



U.S. General Services Administration



Telework Exchange

The Benefits of Telework

Executive Summary

Telework yields multiple benefits to the Federal Government, other public sector organizations, the private sector, the individual employee, and the community. It is becoming increasingly prevalent in the modern workforce because its proven results and reliability are shown to significantly improve life holistically. Its results are so proven in fact, that Public Law 106-346 §359 requires Federal agencies to “establish a policy under which eligible employees of the agency may participate in telecommuting to the maximum extent possible without diminished employee performance.”

This paper, developed collaboratively by the US General Services Administration (GSA) and the Telework Exchange, discusses key benefits reaped by all parties from having a telework program in place. GSA is a lead agency for Federal telework and the Telework Exchange is a public-private partnership focused on demonstrating the tangible value of telework to the Federal telework community. While the paper focuses on the Federal Government, the discussion is applicable to all public and private sector organizations.

Definition

The definition of telework according to the Telework Exchange website is:

Any arrangement in which an employee regularly performs officially assigned duties at home or other work sites geographically convenient to the residence of the employee.

As stated, telework does not have to be done from home; flexibility drives the telework initiative. Telework, also known as telecommuting, flexiwork, or flexiplace, may be conducted from a residence, a telework center, an agency office in proximity to the employee’s residence, or another alternative location agreed upon by the employer.

Benefits of Telework

Key benefits stemming from mainstream implementation of telework include:

- A workforce that is capable of teleworking on a regular basis is also capable of leveraging its decentralized work settings to maintain continuity of operations (COOP) in the face of a natural disaster, terrorist attack, or other emergency situation.

- Telework contributes to a greener environment by diminishing vehicle carbon emissions as a result of a truncated or nonexistent employee commute.
- The job performance of teleworkers has been documented to either exceed or remain on par with that of workers in a traditional workplace arrangement.
- Telework increases personal freedom and flexibility, thereby improving morale and decreasing stress.
- A strong telework program improves employee retention and recruitment by increasing an employer's attractiveness in the current competitive job market.
- Telework accommodates persons with disabilities.
- Telework permits more time for employees to care for their loved ones.
- Telework can enable reduced demand for office space as well as reduced facility operating costs.
- Telework allows for optimal use of technological advances.

Improved Emergency Responsiveness and Continuity of Operations

Telework is a key factor in emergency planning, response, and prevention because it allows for the continuity of operations (COOP), or business continuity plans, where catastrophe would inhibit necessary protocol. Essentially, telework decentralizes and spreads the workforce to reduce the ratio of those impacted by a disaster. In fact, many public and private sector workplace policies now contain a telework component for COOP in the wake of the NYC terrorist attacks in 2001, hurricane Katrina, and potential pandemic or other widespread illnesses.

The Bush Administration, in particular, made clear the necessity for emergency planning and response. On May 3, 2006, President Bush issued the *Implementation Plan for the National Strategy for Pandemic Influenza*, which outlines the government's approach for dealing with the threat of pandemic influenza. It states: "All departments and agencies will be responsible for developing pandemic plans that ... (2) ensure that the department or agency will be able to maintain its essential functions and services in the face of significant and sustained absenteeism."¹

¹ [Implementation Plan for the National Strategy for Pandemic Influenza](http://www.whitehouse.gov/homeland/nspi_implementation.pdf), Homeland Security Council. May 2006. pg. 30.

To put absenteeism in a more quantitative sense, the Department of Health and Human Services expects a workplace absenteeism rate of up to 40% in the middle of a severe pandemic.² The Telework Exchange reports that 73% of Federal employees assert that they will not show up at the office in the event of a pandemic outbreak and that only 27% of employees note that their agencies' COOP plans incorporate telework.³

A telework program should not be merely delineated in a COOP plan however. For a telework program to be effective during an emergency, employees must already be actively teleworking, so as to smooth the transition from office to home and ensure security concerns are adequately addressed. This means as many employees as possible should have telework capability already, such as telework arrangements, connectivity, equipment commensurate with their work needs, and frequent enough opportunities to telework so their systems may be tested and known to be functional.

For more information, visit <http://www.fema.gov/government/coop/index.shtm> and click on Continuity of Operations (COOP) Pandemic Influenza Guidance under Federal Preparedness Circular.

