The Nexus of Energy, Environment and the Economy: A Win, Win, Win Opportunity

BECAUSE TRANSPORTATION IS SO HEAVILY DEPENDENT ON PETROLEUM FUELS, IT IS AT THE CENTER OF THE U.S. ENERGY SECURITY ISSUE AND IS A SIGNIFICANT FACTOR IN GREENHOUSE GAS CONCERNS. MANY ASPECTS OF THESE DRIVING FORCES ACT IN PARALLEL, AND ADDRESSING THEM CAN YIELD BENEFITS IN ALL THREE AREAS. THIS FEATURE REVIEWS THE DIRECTIONS THAT MIGHT BE TAKEN BY ITE IN UTILIZING ITS EXPERTISE AND UNIQUE POSITION TO HELP ACHIEVE A TRIPLE-WIN.

BY ALAN PISARSKI

INTRODUCTION

The present economic situation in the United States is buffeted by sharp downturns in consumer demand and housing values. At least in part, this was precipitated by the energy shocks of 2007 and 2008, with fuel costs crossing $3 per gallon in 2007 and then $4 per gallon by mid-2008. Beyond cost, there is concern about the integrity of future supplies of petroleum fuels and the nation's energy security in an uncertain world. At the same time, there is growing worldwide concern for the effects of burning carbon-based fuels and the greenhouse gas (GHG) emissions they produce.

At the nexus of these three intersecting concerns are the possibilities for a win, win, win situation. Many aspects of these driving forces act in parallel, and addressing them can yield benefits in all three areas. Amory Lovins said it well in a recent *Wall Street Journal* policy piece:

> *Making our energy supplies affordable, secure and climate-safe all require exactly the same actions—mainly energy efficiency—so it doesn't matter which of them you care most about.*[1]

Because transportation is so heavily dependent on petroleum fuels, it is at the center of the U.S. energy security issue and is a significant factor in GHG concerns as well. This feature reviews, at a relatively broad level, the directions that might be taken by ITE in utilizing its expertise and unique position to help achieve a triple-win.

A FACTUAL BASE

There is a tendency to paint a rather dire portrait of U.S. energy and GHG emissions trends. Many positive aspects of the picture need to be recognized up front. Perhaps the two most significant measures of important trends are energy use per unit of gross domestic product and energy use per capita.

The trend picture (see Figure 1) shows that national energy intensity has been cut in half since the first energy crisis in 1974. This is due in part to energy-efficiency gains and in great part to the shifts away from energy-intensive industries (such as steel-making) to non-intensive industries (such as services). This trend is expected to continue into the future.

An equally significant pattern is seen in energy intensity per capita. This does not exhibit so dramatic a downward trend, but it shows a stable or slightly declining level of circa 350 million BTUs per capita since the first energy crisis in 1974.

If these patterns are examined more closely by economic sector, transportation seems to emerge as the main culprit, exhibiting an increasing share of national petroleum consumption since the 1970s. What has happened should not be surprising; with the dramatic increases in petroleum costs in the period, sectors of the economy that could shift away from petroleum use did so.

For example, the percentage of homes heated with oil dropped from 32 percent in 1973 to 17 percent by 1997; the share of electricity generated by petroleum dropped from 16 percent to less than 3 percent in the same period. Transportation, far more dependent on an easily portable energy source with high-energy density per pound and per cubic foot, has had to stay with petroleum.

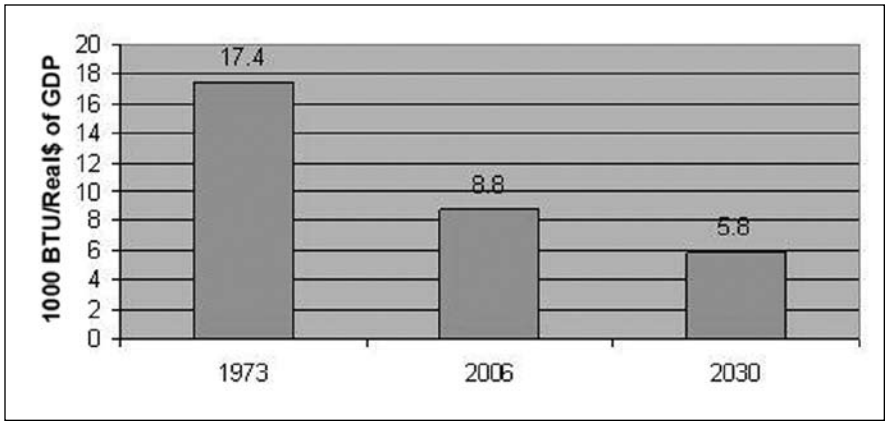
As a consequence, transportation consumption of petroleum grew by about 1.3 percent per year in the period from 1973 to 2007, while residential use declined at 2.1 percent, commercial use at 2.4 percent and electricity generation at 4.8 percent per year. Only industrial uses grew slightly, at 0.4 percent per year. This has led to today's situation, where transportation is 95-percent dependent on petroleum, just as it was in 1973, and accounts for more than two-thirds of petroleum use, with only industrial uses

