WWS 402f: Sustainable Development – Can We Do It?

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Sustainable Development at Home: Reducing CO_2 Emissions in the US Transportation Sector

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ABSTRACT

The Final Report of the WSSD, signed by the US at Johannesburg, included the provision that "[a]ll countries should promote sustainable consumption and production patterns, with the developed countries taking the lead." This policy paper focuses on the US passenger transportation sector as a starting point for a transition to more sustainable consumption patterns. While environmental concerns are often highlighted as motivations for changing these patterns and the resulting CO_2 emissions, there are also significant national security and economic benefits to making such shifts. Acknowledging the various approaches available for reducing emissions, the specific goals of increasing vehicle efficiency and reducing total vehicle miles traveled are selected, and a short and long-term strategy is discussed for each, to be pursued simultaneously. Recommendations for increasing vehicle efficiency include both the immediate strengthening of current CAFE standards and a long-term investment in hydrogen fuel cell technology, infrastructure, and marketing. Strategies for reducing vehicle miles traveled include establishing transportation prices that accurately reflect social costs through a reduction in indirect subsidies, combined with a long-term commitment to and investment in viable alternatives to personal vehicle use.

INTRODUCTION

Sustainable development is a sweeping concept that calls for action in many interconnected sectors: health, sanitation, resource use, energy access, and pollution control, among others. The preceding policy papers address several of these themes, and specifically consider how the United States can help other nations work towards this ultimate goal. It is imperative to remember that the development to which the concept

refers is not limited to that of developing nations; rather, steps towards sustainable development must be taken by developed countries as well.

The Report of the World Summit on Sustainable Development, signed by the US in Johannesburg, affirmed, "…we commit ourselves to undertaking concrete actions and measures at all levels and to enhancing international cooperation, taking into account the Rio principles, including, inter alia, the principle of common but differentiated responsibilities…."[1] The Report's Plan of Implementation also stressed that, "All countries should promote sustainable consumption and production patterns, with the developed countries taking the lead…."[2] Drawing from these two statements, our commitment to sustainable development implies not only assistance to and partnerships with other nations, but a simultaneous effort here at home to promote sustainability. It is within this context that I approach US contributions to global CO_2 emissions.

Many widespread US practices lead to unsustainable consumption and production patterns, and so national efforts can (and should) focus upon a number of areas. However, present CO_2 emissions form a pressing concern both globally and nationally, and strategies for reductions have been well-researched, making the issue an ideal starting point in a move towards sustainable development. Specifically, I will focus on reducing emissions in the US transportation sector, both because of its significant contribution to the problem and because of the variety of options available for instigating change.

[1] *Report of the World Summit on Sustainable Development, Johannesburg, South Africa, 26 August-4 September 2002* (New York: United Nations, 2002), 8. http://www.johannesburgsummit.org/html/documents/summit_docs/131302_wssd_report_reissued.pdf 25 February 2003.
[2] Ibid, 13.

BACKGROUND

The Intergovernmental Panel on Climate Change, established in 1988 and one of the premier authorities on the subject, stated in *Climate Change 2001: The Scientific Basis*: "In light of new evidence and taking into account the remaining uncertainties, most of the observed warming over the last 50 years is likely [66-90% chance] to have been due to the increase in greenhouse gas concentrations."[3] Furthermore, they report that, "[e]missions of CO_2 due to fossil fuel burning are virtually certain [greater than 99% chance] to be the dominant influence on the trends in atmospheric CO_2 concentration during the 21st century."[4] While there is general acknowledgement of a global climate change problem, there is no such agreement on national responsibilities. However, considering our disproportionate contribution to the problem and the commitments made at the WSSD, the US must aim to lower current emissions levels. According to the Carbon Dioxide Information Analysis Center, the United States, making up approximately 4.7 % of the global population, was responsible for almost 25% of global CO_2 emissions in 1999, by far the largest emitter.[5] Per capita emissions, often a much more telling measure, also point to the US as a huge contributor. The US had per capita rates of approximately 5.5 metric tons of carbon in 1999, compared to a rate of 0.6 in China, the nation with the second largest total emissions. Other industrialized nations' per capita rates fall in between, with the United Kingdom at 2.46 metric tons per person and

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[3] *Climate Change 2001: The Scientific Basis. Summary for Policymakers*. Intergovernmental Panel on Climate Change, 10. http://www.ipcc.ch/pub/spm22-01.pdf 14 March 2003.
[4] Ibid, 12.
[5] Population statistics from: "World Population Prospects: The 2002 Revision Population Database," United Nations Population Division http://esa.un.org/unpp/ 28 April 2003; Emissions statistics from: "Top 20 (1999 total CO_2 emissions)," Carbon Dioxide Information Analysis Center. http://cdiac.esd.ornl.gov/trends/emis/graphics/top20_1999.gif 30 March 2003.

Germany at 2.63.[6] Besides the disproportionate contribution that these statistics reveal, what is perhaps most frightening is that our emissions continue to rise: in the 1990s, US emissions increased by 12%.[7]

Why Take Action?