Reduction of Energy Consumption and the Associated Carbon Footprint

Exorbitant gas prices, vehicle plumes billowing into the air, irate, frustrated workers burning wasteful fuel sitting in traffic: horror story or reality? America's post-industrial age has left modernized cities inundated with smog, pollution, vehicle emissions, and other environmental toxins. As we hand over our global home to our posterity, we are reminded of the environmental motto of 'do your part!' In stride, we seek to buy less plastic, turn off the computer at night, use the recycling bin, and yes, even telework.

Telework curbs the emission of vehicle byproducts by keeping teleworkers off the road or at least reducing their commute. As an added benefit, less time spent on the road also means less traffic congestion for those who choose to commute.

Domestically, the Federal Government is seeking to preserve environmental purity, cut oil dependency, and keep drivers' coffers full. Telework researchers Kate Lister and Tom Harnish reviewed data from the Environmental Protection Agency (EPA), Department of Transportation (DOT), General Services Administration (GSA), and 7 other sources and found that if 33 million Americans worked from home, Gulf oil imports could be reduced by 24% to 48%, greenhouse gases by up to 67 million metric tons a year, and as much as 7.5 trillion gallons of gasoline each

² "HHS Pandemic Influenza Implementation Plan." Health and Human Services. 12/15/06. <http://www.hhs.gov/pandemicflu/implementationplan/intro.htm>.

³ "Federal Contact: Bird Flu in America." Telework Exchange. 5/11/06. <http://www.teleworkexchange.com/study-register-flu.asp>.

year, for a total of \$110 million in savings a day.⁴ According to Telework Exchange, if all eligible Federal employees teleworked two days per week, the Federal workforce would collectively save \$3.3B and 2.7M tons of pollutants annually.⁵

Seeking to lead by example, GSA determined the estimated savings reaped from further integrating its telework program. The following estimates are based on GSA's estimated workforce of 12,205, a telework eligibility level of 85%, and a participation level of 50%, of those eligible, teleworking one day per week. The environmental and other savings projections are based on fuel costs and other factors as of 9/3/07. Calculations for the following figures are listed fully in Appendix A.

- Total GSA Telework Work Trip Miles Saved By Teleworkers = **4,735,146 Single Occupancy Vehicle Miles.**
- Total GSA Telework Work Trip Gas (gallons) Saved by Teleworkers = **220,239.3 Gallons.**
- Total GSA Telework Work Trip Cost Saved by Teleworkers = **\$615,789 Fuel Costs.**
- Total GSA Telework Work Trip Emissions (tons) Saved by Teleworkers = **2,299.5 Tons.**

It is clear from the figures above that GSA telework alone can achieve significant reductions in vehicle emissions, refueling costs, and vehicle maintenance costs from extended wear and tear. And with the price of gas even higher than when these estimates were calculated, figures are expected to be even higher.

Improved Performance

The current research consensus is that telework either improves job performance or maintains existing levels. According to a recent Telework Exchange study of Federal managers, 66% of managers who manage teleworkers find that teleworkers are as productive as their in-office counterparts.⁶ A considerable case in point is the US Patent and Trademark Office's (PTO) telework program.

PTO has one of the largest telework programs in the Federal Government because it established sound telework policies that led to maximum participation, abundant program support, and

⁴ Kate Lister and Tom Harnish. "New Analysis Shows U.S. Can Cut Gulf Oil Use By Half." Undress for Success. 1/31/08. <http://www.pr.com/press-release/69559>.

⁵ "No Free Ride." Telework Exchange. 11/16/06. <http://www.teleworkexchange.com/study-register-fs.asp>.

⁶ "Face to Face with Management Reality - A Telework Research Report." Telework Exchange. 1/22/07. <http://www.teleworkexchange.com/managementstudy/>.

aggressive top level leadership. As of October 2007, there were 3,609 PTO employees participating in some form of telework. This represents an impressive 40.7% of PTO's total work force and 45.7% of total eligible employees.⁷

PTO identified strong job performance as one of its key goals for its telework program. Examiners participating in one PTO pilot telework program showed a productivity increase of 10% with no difference in the quality of work.⁸ By 2003, there was so much interest in its telework pilot program that the agency needed to create a waiting list for participation.⁹ In part because of its use of telework, PTO has been recognized by *Business Week* magazine as one of the best places in America to launch a career and to round out one's career, and by *Families* magazine as one of the best places in the Washington area to work if you have a family.¹⁰