still consuming a significant share at 25 percent (see Figure 2).

This puts transportation at about 28 percent of all energy consumption in the United States and, consequently, at a similar share of GHG emissions. As a factor in GHG emissions, transportation is important but not absolutely critical, especially when measured on a scale looking at cost-effective opportunities for improvements. In terms of energy security, however, transportation must be the centerpiece of the discussion.

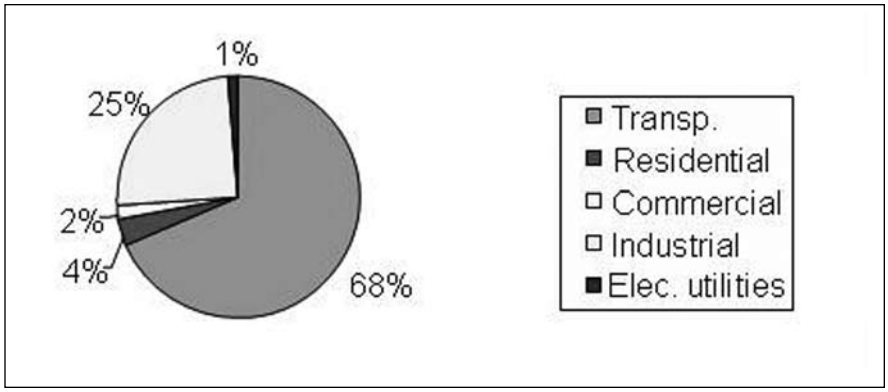
Finally, when the longer term is considered, the picture is less tranquil and transportation again becomes a critical player in GHG emissions. Technologically, it can be seen that in the mid-term, transportation can realize upwards of 30-percent improvements, particularly in surface transportation vehicles. Coupled with the demographically determined lower growth prospects in vehicle miles traveled (VMT), a more stable transportation energy and GHG condition can be envisaged. In the longer term (2050, for example), as transportation becomes the major energy user in the economy and worldwide, and as travel growth continues, particularly in freight and air travel, something very close to the complete decarbonization of ground transport will be required.

The recent enactment of the Energy Independence and Security Act of 2007 (EISA) established new corporate average fuel economy (CAFÉ) standards of 35 miles per gallon for cars and light trucks by 2020. This forecasts a 40-percent improvement in fuel efficiency, which reduces dependence on petroleum by more than 2 million barrels per day in 2030. The 2008 U.S. Department of Energy (DOE) *Annual Energy Outlook* indicates a 14-percent increase in energy use by transportation by that year and a decline in overall petroleum dependence in transportation from 96 to 88 percent. In terms of both energy security and GHG emissions, this would be a very real challenge, particularly in the years beyond 2030.



Source: *Annual Energy Outlook 2008*. U.S. Department of Energy.

Figure 1. Energy intensity of the U.S. economy.



Source: *The Energy Data Book*, Edition 27. U.S. Department of Energy.

Figure 2. Shares of petroleum consumption, 2007.

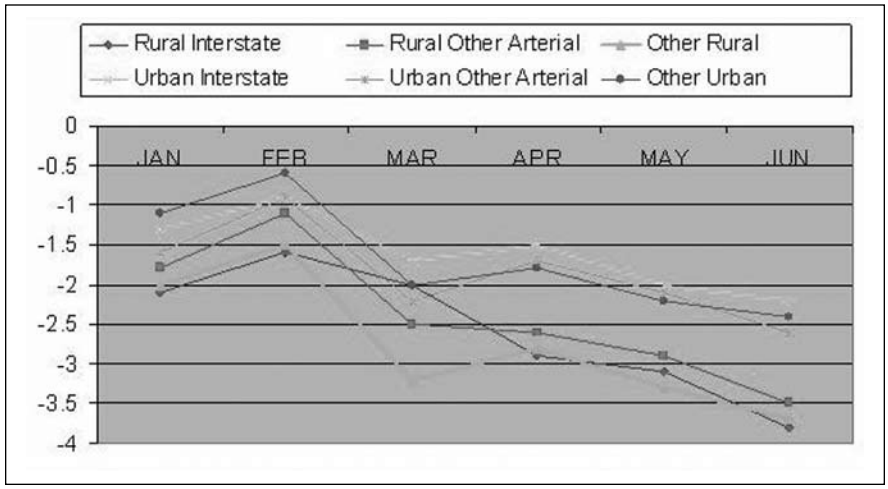


Figure 3. Percent decline in VMT by month.

