



NATIONAL RESEARCH AGENDA FOR TRANSPORTATION AND SUSTAINABLE COMMUNITIES

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16. Abstract This Plan, prepared by DOT for the NSTC Committee on Technology, serves as a benchmark for the future interagency cooperative efforts to optimize essential government research toward the attainment of critical aviation and air transportation goals. This report represents a broad new consensus among FAA, NASA, and DOD as to aviation goals agency roles in R&D to support civil aviation, and provides the foundation for developing more-integrated program plans in the future. This document provides an overview of the full spectrum of aviation research in the context of long-term objectives and programmatic structures. It is an important element in implementing the formal R&D partnership established between FAA and NASA in October 1998.					
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National Research Agenda for Transportation and Sustainable Communities

September, 1999

prepared by:

**National Science and Technology Council
Committee on Technology
Subcommittee on Transportation Research and Development
Transportation and Sustainable Communities Team**

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In its 1997 *Transportation Science and Technology Strategy*, the NSTC Committee on Transportation Research and Development called for development of Strategic Partnership Initiatives in a number of areas, including sustainable transportation. An interagency *Transportation and Sustainable Communities Team* has been formed to develop plans for research investments in this area. The Team's first phase of work defined a framework for sustainable transportation and describing current interagency research using that framework. This *National Research Agenda for Transportation and Sustainable Communities* documents the second phase in an evolutionary process to coordinate Federal research activities related to transportation and sustainable communities, and to identify and realize new opportunities for partnerships on multiple levels. It should be treated as a work in progress.

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Executive Summary

This second report of the Transportation and Sustainable Communities Team of the National Science and Technology Council (NSTC) creates a short-term strategic framework to initiate and coordinate the research agendas of Federal agencies on transportation and sustainable communities. This Agenda supports the FY 2000 President's Budget, and lays the groundwork for longer term research programs to implement and support transportation and sustainable communities.

Based on its previous review of Federal research and other initiatives related to the sustainability of transportation, this interagency team has found that Federal activities supporting the range of sustainability issues related to transportation are fragmented, and that a more strategic interagency systems approach to transportation, sustainability, and global climate change is urgently needed to complement current vehicle technology and fuels research.

In the short term, the Team recommends a core strategy to establish technical expertise and understanding of sustainability issues within DOT. This will involve increasing involvement by DOT in sustainability issues; establishing a sustainability research agenda, including analytical case studies; and building partnerships with Federal, state, and local agencies. The Team has discussed several opportunities for funding this initiative within proposals pending under reauthorization and appropriation bills. This core strategy will also support major related Federal programs, including alternative fuels and vehicle technologies, by coordinating those activities with national transportation programs and initiatives. Once this focus is established, the Team proposes a comprehensive program that includes broader research, outreach and education. This initiative will include:

- **Strategic Research:** Organize a center within DOT to analyze environmental trends related to transportation, coordinate DOT research and policies related to those trends, tie these activities to the Department's Strategic Plan, and share research information with the public and DOT's partners and stakeholders.
- **Case Studies:** Support regional, state, and local analytical case studies, demonstrations, pilots, and evaluations of innovative transportation and land development strategies that ensure mobility and accessibility, while making communities more sustainable, particularly with consideration of potentially irreversible environmental effects.
- **Outreach:** Expand in-service and university curricula for planning and transportation professionals, develop educational materials for the general public, and disseminate findings to business and government decision makers on the roles transportation and land development play in sustainability.

A preliminary timetable is provided in Figure 1.