While PTO may quantitatively assess productivity due to determining the amount of patents reviewed, many Federal Agencies' productivity rates are not so easily calculated. There is no truly valid quantitative measure of typical white collar job performance. In spite of this however, even at jobs lacking the yardstick-type measurements used at PTO, there is ample evidence to suggest productivity is not diminished by telework and in some cases is actually increased:

Frequent teleworkers reported that they performed work not easily accomplished with frequent interruptions faster while at the home office, lost no time due to traffic congestion or to the stresses associated with commuting, and used less sick leave because staff generally use health care providers located close to home according to the Equal Employment Opportunity Commission's Office of the Inspector General.¹¹

⁷ Deborah S. Cohn. "Commentary: Telework is the answer." FederalTimes.com. 12/17/07. <http://www.federaltimes.com/index.php?S=3255552>.

⁸ Statement of the Honorable Margaret J.A. Peterlin, Deputy Under Secretary of Commerce for Intellectual Property and Deputy Director of the United States Patent and Trademark Office before the Subcommittee on Federal Workforce, Postal Service, and the District of Columbia Committee on Oversight and Government Reform, United States House of Representatives. "Telework: Breaking New Ground." 11/6/07. p. 13. <http://federalworkforce.oversight.house.gov/documents/20071106134856.pdf>.

⁹ Maureen Sirhal. "Agency sees gains from telework initiative." GovernmentExecutive.com. 4/15/03. <http://govexec.com/dailyfed/0403/041503td2.htm>.

¹⁰ Statement of the Honorable Margaret J.A. Peterlin, Deputy Under Secretary of Commerce for Intellectual Property and Deputy Director of the United States Patent and Trademark Office before the Subcommittee on Federal Workforce, Postal Service, and the District of Columbia Committee on Oversight and Government Reform. United States House of Representatives. "Telework: Breaking New Ground." 11/6/07. <http://federalworkforce.oversight.house.gov/documents/20071106134856.pdf>.

¹¹ US Equal Employment Opportunity Commission. Office of the Inspector General. "Office of Inspector General Frequent Telework Pilot Program." 3/28/07. <http://www.eeoc.gov/abouteeoc/plan/oig/OIG-FrequentTeleworkPilot.html>.

A two year study was conducted on the productivity of a telework program at the Administrative Appeals Office in the Department of Justice (DOJ) where production-oriented tasks, i.e., adjudicative casework, are the primary source of work. Due to telework, there was approximately a 71% increase in productivity at DOJ.¹² And at the National Energy and Water Management Center, telework afforded a 44% increase in productive person-hours.¹³

There is a gamut of reasons telecommuting has the ability to increase productivity. Telecommuters typically find working at home to be more pleasant and less stressful, and people who enjoy their work and/or are less stressed are likely to be more productive. According to a study of the British communications company, BT, “[m]ore than 90 percent of BT’s teleworkers who responded to a European Union-backed survey said they experienced less stress and that their productivity increased.”¹⁴ Also, certain tasks are easier to perform in specific environments. If a worker must read a mountain of reports, a quiet room at home is preferred to a busy office with distractions and frequent interruptions.

On the managerial side, telecommuting may improve performance management by leading managers to measure performance primarily by results. Telecommuting pushes aside the justification of process and focuses on outcome. Essentially, managers and employees agree on which projects need to be completed and when, removing the need to constantly prove busyness at a desk.

This contrasts with the traditional office setting where there is more of a tendency for a manager to be impressed by those who spend long hours in the office. Such employees may indeed be hard-working, but staying behind a desk for a long period of time is not, in itself, evidence of high productivity. As a result then, the concept of work becomes more defined by accomplishing tasks, rather than maintaining a 9-to-5 schedule.

Another reason accounting for telework productivity may be that it allows workers the flexibility to schedule their work periods according to their natural productivity peaks thus optimizing output. If a manager tells a telecommuter to complete a report by 5pm Friday, the telecommuter can arrange his schedule any way he likes, so long as he meets his deadline.

¹² Department of Justice Office of Administrative Appeals. “Assessment of the Flexible Workplace Pilot Program at the Administrative Appeals Office.” 2000. <http://www.usdoj.gov/jmd/ps/insflexreport.doc>.

¹³ General Services Administration: National Energy and Water Management Center. Fort Worth, Texas. Alternative Officing Performance Report: 2004.

