons Brinckerhoff (PB), leading the firm's program development activities in the areas of public/private partnerships in Intelligent Vehicle Highway Systems, highway development, and congestion management. Parsons Brinckerhoff is the nation's largest transportation design firm.

Prior to joining PB, Mr. Lockwood served for 3 years as the Federal Highway Administration's (FHWA) Associate Administrator for Policy. In that position, he oversaw policy development and new legislation, as well as strategic studies and international programs. Mr. Lockwood led the FHWA Task Force that developed the initial 1991 surface transportation legislative proposal. He was the Administration's chief spokesman for public/private partnerships.

During the 2 years before joining FHWA, Mr. Lockwood directed the Transportation 2020 Alternatives Group, a newly organized coalition of national interest groups dedicated to reshaping national transportation policy for the 21st Century.

Prior to his national policy focus, Mr. Lockwood served as Vice President of a major national and international consultancy. Over a 15-year period, he directed a broad range of major transportation projects nationwide and specialized in leading multidisciplinary teams resolving major highway and transit controversies. He also developed innovative transportation/land use and urban design solutions for rapidly growing suburban areas.

Overseas, Mr. Lockwood served as Resident Manager for the planning of the new capital city of Nigeria and directed a number of urban infrastructure and service studies for developing countries in West Africa, the Middle East, and Southeast Asia.

Mr. Lockwood is a member of the Transportation Research Board and IVHS America, lectures widely, and has written many journal articles. He was educated at Harvard University and the University of Pennsylvania in architecture, urban planning, and transportation planning.

Gary E. Maring

Federal Highway Administration

Steven A. Morrison

Professor of Economics, Northeastern University

Steven A. Morrison is Professor of Economics at Northeastern University. He has also held positions at the University of British Columbia (Assistant Professor), the London School of Economics (academic visitor), and the Brookings Institution (visiting fellow).

Dr. Morrison's research and professional interests lie in the area of transportation economics in general and air transport economics in particular. The author of numerous articles on transportation policy and deregulation, Dr. Morrison was an author (with Clifford Winston) of *The Economic Effects of Airline Deregulation*, published by the Brookings Institution in 1986. He and Dr. Winston are currently completing *The Evolution of the*

Airline Industry, also to be published by Brookings. He has served as a consultant to the governments of the United States, Canada, and Nepal on aviation matters.

Dr. Morrison received his B.A. in economics from the University of Florida in 1973, where he was elected to Phi Beta Kappa. He received his Ph.D. in economics in 1979 from the University of California, Berkeley.

Robert E. Nyman

Manager, Natural Gas/Clean Vehicles, The Brooklyn Union Gas Company

Robert E. Nyman has been with the Brooklyn Union Gas Company for 14 years. During that period, he has held a wide variety of positions in the company's Distribution, Engineering, Customer Service, Fleet Services, and Research, Development and Demonstration Areas. Mr. Nyman has recently been promoted to the position of Manager of Natural Gas/Clean Vehicles with Brooklyn Union's Business and Product Development. His previous position was that of Principal Engineer for Gas Utilization Technologies with Brooklyn Union's Research, Development and Demonstration Area. Mr. Nyman has been involved with natural gas vehicles (NGVs) for over 10 years, and presented a poster session on NGV emissions testing results at the November 1990 Osaka Gas R&D Forum in Japan.

Mr. Nyman received a bachelor's degree in civil engineering from the Cooper Union in New York City in 1979, and an M.B.A. in business economics from Pace University in 1987. He is a member of the American Gas Association, the Society of Gas Engineers, and the Natural Gas Vehicle Coalition.

Mark Primack

Commonwealth of Massachusetts

Michael Replogle

Co-Director, Transportation Project, Environmental Defense Fund

Since October 1992, Michael Replogle has been Co-Director of the Environmental Defense Fund's (EDF) Transportation Project, based in Washington, D.C. He is responsible for development of EDF efforts to promote effective regional enforcement of the Clean Air Act and ISTEA transportation reforms in major metropolitan areas. He provides technical assistance, oversight, and guidance to local, regional, state, and Federal agencies and others on the evaluation of transportation-related environmental problems. Working with top experts in travel demand modeling, senior planning staff, and elected officials, he seeks to mobilize resources and expertise to advance the state of the art and practice in travel demand and impact analysis for short- and long-range planning. He works with senior environmental attorneys on transportation-related legislative, regulatory, and litigation strategies. By

providing technical assistance for long-range-plan scenario development and evaluation, he helps advance analysis of alternative transportation, land use, pricing, and urban design policies and investments.