Motives for addressing US CO_2 emissions fall into three categories: environmental concerns, national security interests, and economic benefits. The first category contains the most often discussed motivations: the predicted damage to the environment, the disproportionate US contribution to the problem, and our comparative lag in controlling emissions relative to other industrialized nations. This concern is in many ways embodied by our failure to accept Kyoto, which would have mandated a decrease in CO_2 emissions of 7% from 1990 levels by 2012, a reduction of approximately 347 million metric tons (MMT).[8] However, as is evident in our reaction to the Kyoto targets, these are also the most contested motivations, and so a consensus on and commitment to action based only in these concerns is unlikely.

The second category, national security interests, is probably the most convincing (or least opposed) argument for reducing emissions at present. The need to decrease or even eliminate our dependence on foreign oil is something most everyone agrees upon, regardless of party affiliation. Members of both parties in Congress acknowledge that efforts to decrease national oil consumption are essential in avoiding future conflicts like

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[6] Gregg Marland, Tom Boden, and Bob Andres, "National per capita CO2 emission estimates for 1999 from fossil-fuel consumption and cement production expressed in metric tonnes of carbon (not CO2)," Carbon Dioxide Information Analysis Center http://cdiac.esd.ornl.gov/ trends/emis/top99.cap 28 April 2003.

[7] Martyn Turner and Brian O'Connell, *The Whole World's Watching: Decarbonizing the Economy and Saving the World* (Chichester, England: John Wiley & Sons, 2001), 27.

[8] Reduction value calculated as follows: 1990 emissions = 4,957,022 gigagrams = 4957 MMT; 7% of 4957 = 347 MMT. Jason Shogren, *The Benefits and Costs of the Kyoto Protocol*, (Washington, DC: AEI Press, 1999), 5-6.

the current war in Iraq.[9] The proposal now being encouraged by the administration, opening up the Arctic National Wildlife Refuge for oil drilling, is an ill-advised, unsustainable and destructive solution to the problem of oil dependence. Efforts to reduce CO_2 emissions in the transportation sector such as those proposed below provide the means to reduce oil consumption in a much more sustainable manner.

The third set of motivations for reducing emissions involves the potential economic benefits. The proposition of decreasing CO_2 emissions, specifically via the Kyoto Protocol, is often discussed only in terms of costs and predicted economic damage. Economic consulting firms have estimated that with implementation of the Protocol, (reductions of total greenhouse gas emissions to 7% below 1990 levels),

> …U.S. GDP could decline by nearly 3 percent annually—$250 billion a year… According to those firms, the trade deficit would increase by tens of billions of dollars, gasoline prices would increase by nearly fifty cents a gallon, electricity prices would nearly double, and two million U.S. jobs would disappear.[10]

The assumptions in which these forecasts are based must be critically analyzed. The economic thinking behind these cost predictions is largely based on the work of Yale economist William Nordhaus. "Nordhaus now says (in effect) that the only possible impact of government interventions to reduce greenhouse gas (GHG) emissions will necessarily be to reduce economic growth from the optimum trajectory."[11] This thinking assumes both perfect competition and information in the energy market, and that

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[9] See "New Apollo Project" proposed by Representative Jay Inslee (D) http://seattlepi.nwsource.com/opinion/100516_inslee19.shtml and the Republicans for Environmental Protection Energy Policy http://www.repamerica.org/policy/energy.html.

[10] Jason Shogren, *The Benefits and Costs of the Kyoto Protocol*, (Washington, DC: AEI Press, 1999) 20.

[11] Robert Ayres, "How economists have misjudged global warming," *World Watch* 14 (Sept/Oct 2001), Available: Proquest, 17 March 2003.

innovation and progress occur independently of crises.[12] However, if these assumptions are not made (as they should not be in this case, given the lack of alternatives in the transportation sector and limited information on the true social cost of transportation that will be discussed further on), the potential economic benefits of cutting back on CO_2 emissions are visible. Robert Ayres suggests a very different result of committing to emissions reductions, which would spark an investment in technological innovation: "…[E]conomic growth comes from technological innovation, as the histories of the industrial and communications revolutions amply demonstrate…And more often than not, this creative activity is prompted by some sort of disequilibrium or scarcity."[13] Some have already picked up on the potential economic gains – U.S. Representative Jay Inslee has called for a "New Apollo Project", "a unified and highly prioritized national program to fulfill America's destiny of leading the world to a new clean energy future."[14] He writes, "…we are on the cusp of a 'clean energy gap' just as worrisome as the missile gap of the Sputnik era…Why should we, the greatest seedbed of technological innovation in world history, cede these emerging markets to the rest of the world?"[15]

Besides benefits from investment in these markets, the US stands to gain by improving its energy efficiency: "The very high carbon to GDP ratio of the US, which stems from its high energy intensity, might suggest that compliance with climate protection goals would be costly to the economy. However, there exist many cost-effective opportunities to reduce greenhouse gas and pollutant emissions from all sectors

[12] Ibid.
[13] Ibid.
[14] Jay Inslee. "New Apollo Project can help us unplug our need for oil." Seattle Post-Intelligencer 19 December 2002. http://seattlepi.nwsource.com/opinion/100516_inslee19.shtml
[15] Ibid.

of the US economy."[16] Lastly, and more specific to the case of passenger vehicle transport that will now be discussed, some researchers argue that automobile dependency, beyond a certain level, actually decreases regional economic development as it requires that a greater percentage of funds be spent on roads and commuting, increases per capita accidents, and decreases the efficiency of transit systems.[17]

Why the Transportation Sector?