¹⁴ Andrew Swinton. “Teleworking ‘is good for your health.’” 10/14/02. <http://news.zdnet.co.uk/itmanagement/0,1000000308,2123864,00.htm>.

Greater Flexibility, Morale, and Decreased Stress

Why crank on the engine and jump in the car to face a stressful commute when you can crank on the coffee maker and commute from your bedroom to another room in your home? Telework is becoming an increasingly popular alternative to driving the car or riding the train simply because it uses up less personal time, is more convenient, and cuts commuting costs.

Just how much free time is gained back? According to Telework Exchange, Americans spend more time commuting each year than on vacation, a shocking 245 hours on average. And teleworking just two days per week gets the typical Federal employee 98 hours of their life back.¹⁵ If time is money, then pocketing between 98 and 245 hours of time is cost worthy indeed! But the buck does not stop there.

Having more time to spend in a qualitative way rather than on a rush hour commute reduces stress and improves morale. One of the most consistent and common findings regarding telework benefits is reduced work-related stress. This reduction is due to decreased traffic headaches, a better work-life balance, more personal control over time and environment, and consequently, an increase in overall flexibility.

Telework also allows employees to be the determinants of their own schedule, so long as the number of hours worked or tasks completed is being met. For example, a teleworker beginning the workday at 8am may opt to take a morning run at 10am but replace the time by tacking on an extra half hour at the end of the day. In this way, teleworkers may maintain productivity and feel less guilty about taking a break if they've run out of work flow inspiration; they may extend their work day and take a breather when they need it.

In addition to spending less on transportation costs and having fewer interruptions, telework allows for increased opportunity for appropriate meals and reduced exposure to contagious illness and/or unhealthy weather/air conditions.

For more information, a study by Ravi S. Gajendran and David A. Harrison of Pennsylvania State University summarizes multiple studies and provides empirical support for the work life benefits of telework.¹⁶

Improved Recruitment, Retention, and Staffing

Despite the number of premature 'retirement wave' predictions forecasting a major decrease in the government workforce, its inevitability is certain. The Office of Personnel Management

¹⁵ "No Free Ride." Telework Exchange. 11/16/05. <http://www.teleworkexchange.com/study-register-fs.asp>.

¹⁶ Journal of Applied Psychology Copyright 2007 by the American Psychological Association: 2007, Vol. 92, No. 6, 1524–1541. "The Good, the Bad, and the Unknown About Telecommuting: Meta-Analysis of Psychological Mediators and Individual Consequences."

(OPM) estimates that 61,700 Federal employees will retire in fiscal year 2008, a figure much higher than in previous years.¹⁷ OPM expects 40% of the Federal workforce to retire between 2006 and 2015.¹⁸

On the recruitment end of things, the incoming new generation of workers expects a more flexible work environment.¹⁹ The generation that is on tap to replace the retirees is a “digital” generation – one that has grown up in the era of computers and mobile technology. Generation Y (those who grew up with Carebears and G.I. Joe action figures) expects a fundamentally different experience in the workplace than their predecessors. Telework Exchange’s “Generation Y in the Federal IT Workplace” study notes that compressed workweek / telework options are key job perks for Generation Y.²⁰ Time Magazine reports in an article entitled, “What Gen Y Really Wants” that:

It feels normal for Gen Y employees to check in by BlackBerry all weekend as long as they have flexibility during the week. Sun Microsystem’s telecommuting program, for example, has kicked into high gear in response to Generation Y’s demands. Today more than half of Sun’s employees work remotely.²¹

On the retention end of things, the importance of retaining productive workers cannot be overstated, especially in a competitive job market. Along these lines, the Patent and Trademark Office (PTO) successfully implemented telework to counteract employee turnover and shortages. Largely as a result of the hoteling telework program it began in 2006, PTO has improved its ability to retain qualified workers and also expects to save on office space rental costs.²²

Additionally, effective succession planning requires that employers maintain occupational contact with retirees to facilitate a smooth and continuous transition of institutional knowledge and capability from one generation of workers to the next. Telework can facilitate this continued contact because it is a very appealing option for retirees willing to continue work with their former organizations.

¹⁷ Stephen Barr. “The End of the Year, and of Many Careers.” Washington Post. 12/21/07.

¹⁸ Office of Personnel Management. http://www.opm.gov/hcaaf_resource_center/careerPatterns/index.asp.

