

# The Federal Role in Achieving Sustainability in Transportation<sup>1</sup>

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## Abstract

This paper identifies the historical and current role of the U.S. federal government in regulating and promoting transportation. Within this context, the U.S. position on sustainable development/transportation is explored by identifying relevant federal initiatives, legislation, and programs. The paper argues that the current federal approach to transportation aligns with the ‘Auto, Plus’ paradigm and highlights a number of barriers that limit progress towards sustainable transportation and how these can be overcome. The paper concludes by presenting a multidimensional sustainable transportation decision-support framework that defines the federal role in achieving sustainability in transportation.

## The Evolving Role of Federal Government in Transportation

The federal government’s involvement with transportation began towards the end of the nineteenth century following a series of ‘Granger cases’ that were brought before the Supreme Court (Hazard 1988; Lieb 1981). Due to poor rail service, high rates, and discriminatory practices by the railroads, farmers in the Midwest (supported by the Grange organization) lobbied their legislators to establish maximum railroad rates to protect their livelihoods. In response, the ‘private’ railroads brought six cases before the Supreme Court that questioned the constitutionality of a state’s right to regulate a private enterprise.<sup>2</sup> The case most relevant to the federal government was *Wabash, St. Louis, and Pacific Railway Co. vs. Illinois* (1886), in which the Supreme Court ruled that states could not regulate railroad rates for interstate commerce.<sup>3</sup>

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<sup>2</sup> The basis for the Granger cases was the 14<sup>th</sup> Amendment to the U.S. Constitution, adopted in 1868 nearly ten years prior to the first case. The amendment declares that no state shall “*deprive any person of life, liberty, or property, without due process of law.*”

<sup>3</sup> The authority for states to regulate interstate railroad commerce was originally granted in *Munn vs. Illinois* (1877). This case revolved around the ability of the State of Illinois to regulate grain elevator rates in Chicago. The Supreme Court ruled that “[w]hen ... one devotes his property to a use in which the public has an interest, he, in effect, grants to the public an interest in that use, and must submit to be controlled by the public for the common good.” Therefore, since the grain elevators were “*a business in which the whole public has a direct and positive interest,*”

Since about three-quarters of the railroads extended across state boundaries, this ruling severely limited the ability of states to address railroad monopoly abuses (Lieb 1981).<sup>4</sup> The *Wabash* decision effectively passed the responsibility for regulating railroads (and commercial carriers more generally) to the federal government.

The authority of the federal government to regulate interstate commerce stems from the ‘commerce clause’ of the U.S. Constitution, which gives Congress the power to “*regulate Commerce ... among the ... States*” (Article 1, Section 8, Clause 3). In response to *Wabash*, Congress used the commerce clause to establish the Interstate Commerce Commission (ICC) - the first economic regulatory agency - with the passage of the Act to Regulate Commerce in 1887. Over the next century, the ICC became the most influential economic regulator until its abolishment in 1995 following a period of economic deregulation and privatization that began in the 1970s.<sup>5</sup> Today, the Surface Transportation Board (STB) - created by the ICC Termination Act of 1995 - has the core responsibility of resolving railroad rates and service disputes and evaluating proposed railroad mergers.<sup>6</sup>

The early involvement of the federal government in the regulation and promotion of transportation has now created a situation in which the government has become “*a fully-fledged participant in the transportation process*” (Hazard 1988, p. 20). Hazard (1988, p. 20) describes the gradual expansion of the federal government’s role in transportation as the acquisition of functions that tend “*to accrue without major cutbacks.*” In particular, he identifies eight major

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they could be regulated. The authority of the states to regulate common carriers ‘affected with a public interest’ was circumscribed by the 1886 *Wabash* decision.

<sup>4</sup> The Supreme Court ruling did, however, allow states to regulate ‘indirect’ burdens such as safety.

<sup>5</sup> Since the initial focus on the economic regulation of railroads, Congress has used the commerce clause to justify a much broader range of economic and social regulation (Ashford and Caldart forthcoming 2007). Whereas economic regulation tends to focus on a specific industry, social regulation (i.e., health, safety, and environmental regulation) is more general and cuts across industries and sectors. If Congress passes a bill that justifies regulation on the grounds of the commerce clause, Congress must show that there is an adequate connection between a regulated activity and interstate commerce for the regulation to withstand judicial review. Since most social regulation is directed at activities that have a relatively clear economic and interstate connection (such as manufacturing, construction, energy production and use, and transportation), the courts have generally supported the expansion of Congressional oversight in this area. Two recent exceptions, however, were the Supreme court decisions in *United States vs. Lopez*, 514 U.S. 549 (1995) and *United States vs. Morrison*, 529 U.S. 598 (2000), where Congress was found to have exceeded its authority granted under the commerce clause.

<sup>6</sup> See the Surface Transportation Board (STB), <http://www.stb.dot.gov/> (accessed on 04/27/06).

functions that the federal government has taken on over the past two centuries that are still relevant today. These are (Hazard 1988):

1. *Economic Regulation* [and Deregulation] - i.e., the monitoring of rates and services provided by common carriers and the entry/exit control of these carriers on important routes and services.
2. *Social Regulation* - i.e., the establishment of environmental and safety standards, employment rights, environmental justice, and civil rights.
3. *Plans and Operates the Ways* - i.e., the creation of policy to guide (or support) the development and operation of interstate and international ways (e.g., highways, railroads, waterways, airways, and pipelines).
4. *Coordination of Services* - i.e., the development of policy to coordinate the provision of transportation services.
5. *Financing and User Charges* (Revenue Raising) - i.e., the provision of federal funds to assist with the development of transportation modes. Historically, most of these funds are sourced from transportation-related user charges and taxes.
6. *Intervention in Services* - i.e., the assumption of responsibility for services or the provision of financial assistance to service providers during a time of war, national emergencies, financial crises, or labor/management disputes to ensure a continuity of service to protect social well-being.
7. *Research and Development* - i.e., the financing and support of research and development in policy, technology, and other related areas.
8. *Organization and Management* - i.e., the organization, management, and execution of the seven functions described above and the coordination of agencies responsible for the management of national transportation policies.

The importance the federal government gives to each of the above functions depends upon a wide range of interconnected factors that continually evolve over time (Cambridge Systematics 1996; U.S. DOT 2000). These factors include [1] the extent and the condition of the nation's transportation systems, [2] the perceived impact of negative transportation-related externalities, [3] the performance of the nation's private transportation service providers in the movement of people and goods, [4] technological innovation and the rise of globalization, [5] changing

demographics and shifts in personal lifestyle choices, and [6] the federal government's shifting ideology on its role in transportation (e.g., its perspective on economic and social regulation).

Since the early twentieth century, the role of the federal government in transportation has evolved through a cycle of economic regulation and deregulation and growth in transportation-related social regulation (covering environmental and civil rights issues) (Harper 1982; Hazard 1988; Lieb 1981; Mertins 1972; Norton 1967; Weiner 1984; 1992; 1997). What is evident from this period is that the functions of the federal government tend to be used in response to transportation problems rather than being deployed proactively to prevent problems from occurring. Hazard (1988, p. 20 and 3, respectively) goes as far as describing the federal role in transportation as a “*reluctant, retrospective, almost unconscious process*” that is guided by events rather than a “*conscious design*.”

If one accepts that a central element of sustainable transportation is a ‘holistic systems approach’ to policy and planning (Gudmundsson and Hojer 1996; Replogle 1991; 1995; UK Round Table on Sustainable Development 1996), it can be argued that the historical approach of the federal government to transportation must change if significant progress is to be made towards realizing sustainable transportation. Thus, the federal government's role in transportation needs to be guided by a holistic view of the driving forces that shape the transportation system over the short- and long-term; this holistic view should inform the creation of *proactive* policies designed to prevent expected problems. Such an approach will require the development of a set of indicators that highlights areas where problems are arising and *preemptive* action can be taken. Thus, if the federal government wishes to pursue sustainable development, its approach to transportation needs to transition from a ‘reluctant and retrospective’ to a ‘proactive and preemptive’ process. This approach is also likely to involve difficult short-term versus long-term tradeoffs that would be guided by a clear vision of how the national transportation system should develop.

