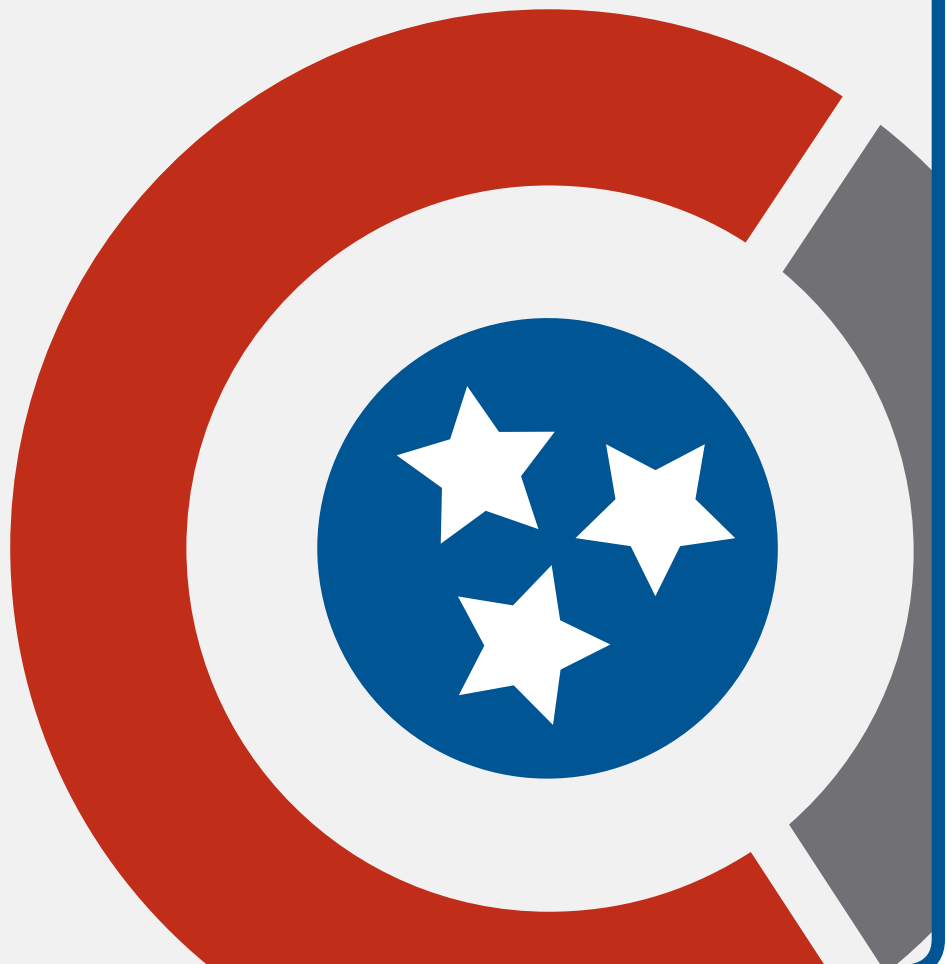




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Teleworking and the Broadband Superhighway



May 2012

For Tennesseans who travel I-24 every day to work, it will come as no surprise that the Nashville-Murfreesboro commute is the longest commute in the country. The average employee working in any of the fifty largest U.S. cities spends about 200 hours per year traveling in rush hour, while the typical Nashville employee spends more than 280 hours!¹ That's more time spent commuting than on vacation for most Tennesseans. These long commute times have contributed to all four of Tennessee's major cities ranking among the top 25 U.S. cities for carbon emissions per capita - Nashville is ranked 6th; Knoxville is ranked 10th; Chattanooga 13th; and Memphis 24th.²

Teleworking, or using the Internet to work from home instead of commuting to work, can change all of that. In order to do that, though, Tennessee workers need to be able to access reliable high-speed Internet. Broadband services help provide employees and businesses with vital functions like seamless data, video, and voice communications, allowing workers to work from home just as effectively as they would in an office.