Bearing in mind that we stand to gain from environmental, national security and economic standpoints, I suggest that the US transportation sector, and specifically passenger vehicle transportation, is the most opportune arena for a government effort aimed at reducing current emissions levels. Firstly, the sector's contributions to CO_2 emissions are substantial. In 1997, 26% of US greenhouse gas emissions were attributed to transportation (95% of these emissions are CO_2).[18] More distressing, however, is that the rate of emissions increase from the transportation sector alone from 1997 to 2010 is projected to grow at 2.1% annually, while emissions from total energy use are projected to grow at a rate of 1.5%.[19] Data available thus far corroborate these predictions: while overall transportation emissions increased by 0.8% from 2000 to 2001, transportation emissions resulting directly from gasoline consumption (which would include passenger vehicle transport) increased by 2.1% (as opposed to emissions reductions in fuel used in air travel and ships within the sector).[20] This is in contrast to the electric power,

[16] Stephen Bernow and Max Duckworth, "An evaluation of integrated climate protection policies for the US," *Energy Policy* 26 (1998), 358.
[17] Todd Litman and Felix Laube, "Automobile Dependency and Economic Development," Victoria Policy Transport Institute August 6, 2002, p. 7. http://www.vtpi.org/ecodev.pdf 20 April 2003.
[18] Steve Winkelman, Tim Hargrave and Christine Vanderlan, *Transportation and Greenhouse Gas Emissions Trading: Final Technical Report* (Washington, DC: Center for Clean Air Policy, 1999), 3.
[19] Ibid, 3.
[20] Energy Information Administration, "Emissions of Greenhouse Gases in the United States 2001 Summary" February 10, 2003. http://www.eia.doe.gov/oiaf/1605/ggrpt/summary/index.html 29 April 2003.

residential and industrial sectors, all of which experienced decreases in emissions during the 2000-2001 period, suggesting that a focus on the passenger transportation sector, an increasingly large contributor to US emissions levels, is appropriate.[21]

Secondly, emissions reductions in the transportation sector would potentially involve a much greater number of actors than would efforts within industry or other energy-consuming sectors; this wider involvement, I will argue in the next section on guidelines for recommendations, is essential to bringing about significant emissions reductions.

Thirdly, a focus on the transportation sector makes sense because of the many options available for decreasing emissions. Proposals include emissions trading between fuel producers, vehicle manufacturers, or other actors involved in the resultant emissions, gasoline taxes, continued investment in research and development for vehicles that do not rely on internal combustion engines, and larger incentives for purchasing hybrid vehicles among many others, some of which I will discuss in the following recommendations.

With these considerations in mind, I believe that a series of orchestrated efforts within the transportation sector to reduce CO_2 emissions would represent a significant step towards sustainability and our commitments at the WSSD.

Guidelines for Recommendations

These three guiding principles shape the recommendations that follow:

1. There must be a sustained government commitment to CO_2 emissions reductions, regardless of the strategies selected. Given the environmental, national security, and economic motivations for taking action, we clearly stand to lose a great deal if a commitment to reductions is not a continued government priority.

[21] Ibid.

2. The encouragement of public awareness is imperative. Increasing awareness on the effects of climate change and our historical contribution to the problem will help to generate public concern and demand for change; these in turn are important in motivating behavior change and in bringing new technologies into the marketplace, both of which are central to my recommendations. Involvement on the individual level ensures that the burden of reducing CO_2 emissions is not placed solely on the industrial or energy sectors. A focus on transportation allows people to play the important role that is rightly theirs in reducing the nation's CO_2 emissions.

3. Both short- and long-term solutions must be simultaneously pursued. The California Air Resources Board's experience with car manufacturers suggests that it is government's responsibility to ensure that there will be both short- and long-term efforts to reduce emissions. In California, it was noted that while there is much support for the development of battery electric vehicles, as manufacturers invested more in this technology, less was invested in longer-term solutions such as fuel cells.[22] It is imperative for policymakers to ensure that, on the national level, there are strategies in place to reduce CO_2 emissions in both the short- and long-term – while immediate steps are needed, they cannot take the place of more significant, deeper changes that will ensure reductions in the future.

RECOMMENDATIONS

The equation below lays out the different variables that contribute to transportation sector CO_2 emissions:

[22] California Environmental Protection Agency Air Resources Board, *Staff Report: Initial Statement of Reasons, 2003 Proposed Amendments to the California Zero Emission Vehicle Program Regulations* 10 January 2003 http://www.arb.ca.gov/regact/zev2003/isor.pdf 17 March 2003.

$$\text{vehicle carbon emissions} = \text{vehicle miles traveled (VMT)} \div \text{vehicle efficiency (mpg)} \times \text{fuel carbon content (lb. C/gal)}$$[23]

The first two variables provide a framework for the following emissions reduction strategies. Recommendations will focus on increasing vehicle efficiency and decreasing vehicle miles traveled (VMT).

