Congestion Mitigation Commission Technical Analysis

Telecommuting Incentives

technical memorandum

prepared for
New York City Economic Development Corporation
New York City Department of Transportation

prepared by
Cambridge Systematics, Inc.
Technical memorandum

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Cambridge Systematics, Inc.
33 East 33rd Street, Suite 804
New York, New York  10016

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Executive Summary

On any given workday, the Manhattan Central Business District hosts nearly two million workers from around the region, hundreds of thousands of tourists, and several hundred thousand residents. Streets are congested with cars, trucks, buses, taxis, pedestrians, and cyclists. The saturated roadways slow bus service, cause emergency vehicles to lose valuable response time, and contribute to the region’s air pollution problems.

Telecommuting is a congestion management strategy that has been embraced by states, MPOs, and local jurisdictions nationwide. Generally, telecommuting participants work from an alternative location instead of traveling to the workplace. Most employers are knowledgeable about telecommuting as an employee benefit and many public and private employers offer some level of telecommuting to their employees.

A number of governments at the state, county, or regional level provide incentives such as free technical assistance for telecommuting program development and financial reimbursement of, or tax credits for, telecommuting costs to help boost telecommuting participation. New York City offers some financial and technical incentives for employers but the question remains: would the implementation of more powerful or better incentive programs increase telecommuting participation rates? Even if incentive programs can increase participation and decrease congestion, would it decrease congestion enough to make a difference?

For such incentives to have an impact, there first must be latent demand for telecommuting. Available survey data show that there is indeed some latent demand for telecommuting. However, even if all of the potential latent demand was realized, only between 0.2 and 1.3 percent of New York City commute trips or 0.03 to 0.21 percent of all vehicle-miles of travel (VMT), or 1,500 to 10,000 daily VMT, would be reduced.

Furthermore, there has been no conclusive evidence that implementing any sort of incentive program has made any measurable impact on telecommuting participation rates. Analysts and academics have inspected telecommuting participation rates around the country and found that telecommuting levels range from 5 to 15 percent of the workforce. However, they have not been able to connect differences in telecommuting levels to the presence or strength of an incentive program. Surveys have found that only a small percentage of employers and employees have taken advantage of such programs. Table ES.1 summarizes the set of case studies reviewed for this study and reports the telecommuting participation levels, the frequency at which an employee telecommutes, the entity that administers the telecommuting incentive program, and the incentives that the entity offers.
Telecommuting participation has been rising with or without incentives in place. The force behind this rise has been left unexplained but it seems likely that market forces such as changes in work to an information society, better technology, and a younger generation of managers who are comfortable with the new way of thinking have been at its root. Telecommuting incentives, though, have had very little tangible impact on telecommuting levels. As a result, this study does not anticipate that offering additional incentives in New York City would measurably reduce work-trips or vehicle-miles of travel (VMT).

### Table ES.1 Summary Telecommuting Programs and Incentives Offered

<table>
<thead>
<tr>
<th>Geography</th>
<th>Telecommuting Levels</th>
<th>Telecommuting Frequency</th>
<th>Program Administrator</th>
<th>Incentives Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline National</td>
<td>8% (2000)</td>
<td>0.9-1.8 days per week</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Federal</td>
<td>6.6%</td>
<td>1.6 days per week</td>
<td>Federal Government</td>
<td>Telework Enhancement Act of 2007 including:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Dedicated telecommute manager;</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Less stringent guidelines for eligibility; and</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Increased training and education</td>
</tr>
<tr>
<td>New York – Long Island</td>
<td>10.5%*</td>
<td>1.6 c days per week</td>
<td>Long Island Transportation Management</td>
<td>Grant Program for Telecommuting program design and implementation. $1,000 per employee with $100,000 max payout</td>
</tr>
<tr>
<td>New York – Westchester County</td>
<td>10.5%*</td>
<td>1.6 c days per week</td>
<td>Smart Commute</td>
<td>Marketing and outreach including site visits and recommending telecommuting as TDM measure</td>
</tr>
<tr>
<td>New York – New York City</td>
<td>10.5%*</td>
<td>1.6 c days per week</td>
<td>Commuter Link</td>
<td>Grant Program for TDM, including telecommuting, with graduated payment by size of employer and a $10,000 max payout</td>
</tr>
<tr>
<td>New York – Metro Connecticut and New York</td>
<td>15.4%b</td>
<td>1.6 c days per week</td>
<td>MetroPool</td>
<td>Free Consulting</td>
</tr>
<tr>
<td>State of Connecticut</td>
<td>8.9%</td>
<td>1.79 days per week</td>
<td>Telecommute Connecticut!</td>
<td>Free Consulting State Tax Credit of $250 per employee (only available when a county is in a severe nonattainment area)</td>
</tr>
<tr>
<td>Geography</td>
<td>Telecommuting Levels</td>
<td>Telecommuting Frequency</td>
<td>Program Administrator</td>
<td>Incentives Offered</td>
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<td>------------------------------</td>
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<td>--------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| State of Washington          | 7-8%                 | 1.4-2.5 days per week   | Department of Transportation                | Commute Trip Reduction Program mandates trip reduction  
Trip Reduction Performance Program buys annual reduced trips  
State Tax Credit of $60 per employee                                                                         |
| Denver Metro Area, Colorado  | N/A                  | 1.84 days per week      | Denver Regional Council of Governments      | Marketing and outreach  
Free Consulting                                                                                              |
| Phoenix Metro Area, Arizona  | 5-13%                | 1.9-2.1 days per week   | Valley Metro                                | Free Consulting  
Trip Reduction Program mandates trip reduction                                                                   |
| Atlanta Metro Area, Georgia  | N/A                  | 2.46 days per week      | Clean Air Campaign                          | Cash for Commuters pays commuters for not driving alone  
Commuter Prize pays commuters who use alternative mode most often  
Telework Leadership Initiative provides free consulting  
State Tax Credit of $1,200 per employee and $20,000 per employer                                                  |

*Based on data from RT-HIS survey for entire city of New York.  
Based on data from RT-HIS survey for portion of Connecticut in the metro New York area.  
*Based on data from RT-HIS survey for entire New York City metro area.
1.0 Introduction

On any given workday, the Manhattan Central Business District hosts nearly two million workers from around the region, hundreds of thousands of tourists, and several hundred thousand residents. Streets are congested with cars, trucks, buses, taxis, pedestrians, and cyclists. The saturated roadways slow bus service, cause emergency vehicles to lose valuable response time, and contribute to the region’s air pollution problems.

According to Texas Transportation Institute’s Urban Mobility Report, New York City ranks second in the nation in terms of annual delay. The majority of the delay is spent during the peak hour, with travelers experiencing 46 hours of annual delay (per traveler) in 2005, up from 34 hours in 2000, a 35 percent increase. This congestion costs the City and its residents over $7 billion in 2005, costing each peak traveler approximately $888.

By 2030, nearly a million more residents, 750,000 more jobs, and millions more visitors are expected to further strain the City’s transportation system. The current system cannot handle the anticipated increase in traffic and meaningful infrastructure-based solutions are challenging, costly, and lengthy to implement. A comprehensive and innovative set of strategies must be implemented to make a profound change in travel behavior.

Telecommuting is a congestion management strategy that has been embraced by states, MPOs, and local jurisdictions nationwide. Generally, telecommuting participants work from an alternative location instead of traveling to the workplace. Most employers are knowledgeable about telecommuting as an employee benefit and many public and private employers offer some level of telecommuting to their employees. A number of governments at the state, county, or regional level provide incentives such as free technical assistance for telecommuting program development and financial reimbursement of, or tax credits for, telecommuting costs to help boost telecommuting participation. New York City offers some financial and technical incentives for employers but the question remains: would the implementation of more powerful or better incentive programs increase telecommuting participation rates? Even if incentive programs can increase participation and decrease congestion, would it decrease congestion enough to make a difference?

The objective of this memorandum is to provide information about existing telecommuting programs and participation, identify existing and potential telecommuting incentives for New York City, and discuss potential telecommuting participation increases from the implementation of the incentives.

The report begins with a general review of telecommuting (definitions, barriers, benefits, levels and frequency of telecommuting, and demographics of telecommuters) in Section 2.0; followed by a review of existing telecommuting
programs in New York City along with an expanded look at telecommuting programs in Federal executive offices, states, and metro regions in Section 3.0; a synthesizes of lessons learned as they apply to New York City in Section 4.0; and finally Section 5.0 provides conclusions and key findings.
2.0 Telecommuting

2.1 DEFINING TELECOMMUTING

Telecommuting is a term that can, very generally, mean working from home instead of at the workplace. It is a word, however, that tends to defy definition. Jack Nilles, the father of telecommuting, coined the phrase after attempting to explain his 1973 Telecommunications-Transportation Tradeoff Project. The project focused on the tradeoffs between telecommunications and transportation.¹ Nilles himself defines telecommuting as “moving the work to the workers instead of moving the workers to the work.”² The term telecommuting is often used interchangeably with the term teleworking, which Nilles also coined. Teleworking is defined as “any form of substitution of information technologies (such as telecommunications and computers) for work-related travel.”³ Teleworkers, by this definition, can have a webcast meeting in lieu of traveling to a client’s office. Telecommuters are a specific subset of these workers who work from any location (home, hotel, etc.) instead of traveling to the workplace.

These definitions are general and open ended. This generality has led to different interpretations by academics, consultants, and researchers who work to understand telecommuting. This, in turn, has made it difficult to compare results across studies. Mokhtarian, Salomon, and Choo (2005)⁴ define telecommuting with a focus on transportation impacts of telecommuting as “…that subset of teleworking in which salaried employees of an organization replace or modify the commute by working at home or a location closer to home than the regular workplace, generally using ICT to support productivity and communication with the supervisor, co-workers, clients, and other colleagues,” where ICT is information and communications technologies. Mokhtarian’s definition of telecommuting is appropriate for a study of potential transportation impacts from the implementation of incentive programs.

People who work at home when there is no other workplace are not telecommuters because they do not substitute telecommunications for travel. These people are either home-based workers or workers who work in homes

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³ Ibid.
⁴ Patricia L. Mokhtarian, Ilan Salomon, and Sangho Choo, Measuring the Measurable: Why can’t we Agree on the Number of Telecommuters in the U.S.?, Quality and Quantity.
such as plumbers or housekeepers. This is an important distinction to make. The home-based worker who does not reduce a trip should not be counted as a telecommuter for trip reduction studies. Some studies do count home-based employees and it is not always clear how many.