RECENT TRENDS

The dominant factor in recent trends has been the extreme volatility in gasoline prices. In November 2007, gasoline prices moved beyond the threshold of $3 per gallon—not surprisingly, that was the first month in which national-level VMT declines were measured. In retrospect, it seems the declines were as much a function of sticker-shock as were the actual costs. By June 2008, prices crossed the even more sticker-shocking level of $4, only staying there for about eight weeks. Although it applied for a very short period, it is significant how strong an impact the $4 price threshold had on the national perspective. At this writing, a barrel of oil is down to below $50 per barrel, well below one-half of what it was in July 2008, but neither VMT nor auto sales have recovered.

Several important facets to the declining VMT trend go well beyond fuel prices:

- All functional levels of the highway system and all parts of the United States are affected (see Figure 3).

In August 2008, the peak summer travel month, no state showed positive VMT growth.

- Rural facilities are far more affected than are urban, with typical rural levels of reduction more than twice those of urban facilities. This indicates that business travel and tourism are affected as well as lower-income rural populations, with their typically longer trip distances for all trip purposes.
- These trends are attributable to more than just fuel prices. The housing mortgage crises and the economic downturn have affected travel substantially.
- This is all happening in a demographic context in which VMT growth levels have declined steadily over five decades (see Figures 4 and 5). Even with the return to a more stable economy and more affordable fuel prices, annual VMT growth levels beyond the 1- to 2-percent range should not be expected in the future.

A measure of the conflicting attitudes in society today can be seen in the public reaction to reports on the decline of VMT. Too many, with a note of glee, thought those suburbanites in their sport utility vehicles had it coming. Just about every reporter in the United States wrote about a "tipping point" where fuel prices had at last reached levels where everyone would move back to the city and walk to work à la 1908. Others recognized that VMT equals trips with economic and social transactions of value to society, and their suppression at this time was not what the economy needed. Sadly, too many public officials saw the VMT decline only in terms of its impact on their revenues, without any apparent interest or concern for national economic or societal repercussions or the very real impact on households.

A little better sense of scale is needed—something that all reporters seem to lack. If VMT is down by 3.5 percent this year, for example: Last year I drove 300 miles per week; this year I drove 290, which effectively equals a 5-mile trip from home dropped per week. (When the author gave reporters this take on the story, they preferred to report that the amount of VMT lost was equal to 586 trips to the moon—a very helpful transportation metric.)

Along with a requisite better sense of scale is a better sense of history. There were similar declines in VMT in both of the previous energy shocks of 1974 and 1979, and each very quickly recovered to previous VMT growth levels. In those cases, fuel prices did not drop, but with time, with some inflation and with the purchase of the "econo-boxes" of the period, society came through reasonably well.

In the present case, even at prices in the neighborhood of $4, the situation is comparable to 1980 or 1981. Adjusting for inflation, the price of fuel in 1981, in 2007 dollars, was about $3.10 per gallon against the average price in 2007 of $2.85. If this is divided by the fuel efficiencies of the period, 2007 is far better off in terms of cost per mile than 1981, as shown in Table 1. Moreover, this fails to recognize that society is approximately 20-percent wealthier today. Because petroleum is far less significant in the economy today than then, it would take oil at $145 per barrel in today's dollars to equal the economic impact on the economy of the early 1980s.

