

Commission Briefing Paper 4H-01

Potential Impacts of Increased Telecommuting on Passenger Travel Demand

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Introduction

This paper is part of a series of briefing papers to be prepared for the National Surface Transportation Policy and Revenue Study Commission authorized in Section 1909 of SAFETEA-LU. The papers are intended to synthesize the state-of-the-practice consensus on the issues that are relevant to the Commission's charge outlined in Section 1909, and will serve as background material in developing the analyses to be presented in the final report of the Commission.

This paper presents information on the growth in telecommuting, describes several State and local programs to promote telecommuting, reviews the elements of successful telecommuting programs, provides two estimates of the level of future work at home, and suggests possible national strategies to expand and improve telecommuting.

Background and Key Findings

Expanded telecommuting has the potential to reduce vehicular travel, traffic congestion and travel time. As a result, telecommuting can reduce air pollution emissions, including greenhouse gases, energy consumption and accidents, and eliminate the need for some highway construction and capacity expansion. Telecommuting is currently of particular interest to public agencies struggling to relieve local highway congestion and meet legislative mandates for improved air quality. For them, telecommuting is an important Transportation Demand Management (TDM) tool--a strategy that can reduce congestion by eliminating a trip or shifting it out of the peak travel period.

In the wake of the September 11 terrorist attacks, telecommuting has taken on a new, increased emphasis in light of proposals to create a less targetable, more dispersed workforce. Private industry and public agencies displaced by the attacks have relied upon telecommuting to restore needed operations, while others are examining telecommuting as an alternative to traditional centralized work spaces.

Telecommuting, also known as teleworking, means using information technology and telecommunications to replace work-related travel. Simply put, it means working at home or closer to home. With telecommuting, employees work at home or perhaps at a local telework center one or more days per week. Communication is accomplished by phone, fax, modem, and teleconferencing. Telecommuting, or telework, or flexiplace, encompasses a wide range of non-traditional work arrangements that move work to people rather than people to work, is being driven by a number of factors. Business and government agencies continue to pursue ways to enhance productivity, reduce costs, and remain competitive in the local, national, and international marketplace. Employees are concerned about accomplishing work requirements in

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a timely and quality fashion, while balancing job and family responsibilities. At the same time, rapid advancements in telecommunications and computer technologies have greatly enhanced our ability to communicate and work across long distances.

- Work at home was the only "mode" to increase from 1980 to 2000 in the Census Bureau's Journey to Work survey besides auto driver. Many of those in the work at home category were telecommuters. (Exact numbers are difficult to determine.)
- As the numbers of telecommuters increase, so does their impact on reducing congestion, air pollution and energy consumption. It also leads to a reduction in highway infrastructure needs.
- A number of states and local communities and private companies have instituted programs to increase telecommuting.
- Federal legislation requires that each executive agency establish a policy under which eligible employees may participate in telecommuting to the maximum extent possible without diminished performance.
- Looking to the future, many of the factors that influence the level of telecommuting are likely to cause an increase in the number of telecommuters. Computer and communication technology will vastly improve. New workers will be more attuned to a "wired" work place.
- Nevertheless, there is still disagreement on the extent to which telecommuting will be a substitute for travel or face-to-face interactions.
- A conservative estimate of the number of persons that work at home would increase from 4.2 million in 2000 to 7.2 million in 2030.
- To obtain a substantially larger forecast of work-at-home and telecommuting, a major restructuring of the work environment would have to be assumed. If work-at-home and telecommuting continue to grow as a share of all work trips at the same rate as they did from 1980 to 2000, work at home would capture 4.8 percent of work trips by 2030.
- There are a number of strategies that could improve and expand the use of telecommuting including tax credits to businesses, expanding funding eligibility of existing Federal-aid programs, public outreach, technical assistance, and demonstrating efficacy of telecommuting.

Telecommuting Trends

National Trends

There has been a steady growth in telecommuting over the last 15 or more years. Other than driving alone, telecommuting is the only commute mode to gain market share since 1980. The Census Bureau notes that from 1990 to 2000 the number of those who usually worked at home grew by 23 percent, more than twice the rate of growth of the total labor market. From 1980 to 2000, the increase in the number of those who worked at home increased 92 percent.