Increasing Vehicle Efficiency

Policymakers seeking to decrease transportation sector emissions should begin by focusing on improving vehicle efficiency, both because of the attention the issue has received in the past and because there are currently the beginnings of efforts in place. John DeCicco and Jason Mark propose this makeup for a policy package aimed at increased efficiency:

> A combination of federally sponsored energy-efficiency research and development (technology 'push') coupled with commercialization programs and backed by efficiency standards and incentives (technology 'pull')…An ideal strategy would include initiatives to both push technology horizons forward and pull innovative concepts into market, accelerating the ability to bring costs down and ensure widespread use of technology solutions."[24]

Strengthening and Revising CAFE Standards

In the short-term, a focus on such a technology 'pull' is most practical, and the existing Corporate Average Fuel Economy (CAFE) standards provide a starting point. The US Energy Policy and Conservation Act of 1975 created the standards, originally established in order to curb oil consumption during the 1970s oil crisis. The current standard for passenger car fleet averages is 27.5 mpg, the same level at which they were set in 1975. Very high levels of public support for the standards have been revealed in

[23] Steve Winkelman, Tim Hargrave, and Christine Vanderlan, *Transportation and Greenhouse Gas Emissions Trading*, 4.

[24] John DeCicco and Jason Mark, "Meeting the energy and climate challenge for transportation in the United States," *Energy Policy* 26 (1998), 398.

numerous polls, suggesting that the existing CAFE regulations provide a powerful tool for vehicle efficiency improvements.[25]

The recommended reform of the current standards is twofold. First, the fleet average fuel economy required for each auto manufacturer must be increased; and second, SUVs should be moved from the light truck category, where they are now subject to different regulations, to the passenger car category.

The first reform follows from the simple fact that improvements in automobile efficiency technology over the last quarter-century have until now not been reflected in a higher fuel economy standard. According to *Technology Review*, if new vehicles incorporated existing and soon-to-be available technology, average fuel economy could go from 27.5 to 46 mpg; they stress that the remaining challenge is not technological but rather in applying the already-existent technology to the car fleets, and that, "…with no mandate from Washington or the public, the auto industry has little motivation to change."[26] While there have been recent proposals to increase the current passenger car standards, none have yet been passed. In his testimony to the Senate Energy and Natural Resources Committee earlier this year, David Nemtzow, President of the Alliance to Save Energy, points, among the larger failure of Congress and the administration to support energy efficiency, specifically to the Senate's removal of legislation that would have increased CAFE standards last year.[27] More recently, this past March, Representative Markey's (MA) proposal to the House Energy Committee to increase standards (for cars,

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[25] See David L. Greene, "Why CAFE worked", p.607-608. For example, in a December 1995 poll, "94% of respondents favored 'improving vehicle fuel efficiency' as a means of addressing the problem of US oil dependency."

[26] "Why Not a 40-mpg SUV?," *Technology Review*, November 2002, 42, 46.

[27] U.S. Congress, Senate Committee on Energy and Natural Resources, *Energy Efficiency and Conservation*, David M. Nemtzow, President of Alliance to Save Energy, in Hearings, 108th Congress, March 11, 2003, p. 4. LEXIS NEXIS

light trucks, and SUVs) by approximately 20 percent by 2010 was rejected.[28] Furthermore, it is not clear whether the proposals to modify CAFE standards now under consideration by the administration will actually increase or decrease US fleet fuel economy.[29] The value of increased CAFE standards appears clear to some in Washington, but not yet to a percentage large enough to ensure strengthened regulations.

Establishing slow but steady annual increases in fuel efficiency until a target of 40 mpg is reached would help to "pull" the existing technology into the market. The target of 40 mpg is selected because, while it would represent a substantial improvement from the current average of 27.5 mpg, it is an average fuel economy that, given available technology, could be reached by SUVs as well by the end of the decade.[30]

Strengthening of the standards to a level that would allow the inclusion of SUVs in the passenger car category is essential. The reasoning for such a shift is clear: "the average SUV emits 9.1 tons of greenhouse gases a year, as opposed to 6.4 tons for the average car."[31] That is, each SUV has approximately 42% greater emissions than a passenger car, a distinction that is held in place by the current standards. This difference in regulation ignores the reality of SUVs, which now make up at least 27% of new personal vehicle purchases in the US: they are used, just as passenger cars, for personal use, yet are subject to standards created for light trucks, presumably used for commercial purposes.[32] This is not the only case in which SUVs escape appropriate regulation: the Bush administration has plans to increase the available tax break on SUV purchases by

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[28] "The Missing Energy Strategy," *The New York Times*, March 23, 2003.
[29] See Danny Hakim, "Fuel Economy Regulations Could be Revised," *The New York Times*, March 21, 2003;.
[30] "Why Not a 40-mpg SUV?", 42.
[31] Martyn Turner and Brian O'Connell, *The Whole World's Watching*, 56.
[32] "Demand for SUVs in the U.S. continues to grow," *www.CanadianDriver.com*, September 26, 2002 http://www.canadiandriver.com/news/020926-2.htm 28 April 2003.