Where did all that VMT really go? It is something of an indictment of system monitoring practices and overall data collection processes in the United States today that we really do not know. Some surmises:

- More cuts in rural trip-making than in urban areas, with very negative impacts on rural economies.
- Declines in summer discretionary travel: "Sorry Grandma, we're not coming this year."
- Some payoff from trip-chaining; pack-

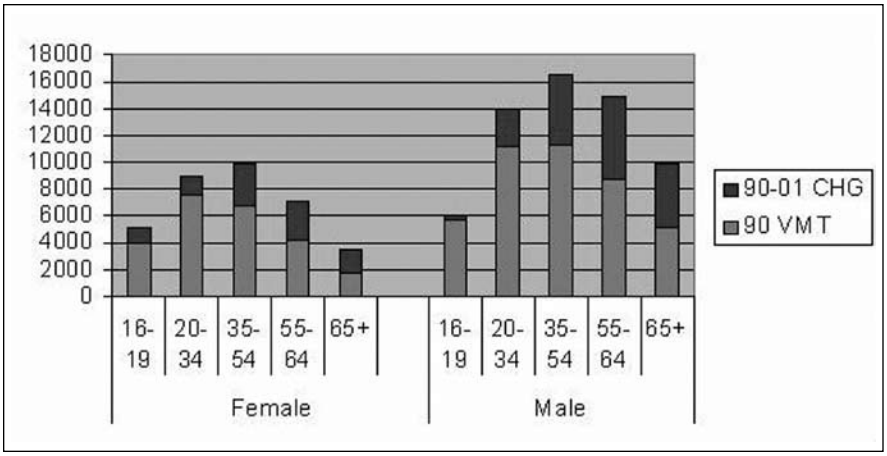


Figure 4. Trends in personal VMT.

Figure 5. VMT growth rate per decade.

Table 1. Cost per mile, 2007 and 1981.

	Cost/gallon	Average fuel efficiency	Cost/mile
1981 (in 2007 $)	$3.09	16.4	18.8 cents
2007	$2.85	22.4 (2006)	12.7 cents
2008 approximation	$4.00	22.4 (2006)	17.8 cents

aging one's itinerary to reduce travel.
- Some carpooling, both work and non-work related, such as soccer moms: "I'll take your kids today and you take mine tomorrow."
- Small trip-length reductions: "Let's go to the closer restaurant."
- Trips curtailed: "Let's forget going to the movies and watch TV."
- Walking/biking: "Let's give it a try; we need the exercise."
- Transit saw substantial increases, and reporters tended to equate it with declines in VMT. In reality, at most, maybe 2 percent of the VMT decline can be explained by shifts to transit.
- Considerable fleet (bus and truck) reorganizing of routes and loads. Fuel users who can pass through their rising costs tend to be more immune to cost increases.

STATE OF THE PRACTICE

There has been an explosion of studies in this area in the United States and abroad and a similar explosion in the numbers of organizations weighing in on the topic. For the most part, this has been beneficial and is a part of the process of educating oneself in this relatively new area.

Because so many European countries were ahead of the United States in these concerns, their research and experience can provide helpful guidance. Standing out among these have been the U.K. studies, which have had broad significance around the world. These include the Stern review of the economics of climate change; the Eddington study examining the links between transportation and the economy; and the King study reviewing low-carbon fuel opportunities for surface transportation.[2] Taken together, they encompass many of the key issues challenging the world today in transportation, the economy, energy and environment.

In the United States, the studies of the National Commission on Energy Policy; the Institute for 21st Century Energy of the U.S. Chamber of Commerce; and the Energy Security Leadership Council have all examined the threats and prospective solutions. Also influential has been the so-called McKinsey study, which addressed the relative cost-effectiveness of alternative approaches to GHG emissions.

Gleaned from these studies are some key observations that can provide guidance:
- The transportation role of increasing access to the labor force and to markets is central to economic well-being. (Eddington)
- There are two major functions of transport investment—assuring connectivity within a country and overcoming congestion in major metropolitan areas. (Eddington)
- A nation today operates in a world market and its future depends on its success in that world. (Eddington)
- There is a strong need to address GHG emissions and to do so cost-effectively. (Stern review)
- There are highly positive transportation opportunities: the prospect of a 50-percent reduction in carbon fuels used by 2030 and the potential for complete decarbonization of surface transportation by 2050. (King report)
- Emissions saved now are more valuable than those saved later. (King report)

Overall, there is strong recognition that this problem is technological in nature and can be meaningfully addressed by technology. The world is burgeoning with good ideas about responses. This is even truer than were the challenges of air pollution.

When asked what percentage of the solution to air quality issues in the United States is attributable to changes in vehicle and fuel technology versus changes in people's behavior, audiences agree that it is at least 95-percent technology (some say 105 percent). There seems to be a greater recognition that the GHG emissions challenge is even more of a technological question, yet we persist in attacking behavior first. Whether this is due to lack of understanding of sometimes esoteric technologies, regulations that diminish the potential application of technologies, the lack of appreciation of the difficulties of moving public behavior in any direction in a pluralistic society, or just that some people like to tell others how to live, is unclear.