## **The U.S. and Sustainable Development/Transportation**

Since the international emergence of sustainable development, many nations around the world have endorsed the concept as a national objective.<sup>7</sup> However, while sustainable development has received attention in the U.S., there is currently no integrated national strategy to pursue this objective. At best, the U.S. position on sustainable development can be described as “*somewhat ambiguous*” (Fletcher 1997, p. 4).

The closest the federal government has come to creating a national policy on sustainable development was the formation of the President’s Council on Sustainable Development (PCSD) in 1993. During its six-year existence (1993-1999), the PCSD (1996; 1997; 1999) prepared three reports that are often referred to as a basis for a national strategy on sustainable development (Dernbach 2002; Dernbach and Bernstein 2003; Spyke 2005).<sup>8</sup> However, because the executive branch and/or Congress did not make progress towards sustainable development a national priority, the work of the PCSD has not gained momentum.

Since the federal government has not endorsed the concept of sustainable development, it is hardly surprising that there is no formal policy on sustainable transportation. While some regulation and federal initiatives have focused on important aspects of the concept of sustainable transportation (discussed below), these cannot be considered to be a national strategy. A major obstacle to sustainable development/transportation is the lack of an integrated approach to decision-making within the federal system.

In response to the emergence of the environmental movement during the 1960s and 1970s and interest in sustainable development during the 1980s and 1990s, legislation passed by Congress began to incorporate broader social regulations that influenced federal actions across all sectors

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<sup>7</sup> The UK, Canada, and the Netherlands are three good examples of nations that have developed a national strategy for moving towards sustainable development. See the UK Government, *Sustainable Development*, <http://www.sustainable-development.gov.uk/index.asp>; Canadian International Development Agency, *Sustainable Development Strategy: 2004-2006*, <http://www.acdi-cida.gc.ca/sds>; and the Netherlands Ministry of Housing, Spatial Planning, and the Environment, *A National Strategy for Sustainable Development, What Choices Must the Government Make?*, <http://www2.vrom.nl/pagina.html?id=7388> (accessed on 04/07/06).

<sup>8</sup> In addition to these reports, the PCSD established a number of task forces (comprised of PCSD members and non-members) that prepared reports on Eco-Efficiency; Energy and Transportation; Population and Consumption; Public Linkage, Dialogue, and Education; Sustainable Agriculture; Sustainable Communities; and Natural Resources. Source: PCSD, Publications, <http://clinton2.nara.gov/PCSD/Publications/> (accessed on 04/05/06).

of the economy. Since the formation of the U.S. DOT in 1966, the following *transportation-related* legislation has played a significant role in shaping the Department's policies and programs:

- 1966 National Historic Preservation Act;
- 1969 National Environmental Policy Act (NEPA);
- 1970 Occupational and Safety Health Act (OSH Act);
- 1970/77/90 Clean Air Act (CAA);
- 1972/77 Clean Water Act (CWA);
- 1973 Endangered Species Act (ESA);
- 1975 Energy Policy and Conservation Act;
- 1978 National Energy Act;
- 1979 Emergency Energy Conservation Act;
- 1980/86 Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) - also known as Superfund; and
- 1990 Americans with Disabilities Act (ADA).<sup>9</sup>

A problem with the above regulations is that they tend to be designed to address a specific problem such as air quality or civil rights and only in a few incidents do the laws attempt to integrate or co-optimize social and economic regulation.<sup>10</sup> Thus, any serious initiative to pursue sustainable development/transportation would require careful consideration of how existing laws and policies could be integrated.

Until the passage of the Intermodal Surface Transportation Efficiency Act (ISTEA) in 1991, transportation legislation had evolved primarily along modal lines with limited integration of modal policies. ISTEA changed this approach. The legislation marked the beginning of the post-

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<sup>9</sup> In addition to these acts, there have been numerous Presidential Executive Orders (EOs) that focus on issues central to sustainable development. The most notable EO, written by President Clinton, raised the notion of 'environmental justice.' See President Clinton's Executive Order 12898, February 11, 1994, 'Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,' <http://www.archives.gov/federal-register/executive-orders/pdf/12898.pdf> (accessed on 04/05/06).

<sup>10</sup> A notable example of an attempt to integrate environmental and development concerns is the connection established between the 1990 Clean Air Act Amendments and the 1991 Intermodal Surface Transportation Efficiency Act (ISTEA). ISTEA also established connections to important social issues by providing funds to meet certain ADA obligations.

interstate era and a desire to move towards the creation of a multimodal,<sup>11</sup> interconnected, equity-based transportation system and the preservation of this system (Downey 2005). Since its creation, ISTEA has largely remained intact philosophically through two reauthorizations in 1998 (with the passage of the *Transportation Equity Act for the 21st Century - TEA-21*) and 2005 (with the passage of the *Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users - SAFETEA-LU*).

ISTEA introduced several important policy innovations that support the objectives of sustainable transportation (Benfield and Replogle 2002; Frankel 2003; Schoener 2003; ACIR 1995; U.S. DOT 2000). First, ISTEA devolved decision-making authority to metropolitan planning organizations (MPOs) by enhancing their role in transportation planning and programming. Second, ISTEA supported its objective to create an intermodal/multimodal transportation system by increasing the ability of MPOs and state DOTs to transfer federal funds between transportation programs. Finally, a significant policy initiative in ISTEA was the integration of surface transportation legislation with the 1990 Clean Air Act Amendments (CAAA) (Lyons 2000; Weiner 1997).

Since the formation of ISTEA, environmental advocates have fought hard during the act's reauthorizations to retain, improve, and add new programs that support components of sustainable transportation (Benfield and Replogle 2002; Dilger 2003). As a result, the current surface transportation legislation (SAFETEA-LU) includes a number of programs that have the potential to improve the environmental, social, and economic performance of certain elements of the transportation system (Box 1). In particular, the Transportation, Community, and System Preservation (TCSP) program was specifically designed to better integrate transportation and urban development and move the current system towards sustainable development/transportation.<sup>12</sup> The idea was to capture successful and innovative planning practices from the TCSP program and incorporate them into other federal transportation

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<sup>11</sup> The use of the word 'intermodal' in the title of ISTEA was unfortunate since in reality most transportation systems connect to more than one mode. A better word would have been 'multimodal;' however, this would have created a less memorable acronym.

<sup>12</sup> Source: Personal communication with Edward Weiner (Senior Policy Analyst, Office of the Secretary of Transportation, U.S. DOT), January 30, 2006.

programs. However, significant earmarking of the TCSP program's limited funding has reduced its efficacy and ability to initiate change.