"small business owners" from the current $25,000 to $75,000.[33] It is irresponsible to ignore how SUVs are used by US drivers and to include them, for regulatory purposes, with commercial rather than passenger vehicles. Given emerging technologies that increase fuel efficiency, it is reasonable to demand an SUV with a fuel economy of 40 mpg.[34] This directed change would not interfere with Americans' right to purchase an SUV, but would simply hold manufacturers responsible for incorporating existing technology into these popular vehicles. Mandating this regulatory shift is important because without it, considering the increasing market share and current low fuel economy of SUVs, fleet average fuel economy might not see a true increase.

It is noteworthy that last month a constructive step was taken when the National Highway Traffic Safety Administration announced that CAFE standards for light trucks, including SUVs, would increase by 1.5 mpg (from 20.7 mpg, where they have been since 1996, to 22.2 mpg) for vehicles in Model Years 2005-2007.[35] This change was an important move in the right direction, and signals future possibilities.

Investments in Hydrogen Fuel Cell Vehicle Technology

To complement the technology 'pull' of strengthened CAFE standards aimed at reductions in the near-term, the government should simultaneously invest in a technology 'push', focusing on means of increasing vehicle efficiency in the more distant future. However, these proposals that concentrate on long-term efforts cannot be used simply as an excuse for inaction in the present; as stated above, a policy that truly aims to reduce emissions must consist of strategies for both the future and present.

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[33] Jeff Plungis, "SUV tax break may reach $75,000," *Detroit News*, January 20, 2003 http://www.detnews.com/2003/autosinsider/0301/20/a01-64218.htm 28 April 2003.
[34] "Why not a 40-mpg SUV?," 42.

Government investment in the research and development of technology that aims to reduce transportation sector emissions has not been lacking. In 1993, the Partnership for a New Generation of Vehicles (PNGV) began, under which the federal government and the "big three" US auto manufacturers collaborated with the goal of producing a "Supercar" that would have a fuel efficiency three times as great as the standard midsize car at that time.[36] According to Joan Ogden, research scientist in the Energy Group at the Princeton Environmental Institute, PNGV was scheduled as a 10-year program and would have terminated this year; she described the FreedomCAR program, supported by the current administration, as an outgrowth of the Clinton administration's PNGV.[37] In his State of the Union address, the President proposed a significant investment in fuel cell vehicle technology via the FreedomCAR program, in the form of "$1.2 billion in research funding so that America can lead the world in developing clean, hydrogen-powered automobiles."[38] While such an investment could yield great improvements in vehicle efficiency, these benefits will come in the long-term. If the FreedomCAR initiative is no more than a pet project of the administration, or if its funds are diverted to a different program after the 2004 elections, then the program will not serve as a long-term strategy for improving vehicle efficiency. Ogden, who testified earlier this year in Congress on the potential of fuel cell technology, emphasized that it could take between 20 to 50 years

[35] US Department of Transportation, "NHTSA Announces Final Model Year 2005-2007 Fuel Economy Standards for Light Trucks," April 1, 2003. http://www.dot.gov/affairs/nhtsa0903.htm 21 April 2003.
[36] Technology Administration, Department of Commerce, "What is PNGV?" May 5, 2002 http://www.ta.doc.gov/PNGV-Archive/AboutPNGV/intro.htm 31 March 2003
[37] Joan Ogden, research scientist, Princeton Enivronmental Institute, interviewed by Elyse Kovalsky, April 9, 2003.
[38] George W. Bush, "State of the Union Address," January 28, 2003 http://www.whitehouse.gov/news/releases/2003/01/20030128-19.html 1 April 2003.

for fuel cell vehicles to be widely available.[39] Government funding and support must be sustained over this time period.

Fuel cells were selected for the FreedomCAR program because PNGV participants agreed that this new technology had significant potential, and because the long-term nature of its benefits requires support without demands for results in the near-term. The funds that the President requested for the new program could have a variety of applications, including: research on hydrogen storage, controlled fleet trials, and, perhaps most importantly, addressing hydrogen production and infrastructure concerns.

Despite the advances fuel cells would make in reducing emissions directly from vehicles, hydrogen production itself uses fossil fuels and therefore also emits significant amounts of CO_2. If emissions reductions are the desired end, this issue must be addressed, specifically by investigating the possibility of hydrogen production using renewable energy sources.

Developing an infrastructure for fuel cell vehicles presents an equally large obstacle, often described as the "…chicken-and-egg problem. We cannot have large numbers of fuel-cell vehicles without adequate fuel availability to support them, but we will not be able to create the required infrastructure unless there are significant numbers of fuel-cell vehicles on the roadways."[40] The US Department of Transportation has welcomed its role in infrastructure development, but does not appear to have begun work in the area.[41] As its partners in the FreedomCAR program focus on fuel cell technology,

[39] Joan Ogden, April 9, 2003.
[40] Lawrence D. Burns, J. Byron McCormick and Christopher E. Borroni-Bird, "Vehicle of Change," *Scientific American* 287 (October 2002), Available: EBSCOhost, 17 March 2003.
[41] Congress, Senate Energy and Natural Resources Committee, Testimony by Emil Frankel, Assistant Secretary, Transportation Policy, Transportation Department, 108th Congress, March 6, 2003.

the government must simultaneously ensure the creation of the necessary infrastructure so that its investment in fuel cell technology can be turned into a reality.