Since 2000, telecommuting has continued to grow in popularity. Roughly 4.5 million Americans telecommute most work days, roughly 20 million telecommute for some period at least once per month, and nearly 45 million telecommute at least once per year.

- The number of employed Americans who performed any kind of work from home, with a frequency range from as little as 1 day a year to full time, grew from 41.3 million in 2003 to 44.4 million in 2004, a 7.5 percent growth rate.

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- 65 percent of home teleworkers are males vs. 44 percent of non-teleworkers.
- The average commute of a teleworker when not teleworking is 18 miles.
- Teleworkers save an average 53 minutes of commuting each day they don't drive to work.

State and Local Trends

Although they effectively receive no public subsidies, telecommuters actually outnumber transit commuters in a majority (27) of the 50 most populous metropolitan areas. Telecommuters outnumber transit commuters in places like San Diego, Dallas, and Phoenix. They outnumber commuters by more than two to one in places like Raleigh-Durham, Tampa-St. Petersburg, and Nashville. In Oklahoma City telecommuters outnumber transit commuters by nearly five to one.

Urban areas with the largest concentration of telecommuters tend to be in the fastest growing areas. (Table 1)

Table 1: Top Telecommuting Metros (Work Trip Market Share 2000)		
Rank	MSA	% Telecommute (2000)
1.	Denver	4.7
2.	Portland	4.6
3.	San Diego	4.4
4.	Seattle	4.2
5.	W. Palm Beach	4.1
5.	San Francisco	4.1
7.	Sacramento	4
8.	Salt Lake City	3.8
8.	Minneapolis	3.8
10.	Phoenix	3.7

Source: U.S. Census Bureau

The urban areas with the fastest growth in telecommuters also tend to be the faster growing areas generally in the South and West. (Table 2)

Table 2: Top Metros by Telecommuting Growth (Percent Increase 1990-2000)		
Rank	MSA	% increase 1990-2000
1.	Atlanta	59
2.	Raleigh-Durham	52
2.	W. Palm Beach	52
4.	Memphis	47
4.	Charlotte	47
6.	Orlando	45
7.	Las Vegas	44
8.	New Orleans	41
9.	Miami	40
10.	Chicago	38

Source: Calculated from U.S. Census Bureau Data

Federal Employees

After years of modest progress in telecommuting by Federal employees, U.S. Representative Frank Wolf (VA) sponsored an amendment to the FY 2001 Department of Transportation

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Appropriations Act requiring each Federal agency to establish telecommuting programs. Section 359 of the Act (Public Law 106-346), requires each executive agency to establish a policy under which eligible employees may participate in telecommuting to the maximum extent possible without diminished performance. The Act requires that the policies initially cover 25 percent of the Federal workforce, with an additional 25 percent added each year thereafter. The Office of Personnel Management coordinates telecommuting activities in the Federal Government and issues an annual report on the progress of Federal telecommuting programs.

For the third consecutive year, the number of telework-eligible and teleworking employees continues to grow. Government wide, 751,844 Federal employees representing 43 percent of the Federal workforce were telework-eligible in 2003, compared with 625,313 Federal employees representing 35 percent of the Federal workforce in 2002. This represents an increase of 20 percent, or an additional 126,531 identified telework-eligible positions. The actual number of employees teleworking in 2003 was 102,921, representing a 14 percent increase over the number of teleworkers in 2002. Notably, since April 2001, the number of teleworkers has increased from 53,389 to 102,921, an increase of 93 percent in the size of the telecommuting workforce. This number is an increase from 3,000 in 1995 and 9,000 in 1996.