The benefits of teleworking go far beyond transportation infrastructure savings, emissions reduction, and congestion management; teleworking can help businesses and government agencies reduce real estate, energy, and other overhead costs and use the savings to avoid job cuts or to hire new staff. It can increase an employer's productivity by 20% or more, and enable them to continue operating without skipping a beat in the face of a natural disaster or other emergency situation that might otherwise bring business to a halt.³ Teleworking also allows employees to lower their commuting costs while juggling both work and family, even accommodating people with disabilities, the elderly, mothers, and rural residents who may not be in a position to work outside the home.

As part of the 2011 Residential and Business Technology Assessments, Connected Tennessee examined the impact of teleworking in Tennessee.

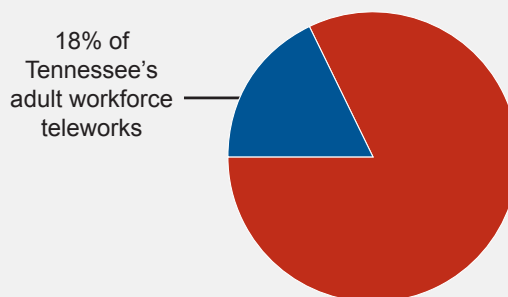
Teleworking Trends in Tennessee

In 2007, when Connected Tennessee first started tracking teleworking participation, 7% of Tennessee's workforce teleworked. Today, nearly one in five Tennessee employees (18%, representing approximately 489,000 adults) telework (Figure 1).

Among the findings from this survey:

- Across the state of Tennessee, nearly one in five employees (**18%**, representing approximately **489,000 adults**) work from home instead of commuting.
- The percentage of rural Tennessee residents who reported teleworking has **tripled** since 2007, when Connected Tennessee first started measuring telework participation.
- Combined, **44%** of employed Tennessee adults say that they either telework now or would be willing to do so if given the opportunity by their employers. This represents more than 1.18 million employed Tennesseans.
- An additional **586,000** Tennessee adults who do not currently work say they would be willing to do so if they were allowed to telework.
- Connected Tennessee's research indicates that approximately **37,000** Tennessee firms allow their employees to telework.
- By working from home full-time instead of commuting, a Nashville employee saves approximately **\$2,300** per year in auto-travel expenditures (gas, maintenance, and tires) and produces approximately 9,480 fewer pounds of CO₂ emissions per year.

Figure 1.
Percentage of Employees Who Telework



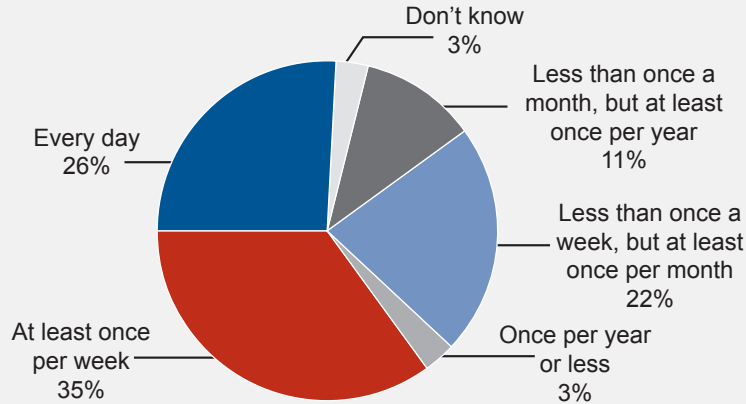
1 <http://www.ceosforcities.org/pagefiles/DrivenApartXSFINAL.pdf>

2 http://www.brookings.edu/~media/Files/rc/reports/2008/05_carbon_footprint_sarzynski/carbonfootprint_report.pdf

