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*Telecommuter's Casual Friday...*

## **Telecommuting and Working at Home in the Emerging Work Environment**

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**By Wendell Cox**



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Note to reader: Some words in this document may appear in blue and are underlined. Clicking on these words will direct the reader to relevant sites or documents using your associated web-browser.

# Executive summary

## **The Workplace and Workday are**

**Changing:** Advances in information technology are driving a move away from the traditional 9:00 to 5:00 workday at the employer's facility and toward working from home. Working from home has emerged as a near equal to alternatives to driving alone to work such as carpooling and public transit. Improved information technology is the principal driver of this change, as people can connect with colleagues and customers by electronic means, or telecommuting.

## **Telecommuting and Working at Home are Increasing:**

Currently, in Canada 19.2 per cent of employees and self-employed people work at home at least part of the time. This increased from 2000 to 2008 at a rate of 1.9 per cent per year. Over that period, nearly 41 per cent of new jobs involved working at home at least some of the time. Among employees, nearly 20 per cent of new jobs involved working at home. A far larger share of self-employed people work at home, and their numbers grew faster than the increase in self-employment from 2000 to 2008.

## **Telecommuting and Working at Home Have Become a Principal Alternative to the Automobile as a Mode of Access to Employment:**

Among the 35 census metropolitan areas and census agglomerations with more than 100,000 people, working at home accounts for 6.2 per cent of the usual work locations. The significance of working at home is illustrated by a comparison with transit, which represents the strongest alternative to the automobile for access to employment.

Among the 10 largest metropolitan areas, working at home leads transit in employment access only in London, Ontario. However, among the other 25 metropolitan areas, working at home leads transit in 21.

## **Telecommuting and Working at Home are Distributed Evenly throughout the Metropolitan Areas:**

Working at home is distributed evenly throughout metropolitan areas in contrast with transit, which has much larger employment access shares to core areas of the metropolitan areas and much weaker shares to surrounding areas.

## **Telecommuters and People Working at Home are More Likely to Live in Areas that are More Peripheral, and They are Better Educated:**

People who work at home tend to live in areas that surround metropolitan areas, particularly peripheral areas. They tend to be university-degree holders to a greater extent than other workers, and their occupations tend to be more concentrated in management and professional and technical fields. Telecommuters tend to have longer job tenure than people who do not telecommute. Finally, women with children are more likely to telecommute than are those without.

**Telecommuting and Working at Home in the Modern Context:** The expansion of working at home and telecommuting complements trends that are well underway in society, while responding to important societal objectives.

- In metropolitan areas, residential and employment dispersion continues, and as the distance between the residence and the employment location expands, more telecommuting is likely.
- There is a well-documented connection between greater employment access and job creation and economic growth in metropolitan areas. Because working at home makes employment access virtually instantaneous, it has great potential for improving urban productivity and creating jobs.
- Working at home can also improve employment access for people with disabilities or without access to automobiles, expanding social inclusion.
- There is considerable evidence that working at home results in improved productivity and reduced costs for employers. It can also assist employees in improving the balance between work and personal responsibilities (the work-life balance).
- It seems likely that continuing advances in information technology will lead to an even greater expansion of working at home.
- Because working at home eliminates the work trip, it has the potential to reduce traffic congestion and to reduce expenditures for expanding transit and roads.
- Further, working at home virtually eliminates greenhouse gas emissions from the commute to work, making working at home the most sustainable of employment access methods.

**There is Considerable Potential to Expand Telecommuting and Working at Home:** The research indicates that working at home could expand materially.

- The most modest estimates for expansion indicate that working at home could double. This could lead to a reduction of 9 billion annual kilometres of work-trip driving and approximately 3 per cent in greenhouse gas emissions from light vehicles.
- Research suggests that working at home could reduce automobile travel by 8 per cent in metropolitan areas. If this were achieved, there would be a 23.5 billion kilometre reduction in driving in 30 years and an 8 per cent reduction in greenhouse gas emissions from light vehicles.

**Telecommuting and Working at Home Should be Expanded:** Because of its potential for reducing public expenditures, improving productivity and reducing emissions, working at home justifies considerably more attention than it has received.

Governments, and especially regional agencies, should raise the profile of telecommuting and working at home in their plans and analysis to at least an equal emphasis with transit, cycling, and walking. Businesses should examine the potential for improving their performance using telecommuting and working at home.

# Introduction

There have been significant changes in the workplace in recent decades. Advances in information technology have diminished the importance of the fixed workplace provided by employers, especially in service occupations. At the same time, service industries have generally grown faster than other sectors. Many employees are no longer tied to a 9 to 5 work schedule, and they now work at home rather than in an office or other employer location. Working at home has become nearly the equal of carpooling (passengers) and transit as the principal means of access to work outside of driving alone, the dominant access mode (Figure 1).<sup>1</sup>

Working at home is sometimes referred to as “telecommuting.” Telecommuting implies being linked to the employer’s location and customers from home by means of information technology. However, not all home-based employment is telecommuting.<sup>2</sup>

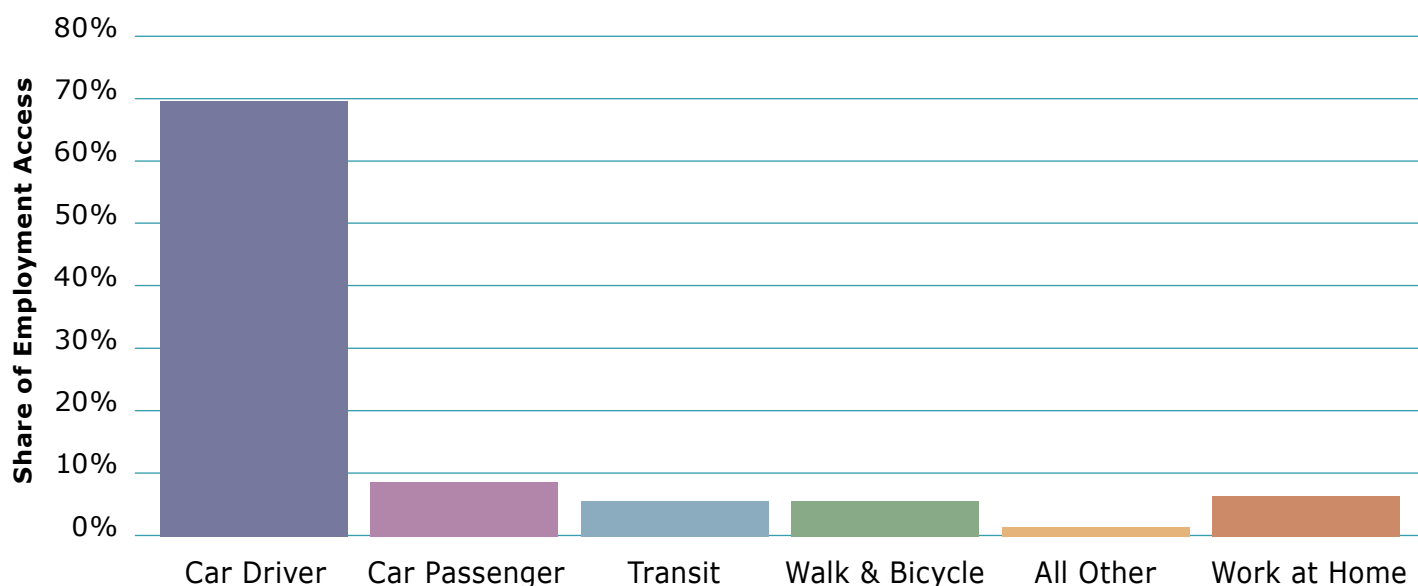
The trend toward remote working locations is not limited to the same metropolitan area or even within the nation. There has been an expansion of service support to Canadian businesses from India and the Philippines, for example. These jobs, which formerly were held by people in Canada, have been moved, as businesses have attempted to maintain or improve their competitiveness in international markets.

This paper describes how prevalent working at home is, along with associated trends and issues. The conclusion is that working at home could offer the economy, businesses, government agencies and workers a level of flexibility that could not only improve productivity within the nation but also contribute toward improved international competitiveness.

**FIGURE 1**

## Employment Access Modes

Metropolitan Areas of Over 100,000 People (2006)



# Working at home: The Situation

There are two principal sources for information on working at home. The first source is the General Social Survey (conducted by Statistics Canada) and compiled by Martin Turcotte in a Statistics Canada report.<sup>3</sup> Turcotte provides broad national data as well as some data for metropolitan areas. The second source, the national Census (conducted every five years) provides information on employment access for geographies from the national, provincial and metropolitan areas to the neighborhood or Census tract level.

The term “employment access” is used rather than terms that denote travel such as “work trip,” because working at home does not require travel. Travel, including work trip-travel, can be considered a transaction cost—necessary for holding a job but not directly contributing to the economic output of the job. In the context of employment, travel is a secondary activity but a means to the end, which

is employment. Working at home allows employment access but without the work trip.