A further factor that reinforces the technological approach is that the potential changes are real improvements that create parallel motivations in the public and among regulators. The McKinsey study points out that many technological changes will reduce fuel costs without loss of the consumer surplus the automobile provides in terms of flexibility, speed and other amenities.

A final observation derived from the literature is that these challenges need to be addressed in stages. As the King report states, the nature of GHG emissions is that they are cumulative and represent an increasing threat over time. This argues for staged responses with near-term, mid-term and longer-term perspectives. It also argues for something like a present-worth analysis, where immediate actions are far more valuable than actions with very long lead times.

Modeling and data development are moving ahead in this new area, but there will be gaps in knowledge and ability to monitor and model trends. The nature of the issues will be focused on understanding trends and their implications. Support for the ability to monitor system performance and conduct cost-effectiveness and cost-benefit studies will be critical. Most of the issues will be in developing cost relationships per ton of carbon reduced and the performance metrics that surround that.

One of the gaps in metropolitan and state air quality processes is often their inability to effectively incorporate technological opportunities. This will be even more critical in regard to GHG emissions. Economic considerations will be key, and stronger metropolitan and state abilities in the economic analysis arena will be very important. Closer coordination between vehicle and fuel designers and the planning and engineering professions will be critical, as will better training for transportation planners and engineers in regard to technologies. The planning process may well have to learn about the energy costs and GHG emissions embedded in the fabrication and construction of transportation infrastructure. These must be incorporated into any analysis of potential options. Much of transportation infrastructure is immensely energy-intensive—steel, aluminum, concrete, asphalt, tunneling, etc. There will need

to be extensive research on less energy-intensive methods and applications.

POLICY ISSUES AND EXPECTATIONS

Efficiency vs. Equity

One of the fundamental conflicts that emerges in any regulatory process is that of efficiency versus equity. Efficiency means cost effectiveness—generating the greatest benefits at the lowest cost first and then moving on to more difficult and more expensive options, thus solving more of the problem per dollar. The cap-and-trade philosophy is premised on an efficiency argument. This often conflicts with a sense of equity, in which the view is that all should share in the gain or pain in proportion to their share of the problem.

Using an equity argument, if air travel constitutes roughly 9 percent of the emissions problem, it should be responsible for 9 percent of the solution. On cost-effectiveness grounds that would be absurd because aviation is the most dependent of any economic sector on a high-energy-density-per-pound and per-cubic-foot portable fuel, and therefore is likely to be the most difficult and costly to remediate.

It would be far wiser, for example, to use resources to reduce an equivalent amount of GHG emissions by shifting the production of electricity to non-carbon sources. Further, one would expect that aviation has already wrung as much efficiency out of its equipment designs and operations as possible given fuel's high relative costs and weight and would eagerly adopt any new technology that promises greater efficiency. Most transportation shares the same challenge of the weight, volume and cost of fuels as aviation, but at a lesser degree. The quintessential cost-effectiveness question is: "What share of my problem am I resolving with what share of my resources?"

The equity vs. efficiency issue has two parts: an intra-transport issue where trade-offs among modes may be significant and, perhaps more important, an inter-sectoral issue where trade-offs between transportation and electric power generation or residential, commercial, agricultural and industrial capabilities will need to be pursued. The transportation industry will need to be prepared to represent transportation interests on the side of being most responsive to cost-effective opportunities. If it is agreed that global warming and energy security are linked serious problems, it is critical that solutions be approached in a quantitative and economically sound way.

ITE MEMBERS CAN BE THE GREAT EDUCATORS IN THE FIELD, WORKING IN THEIR COMMUNITIES AND STATES AND AT THE NATIONAL LEVEL, BECOMING A TRUSTED SOURCE OF SOUND ADVICE AND UNDERSTANDING.

Alignment of Interests

There is a strong alignment of interests between consumers of transportation and the goals of reduced GHG emissions and energy security. Direct fuel savings that reduce operating costs as well as reduce emissions and the need for imported fuels represent a win, win, win situation. This is different from the air quality technology changes to vehicles in past decades, where costs were added to the vehicle and the only benefit perceived by consumers was a broad and amorphous future improvement in air quality. In the present case, it must be recognized that all of these forces are moving together in the right direction. There well may be trade-offs to be recognized as there were in the early 1980s where compromises of power and safety were significant, but current technologies seem to promise that consumer benefits can be sustained as improvements are made.