**Box 1: SAFETEA-LU Programs that Support Elements of Sustainable Transportation (with FY 05-09 authorizations)<sup>13</sup>**

- *Surface Transportation Program (STP)*: provides flexible funding that can be used on any federal-aid highway; 10% of funds are set aside for transportation enhancements - \$32.6 billion.
- *Congestion Mitigation and Air Quality Improvement (CMAQ) Program*: provides funding for projects and programs in air quality non-attainment and maintenance areas that reduce transportation-related emissions and congestion - \$8.6 billion.
- *Capital Investment Grants (New Starts)*: provides funding for major fixed guideway capital investment projects (New Starts) and capital investment grants of \$75 million or less for smaller transit investments (Small Starts) - \$8.0 billion.
- *Highway Safety Improvement Program*: provides funding for a new federal-aid program (beginning in FY 2006) to fund projects and programs that reduce traffic fatalities and serious injuries on all public roads - \$5.1 billion.
- *Job Access and Reverse Commute*: provides funding for local programs that offer transportation services to low-income individuals who live in city centers and work in suburban locations - \$727 million.
- *Formula Program for Elderly Persons and Persons with Disabilities*: provides funding to increase mobility for the elderly and persons with disabilities - \$584 million.
- *Intelligent Transportation Systems (ITS) Research*: provides funding to support a comprehensive ITS research, development, and operational test program with priority given to enhancing mobility and productivity, improving safety, and integrating vehicle and infrastructure technologies - \$550 million.
- *New Freedom Program*: provides funding to support the development of transportation services and public transportation alternatives beyond that required by the Americans with Disabilities Act of 1990 (ADA) to assist individuals with disabilities - \$339 million.
- *Transportation, Community, and System Preservation (TCSP) Program*: provides funding for research and projects that investigate the relationship between transportation, community, and system preservation plans and practices and identifies private sector-based initiatives to improve those relationships - \$270 million.
- *Clean Fuels Grant Program*: provides capital grants for clean fuel buses (up to 25 percent "Clean Diesel") and related facilities - \$188 million.
- *Non-motorized Transportation Pilot Program*: provides funding for demonstration projects to evaluate the extent to which bicycling and walking can provide a solution to transportation problems - \$100 million.
- *Value Pricing Pilot Program*: provides funding to evaluate the effectiveness of different value pricing approaches at reducing congestion - \$59 million.
- *Safe Routes to School Program*: provides funding to enable and encourage children, including those with disabilities, to walk and bicycle to school in a safe and healthy environment - \$54 million.

<sup>13</sup> Sources: FHWA, SAFETEA-LU Fact Sheets, <http://www.fhwa.dot.gov/safetealu/factsheets.htm> (accessed on 04/05/06); FHWA, Funding Tables, <http://www.fhwa.dot.gov/safetealu/fundtables.htm> (accessed on 04/05/06); and FTA, SAFETEA-LU Implementation, [http://www.fta.dot.gov/17003\\_ENG\\_HTML.htm](http://www.fta.dot.gov/17003_ENG_HTML.htm) (accessed on 04/05/06). Note: While the transportation programs in Box 1 are not a comprehensive list, they do represent many of the core environmental and social programs in SAFETEA-LU.

In addition to the programs described in Box 1, SAFETEA-LU includes three major federal-aid highway programs that focus on maintaining and improving the transportation system. These are the National Highway System (\$30.5 billion, FY 05-09), the Interstate Maintenance Program (\$25.2 billion, FY 05-09), and the Bridge Program (\$21.6 billion, FY 05-09). While these programs are essential for keeping the current system operational, the predominant focus on highways means that it is difficult for states and metropolitan areas to direct attention towards developing a multimodal system. Further, the high cost of maintaining the national highway system is a significant financial burden that is likely to limit the scale of future sustainable transportation initiatives.

Beyond the programs within SAFETEA-LU, there are other federal transportation initiatives that can be associated with sustainable transportation.<sup>14</sup> For example, with regards to aviation, two programs designed to assist airports in meeting their obligations under the CAAA are the (recently completed) Inherently Low Emission Airport Vehicle (ILEAV) pilot program<sup>15</sup> and Voluntary Airport Low Emissions (VALE) program<sup>16</sup> (FAA 2004).

With regards to energy efficiency and reducing oil imports, the Corporate Average Fuel Economy (CAFE) standards - established by the Energy Policy Conservation Act of 1975 - effectively doubled the fuel economy of passenger cars to 27.5 mpg and reduced the fuel consumption of light trucks (the current light truck standard is set to increase from 21.6 to 22.2

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<sup>14</sup> See the section entitled ‘Sustainable Transportation Decision-Support Framework’ for a discussion on the concept of sustainable transportation. *Infra* note 33.

<sup>15</sup> The ILEAV pilot program was established by the 2000 Wendell H. Ford Aviation Investment and Reform Act for the 21<sup>st</sup> Century (AIR-21). The pilot program authorized the FAA to make grants of up to \$2 million to each of no more than 10 commercial service airports situated in air quality non-attainment areas. These grants enabled participating airports to evaluate the performance of low emission technology and alternative fuels. See the FAA, *Inherently Low Emission Airport Vehicle (ILEAV) Pilot Program, Final Report*, [http://www.faa.gov/airports\\_airtraffic/airports/environmental/vale/media/ileav\\_report\\_final\\_2005.pdf](http://www.faa.gov/airports_airtraffic/airports/environmental/vale/media/ileav_report_final_2005.pdf) (accessed on 04/05/06).

<sup>16</sup> The VALE program was developed by the Federal Aviation Administration (FAA) in response to a mandate given by the Vision 100-Century of Aviation Reauthorization Act of 2003. This act called for a voluntary program to reduce airport ground emissions at commercial service airports located in air quality non-attainment *and* maintenance areas. The VALE program effectively extends the incentives of the ILEAV pilot program to other airports (FAA 2004). See the FAA, *Voluntary Airport Low Emissions (VALE) Program*, [http://www.faa.gov/airports\\_airtraffic/airports/environmental/vale/](http://www.faa.gov/airports_airtraffic/airports/environmental/vale/) (accessed on 04/05/06).

mpg in 2007).<sup>17</sup> While a fuel tax might have been a more cost-effective approach and would have increased (rather than reduced) the per-mile cost of driving - making modes such as transit more attractive (CBO 2003; Dinan and Austin 2004)<sup>18</sup> - there was, and still is, strong opposition by the President and Congress to increasing fuel taxes (Lave and Lave 1999).

Another program designed to increase the fuel economy of vehicles was the Partnership for a New Generation of Vehicles (PNGV) established by President Clinton in 1993 (Black 1996; Sissine 1996). This program also sought to enhance the competitiveness of the U.S. automobile industry. Each manufacturer was originally required to reveal a concept vehicle in 2000<sup>19</sup> and have a production prototype ready by 2004. However, in 2002, the Department of Energy announced the FreedomCAR initiative (where CAR stands for cooperative automobile research), which replaced the PNGV. The FreedomCAR initiative effectively cancelled the PNGV mandate to have production prototypes of diesel hybrids ready for 2004.

The bold objective of the FreedomCAR program is to develop “*emission- and petroleum-free cars and light trucks.*”<sup>20</sup> To achieve this objective, the initiative is focusing on the development of fuel cells and advanced hybrid propulsion systems. While both the PNGV and FreedomCAR initiatives support many of the environmental objectives of sustainable transportation, critics of these programs argue that they represent an attempt by the automobile industry and government officials to undermine calls to strengthen CAFE standards (Sperling 2002; 2003). The PNGV initiative was also criticized as ‘corporate welfare’ since automobile manufacturers were already

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<sup>17</sup> For a detailed and up-to-date discussion of the CAFE standards, see the National Highway Traffic Safety Administration’s (NHTSA’s) *CAFE Overview*, <http://www.nhtsa.gov/cars/rules/CAFE/overview.htm> (accessed on 04/05/06).

<sup>18</sup> The federal gasoline tax is currently set at 18.4 cents per gallon. However, the average gasoline tax - including federal, state, and local taxes - is 41 cents per gallon. The Congressional Budget Office (CBO 2003) has estimated that gasoline taxes would have to be increased by 46 cents per gallon to achieve a 10 percent reduction in gasoline consumption. It was estimated that such a tax increase would impose a welfare cost of \$2.9 billion per year. In contrast, CAFE standards would have to be increased to 31.3 mpg for passenger cars and 24.5 mpg for light trucks to achieve the same reduction in fuel consumption (ibid). In addition, the annual cost imposed upon manufacturers and consumers of new vehicles would range from between \$3.0 and \$3.6 billion (or \$184 and \$228 per new vehicle), depending on whether a fuel economy credit trading scheme was established (which would lower costs).

<sup>19</sup> Source: U.S. Department of Energy, PNGV Concept Vehicles Presented to the Public in 2000, [http://www1.eere.energy.gov/vehiclesandfuels/facts/favorites/fcvt\\_fotw128.html](http://www1.eere.energy.gov/vehiclesandfuels/facts/favorites/fcvt_fotw128.html) (accessed on 04/05/06).