Private Companies

A major survey of over 600 employers by the Mellon Financial Corporation revealed that employers are responding to their employees' needs for work/life balance. From 1996 to 2004, the proportion of companies that offer flex-time increased from 32 percent to 71 percent, and the proportion that offered telecommuting, work-at-home arrangements, increased from 9 percent to 50 percent. Another survey conducted in 2005 of 1,043 large employers by Mercer Human Resources Consulting found that 44 percent of U.S. companies offered at least some telecommuting options. That is up from 32 percent in 2001. A number of major companies have instituted successful telecommuting programs for their employees including: Georgia Power, IBM, Exxon-Mobil, TRW, and United Airlines.

Major State and Local Initiatives

Atlanta, Georgia

Georgia's Clean Air Campaign telework program in 2006 provided 13 participating companies with up to \$10,000 in consulting services and up to \$10,000 in reimbursement funds for staff time spent developing and implementing a telework pilot. In return, these companies had to commit to creating or expanding their telework programs. The program resulted in 1,800 new teleworkers in the Atlanta metropolitan area. Teleworkers in the Atlanta region save an average of 107 minutes each day they telework by not commuting. More than 70 percent of participants in Georgia's telecommuting program said they typically use the extra time to do more work. Employers reported significant bottom line benefits, including increased productivity, improved morale and even savings on office space. Participating companies invested or improved their computer technology, remote access and telephone systems. Companies with good remote access options found it easy to telecommute more often, according to Clean Air Campaign. Among the lessons participating companies learned is that telework training for employees and managers makes a difference, as does selecting the right employees for teleworking and having solid management approval. Formalizing existing programs lets organizations increase participation, the group says.

In addition, Georgia businesses that encourage employees to work from home get an income tax break under a measure signed into law by Gov. Sonny Perdue. The law, one of the first in the nation, gives employers a state income tax credit of up to \$20,000 if they conduct a study on how to implement a teleworking program for their business. The measure also rewards employers who implement teleworking programs by giving them a tax credit of up to \$1,200 per employee for a percentage of their telework expenses in calendar years 2008 and 2009.

Arizona

Since 1996, when then-Governor Fife Symington issued an executive order mandating that state agencies offer telework as an option for employees, Arizona has had a formal telework program that tracks--and set goals for--how many employees work outside the office, and when they do it. Both of his successors have reissued the order. The current governor, Janet Napolitano, has endorsed a goal of having 20 percent of the state employees in Maricopa County, where the capital is located, participating. So far, 3,300 employees, or just over 15 percent, have signed up. The State's Department of Health Services has demonstrated what may be the program's greatest success. In the initiative's first year, six environmental consultants began working outside the office full time, saving the department more than \$11,000 per year in office rent.

Portland, Oregon

All businesses in the Portland, Oregon, area with 50 or more employees are required by the State of Oregon to develop strategies to cut down on commuting trips by their employees. Private employers receive the same services as public agencies to help them get started, including educational materials, which help both employers and employees establish telework in the workplace. The Oregon Office of Energy has also given presentations to groups on establishing telecommuting programs, and provided technical assistance as well as providing access to a telework training Web site sponsored by the State's Office of Energy. Oregon also offers a Business Energy Tax Credit, which reimburses companies for 35 percent of the cost of telework equipment. The credit is useful, but no one argues that it is the primary reason businesses offer telework programs. Businesses emphasize gains in productivity, better employee retention, and savings in real estate costs rather than the tax credit.

Washington, DC

One of the oldest TDM programs in the nation is the National Capital Region. Commuter Connections Program. It was originally created in 1974 as the *Commuter Club*, providing one of the first computerized carpool matching systems in the nation. The Metropolitan Washington Council of Governments (COG) provided the direct ride matching services to the public. This service was and still is provided free to anyone who requests ride matching information. This program grew into the Commuter Connections Program in operation currently. In 1996 and 1997, the services grew beyond just carpool/vanpool matching to include transit route and schedule information, a regional Guaranteed Ride Home program, bicycle to work information, park-and-ride lot and HOV lane information, telecommute/telework program assistance, InfoExpress commuter information kiosks, commuter information services through our Internet site, and employer services. In addition, Commuter Connections supports an extensive telecenter programs established originally by the U.S. General Service Administration for Federal employees. These full-service telework facilities provide a professional work

environment, including a variety of work settings with computers with the latest software and high-speed internet access. Other amenities include photocopiers, fax machines, voice mail, meeting rooms and videoconferencing. The telework centers provide an alternative for those who are unable to work from home. There are 15 telework centers in the District of Columbia, Virginia, West Virginia, and Maryland. Telework Centers are now open to both Federal and private-sector employers.