Timing Questions

A real distinction from air quality approaches is the cumulative nature of GHG emissions. Many of the statistical treatments by U.S. DOE show both emissions generated per year and cumulative emissions over a period of study. This places a premium on early actions and suggests a time-discounted value approach to options. Recognizing the distinctions in the short- to long-term options will be key. Some examples:

- short term: 1 to 5 years:
  - attack on current congestion;
  - focus on operations, speeds and traffic flow;
  - modified work schedules, greater flexibility;
  - public information on eco-driving generated and disseminated;
  - non-construction mode shifts to carpooling, use of current transit and non-motorized modes, expanded work at home;
  - trip planning and trip chaining; and
  - research and analysis redirected to operations and energy-saving construction approaches.
- mid term: 5 to 20 years:
  - new vehicle technologies and infrastructure;
  - changes in sources of electricity;
  - changes in scale and nature of movements of energy products;
  - new passenger miles of travel (PMT)/VMT effects incorporated in demographic trends;
  - recognition of embedded energy and GHG in construction processes; and
  - recognition of non-transportation energy improvements in other sectors—agriculture, commercial services, housing and electricity generation.
- long term: 30 to 50 years:
  - substitutes for mobile fuels;
  - substitutes for carbon-based fuels;
  - long-term lifestyle trend changes;
  - changes in productivity keyed to energy;

- changes in energy-intensive and non-intensive industries; and
- ultimately, the issues will come down to how electricity is produced.

Distinctions from Air Quality

There are important differences between the treatment of GHG emissions and historical air quality approaches that need to be recognized in any attack on current problems. Already noted is that the timeframes are different—almost diametrically opposed. The emphasis on near-term responses in GHG emissions argues for a cost-effectiveness based process with emphasis on present-worth kinds of approaches where a solution today is far more valuable than a solution some time off in the future. Long-term options such as major infrastructure construction and reorganization of land uses need to be severely discounted.

The nature of the solutions in GHG emissions will be even more technologically determined than air quality has been. More important, responses to GHG emissions will largely be nationwide and even worldwide, as contrasted to the metropolitan scale of air quality approaches. The project-based approach typical of air quality remediation will be much less of a factor in regard to energy reductions and emissions. Perhaps the most important distinction is that in the present instance, the interests of the consumer and the regulators are aligned, and there will be far fewer cost-based conflicts as a result. If engineers and planners can provide transportation capabilities, most specifically personal vehicles, with lower fuel use and lower emissions while not forcing unacceptable trade-offs in safety and utility, public support will be assured.

Emissions or VMT

It must be agreed that the target is fuel use and related emissions, not the existence of transportation services per se. Therefore, PMT and ton miles of travel should not be the surrogate targets for reductions. For example, in the cross-sectoral concerns cited earlier, transportation appears to be the only sector in which output—passenger miles and ton miles—is targeted for reduction, rather than their emissions or fuel consumption. No one has proposed parallel cuts in agricultural or industrial outputs proportionate to their emissions, or reductions in the amount of housing or commercial activity.

Perhaps transportation, being a means to other ends, makes it easier to be more casual about reductions without a real sense of what is being lost. It may be reflective of other agendas at work. Many of the state pronouncements on GHG targets, specifically VMT, can be seen as mostly aspirational, often with little or no foundation or understanding of the social or economic implications of their actions. It is clear that transportation expertise and experience were not engaged in these expressions of sentiments. The chairman of the President's Council on Environmental Quality had it right when he stated: "There is a stunning degree of innumeracy when it comes to the numbers surrounding climate change legislation." An important role for transportation professionals is to replace that innumeracy with something more substantive.

The Four-Legged Stool—Operations

An almost standard conceptual tool today on this subject is the four-legged stool: vehicles, fuels, VMT/land use and operations. The latter two need to be addressed further. It is a pleasant surprise that the usual three-legged stool has added a leg called operations, clearly an area of strength for ITE. Operations is a powerful player in this arena for a substantial number of sound reasons. The first is that operations is, at least relatively, an immediate-action program not subject to most of the long-term planning and review delays of capital intensive approaches. The GHG emissions issue places great emphasis on early action, placing operations in an important light.

Beyond what might be called traditional operations; congestion response—deriving the maximum service levels from existing facilities—there are other operational aspects of interest. These include the operation of vehicles—eco-driving is the term of use in Europe—training drivers to handle their machines in an energy-effective manner and managing facilities to assure efficient flow speeds. This could extend to vehicle routing, trip-chaining, load factors and fleet optimization. All non-motorized transportation would also fall under this rubric.