While Ogden fully supported the $1.2 billion request by Bush, she voiced several concerns about the program. Firstly, she expressed that, despite the program's advancements, the emergence of a fuel cell fleet is largely a factor of marketing and public support. If interest is not demonstrated to manufacturers, they in turn will not mass-produce the vehicles, and there is a role for government to play in fostering such interest. Secondly, there is concern that money for the FreedomCAR program would be taken away from funds previously devoted to other clean energy technologies, including renewable energy. Ogden emphasized that a simple redistribution of funding already set aside for clean energy would not be beneficial.[42]

While they hold immense potential, there is still an uncertainty associated with fuel cell vehicles, making it all the more important to promote change in the short-term with increased CAFE standards. Applying the technological advances already made under PNGV to the full US fleet can help manufacturers move towards the goal of higher vehicle efficiency. Lastly, while scientists are confident that the technology exists or soon will to increase vehicle efficiency, both the case of raising CAFE standards and of fuel cell vehicle development clearly suggest that the federal government still has an important role to play in bringing these technologies into the market.

Decreasing Vehicle Miles Traveled

While improvements in vehicle efficiency alone would presumably ensure reductions in CO_2 emissions, it is equally important for policymakers to develop strategies for decreasing vehicle miles traveled (VMT). Predictions of a 25% increase in

VMT from 1990 to 2010 suggest that gains made through increased vehicle efficiency could be offset by increases in VMT.[43] Reducing VMT poses a significant challenge in that policymakers cannot depend on technological improvements to the same degree that they can for increases in vehicle efficiency. The following recommendations focus on the need for individual behavior change so that decreases in the total number of vehicle miles traveled can be brought about.

Current levels of VMT in the US can be understood as the result of a series of market distortions in the transportation sector, specifically "underpricing" and lack of transportation options.[44] The following recommendations aim to address these distortions, the first as part of a short-term strategy and the second as part of longer-term proposal.

Eliminating Indirect Subsidies to Transportation

Todd Litman explains that most vehicle expenses are either fixed or external, rather than dependent on how much driving is done, leading to a kind of "underpricing" and the logical conclusion that drivers seek to "'get their money's worth'" by increasing their VMT.[45] DeCicco and Mark provide an estimation that, according to a 1994 Office of Technology Assessment, "market prices fail to reflect 33-50% of the total social costs of transportation."[46] Indirect subsidies to transportation are one among many factors that contribute to this market failure and resultant high VMT. While not an easy task in

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[42] Joan Ogden, interview, April 9, 2003.
[43] Daniel Sitarz, ed., *Sustainable America: America's Environment, Economy and Society in the 21st Century* (Carbondale, Ill.: Earthpress, 1998), 195.
[44] A discussion of these market distortions can be found in: Todd Litman, "Transportation Market Reforms for Sustainability," *Transportation Research Record* 1702 (2000), 11-12.
[45] Tod Litman, "Transportation Market Reforms for Sustainability," *Transportation Research Record* 1702 (2000), 11.
[46] John DeCicco and Jason Mark, "Meeting the energy and climate challenge," 398.

political terms, the gradual elimination of such subsidies to transportation is recommended to address this "underpricing", thereby reducing VMT and CO_2 emissions.

An OECD report emphasizes how public awareness of such subsidies and their effects is critical:

> In order to have an informed policy debate on the desirability of support measures, it is essential that fiscal policies and support measures are as transparent as possible….Increasing the available information on the type and impact of support measures in place will also contribute to an understanding of the effectiveness of the measures…and what environmental effects they might have.[47]

The termination of subsidies, or "support removal," can help move "…towards the full cost pricing of environmentally-harmful activities."[48] The report adds, however, that before eliminating a subsidy, it is important to consider why it was established and who may be negatively affected by its removal.[49]

In 1997, the tax exemption on employer-provided parking had an approximate value of $19 billion/year.[50] This exemption acts as an indirect subsidy to private transportation in that the cost of driving to work (or, in this case, of having a car in a parking lot all day) is artificially low, changing the price signal sent to the driver. A 1997 report estimated substantial reductions in CO_2 emissions if the subsidy was completely eliminated (reductions by approximately 22 MMT in 2000 and by 27 MMT in 2010).[51] The 2002 US Climate Action Report announced a series of measures, voluntary either on the part of the employer or employee and dubbed "Commuter Options Programs", aimed

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[47] OECD, *Improving the Environment Through Reducing Subsidies: Part II, Analysis and Overview of Studies*, 1998, 96.
[48] OECD, *Improving the Environment Through Reducing Subsidies: Part I, Summary and Policy Conslusions*, 1998, 8.
[49] Ibid, 9.
[50] Michael Shelby, Robert Shackleton, Malcolm Shealy and Alexander Cristofaro, "The Climate Change Implications of Eliminating United States Energy (and Related) Subsidies," in *Role Of Economic Instruments in Integrating Environmental Policy with Sectoral Policies*, United Nations, 1998, 63-4.

at decreasing emissions from commuters' VMT.[52] The EPA estimated the resulting emissions reductions at 0.95 MMT in 2000 and 3.81 MMT in 2010.[53] If an accurate prediction, these 3.81 MMT would represent 14% of the reductions possible with a complete elimination of the subsidy. To build on this beginning, the government has two options: to begin to tax the income still spent on employee-provided parking, or to focus upon increasing the number of participants in the voluntary programs. This second option might be better approached on the local level, where simple efforts to reduce VMT such as carpooling and other community organizing can occur most efficiently.