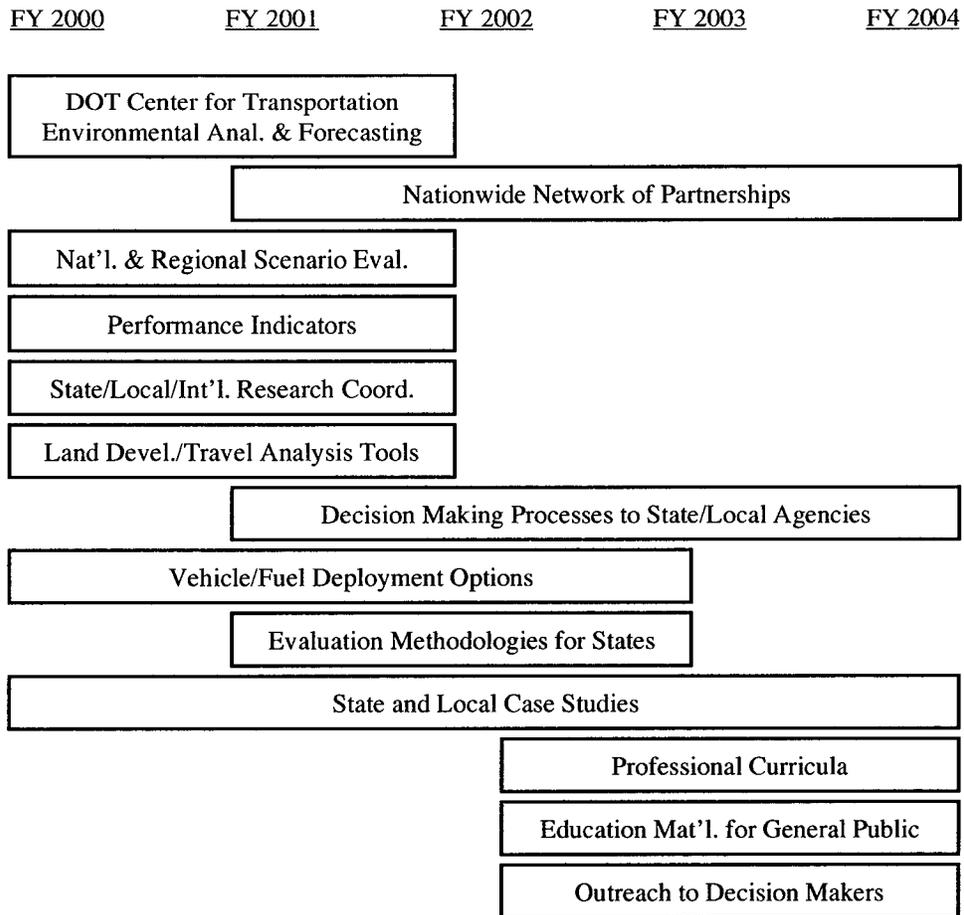


Figure 1. Approximate Schedule for Transportation and Sustainable Communities Initiative Activities

Introduction

In its September 1996 *Transportation Science and Technology Strategy*, the National Science and Technology Council (NSTC) Committee on Transportation Research and Development (CTRD) identified twelve strategic partnership initiatives that address critical national transportation needs. An interagency team was established to address two of the initiatives: Local Environmental Assessment Systems and Environmental Sustainability of Transportation Systems. Following extensive deliberation, the Team began work on an integrated initiative for Transportation and Sustainable Communities that addresses economic, environmental, and social equity aspects of “sustainability.” This initiative will consider sustainability from local, regional, inter-city, national and international perspectives, for all transportation modes.

The Team is charged with producing a cooperative interagency plan for Federal research and development on transportation and sustainability. As a first step, the Team achieved a consensus on the scope for transportation and sustainability; compiled an initial inventory of related Federal research; and identified research gaps. In particular, it found that although there are current Federal transportation research activities that address—sometimes indirectly—selected issues associated with sustainability, a holistic, strategic, and coordinated approach is clearly needed. Appendix A presents highlights from this phase of the Team’s work, including goals for this initiative, and the Team’s general approach to transportation and sustainability. This phase is presented in the working paper, *Transportation and Sustainable Communities Initiative: Overview of Federal Sustainable Transportation Activities*, June 1, 1998.

Consistent with the developing national priorities on sustainability and global climate change, the Team’s immediate priority is to develop a research agenda to address cumulative and potentially irreversible consequences of transportation, including emissions of greenhouse gases (GHG). Nonetheless, other critical national goals for sustainability—to improve the quality of the environment, maintain a vigorous economy, and foster social equity—are also of critical importance. Transportation research related to climate change will ensure mobility and accessibility and will be considered in the broad context of sustainability. Potential climate change strategies, whether they involve fuel and vehicle technologies, road pricing, or land development, will be considered not only for their ability to reduce greenhouse gases, but also in balance with needs for economic growth and social equity.

The research agenda presented in this second report by the Team outlines strategies for Federal agencies to begin to address broad sustainability issues, including global climate change. The Team proposes a framework of research, case studies, and education for FY 2000 that will help to meet national transportation goals for access and mobility in balance with economic, environmental, and social equity concerns. Considering the complexity of the topic, this is the first step in an evolutionary process to coordinate Federal research, and to identify and realize new opportunities for partnerships, with specifics on participating agencies, funding, products, and outcomes in terms of improved sustainability. Further coordination through an evolving Partnership Initiative that responds to this research agenda will produce improved results with limited resources.

Background

The Nation's transportation infrastructure is vital to our economy and the character of our society. Transportation can be considered a means to a broad array of ends. It supports economic development through access to jobs, services and other activities, and through the movement of goods. But as we approach the twenty-first century it is becoming equally apparent that we must also consider the ramifications of transportation for sustainability.