The second key element in operations as illustrated by many of the above elements is that there is no heavily embedded energy or GHG in the construction of the tools employed, as would be the case in the development of new roadways or transit systems. An important third positive factor is that operations represents a no-regrets approach with little downside. All of the above-mentioned tools and others provide positive pay-offs even were the concerns about energy and GHG to be obviated.

The Four-Legged Stool—Land Use

Just as strong as the operations case is, the almost opposite applies to prospective land-use solutions. There is little in the way of pay-offs in the immediate near term. Most land use pay-off potentials are in the long-term future, and studies to date place the potential pay-offs there as limited.[3] This is even truer today with immense housing hangovers across the country. Moreover, from a demographic perspective, today's population-doubling rate is on the order of 100 years contrasted to about 50 years back in the 1950s. An aging population tends to be a more sedentary population, with moving rates far lower than younger age groups.

The second differing aspect is the embedded energy nature of the high-density land-use approach—it would require substantial new construction with all it entails in terms of embedded energy. This is not to suggest there are no opportunities but to make certain that such opportunities are addressed in a realistic light. As housing construction continues in the future, it should be assured that there are no regulatory or market impediments to building in ways that the public wants or that builders are willing to provide—whether high density or low. This suggests that the policy should be a "let it happen" rather than a "make it happen" approach.

A coercive approach that forces the public to live in ways that we find efficient is fundamentally bankrupt, founded on way too little knowledge. We need to be more modest in our prescriptions. The U.S. public has no obligation to live in ways that makes it convenient for us to serve. Given the existing distribution of land uses in any metropolitan area today, the potential

exists for the public to "optimize" their travel rather dramatically if they choose. They can live nearer to work if the work trip is more important to them than other amenities. They can live nearer shopping or other opportunities as they prefer. The fact that they do not tells us something—at a minimum it tells us that the situation is a bit more complex and multifaceted than our often simplistic analyses reveal. Monitoring future trip lengths as a measure of the public's real interest in such opportunities/amenities should be a part of our quantitative approach.

RECOMMENDATIONS

In many respects, ITE and its members are ideally situated to play a substantial role in these areas of interacting concern. Many of the central issues facing the nation fit the professional skills and experience of its worldwide membership. Perhaps the most crucial is whether the decisions that must be addressed will be made based on quantitative decision-making or on political grounds among battling advocacies. The author would argue that this set of challenges is even more oriented to quantitative analyses than the challenges of air quality. This plays to the strengths of the profession. The profession must focus its thinking and its proposals around data, modeling capabilities and cost-effectiveness or cost-benefit approaches. It must help guide the decision-making ahead toward a strongly quantitative process to everyone's benefit. It must be a champion for substantive, sound analysis.

When a subject area is new, as global climate change or energy security are to many, there often is a very salutary emphasis on educating oneself. Because it is new, it becomes acceptable for decision-makers to admit their ignorance and pursue ways in which to seek expertise and learn more. ITE members can be the great educators in the field, working in their communities and states and at the national level, becoming a trusted source of sound advice and understanding regarding many of the interrelated factors involved. In these early stages, just as in the first energy crises of the mid- and late-1970s, political advocacy will lose out to more sound quantitative reasoning only if there is a strong, trusted professional resource.

WORKING WHERE THE LIGHT IS GOOD

ITE professionals can take on the role of strongly advancing those areas where their expertise is undisputed. Some of these areas are:

- Promoting enhanced operations: ITE must become the central advocate for expanded utilization of improved operations capabilities to reduce fuel consumption and GHG emissions through improved traffic flow. This activity and the promotion of eco-driving, discussed below, have the great reward of being low-cost, immediate-action opportunities with immediate rewards in all sectors of concern. This will take action by members at all levels—communities, metropolitan areas, states as well as in Washington.
- Promoting eco-driving: This approach, focused on the driver's behavior, is a natural fit with enhanced operations, utilizing the best of the experience being tested in other countries, where savings of up to 10 percent have been observed. It will take operations knowledge and public information capabilities.
- An extensive public information program: One of the great disappointments of the recent surge in fuel costs has been the failure of governments at all levels to address the public's concerns and assist them in responding. Public recommendations such as traveling at slower speeds, assuring correct tire inflation and fewer start-stop cycles could have been responsive and helpful. More broadly, the promotion of carpooling, working at home and revised work schedules could have had immediate benefits to travelers and society but were almost totally without discussion. ITE membership can undertake that role going into the future, documenting the strong and immediate benefits of such approaches.
- Advancing a more effective planning process: It is a given today that the planning process is too slow and clumsy for current and future needs. ITE can play a very effective role in assuring that prospective legislation and subsequent regulation recognizes the need for a rigorous, professional, quantitative process conducted in a timely fashion. A major part of that will be a shared sense of need for performance measurement and performance-based decisions.
- Advancing progress in infrastructure adaptation: It is recognized that adapting existing infrastructure and operations to changing weather patterns will be an important facet of concerns in transportation. In many of these areas and particularly with respect to emergency management, the profession will have a powerful role to play.
- Advancing the research agenda: Many of the areas of concern identified here are areas of weakness in understanding and experience. A strong research agenda must be defined, justified, funded and managed. ITE is a natural player in this arena. Its members must be active participants in the research process.