Telecommuting, by Mokhtarian’s definition, describes the commute pattern of people who work at home anywhere from one day a year to five days a week instead of traveling into the workplace. In some cases, however, telecommuters are only counted if they telecommute more than one day per week, in others they are counted if they telecommute more than one day per month.

Finally, surveys do not always include telecommuters who travel to telework centers as telecommuters. A telework center is a location closer to the employee’s home that provides connectivity and office equipment required for work style productivity. These workers should also be counted in the total for telecommuters.

The definitional issues can lead to over counting of telecommuters (by counting home-based employees or employees who work in homes) or undercounting of telecommuters (by not counting those who work at telework centers or those who telecommute below the threshold). It is not clear in the literature how much impact these issues have on the telecommuting results.

Telecommuting, as defined for this report, will include all telecommuters who travel to telework centers and those who telecommute from home instead of traveling to their workplace. These people will count as telecommuters with no minimum cut-off.

### 2.2 BARRIERS TO TELECOMMUTING

Barriers to telecommuting impact how many employers offer telecommuting and how many employees participate in telecommuting programs.

**Institutional Barriers**

Telecommuting is a feasible option for any employee who has information-based work tasks such as reading, writing, research, data entry, and talking on the phone. Telecommuting, on the other hand, is not a feasible option for those employees who require face-to-face contact or on-site labor.

Employees who can telecommute because they work with information and have the required technology to perform these duties face barriers to telecommuting, some internal and some external. Internal barriers include lack of awareness of telecommuting and/or lack of drive to telecommute. External barriers to telecommuting include management reluctance and generational understanding. Finally, some employees who have none of these barriers simply just do not choose to telecommute.
Historically, management has been reluctant to allow telecommuting. Middle management support among organizations that allow, did allow, or will allow telecommuting in the Phoenix metro area in 2006 sits at 54 percent. Managers fear the loss of direct eyes-on supervision will negatively impact their employees' productivity, reduce their control over employees, or precipitate the loss of company spirit.

A manager’s lack of trust for his or her employees marks one of the largest barriers to telecommuting. A recent survey found that the most significant institutional barrier to telecommuting was management resistance. Recent case studies of employers with significant telecommuting programs in New York City have shown that, contrary to the common belief of management, productivity increases by 10 to 40 percent when people telecommute. Additionally, control is being regained by management as technology increases connectivity.

Lack of management support could be caused by a generational rift – today’s veteran managers learned to manage in another mold. Telecommuting requires managers to relearn and rework their management styles to fit the new work techniques and to judge results over process. This has met some apparent resistance. As management learns to work within the new technology framework, and there is a generational succession, this problem should be alleviated.

Employers and employees must also be aware of the telecommuting option to make use of it. A recent survey of Phoenix metro area employers shows that the great majority (91 percent) of employers are familiar with the term telecommuting.

Still, not all employees embrace telecommuting as an alternative to office work. Employees who have the drive to telecommute cite work, family, leisure or independence, commuting, and ideology (clean commute) for reasons why they telecommute. Other employees who lack this drive or whose drive is outweighed by personal constraints such as risk aversion, interpersonal interaction needs, or perceived benefit of the commute (physical and mental separation between home and work) will not telecommute. In fact, Mokhtarian estimates that about 50 percent of employees who can telecommute actually telecommute.

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6 Ibid.
8 Ibid.
want to. Furthermore, Phoenix survey results show that in 2006 only 74 percent of employees who were allowed to telecommute actually did.

These employees feel that lack of face time will leave their managers with the impression that they are not working hard or effectively which may, in turn, cause their managers to pass them over for promotions. Some people feel that being present at the place of work allows for better team dynamics, brainstorming, and relationship building. Many people do not like working at home due to lack of appropriate space and the distractions of family, errands, etc.

As managers become more comfortable with telecommuting and learn to manage in this new way, employee fears regarding promotions and impressions should wane. However, interpersonal relationships and a lack of drive for telecommuting will remain as reasons why employees choose not to telecommute. Finally, it takes the combination of a willing manager, a willing employee, an employee’s disposition to work well alone, and an employer who is able to recognize the employee’s work from afar for an employee to actually telecommute.

**Technology Barriers**

The lack of technology or, more specifically, the lack of speedy technology hampers telecommuting. If, for example, a worker requires particular software that is only licensed at the office, he or she cannot telecommute. If workers cannot access files at the office, have slow connection speeds, have unreliable connectivity, cannot access e-mail, or have difficulty staying abreast of client and home office needs, it is likely that telecommuting will not provide a viable replacement for office work. In fact, a survey of AT&T employees found the most significant technology barrier to telecommuting was slow access to corporate systems, followed by difficulties with downloading large files and applications that do not run well at home.

Security is another technology barrier. It can be especially difficult for small companies and branch offices without dedicated information technology staff to implement security features necessary to ensure the safety of potentially confidential data.

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10 Ibid.

11 WestGroup Research, for Valley Metro, Employer Telecommuting Study, June 2006

Here we assume that if an employee was allowed to telecommute that they also wanted to telecommute based on the assumption that an agreement was likely made between the two parties before the decision to actually telecommute was made.

Technology barriers are fast disappearing as more Americans are gaining access to broadband and high-speed Internet access, remote desktop software and virtual private networks (VPN) are becoming more prevalent, and a mobile economy is forcing companies to secure their connections for reasons other than telecommuting.

Zoning
The zoning barrier could impact both the employee’s decision to telecommute and the employer’s decision to offer telecommuting. Zoning ordinances exist that prohibit working from the home. These ordinances include restricting any use of home business or limiting the number of packages that may be delivered to a home office. These ordinances were enacted long before the technology revolution and were meant to prohibit undesirable uses from being constructed near residential development.

Minimum parking requirements also impact telecommuting participation. Often, the cost of a parking space is included in the cost of rent for an office building. If the lessee is paying for the parking space, they may not be as willing to offer work from home options that might cost more money. However, over time, employers should be able to adjust lease arrangements to better reflect changing work styles.

OSHA
The Occupational Safety and Health Administration (OSHA) regulates workplace safety and health standards. If injuries that occur at home while an employee is telecommuting, employers are concerned they would be considered at “the workplace.” OSHA does not require home inspections but employers have been proactive and have conducted home inspections or provided guidelines for home office setup.

Taxes
Some states have tax laws that can lead to the double taxation of telecommuters. Generally, an employee pays taxes to the state where work is performed and sometimes an employee’s home state also taxes the income. In this case, employees that live in New Jersey and work in New York are responsible for paying taxes to both states.

This creates grey area for telecommuters since an employer’s home office is in one location but the actual work is done at another – creating a situation where an employee has two simultaneous workplaces. If an employee telecommutes to an office located in the State of New York, she does not physically perform her work in New York but is still taxed by New York for that income. This is allowed under the New York tax rule known as the “convenience of the employer” rule. This rule allows the state where the employer is located to tax the telecommuter for days when he or she is not physically at the workplace.
unless the employee is telecommuting for “the convenience of the employer.” It is very difficult for telecommuters to prove that they are telecommuting for the convenience of the employer. As such, this tax rule allows both the employer’s state and the employee’s state to tax the telecommuter for the same income even when work is not physically performed in both. A telecommuter who lives in Connecticut and works in New York State will have to pay taxes for 100 percent of their income in New York on top of the taxes on the portion of his or salary earned while working in Connecticut.

In May 2006, New York amended its application of the convenience rule. It now allows telecommuters to avoid the tax if they could prove that their work days were normal” and their home offices qualify as “bona fide employer” offices. These requirements are very difficult to meet, which leaves telecommuters open to double taxation.13

In March 2007, Representative Christopher Shays (R-CT) reintroduced the Telecommuter Tax Fairness Act (H.R. 1360). It has also been reintroduced in the Senate (S.785) by Senator Christopher Dodd (D-CT). The Telecommuter Tax Fairness Act of 2007 is designed to protect telecommuters against double taxation.

2.3 BENEFITS OF TELECOMMUTING

Fewer Cars on the Road

One study conducted in 1996 reviewed the trip and VMT reductions of employees who participated in the State of California Telecommuting Pilot Project in the early 1990s. They found that telecommuters reduced their total number of trips by 27 percent and their VMT by 77 percent on days that they telecommuted.14 Other studies found that the average number of trips taken on telecommuting days by telecommuters is lower by between 27 percent and 51 percent, and that VMT is lower by between 53 percent and 77 percent.15 Overall, on any given day, 2 percent of employees are telecommuting. Reductions in both trips and VMT lead to a direct reduction in emissions, improvement in safety, and energy conservation, all significant social benefits.

The peak-hour commuter trips to dense work locations such as central and edge cities are replaced by shorter, more frequent trips in the vicinity of the

13legalnews.tv/commentary/taxing_telecommuters_what_should_congress_do.


employees’ home to purchase office supplies, send packages, and perform other household errands. In fact, a 77 percent reduction in VMT implies that an employee makes these shorter trips on days that he telecommutes. These trips, though, consist of only 23 percent of the distance that he would have driven had he commuted to work.

The VMT reductions are representative of a population of telecommuters that lives further away from work than the nontelecommuting worker. The telecommuter in Connecticut lives 18 miles away from the workplace, 5 miles more than the nontelecommuting employee.16

The trip reduction estimates above account for the extra trips that telecommuters make during the days that they telecommute. Tempering these reductions, however, is the “induced demand” and increased urban sprawl. The basic theory of induced demand states that more people drive when additional capacity is created. This holds true for telecommuting as well, as more people are taken off of the road, especially during commute times, capacity is increased, travel time is decreased, and more people decide to drive.

Sprawl is induced because telecommuting can free people from the restriction of location and makes it easier to live further away from the workplace. Researchers have estimated that the increase in travel from induced demand and from increased sprawl is more than offset by the decrease in travel, resulting in a net decrease (Figure 2.1).17


A study by the U.S. Department of Energy (DOE) found that the delay would be reduced most in areas where there is currently the most congestion. In other words, they found that the biggest time savings from telecommuting could come in the largest metropolitan areas. In 1994, when the study was published, the Metro New York area ranked second only to the Los Angeles area when estimating the potential delay reductions. Figure 2.2 depicts the curve of cities ranked by projected benefit.
Benefits for Workers

Workers enjoy more benefits than relief from commuting congestion when they telecommute. The time an employee formerly spent commuting can now be spent more productively on work or leisure activities. New York City telecommuters would save 23 work days per year if they telecommuted three or more days per week based on a 76.6-minute roundtrip commute time. Telecommuting frees the commuter to use local services like grocery stores, post offices, etc., in the off-peak period, which also saves time.