<sup>20</sup> Source: U.S. Department of Energy, FreedomCAR and Vehicles Technologies Program, <http://www.eere.energy.gov/vehiclesandfuels/> (accessed on 04/05/06).

undertaking research in this area and were thought to have had more than adequate resources to fund such work (Nader 2000).

The above discussion identifies a number of federal initiatives that can be associated with specific aspects of sustainable transportation. However, the effectiveness of these initiatives is likely to be reduced by the fact that there is no federal mechanism to coordinate or integrate these activities.<sup>21</sup> The fact that surface and air transportation legislation are considered separately and the majority of programs within transportation legislation are directed at specific modes provides little hope that the current system will be developed in an integrated, multimodal way.

### **The Federal Government's 'Auto, Plus' Approach to Surface Transportation**

A useful framework that appears to capture the current federal approach to surface transportation is Dunn's (1996) 'Auto, Plus' paradigm. This paradigm is based upon the basic idea that the automobile is an integral part of the American lifestyle that delivers significant benefits to a wide range of people. Thus, the Auto, Plus viewpoint is committed to preserving the benefits of automobility. However, it also recognizes that the automobile creates a number of negative externalities that need to "*be addressed in ways that are cost effective, complement the strengths and achievements of the auto system, and enhance individuals' mobility choices*" (Dunn 1996, p. 170).

The 'Plus' refers to the promotion of initiatives that reduce the social burden of the automobile while maintaining its 'basic achievements.' These initiatives include "*innovations in regulatory policy, in energy-efficient auto technology, in community design, and in alternative modes of transport*" (Dunn 1996, p. 170). Today, congestion charging or value pricing should be added to Dunn's list. While such instruments raise important equity considerations, they provide a mechanism through which congestion and environmental issues can be addressed. Hence, the

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<sup>21</sup> While this section focuses primarily on transportation programs, an evaluation of federal transportation research initiatives undertaken by the National Science and Technology Council (NSTC) reached a similar conclusion. The NSTC (1999, p. 1) argues 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.*"

‘Plus’ component of the paradigm incorporates what many consider to be the central elements of sustainable transportation.

Another important aspect of the Auto, Plus paradigm is that it is grounded in political realism. Dunn (1996) argues that transportation policies that increase the cost of owning/using an automobile or reduce its convenience run against mobility preferences and market forces.

If Dunn’s (1996) notion of Auto, Plus is compared to the federal government’s approach to surface transportation policies and programs discussed previously, the similarities between the two quickly become apparent. Perhaps the best indicator of the federal government’s approach to surface transportation is its funding allocations. SAFETEA-LU authorizes \$286 billion (FY 04-09) for surface transportation, of which \$234 billion (82%) is directed towards highway and safety programs, and \$52 billion (18%) is directed at transit programs.<sup>22</sup>

The current federal role in transportation is largely a product of the interstate era. The significant investment in the interstate highway system combined with the creation of the Highway Trust Fund (HTF) created a *highway legacy* that the federal government must now manage. A particularly cumbersome problem is the HTF. It was initially established to keep revenues from federal highway user tax receipts separate from the General Fund so they could be invested directly back into the interstate system. The basic philosophy underpinning the HTF is the notion of ‘user fee = user benefit’ - i.e., federal highway taxes should benefit those who pay the tax (Ankner 2003). A major problem with this approach, however, is that the user fees do not cover the true social costs of transportation. In fact, current user fees are less than those required to maintain the condition and performance of existing transportation systems (Cambridge Systematics 2005; U.S. DOT 2002).

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<sup>22</sup> Source: U.S. House of Representatives, Committee on Transportation and Infrastructure, SAFETEA-LU, Executive Summary, <http://www.house.gov/transportation/highway/issues/safetealu.pdf> (accessed on 04/05/06). Note: The Passenger Rail Investment and Improvement Act of 2005 (PRIIA) recently authorized \$11.4 billion of federal funds over a six-year period (FY 06-11) to help Amtrak upgrade and maintain the passenger rail system. While PRIIA increases non-highway funding, the total amount is still significantly less than the funding directed at highways. The fact that federal funding for passenger rail is considered separately from SAFETEA-LU (the *surface* transportation act) provides further evidence of the desire to keep highway funds from being diverted to other modes.

The reason that approximately 80 and 20 percent of SAFETEA-LU's funding is directed towards highways and transit, respectively, is that the HTF diverts the same percentages of federal highway tax receipts into the Highway Account and Mass Transit Account. While ISTEA, TEA-21, and SAFETEA-LU have gradually increased the amount of 'flexible funds' that can be transferred from highway to transit programs,<sup>23</sup> there is clearly a structural bias towards highways in the way that funds are initially allocated.<sup>24</sup> However, any attempt to change the structure of the HTF to support the development of a truly multimodal transportation system is certain to face significant barriers. First, diverting funds generated from highway taxes away from highways to transit runs against the 'user fee' principle. Second, any change to the HTF is likely to face significant resistance from groups that benefit from the current structure of the Fund - particularly those groups supported by the Highway Account. Finally, the general public's reliance on automobiles makes any attempt to divert funds away from maintaining and developing the highway system difficult to sustain.

Given the above observations, Dunn's (1996) Auto, Plus paradigm seems to accurately represent the current federal approach to transportation. However, an important question is how much emphasis is being placed on each of the 'Auto' and 'Plus' components of the paradigm. Now that the interstate system is complete, one could argue that there is a need to rethink the way in which the federal government allocates its transportation funds. In the post-interstate era, the federal government has shifted its emphasis to maintaining and enhancing the capacity of the transportation system through a wide range of highway, mass transit, and other transportation programs (GAO 2004).<sup>25</sup> There has also been a growing interest in private toll roads. One might characterize this shift in emphasis as placing more importance on the 'Plus' component of the Auto, Plus paradigm. The ISTEA-CAAA framework, the significant investment and interest in

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<sup>23</sup> For example, ISTEA established the Surface Transportation Program (STP) that provided unprecedented flexibility in the use of federal funds for transportation initiatives and required 10% of STP funds to be set aside for both safety and transportation enhancements. The principle of flexible funding was initially welcomed by many sustainable transportation advocates; however, in practice only a small portion (about 7% or \$3.3 billion) of the available flexible funds were used on non-highway related projects between 1992 and 1999 (STPP 2000).

<sup>24</sup> McCann (1999) argues that the best way to address the structural bias of the HTF would be to divide surface transportation funds equally between highway and transit. However, such a solution seems somewhat arbitrary and might lead to significant system inefficiencies. The challenge is to manage the highway legacy and maintain important highway networks while identifying ways to make the entire transportation system more sustainable.

<sup>25</sup> In many ways, the growing attention given to transit reflects a failure of the federal government to maintain these systems during the interstate era.

clean fuels and energy efficient vehicle technology, and the creation of transportation programs to enhance communities all indicate movement towards sustainable development/transportation. The challenge, therefore, is how to build upon the Auto, Plus paradigm and transform it into a sustainable transportation paradigm.

The following section looks at the barriers to achieving a more sustainable transportation system and identifies a number of actions the federal government should take to promote the broad concept of sustainable development/transportation.

### **What Are the Barriers to Achieving Sustainable Transportation and How Can They Be Overcome?**

Important factors that have limited progress towards a national sustainable transportation policy are as follows:<sup>26</sup>

1. The lack of Presidential and/or Congressional support for making sustainable development/transportation a national objective;
2. The lack of *horizontal integration* needed to overcome the balkanization/fragmentation of issues across and within federal government agencies and Congress;
3. The lack of *vertical integration* needed to overcome the bureaucratic barriers that exist between the multiple levels of government - i.e., federal, state, and regional/local;
4. The problem of *disparate time horizons* - i.e., the long-term nature of many issues related to sustainable development makes it difficult to address problems given the short-term focus of political cycles;
5. The complexity of the legislative process which is influenced by interest groups that tend to promote individual modes at the expense of a more integrated approach;<sup>27</sup>
6. The problem of integrating or aligning federal policies and programs with the diverse transportation needs of different states, regions, and local areas across the U.S.; and
7. The inadequacy of tools and/or planning guidance to inform and create a clear vision for the development of sustainable transportation policies and programs.