AN EDUCATED PARTICIPANT

There are other critical areas where, although not within the traditional strengths of ITE and its members, they can still play an educated and knowledgeable role:

- Taxation: It is recognized that public investment revenues are grossly inadequate. ITE can play a significant role in making the case for effective mechanisms of revenue-raising that can produce the needed revenues. The coming months will see an astonishing array of revenue devices being proposed. Sound criteria for judging these revenue devices will be needed, including traditional revenue tools and new ones such as stimulus packages, cap-and-trade, carbon taxes, etc.
- Vehicle efficiency and fuel technologies: Perhaps the central transportation issue of the current era will be how fast, and with what effects, the nation's vast fleet of about 250 million vehicles can be turned over. One important aspect will be which vehicles with which technologies and fuels are to be promoted. Finally, the system implications of these new ve-

hicle fleets need to be assessed, including their traffic implications and safety consequences.

- More effective legislation and regulation: Because transportation is not properly appreciated in public policy, ITE must be a leader in making the case for the value and importance of transportation. A large part of this will be in being prepared to demonstrate the value of transportation to society in both economic and social terms. If transportation goals can be met by everyone staying home and goods not moving, we need to rethink our goals. The profession can provide the leadership at all levels of government in making that case.

Were our resources great and the problem not serious, we could perhaps afford a business-as-usual approach, with funding of advocates in proportion to noise level and a unhealthy dollop of earmarks. But if the problem is serious—and it is—and our resources are limited—and they are—we must address these challenges in more quantitative and substantive ways, founded on sound information and analytical methods. ITE has an immensely important role to play in assuring that approach. ■

References

1. "Energy—The Journal Report." *Wall Street Journal*, November 17, 2008.
2. See reading list.
3. "Growing Cooler." ULI, 2007

ALAN PISARSKI, *best known for his Commuting in America series spanning 20 years, is an independent consultant in travel behavior and public policy.*

Reading list.

Study	Purpose	Access
A Primer on Climate Change	A primer on climate change and its implications for transportation policy	www.transportation.org
Eddington study	Economic study of role of transport	www.hm-treasury.gov.uk/press_eddington_06.htm www.dft.gov.uk/results?view=Filter&t=EDDINGTON&pg=1
King study	Review of vehicle options for GHG responses	www.hm-treasury.gov.uk/king
Stern study	Review of impacts of GHG	hm-treasury.gov.uk/independent _reviews/stern
U.K. sustainability study	Seeks to meld the three above into a coherent strategy	www.dft.gov.uk
OECD Observer	Bimonthly reporting	www.oecdobservier.org
ECMT Report	Findings of ministers of transport on carbon dioxide abatement	CEMT/CM(2006)4/FINAL
COST 355; EU	Changing behavior toward a more sustainable transport system	COST, European Union
McKinsey study	Review of costs and benefits of GHG responses	www.mckinsey.com/clientservice/ccsi/greenhousegas.asp
NCOEP	Recommends policies to improve GHG and energy security	www.energycommission.org/
D.L. Greene	Reducing GHG emissions from U.S. transportation	www.pewclimate.org/global-warming-in-depth/all_reports/reduce_ghg_from_transportation/ustransp_execsumm.cfm
D.L. Greene	Oil independence model	TRB 2007 annual meeting CD
Special Energy Report	The power and the glory	*The Economist*, June 21, 2008 www.economist.com/specialreports
Burbank study	Evaluation of transportation options re global climate change	NCHRP 20-24, Task 59: Strategies for Reducing the Impacts of Surface Transportation on Global Climate Change: A Synthesis of Policy Research and State and Local Mitigation Strategies