¹⁹ Kansas City Business Journal. “How have hiring practices changed as Generation Y has entered the work force?” <http://www.bizjournals.com/kansascity/stories/2008/05/05/focus27.html>. 5/2/08.

²⁰ “Generation Y in the Federal IT Workplace.” Telework Exchange. 11/15/07. <http://www.teleworkexchange.com/geny/>.

²¹ Time Magazine. “What Gen Y Really Wants” Penelope Trunk. 7/5/07. <http://www.time.com/time/magazine/article/0,9171,1640395,00.html>.

²² Maureen Sirhal. “Agency Sees Gains From Telework Initiative.” GovernmentExecutive.com. 4/15/03. <http://govexec.com/dailyfed/0403/041503td2.htm>.

Finally, telework increases flexibility on hiring and staffing options through the broadening of the pool of exceptionally qualified people. This is due in part because telework allows an employer to hire employees living much further than within the driving/commuting distance of their place of employment. On the flip side, employers may also retain employees who want to relocate their residence beyond the local commuting area. This growing trend among employees is due to a variety of reasons such as maintaining family togetherness when a spouse wants/needs to relocate, the desire for a better quality of life provided by another location, the need to move for health-related reasons, etc.

Improved Accommodations for Persons with Disabilities

Telework improves accommodations for persons with disabilities who may prefer to work from the comfort of their home or are unable to work outside the home. While not all persons with disabilities need, or want, to work from home, telework is an option many may consider to reduce mobility and/or other impairment difficulties. The Bush Administration supports telework for these very benefits, stating in the President's New Freedom Initiative that the:

“full inclusion of persons with disabilities into the workforce is an important goal not only because of the positive impact this will have on the worker, but also because of the benefits to the economy as a whole as production increases and people begin to leave government assistance....[of which may be realized by increasing] the number of employees with disabilities in the Federal workforce by implementing innovative hiring and working practices, including telework...”²³

Jane Anderson, Executive Director for the Midwest Institute for Telecommuting Education, provided Congressional testimony on Telework for Persons with Disabilities. She stated that “The National Association for the Development of Disability Research in 1999 stated that the demand for telework from clients with multiple sclerosis continues to grow.”²⁴ Ms. Anderson provided multiple examples of telework benefitting those with disabilities and the employer – the persons with disabilities were able to work from home and the companies were not limited in their hiring. Additionally, many companies hired employees with disabilities to work off-peak hours. The persons would work evening or overnight shifts allowing for 24-hour customer service.

²³ The President's New Freedom Initiative: The 2007 Progress Report. Executive Summary. <http://www.whitehouse.gov/infocus/newfreedom/newfreedom-report-2007-2.html> - 11.4KB.

²⁴ Jane Anderson, Executive Director, Midwest Institute for Telecommuting Education. “Small Business Use of Telework: Successful Job Alternatives for Persons with Disabilities and Veterans.” Congressional testimony provided for the House Committee of Small Business by Ms. Anderson on 9/24/02. <http://www.mite.org/Small%20Business%20Use%20of%20Telework.htm>.

Flexible Dependent Care

As stated in the benefit discussing greater flexibility, morale, and decreased stress, teleworking allows more work-related personal freedom and flexibility. This flexibility in turn allows for improved employee capability to care for loved ones.

Essentially, those with children or ailing parents may use telework to increase their options for providing care for their loved ones while maintaining effective levels of work performance. This allows a person to be both employee and caretaker, removing the stress of leaving a dependent under the guidance of someone else, alone unattended, or with a caregiver who may only be present for a couple hours.

GSA published a report in August 2006 on dependent care and telework entitled “Is Standard Practice Best Practice? Emerging Perspective on Telework and Dependent Care.” The report was based on research conducted by GSA focusing on employees teleworking from home. GSA surveyed 1,635 Federal teleworkers on their use of telework to assist with dependent care situations. 27 Federal agencies and sub-agencies participated in the survey. 53% of the respondents were taking care of dependents, and of those, 91% indicated that telework aided them with their caretaking responsibilities. Furthermore, most of the 91% indicated that “telework benefited themselves as well as their dependents (happier, healthier) and their organizations (reduced turnover, improved job performance).”²⁵

Through telework, both the employer and the employee, who recently came into a caregiving role or who may already have had dependent care responsibilities, benefit from the reduced stress experienced by the caregiving employee. Because telework allows such employees to perform their work and simultaneously have a comforting proximity to their dependents, they have lower stress levels and dependent care costs resulting in telework being a win-win situation for employer, caregiver, and dependent.