Telecommuters also save on spending. The average work trip length made by auto in the New York metro region as collected in 1998 is 10.9 miles and the average cost per mile based on national reimbursement is $0.485 per mile, then

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Telecommuters save $5.29 per trip in gasoline, vehicle maintenance, and other operating costs. This example assumes that telecommuters make no other trips during the day, but it highlights the savings potential of telecommuting. Employees who are required to pay for parking at work would save even more by telecommuting from home. Telecommuting also provides opportunities for disabled workers.

Benefits for Employers

Employers can also benefit when they allow their employees to telecommute for the following reasons:

- Telecommuters can be more productive than their office counterparts;
- Prospective employees can come from a much larger commute shed;
- Recruitment improves;
- Turnover drops;
- Office costs drop;
- Absenteeism drops; and
- Work can continue during emergencies.

Shirazi compiled case studies from New York City employers with telecommuting programs in place and found that telecommuting employees enjoyed productivity gains between 10 and 40 percent. A recent telecommuting survey shows that at least half of participating employers experienced positive impacts in morale, productivity, retention, customer service, absenteeism, recruiting employees, and office space costs.

2.4 TELECOMMUTING LEVELS AND FREQUENCY

Telecommuting levels describe how many employees telecommute or, alternatively, how many employees participate in telecommuting activities. Telecommuting frequency, on the other hand, describes how often employees telecommute and is generally described in terms such as days per week, hours per month, or percent of total time. Finally, telecommuting is also commonly described in terms of the amount of telecommuting employees on any given day which is a synthesis of telecommuting levels and frequency.

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National Telecommuting Levels and Frequency

National Levels – A Synthetic Approach

An estimated 30 to 40 percent of all employees have jobs suitable for telecommuting yet telecommuting levels remain low. Researchers and program administrators have not been able to fully tap into this potential. Section 2.2 outlines the forces that act against the adoption of telecommuting as a replacement or modification to a normal commute trip.

Barriers to telecommuting inhibit the overall potential of telecommuting. Some of these barriers might change over time such as zoning, technology, and management barriers while others will likely remain like personal drive to telecommute. The combination of the impact of these barriers is defined by Mokhtarian.\textsuperscript{23} She models the participation in telecommuting as the combination of three factors:

- **Ability to Telecommute** – Those whose job is eligible for telecommuting, whose manager is willing to allow telecommuting, and whose external constraints do not inhibit telecommuting;
- **Wanting to Telecommute** – Those who have the ability to telecommute that want to telecommute; and
- **Choosing to Telecommute** – Those who both have the ability to telecommute and want to telecommute that actually do telecommute.

Telecommuting is a feasible option for any employee who has information-based work tasks such as reading, writing, research, data entry, and talking on the phone. Telecommuting is not a feasible option for those employees who require face-to-face contact or on-site labor. The employees with telecommuting feasible, or eligible, jobs make up the telecommuting universe.

It is difficult to describe the number of employees in the telecommuting universe because the employment data is aggregated by industry rather than by job type. As a proxy, researchers have defined the telecommuting universe in terms of industry, selecting all employees in information-related industries. Mokhtarian cites estimates that between 50 and 70 percent of all employees are information workers.\textsuperscript{24} A 1996 survey of information workers found that 56 percent of employees felt that their tasks were appropriate for telecommuting.\textsuperscript{25}


\textsuperscript{25}Ibid.
Combining the estimate of information workers with the number of information employees who feel that they have work tasks eligible for telecommuting implies that between 28 and 39 percent of all workers are eligible for telecommuting. The Federal government estimates that 70 percent of the Federal workforce in 2005 was eligible for telecommuting. However, from 2001 through 2004, they estimated that between 30 and 41 percent of Federal employees were eligible for telecommuting.26

The dramatic shift in Federal telecommuting eligibility stems from a change in eligibility definition between survey year 2004 and 2005. In 2004, an employee was defined as eligible if “regularly or occasionally, some or all of duties could be performed away from the principal place of duty.”27 In 2005, on the other hand, an employee was defined as eligible if they did not handle secure materials, have on-site activity that cannot be handled remotely or at an alternate worksite, or was rated poorly for conduct or success in the previous year.28

In 2004, an employee was considered eligible if tasks seemed suitable and in 2005 an employee was considered eligible if they or their tasks were not unsuitable. It is not clear why the change in definition changed eligibility levels so drastically, but since other estimates are in the range of 30 to 40 percent of all employees, it seems likely that the original definition resulted in a more accurate estimate. Table 2.1 provides a summary of employees eligible for telecommuting. An estimate of between 30 and 40 percent of all employees is reasonable based on the available data.

### Table 2.1 Summary of Telecommuting Eligible Employees

<table>
<thead>
<tr>
<th>Estimated by</th>
<th>Year</th>
<th>Eligible Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mokhtarian</td>
<td>1996</td>
<td>28-39%</td>
</tr>
<tr>
<td>Federal Government</td>
<td>2001</td>
<td>30%</td>
</tr>
<tr>
<td>Federal Government</td>
<td>2002</td>
<td>35%</td>
</tr>
<tr>
<td>Federal Government</td>
<td>2003</td>
<td>42%</td>
</tr>
<tr>
<td>Federal Government</td>
<td>2004</td>
<td>41%</td>
</tr>
<tr>
<td>Federal Government</td>
<td>2005</td>
<td>70%</td>
</tr>
</tbody>
</table>


The data described here and in Section 2.2 outline the reasons and background data for each of these three factors. Those with the ability to telecommute can do so because they have no barriers to telecommuting, this is a combination of manager willingness (managers are willing 56 percent of the time), job suitability (the job is suitable 30 to 40 percent of the time), and lack of other external constraints (9 percent of employers are unaware of telecommuting). It is possible for all three of these factors to overlap, for example, when the job is not suitable and the manager is not willing. Given the overlap, Mokhtarian found that approximately half of those employees that are suitable are actually able to telecommute. Based on the estimated 30 to 40 percent of suitable employees and Mokhtarian’s estimate that half of these employees would have the ability to telecommute based on a set of constraints the available data imply that between 15 and 20 percent of all employees have the ability to telecommute.

Furthermore, the data in Section 2.2 show that 50 percent of employees who have the ability to telecommute actually do not want to telecommute, mostly for interpersonal reasons or a lack of interest in telecommuting. Finally, of those employees that both have the ability and desire to telecommute, only 74 percent actually choose to telecommute. Table 2.2 summarizes the factors that impact telecommuting levels. The resulting level of expected telecommuting in the general population, between 5.5 and 7.4 percent, is estimated by multiplying these three factors.

**Table 2.2 Impact of Telecommuting Barriers**

<table>
<thead>
<tr>
<th>Factors</th>
<th>Percent of Employees</th>
<th>Combined Percent of Employees</th>
<th>Total Percent of Employees (AXBXC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability (A)</td>
<td>Suitability 30% – 40%</td>
<td>Manager Willingness 54%</td>
<td>Other External Constraints 9%</td>
</tr>
<tr>
<td>Wanting (B)</td>
<td>50%</td>
<td>50%</td>
<td></td>
</tr>
<tr>
<td>Choosing (C)</td>
<td>75%</td>
<td>74%</td>
<td></td>
</tr>
</tbody>
</table>

**National Levels – Survey Evidence**

Sources of telecommuting data employ different definitions of telecommuting which complicates comparison over years. As a reminder, for the purposes of this report, telecommuting is basically defined as someone who works at home instead of commuting to a place of work. Furthermore, a telecommuter is counted as such when she telecommutes at any frequency – once a year to 4 times per week.
The U.S. Census indicates that the percentage of workers who usually work at home has increased from 2.3 percent of total employees or 2.2 million employees in 1980 to 3.0 percent of total employees or 3.4 million employees in 1990 to 3.3 percent or 4.2 million total employees in 2000. The American Community Survey by the U.S. Census Bureau estimates that in 2005 that 3.6 percent of all employees or 4.8 million worked from home and in 2006 3.9 percent of employees worked from home or 5.4 million. While this provides some indication of telecommuting levels, employees who have home-based businesses, including retirees and homemakers who are taking advantage of a full employment economy, do not replace trips to the office and so should not count by the definition employed in this report. On the other hand, the Census definition does not include people who telecommute only one or two days a week. As a result, the Census does not provide a reliable indicator of telecommuting levels.

Market research documented that telecommuting has grown from 2.2 million employees in 1988 to 18.5 million employees in 2001.\textsuperscript{29} Using the U.S. Census for total employment numbers, the market research indicates that 3.5 percent of employees were telecommuting in 1990 and that 8 percent of employees were telecommuting in 2000. This research defined telecommuters as company employees or contract workers who telecommute more than one day per month. This definition fits well with the definitions of this report. However, the results of these studies are based on much smaller sample sizes than the census and there has been concern that the data might include non-commute reducing telecommuters so the results should be considered with caution.\textsuperscript{30}

The results of the Census and the market research indicate that the sheer numbers of employees that telecommute are increasing over time and the telecommuting share has been increasing over time. Table 2.3 shows the telecommuting levels as described by these two sources over time. A conservative estimate in the year 2000 suggested that approximately 8 percent of employees and contract workers nationwide telecommuted. Since telecommuting was trending upward, the current value is probably higher.

\textsuperscript{29} Reported in Patricia Mokhtarian, Ilan Salomon, and Sangho Choo, Measuring the Measurable: Why can’t we Agree on the Number of Telecommuters in the U.S., 2005 (market research by Cyber Dialogue).