3 <http://www.telcoa.org/members-only/telework-tools/telework-benefits/>

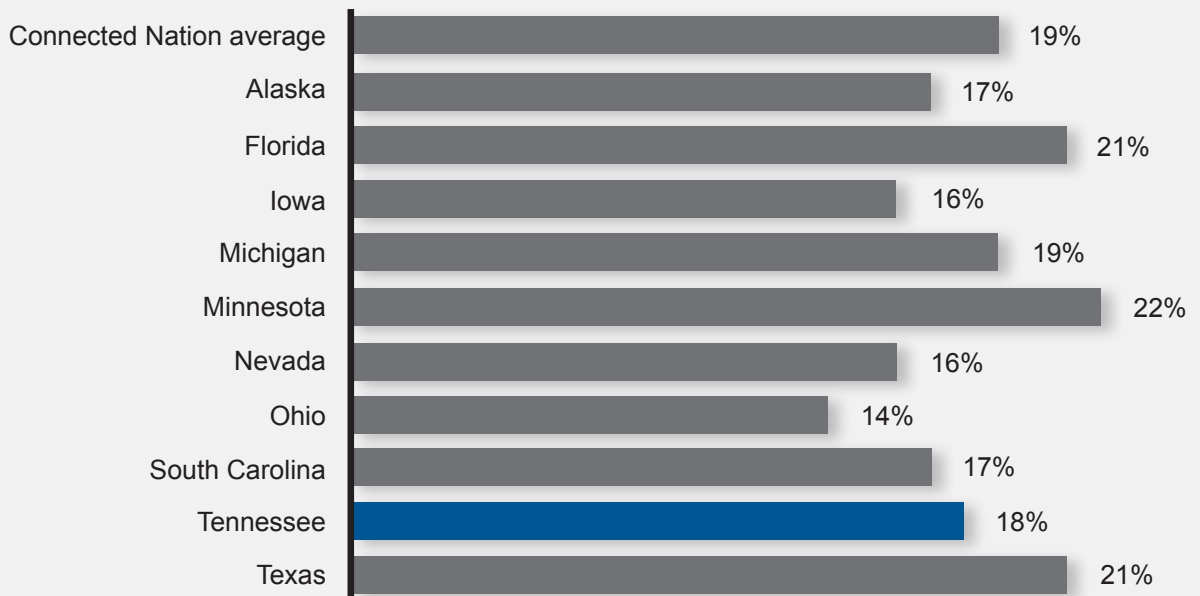
When asked how often they telework, more than one-quarter of Tennessee’s teleworkers (26%, representing approximately 128,000 employees) say they telework every day, while an additional 35% (representing approximately 173,000 employees) telework at least once per week (Figure 2).

Figure 2.
Frequency of Teleworking



When compared to other states surveyed by Connected Nation, Tennessee ranks in the middle of the pack, behind states like Minnesota, Florida, Texas, and Michigan (Figure 3).

Figure 3.
Percentage of Employees Who Telework



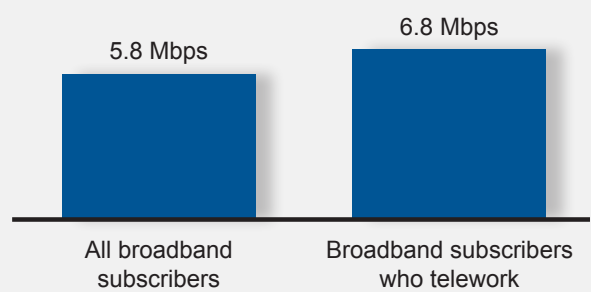
The Role of Broadband

Simply put, without the availability and adoption of high-speed Internet, teleworking isn't possible. While the overall broadband adoption rate among Tennessee residents is 64%, more than nine out of ten teleworkers (94%) rely on a high-speed Internet connection to work from home, and the broadband connection speeds of teleworkers are significantly higher than the average broadband user (Figure 4).