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<sup>26</sup> For related discussions of the barriers to progress towards sustainable development see Ashford (2004; forthcoming 2007) and Dernbach (2002; 2003).

<sup>27</sup> For a related discussion on inequality of access to economic and political power see Dye (2001).

The lack of Presidential and/or Congressional (i.e., political and financial) support for sustainable development/transportation is perhaps the most significant barrier to progress. One way to address this problem is to create a clear, long-term, and compelling vision that motivates the federal leadership to take action. Specifically, identifying ways to enhance national competitiveness and environmental quality through technological, organizational, institutional, and social innovation is one useful area of future action and research.

The actions the federal government could take to circumvent the problem of horizontal integration depends upon whether its leadership is committed to sustainable development/transportation. Figure 1 has been developed to try and visualize the problem of horizontal integration.

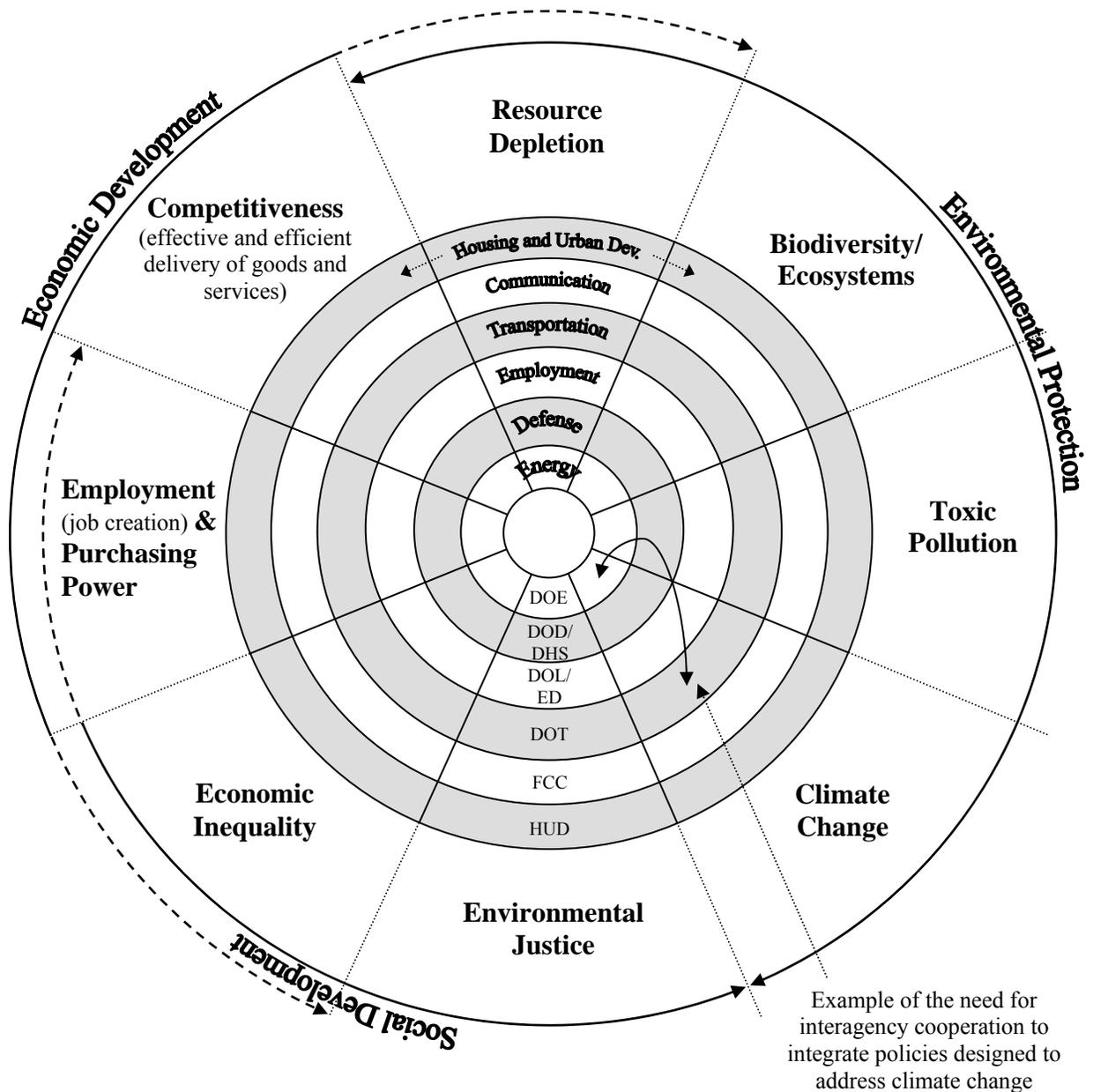
The role of the federal government in the nation's development can be characterized by activity areas (i.e., those areas where government provides basic goods and services), which are represented in Figure 1 by a series of concentric circles. These activity areas are usually supported by cabinet-level departments or agencies. If necessary, each activity area could be broken down further. For example, transportation could be divided into transit, highway, airways, waterways, etc. There is no hierarchy to the activity areas shown in Figure 1. Thus, those located near the center of the circle are not necessarily more or less important than those located near the edge. In addition, only a representative group of activity areas has been shown in Figure 1; other areas that could be added to the diagram include agriculture and health and human services.

Figure 1 does not incorporate those governmental agencies that address *multiple-activity* areas such as environmental protection. In many ways, an organization such as the Environmental Protection Agency (EPA) is more closely aligned with the environmental wedges shown in Figure 1 than an activity area.<sup>28</sup> This observation highlights an important question: Should the U.S. DOT develop policies and programs designed to encourage sustainable development, or should other federal agencies such as the EPA - whose authority over environmental issues spans

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<sup>28</sup> Figure 1 represents the author's best attempt to capture the multidimensional nature of sustainable development. While it has limitations, it does provide a way to visualize the horizontal integration problem.

across activity areas - take the lead? The critical issue is which government agency is really driving the system. In the case of transportation, the U.S. DOT is the lead agency; however, other federal agencies such as the EPA, the Department of Energy (DOE), and the Department of Housing and Urban Development (HUD) also play influential roles. Thus, part of the horizontal integration problem is that there is no natural marriage between government entities that address activity or multiple-activity areas.



**Figure 1: Government Activity Areas and Sustainable Development Concerns - The Challenge of Horizontal Integration**

If there were Presidential and/or Congressional support, an ideal approach to addressing horizontal integration would be to establish an executive-level entity (such as an enhanced Council on Environmental Quality)<sup>29</sup> to coordinate and assist with the implementation of a national sustainable development/transportation strategy (Dernbach 2002).<sup>30</sup> Such an entity could lead efforts to develop and coordinate interagency collaboration. In addition, a counterpart entity should be established in Congress and given the responsibility to coordinate, investigate, and report on the impacts of proposed/existing legislation on sustainable development/transportation (ibid). Without Presidential and/or Congressional support, one (probably less effective) option would be for an enlightened U.S. DOT to lead interagency collaboration on regulation that affects progress towards sustainable transportation.<sup>31</sup>

In general, the problem of horizontal integration can be characterized by the lack of connectivity between [1] the activity areas (i.e., the concentric rings), [2] the issues within each activity area (i.e., the segments within a concentric ring), and [3] the social/environmental/economic challenges that cut across the activity areas (i.e., the wedges).