\textsuperscript{30} Ibid.
### Table 2.3 National Telecommuting Levels

<table>
<thead>
<tr>
<th>Year</th>
<th>Census Data</th>
<th>Market Research</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>2.2 Million (2.3%)</td>
<td></td>
</tr>
<tr>
<td>1988</td>
<td>2.2 Million</td>
<td></td>
</tr>
<tr>
<td>1989</td>
<td>3.0 Million</td>
<td></td>
</tr>
<tr>
<td>1990</td>
<td>3.4 Million (3.0%)</td>
<td>4.0 Million (3.5%)</td>
</tr>
<tr>
<td>1991</td>
<td>5.5 Million</td>
<td></td>
</tr>
<tr>
<td>1992</td>
<td>6.6 Million</td>
<td></td>
</tr>
<tr>
<td>1993</td>
<td>7.3 Million</td>
<td></td>
</tr>
<tr>
<td>1994</td>
<td>9.1 Million</td>
<td></td>
</tr>
<tr>
<td>1995</td>
<td>8.5 Million</td>
<td></td>
</tr>
<tr>
<td>1996</td>
<td>9.7 Million</td>
<td></td>
</tr>
<tr>
<td>1997</td>
<td>11.1 Million</td>
<td></td>
</tr>
<tr>
<td>1998</td>
<td>15.7 Million</td>
<td></td>
</tr>
<tr>
<td>1999</td>
<td>16.3 Million</td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td>4.2 Million (3.3%)</td>
<td>10.3 Million (8.0%) (^{31})</td>
</tr>
<tr>
<td>2001</td>
<td></td>
<td>18.5 Million (14.4%)</td>
</tr>
<tr>
<td>2005</td>
<td>4.8 Million (3.6%)</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>5.4 Million (3.9%)</td>
<td></td>
</tr>
</tbody>
</table>

**Potential Telecommuting Levels**

Experience from surveys in two different metropolitan areas can help to guide the establishment of an upper bound for levels of employers who offer telecommuting. Employer levels and employee levels have some synergy, if more employers allow employees to telecommute, more employees will likely telecommute. Finding the upper bound for one, however, does not necessarily mean finding the upper bound for another – the employer industry mix as well as each particular workplace employee mix will play a large role in determining how many of each embraces telecommuting. Still, by making the assumption that employees who work for employers who currently offer telecommuting and employees who work for employers who have potential to offer telecommuting

\(^{31}\)The lower levels in 2000 compared to adjacent years may be a result of different definitions used in the various surveys. In particular, the 2000 survey excluded self-employed workers. Since this exclusion is consistent with the definition we are employing in this paper, the figure of 8 percent is cited as an estimate of the number telecommuters nationwide at the time.
are essentially identically mixed – they have same propensity to telecommute – it follows that potential employer levels are transferable directly to potential employee levels.

A 2006 telecommuting study\textsuperscript{32} conducted in Phoenix, Arizona showed that among the employers who do not currently offer telecommuting to their employees (69 percent of all employers do not offer telecommuting to their employees), 63 percent claim that nothing can convince them to do so. The remaining 37 percent would consider implementing a telecommuting program in the future.

This leaves 26 percent of all employers who would potentially offer telecommuting of those who do not currently. Table 2.4 provides a summary of the employer willingness to offer telecommuting.

Table 2.4 Summary of Phoenix Area Employers who Might Consider Telecommuting Programs

<table>
<thead>
<tr>
<th>Employer Type</th>
<th>Percent (A)</th>
<th>Might Consider Program?</th>
<th>Percent (B)</th>
<th>Percent of All Employers (A X B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offers Telecommuting</td>
<td>31%</td>
<td>Yes</td>
<td>100%</td>
<td>31%</td>
</tr>
<tr>
<td>Does Not Offer Telecommuting</td>
<td>69%</td>
<td>Yes</td>
<td>37%</td>
<td>26%</td>
</tr>
</tbody>
</table>

|                                | No          | 63%                     | 43%         |


It is likely that a portion of employers would say that they would consider implementing a telecommuting program but would not act on that consideration. In fact, 25 percent of all employers who considered telecommuting decided not to offer a telecommuting program to their employees.\textsuperscript{33} There are likely to be some employers who claim that they would consider telecommuting but never act on the impulse. Here, we make an arbitrary estimate of employers who would not actually consider telecommuting of 25 percent.

The remaining 50 percent of all employers who do not currently offer a telecommuting program but claim they would consider implementing a telecommuting program in the future would actually implement a telecommuting program or 13 percent of all employers. Table 2.5 describes this process.

\textsuperscript{32}WestGroup Research, Employer Telecommuting Study, Valley Metro, June 2006.

\textsuperscript{33}Ibid.
Finally, comparing the number of employers that currently offer telecommuting to the number of employers that might actually implement a program reveals the total potential for telecommuting participation by employers. The survey shows that 31 percent of employers have already implemented programs and the estimates imply that an additional 13 percent of employers could implement programs. This would mean that 44 percent of all employers have implemented or would implement telecommuting programs. The increase from 31 percent of all employers to 44 percent of all employers represents an increase of 41 percent. In other words, 41 percent of all demand for telecommuting program implementation is latent.

Another survey from Arlington, Virginia\textsuperscript{34} found that 55 percent of all employers offer telecommuting and 10 percent of the remaining employers would consider offering this as a benefit. Using the same logic from the first survey results would imply that half of the 10 percent would actually implement a telecommuting program. This would bring the total employers who offer telecommuting from 55 percent to 60 percent, an increase of about 9 percent.

It is likely that current and potential telecommuting levels vary among metropolitan areas as a result of differences in the employment mix as well as other factors such as congestion levels. The results of the two surveys cited here are inconclusive, but do help to bound the range of potential impacts. One shows that, at a maximum, 44 percent of all employers would offer telecommuting to their employees. The other shows that 55 percent of employers already offer telecommuting to their employees and that, at a maximum, 60 percent would offer this benefit. With the assumption that new telecommuters from these programs would act identically to current

\begin{table}
\centering
\begin{tabular}{|l|c|c|c|c|c|}
\hline
Employer Type & Percent (A) & Might Consider Program? & Percent (B) & Implement? & Percent of All Employers (A x B x C) \\
\hline
Does Not Offer Telecommuting & 69\% & Yes & 37\% & No – Consider and decide against & 25\% & 6.5\% \\
& & & & No – Not actually consider & 25\% & 6.5\% \\
& & & & Yes & 50\% & 13\% \\
& No & 63\% & No & & 100\% & 43\% \\
\hline
\end{tabular}
\end{table}


\textsuperscript{34}Southeaster Institute of Research, Arlington County Virginia, Presentation.
telecommuters from existing programs, it is possible to extend the employer telecommuting levels to project employee telecommuting levels.

The Arlington County survey also asked specifically about employers’ use of telecommuting assistance provided by the County and the State of Virginia. Only three to four percent of respondents reported that they are aware of, or have used, telework consulting services or incentives.

**Frequency**

There are multiple academic studies that seek to identify telecommuting frequencies, or how much people telecommute. One study finds that employees who telecommute do so between 0.9 days per week and 1.4 days per week.\(^{35}\) A second finds that employees telecommute 1.6 days per week, on average.\(^{36}\) Another study shows that employees who telecommute do so 1.5 days per week, on average.\(^{37}\) The frequency has been declining over time with the most likely reason that early adopters telecommute more often and the newer telecommuters are bringing the frequency down.\(^{38}\) Finally, market research indicates that employees telecommute between 1.6 and 1.8 days per week.\(^{39}\) The composite results of the studies indicate that a national average telecommuting frequency range of 0.9 to 1.8 days per week is reasonable.

**New York City Telecommuting Levels and Frequency**

**Current Telecommuting Levels**

In the late 1990s, the New York Metropolitan Transportation Council (NYMTC) and the New Jersey Transportation Planning Authority (NJTPA) conducted the Regional Travel-Household Interview Survey (RT-HIS). The survey included travel diaries from February of 1997 through May of 1998. While the data is now 10 years old, it is one of the larger datasets available nationally and presents results specific to New York City. The data represents 27,369 individuals in 11,264 households and 90,764 trips. This database includes those workers who are home-based workers. This inclusion therefore inflates telecommuting levels

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\(^{38}\) Ibid.

as defined in this report. In the greater New York Metro area, approximately 11.9 percent of workers telecommute at least one day per week.40

Census data from the American Community Survey indicate that in 4 percent or 142,000 of New York City employees worked at home most of the time in 2006 while data from the Decennial Census indicate that 2.5 percent or 92,000 of New York City employees worked at home most of the time in 2000.

**Potential Levels**

It is possible to estimate the potential levels of telecommuting in New York City based on the analysis of potential levels described in the National Telecommuting Levels and Frequency above. Using both of the estimated upper bounds from this section will, at the very least, give an idea based on stated-preference surveys, what a reasonable range of potential telecommuting might look like.

The first survey implies that telecommuting levels have the potential to increase by 41 percent over existing levels while the second implies a smaller 9 percent increase. Previously, New York City metro area telecommuting levels (percent of total employees who telecommute) were found to be 10.5 percent.

If the level of telecommuter were to grow by 41 percent, telecommuting levels would increase from 10.5 percent to 14.8 percent. If the level were to grow by 9 percent, on the other hand, telecommuting levels would grow from 10.5 percent to 11.4 percent.

**Frequency**

RT-HIS data indicate that telecommuters used this mode one day a week 54 percent of the time, two days a week 14.5 percent of the time, three days a week 8.3 percent of the time, and four or more days a week 23.2 percent of the time.41 The data are presented in Table 2.6. The overall frequency as measured by this survey is 1.6 days per week.

<table>
<thead>
<tr>
<th>Days Per Week</th>
<th>Percent of Telecommuters</th>
</tr>
</thead>
<tbody>
<tr>
<td>One</td>
<td>54.0%</td>
</tr>
<tr>
<td>Two</td>
<td>14.5%</td>
</tr>
<tr>
<td>Three</td>
<td>8.3%</td>
</tr>
<tr>
<td>Four or more</td>
<td>23.2%</td>
</tr>
</tbody>
</table>


2.5 **DEMOGRAPHICS OF TELECOMMUTERS**

There are very few large datasets available that have the socioeconomic data required to develop econometric models designed to estimate likelihood for telecommuting. These models are designed to give information on the specific impacts of each demographic variable. The models can estimate how much, all else being equal, demographic factors such as age, income, sex, race, etc., impact the likelihood of telecommuting. Two such models have been estimated using data in from the RT-HIS survey in New York City and data collected by the San Diego Association of Governments (SANDAG). The SANDAG data gives unique and valuable insights into the type of employee that is likely to telecommute.