Office Space and Operating Cost Savings

Another benefit of telework is that it can result in reduced demand and associated costs for office space, technology costs, and costs in other organization operations. Successful telework programs characterized by aggressive top level support, solid program design, and clear measures, such as those at GSA, Treasury Inspector General for Tax Administration, and PTO, all reported significant space savings.

GSA published a report in 2006 based on an assessment of 20 Federal Agencies’ current telework program. Using estimated averages based on agency survey responses, the report

²⁵ General Services Administration. “Is Standard Practice Best Practice? Emerging Perspective on Telework and Dependent Care.” 8/3/06. <http://www.gsa.gov/graphics/ogp/teleworkdepcarefinalfullwebversionreport.doc>.

determined that an investment of approximately \$16 million over three years towards a “basic” teleworker-at-home solution for 50,000 teleworkers at an agency with a total staff of 100,000 can, in appropriate circumstances, be offset with a realization of over \$36 million in benefits over the same three-year period. These benefits were noted to have come through cost savings achieved from human resource improvements (such as reduced employee absences), reduced real estate demands, reduced employee retention costs, and improved productivity savings.²⁶

For a “do-it-yourself” method, GSA developed a tool called the “Cost per Person Model” (CPPM) that enables agencies to assess the “break-even” point between the cost of additional telework (IT and connectivity) and the savings from reduced real estate use. A copy of the CPPM may be requested online at <http://www.gsa.gov/cppm>. For documented space savings, visit <http://www.gsa.gov/telework> and find information using two paths: 1) Under ‘Where to Work’, select alternative officing information, go to the library, and you will find case studies. 2) Under Basics, select Guidance and Studies, and view the Telework Technology Cost Study.

Optimal Use of Technological Advances

Understated but nevertheless important is the potential of telework to facilitate the optimal use of existing and cutting-edge workplace technology. This is an ironic twist since it is widely held that technology enables telework. However, telework is responsible for enabling the use of technology because most advances in workplace technology are highly suited for mobility and telecommunications required by telework – products that are lighter, more portable, more virtual, more responsive, etc.

The benefit of promoting the use of current technology is two-fold, as the use of such requires on-the-job-training to familiarize employees with electronic equipment functionality. This naturally keeps the workforce adept and sharp in the use of workplace technology.

The optimal use of technology ultimately increases return on technology investments, increases employee productivity through streamlined asset functionality, increases workforce mobility and flexibility, improves capability in emergency (COOP) situations, and maintains an up-to-date technologically-capable workforce.

Conclusion

Telework is and will continue to be good policy. It provides a window of opportunity for many employees who need a respite from the daily grind of commuting and office restrictions. It helps protect government informational infrastructure and reduces American oil dependency. It preserves environmental integrity. And it increases an employer’s attractiveness in the search for hires, broadens the workforce pool, and spirals technological growth.

²⁶ Telework Technology Cost Study, Cost Recovery ROI Strategies, http://www.gsa.gov/graphics/ogp/Task7CostRecoveryROIStrategieswAltTags_508.ppt

It is modern in that it contrasts to the working style of recent generations, yet embraces a sociological truth of people determining their way of living which was done for thousands of years before the Industrial Revolution. It embraces the traditions of the past while reveling in the synergistic fusion of all aspects of the present employee's life.

In short, we cannot afford to trumpet a world without telework. For to refrain from reaping the benefits does not merely leave the status quo – it leaves a world with one less valuable option to engage threats to the homeland, incorporate the real needs of employees, accost the ever breakdown of the environment, and reduce excessive costs spent on office spacing. Telework is one option we cannot afford to do without.