The most frequently cited definition of sustainability was adopted by the World Commission on Environment and Development (the Brundtland Commission): "A sustainable condition for this planet is one in which there is stability for both social and physical systems, achieved through meeting the needs of the present without compromising the ability of future generations to meet their own needs." The Brundtland Commission definition was selected for this Initiative because it acknowledges that sustainability has social and community as well as physical dimensions, and is the most broadly accepted definition of "sustainability." This Agenda shares this comprehensive approach to sustainability, which is consistent with recent major research and the broad concerns and responsibilities of the participating agencies.

Transportation systems interact with other built, social, and natural systems to produce broad effects on sustainability. Goals for transportation include safety, mobility, economic growth and trade, enhancement of communities and the natural environment, and national security. Transportation systems produce environmental, economic, and social equity effects, characterized as the "Three E's." Transportation systems can be considered "sustainable" to the extent that they contribute, in the short and long term, to national goals such as: reduced greenhouse gas emissions; healthy ecosystems; enhanced biodiversity; reduced air and water pollution; reduced dependence on finite fossil fuel supplies; and affordable access to economic and social opportunity.

Transportation decisions can be considered "more or less" sustainable in terms of how they produce and balance these effects. Advancement of sustainability can be considered as a matter of degree, or as movement along a continuum using indicators. National and local goals can be expressed in terms of these indicators. The challenge for decision makers is to achieve a balance among sustainability goals. Because this Agenda represents a "work in progress," the choice of outcomes and measures will be refined by participating agencies and stakeholders.

Important concerns for this initiative are the effects of transportation systems and land development patterns, such as air and water pollution, widespread congestion, inefficient land consumption, ecosystem degradation, and global climate change. Transportation accounts for about one quarter of total domestic greenhouse gas emissions. The Administration is committed to addressing the problem of climate

Clean Air Partnership Fund: The President's FY 2000 budget proposes a new Clean Air Partnership Fund to support state, local, and private efforts to reduce both greenhouse gas emissions and ground-level air pollutants. Through grants to state and local governments the Fund will help finance projects that go beyond legal requirements and enable communities to achieve clean air goals sooner. It will also stimulate cost-effective pollution control strategies, spur technological innovation, and leverage substantial non-Federal investment in improved air quality. The Fund will be administered by EPA under existing authority.

change, as demonstrated by the President's October 1997 climate change proposal. The President's FY 2000 budget strengthens this commitment through a newly proposed *Clean Air Partnership Fund* for state, local, and private efforts to reduce air pollution.

Research to support the United Nations Framework Convention on Climate Change is an immediate priority for this Plan. Nonetheless, broad national policies and statutory requirements define other critical Federal responsibilities related to transportation and sustainability. Examples are: the National Environmental Policy Act; the Clean Air Act; the Energy Policy Act; the Clean Water Act; the Endangered Species Act; the Transportation and Equity Act for the 21st Century (TEA-21); and the Americans with Disabilities Act. There are extensive Federal programs and research underway to fulfill responsibilities under these policies. This Agenda makes a unique contribution, outlining for the first time a Federal transportation research program focused directly on promoting a balanced and integrated approach to sustainability.

Proposed Initiatives and their Linkages

This Agenda identifies a core research effort that will provide a solid foundation for expanded future efforts to improve decision making at all levels to create more sustainable transportation systems, with a near-term emphasis on potentially irreversible environmental effects. The core effort is described in terms of participating agencies, goals, products, outcomes, and funding. This Agenda proposes three major initiatives:

- 1) Strategic Research to Support Sustainable Transportation
- 2) Case Studies to Promote Sustainable Communities
- 3) Education for Transportation and Sustainability

The initiatives are closely related, and mutually supportive, as shown in Figure 2. Case studies will test ideas generated in the Research Initiative, and improve the knowledge base to be communicated through the Education Initiative. Through their combined effects, the three strategic initiatives will contribute to accomplishment of the broad range of sustainability goals.