Popuri and Bhat (2003) estimated the impact of socioeconomic data on the RT-HIS dataset for New York City. They estimate the following with respect to likelihood to telecommute and the likelihood for frequency of telecommuting:

- Women are less likely to telecommute if there are no children in the household;
- If there are children, women and men are about equally likely to telecommute;
- Age per se is not a determinant of propensity to telecommute, but older people are more likely to telecommute more frequently;
- Married people are more likely to telecommute and to telecommute more frequently;
- College educated people are more likely to telecommute; individuals in households with several vehicles, individuals who drive to work, and individuals with a driver’s license are less likely to telecommute:
- Private sector employees are more likely to telecommute than their public sector counterparts;
- Workers requiring face-to-face contact tend to be less likely to telecommute but this factor has no impact on telecommuting frequency; part-time employees are more likely to telecommute and telecommute more frequently;
- Individually who have to pay to park at the workplace are more likely to telecommute and are more likely to telecommute more frequently; and
- Individuals in households with higher incomes are more likely to telecommute and telecommute more frequently.

Walls, Sofirova, and Jiang (2006) estimated a similar model as Popuri and Bhat, but did so with SANDAG data collected in 2002. They estimate the following with regard to likeliness to telecommute:

---

• The transportation and communication industry is 11.3 percent less likely to telecommute;
• The retail trade industry is 10.3 percent less likely to telecommute;
• The entertainment industry is 9.5 percent more likely to telecommute;
• The consulting industry is 9.9 percent more likely to telecommute;
• The construction, maintenance and repair, and production industries are 7.3 percent less likely to telecommute;
• The architecture, engineering, or other professionals are 10.4 percent more likely to telecommute;
• The education and training industries are 11.2 percent more likely to telecommute;
• The health services industry is 8.8 percent less likely to telecommute;
• The sales industry is 14.3 percent more likely to telecommute;
• Senior or middle management is 11 percent more likely to telecommute;
• College makes one 17.8 percent more likely to telecommute;
• Kids between 6 and 17 makes people 4.5 percent less likely to telecommute;
• Age (older than 30) makes people 10.9 percent less likely to telecommute;
• Age (older than 30) makes people 35.1 percent less likely to telecommute frequently;
• College makes people 37.9 percent more likely to telecommute frequently;
• Full-time workers are 68.4 percent less likely to telecommute frequently;
• Office workers are 39 percent more likely to telecommute frequently;
• Formal telecommute programs make people 66.3 percent more likely to telecommute frequently;
• Commute time makes people 0.3 percent more likely to telecommute frequently;
• Days that people work make people 33.2 percent more likely to telecommute frequently; and
• Having more than two jobs makes people 54.7 percent more likely to telecommute frequently.
3.0 Case Studies

Telecommuting levels remain stubbornly low when compared to the estimates of employees who are eligible to telecommute or even those that have the potential to telecommute. To remedy that, and to realize the full potential benefits of telecommuting, it is important to remove the barriers described in section 2.2 of this report. To that end states, regional planning bodies, counties, and the Federal government are offering numerous incentives ranging from access to information to significant financial benefits and legal requirements.

The following case studies outline a number of telecommuting incentive programs and focus primarily, due to availability of data, on how effective these programs are at increasing telecommuting participation levels specifically in the private sector. The case studies survey both national and international programs and their effectiveness.

As just one example of an incentive or mandate not listed in the case studies, companies which do substantial government work may be required to institute formal telecommuting policies to meet the requirements of government auditors. For example, Cambridge Systematics was recently required by its Federal Highway Administration auditors to implement such policies, and to require both regular and occasional telecommuters to sign such policy statements. Such requirements impose additional administrative burdens on both employers and employees.

3.1 United States Federal Government

In October of 2000 the Federal Department of Transportation Appropriation Act was amended (Section 359 of Public Law 106-346) to require all eligible employees of the executive offices to telecommute at least once a month. It mandated that the executive offices develop criteria for telecommuting programs and to remove barriers to telecommuting. Even considering that public employees are less likely to telecommute than private sector employees, the results of the mandate were disappointing. While this program is not an incentive, it provides useful corollaries to incentive programs. Incentive programs and Federal mandates both aim to increase telecommuting through external forces. This case is used to highlight the challenges faced when attempting to break the barriers to telecommuting, even with strong incentives.

In 1993 the GSA, in partnership with state and local officials in the Washington, D.C. area, funded and built several Federal telework centers close to large populations of Federal employees. Telecommuters could either work from home or travel to a telework center.
In July of 1994, President Clinton sent a memo to all Federal agencies directing that each agency establish a program to support alternative work arrangements and to reduce the barriers to such programs. In response, the U.S. Department of Transportation (DOT) and General Services Administration (GSA) developed education manuals to help agencies implement the programs.

The National Telecommuting Initiative in 1996 set objectives to increase the number of Federal telecommuters to 60,000 by October 1998 and 160,000 by the end of 2002. The results of the program were disappointing. Participation languished at 25,000 in 1998, far below the goal. The result was that 1.6 percent of the entire Federal work force was telecommuting in 1998.

In 2001, the Federal government required that each executive agency establish a policy that allowed employees to telecommute “to the maximum extent possible without diminished performance.” The policy included a graduated requirement that in four years time, 100 percent of the eligible Federal workforce would be telecommuting at least one day per week. The U.S. Office of Personnel Management (OPM) surveyed the results and found that telecommuting by Federal employees had increased from 45,300 in 2001 (4.2 percent of the Federal workforce) to 102,900 in 2003 (5.0 percent of the Federal workforce). The most recent OPM survey (2005) indicates that 119,248 employees telecommute at least one day a month or 9.5 percent of total eligible Federal employees and 6.6 percent of all Federal employees. Table 3.1 summarizes this data. Additionally, in 2005, Federal employees telecommuted 1.74 days per week.

**Table 3.1  Telecommuting in the Federal Workforce**

<table>
<thead>
<tr>
<th>Year</th>
<th>Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998</td>
<td>25,000 (1.6%)</td>
</tr>
<tr>
<td>2001</td>
<td>45,300 (4.2%)</td>
</tr>
<tr>
<td>2003</td>
<td>102,900 (5.0%)</td>
</tr>
<tr>
<td>2005</td>
<td>119,248 (6.6%)</td>
</tr>
</tbody>
</table>


Federal telecommuting levels have reached 6.6 percent and frequency of 1.74 days per week. These numbers are comparable to the National data described in Section 2.4. In that section, telecommuting levels were between 5 and 8 percent and frequency was between 1 and 1.8 days per week. Federal employees have

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enjoyed growth in their telecommuting levels over time but that the growth has not exceeded national averages implies that Federal mandates have not been able to coax their employees to telecommute.

The Telework Enhancement Act of 2007 (S-1000) is intended to increase the number of Federal employees who telecommute through less stringent guidelines on eligibility, the introduction of a full-time telecommuting program manager, and an increased emphasis on training and education. It is not clear whether this will indeed increase the telecommuting levels in the Federal government or if they will remain steady with national rates as a whole.

3.2 INTERNATIONAL (STOCKHOLM, SWEDEN AND WELLINGTON, NEW ZEALAND)

The City of Stockholm, Sweden implemented a trial congestion pricing scheme. Detailed records of changes in travel patterns were maintained, including changes in mode shift throughout the trial. Based on interviews of two large employers (one inside and one outside the cordon both before and during the pricing trial) the implementation of a cordon fee congestion pricing scheme in downtown Stockholm resulted in no increase in telecommuting. The researchers conceded that the trial was perhaps too short to observe any change in certain behaviors. Furthermore, it is not clear whether the chosen employers had a formal telework program or what a priori telecommuting levels were.

In Wellington, New Zealand, the Greater Wellington Regional Council launched a telecommuting marketing campaign including billboards, press releases, a website, a series of workshops, a leaflet delivery to all 18,228 households, and technical and marketing support.\(^45\) The program, called Close2: Kapiti, was deemed a failure and funding was stopped five months into the 12-month trial period. However, a survey of 400 random commuters showed that 6 percent of commuters began telecommuting as a direct result of the Close2: Kapiti marketing campaign.\(^46\) In the end the program developed 40 new teleworkers and 3 peak-period trips per week.

3.3 NEW YORK CITY

There are several organizations in the New York City metro region which provide various incentives to increase telecommuting. Among them are Commuter Link in New York City, Smart Commute in Westchester County,

\(^{45}\)Joe Hewitt, Report 03.264 to the Regional Land Transport Committee, Greater Wellington Regional Council.

Telecommuting Incentives
Technical memorandum

Long Island Transportation Management, and MetroPool in certain counties in Connecticut and New York. Each is described below.

**Commuter Link**

Commuter Link is a transportation demand management (TDM) agency that is funded by the New York State Department of Transportation and is supported by the New York City Department of Transportation. It covers employers in New York City. It has a grant program that provides funds to companies which implement transportation demand measures (TDMs). It is a graduated program that gives more funding to larger companies (up to a maximum of $10,000). The money can be used for telecommuting equipment or training.

Commuter Link’s grant program has given no money for telecommuting programs to date with anecdotal evidence that the funds offered in the grant program are not significant enough to make an impact on employers. Overall, in the two-year availability of the grant program, six companies have used or been processed through the grant program.

Commuter link had a telecommuting program on the table in 2002 that would have provided free consulting services to implement telecommuting programs for local employers but was canceled due to lack of support from New York City.

**Smart Commute**

Smart Commute is a TDM agency that covers Westchester County, New York and is sponsored by the New York State Department of Transportation. It markets TDM techniques including telecommuting, and provides free services to help set up such TDM programs for local employers. Their services include surveying employees and tailoring TDM programs based on the results. Smart Commute always includes telecommuting as a recommendation for travel demand management. Smart Commute does not collect data on the effectiveness of these programs, however, over the past five years, 14 worksites have worked with Smart Commute to implement travel reduction programs.

**Long Island Transportation Management**

The Long Island Transportation Management (LITM) on Long Island, New York provides free services to help employers implement telecommuting programs.

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49 www.westchestergov.com/smartcommute.
50 Interview with Tony-Pascal Offurum of Smart Commute, September 14, 2007.
51 www.litm.org.
under the Commuter Choice program. They offer the Long Island Region Improving Commuting (LIRIC) Grant Program, which provides funding for TDM program development of $1,000 per employee, up to $10,000 total. The program requires that employers have 30 employees or more, that they are part of LITM’s Commuter Choice program, and that LITM completed a survey that indicates specific TDM schemes. The development or expansion of telecommuting programs are eligible under this grant program but the purchase of capital equipment is not.