## National Information

The Statistics Canada national report estimates the number of people who worked at home at least part of the time between 2000 and 2008. The overall share of people working at home rose 15.1 per cent between 2000 and 2008, from 16.7 per cent to 19.2 per cent, for an average annual increase of 1.9 per cent (Figure 2). It seems apparent that the information technology “revolution” is still in its infancy, which could mean that telecommuting could increase its share of employment access even more in the future.

Among employees, the working at home share increased from 10.2 per cent of employees to 11.2 per cent, a 9.8 per cent increase (Figure 3, next page).

**FIGURE 2**

### Working at Home: Overall

National Share (2000-2008)

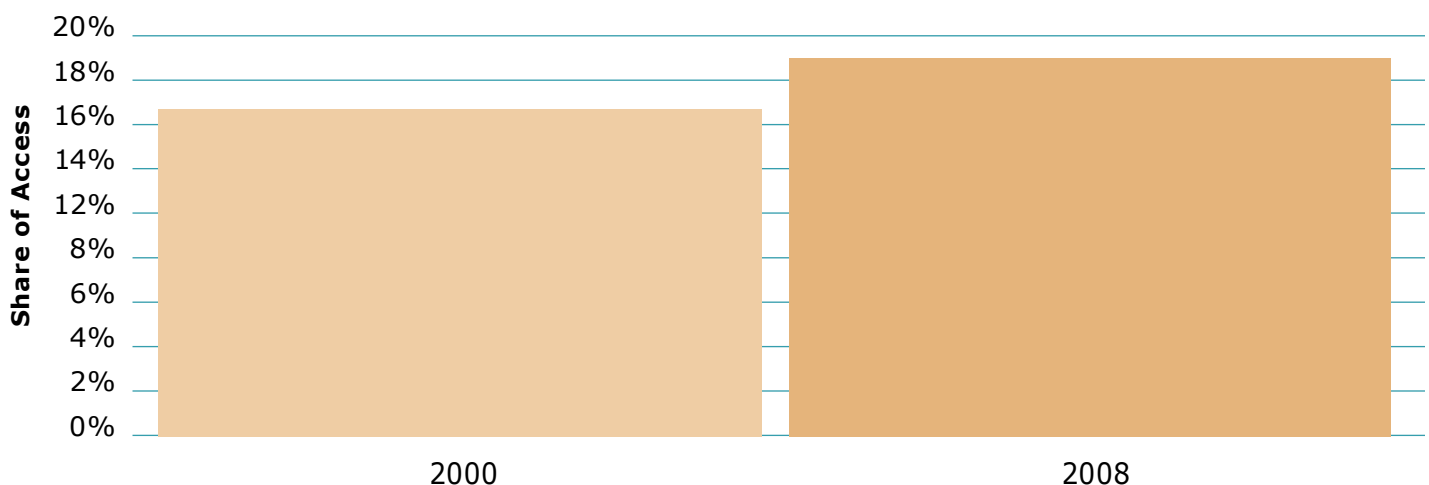
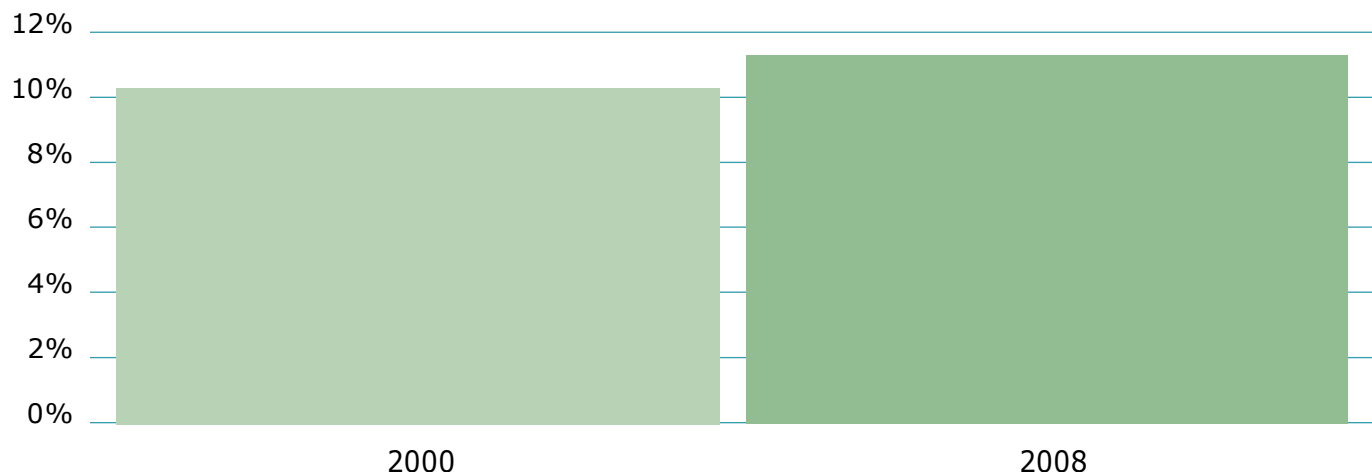


FIGURE 3

**Working at Home: Employees**

National Share (2000-2008)



Among the self-employed, the working at home share was much greater at 49.8 per cent in 2000. By 2008, the share of the self-employed working at home had reached 60.0 per cent, an increase of 20.5 per cent (Figure 4).

As the employed labour force has grown, a larger share of the increase has been accounted for by working at home (Figure 5).

Between 2000 and 2008, the economy added 1,965,000 jobs (employees and self-employed people). Of these, 800,000 worked at home at least part of the time. Thus, 40.7 per cent of the additional jobs involved working at home. This is nearly 2.5 times the overall figure of 16.7 per cent who worked at home in 2000.

Among employees, 323,000 of the 1,426,000 additional employees worked at home at least part of the time in 2008. This represents 19.7 per cent of the additional employment, which is nearly double the 2000 share of 10.2 per cent.

The increase in self-employed people working at home was actually greater than the increase in self-employment, indicating that a substantial number of the self-employed who had not done so previously, now began to work at home.

Self-employment grew by 323,000 people between 2000 and 2008, while the number of self-employed working at home at least part of the time increased by 477,000. This 145 per cent share of new self-employment was nearly triple the 49.8 per cent share working at home in 2000. The number of self-employed not working at home at least part of the time dropped from 1,376,000 in 2000 to 1,228,000 in 2008.

Overall, working at home increased to 800,000 people from 2000 to 2008. This is the equivalent of nearly 1.5 times the employment in the Ottawa-Gatineau metropolitan area and more than double the employment in the Winnipeg metropolitan area.

Nonetheless, the increase in working at home was muted by the declining share of the workforce employed in family farming, which is an occupation that inherently involves working at home.

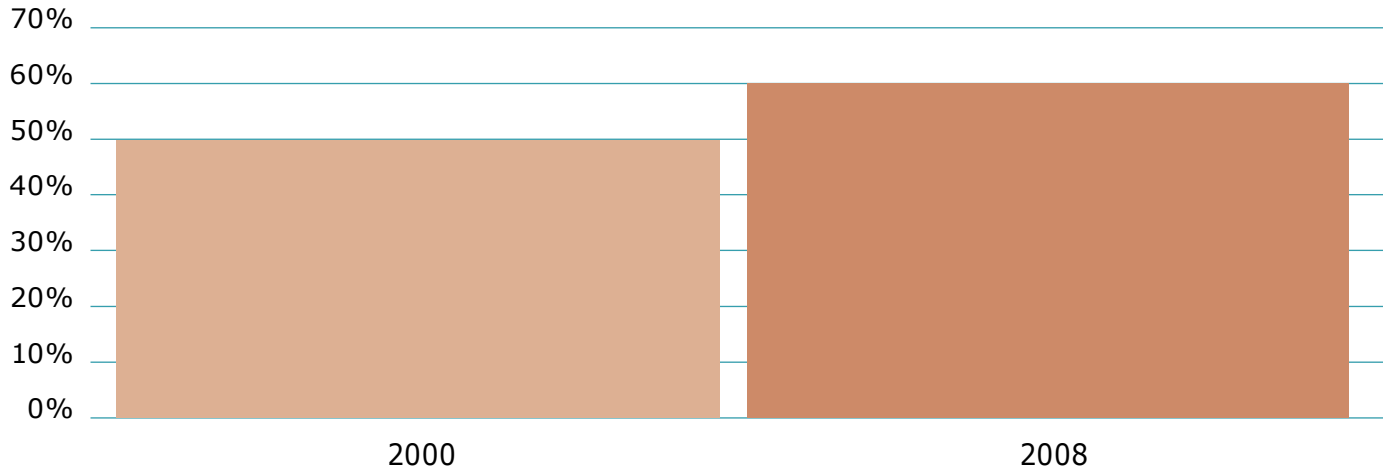
Among metropolitan areas, the highest work-at-home shares among employees who work part of their schedules at home were in Ottawa-Gatineau and Québec City, both at 16 per cent. Among the largest metropolitan areas, Vancouver had the highest work-at-home share at 14 per cent, followed by Toronto at 13 per cent



**FIGURE 4**

**Working at Home: Self Employed**

National Share (2000-2008)



**FIGURE 5**

**Total Employment & Working at Home**

Change (2000-2008)



and Montréal at 11 per cent. Winnipeg and Edmonton had work-at-home shares of 12 per cent, while Calgary's share was 11 per cent. The overall average for metropolitan areas was 12 per cent.