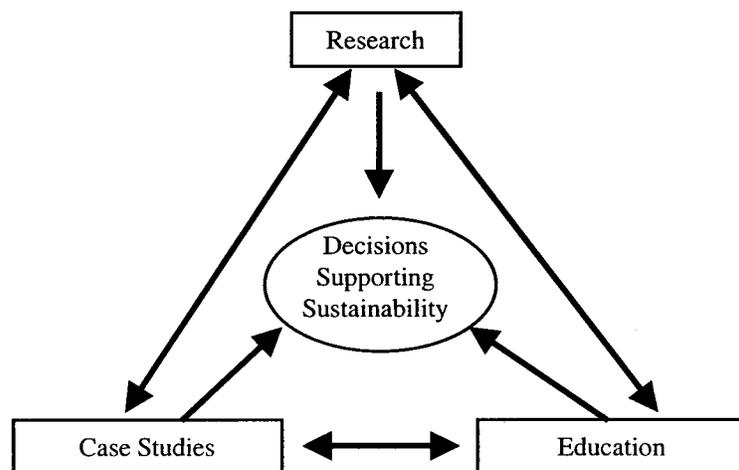


Figure 2. Sustainable Transportation Systems

This Agenda will depend on partnerships with public sector organizations, including: Metropolitan Planning Organizations; local governments; regional and state transportation, environmental, energy, and social service agencies; transportation providers; tribal governments; universities and research centers; the private sector; civic organizations; and advocacy groups. As demonstrated by the President's proposed *FY 2000 Livability Initiatives*, much of the expertise, innovation, and responsibility for transportation and environmental programs rests with state and local governments, regional institutions, business, and other non-Federal stakeholders. These organizations will be responsible for developing visions and actions to improve the balance of economic, environmental, and social considerations in local communities. A key Federal role is to provide resources for research and technical assistance, incentives for experimentation and innovation, and dissemination of best practices through education and outreach.

Complementing this Agenda, Section 1221 of TEA-21 establishes a new *Transportation and Community and Systems Preservation Pilot Program* to fund planning, implementation and analysis of innovative transportation and community development initiatives by state and local agencies. Funding for the TCSP was authorized at \$20 million for FY 1999, and \$25 million per year for FY 2000 through FY 2003. The President's FY 2000 budget proposes to increase the funding for TCSP to \$50 million as part of the President's *FY 2000 Livability Initiative*.

The Team has discussed potential opportunities for funding key elements of this Agenda within DOT, and recommends that funding be identified to undertake the core strategy of organizing a center for strategic research in these areas, initiating case studies, and beginning outreach.

Specific funding levels for other agencies will be addressed in later stages of development of this Agenda. Participating agencies—particularly EPA and DOE—which already have major

FY 2000 Livability Initiatives: The President's FY 2000 budget proposes significant new investments to help communities across America grow in ways that ensure a high quality of life and strong, sustainable economic growth. President Clinton and Vice President Gore are proposing a comprehensive *Livability Agenda* providing new tools and resources for state and local governments. By delivering these resources to the local level, where issues of growth are most appropriately addressed, this initiative will help empower citizens to build more "livable communities" for the 21st century. The proposed Initiatives include:

- ***Better America Bonds:*** tax credits totaling more than \$700 million over five years to support *Better America Bonds*, which can be used to preserve green space, create or restore urban parks, protect water quality, and clean up abandoned industrial sites.
- ***Community Transportation Choices:*** in FY 2000, a record \$6.1 billion for public transit and \$2.2 billion to aggressively implement innovative community-based programs in TEA-21. These programs help communities create regional transportation strategies, improve existing roads and transit, and encourage broader use of alternative transportation.
- ***Regional Connections Initiative:*** \$50 million in matching FY 2000 funds from HUD for local partnerships to design and pursue smarter growth strategies across jurisdictional lines.
- ***Other Livability Initiatives:*** \$100 million for programs in FY 2000 to encourage citizen participation in the design of schools as centers of their communities, provide communities with new information tools so they can grow according to their values, and improve public safety by sharing crime data among communities.

ongoing programs in sustainability and global climate change, are encouraged to develop their own initiatives within this cooperative framework.

Initiative 1: Strategic Research to Support Sustainable Transportation

1.1 Expanded Program and Policy Options

Objectives: To expand the set of recognized potential strategies and scenarios to make transportation systems more sustainable—particularly with respect to potentially irreversible environmental effects, and to develop improved methods for characterizing the expected combined effects of different strategies.

Discussion: As evidenced by the proceedings of the *Policy Dialogue Advisory Committee to Assist in the Development of Measures to Significantly Reduce Greenhouse Gas Emissions from Personal Motor Vehicles* (i.e., “Car Talk”), Federal and other decision makers need an expanded range of options to address the sustainability of transportation systems, and a more complete set of tools to understand the combined effects of those options. A systems approach that considers a wider range of sustainability issues and transportation modes, and includes a wider range of stakeholders, will require Federal leadership. This initiative will foster national discussions to establish a consensus on research needs, and build partnerships to conduct and apply this research. DOT will take a leadership role to integrate transportation with sustainability goals, identify effective institutional models for transportation planning and decision making, and develop new analytical tools and indicators.

Outputs:

- Organization of a center within DOT to focus expertise on strategic research and development of policies and programs, and on coordination of these with related initiatives at other Federal agencies.
- Development of effective working relationships among Federal, regional, state, local, and private partnerships to integrate and advance transportation and sustainability programs.
- Evaluation of a range of national, regional, and inter-city scenarios that combine planning, transportation, land development and redevelopment, multi-modal systems, vehicle technology, fuel, travel behavior, locational choice, and other strategies to reduce greenhouse gas emissions and enhance ecosystems and biodiversity, while facilitating progress toward other sustainability goals.
- A recognized set of sustainability-oriented performance indicators that are relevant to national, regional, and local transportation decision making for policy and investments.
- Coordination of research and information exchange on transportation and sustainability with state, regional, and local partners as well as international organizations.