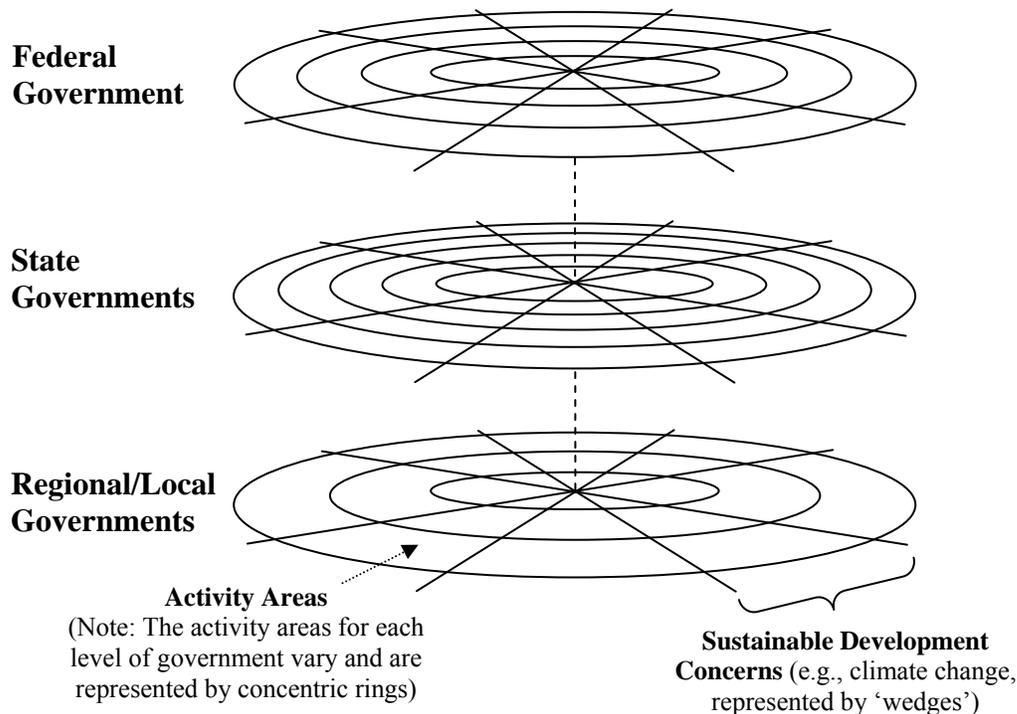
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<sup>29</sup> The Council on Environmental Quality (CEQ) was established under Title II of the 1969 National Environmental Policy Act (NEPA) (42 U.S.C. § 4371). The core functions of the CEQ are to monitor the condition and trends in the quality of the environment and annually report the results to the President, appraise federal programs/activities for compliance with NEPA, and recommend environmental policies and initiatives to the President that promote and improve environmental quality (42 U.S.C. § 4344). The CEQ was originally required to prepare an annual Environmental Quality Report to Congress, but this mandate was rescinded in response to the Republican Party's 'Contract with America' and the Federal Reports Elimination and Sunset Act of 1995. The CEQ is located within the Executive Office of the President, from which it is able to coordinate federal environmental efforts and work closely with executive agencies and other White House offices. Source: Council on Environmental Quality (CEQ), <http://www.whitehouse.gov/ceq/> (accessed 04/05/06). If the CEQ were to lead efforts on sustainable development, its functions and capabilities would need to be expanded beyond its current focus on environmental quality to include social and economic concerns.

<sup>30</sup> Another solution put forward by Dernbach (2002) is the idea of using the Government Performance and Results Act (GPRA) of 1993 as a mechanism to initiate and measure an agency's progress towards sustainable development. As with enhancing the CEQ, there must be a Presidential commitment to sustainable development for agencies to integrate the concept into their strategic plans.

<sup>31</sup> The precedent for interagency collaboration on regulation dates back to the Carter Administration when the heads of the major environmental and public health agencies formed the Interagency Regulatory Liaison Group (IRLG) in 1977 to coordinate their regulatory activities (Schierow 1998). The initial members of the IRLG - the Environmental Protection Agency (EPA), Consumer Product Safety Commission (CPSC), Food and Drug Administration (FDA), and Occupational Health and Safety Administration (OSHA) - were later joined by the Food Safety and Quality Service of the U.S. Department of Agriculture (USDA) (ibid).

By expanding Figure 1 vertically, it is possible to visualize the problem of vertical integration. Figure 2 indicates that each level of government - i.e., federal, state, and regional/local - has its own system to deliver goods and services and address problems that might or might not align with the systems at the other levels. Thus, even the best conceived federal policies can fail due to the different practices and procedures in place at the state, regional, and local level.



**Figure 2: Government Activity Areas, Sustainable Development Concerns, and Different Levels of Government - The Institutional Challenge of Vertical Integration**

It seems that the best way to address the problem of vertical integration would be for the U.S. DOT to continue to build working relationships with governmental/quasi-governmental entities affected by federal regulation to identify ways to overcome potential problems/agenda conflicts. One interesting idea might be to transform the FHWA and FTA field offices into U.S. DOT field offices to better integrate the activities of the Department with those of state DOTs and MPOs. Such offices would also promote a multimodal approach to transportation rather than focusing predominantly on highways or transit.

The creation of U.S. DOT field offices would also help address the problem of better integrating federal policies and programs with the wide-ranging transportation needs of states, regions, and

local areas across the U.S. The field offices would provide a conduit through which compliance with federal mandates could be assessed in the context of local circumstances. The offices could also ensure that federal mandates do not undermine positive state DOT and MPO initiatives. Another way to increase the effectiveness of federal transportation programs at the regional and local levels would be to continue and enhance the ability to move funds between programs. However, flexible funds are only valuable if they can be used in the desired way. Therefore, an interesting idea might be to give the U.S. DOT field offices the authority to sanction the use of a predetermined amount of authorized funds on important projects that fall outside the scope of federal programs.

With regards to the problem of disparate time horizons, the federal government (as trustee) has a responsibility to ensure that the distributional impacts of its decisions are considered in short-term, long-term (e.g., 20 years), and intergenerational contexts. To help integrate these time horizons a trade-off approach, which does not automatically discount future benefits, could be used to consider the expected impacts of various transportation policies over different time intervals and across different groups (Ashford 1978; 2003; Hall 2006; Söderbaum 1973; 2000). At the regional level the easiest way to address this issue would be to maintain the federal requirement that MPOs develop long-range transportation plans (LRTP). Many MPOs are already using the LRTP as a way to consider sustainable development in their visioning processes. Further, if these plans were developed using a participatory backcasting approach (Quist and Vergragt 2004), MPOs and their stakeholders could explore the use of promising sustainable technologies that could open new trajectories towards sustainable transportation.

Yet another barrier to creating a sustainable transportation policy is the complexity of the legislative process. Identifying mechanisms that can promote sustainable transportation legislation through the Congressional review process is a difficult task. However, two approaches that hold some promise include the idea of [1] creating a strong policy network to support sustainable transportation issues (Hall 2006) and [2] enhancing the ability of the U.S. DOT to promote and lead sustainable transportation policy initiatives in a *unified manner* by consolidating decision-making authority within the Office of the Secretary of Transportation

(Hazard 1988).<sup>32</sup> The objective of the former approach is to promote sustainable transportation policy through agenda building and problem development. The objective of the latter approach is to reduce the power of the modal administrators and increase the power and ability of the Secretary and Assistant Secretaries of Transportation to promote an integrated transportation strategy. Of course, for the latter approach to be successful the Secretary of Transportation - as a policy entrepreneur (Coughlin 1997) - must support the concept of sustainable transportation.

Finally, the inadequacy of tools and/or planning guidance to inform the development of sustainable transportation policies and programs is a significant (though largely unrecognized) barrier. This problem is addressed in the following section.

### **Sustainable Transportation Decision-Support Framework**

Sustainable transportation is not an *end state*, but rather a *process* of continual improvement that removes perverse incentives and halts or reverses clearly unsustainable development. Thus, specific emphasis should be given to the design of *integrated* and *coherent* policies and programs that seek to improve social, environmental, and economic transportation-related factors and impacts. The challenge facing the federal government is to identify ways to guide the transportation system's transformation towards sustainability by focusing on important areas where change can occur. These include (Ashford 2004):

- Changes in prices, markets, and industry structure to shape private/public sector activity and transportation supply/demand;
- System changes related to the organizational/institutional structure of government;
- Changes in law and the political process (e.g., legislation, regulation, negotiation, and stakeholder participation); and
- Technological/scientific changes (e.g., options for research and development, innovation, and diffusion of existing technology).