To remain productive, teleworkers need fast, reliable access to large files that would take too long to transfer via a dial-up connection. And while face-to-face meetings once required long, expensive commutes, high-speed Internet now makes these meetings easier and cheaper via teleconferencing, which allows participants to observe non-verbal cues during the meeting, as they would in a face-to-face meeting. In fact, research indicates that only 7% of a message's meaning is conveyed by the actual words that are delivered, while 55% of its meaning is conveyed by facial expressions, and 38% is conveyed through voice tone.⁴ This means that teleworkers who rely on phone conversations and faxes alone could be missing more than half of what is being communicated. To communicate as effectively as possible, teleworkers need to be able to receive non-verbal cues from their co-workers and clients, which requires video conferencing, made possible only through a high-speed Internet connection.

Figure 4.

Average Download Speeds



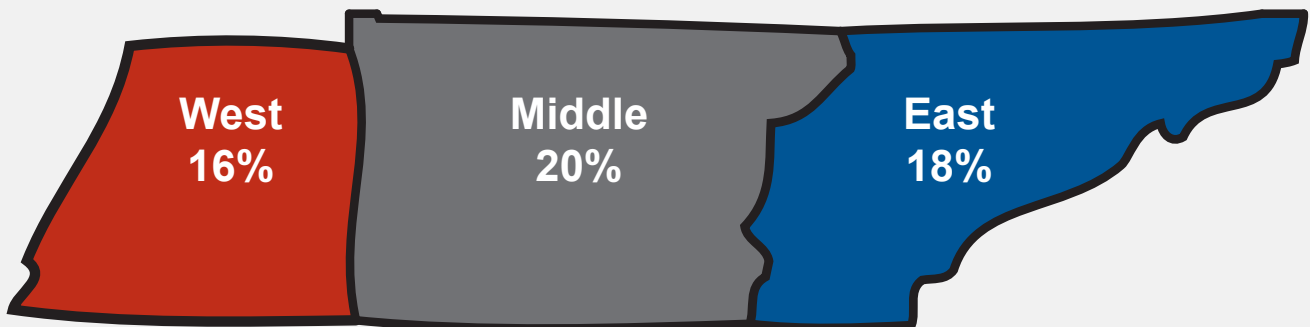
Who Teleworks?

Geography

Middle Tennessee has the highest number of teleworkers, with one-fifth (20%, or approximately 207,000 employees) of the region's employees teleworking rather than commuting to work. In East Tennessee, 18% or approximately 187,000 employees telework. West Tennessee reports the lowest percentage of teleworkers – only 16% of employees in this region telework, which equals about 95,000 employees (Figure 5).

Figure 5.

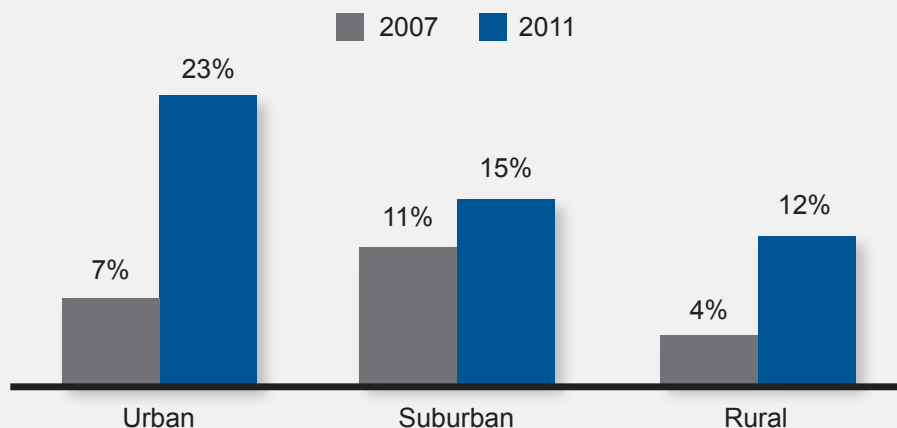
Employees who Telework by Grand Division



⁴ Yun Chu et al., *Silent Messages In Negotiations: The Role of Nonverbal Communication In Cross-cultural Business Negotiations* 4, J. ORG. CULTURE, COMM. & CONFLICT, Jul., 2008, available at http://findarticles.com/p/articles/mi_m1TOT/is_2_9/ai_n25121995.