Outcomes: Decision making that supports transportation and sustainability through meaningful and effective analytical tools and strategies to provide a wide range of options for different transportation system elements. Transportation decision making processes and documents reflect the use of recognized analytical tools and performance indicators applicable to sustainability, and the consideration of recognized potential strategies for increasing sustainability.

1.2 Land Development and Travel Behavior

Objectives: To update and refine our knowledge of the interrelationships between land development, locational choice, travel behavior, and other factors affecting travel, such as pricing and incentives. To integrate this information into planning models and tools, decision making processes, and programs to support sustainability.

Discussion: In most areas of the U.S., the transportation infrastructure is in place and land development patterns have long been established. Often transportation systems are developed in reaction to short term local demands to improve mobility, reduce congestion, and maintain current infrastructure rather than also addressing broader, long term sustainability goals. At the same time, current Federal research activities supporting the reduction of transportation-related greenhouse gas emissions emphasize vehicle technology and fuels, much more so than the nature and level of travel demand.

Through this research effort, Federal agencies will conduct and coordinate research to promote efficient applications of transportation systems and land development as part of sustainable communities. These efforts will include research, evaluations and innovative demonstrations to understand the complex relationships that drive development decisions, locational choice, and travel demand. This research will support development of advanced models and analytic tools and explore decision making and institutional processes that are effective in leading to more sustainable land development and transportation decisions. Research will consider interrelated transportation systems of different modes at a range of scale from long distance and intercity to metropolitan and local perspectives.

Outputs:

- Research on the interrelationship of travel behavior, trip type and mode choice, development patterns, and locational choice is incorporated into analytic tools, programs, and training.
- Decision making processes, advanced analytical tools and models are evaluated and provided to Federal, state, regional, and local transportation and land development agencies to support more sustainable choices.

Outcomes: Greater community sustainability is fostered through improved integration of transportation and land development.

1.3 Future Transportation Vehicle and Fuel Systems

Objectives: To review the long-term sustainability of advanced vehicle/fuel systems, and ensure timely interagency consideration of key implementation issues.

Discussion: The established system of transportation vehicles and fuels is heavily dependent on petroleum-based fuels. Because of long-term resource limitations and carbon emission impacts on global climate, current fossil fuel technologies for transportation are not sustainable.

Federal research sponsored by DOE, EPA, and other agencies currently supports a range of activities targeting the development of new fuels and vehicle technologies. Although some recent comparative studies are available, it is not clear which systems of vehicles and fuels will emerge as sustainable choices for the future. Nor is it clear which evolutionary pathways between markedly distinct systems would be the most desirable. The Team proposes a partnership among Federal agencies to review the long-term sustainability (e.g., over twenty- and fifty-year horizons) of different systems, and to ensure timely interagency consideration of key implementation issues, including infrastructure compatibility, distribution facilities, hazardous materials safety, evolutionary pathways, and transportation policy.

Outputs:

- Evaluation of advanced vehicle/fuel systems, emphasizing system-wide safety, economics, and long-term sustainability.

Outcomes: Public investments are directed toward advanced transportation vehicle and fuel systems which best reduce GHG emissions while facilitating progress toward safety and other sustainability goals. This initiative would measure such systems according to relative energy consumption, fleetwide crash-related losses, air pollutant emissions (GHG, criteria pollutants, air toxics, ozone-depleting chemicals), as well as direct and indirect costs and economic and social equity effects. A full life-cycle and fuel-cycle approach would be emphasized. Different pathways for transitioning between alternative vehicle/fuel systems would be characterized according to such measures, supporting future public and private decision making.

Initiative 2: Case Studies to Promote Sustainable Communities

Objectives: Review existing case studies, increase awareness, and fill gaps by supporting new analytical case studies, demonstrations, pilots, and evaluation of innovative transportation, land development, and other strategies that make communities more sustainable, in particular with respect to potentially irreversible environmental effects.

Discussion: This initiative will begin with a review of existing case studies and a strategy for increasing awareness and adapting them to local needs. This initiative will then apply research to demonstrate and evaluate how innovative approaches to transportation systems and land development can help build sustainable communities. Following an analysis of gaps in the existing base of pilot programs, ideas to be tested will be initiated by local partners benefiting from the research component of this Plan. These efforts will allow evaluation of hypotheses about how a range of innovative transportation and land development strategies can promote sustainability through improving the balance between economic, environmental, and social equity goals.