Once indirect subsidies such as the parking tax-exemption are eliminated, further steps should be taken so that price signals represent a greater portion of the social cost of driving, including environmental and social harm. An increase in the gasoline tax, with associated revenues set aside for environmentally-friendly transportation projects or climate change research, could help improve the accuracy of the true total cost of driving.

Creating Options: Alternative Transportation Systems

While having prices that reflect the total social cost of an activity is significant, these changes alone are not enough to decrease VMT (and, when taken alone, they may hurt consumers). The effectiveness of these measures depends largely upon the set of *practical* transportation alternatives available to drivers. Local, regional and national leaders seeking to reduce VMT must initiate a long-term plan to ensure that these other options exist and help create them where they do not.

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[51] Ibid, 64.
[52] *US Climate Action Report 2002* http://yosemite.epa.gov/oar/globalwarming.nsf/content/ResourceCenterPublicationsUSClimateActionReport.html 2 April 2003.
[53] Ibid. Estimates obtained using the following conversion: 1 Tg = (44/12) 1 MMT.

Plans to create transportation alternatives to personal vehicles should include the following considerations. Firstly, the development of such systems is inextricably tied to land-use patterns in urban and suburban areas; local planners should use a "Smarth Growth" development model to ensure the feasibility of public and alternative transit.[54] Secondly, decisions on the appropriate alternative transportation method for a given community should be taken by community leaders. The Transportation Equity Act for the 21st Century, or TEA-21 (legislation that will expire in September and is awaiting reauthorization) facilitates this local level decision-making by providing federal funds for local transportation projects. Possibilities abound for these projects, including among many others light rail systems, buses using low-emission and high-efficiency technology, and the construction of bicycle lanes. On the regional level, efforts to link nearby cities with high-speed trains should be consolidated so that consumers are provided with a time- and cost-efficient alternative to personal vehicles for medium-length travel.

TEA-21's focus on locally designed transportation solutions is commendable, as is its stress on intermodal approaches. However, in its reauthorization a provision should be included that requires an assessment of each federally-funded project which would take into account the project's true social cost, including environmental and social costs (just as the total cost of driving should reflect these external costs).

Enhancing Desirability of Transportation Alternatives

One goal for "Sustainable Transportation" from the 1997 *Energy and Transportation Task Force Report* reads, "Stabilize average vehicle miles traveled per capita at 1990 levels by 2010 while enhancing the desirability of alternatives to single

[54] See Todd Litman, "Draft: An Economic Evaluation of Smarth Growth and TDM," *Victoria Transport Policy Institute*, November 9, 2000. http://www.vtpi.org/s_growth.pdf 20 April 2003.

occupancy driving."[55] The "desirability" of alternatives should be approached through technical design of the system itself as well as through its broader cultural attractiveness relative to personal vehicle use. The importance of technical design was highlighted by one study that aimed to illustrate the perceived benefits of car use:

> …rather than cars per se providing a sense of status or prestige, for some people the positive contribution of cars was relative to the negative inferences to be drawn from having to rely on such a poor quality public transport system. The implication is that these relativities are not fixed, but could be changed by appropriate commitment and investment in public transport.[56]

Considerations should include system access in terms of time and space as well as system efficiency. Local transportation planners must ensure that potential users can easily reach the system, that its schedule and frequency allow them to make use of it, and that price advantages will not be offset by the perception that it is an inefficient use of time.

The desirability of public and alternative transit can be understood relative to the cultural attractiveness of personal car use. A study in Scotland set out to explain this attractiveness: "The car is connected to the prevailing cultural values of individualism, power, freedom and materialism…Unlike cars, buses tend to be linked in the public mind to people on the margins of society. Studies show that public transport users are often treated as if they are of little consequence."[57] These conclusions may easily be extended to the US, where public transportation tends to be less desirable than in much of Europe. An understanding of these values and how they ultimately play into our transportation

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[55] *Energy and Transportation Task Force Report*, The President's Council on Sustainable Development, Washington, D.C., 1997, 29.
[56] Rosemary Hiscock, Sally Macintyre, Ade Kearns, and Anne Ellaway, "Means of transport and ontological security: Do cars provide psycho-social benefits to their users?" *Transportation Research Part D* 7 (2002)133.

systems and policy (contributing to our CO_2 emissions levels) is just as important as the technical considerations mentioned above.