The LIRIC grant program offers telecommuting programs as an eligible expense. They do not, however, keep data on how many trips are reduced from this program. Data indicating how many employers apply for or receive these grants are not readily available.

**MetroPool**

MetroPool provides services to commuters traveling to destinations in Fairfield County in Connecticut and Westchester, Rockland, Orange, and Putman Counties in New York. They offer free consulting services to employers that are designed to identify, implement, and support mobility options for each worksite. MetroPool includes telecommuting as an available commute option. MetroPool currently supports alternative mobility programs for close to 300 employers. Data indicating how many trips are reduced from this program are not available.

### 3.4 CONNECTICUT

The State of Connecticut instituted the Telecommute Connecticut! program 10 years ago. Telecommute Connecticut! is a commuter service provided by the Connecticut Department of Transportation for employees in the State of Connecticut. The program offers free assistance to develop and implement telecommuting programs to employers in the State.

Telecommute Connecticut! has provided information or provided consulting services to approximately 200 existing employers to date. A 2000 survey found that between the years of 1997 and 2000:

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• The number of employers offering telecommuting remained at 8 percent;
• There was a 74 percent increase in the number of telecommuters per
  worksite; and
• There was a 91 percent increase in telecommuting days per week.

A recent survey, performed in August of 2006\textsuperscript{55} found that:
• More than 158,000 employees telecommute in Connecticut in 2006, up from
  85,260 in 2001;
• 53 percent of telecommuters work at home less than five days a month,
  spending on average 17 percent of their work hours at home;
• 47 percent of telecommuters work at home at least five days a month,
  spending on average 57 percent of their work hours at home;
• An estimated 60,000 vehicles are removed from the road on an average day;
  and
• 23 percent of telecommuters started in the past six months.

The Telecommute Connecticut! survey defines telecommuters as those
employees who work at home one or more days per month during normal
business hours and exclude home-based businesses and employees who take
work home after hours. This definition is in line with the definition employed in
this report.

It is possible to calculate the telecommuting frequency and levels using the data
in the Connecticut survey results and U.S. Census results. To calculate
telecommuting frequency, convert the percent of the work hours at home to days
of the week (17 percent of work hours at home is 0.85 days per week) and take a
weighted average of the results. Table 3.2 provides a summary of the
calculations. The telecommuting frequency in Connecticut in 2006 was 1.79 days
per week.

<table>
<thead>
<tr>
<th>Percent of Work Hours at Home</th>
<th>Converted to Days of the Week (Hours X 5 Days)</th>
<th>Percent of Total Employees</th>
<th>Weighted Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>17%</td>
<td>0.85 days per week</td>
<td>53%</td>
<td>1.79 days per week</td>
</tr>
<tr>
<td>57%</td>
<td>2.85 days per week</td>
<td>47%</td>
<td></td>
</tr>
</tbody>
</table>

Source: www.telecommutect.com/employers/pr_3_26_07_p2.php.

\textsuperscript{55}www.telecommutect.com/employers/pr_3_26_07_p2.php.
It is possible to calculate the percent of employees telecommuting in Connecticut by using the total employment values for the State of Connecticut from the U.S. Census American Community Survey in conjunction with the Connecticut survey results. Table 3.3 shows the calculations and results. In 2006 8.9 percent of Connecticut employees telecommuted compared to 5.1 percent of employees in 2001.

### Table 3.3  Telecommuting Levels in Connecticut

<table>
<thead>
<tr>
<th>Year</th>
<th>Census Employment</th>
<th>Connecticut Telecommuters</th>
<th>Percent Telecommuting</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>1,672,798</td>
<td>85,260</td>
<td>5.1%</td>
</tr>
<tr>
<td>2006</td>
<td>1,764,288</td>
<td>158,000</td>
<td>8.9%</td>
</tr>
</tbody>
</table>


It is not clear what impact Telecommute Connecticut! has had on the overall increase in telecommuting in Connecticut. It has given information to approximately 200 employers over the 10 year life of the program. It has no way of knowing whether these employers would have implemented telecommuting programs without the use of the available incentives. Further, Telecommute Connecticut! has no information regarding the total number of trips reduced due to the incentive program. However, it has documented substantial increases in telecommuting at the participating companies.

In addition to the telecommuting program, Connecticut offers a Traffic Reduction Tax Credit to employees with more than 100 employees. The credit program, implemented in 1997, was designed to encourage employees to use alternative modes. To be eligible, the employer must be located in Fairfield County, a severe air quality nonattainment area. The Traffic Reduction Tax Credit gives employers 50 percent of “direct costs of traffic reduction programs and related services,”\(^\text{56}\) up to $250 per employee. The credit is limited to $1.5 million per year.\(^\text{57}\) The credit, though, is currently inactive due to the downgrade of most towns in Fairfield County from severe to moderate nonattainment areas. No information is available about the impacts of the tax credit program on alternative mode use in general, or on telecommuting in particular.


3.5 **WASHINGTON STATE**\(^{58}\)

Washington State does not have any specific telecommuting programs but offers incentives and mandates that may involve telecommuting through its trip reduction program.

Washington State has a Commute Trip Reduction (CTR) program that requires employers in the 10 largest counties in the state with over 100 employees to implement TDM programs. Telecommuting is specifically recommended as one of the TDM strategies. The CTR program includes 1,114 worksites and 560,000 employees. While employers are required to develop and implement trip reduction plans, they are not penalized for failure to meet state-established trip reduction targets.

The CTR program in King County, for example, reduced 1,583 trips in 1995 and 12,075 in 2007 with between a 2 and 4 percent of all trips reduced by telecommuting on an average day. In the entire state, as of 2005, the CTR program had achieved a reduction of 20,000 vehicle trips during each average morning commute. Telecommuting levels in 2001 were 7 percent and grew to 8 percent by 2003.\(^{59}\)

We can calculate telecommuting frequency from telecommuting levels (7 to 8 percent of employees) and the total trip reduction rates (2 to 4 percent of all trips). Table 3.4 summarizes the calculation. It is important to understand that percent of telecommuting trips is calculated by multiplying frequency by levels. Telecommuting frequency, then, is calculated by dividing total trips (2 to 4 percent) by levels (7 to 8 percent). Telecommuting frequencies in Washington based on the available data are between 1.4 days per week and 2.5 days per week.

### Table 3.4 Washington Telecommuting Frequency

<table>
<thead>
<tr>
<th>Low/High</th>
<th>Telecommuting Levels</th>
<th>Percent of Telecommuting Trips</th>
<th>Telecommute Frequency = Trips/Levels (as Percent of Total Time)</th>
<th>Telecommuting Frequency (as Days per Week)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>7%</td>
<td>2%</td>
<td>28%</td>
<td>1.4 days per week</td>
</tr>
<tr>
<td>High</td>
<td>8%</td>
<td>4%</td>
<td>50%</td>
<td>2.5 days per week</td>
</tr>
</tbody>
</table>


\(^{58}\)[http://www.wsdot.wa.gov/tdm.](http://www.wsdot.wa.gov/tdm)

In combination with this program, the State offers a CTR tax credit for employers who give subsidies to their employees to shift transportation mode (although this does not include telecommuting). The tax credit program provides a credit of 50 percent of the amount paid to or on behalf of each employee for ridesharing, carsharing, using public transportation, or using nonmotorized commuting.\textsuperscript{60} The credit is capped at $60 per employee and $200,000 per employer per year up to a maximum tax credit of $2.75 million.

Washington also offers a Trip Reduction Performance Program (TRPP). The program allows the state to purchase annualized reduced trips at market value (if one person switched from full-time commuting to full-time telecommuting he or she would create one annualized reduced trip).

The program is designed in a proposal format. The State of Washington releases a request for proposals (RFP) and any entity (private, schools, public agencies, TDM agencies, etc) can respond with a proposal to reduce annual trips for a price. For example, Seattle Central Community College proposed a telecommuting trip reduction program for $10,000 that would reduce a total of 25 annualized trips (at a cost of $400 per trip) by having eligible staff telecommute at least one day a week. The state reviews and accepts the proposals into the program for funding.

The program pays 50 percent of the proposed cost of implementing the trip reduction program up front ($5,000 to the Community College, for example\textsuperscript{61}) and pays the remainder pending proof of actual achieved trip reduction. If the Community College were to reduce 15 annual trips with this program instead of the proposed 25, they would receive a total of $6,000 (15 trips times $400 per trip). However, if they were to reduce 50 annualized trips, they would be paid $20,000 (50 trips X $400). The Community College proposal was set to begin in July 2007 and results should be available after a year-long trial.

The CTR, TRPP, and tax programs provide the carrot and the stick for TDM. Washington provides financial incentives to employers through tax credits and funding programs while requiring by law that trips be reduced. Despite these measures, telecommuting levels remain consistent with those at the national level.

\textsuperscript{60} dor.wa.gov/Docs/Pubs/Special Notices/2005/sn_05_CommuteTripProgChgs.pdf.

\textsuperscript{61} www.wsdot.wa.gov/TDM/default.htm for reports, data, and further background regarding CTR, TRPP, and tax programs available in Washington.
3.6 ATLANTA, GEORGIA

The Clean Air Campaign is a nonprofit TDM agency that is funded through the Georgia Department of Transportation and is supported by the Georgia Environmental Protection Agency, The Atlanta Regional Commission (Atlanta’s Metropolitan Planning Organization), Georgia Regional transportation Authority, the Metro Atlanta Chamber of Commerce, and other private corporations. It offers a variety of incentive programs to both employers and employees in the Atlanta metro region. It offers assistance to employers to design and implement travel reduction programs, Cash for Commuters (CFC), Commuter Prizes, and the Telework Leadership Initiative. Each program is discussed below.

The CFC program started in 2002 to target employees as a complement to the efforts that target employers specifically such as free consulting assistance for the design and implementation of TDM programs. Only commuters who currently drive alone and work in an air quality nonattainment area are eligible for the CFC program. The employee, therefore, must live in the Atlanta metro area. Participating employees must record their travel for a 90-day period after which they are paid $3 a day for each day they used an alternative commute mode, up to a maximum of $180. The commuter must use an alternative mode at least 13 times during the 90-day period. Telecommuting counts as an eligible alternative mode of travel.