Further Information

Telework Exchange

www.teleworkexchange.com

Federal Information on Telework

www.telework.gov

Additional Telework Websites

www.ivc.ca

www.telcoa.org

www.worldatwork.org

www.mwcog.org

www.gsa.gov/alternativeofficing

www.gsa.gov/telework, click Basics, Guidance and Studies

APPENDIX A: ENVIRONMENTAL IMPACT CALCULATIONS

Data References:

1. OPM: Federal Civilian Workforce Statistics: The Factbook, 2005 Edition
2. OPM: Federal Civilian Workforce Statistics: Work Years and Personnel Costs, FY 2003
3. EPA: Average Annual Emissions and Fuel Consumption for Passenger Cars and Light Trucks: Air and Radiation, EPA420-F-00-013, April 2000, Office of Transportation and Air Quality
4. DOT (FHA): National Household Travel Survey, 2001-2002 edition
5. DOT (Bureau of Transportation Statistics): Omnibus Household Survey, Volume 3, Issue 4, October 2003
6. Energy Information Administration <http://tonto.eia.doe.gov/oog/info/gdu/gasdiesel.asp>

Calculations:

(A) Workdays in a year: 261 days - 40 average leave days [AL+SL+HL] (Ref. #2, pg 70)

= 221 average days worked in 2003

(B) $221 \times 2 = 442$ average annual work trips

(C) GSA Workforce = 12,205

(t1) GSA Eligible and Willing percent of workforce (at least one day/week) = 85%;

Projected number eligible and willing to telework at least one day per week = 10,374

(t2) Number of GSA teleworkers (50% of t1) = 5,187

(D) Percent of workforce using car for commute (Ref. #5) = 81%;

(E) Percent of Car commuters who drive alone (Ref. #5) = 85%

(F) GSA employees who drive alone (SOV) = $C \times D \times E = 8,403$

(Ft) GSA teleworkers who drive alone (SOV) = $(t2) \times D \times E = 3,571$

(G) Total GSA SOV Work Trips = $F \times B = 3,714,126$

(H) Telework Work Days @ 1 day/week = $A/5 = 44.2$

(H1) Telework Work Trips @ 1 day/week = 88.4

(I) Average Miles per Commute (Ref. #4) = 15;

(J) Average Minutes per Commute (Ref. #4) = 26.4

(K) Total GSA SOV Work Trip Miles = $G \times I = 55,711,890$

(L) Total GSA Telework Work Trips = $F \times H1 = 3571 \times 88.4 = 315,676.4$

(M) Total GSA Telework Work Trip Miles = $L \times I = 4,735,146$ SOV Miles Saved

(N) Average Miles per Gallon of Gas (Ref. #3) = 21.5

- (O) Total GSA Telework Work Trip Gas (gallons) = $M/N = 220,239.3$ Gallons Saved
- (P) Average Cost of Gallon of Gas (as of 9/3/07 Ref. #6) = \$2.796
- (Q) Total GSA Telework Work Trip Cost = $OxP = \$615,789$ Dollars Saved
- (R) Total GSA Telework Work Trip Hours = $JxL/60 = 138,897.6$ Hours Saved
- (T) Hydrocarbon emissions (pounds per mile) (Ref. #3) = $2.8 \times \text{miles}/454$
- (U) Carbon Monoxide (pounds per mile) (Ref. #3) = $20.9 \times \text{miles}/454$
- (V) Oxides of Nitrogen (pounds per mile) (Ref. #3) = $1.39 \times \text{miles}/454$
- (W) Carbon Dioxide¹ (pounds per mile) (Ref. #3) = $.916 \times \text{miles}$
- (a) Tot Telework Work Trip Hydro. Emissions (tons) = $MxT/2000 = 14.6$ Tons Saved
- (b) Tot Telework Work Trip Carb. Monox. Emissions (tons) = $MxU/2000 = 109$ Tons Saved
- (c) Tot Telework Work Trip NOx Emissions (tons) = $MxV/2000 = 7.2$ Tons Saved
- (d) Tot Telework Work Trip Carb. Diox. Emissions (tons) = $MxW/2000 = 2,168.7$ Tons Saved
- (e) Tot Telework Work Trip Emissions (tons) = $a+b+c+d = 2,299.5$ Tons Saved
- (f) Tot GSA Work Trip Hydrocarbon Emissions (tons) = 171.8 Tons
- (g) Tot GSA Work Trip Carb. Monox. Emissions (tons) = 1282.4 Tons
- (h) Tot GSA Work Trip NOx. Emissions (tons) = 85.3 Tons
- (i) Tot GSA Work Trip Carb. Diox. Emissions (tons) = 25,516 Tons
- (j) Tot GSA Work Trip Emissions (tons) = 27,055.5 Tons
- (k) Telework Emissions Savings as a percentage of total work trip emissions = $e/j = 8.5\%$ of total GSA emissions saved