The highest self-employment work-at-home market shares for people who work part of their schedules at home were in Ottawa-Gatineau at 64 per cent, Toronto and Vancouver at 63 per cent and Montréal at 60 per cent. Overall, the work-at-home share among the self-employed was 60 per cent in metropolitan areas.

## Metropolitan Area Data

Statistics Canada, through the national census of population, collects additional data on working at home. The national census provides employment access data for metropolitan and other geographical areas. Unlike the later national data from the General Social Survey, the census data does not differentiate between self-employed people and those who are employed by others. Further, the census data are based upon the person's usual employment access method, and thus it provides information on the number of people who report their residence as their usual place of employment. (The Statistics Canada Turcotte report cited above covers all people who work at home, either full time or part time.)

Among the 35 metropolitan areas (census metropolitan areas and census agglomerations<sup>4</sup>) with more than 100,000 people, the 2006 census indicated that 6.2 per cent of employed people work at home. In the nine largest metropolitan areas of more than 500,000 people, the average working-at-home market share was 6.5 per cent, while among the 15 additional metropolitan areas with populations above 150,000, the figure was 6.3 per cent. The smaller

metropolitan areas with more than 100,000 people but fewer than 150,000 had an average working-at-home market share of 5.8 per cent (Table 1, page 15).

Vancouver had the highest working-at-home share of any metropolitan area with more than 500,000, at 8.4 per cent. The other metropolitan areas with more than 500,000 people had a working-at-home market share of 6.0 or above, with the exception of Québec City (5.5 per cent) and Winnipeg (5.1 per cent).

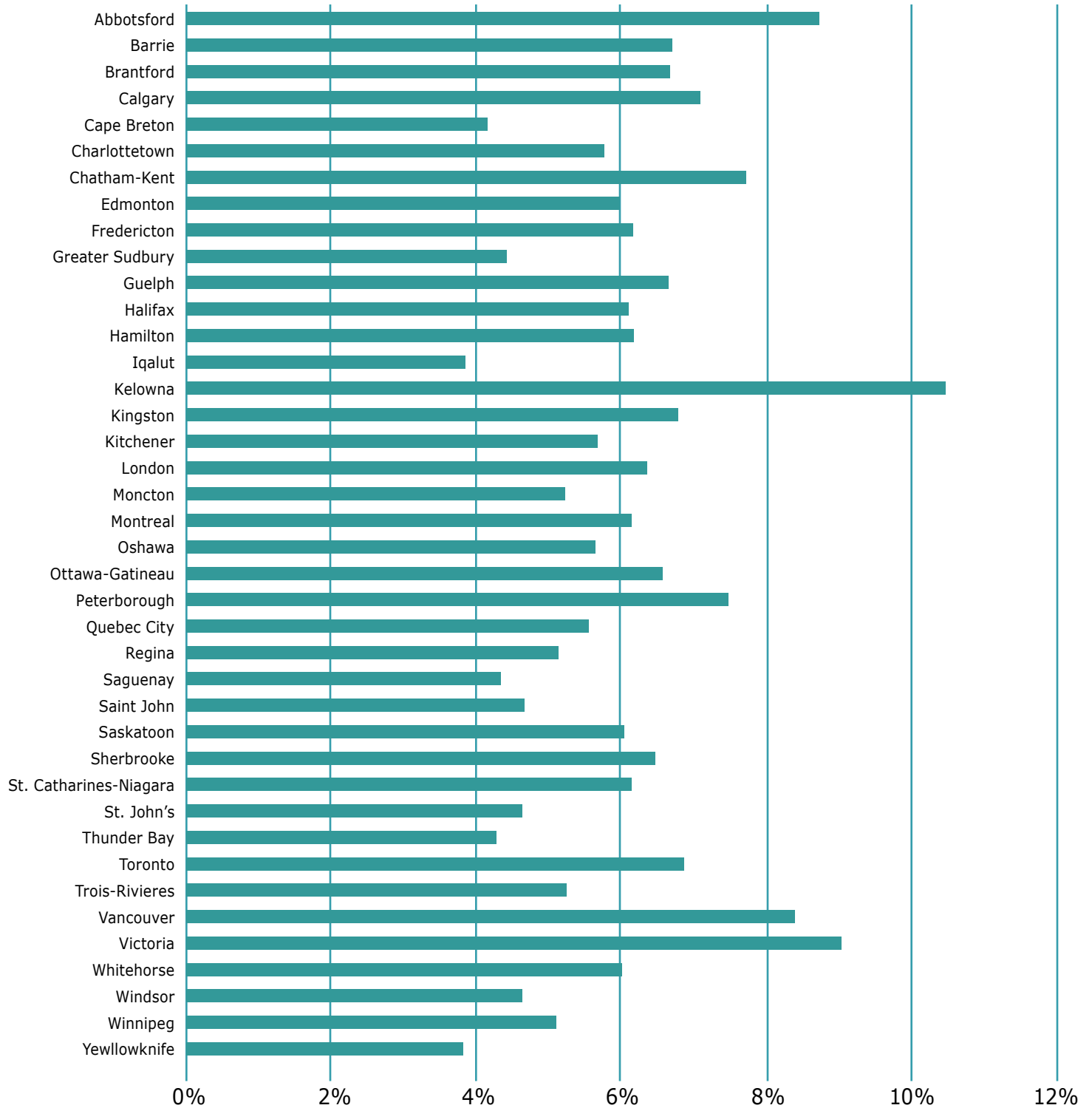
Among the top 35 metropolitan areas and agglomerations, Kelowna had the highest working-at-home market share at 10.4 per cent, followed by Victoria at 9.0 per cent. The lowest working-at-home shares were in Cape Breton at 4.1 per cent, Saguenay and Trois-Rivieres at 4.3 per cent and Greater Sudbury at 4.5 per cent (Figure 6).

The working-at-home market share trailed transit in each of the nine largest metropolitan areas, though it exceeded transit in London, the 10th largest. Working at home exceeded walking and cycling combined in five of the top 10 metropolitan areas including Toronto, Vancouver, Calgary, Edmonton, and Hamilton.

Among the 25 metropolitan areas ranked lower than 10th, 21 had a larger working-at-home market share than a transit market share. Out of this 25, 18 had a larger working-at-home share than the combined walking and cycling market share. This somewhat stronger showing for walking and cycling in the smaller areas is indicative of the greater range relative to metropolitan area size that these modes can provide.

**FIGURE 6**

**Work at Home Market Shares**  
**Metropolitan Areas Over 100,000 (2006)**



## Other Census Agglomerations: Smaller Provincial and Territorial Capitals

In the smaller provincial and territorial capitals, the share of people working at home was 5.1 per cent. The highest work-at-home market shares were in Fredericton at 6.2 per cent and Whitehorse at 6.0 per cent. Charlottetown had a working-at-home market share of 5.8 per cent. The lowest working-at-home market shares were in Yellowknife and Iqaluit at 3.8 per cent. In each of these census agglomerations, the working-at-home market share was greater than that of transit but less than walking and cycling. Again, this larger walking and cycling market share is reflective of the greater access provided by these modes in smaller areas. In fact, the walking and cycling market shares in Iqaluit (31.0 per cent) and Yellowknife (23.4 per cent) were by far the highest among the 35 largest metropolitan areas and the five smaller agglomerations examined. In Iqaluit, walking to work is feasible throughout the agglomeration (weather permitting), with a maximum distance of little more than three kilometres from the urban fringe to the urban core and a gross land area of only 3.5 square miles.<sup>5</sup>

**Prairie Agglomerations:** 25,000 to 100,000 people: Working-at-home ranges between 2.8 per cent of the market (Wood Buffalo, Alberta) to 8.1 per cent (Brandon, Manitoba) among the Prairie census agglomerations with between 25,000 and 100,000 people. In each of these agglomerations except for Wood Buffalo, the working-at-home market share was greater than that of transit. In five of the Prairie agglomerations, working-at-home had a larger market share than walking and cycling (Table 2, page 15).