Since 2007, Tennessee's urban residents have witnessed the largest increase in teleworking (Figure 6). In 2011, nearly one-quarter of Tennessee's urban employees (23%, or approximately 326,000 employees) telework, an increase of 16 percentage points since 2007. By comparison, only 12% of Tennessee's rural employees telework (approximately 75,000 employees). This is, however, a marked increase from 2007, when only 4% of employees teleworked.

Figure 6.
Employees who Telework by Urban/Rural Location



Teleworking is particularly advantageous for rural residents as it allows rural Tennessee residents to find work that might otherwise be outsourced and enables Tennessee businesses to offer jobs that might otherwise be inaccessible for rural residents. Telework doesn't require expensive relocation or expansion costs for employers and communities, and it provides urban employers with new opportunities to meet labor needs while reducing costs. Teleworking benefits rural communities by providing jobs, reducing out-migration, providing year-round employment, and bolstering the economy in those regions experiencing a shortage of natural resource-based jobs.⁵ Plus, rural communities with sufficient broadband infrastructure can attract new residents who are looking to escape city life for life in the country. Telework is flexible and scalable, and is based on the needs and interests of employers, communities, and individual workers.⁶ Overall, teleworking both strengthens and diversifies rural economies.

There are a number of different ways that Tennessee can take advantage of teleworking – from individuals working out of home-based offices to telework centers where multiple employers have employees working in a shared facility. These telework centers can also serve as community-based technology centers that provide technology access and training to residents.

One illustration of Connected Tennessee's initiative to promote community telework centers is the "Vision Perry Digital Factory," located in rural Linden, Tennessee. Made possible with computers donated by Connected Tennessee and AT&T, Vision Perry provides office space, high-speed Internet service, a conference room, and training/work rooms that all act as a hub for employees, remote employers, and online training courses.⁷ This organization is successfully creating jobs (in 2011, Vision Perry employed nearly 100 local residents) and connecting residents to Nashville-based companies with no additional infrastructure needed.⁸

⁵ <http://dgss.wsu.edu/di/projects/telenetwork-history.html>

⁶ *Ibid.*

⁷ http://www.cityofparsons.com/digital_factory.htm

⁸ More information about Vision Perry and Connected Tennessee can be found at <http://www.connectedtn.org/blog/post/connected-tennessee%E2%80%99s-computers-4-kids-program-helps-revitalize-rural-perry-county>

Demographic Profile

Who are Tennessee's teleworkers? Table 1 explains:

- Nearly one-half of Tennessee's teleworkers (46%) have children living at home, which means that teleworking parents can spend less time commuting and more time at home with their families.
- Nearly two out of three teleworkers (65%) are men, and approximately one-third are between the ages of 45 and 54, with the average age being 43.
- The vast majority of Tennessee's teleworkers (86%) are white, while one out of ten are African American. The remaining 4% are either Asian, Hispanic, or gave no response.
- Nearly nine out of ten teleworkers in Tennessee (86%) have a college education and more than one-half (56%) report an annual household income above \$75,000.

Industrial Profile

Connected Tennessee's 2011 Business Technology Assessment reveals that more than one-quarter of all Tennessee businesses (28%) allow their employees to telework. This includes 47% of businesses in the High Tech sector and 41% of employees in the Professional & Financial Services sector. Interestingly, business size has little effect on teleworking.