Mr. Replogle is a former Transportation Research Associate of Public Technology, the technical arm of the U.S. National League of Cities, and author of the book, *Bicycles and Public Transportation*, and of more than 150 articles and reports on urban transportation policy and planning. He has conducted extensive research on transport systems and policies in the Americas, Asia, and Europe. Mr. Replogle holds an M.S.E. and B.S.E. in civil and urban engineering and a B.A. in sociology, all from the University of Pennsylvania. He has been a visiting lecturer at MIT and Cornell University, and frequently addresses conferences and seminars on a range of topics related to transportation and land-use coordination, growth management, computer transportation modeling, and analytic methods.

Michael T. Saunders

Deputy Commissioner for Policy and Planning, Connecticut Department of Transportation

As Deputy Commissioner for Policy and Planning in the Connecticut Department of Transportation, Michael T. Saunders oversees the development of the Department's capital investment budget, totalling approximately \$750 million a year, and coordinates transportation systems, intermodal, and environmental planning. Mr. Saunders previously worked for the Federal Highway Administration in the areas of transportation planning and project development, rising to the position of the agency's national specialist for project-level environmental planning and compliance. He has also worked for the Organization for Economic Cooperation and Development in Paris, France, where he coordinated scientific expert groups from 24 countries in specific high-priority transportation research activities.

Mr. Saunders has a bachelor's degree from Trinity College in Hartford, Connecticut, and master's degrees in urban and environmental planning (the University of Virginia) and civil engineering (Michigan State University).

Daniel Sperling

Professor of Environmental Studies and Transportation Engineering, University of California, Davis

Daniel Sperling is a Professor of Environmental Studies and Transportation Engineering and Founding Director of the Institute of Transportation Studies at the University of California, Davis (ITS-Davis). He is a North American editor of *Transport Policy* and a member of the editorial boards of three other energy and transportation journals. He is the current and founding chair of the Alternative Transportation Fuels Committee of the Transportation Research Board of the National Research Council, and a member of many advisory and steering committees. He is co-manager of an international study, "The Future of

Motor Vehicles in an Environmentally-Constrained World," funded by international automotive and oil companies and the U.S. Department of Transportation.

Professor Sperling has authored or co-authored almost 100 technical papers and four books in the last 12 years on transportation, energy, and the environment. He has testified numerous times before the U.S. Congress and various government agencies and given many keynote presentations and invited talks around the world.

Prior to obtaining his Ph.D. from the University of California, Berkeley, Professor Sperling worked for the U.S. Environmental Protection Agency for 2 years, and as an urban planner in the Peace Corps in Honduras for 2 years.

Louis S. Thompson

Railways Adviser, The World Bank

As Railways Adviser for The World Bank in Washington, D.C., Louis S. Thompson consults in all of the Bank's railway lending activities and develops reports and policy positions. He is currently engaged in research on the usage of energy in transport.

Prior to joining The World Bank, Mr. Thompson worked for the Federal Railroad Administration (FRA) of the U.S. Department of Transportation (DOT) as Director for the Northeast Corridor Improvement Project (NECIP); Associate Administrator for Intercity Services; Associate Administrator, Passenger and Freight Services; and Associate Administrator for Policy. In these positions, Mr. Thompson was responsible for such projects as NECIP, the Amtrak budget, high-speed-rail studies, and FRA policy development.

Mr. Thompson also served as an economic consultant with Barber Associates in Washington, D.C.; as a Policy and Budget Analyst in the U.S. DOT Office of the Secretary; and as an engineering consultant with the Badger Company, Inc., Cambridge, Massachusetts.

He received a B.S. degree in chemical engineering from MIT in 1963 and an M.B.A. from Harvard University in 1965.

Jane Warren

Director of Research and Acting Co-Executive Director, Health Effects Institute

At the Health Effects Institute (HEI), Jane Warren works with a committee of scientists and staff to develop and oversee a broad extramural research program on the health effects of motor vehicle emissions. Funded 50–50 by the U.S. Environmental Protection Agency and 28 U.S. manufacturers or marketers of motor vehicles, HEI's mission is to develop information that will provide a sound basis for regulation.

Ms. Warren holds a Ph.D. in biology from Princeton University.

Lisa Wormser

Surface Transportation Policy Project