## Working at Home: Distribution Within Metropolitan Areas

Working at home is a generally consistent employment access share throughout the largest metropolitan areas. This is in contrast to mass transit, which is the leading alternative to commuting by automobile. Mass transit reaches its highest work-trip market share to destinations in the urban core, and it has far smaller market shares in other parts of the metropolitan area. This variation in transit use produces complementary variations in automobile use, though in smaller magnitudes, because of the dominance of the car in urban transport (from 65 per cent to 87 per cent of work-trip travel).

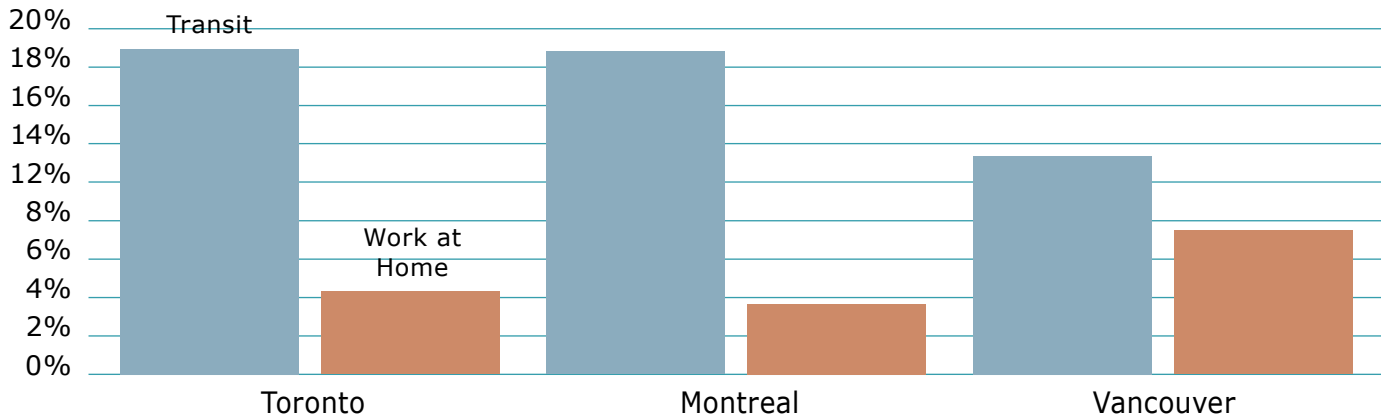
The greater geographical evenness of working at home in metropolitan areas is illustrated by comparing its employment access share to that of mass transit. The analysis categorizes areas (municipalities or census subdivisions) of metropolitan areas by the share of jobs that are accessed by people using mass transit. Areas with a mass transit market share of 10 per cent or more are referred to as “more transit oriented,” while areas with a less than 10 per cent transit market share are referred to as “less transit oriented.”<sup>6</sup> The more transit-oriented areas are all central municipalities, adjacent municipalities or census subdivisions.

Overall, transit accounts for approximately three times the employment access market share of working at home in Toronto and Montreal. In Vancouver, transit accounts for slightly less than double the work-at-home employment access share (Figure 7).

**FIGURE 7**

**Access: Transit & Work at Home - Overall**

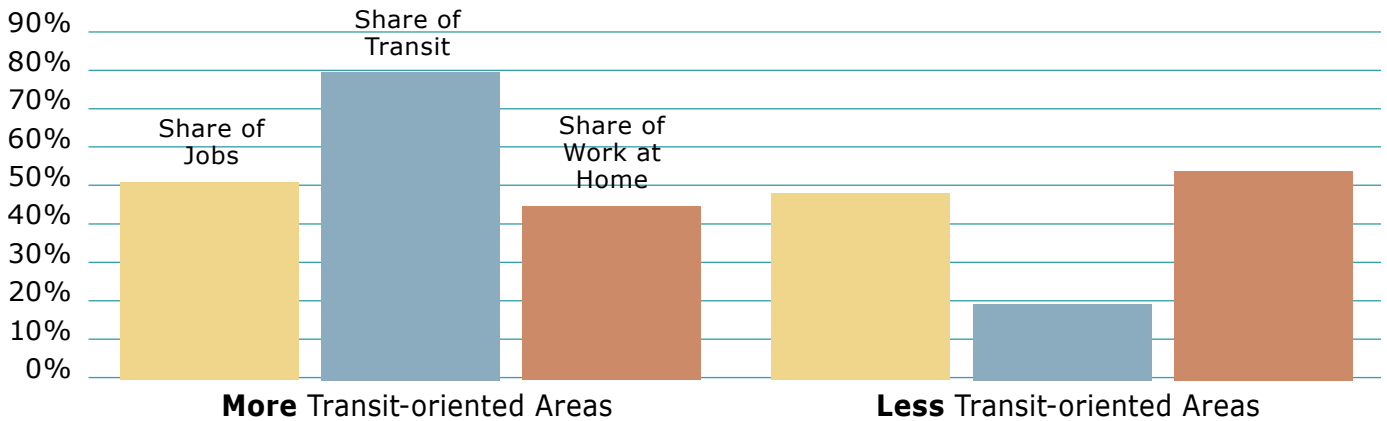
Toronto, Montreal and Vancouver Average



**FIGURE 8**

**Work Access by Transit Orientation**

Toronto, Montreal and Vancouver Average



**FIGURE 9**

**Access: More Transit-oriented Areas**

Toronto, Montreal and Vancouver Average

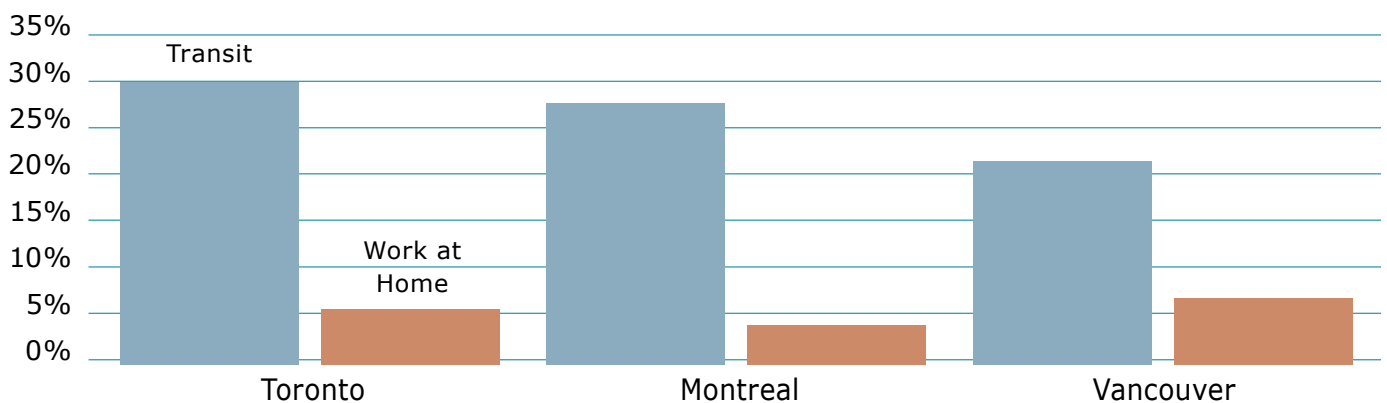
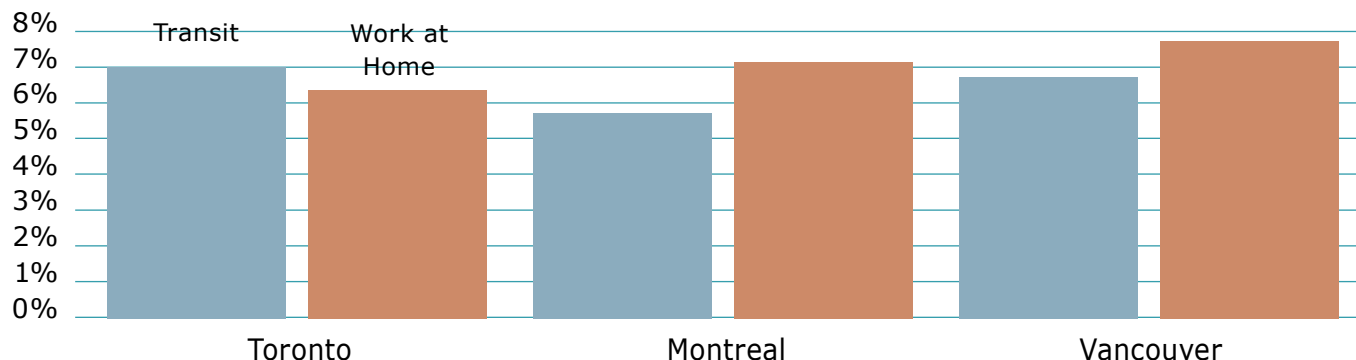


FIGURE 10

**Access: Less Transit-oriented Areas**

Toronto, Montreal and Vancouver Average

**More Transit-oriented Areas**

In the three largest metropolitan areas (Toronto, Montreal, and Vancouver), the overall average share of jobs in the more transit-oriented areas is slightly more than 50 per cent. Approximately 80 per cent of public transit with people commuting to jobs in the metropolitan areas is in the more transit-oriented areas. The share of people working at home is slightly less in the more transit-oriented areas than in the less transit-oriented areas (Figure 8, previous page).