Best Practices of Telecommuting Programs

A study conducted by the Texas Transportation Institute for the U.S. Department of Transportation identified the following elements to be important in maximizing the potential benefits of telecommuting to employees and employers:

- **Top Management Support** - Support from top management is critical to the development and implementation of a telecommuting program. Management must be willing to provide necessary financial support, as well as any changes in policies and procedures for telecommuting.
- **Employee Interest and Support** - Interest from employees is critical to the success of telecommuting programs, and must be promoted at the staff level. Employee groups may be encouraged to conduct background research, develop draft policies and programs, and pursue pilot tests within their own organization. Early inclusion and involvement of and support of labor unions are critical.
- **Clearly Articulated Policies and Guidelines** - Establish formal guidelines governing the telecommuting program. These policies identify the expectations of both employees and management, and outline the specific requirements such as productivity/accomplishments expected, work area, work hours, communications with the office, and other items.
- **Support from Human Resource/Personnel Department** - Support is important to ensure that both management and employees are able to obtain assistance during the implementation of a telecommuting program, as well as on an ongoing basis.
- **Selection of Job Tasks** - Guidelines must identify the types of jobs or job tasks and functions appropriate for telecommuting. Such jobs generally exhibit the following characteristics:
 - Can work tasks be done at home or at a remote work site?
 - Can work tasks be done without on-site or face-to-face interactions?
 - Is equipment required available at home or at a remote work site?
 - Can job objectives be identified and measured?
- **Selection of Telecommuters** - Establish employee criteria, including consideration of employee's work habits, for identifying and selecting telecommuters. It is recommended a signed agreement help establish the expectations of both supervisors and telecommuters. The following criteria are often considered:
 - Does the employee want to participate in a telecommuting program?
 - Is the employee self-motivated and a self-starter?

- Does the employee work independently?
 - Does the employee work well without supervision?
 - Does the employee complete tasks in a timely and professional manner?
 - Does the employee have a home office where they can work without interruption?
- **Selection of Managers and Supervisors** - The selection of managers and supervisors of telecommuters is as important as identifying telecommuters. Telecommuting may require managers to adopt new or to modify existing management styles and procedures. Employee productivity must be measured by factors other than direct oversight. The same standards that apply in the office apply to those working at home. Managers and employees must be comfortable with the telecommuting arrangement and have established a good working relationship.
 - **Establishment of Communication Methods** - Regular and ongoing communication methods must be established, including regular times for phone calls, using emails, and making special arrangements in the case of an emergency.
 - **Monitoring and Evaluation** - Regularly established, pilot or demonstration programs must be monitored and evaluated. These evaluations are used to gauge costs and benefits, with the results used in determining the future of the program. An ongoing monitoring system ensures that a telecommuting program continues to provide the desired benefits to both employees and employers. A monitoring program can help identify problems, permit appropriate remedial action to be taken, and can document benefits which may prove important in justifying the program.
 - **Equipment and Support** - Although extensive equipment may not be necessary, telecommuters often use computers, links to the office, extra telephone lines, fax machines, and pagers. These items may be provided by the employee, the employer, or the costs may be shared. Situations vary, but employer provided equipment, connections and support services enhance compatibility, dependability and security. In addition, the IT departments need to give priority to supporting telecommuting programs with software and technical assistance.

Future Forecasts

Looking to the future, there is not a consensus on the potential growth in telecommuting and its related impact on the amount of vehicle travel. The forecast of future telecommuting impact on travel revolves around the central question of substitution versus complementarity—that is, whether telecommunication replaces travel or generates it.

There are several factors that can contribute to expanding telecommuting and its impact on highways. First, it is likely that there will be huge increases in computer and communications technology. These improvements will make telecommuting easier and more transparent. Supervisors will be more able to remain in communication with telecommuters, easing their concerns about work being accomplished in a satisfactory and timely manner.