New pilot projects will include evaluations of the ability to produce broad sustainability effects. This initiative will develop and apply a rigorous, broad-based, but flexible, methodology, developed in cooperation with states, MPOs and other stakeholders, to evaluate the results of selected pilot projects. This initiative will also seek to leverage additional state, regional, local,

and private funding for evaluation and mainstreaming of current pilot programs, and complementary Federal programs, including the TCSP.

Outputs:

- Increased awareness of existing strategies and applicable case studies, and better adaptation of those strategies to local needs.
- Development of a flexible multi-disciplinary methodology for evaluating the potential sustainability effects of various transportation and land development strategies.
- Case studies of a broad range of innovative community, regional, and state transportation and land development innovations to meet sustainability goals.

Outcomes: By drawing upon the knowledge base generated by new and existing case studies, local, regional, state, and Federal transportation decisions, investments, and strategies contribute to measurable increases in sustainability. Related decision making processes and documents make direct reference to such studies.

Initiative 3: Education for Transportation and Sustainability

Objectives: To enhance in-service courses and university transportation programs, to quickly disseminate and ultimately apply new research results and provide broad inter-disciplinary training to planning and transportation professionals; to raise the awareness of young people and the public about relationships between individual travel behavior, transportation systems, and environmental conditions; and to provide resources to assist decision makers with identifying transportation decisions that promote sustainability.

Discussion: Education is a crucial component of this research program, and will be increasingly emphasized beyond the first two-year period, when core research activities and case studies are building an integrated knowledge base for dissemination. Efforts under this initiative will fill important gaps in current transportation education, by focusing on the complexity and inter-relationships between transportation and the environment, and on developing an understanding among key groups of the need for inter-disciplinary solutions to move towards greater sustainability. This initiative will also build on several on-going Federal educational partnership programs with important relationships to transportation and sustainability, for example, the DOT's University Transportation Centers Program. This will be accomplished with educational programs in three areas: enhancement of in-service training for transportation professionals and college curricula in professional programs; education programs for the general public, including programs in schools; and provision of information to state, regional, local, and business decision makers.

This initiative will add a new focus for transportation and environmental education programs currently supported by DOT, EPA, and other agencies, to create an effective broad-based education program to inform and influence individual, business, and government transportation choices that are sustainable.

Outputs:

- New curricula for transportation professionals that are inter-disciplinary and focus on creative solutions to sustainability problems.
- Educational materials and programs for the general public, including schools, that effectively inform the public about the sustainability of locational and travel decisions.
- Conferences, workshops, and resource materials that educate business and government decision makers about the need for inter-disciplinary solutions and the role transportation plays in sustainability.

Outcomes: At every level of our society there is better understanding of the relationships between individual travel choices, transportation systems, and community and global sustainability, an improved ability to address and support emerging issues with creative and innovative solutions. Popular and professional publications reflect a more sophisticated and up-to-date understanding of these relationships.

Conclusion and Next Steps

The initial activities of this Team led to important interagency consensus regarding the overall scope of transportation and sustainable communities, an inventory of current Federal research activities, and the development of a framework through which new opportunities for collaboration can be identified. This report identifies strategically important opportunities to fill gaps in ongoing and planned research, and to improve coordination between participating agencies.

This partnership initiative will evolve as agencies participating in this activity develop details — including proposed partnership activities — of this first-ever *National Research Agenda for Transportation and Sustainable Communities*.

Appendix A

Excerpts from *Transportation and Sustainable Communities Initiative: Overview of Federal Sustainable Transportation Activities, June 1, 1998.*

Approach to Transportation and Sustainability

The most frequently cited definition of sustainable development was that adopted by the World Commission on Environment and Development (the Brundtland Commission) in 1987: “A sustainable condition for this planet is one in which there is stability for both social and physical systems, achieved through meeting the needs of the present without compromising the ability of future generations to meet their own needs.” The Brundtland Commission definition was selected for this Initiative because it acknowledges that sustainability has social and community as well as physical dimensions.

To reflect the broad concerns and responsibilities of the agencies participating in this Initiative, this Overview Report takes a comprehensive approach to the much debated subject of sustainability. This approach enables the Research Agenda to be viewed as an extension of important recent studies. In addition to that of the Brundtland Commission, these include:

- The National Research Council’s Transportation Research Board, Committee for a Study on Transportation and a Sustainable Environment (Toward a Sustainable Future, 1997). The report recognizes that research on sustainable transportation can cover both ecological and natural resource needs, as well as social and economic aspects. The report focuses on transportation’s contribution to long-term irreversible environmental problems, specifically on long-term effects of motor vehicle transportation on climate and ecology. Concerns include the risk of losses in biological diversity and ecosystem functions from changes in air, water, and soil chemistry caused by chemicals emitted into the air by motor vehicles and from changes in habitats caused by road systems and other transportation infrastructure. Two approaches for reducing motor vehicle emissions are explored -- (1) changing travel behavior, and (2) developing new transportation technologies that use less fuel or alternative fuels.
- The President’s Council on Sustainable Development (Sustainable America -- A New Consensus for Prosperity, Opportunity, and A Healthy Environment for the Future, 1996), uses the Brundtland definition of sustainable development and includes the following in its vision statement: “A sustainable U.S. will have a growing economy that provides equitable opportunities for satisfying livelihoods and a safe, healthy, high quality of life for current and future generations.” A key goal of the Council’s report, Energy and Transportation, is to “improve the economic and environmental performance of the U.S. transportation system while increasing all Americans’ access to jobs, services, and recreation.” The report provides indicators of progress, and statements on national and economic security, efficient transportation, traffic congestion, and the need to improve accessibility while reducing travel.

- In an effort related to the work of the Council, the President established the *Policy Dialogue Advisory Committee to Assist in the Development of Measures to Significantly Reduce Greenhouse Gas Emissions from Personal Motor Vehicles*, known popularly as “Car Talk.” Although the Committee did not reach a consensus, its work provides a valuable source of data for analysis of automobiles and greenhouse gas emissions.
- The World Bank (Sustainable Transport: Priorities for Policy Sector Reform, 1996), which considers economic and financial sustainability; environmental and ecological sustainability; and social sustainability. The report considers how transport policy can be formulated to further these goals.
- The Organization of Economic Cooperation and Development (OECD) and European Conference of Ministers of Transport (Urban Travel and Sustainable Development, 1995) concentrate on: the relationship between land-use and transport policies; increasing levels of urban automobile use and growing congestion, air pollution, noise, and acid rain; the risk of global warming; and formulating integrated policies and strategies to foster sustainability. OECD/ECMT have another project with the Pollution Prevention and Control Group’s Sustainable Transportation Task Force. This Task Force has, among other things, developed a list of various projects relating to sustainability with case studies on sustainable transportation.

Transportation systems interact with other built, social, and natural systems to produce broad impacts. Within this context, transportation systems have major impacts on sustainability, as understood in the literature cited. This Initiative focuses on the inter-relationships between transportation decisions, including policies, investments, and strategies; and development strategies. These relationships produce environmental, social equity, and economic outcomes, sometimes characterized as the “Three E’s.” Transportation systems can be considered “sustainable” to the extent that they contribute to improved economic opportunity, social equity, efficient public expenditures, and environmental quality. In addition, this Research Agenda includes health as a human environment and sustainability measure. Transportation decisions affect individual, community and national health and well-being. Physical activity, through walking or bicycling can reduce the risk of premature mortality.

Conceptually, transportation decisions can be considered “more or less” sustainable in terms of promoting economic, environmental, and equitable outcomes, individually or in combination. Advancement of sustainability can be considered as a matter of degree, or as movement along a continuum using indicators to measure accomplishment of desired goals and outcomes. Examples of indicators include levels of greenhouse gases and their affect on ecosystems or ease of access to employment by former welfare recipients. The related national (or local) goals discussed in the next section can be expressed in terms of these same indicators (e.g., reduce greenhouse gases by x by year z , attain the National Ambient Air Quality Standard for ozone by 2010, or provide access to public transit for x % of mobility impaired citizens by year y). The challenge for decision makers is to achieve a balance among preferred

sustainability goals and outcomes, some of which may be in competition or difficult to discern in the short-term.

Research results in specific *outputs* (for example, improved forecast models or data bases) which can be applied to produce desired *outcomes* (for example, applications of the model by planning agencies, or ultimately, applications that improve transportation efficiency, reducing greenhouse gas emissions).

This conceptual approach to sustainable transportation is described in Figure A-1. Because development of the Research Agenda is a “work in progress,” the choice of outputs, outcomes, and measures will be evolutionary and continue to be refined by participating agencies and key stakeholders.