- In Toronto, the transit access share in the more transit-oriented area was 30.1 per cent, more than five times the 5.8 per cent work-at-home share.
- In Montreal, the transit access share in the more transit-oriented areas (Ville de Montréal and seven adjacent municipalities<sup>7</sup>) was 28.0 per cent, approximately six times the 4.7 per cent work-at-home share.
- In Vancouver, the transit access share in the more transit-oriented areas (the municipality of Vancouver and five other municipalities or census divisions<sup>8</sup>) was 21.5 per cent, less than three times the 7.3 per cent work-at-home share (Figure 9, previous page).

**Less Transit-oriented Areas:** The less transit-oriented areas account for slightly less than 50 per cent of the metropolitan area employment. Only 20 per cent of metropolitan transit commuting is to jobs in the less transit-oriented areas.

However, the share of employment access by working at home in the less transit-oriented areas is more than one-half and slightly more than the share of employment in the less transit-oriented areas.

- In Toronto, the transit access share in the less transit-oriented areas was 7.0 per cent, slightly above the 6.6 per cent work-at-home share.
- In Montreal, the transit access share in the more transit-oriented areas was 5.9 per cent, approximately 15 per cent less than the 7.0 per cent work-at-home share.
- In Vancouver, the transit access share in the less transit-oriented areas was 6.8 per cent, approximately 10 per cent below the 7.5 per cent work at home share (Figure 10).

The geographic consistency of working at home throughout metropolitan areas is furthered by the fact that in the more transit-oriented areas its share is only 16 per cent less than in the less transit-oriented areas. By contrast, transit's market share in the more transit-oriented areas is 300 per cent more than in the less transit-oriented areas.

**Table 1. USUAL WORK ACCESS MODE BY METROPOLITAN AREA OVER 100,000 PEOPLE: 2006**

Rank	Metropolitan Area	Car:			Walk or Bike	All Other Modes	Work at Home
		Car: Driver	Passenger	Transit .			
1	Toronto	59.2%	7.0%	20.7%	5.4%	0.9%	6.9%
2	Montreal	61.3%	4.7%	20.1%	6.9%	0.8%	6.2%
3	Vancouver	61.7%	6.5%	15.1%	7.3%	1.1%	8.4%
4	Ottawa-Gatineau	58.6%	7.5%	18.2%	8.3%	0.8%	6.6%
5	Calgary	64.2%	7.0%	14.5%	6.2%	1.0%	7.1%
6	Edmonton	70.5%	7.4%	9.1%	5.9%	1.1%	6.0%
7	Quebec (City)	70.7%	5.1%	9.7%	8.2%	0.7%	5.5%
8	Winnipeg	66.2%	8.4%	12.3%	7.1%	0.8%	5.1%
9	Hamilton	71.4%	8.0%	8.2%	5.5%	0.8%	6.2%
10	London	70.7%	8.5%	6.3%	7.2%	0.9%	6.4%
11	Kitchener	73.9%	8.9%	4.5%	6.3%	0.7%	5.7%
12	St. Catharines-Niagara	76.1%	8.3%	2.4%	6.1%	1.1%	6.1%
13	Halifax	61.2%	10.0%	11.1%	10.4%	1.2%	6.1%
14	Oshawa	74.5%	8.1%	7.5%	3.6%	0.7%	5.6%
15	Victoria	59.1%	6.1%	9.3%	14.6%	1.8%	9.0%
16	Windsor	79.2%	7.2%	2.8%	5.3%	0.9%	4.6%
17	Saskatoon	73.9%	7.0%	3.5%	8.1%	1.5%	6.0%
18	Regina	75.5%	7.7%	4.0%	6.8%	0.9%	5.1%
19	Sherbrooke	75.1%	5.5%	4.5%	7.8%	0.7%	6.5%
20	St. John's	71.0%	13.2%	2.8%	6.5%	2.0%	4.6%
21	Barrie	75.8%	8.8%	3.6%	4.2%	1.0%	6.7%
22	Kelowna	72.8%	6.9%	2.4%	6.0%	1.3%	10.5%
23	Abbotsford	75.9%	9.1%	1.6%	3.5%	1.1%	8.8%
24	Greater Sudbury	73.9%	9.0%	4.9%	6.5%	1.1%	4.5%
25	Kingston	68.2%	8.6%	3.8%	11.2%	1.4%	6.8%
26	Saguenay	81.4%	5.0%	2.3%	5.8%	1.1%	4.3%
27	Trois-Rivieres	80.4%	4.3%	2.3%	7.1%	0.7%	5.3%
28	Guelph	71.0%	7.9%	5.6%	7.8%	1.0%	6.6%
29	Moncton	70.8%	11.7%	2.7%	8.2%	1.4%	5.2%
30	Brantford	74.9%	8.9%	2.9%	5.5%	1.2%	6.7%
31	Thunder Bay	76.4%	8.2%	3.0%	7.2%	0.9%	4.3%
32	Saint John	71.6%	10.7%	4.2%	7.3%	1.6%	4.7%
33	Peterborough	70.6%	9.2%	2.3%	9.4%	1.0%	7.5%
34	Chatham-Kent	75.4%	8.5%	0.8%	6.6%	0.9%	7.7%
35	Cape Breton	74.4%	11.4%	1.7%	6.1%	2.2%	4.1%
Other Provincial & Territorial Capital Agglomerations							
	Whitehorse	71.5%	7.5%	2.9%	10.5%	1.6%	6.0%
	Yellowknife	53.7%	11.1%	1.0%	23.4%	6.8%	3.8%
	Charlottetown	72.2%	11.0%	0.6%	8.9%	1.4%	5.8%
	Fredericton	69.9%	10.3%	3.0%	8.7%	1.9%	6.2%
	Iqaluit	40.6%	16.4%	0.0%	31.0%	7.7%	3.8%

**Table 2. USUAL WORK ACCESS MODE: PRAIRIE METROPOLITAN AREAS 25,000 - 100,000 PEOPLE: 2006**

Metropolitan Area	Car:			Walk or Bike	All Other Modes	Work at Home
	Car: Driver	Passenger	Transit			
Brandon	72.7%	7.8%	3.8%	8.9%	0.9%	5.9%
Grande Prairie	76.5%	7.8%	1.5%	5.3%	1.1%	7.8%
Lethbridge	75.3%	7.0%	2.0%	6.5%	1.1%	8.1%
Lloydminster	79.0%	8.3%	0.4%	5.4%	1.2%	5.7%
Medicine Hat	78.0%	7.1%	1.8%	4.4%	1.5%	7.3%
Moose Jaw	77.9%	7.1%	0.7%	7.9%	1.1%	5.3%
Prince Albert	75.2%	6.9%	0.6%	7.1%	2.8%	7.3%
Red Deer	75.1%	8.5%	3.6%	6.4%	1.5%	5.0%
Wood Buffalo	50.8%	13.7%	14.4%	4.6%	13.7%	2.8%

# Working at Home: Characteristics

The Turcotte Statistics Canada report provides information on the characteristics of people who work at home (part time and full time.) This data is not available through the Census.

- Employees who lived further from their work location were more likely to work at home. For example, employees living 30 kilometres or more from their work location work at home at a rate of 13 per cent compared with 7 per cent for workers who live within five kilometres of their work location.
- Employees with university degrees tended to work at home at a substantially higher rate than other employees did. While 22 per cent of university-degreed employees worked at home, only 7 per cent of employees with only a high school degree worked at home.
- Working at home was more concentrated in management, professional, and technical occupations.

Other research found that women generally were more likely to telecommute and that women with children at home were more likely to telecommute than were women without children. Further, employees with longer tenure tended to telecommute more regularly.<sup>9</sup>



# Working at home: The Context

The expansion of working at home and telecommuting complements trends that are well underway in society, and it responds to important societal objectives.

## Urban Dispersion

As noted above, working at home is associated with peripheral residential locations and areas where the average work-trip distances are greater. For decades, urban peripheries have captured nearly all the population growth and much of the employment growth. This trend continued in the period between the 2001 and 2006 censuses.