The CFC program reported a total of 8,600 participants through three implementation phases. On average, participants were paid $140. Only 6 percent of all program participants chose telecommuting as the alternative mode of commuting. Also, participation in the program has declined somewhat over time, with less than two-thirds of original participants continuing in the program after one year. After the 90 days were over, the participation in all alternative modes diminished to between 71 and 74 percent of “in program” levels after 3 to 6 months and to 64 percent of “in program” levels after 9 to 12 months. Table 3.5 summarizes the estimation of telecommuting participation decline, assuming that telecommuting follows a similar progression to overall alternative mode participation. The percent of program participants who were still telecommuting after 3 to 6 months was between 4.3 and 4.4 percent and was 3.8 percent after 9 to 12 months. It is not known whether this trend will continue downward or whether ex-participants would tend to stay with one alternative mode over another. It may be inferred, therefore, that the program permanently encouraged around 300 employees in the Atlanta

63 Ellen Macht, Cash for Commuters, a web presentation in November 2004.
64 Ellen Macht, Cash for Commuters, a web presentation in November 2004.
metro area to telecommute – just under 0.1 percent of all employment just in the City of Atlanta and 0.02 percent of regional employment.

Table 3.5 Participation in the Atlanta Cash for Commuters Program

<table>
<thead>
<tr>
<th>Mode</th>
<th>Using Mode “in Program”</th>
<th>Using Mode 3-6 Months “after Program”</th>
<th>Using Mode 9-12 Months “after Program”</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Modes</td>
<td>100%</td>
<td>71-74%</td>
<td>64%</td>
</tr>
<tr>
<td>Telecommuting</td>
<td>6%</td>
<td>4.3%-4.4%&lt;sup&gt;a&lt;/sup&gt;</td>
<td>3.8%&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
</tbody>
</table>


<sup>a</sup> These values are estimated.

The Commuter Prize program was introduced in 2005 to offer financial incentive to employees who work in the Atlanta metro area. Participants are entered into monthly drawings for $25 gift cards with each alternative commute earning one entry into the drawing. Additionally, participants who meet certain criteria such as the most number of reports or most days with an alternative commute mode are eligible to win a $100 gift card. Data are not available showing the effectiveness of the Commuter Prize program.

The Telework Leadership Initiative (T LI) provides employers in the Atlanta metro area with free consulting services to start or expand telecommuting programs, up to $20,000 in value. The T LI initiative provided assistance to 13 employers to develop or expand their telecommuting programs. Almost 1,800 employees began telecommuting as a direct result of this program.

In addition to the other ongoing incentive programs in Atlanta, the State of Georgia has implemented a telework tax credit. The program offers two types of tax incentives, both credits apply to the employer. The first credits employers up to $1,200 per employee for the cost of equipment, connectivity, software, etc. The credit is graduated depending on how often the employee telecommutes (25 percent based on 5 or more days per month, 75 percent based on 12 or more days per month, and 100 percent based on 12 or more days per month if the employer is in a nonattainment county.) The second credits employers up to $20,000 for expenses related to the design and implementation of telecommuting programs.

3.7 PHOENIX, ARIZONA<sup>65</sup>

Valley Metro is a regional transit authority that is funded by sales tax and local transportation assistance funds. The transit authority runs a program to help

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<sup>65</sup>www.valleymetro.org.
implement TDM measures and offers employers in the Phoenix metro area incentives to telecommute. The agency surveys telecommuters every two years to learn about levels, awareness, perception, support, and why employers choose not to telecommute. Maricopa County also administers a Trip Reduction Program.

Valley Metro offers employers free consulting services to design and implement telecommuting programs, but has canceled a program offering funding for telecommuting equipment due to lack of interest. Valley Metro received only one request in two years. The free consulting services have had very few takers for several years.

Valley Metro data from regional surveys show that 13 percent of employees were telecommuters in 2007. The average telecommuting frequency from 2002 through 2007 was between 2.1 days per week and 1.9 days per week. Figure 3.1 illustrates the trend of telecommuting frequency over time in Maricopa county. The participation rates in telecommuting are similar or better in Phoenix as compared to the nation as a whole, yet the incentive programs that Valley Metro provides are poorly used.

In a separate program, Maricopa County requires employers or schools with more than 50 employees or students to participate in the Trip Reduction Program. The Trip Reduction Program requires participants to reduce single occupancy vehicle trips by 10 percent per year for the first 5 years and 5 percent per year thereafter until no more than 60 percent of trips are made by single occupancy vehicle. While employers are required to conduct annual surveys to measure success, no enforcement actions are taken if trip reduction goals are not met.

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3.8 **DENVER, COLORADO**

Two telecommuting incentive programs are in effect in Denver, Colorado. One program at the regional level involves consulting support and information technology (IT) services, while the second is a tax break offered by the State of Colorado.

The Denver Regional Council of Governments (DRCOG) offers free consulting to businesses to design and implement telecommuting programs. Telecommuting education is made available as well through monthly lunch meetings.

DRCOG has helped 140 companies with its free consulting services and usually gains a few new employers at each monthly lunch event. They keep data for the 140 employers in their program, but not for the entire Denver metro region. The average commuter in this program telecommutes 1.84 days per week, which is within the range of values observed in other areas. As of August 2007, DRCOG began offering an additional incentive – free IT support to companies that already have or are in the process of designing a telecommuting program. The free IT support program is enjoying early success as the program consultant...

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has already been deployed to help three employers with their IT needs in the first month.

Estimated VMT savings are reported by DRCOG to the Colorado Department of Transportation, however the information is not available. DRCOG is currently developing surveys that will better estimate the effectiveness of the programs.

DRCOG experienced a great deal of marketing luck. A news team approached DRCOG for a story, goaded by rising gas prices. This led to additional newspaper stories and morning talk show appearances. These events generated most of the program’s participants.

Colorado has tax incentives in place or in the planning stages. DRCOG is currently developing a proposal to the Governor’s Energy Office to offer tax incentives for telecommuting while the State of Colorado has placed a state tax moratorium on telecommunications taxation with the intent to provide incentives, in part, to telecommuters.

3.9 THE TELECOMMUTING INCENTIVE TOOLBOX AND IMPACT

Nationally, the range of strategies to promote telecommuting has included:

- Marketing campaigns;
- Free consulting services for the design and implementation of telecommuting programs;
- Education and outreach;
- Cash for choosing an alternative mode of travel;
- Prizes for using an alternative mode the most;
- Tax moratoriums on telecommunications fees;
- Tax credits;
- Markets for the purchase of annual trip reductions; and
- Funding for the design and implementation of telecommuting programs.

The effectiveness of these programs is rarely measured. While there is no formal measurement of the increase in telecommuting from any of these programs, a reasonable proxy might be the comparison of local and national telecommuting levels. This is a difficult comparison to make for a number of reasons. It assumes that all sources have identical definitions of telecommuting, that there are no regional effects of telecommuting, and that telecommuting levels and frequency are fairly stable over time. However, the comparison of these values can provide a first order approximation of the effectiveness of telecommuting incentive programs. Table 3.6 shows each case study, the local telecommuting
levels, the local telecommuting frequency, the program administrator, and the specific incentives offered in that locale.

Table 3.6  Summary Telecommuting Programs and Incentives Offered

<table>
<thead>
<tr>
<th>Geography</th>
<th>Telecommuting Levels</th>
<th>Telecommuting Frequency</th>
<th>Program Administrator</th>
<th>Incentives Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline National</td>
<td>8% (2000)</td>
<td>0.9-1.8 days per week</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Federal</td>
<td>6.6%</td>
<td>1.6 days per week</td>
<td>Federal Government</td>
<td>Telework Enhancement Act of 2007 including:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Dedicated telecommute manager;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Less stringent guidelines for eligibility; and</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Increased training and education</td>
</tr>
<tr>
<td>New York – Long Island</td>
<td>10.5%(^a)</td>
<td>1.6(d) days per week</td>
<td>Long Island</td>
<td>Grant Program for Telecommuting program design and implementation.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Transportation</td>
<td>$1,000 per employee with $100,000 max payout</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Management</td>
<td></td>
</tr>
<tr>
<td>New York – Westchester County</td>
<td>10.5%(^a)</td>
<td>1.6(d) days per week</td>
<td>Smart Commute</td>
<td>Marketing and outreach including site visits and recommending telecommuting as TDM measure</td>
</tr>
<tr>
<td>New York – New York City</td>
<td>10.5%(^a)</td>
<td>1.6(e) days per week</td>
<td>Commuter Link</td>
<td>Grant Program for TDM, including telecommuting, with graduated payment by size of employer and a $10,000 max payout</td>
</tr>
<tr>
<td>New York – Metro</td>
<td>15.4%(^b)</td>
<td>1.6(e) days per week</td>
<td>MetroPool</td>
<td>Free Consulting</td>
</tr>
<tr>
<td>Connecticut and New York</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>State of Connecticut</td>
<td>8.9%</td>
<td>1.79 days per week</td>
<td>Telecommute Connecticut</td>
<td>Free Consulting State Tax Credit of $250 per employee (only available when a county is in a severe nonattainment area)</td>
</tr>
<tr>
<td>State of Washington</td>
<td>7-8%</td>
<td>1.4-2.5 days per week</td>
<td>Department of</td>
<td>Commute Trip Reduction Program mandates trip reduction</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Transportation</td>
<td>Trip Reduction Performance Program buys annual reduced trips</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>State Tax Credit of $60 per employee</td>
</tr>
<tr>
<td>Geography</td>
<td>Telecommuting Levels</td>
<td>Telecommuting Frequency</td>
<td>Program Administrator</td>
<td>Incentives Offered</td>
</tr>
<tr>
<td>----------------------</td>
<td>----------------------</td>
<td>-------------------------</td>
<td>--------------------------------</td>
<td>--------------------------------------------------------</td>
</tr>
<tr>
<td>Denver Metro Area, Colorado</td>
<td>N/A</td>
<td>1.84 days per week</td>
<td>Denver Regional Council of Governments</td>
<td>Marketing and outreach Free Consulting</td>
</tr>
<tr>
<td>Phoenix Metro Area, Arizona</td>
<td>5-13%</td>
<td>1.9-2.1 days per week</td>
<td>Valley Metro</td>
<td>Free Consulting Trip Reduction Program mandates trip reduction</td>
</tr>
<tr>
<td>Atlanta Metro Area, Georgia</td>
<td>N/A</td>
<td>2.46 days per week</td>
<td>Clean Air Campaign</td>
<td>Cash for Commuters pays commuters for not driving alone\nCommuter Prize pays commuters who use alternative mode most often Telework Leadership Initiative provides free consulting State Tax Credit of $1,200 per employee and $20,000 per employer</td>
</tr>
</tbody>
</table>

*Based on data from RT-HIS survey for entire city of New York.