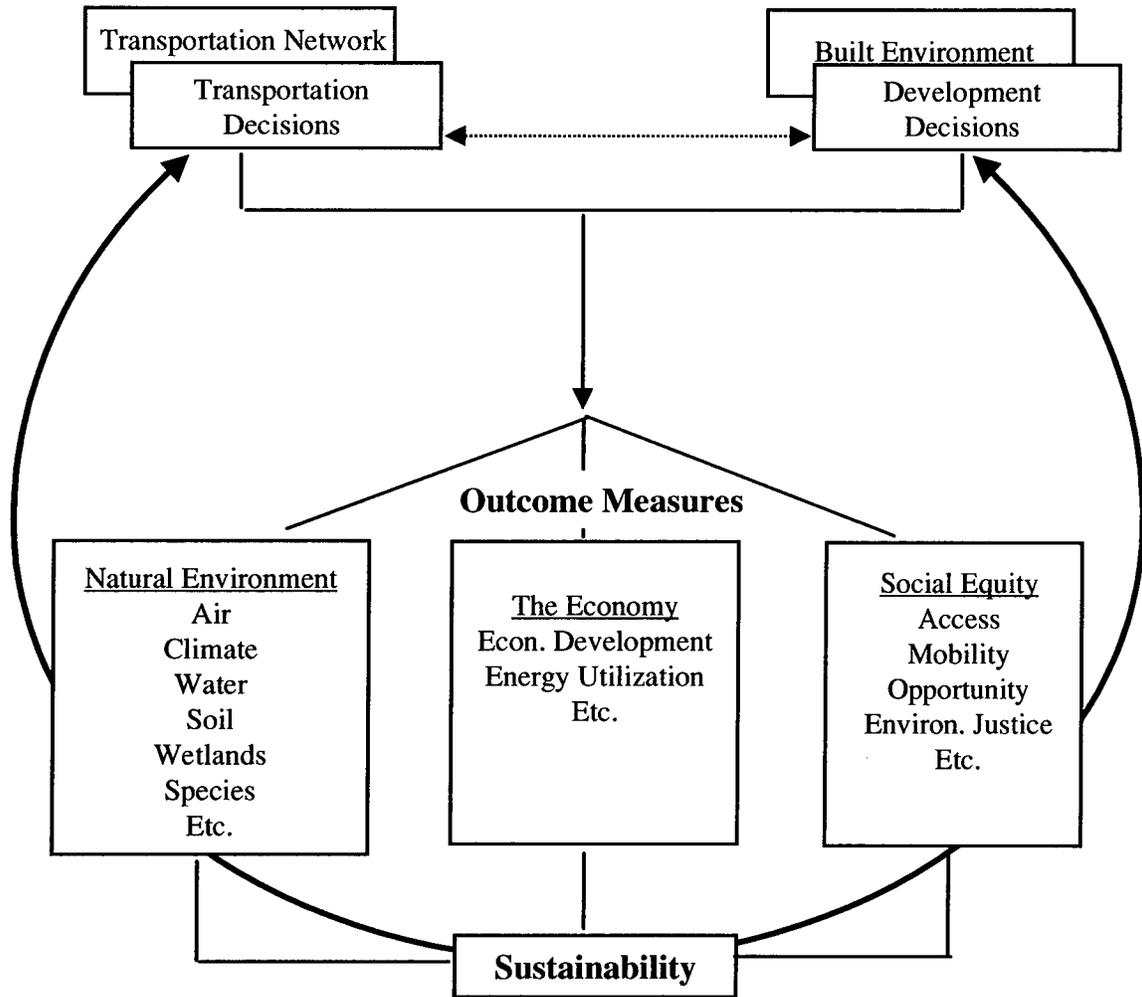


Figure A-1. Transportation and Sustainability

Policy Context and Desired Outcomes

As indicated above, the scope of “sustainability” has been a prominent and fundamental consideration by the team. Reduction of greenhouse gas emissions, particularly in the transportation sector, is a key sustainability focus within the Administration at this time. Nonetheless, issues such as metropolitan and rural “quality of life,” including air and water quality, a vigorous economy, social equity, and meeting needs for housing are also of major importance.

Several basic goals or outcomes targeted by this Initiative either have been identified through Federal legislation, or are in the process of being negotiated at this time. The following examples of federal legislation, policies, and related goals set a broad context for this Initiative, as represented in Figure A-1. These are not presented as a complete set, nor are they intended to limit the Initiative, which combines state and local with federal perspectives.

- Achievement of the goals of the National Environmental Policy Act (NEPA);
- Attainment of National Ambient Air Quality Standards (NAAQS), according to timetables established through EPA regulations implementing the Clean Air Act Amendments of 1990 (CAAA), as updated in 1997;
- Achievement of Energy Policy Act (EPAct) goals for market penetration of transportation fuels from domestic and/or nonpetroleum feedstocks;
- Achievement of targets for atmospheric concentrations of greenhouse gas (GHG) established by the UN Framework Convention on Climate Change (UNFCCC);
- Achievement of standards and goals of the Clean Water Act;
- Achievement of equal access for mobility impaired citizens to transportation, economic, and social opportunities as described in the Americans with Disabilities Act;
- Improvement of the performance of multi-modal transportation systems, and promotion of environmental, economic, and social equity goals through integration of transportation, land use, and air quality planning, as originally encouraged by the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), and continued by the Transportation Equity Act for the 21st Century (TEA-21), June 1998.