**Residential Dispersion:** According to a Statistics Canada report, data from the 2001 and 2006 censuses indicated a strong trend in net migration from the central municipalities to surrounding areas in the three largest metropolitan areas (Toronto, Montreal, and Vancouver).<sup>10</sup> This trend is also illustrated by the general population changes indicated in the Census between 2001 and 2006 (Figure 11).<sup>11</sup>

- In the Toronto metropolitan area, 94.9 per cent of the population growth was in surrounding areas,<sup>12</sup> while only 5.1 per cent of the growth was in the central municipality of Toronto. This limited population growth in the central municipality was far less than its 2001 population share of 53 per cent in the metropolitan area.
- In the Montréal metropolitan area, 76.8 per cent of the population growth was in surrounding areas while only 23.2 per cent was in the central municipality, the Ville de Montréal. The share of population

growth in the central municipality was approximately one-half of its share of the 2001 metropolitan area population.

- In the Vancouver metropolitan area, 75.4 per cent of the population growth was in surrounding areas, while only 24.6 per cent was in the central municipality, the City of Vancouver. Unlike Toronto and Montréal, the central municipality's share of population growth was only slightly less than its 2001 share of the metropolitan area population.

Telecommuting could become important in the future because of the association between working at home and the growing share of peripheral residential locations.

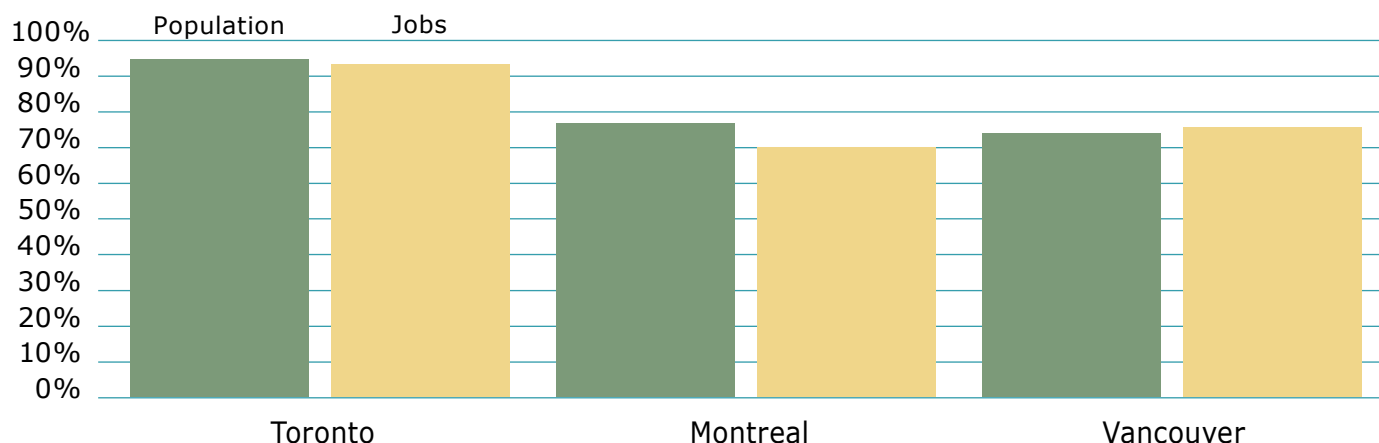
**Employment Dispersion:** Among the three metropolitan areas, the rate of employment growth in surrounding areas was more than double that of core municipalities (12.2 per cent compared with 5.9 per cent). The numeric growth was slightly higher in surrounding areas than in the core municipalities despite the fact that the core municipalities had more than twice as much employment as the suburbs did in 2001.

- In the Toronto metropolitan area, 93.7 per cent of the employment growth was in the surrounding areas, a figure nearly equal to that of the share of surrounding population growth. The central municipality's share of metropolitan employment growth, 6.3 per cent, was well below its 2001 share of employment, which was 56 per cent.
- In the Montréal metropolitan area, 70.8 per cent of the employment growth was in the surrounding areas and was slightly

FIGURE 11

## Peripheral Growth

Share of Metropolitan Area Growth (2001-2006)



less than the share of surrounding population growth. The central municipality's employment growth, 29.2 per cent of metropolitan area growth, was approximately one-half of its 2001 share of employment, which was 58 per cent.

- In the Vancouver metropolitan area, 76.0 per cent of the employment growth was in the surrounding areas and was slightly more than the share of surrounding population growth.

The central municipality's employment growth, 24.0 per cent of metropolitan area growth, was nearly one-third less than its 2001 share of employment, which was 35 per cent.

Thus, working at home has become the virtual equal of transit as a mode of employment access outside the parts of metropolitan areas that are well served by mass transit.

Because of longer work trips and the continuing dispersion of population and employment, working at home could become more important as a method of employment access.

## Access to Employment: Impact on Affluence and Poverty

Improving access to work enhances economic growth and job creation. This primarily involves minimizing the time necessary to access work.

University of Paris researchers found that as the number of jobs that can be accessed in a particular period of time increases, the productivity of an urban area also increases.<sup>13</sup> A related team found that the higher economic productivity of the Paris metropolitan region in comparison with the London metropolitan region was due to the superior highway and mass transit services in Paris, which made it possible for more people to access more employment, because they spent less time travelling to work.<sup>14</sup>

Our urban area research found that greater travel volumes are strongly associated with higher urban income levels. This econometric analysis of data from the 99 international urban areas indicates that average gross product per capita is strongly related to the total kilometres of urban travel per capita.<sup>15</sup> This illustrates the connection between greater employment access and positive economic outcomes.

The research demonstrates the strong association between stronger economic growth and superior employment access (or more-efficient metropolitan labour markets). Stronger economic growth produces greater job creation, which tends to reduce poverty.

At the same time, minimizing travel times in urban areas aids in the movement of freight, contributing to lower product prices, which would lead to larger discretionary incomes. The importance of internal freight movement is illustrated by research in Vancouver, British Columbia,<sup>16</sup> and Portland, Oregon,<sup>17</sup> that highlights the necessity for improving traffic flow to maintain and improve urban area competitiveness.

Thus, the efficiency of urban economies is enhanced as travel speeds are improved and employment access is expanded. Working at home improved employment access even more than improved speeds and decreased travel time, because it eliminates the work trip. The economic impact of working at home can thus be expected to be even more positive.

## Expanding Social Inclusion

Research indicates that cars are an indispensable mechanism for expanding employment opportunities for lower income citizens. This is in part because work-trip travel times are generally reduced compared with other alternatives (such as transit) for most jobs. In addition, cars provide direct access to a far larger number of jobs than do the alternatives (transit, cycling and walking), especially in the surrounding municipalities where most of the job growth is occurring.

A report by the centre-left U.S. Brookings Institution report concluded: "Given the strong connection between cars and employment outcomes, auto ownership programs

may be one of the more promising options and one worthy of expansion."<sup>18</sup>

A study by the U.S. Progressive Policy Institute, a research organization affiliated with the Democratic Leadership Council (of the Democratic Party), noted, "In most cases, the shortest distance between a poor person and a job is along a line driven in a car."<sup>19</sup>

The advantages of working at home are even more pronounced, because there is no work trip and direct access is generally by electronic means rather than by travel. Because of these factors, people who do not have access to a car and people who are constrained by physical disabilities have the potential to enter the workforce. This can contribute to lower poverty rates, less government expenditure on social programs and more-rewarding lives for people who are now able to access employment by working at home.<sup>20</sup>

## Productivity: Business and Government

In the longer run, both business and government will be more effective if they can reduce costs and improve labour productivity. The research on working at home, especially telecommuting, generally indicates improved productivity and lower costs.<sup>21</sup> However, the research is somewhat limited.

The service sector, which is increasing in its share of employment, takes well to telecommuting. This is especially important in the increasingly competitive environment faced by the private sector. Because service sector jobs are easily transferred overseas, it will be important to take advantage of the potential of telecommuting to retain domestic employment.

Employees are able to develop more-effective contact with associates and customers through the advances in information technology such as e-mail, instant messaging, conference calls and video conferencing that make it possible to have important local, regional or even international meetings without the necessity of travel.

Employee absences are a significant cost to employers, in both the public and the private sectors. Telecommuting is reported to boost worker productivity anywhere from 10 per cent to 50 per cent because of a reduction in employee absences. Working at home has been associated with a substantial reduction in employee absences. One study estimated that tele-commuting reduces absenteeism costs by \$2,000 annually per telecommuting employee.<sup>22</sup>

Telecommuting also reduces time lost due to work-trip delays from traffic congestion.<sup>23</sup>

Bell Canada and Allstream (a subsidiary of Manitoba Telecom Services Inc.) have reported gains from telecommuting programs.

- Bell Canada credits its proactive program to encourage telecommuting with improving productivity, reducing employee absenteeism, providing a better work-life balance, providing opportunities for employment to people with disabilities or reduced mobility and improving employee satisfaction.<sup>24</sup>
- Allstream credits its telecommuting with improving productivity, reducing its environmental footprint and improving the work-life balance of participating employees. Allstream also found that its telecommuting program gave it a competitive edge when recruiting high-quality talent.<sup>25</sup>

Reports from other companies also indicate that telecommuting improves productivity.