*Based on data from RT-HIS survey for portion of Connecticut in the metro New York area.

*Based on data from RT-HIS survey for entire New York City metro area.

The data suggest that New York City already has higher than average telecommuting levels and frequency. As discussed in Section 4.0, however, the New York City survey used a somewhat more liberal definition of telecommuting than most other surveys. It also is possible that higher telecommuting levels could be a direct consequence of congestion levels and having an unusually high proportion of longer-distance commuters, as well as other demographic and economic factors.

The data also suggest, when compared with the existing toolbox of telecommuting incentives, that telecommuting incentives do not yet have a tangible demonstrable impact on telecommuting levels or frequency. This suggests that telecommuting is largely market driven and organic, meaning that employers and employees will decide to telecommute based on their own definitions of self-interest regardless of external incentives, assistance or mandates. Some programs have helped a small number of employers or employees adopt telecommuting, but the number of participants has not been large enough to make a measurable impact on work trips or VMT at the regional level.
4.0 Application to New York City

As discussed in Section 3.0, the New York City metro area already has some incentive programs in place for employers and employees including grant programs, outreach, and marketing. Table 4.1 provides a summary of TDM programs in the New York City metro area and provides a description of incentives that they offer.

Table 4.1 Summary of New York City Telecommuting Programs and Incentives Offered

<table>
<thead>
<tr>
<th>Geography</th>
<th>Telecommuting Levels</th>
<th>Telecommuting Frequency</th>
<th>Program Administrator</th>
<th>Incentives Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline National</td>
<td>5-8%</td>
<td>0.9-1.8 days per week</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>New York – Long Island</td>
<td>10.5%&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.6&lt;sup&gt;c&lt;/sup&gt; days per week</td>
<td>Long Island Transportation Management</td>
<td>Grant Program for Telecommuting program design and implementation. $1,000 per employee with $100,000 max payout</td>
</tr>
<tr>
<td>New York – Westchester County</td>
<td>10.5%&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.6&lt;sup&gt;c&lt;/sup&gt; days per week</td>
<td>Smart Commute</td>
<td>Marketing and outreach including site visits and recommending telecommuting as TDM measure</td>
</tr>
<tr>
<td>New York – New York City</td>
<td>10.5%&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.6&lt;sup&gt;c&lt;/sup&gt; days per week</td>
<td>Commuter Link</td>
<td>Grant Program for TDM, including telecommuting, with graduated payment by size of employer and a $10,000 max payout</td>
</tr>
<tr>
<td>New York – Metro Connecticut and New York</td>
<td>15.4%&lt;sup&gt;b&lt;/sup&gt;</td>
<td>1.6&lt;sup&gt;c&lt;/sup&gt; days per week</td>
<td>MetroPool</td>
<td>Free Consulting</td>
</tr>
</tbody>
</table>

<sup>a</sup>Based on data from RT-HIS survey for entire city of New York.

<sup>b</sup>Based on data from RT-HIS survey for portion of Connecticut in the metro New York area.

<sup>c</sup>Based on data from RT-HIS survey for entire New York City metro area.

Telecommuting levels in the New York metropolitan area are above the national range while the telecommuting frequency is within the national range. The RT-HIS data upon which the telecommuting levels and frequency are based include home-based workers, which are not included in the definition of
telecommuting employed in this study. As a result, the levels reported for the New York City metro area are likely to be closer to the national range.

As a cross-reference of telecommuting levels, we can compare the Census “work at home” results. While the Census data both undercounts and over counts, to varying degrees, telecommuters (see Section 2.4 for a discussion of Census data) it provides a consistent definition with which to compare across geographic areas. Table 4.2 shows the comparison of New York Census levels of working at home to National levels of working at home. The results show that New York City and the nation have similar (4.0 percent compared to 3.9 percent) levels of working at home. This implies that data from the RT-HIS survey do, in fact, over estimate telecommuting levels in New York City compared to levels observed in other cities.

Table 4.2 Comparison of Census Data

<table>
<thead>
<tr>
<th>Census Year</th>
<th>National Levels</th>
<th>New York City Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>3.3%</td>
<td>2.5%</td>
</tr>
<tr>
<td>2006</td>
<td>3.9%</td>
<td>4.0%</td>
</tr>
</tbody>
</table>

Source: U.S. Census.

The data show that levels of telecommuting are similar to those in the country as a whole. The national values represent those areas that offer telecommuting incentives as well as those that offer none. This result combined with the weak program participation in New York City Commuter Link telecommuting incentive program (Section 3.3) implies that these levels of telecommuting have not increased with incentive programs. Section 3.9 outlined other telecommuting incentive programs and their impact on telecommuting levels in other areas of the country. The results were similar. Areas that implement telecommuting incentive programs fail to have significantly higher than normal telecommuting levels, and no evidence is available to directly link telecommuting incentive programs to high rates of telecommuting.

This result suggests that telecommuting is primarily a market driven and organic force that could potentially take huge incentives to overcome. It implies that sea changes in type of work, technology, socioeconomic makeup, generation, and culture have a much larger impact than education and incentives such as free consulting assistance or tax credits.

4.1 **Estimated Impact on VMT in the New York City CBD**

Section 2.4 estimated that the ultimate potential for telecommuting levels in New York City ranges from 11.4 percent to 14.8 percent of all employees compared to
the existing level of 10.5 percent. Combining these values with the existing telecommute frequency of 1.6 days per week in New York City, it is possible to define the transportation reductions on an average day, if this ultimate level of telecommuting could be achieved.

If 11.4 percent of all employees were to telecommute 1.6 days a week then 3.6 percent of all trips would be made by telecommuting on an average day [11.4 percent multiplied by (1.6 days per week divided by 5 days per week) equals 3.6 percent]. If 14.8 percent of all employees were to telecommute 1.6 days per week, then 4.7 percent of all trips would be made by telecommuting on an average day. Currently, 3.4 percent of all trips are reduced by telecommuting. The results of the two surveys, then, imply that telecommuting in New York City can be expected to impact traffic, as a percent of total commute trips, between 0.2 and 1.3 percent at best. Table 4.3 shows the potential reduction in VMT from additional telecommuting. Assuming that commute trips make up 27 percent of all VMT (per the 2001 National Household Travel Survey), this equates to a reduction of 1,500 to 10,000 daily VMT, or 0.03 to 0.21 percent of all VMT in the New York CBD.

<table>
<thead>
<tr>
<th>Additional Telecommuting Potential</th>
<th>Total Daily VMT in New York City CBD</th>
<th>Reduction in Commute VMT from Telecommuting</th>
<th>Percent of All VMT Reduced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>2,864,000  4,749,000</td>
<td>0.2%  1,547</td>
<td>0.03%</td>
</tr>
<tr>
<td>High</td>
<td>2,864,000  4,749,000</td>
<td>1.3%  10,053</td>
<td>0.21%</td>
</tr>
</tbody>
</table>

Furthermore, experience from other areas suggests that public sector programs and incentives to encourage telecommuting have not had a significant impact on telecommuting levels. Most people and employers are aware of the possibility of telecommuting, but many have chosen not to implement it at this time for a variety of reasons. While levels of telecommuting are likely to increase in the future as technology improves and people become more comfortable with the concept, technical assistance and modest financial incentives have not been sufficient to overcome other barriers to telecommuting. Therefore, this study concludes that additional telecommuting programs offered by the City would not have a measurable impact on overall vehicle-trips or VMT within the New York CBD.
4.2 PROGRAM COSTS

The costs of a telecommuting outreach and incentive program could vary greatly depending upon the specific approach taken and level of utilization of incentives. Outreach and/or technical assistance activities to promote telecommuting and assist businesses with setting up programs could probably be done with one or two new program staff persons or equivalent consultant assistance on technical matters.

The public sector cost of tax or other fiscal incentives would depend on the amount of incentive provided, level of utilization, and also the extent to which existing telecommuters might be able to take advantage of the incentive (as opposed to only incremental new telecommuters). A program such as a tax credit for telecommuting could potentially be utilized by many people or employers, with no guarantee that people would be “new” telecommuters. Greater outreach to publicize the incentive would increase the likelihood that additional people would choose to telecommute to take advantage of the incentive, but also would increase costs associated with existing telecommuters using the incentive. An incentive specifically targeted towards encouraging new telecommuters – such as Atlanta’s Cash for Commuters program – would have much more limited costs, and these costs would increase in direct proportion to the program’s effectiveness.
5.0 Key Findings and Conclusions

Telecommuting is a promising congestion management strategy that has many benefits, but faces many significant barriers to acceptance. Telecommuting levels and frequencies throughout the country are remarkably similar regardless of whether or not an incentive program is in place.

Transportation demand management staff has long attempted to overcome the barriers to telecommuting participation by implementing various telecommuting incentive programs from simple education and marketing to prizes and tax incentives. The data suggest, however, that these incentive programs have not been successful. It seems as though telecommuting is driven more by underlying market forces, generational understanding, technology, the changing nature of work, and socioeconomic makeup than by the relatively marginal incentives offered to employers. Interestingly, even as technology expands to allow more telecommuting, it creates a world in which travel for meetings becomes more prevalent.

Even if telecommuting levels were to reach their upper bound, it does not seem likely that it would make a significant impact on congestion in New York City. Nevertheless, it may contribute to congestion management as one of a larger set of transportation demand management strategies.
6.0 References and Sources of Additional Information


dor.wa.gov/Docs/Pubs/Special Notices/2005/sn_05_CommuteTripProgChgs.pdf.


Joe Hewitt, Report 03.264 to the Regional Land Transport Committee, Greater Wellington Regional Council.

legalnews.tv/commentary/taxing_telecommuters_what_should_congress_do.


Patricia Mokhtarian, Ilan Salomon, and Sangho Choo, *Measuring the Measurable: Why can’t we Agree on the Number of Telecommuters in the U.S.?*, *Quality and Quantity*. 

Southeaster Institute of Research, Arlington County Virginia, Presentation.


www.litm.org.

www.metropool.com


www.valleymetro.org.


www.westchestergov.com/smartcommute.


www.wsdot.wa.gov/tdm.