Table 1 presents an initial attempt by the author to create a sustainable transportation decision-support framework that pulls together existing and newly-developed tools that could be used to

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<sup>32</sup> Both of these approaches - referred to as the *Moynihan Model* and *U.S. DOT Reinvention Model*, respectively - are explored in detail in Hall (2006).

help integrate decision-making at the federal level. The table presents the current approach to a number of transportation issues and contrasts these with a sustainable transportation approach. The table then identifies the actions/tools/approaches the federal government should take/use to promote a more sustainable transportation system.

**Table 1: Sustainable Transportation and the Role of the Federal Government**

	<b>Current Approach</b>	<b>Sustainability Approach</b>	<b>The Federal Role</b>
<b>System Conceptualization</b>	<i>Mechanistic, linear, and reductionist</i> <sup>a</sup> - Reduce the transportation system into a number of sub-systems - e.g., highways, bus networks, transit networks, cycleways, airports, etc. - where each sub-system is analyzed separately/in isolation and the whole is considered to be the sum of the separate parts.	<i>Holistic systems approach</i> <sup>a</sup> - The transportation system is considered as a series of interconnected socio-technical systems that function like biological and ecological systems. A healthy system displays modal diversity for people and freight that increases with population size. The system is analyzed both in terms of its sub-systems and their interconnections, as well as how the system/sub-systems interact with the natural environment. The whole cannot be analyzed as a simple sum of its parts.	<p>Broaden the scope of issues to be included in the analysis of transportation legislation and projects.</p> <p>In collaboration with other sectors,<sup>33</sup> identify the environmental and resource usage constraints within which the transportation sector must operate. The CAAA/SAFETEA-LU framework is a good example of a mechanism that effectively sets environmental limits to transportation activity.</p> <p>Establish a multimodal entity within the U.S. DOT with technical and policy expertise to focus specifically on ways to connect the transportation modes. Identify opportunities to integrate surface and air transportation legislation.</p>

<sup>33</sup> If the federal government adopts a holistic systems approach to transportation policy development, the impacts of proposed (or existing) transportation policy on activities in other sectors (such as energy, agriculture, manufacturing, etc.) should be considered. Thus, the author recommends the following change to an internationally recognized definition of sustainable transportation.

A sustainable transportation system is defined as one that:

- “allows the basic access and development needs of individuals, companies and societies to be met safely and in a manner consistent with human and ecosystem health, and promotes equity within and between successive generations;
- is affordable, operates fairly and efficiently, offers choice of transport mode, and supports a competitive economy, as well as balanced regional development;
- [in coordination with other sectors,] limits emissions and waste within the planet’s ability to absorb them, uses renewable resources at or below their rates of generation, and, uses non-renewable resources at or below the rates of development of renewable substitutes while minimising the impact on the use of land and the generation of noise” (European Council 2001, pp. 15-16).

While the adjustment to the definition appears minor, it presents an explicit requirement for the transportation sector to work with other sectors to solve problems associated with the natural environment. Of course, the definitions of sustainable energy, agriculture, manufacturing, etc. must also include similar language for this approach to be effective. In effect, the revised sustainable transportation definition makes inter-sector cooperation a primary agenda item in the pursuit of sustainable development. Thus, if the transportation sector began to work closely with the energy sector, for instance, an entirely new set of solutions might become available that combines each sector’s core competencies in new ways (see Figure 1).

	<b>Current Approach</b>	<b>Sustainability Approach</b>	<b>The Federal Role</b>
<b>Transportation Planning</b>	<p>Maximize system capacity, travel speed, and mobility.<sup>a, b</sup></p> <p>Land use considerations are often secondary to transportation planning and vice versa.<sup>a, b</sup></p>	<p>Maximize system efficiency through the provision of a highly interconnected and multimodal transportation system that encourages the use of the most efficient modes of transportation. Promote accessibility rather than mobility.<sup>a, b</sup></p> <p>Land use planning (including environmental considerations) is an integral part of transportation planning; ‘<i>transportation-land-environment planning</i>’ replaces ‘<i>transportation planning</i>’ as a descriptor.</p>	<p>Retain the federal transportation planning factors in SAFETEA-LU. Increase the burden of proof for compliance with these planning factors. Extend the planning factors to air transportation planning, with appropriate amendments.</p> <p>Make <i>transportation-land-environment planning</i> an important element of long-range transportation plans.</p>
<b>Stakeholder Involvement</b>	<p>Modest level of stakeholder involvement. Stakeholders may provide information or are included at certain points of the planning process.<sup>b</sup></p> <p>Stakeholders are sometimes included in scenario planning/visioning exercises.</p>	<p>High level of stakeholder involvement. Stakeholders have a more influential role in the planning/decision-making process and are more cognizant of the distributional impacts of transportation policies/programs/projects.</p> <p>Stakeholders play a central role in participatory backcasting/scenario planning exercises.</p>	<p>Retain and reinforce SAFETEA-LU’s requirement to include the public in transportation planning and decision-making processes. Ensure that similar requirements exist for planning related to aviation operations and airport development.</p> <p>Establish a pilot project to evaluate the technique of participatory backcasting.</p>
<b>Modal Choice</b>	<p>The automobile is the predominant and only choice of transportation for many people. In large metropolitan areas, public transportation is more accessible, but to varying degrees.</p>	<p>A more balanced approach to the provision of transportation is applied. Where feasible, innovative solutions should be tested to begin to bridge the gap between public and private transportation.<sup>c</sup></p>	<p>Ensure states and regions/local areas have the flexibility to develop the most efficient mode(s) to meet their transportation needs. Consider ways to minimize the impacts that federal programs have on creating unnecessary or inappropriate transportation projects.</p>

	<b>Current Approach</b>	<b>Sustainability Approach</b>	<b>The Federal Role</b>
<b>Funding</b>	<p>Transportation funding tends to be directed at specific modes. A significant proportion of available funding is targeted at highways since vehicles are the dominant mode of transportation.</p>	<p>Transportation funding is directed towards enhancing and integrating modal diversity and, in general, is not constrained to a particular mode.</p> <p>In a situation where the transportation system is largely built, funding focuses on operating, maintaining, and transforming the existing system towards a more sustainable form.</p> <p>Significant and sustained financial support is provided for sustainable transportation research.</p>	<p>Maintain and increase funding flexibility.</p> <p>Change the name of the Highway Trust Fund (HTF) to the Transportation Trust Fund (TTF). Evaluate whether the 80:20 split of federal funds between highways and transit represents the best division of funding from a ‘transportation system,’ rather than a political, perspective. In addition, consider new mechanisms that can finance a multimodal transportation system without elevating the priority given to a specific mode of transportation.</p> <p>Provide significant support for research aimed at improving the environmental, social, and economic performance of the transportation system.</p>
<b>U.S. DOT Strategic Objectives</b>	<ul style="list-style-type: none"> <li>▪ Safety;</li> <li>▪ Mobility;</li> <li>▪ Global connectivity/economic growth;</li> <li>▪ Environmental stewardship; and</li> <li>▪ Security.<sup>34</sup></li> </ul> <p>Strategic objectives are focused on <i>managing</i> areas where improvements are deemed necessary.</p>	<ul style="list-style-type: none"> <li>— Safety;</li> <li>— Accessibility;</li> <li>— Multimodality;</li> <li>— Economic development;</li> <li>— Environmental protection/enhancement; and</li> <li>— Security.</li> </ul> <p>Rather than simply <i>managing</i> the strategic areas, the U.S. DOT should search for ways to achieve <i>transformational improvements</i> in each area (see <i>Competitiveness/Innovation</i>).</p>	<p>Adopt a <i>proactive, preemptive, and performance-based</i> approach to the delivery of transportation services.</p> <p>Ensure the U.S. DOT’s strategic objectives support the principles of sustainable transportation.</p> <p>Set ambitious national transportation performance objectives and identify ways to transform the transportation system to meet these objectives.</p>

<sup>34</sup> Source: The U.S. Department of Transportation, *Strategic Vision 2005-2008*, [http://www.dot.gov/stratplan2008/strategic\\_plan.htm](http://www.dot.gov/stratplan2008/strategic_plan.htm) (accessed on 04/06/2006).