- IBM, one of the world's largest corporations, relies on telecommuting to such

## Working at Home: Sustainable Employment Access

The scope for success through these strategies to reduce car-oriented greenhouse gas emissions has inherent limits. Cycling and walking do not provide sufficient metropolitan area employment access necessary for an efficiently functioning labour market, though they can be important in the highest density sections of the urban core. Transit can provide greater geographic access than cycling and walking can, but it is expensive to expand and its effectiveness is very limited for destinations outside the urban core.<sup>45</sup>

Given the nature of public transit systems, which can only be viable if a mass of users is heading to a common place (for example, a major cluster of workplaces), getting to these work places by public transit can be difficult.<sup>46</sup>

An alternative is to make commuting by car more environmentally friendly by expanding roadways. Greater highway capacity can reduce greenhouse gas emissions, especially in the most congested corridors. Highway expansion increases vehicle speed and makes it constant rather than erratic. This not only reduces travel time, but it reduces fuel consumption and both atmospheric and air pollution emissions. By increasing vehicle speed, fuel consumption and emissions can be reduced even with longer travel distances.

a degree that 40 per cent of employees no longer have a permanent office in company facilities.<sup>26</sup>

- Cisco reported saving more than \$275-million in costs because of its telecommuting program. Employees reported improved satisfaction and increased productivity.<sup>27</sup>
- Jet Blue (an airline) saves 20 per cent per reservation with its telecommuting virtual call centre.<sup>28</sup>
- A telecommuting program at Best Buy showed employee productivity increased by 35 per cent.<sup>29</sup>
- Absenteeism among British Telecom employees who work at home was reduced 70 per cent.<sup>30</sup>

Employers that are able to make their work more productive using working at home can reduce overhead expenses such as the cost of office space and office equipment.<sup>31</sup> At Sun Micro Systems, nearly one-half of the workforce telecommutes at least part of the time. The company has realized office space and utility savings of approximately \$400-million.<sup>32</sup>

## Employee Satisfaction

A study synthesizing results from 46 other studies found that employee satisfaction generally improved with telecommuting programs, and it noted that such programs assisted companies in retaining valued employees.<sup>33</sup>

Further, telecommuting employees can better balance their work and life responsibilities (such as household), which can lead to less absenteeism and greater job satisfaction, both of which contribute to improved productivity. The principal reason for the improved balance is that working at home provides employees with greater flexibility.

A recent survey by Cisco indicated that more information technology employees in

emerging nations such as Brazil, China and India think that they can work more productively from home.<sup>34</sup> If their employers hold this attitude, international competition could become even more intense.

People who work at home gain economically by not having commuting or office expenses; this increases their discretionary income. They also save time. On an annual basis, the gross amount of time gained by full-time telecommuting ranges from six to nearly 13 full days (24-hour days) per year.<sup>35</sup>

**Caveats:** At the same time, working at home is not a panacea for all employment. Some jobs do not lend themselves to working at home. Jobs that require people to be on the site to meet customers, for example, cannot be converted to working at home.

Some companies and government agencies may not be able to improve productivity through work-at-home programs and some employees may be less productive when working at home.

However, there is sufficient evidence that productivity improvements are possible and working at home is appropriate, and it should be encouraged in such cases.

## Advances in Information Technology

The expanding use of information technology and the improvements in information technology have been a major factor in the expansion of working at home, especially telecommuting. Statistics Canada data indicate that the share of households with a personal computer doubled from 1997 to 2008. In 2008, personal computers were available in 79 per cent of homes. Internet access has grown even faster, from 17 per cent in 1997 to 75 per cent in 2008.<sup>36</sup>

Continuing advances in information technology could lead to further increases in telecommuting.

## Infrastructure and Traffic Congestion

Metropolitan areas face increasing traffic congestion. In 2006, Transport Canada estimated that traffic congestion cost urban areas between \$2.3-billion and \$3.7-billion annually.<sup>37</sup> This includes the value of wasted time as well as the cost of wasted fuel.

Working at home reduces work-trip travel, which can reduce traffic congestion. There are indications that people who work at home reduce their overall daily driving from 33 per cent<sup>38</sup> to 77 per cent.<sup>39</sup> Research also indicates that overall driving by telecommuters is likely to be reduced, extending to travel not associated with work.

There is substantial potential for growth in working at home as a form of employment access. Research in Great Britain and Belgium projected that working at home could reduce overall automobile traffic volumes by up to 8 per cent and that work-trip volumes could be reduced by up to 15 per cent.<sup>40</sup> U.S. research indicates that up to 40 per cent of employment could be converted to working at home.<sup>41</sup> This compares with less than 5 per cent full-time telecommuters working in the United States.<sup>42</sup>

Thus, working at home not only reduces household costs by reducing travel, but it can also reduce the demand for expansion of the transportation infrastructure, such as building new roads and expanding roads and transit. To the extent that working at home reduces future driving, the number of traffic accidents could decrease and car insurance rates could be lowered.

## Environment and Energy

Working at home can assist in meeting the requirements for reducing greenhouse gas emissions. At the employee level, greenhouse gas emissions from the work trip can be reduced 100 per cent by the elimination of the work trip. Further, as noted above, a reduction in non-work related driving could also occur. No other employment access mode can eliminate greenhouse gas emissions.

Gasoline-powered cars and light trucks account for approximately 12 per cent of the nation's greenhouse gas emissions.<sup>43</sup> Various strategies have been proposed to reduce these emissions, especially transferring travel demand in metropolitan areas to transit, cycling or walking, modes of access that are classified by Statistics Canada as "sustainable transportation, because of their lower levels of atmospheric and other emissions."<sup>44</sup> In fact, working at home is by far the sustainable mode of employment access, because it eliminates the need for work trip travel, reducing traffic volumes and emissions from vehicles.

The scope for success through these strategies to reduce car-oriented greenhouse gas emissions has inherent limits. Cycling and walking do not provide sufficient metropolitan area employment access necessary for an efficiently functioning labour market, though they can be important in the highest density sections of the urban core. Transit can provide greater geographic access than cycling and walking can, but it is expensive to expand and its effectiveness is very limited for destinations outside the urban core.<sup>45</sup>

## Working at Home: Sustainable Employment Access

Statistics Canada classifies transit, cycling and walking as “sustainable transportation,” because they tend to have a lower environmental impact (especially in greenhouse gas emissions) at current rates of fuel economy than does the dominant mode of travel, the car.

However, working at home is the most sustainable of employment access modes, because it produces virtually no atmospheric or air pollution emissions. It would be appropriate for Statistics Canada to add working at home to its sustainable transport classification when reporting the 2011 Census results.

The other sustainable modes of employment access, mass transit, walking and cycling, have competitive disadvantages that make them non-competitive with the car for many trips (as discussed above).

*Given the nature of public transit systems, which can only be viable if a mass of users is heading to a common place (for example, a major cluster of workplaces), getting to these work places by public transit can be difficult.<sup>46</sup>*

An alternative is to make commuting by car more environmentally friendly by expanding roadways. Greater highway capacity can reduce greenhouse gas emissions, especially in the most congested corridors. Highway expansion increases vehicle speed and makes it constant rather than erratic.

This not only reduces travel time, but it reduces fuel consumption and both atmospheric and air pollution emissions. By increasing vehicle speed, fuel consumption and emissions can be reduced even with longer travel distances. (Sidebar: Environmental Consequences of Traffic Congestion) The new cloverleafs on the Winnipeg Perimeter highway and the new Calgary Trans-Canada highway bypass are examples of projects that reduce greenhouse gas emissions by improving the flow and speed of traffic, both car and truck.

Further, there is considerable scope for improving the fuel efficiency of cars, which would reduce energy consumption and greenhouse gas emissions. This could be the most promising of the transportation alternatives for reducing emissions from light vehicles.<sup>47</sup> For example, based upon the present fuel economy standards (which are similar in Canada and the United States), the U.S. Department of Energy projects that greenhouse gas emissions from light vehicles will increase only 2 per cent from 2010 to 2035 despite a 50 per cent increase in driving.<sup>48</sup> This estimate does not include the likely impact of future rounds of improved fuel-economy standards.

However, working at home has considerable advantages over other transportation alternatives (more road capacity, better fuel economy, mass transit, cycling and walking) for reducing emissions. Eliminating the work trip reduces consumer costs and the demand for expansion of transport infrastructure while potentially improving employee productivity, flexibility and economic output. These effects can be achieved while reducing greenhouse gas emissions.

# Working at home: The Potential

The potential for reducing driving and greenhouse gas emissions by converting employment to working at home is illustrated by comparing a high-impact scenario and a low-impact scenario.