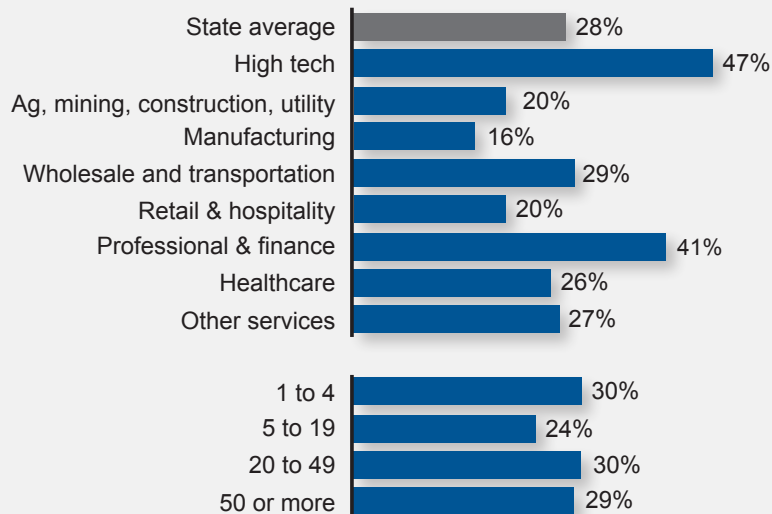
Table 1.

The Demographic Profile of Tennessee's Teleworkers

Gender	2011
Male	65%
Female	35%
Age	2011
18 to 24	9%
25 to 34	19%
35 to 44	23%
45 to 54	34%
55 to 64	11%
65 or older	4%
Presence of Children	2011
Children at home	46%
No children at home	53%
Refused	1%
Race/Ethnicity	2011
White	86%
African American	10%
Asian or Pacific Islander	2%
Hispanic	1%
Refused	1%
Education	2011
No college	13%
College education	86%
Refused	1%
Annual Household Income	2011
Less than \$35,000	9%
\$35,000 to less than \$75,000	20%
\$75,000 or more	56%
Refused	15%

Figure 7.

Percent of Tennessee Businesses that Allow Employees

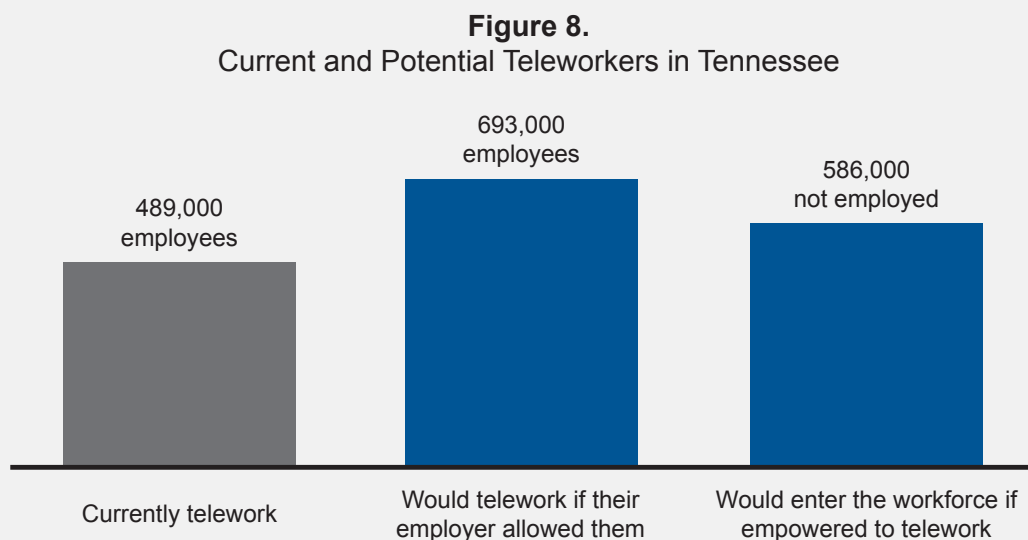


Demonstrating the Current and Potential Impact of Teleworking

In 2011, Connected Tennessee found that nearly one-quarter of employees living in the Nashville-Davidson–Murfreesboro Metro Area (23%, or approximately 158,000 employees) teleworked. Of those employees, 27% reported teleworking every day, totaling approximately 43,000 employees. By working from home full-time instead of commuting, a Nashville employee saves approximately \$2,300 per year in travel expenses (gas, maintenance, and tires) and saves approximately 9,480 lbs. of CO₂ emissions from entering the atmosphere.⁹ In total for 2011, full-time teleworkers in the Nashville metro area saved approximately \$99 million in auto-travel expenditures and more than 400 million lbs. of CO₂ emissions. To put this into perspective, the annual CO₂ emissions saved by Nashville Metro’s full-time teleworkers in 2011 are more than the annual CO₂ emissions of every household in Robertson County.¹⁰