Second, as younger workers move into the work force, they are more likely to be comfortable with wireless communication. This new generation is more "wired" than their predecessors and will likely be more accepting of working outside the office and communicating with it.

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Third, as work trip lengths get longer with the spreading of urban areas, workers tend to work at home more frequently.

Fourth, with improved traffic monitoring and communication with travelers, workers will be able to decide whether to travel to or telecommute on any given day. This flexibility will cause travel patterns to be more varied and difficult to predict.

On the other hand, the so-called information revolution has not been accompanied by a noticeable decrease in travel. For some researchers, the substitution versus complementarity debate has been settled, with complementarity the winner. The preponderance of evidence suggests that when the scope of inquiry is broad enough, the net impact of improved telecommunications is to generate more communication, including new travel. Nevertheless, even if complementarity is accepted as the right answer qualitatively—and some people would contest that—it cannot be assessed quantitatively.

Quantitative Estimates

The Census Journey to Work data for the "mode" work-at-home is shown below for 1970 to 2000. If a conservative approach to work-at-home growth is assumed, projecting the average increase for the previous 20 years, then in 2030, there would be 7.2 million persons in this category.

Census Journey to Work Work at Home 1970-2030 (1,000)							
YEAR	1970	1980	1990	2000	2010	2020	2030
Work at Home	2,685	2,180	3,406	4,184	5,186	6,188	7,190

To obtain a substantially larger forecast of work-at-home and telecommuting, a major restructuring of the work environment would have to be assumed. There are a number of companies and organizations today that operate a "virtual workplaces." They maintain cohesion of their geographically dispersed workforce through telecommunications. Other companies and organizations practice "hoteling" where employees do not have permanent offices but use offices on a space available basis as needed. These practices are likely to expand in the future as technology become more capable and new employees are more telecommunications savvy.

If work-at-home and telecommuting continue to grow as a share of all work trips at the same rate as they did from 1980 to 2000, work at home would capture 4.8 percent of work trips by 2030.

Census Journey to Work Work at Home
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1980-2030						
(Percent of Work Trips)						
YEAR	1980	1990	2000	2010	2020	2030
Work at Home - %	2.25%	2.96%	3.26%	3.77%	4.28%	4.79%

National Strategies to Improve and Expand Telecommuting

There are a number of national strategies that could improve and expand the use of telecommuting and its impacts on transportation and the environment. There are several elements to this strategy which would be more effective if they worked in concert:

- **Tax Credits to Businesses** - to foster telecommuting programs for employees of private businesses;
- **Funding Eligibility** - to assure that telecommuting activities are eligible for existing Federal-aid funds available for congestion mitigation;
- **Outreach** - to publicize telecommuting and its impacts on travel and the environment as well as on organizations and individuals;
- **Technical Assistance** - to assist State and local agencies and private organizations in implementing telecommuting programs; and
- **Demonstrating Efficacy** - to demonstrate that telecommuting can achieve congestion reduction and improve environmental quality.

Tax Credits to Businesses

Private companies seek ways to improve the lifestyle of employees as a means to attract and retain them. Providing a tax incentive could get companies to focus on telecommuting which would have the effect of a major pay raise for the employee, particularly with the current cost of gas. Under this proposal, private companies could receive a tax credits for establishing telecommuting programs and promoting telecommuting among its employees.

Funding Eligibility

Currently, Federal-Aid Highway Planning and Congestion Management and Air Quality Mitigation (CMAQ) program funds can be used by State and local agencies to develop telecommuting programs which include planning, management, organization, promotion, marketing, training, materials, and public awareness campaigns, but not the acquisition and equipping of facilities such as telework centers. To be eligible for Federal transportation funding, these telecommuting programs must be part of a transportation plan and transportation improvement programs (TIPs) developed by State and local agencies.

Some transportation experts believe that these activities should be eligible for funding under all Federal-Aid Highway programs except those for safety related activities. Moreover, the eligibility of telecommuting programs needs to be expanded to included capital items such as equipment and telework centers.