	<b>Current Approach</b>	<b>Sustainability Approach</b>	<b>The Federal Role</b>
<b>Equity</b>	Equity considerations are primarily informed by Title VI of the 1964 Human Rights Act, the 1990 Americans with Disabilities Act, and the 1994 Presidential Executive Order on Environmental Justice.	The principles of ethical transportation policy <sup>d</sup> are applied in the choice of options and pathways for achieving those options.  Federal law and guidance related to equity is adhered to.	Identify ways to ensure that transportation decisions make the transportation-disadvantaged members of society relatively better off.  Integrate the principles of ethical transportation policy <sup>d</sup> into federal transportation regulation and programs.
<b>Employment</b>	Ensure a supply of adequately trained people, facilitate dialogue with workers, and provide safe working environments. <sup>e</sup>	Continue current approach while searching for radical improvements in the human-technology interface (i.e., the integration of human resources and engineering artifacts). <sup>e</sup>	Ensure that public and private transportation service providers adhere to national worker health and safety standards.
<b>Economics and Policy Development/ Analysis</b>	Neo-classical economics.  Policy development is based upon static efficiency.  Primary analysis tools: Benefit-cost analysis (BCA) and cost-effectiveness analysis (CEA).	Ecological economics.  Policy development is based upon <i>dynamic efficiency</i> - i.e., the need to consider how change occurs over time.  Primary analysis tool: Trade-off/positional analysis (supported by the Rawlsian/utilitarian decision-making philosophy). <sup>d</sup>	Encourage the use of analysis tools that enable transportation analysts and decision-makers to evaluate and trade-off the impacts of their policies and programs with regards to important social, environmental, and economic concerns. Highlight the importance of considering these policies and programs in a dynamic, rather than static, manner.

	<b>Current Approach</b>	<b>Sustainability Approach</b>	<b>The Federal Role</b>
<b>Competitiveness/ Innovation</b>	Competitiveness is achieved by improving system efficiency and lowering the costs of transportation services. Innovation is encouraged through single-purpose government policies such as research programs, demonstration projects, government purchasing, market incentives, etc. <sup>e</sup>	Competitiveness is achieved through changing the nature of meeting market needs by encouraging radical or disrupting innovation. <sup>e</sup>  Innovation occurs through an integrated process of technological, institutional, social/behavioral, and organizational changes. Government policy is integrated and co-optimized (i.e., is designed to achieve multiple objectives) and a range of incentives (including more stringent environmental regulation - i.e., the 'strong' Porter hypothesis) <sup>f</sup> is used to encourage disrupting innovation.	Identify ways to transition away from the current procedural approach to transportation planning towards a more substantive approach that requires simultaneous progress (where possible) on social, environmental, and economic fronts.  Use Figure 1 - or a suitable alternative - to identify ways to integrate or co-optimize federal regulatory initiatives directed at, or related to, transportation.  In coordination with other federal agencies, create ambitious transportation performance standards - such as more stringent emissions standards - in areas where disrupting innovation might occur.
<b>Externalities</b>	A wide range of environmental, social, and economic externalities are identified or acknowledged, but a very limited effort is made to internalize the social costs of any negative transportation externalities.	A comprehensive set of environmental, social, and economic externalities is identified and significant effort is made to prevent or internalize the social costs of any negative transportation externalities either through mandated standards or economic instruments. Great care is taken to properly balance efficiency and equity.	Identify ways to minimize negative transportation-related externalities.  Identify ways to ensure that the market reflects the true social cost of a transportation mode.  Educate drivers about any federal subsidies paid to maintain low vehicle ownership and usage costs.
<b>Pollution and Waste</b>	Control emissions and waste.	Pollution and waste are <i>prevented</i> through system changes wherever possible.  Pollution and waste streams are kept within ecological limits.	See <i>System Conceptualization</i> and <i>Competitiveness/Innovation</i> .

	<b>Current Approach</b>	<b>Sustainability Approach</b>	<b>The Federal Role</b>
<b>Energy and Resources</b>	Promote energy and resource conservation.	Transition resource and energy dependence away from non-renewable resources towards renewable resources.  Promote dematerialization/ecological modernization.	In addition to pursuing strategies to promote disrupting innovation, provide significant research funding to universities and national laboratories (via a competitive process) to develop technologies for hyper-efficient modes of transportation and explore the future potential of intelligent transportation systems (ITS).
<b>Trade</b>	The international transportation system is developed in response to the demands of international trade.  The predominant view of trade is based upon Ricardo's theory of comparative advantage, which is not directly concerned with the negative environmental and social impacts of international transportation. Hence, the development of the international transportation system tends to respond to market demands with little or no consideration of the broader system impacts.	The international transportation system is developed to support trade while protecting important social and environmental objectives.  The impacts of trade are considered using ecological economics. The idea that trade can be analyzed in a 'value-neutral' way using neo-classical economics is rejected. Instead, trade is analyzed from more than one ideological perspective. <sup>g, h</sup> Thus, the development of the international transportation system depends upon market demand as well as other important environmental and social considerations.	Support the development of an efficient and multimodal national and international transportation system, considering the impacts of this system in relation to important social and environmental factors, not just in relation to economic growth.
<b>The Four Environmental Concerns that Promote the Need for Sustainable Development<sup>35</sup></b>	Governments tend to focus on one or two of the four environmental concerns to the exclusion of the others.	Governments provide a more balanced approach to addressing the four environmental concerns.	Use Figure 1 as a way to consider the four environmental concerns when making transportation policy decisions.

Key: <sup>a</sup> Replogle (1991; 1995); <sup>b</sup> Litman (2003); <sup>c</sup> Hoogma et al. (2002), <sup>d</sup> Hall (2006); <sup>e</sup> Ashford et al. (2002); <sup>f</sup> Ashford (1999); <sup>g</sup> Janelle and Beuthe (1997); and <sup>h</sup> Söderbaum (2005).

<sup>35</sup> The four environmental concerns are [1] the disruption of ecosystems and loss of biological diversity and the indirect effects these have on human health and well-being; [2] the rapid use of finite resources and energy supplies; [3] the direct impacts of toxic pollution on human health and the health of other species; and [4] the disruption of the global climate (Hall 2006).

## **Conclusion**

A core argument of this paper is that a major barrier to transitioning towards sustainable transportation is not a lack of intelligent ideas, but a lack of integrated decision-making within the federal system. Further, the approach that one adopts when developing a sustainable transportation strategy revolves around political factors and the continually changing (environmental, social, and economic) performance of the transportation system. Hence, while a comprehensive set of actions is put forward by the author, the actual steps that the federal government should take will be dictated by prevailing circumstances. What is perhaps most evident is that unless the President and/or Congress support the concepts of sustainable development and sustainable transportation, significant progress towards these objectives is not likely to result from federal action.

This paper also argues that a useful way to promote sustainable transportation is to equate the concept to a *process* of continual improvement, which focuses on removing perverse incentives that encourage unsustainable activities. Defining the problem in this manner broadens the alternatives available to the decision-maker and does not immediately associate the concept with anti-auto (and politically unattractive) policies. While such policies are likely to be necessary, sustainable transportation should be associated more with progress, innovation, and development than reducing automobile/vehicle usage. The critical issue is that for sustainable transportation to be accepted as the appropriate way forward, it must be seen to be a good idea by the majority of transportation users - most of which own a vehicle.

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