Nearly one-third of Tennessee employees who do not currently telework (32%) say they would telework if allowed to do so. This means there are well over half a million, or approximately 693,000 Tennessee employees, who are interested in teleworking. Altogether, 44% of employed Tennessee adults say that they either telework or would be willing to do so if given the opportunity by their employers. This means there are approximately 1.18 million employees in Tennessee who either telework or want to.

Teleworking could also provide opportunities to put unemployed Tennesseans back to work. Statewide, 28% of Tennessee adults (or 586,000 Tennesseans) who are either unemployed or are not part of the workforce say they would be willing to enter the workforce if they were given the opportunity to telework, including 31% of homemakers, 14% of retirees, and 25% of adults who are not working due to a disability. This represents 98,000 homemakers, 139,000 retirees, and 94,000 Tennessee adults with disabilities who would join the workforce if able to do so via teleworking. To break that down, if 586,000 potential teleworkers were to make just minimum wage working full-time, that would boost annual statewide revenues by approximately \$8.8 billion!¹¹



9 Based on each teleworker commuting 260 days per year, 50 miles round-trip (<http://nashville.uli.org/~media/DC/Nashville/Nashville%20Docs/TA%20update%20Jan%202011.ashx>), with an average automobile operating costs of 17.74 cents per mile (<http://www.aaaexchange.com/Assets/Files/201145734460.DrivingCosts2011.pdf>), and an average automobile efficiency of 26.6 mpg (<http://www.futurepundit.com/archives/004903.html>) producing 19.4lbs. of CO₂ emissions per gallon of fuel consumed (<http://www.epa.gov/climatechange/emissions/downloads/GHGCalculator.xls>)

10 The total number of households in Robertson County is 24,197 (U.S. Census Bureau, 2010). “Typical” annual CO₂ emissions are 14,796 pounds per household, assuming approximately 900 kWh per month http://www.epa.gov/climatechange/emissions/ind_assumptions.html

11 Based on a minimum wage of \$7.25 per hour (<http://www.dol.gov/whd/minimumwage.htm>) for 8 hours a day for 260 work days in a year

Conclusion

Teleworking not only offers an efficient and effective work arrangement for Tennessee's current employees, it also provides the opportunity for Tennessee businesses to tap into the state's workforce potential and put Tennesseans back to work. However, many Tennessee businesses still do not allow their employees to telework.

With the numerous potential benefits that teleworking offers employees, employers, and the local economy alike, businesses that do not currently allow their employees to telework should consider implementing telework policies across their organizations. Additionally, businesses that do allow teleworking should promote these policies and work with managers who may be hesitant to allow their employees to telework by addressing any potential barriers. In doing so, Tennessee businesses will have the opportunity to reach new talent and put Tennesseans back to work, thereby boosting the landscape of Tennessee's workforce.

Ultimately, increasing the availability of high-speed Internet across the state, and thus increasing opportunities for teleworking, could become one of Tennessee's most important economic public policy initiatives. Among its many benefits, teleworking can benefit the environment, boost economic growth, and provide a better work-life balance for employees across Tennessee.



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Methodology and Definitions

2011 Residential Technology Assessment

Between June 30 and August 15, 2011, Connected Tennessee conducted a random digit dial telephone survey of 1,201 adult heads of households across the state. This sample included 1,007 adults age 18 or older who were contacted via landline and 194 adults who were contacted via cell phone.

Of the 1,201 respondents surveyed in 2011, 634 respondents reported having full-time or part-time jobs, and 119 of those were identified as teleworkers. “Teleworkers” are defined as respondents who report being employed full-time or part-time and say that they work from home using the Internet instead of commuting to their workplace. The results of this survey have been compared to similar surveys that Connected Nation conducted across ten states in 2011 (Alaska, Florida, Iowa, Michigan, Minnesota, Nevada, Ohio, South Carolina, Tennessee, and Texas). Altogether, Connected Nation surveyed 12,004 residents across these ten states in 2011 for this study, including 1,202 teleworkers.