Promotion

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Although a large number of activities have been undertaken to promote the use of telecommuting, further efforts need to be carried out to increase the visibility of telecommuting, its advantages, and approaches to expand telecommuting. Many people are still not aware of telecommuting as a congestion relief technique or its advantages for improving productivity and increasing employee retention.

Clearly, statements from senior public officials, conferences and workshops, websites and publications can increase awareness and support efforts at the organization level to expand telecommuting. Special events can increase attention paid to telecommuting such as: Telecommute-to-Work days; Boss-Work-From-Home days. Urban areas or companies with exemplary telecommuting programs could be given awards and their program widely publicized. For example, Best Workplaces for Commuters (www.bestworkplaces.org) gives awards that consider the success of employers' telecommute programs, among other ways, in reducing single occupant vehicle (SOV) travel.

Technical Assistance

Implementation of telecommuting programs can be facilitated and encouraged by increasing the level of technical assistance that is provided. This technical assistance needs to focus on the development of long range plans and transportation improvement programs (TIPs) as well as implementation of actual telecommuting programs. This technical assistance can take several forms:

- Dissemination of techniques for forecasting telecommuting in transportation plans and programs and for analyzing the impacts of region wide telecommuting options on travel demand, congestion, air quality, energy consumption, and safety.
- Dissemination of techniques for regional organizations to implement region wide telecommuting programs which integrate and reinforce the efforts of individual companies and organizations;
- Provision of manuals of practice and courses to assist State and local agencies and private companies;
- Expanding telecommuting web sites to make more accessible manuals, report, results of telecommuting studies, and other materials to assist States and MPOs; and
- Peer-to-peer workshops to facilitate transfer of knowledge on telecommuting.

Demonstrating Efficacy

Another element in advancing telecommuting is to demonstrate that telecommuting will reduce the number of trips on the transportation system, particularly peak hour trips, and thereby achieve the benefits of reduced congestion, air pollution emissions, energy consumption, and accidents. Further research and analysis needs to be carried out to confirm the impacts of telecommuting on travel and the environment that have been identified so far. Initially, the studies that have already been carried out could be summarized and synthesized for dissemination. New case studies can be added as they become available.

CONSOLIDATED COMMENTS FROM MEMBERS OF THE BLUE RIBBON PANEL OF TRANSPORTATION EXPERTS - PAPER 4H-01

One reviewer commented as follows:

Under “Telecommuting Trends,” the data presented is not particularly convincing to this reviewer. First, in 1960, the percentage of the population predominately working at home was 7.2 (census data). The highlighted increase of 0.3 percentage points between 1990 and 2000 is only a shadow of the 3.9 percentage point decrease between 1960 and 2000. Second, the report’s shift between percentages and absolute numbers (in millions) diverts attention from lack of significant progress in terms of market share. Third, census work-at-home data has a specific definition requiring the majority of work days to be in the home. The percentages or numbers of persons who work at home one day per week, one day per month, or even one day per year are not comparable to census data, and clearly do not have anywhere near the same transportation demand implications as for those workers meeting the census definition.

Under “Best Practices of Telecommuting Programs,” one factor could be expanded upon. That is “Selection of Job Tasks.” A fundamental question for analysis is whether the proportion of jobs having most tasks suitable for telecommuting is expected to grow. Clearly, factory production line work, fast-food work, and retail sales work cannot be done at home. On the other hand, many report writers, software writers and electronic forms processors should be able to work a significant number of days at home. At the same time, it is clear many workers have jobs for which telecommuting seems suitable, but they do not telecommute. Explaining why would also go a long way towards addressing the issue of this paper.

Under “National Strategies to Improve and Expand Telecommuting,” while it is helpful to know potential strategies exist for this purpose, what is really needed is quantification of their effectiveness on reducing travel demand and quantification of cost.

Finally, some analysts contend that while telecommuting may reduce peak hour trip-making or VMT, it has no effect on total trip-making or total VMT. Depending on policy goals, this needs to be examined and considered.