**Low-impact Scenario:** If working at home were to double, the number of employees working at home full time would rise from the 2006 figure of 1.2 million employees to 2.4 million. If, in addition, those who work at home part time were to do so one more day per week, there would be a total reduction of nearly 9 billion annual kilometres of work-trip driving.<sup>1</sup>

**High-impact Scenario:** In the highest potential traffic-reduction estimates from Europe (8 per cent), the reduction in annual vehicle travel could reach 23.5 billion vehicle kilometres annually.

**Greenhouse Gas Emissions:** These driving reductions would result in energy conservation and environmental advantages. Fuel consumption for light vehicles would decrease between 3 per cent and 8 per cent.

Additional working at home has the potential to reduce greenhouse gas emissions in the range of 2.5 million tonnes to 6.8 million tonnes. This would result in a 3 per cent to 8 per cent reduction in greenhouse gas emissions from light vehicles.

However, these fuel savings and the reduction in greenhouse gas emissions would likely be larger. Work trips occur predominantly in peak travel hours when there is much stop and go traffic and slower travel speeds. As a result, the reduction in greenhouse gas emissions from eliminating the work trip would be greater. Further, because working at home tends to replace longer work trips, the reduction in greenhouse gas emissions would also be greater.





## Environmental Consequences of Traffic Congestion

Cars and trucks tend to consume more fuel and emit more atmospheric and air pollution at slower speeds and especially if those speeds are erratic. Slower and more erratic speeds are more evident in traffic congestion.

Transport Canada data indicate the extent to which fuel consumption rises with slower speeds and greater congestion. The data have been converted to greenhouse gas emissions in grams per kilometre.<sup>50</sup>

On arterial streets, the average car emits nearly 50 per cent more in greenhouse gases in more-congested conditions at 20 kilometers per hour than in less congested conditions at 30 kilometres per hour.

On freeways, the average car emits nearly 75 per cent more in greenhouse gases in more-congested conditions at 20 kilometres per hour than in uncongested conditions at 95 kilometres per hour.

These examples indicate the tenuous connection between the distance driven and greenhouse gas emissions. The slower and more erratic speeds typical of traffic congestion can result in higher levels of greenhouse gas emissions, even for shorter distances. For example, based upon the Transport Canada data, a car averaging 20 kilometres per hour over five kilometres in congested conditions on an arterial street emits as much greenhouse gas as a car traveling 8.6 kilometres at 45 kilometres per hour in uncongested conditions on an arterial street. The Transport Canada data indicate that emissions per kilometre are even less on freeways

# Conclusion

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All things being equal, people have a better quality of life if they have more time to do the activities that they prefer or that are required in their households. People who work at home spend virtually no time commuting to and from work. As a result, they do not encounter the stress, for example, of driving in traffic congestion or riding in crowded trains or buses. All of these factors generally contribute to a better quality of life

Thus, trends indicate the potential for expanding working at home, especially telecommuting. The areas surrounding metropolitan areas are growing the fastest, and working at home represents the most promising alternative to the car in these areas. Information technology advances are continuing and are likely to make telecommuting a more obvious choice for businesses and employees in the future. In a toughening international environment, expanding working at home could be an important strategy to maintain and improve the nation's competitiveness.

Because of its potential for reducing public expenditures, improving productivity and reducing emissions, working at home justifies considerably more attention than it has received thus far. There is a need for more research that is focused on the employee, business, economic and transportation effects of working at home. However, more than research is needed. Public policy mechanisms can be used to broaden knowledge about the advantages of working at home. For example, the City of Calgary has such a program through Calgary Economic Development (in cooperation with Transport Canada).<sup>51</sup>

Governments and regional agencies especially should raise the profile of telecommuting and working at home in their plans and analysis to at least an equal emphasis with transit, cycling and walking. Businesses should examine the potential for improving their performance using telecommuting and working at home.

## Endnotes

1. As is indicated below, automobile market shares are somewhat lower in larger metropolitan areas, while transit market shares are higher. Statistics Canada combines walking and cycling as a single mode of employment access in much of its data.
2. Telework is a related trend, in which employees work at satellite locations nearer their residences, generally connected to the main employment location by information technology. Telework centres may serve multiple employers. "Telework" is also sometimes used to denote working at home as well as working at telework centres.
3. Martin Turcotte, *Working at Home: An Update*, Statistics Canada, 2010.
4. For convenience, the census metropolitan areas and census agglomerations with 100,000 or more people are referred to as metropolitan areas.
5. Estimated using Google Earth Pro.
6. In each of the metropolitan areas, these more transit-oriented areas are adjacent to one another and, therefore, in or near the urban core.
7. Montréal-Ouest, Mont-Royal, Hampstead, Côte-Saint-Luc, Dollard-Des-Ormeaux, Pointe-Claire and Westmount.
8. Burnaby, North Vancouver (city), West Vancouver and Greater Vancouver Regional District Electoral Area (principally the University of British Columbia area).
9. Margaret Walls and Elena Safirova, *A Review of the Literature on Telecommuting and its Implications for Vehicle Travel and Emissions*, Resources for the Future. Available online at [www.rff.org/Documents/RFF-DP-04-44.pdf](http://www.rff.org/Documents/RFF-DP-04-44.pdf).
10. Available online at <http://www.statcan.gc.ca/pub/11-008-x/2010002/article/11159-eng.htm>.
11. These trends would be less evident in metropolitan areas such as Ottawa, Calgary and Edmonton, where the central municipality is a much larger share of the population (because it includes large areas that are more typical of suburbs than of the urban core).
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42. As indicated above, the employment access share for working at home is higher in Canada than in the United States.

43. Calculated from Environment Canada, *A Summary of Trends: 1990-2008: Sectoral Greenhouse Gas Emission Summary*. Available online at <http://www.ec.gc.ca/ges-ghg/default.asp?lang=En&n=F1CA74A6-1>.
44. See, for example: *Employed labour force (1) by mode of transportation, both sexes, 2006 counts, for Canada, provinces and territories of residence - 20% sample data*, Statistics Canada. Available online at <http://www12.statcan.gc.ca/census-recensement/2006/dp-pd/hlt/97-561/T603-eng.cfm?SR=1>.
45. A recent Brookings Institution study in the United States found that, on average, only 7 per cent of jobs in metropolitan areas with 500,000 people could be reached by the average resident in 45 minutes or less. More than 85 per cent of car commuters in the same metropolitan areas reach their jobs in 45 minutes or less. It is likely that the access figure would be higher in Canada, because of higher transit service levels. For example, Vancouver and Portland, Oregon, metropolitan areas have similar populations. Yet, transit ridership in the Vancouver metropolitan area is more than three times that of Portland. Similar data are not available for the other metropolitan areas of Canada. See Adie Tomer, Elizabeth Kneebone, Robert Puentes and Alan Berube, *Missed Opportunities: Transit and Job Access in Metropolitan America*, 2011. Available online at [http://www.brookings.edu/reports/2011/0512\\_jobs\\_and\\_transit.aspx](http://www.brookings.edu/reports/2011/0512_jobs_and_transit.aspx).
46. *Commuting Patterns and Places of Work of Canadians, 2006 Census: Portrait of census metropolitan areas and their municipalities: Place of work*. Available online at <http://www12.statcan.ca/census-recensement/2006/as-sa/97-561/pdf/97-561-XIE2006001.pdf>.
47. See, for example, *Reducing U.S. Greenhouse Gas Emissions: How Much at What Cost?* McKinsey & Company and The Conference Board, Executive Report, December 2007. Available online at [http://www.mckinsey.com/Client\\_Service/Sustainability/Latest\\_thinking/~/\\_media/McKinsey/dotcom/client\\_service/Sustainability/PDFs/Reducing%20US%20Greenhouse%20Gas%20Emissions/US\\_ghg\\_final\\_report.ashx](http://www.mckinsey.com/Client_Service/Sustainability/Latest_thinking/~/_media/McKinsey/dotcom/client_service/Sustainability/PDFs/Reducing%20US%20Greenhouse%20Gas%20Emissions/US_ghg_final_report.ashx). This report was co-sponsored by the Environmental Defense Fund, the Natural Resources Defense Council, Shell, National Grid, DTE Energy and Honeywell, which indicated that substantial and cost-effective GHG emission reductions were possible while requiring "no change in thermostat settings or appliance use, no downsizing of vehicles, home or commercial space and traveling the same mileage."
48. United States Department of Energy, Energy Information Administration, *Annual Energy Outlook: 2011*.
49. Based on the 2008 light vehicle kilometres from Transport Canada (available online at <http://www.tc.gc.ca/eng/policy/report-aca-anre2009-2464.htm>) and assuming round-trip travel of 11.5 kilometres.
50. Greenhouse gas emissions are directly proportional to fuel consumption.
51. Calgary Region Telework Initiative, Transport Canada. Available online at [http://www.tc.gc.ca/eng/programs/environment-ecomobility-projects-calgary\\_telework-eng-593.htm](http://www.tc.gc.ca/eng/programs/environment-ecomobility-projects-calgary_telework-eng-593.htm).

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