Multiple attempts were made to each working telephone number on different days of the week and at different times of the day to increase the likelihood of contacting a potential respondent. To ensure a representative sample, quotas were set by age, gender, and county of residence (rural or non-rural), and the results were weighted to coincide with 2010 United States Census population figures. For the purpose of setting quotas and weighting, “rural” respondents are defined as living in a county that is not a part of a Metropolitan Statistical Area (MSA), as designated by the United States Office of Management and Budget. Weighting and design consultation were provided by Lucidity Research.

Surveys were conducted by Thoroughbred Research Group in Louisville, KY. On average, the survey took approximately 12 minutes to complete after the respondent agreed to participate. Based on the effective sample size, the margin of error = $\pm 2.99\%$ at a 95% level of confidence for the entire population and $\pm 4.11\%$ for the sample of all employed. As with any survey, question wording and the practical challenges of data collection may introduce an element of error or bias that is not reflected in this margin of error. Weighting and research consultation were provided by Lucidity Research LLC.

2007 Residential Technology Assessment

Between June 14 and July 21, 2007, Connected Tennessee conducted a random digit dial telephone survey of 9,513 adults across the state. Data were collected by Wilkerson and Associates of Louisville, Kentucky. The questionnaire screened respondents to include only adults 18 or older, with quotas set by gender and age to ensure adequate representation of all adults in each county. Weighting and design consultation were provided by Lucidity Research. Based on the effective sample size, the margin of error = $\pm 1.0\%$ at the 95% level of confidence for the entire population.

2011 Business Technology Assessment

Eight hundred and seven (807) Tennessee businesses were contacted by telephone between October 5 and November 1, 2011. Data were collected by Thoroughbred Research Group in Louisville, Kentucky. The error interval or sample tolerance for the survey is $\pm 4.72\%$ at the 95% confidence level. This sample error accounts for sample weighting, using the effective sample size. Weighting of the survey data enables the total sample to also be representative of all employer business establishments in Tennessee, according to the U.S. Census Bureau County Business Patterns (CBP) data. Weighting and research consultation were provided by Lucidity Research LLC.

These surveys were conducted as part of the State Broadband Initiative (SBI) grant program, funded by the National Telecommunications and Information Administration (NTIA). The SBI grant program was created by the Broadband Data Improvement Act (BDIA), unanimously passed by Congress in 2008 and funded by the American Recovery and Reinvestment Act (ARRA) in 2009. To learn more about Connected Tennessee please visit www.connectedtn.org or e-mail us at info@connectedtn.org.

APPENDIX A:
Select questions and sample size

2011 Connected Tennessee Residential Technology Assessment

	<i>n</i> All Respondents	<i>n</i> Employed
All Respondents	1,201	634

Into which of the following employment groups do you fall? Are you...

Employed or self-employed full or part-time	634	634
Not employed	547	

**Which of the following describe the way you work from home, when you do so?
 (Among employed who report working from)**

Work at home using an Internet connection, instead of commuting to usual workplace (teleworkers)	119	119
Do not telework	1,082	515

2007 Connected Tennessee Residential Technology Assessment

	<i>n</i> All Respondents	<i>n</i> Employed
All Respondents	9,513	5,101

Into which of the following employment groups do you fall? Are you...

Employed or self-employed full or part-time	5,101	5,101
Not employed	3,941	

Do you regularly work from home through a broadband connection, commonly known as teleworking? (Among employed or self-employed full or part-time)

Work at home using an Internet connection, instead of commuting to usual workplace (teleworkers)	278	278
Do not telework	4,769	4,769

2011 Connected Tennessee Business Technology Assessment

	<i>n</i> All Respondents	<i>n</i> Allow Employees to Telework
All Respondents	807	226