The question for policymakers then becomes, what can be done to equalize the "attractiveness" of public and private transportation? Mass media could be an invaluable tool in changing conceptions of public and personal transit in the US. The *Population and Consumption Task Force Report* concluded, "[m]ass media powerfully drives consumption patterns in the United States and is an equally powerful force for changing consumer behavior."[58] The Task Forces organized under the President's Council on Sustainable Development outlined how the media can be used to promote sustainable practices; these methods could undoubtedly apply to efforts for increasing the social attractiveness of public transportation and promoting awareness of the social and environmental costs of personal vehicle use and high VMT.[59]

The *Population and Consumption Task Force Report* proposed another, more unique method of educating the public on sustainable development issues. The *Report* pointed out that an ethic of stewardship and general environmental concern has been taken up by many American religious groups in the last several decades.[60] Through these groups, a message of religious responsibility to the environment, promoting environmentally-friendly behavior including public transportation use, could reach a wide

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[57] Rosemary Hiscock, Sally Macintyre, Ade Kearns, and Anne Ellaway, "Means of transport and ontological security: Do cars provide psycho-social benefits to their users?" *Transportation Research Part D* 7 (2002), 121-122.
[58] *Population and Consumption Task Force Report*, The President's Council on Sustainable Development, Washington, D.C., 1997, 46.
[59] See reports including the *Population and Consumption Task Force Report* and *Public Linkage, Dialogue, and Education Task Force Report*.
[60] *Population and Consumption Task Force Report*, The President's Council on Sustainable Development, Washington, D.C., 1997, 48-49.

audience. Noting the President's religious leaning, this might prove an acceptable avenue for promoting change from the administration's standpoint.

Type II partnerships, an important tool of the WSSD, provide a third method for changing perceptions of public and private transportation. Partnerships such as the "Youth Dialogue on Consumption, Lifestyles and Sustainability", involving European governments, consumer and youth organizations, and UN groups, can provide a model for similar efforts in the US to promote and popularize more sustainable practices, including a shift from private to public transportation use.[61]

A series of practical and cultural obstacles stand in the way of a national transition from personal vehicle dependency to a widely used public transportation system. However, as lack of consumer choice creates a distortion in the transportation market, only with the existence of these options will other efforts to decrease national VMT achieve success. A national commitment to improving access, quality and "desirability" of alternative transportation methods is an essential step towards reducing VMT, both in and of itself and as it allows other efforts to have a greater impact. Ensuring both that price signals reflect the total cost of driving and that attractive alternatives exist can produce significant reductions in transportation sector CO_2 emissions.

CONCLUSION

The above recommendations are some of the many options available to policymakers committed to reducing CO_2 emissions from the transportation sector. For any and all of the recommendations, both true government commitment and public concern are crucial in taking these steps toward sustainability. It is important that the

[61] "Youth Dialogue on Consumption, Lifestyles and Sustainability," January, 2003 http://www.un.org/esa/sustdev/partnerships/changing_patterns/youthdialog.pdf 23 April 2003.

commitment translates into immediate action because, as Fred Krupp, President of Environmental Defense, has stressed, we have a "window of opportunity" to take action and address CO_2 emissions, and significant short-term gains can be made with important legislative changes.[62] Public concern is central in pushing through reforms such as those mentioned above, in ensuring a market for improved technologies, and in changing the behavior patterns that lead to high emissions rates from transportation.

Combined efforts to increase vehicle efficiency and simultaneously decrease VMT are essential as improvements in one can be offset by losses in the other. In the short-term, increasing CAFE standards to reflect technological advances and including SUVs in the passenger car regulations would provide significant improvements in vehicle efficiency. A serious commitment to and investment in fuel-cell technology may provide a long-term solution for emissions reductions, but such an investment must not be used as an excuse for inaction in the present – today's CO_2 emissions levels require *both* immediate changes and future planning.

The gradual elimination of indirect subsidies to transportation, such as the tax-exemption on employer-provided parking, can provide short-term options for lowering VMT; the huge sums of money that such subsidies amount to and the environmental damage that is the direct result must be brought to the public's attention. Investments and planning for public and alternative transportation systems will provide an option for those who now view private vehicles as their sole transportation choice. The success of these alternative and public transit systems in reducing VMT depends upon both practical, forward-thinking planning as well as behavior and perception change on the part of the

[62] Speech Fred Krupp, President of Environmental Defense, Princeton University, April 1, 2003.

public. Such a structural change has the power to transform the transportation sector and significantly reduce its role in US CO_2 emissions.

Again, these represent only a few of the options for reducing transportation sector CO_2 emissions. Current attention is focused on the Climate Stewardship Act proposed by Senators McCain and Lieberman which would involve a cap-and-trade system for greenhouse gases and, most significantly, would establish specific emission reduction targets.[63] Alternatively, legislation such as Representative Henry Waxman's March 19th proposal to "…[require] the federal government to propose, finalize and implement a plan to reduce U.S. demand for oil by 600,000 barrels a day…" could provide a context for the implementation of some or all of the above recommendations.[64] It is now Congress and the administration's responsibility to pass legislation ensuring emissions reductions, regardless of the strategies employed.

As we consider what can be done to assist developing nations in meeting the sustainable development goals laid out at the WSSD, we must simultaneously consider steps that must be taken so we ourselves meet those goals. A comprehensive effort to reduce transportation sector emissions can act as an important first step in resuming a leadership position in the sustainable development movement while also providing substantial benefits domestically.

[63] "The Nuts and Bolts of 'Cap and Trade,'" Environmental Defense March 4, 2003 http://www.environmentaldefense.org/article.cfm?contentid=2683 29 March 2003.

[64] "Statement of Rep. Henry A. Waxman Upon offering an amendment to reduce demand for oil in the United States," House Energy and Air Quality Subcommittee, March 19, 2003 http://tompaine.com/feature.cfm/ID/7490/view/print 25 March 2003.

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