The Effects of Long Commutes and What To Do About Them
An Annotated Bibliography
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Prepared by CloseCommute Systems Inc.

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We gratefully acknowledge the assistance of Todd Litman, executive director of the Victoria Transport Policy Institute, in locating and annotating the scientific research.

CloseCommute Systems Inc., a BC-based benefit corporation, is creating two catalysts – a program blueprint for regional governments and a toolkit for employers – to trigger widespread adoption of the Closer Commutes transportation demand management strategy. Contact: Bruce Batchelor, chief organizer – bruce.batchelor@gmail.com
Executive summary

**Closer Commutes** is a common-sense efficiency initiative that could reduce the commuting distances and times for millions of commuters around the world. The process – for commuters and their employers – is simple to understand and implement, at very modest cost.

The Closer Commutes approach calls for multi-worksite employers – school boards, banks, municipalities, health authorities, retail and hospitality chains, etc. who collectively employ about 40% of the urban workforce – to modernize their human resources policies to reduce unnecessary long commutes in these ways:

1. **Swapping work locations.** Allow and encourage people doing the same job to switch locations to improve the commute for both parties. Maintain data on employees’ commutes and regularly examine for potential voluntary swap matches.
2. **Internal openings and new hires.** Consider transfer candidates’ commute times as a criterion when filling internal job openings. Maintain a roster of employees’ desired worksites. Assign new hires to sites near their homes.

A pilot project at 30 Seattle-area bank branches demonstrated a 17% reduction in total employee commute distance could be achieved within 15 months.

**Peer-reviewed research in this annotated bibliography** points to these results/benefits:
- For long commuters – more quality time each day; less stress; improved mental and physical health; better social and family interactions; reduced commuting costs; etc.
- For employers – reduced costs for absenteeism, hiring, training and healthcare; higher productivity; etc.
- For society and the environment – potentially $100s of millions in economic benefits to each metro area; reduced traffic load and congestion; less pollution; decreased greenhouse gas emissions.

In **Part 1, Research on the effects of long commutes**, studies establish that long commutes have adverse effects on commuters’ mental and physical health, activities and social life, family relationships, finances, etc. Long commutes also have been linked to negative effects for their employers, society and the environment: reduced productivity, absenteeism, workplace injuries, traffic congestion, infrastructure costs, pollution, healthcare costs, vehicular accidents, greenhouse gas emissions, etc. We have also included a sampling of articles from popular media discussing the effects of long commutes.

In **Part 2, Calculating the costs of long commutes**, we examine approaches for quantifying the benefits to various stakeholders that accrue from reducing commute distance and duration. **Part 2a** introduces methodologies for commuting vehicle costs, mostly focused on the commuter personally [“internal costs”]. In **Part 2b**, calculators are presented for the “external costs” including transportation system infrastructure, greenhouse gases, reduced commercial productivity due to transport congestion, regional economic impact, etc.

In **Part 3, A transportation planning perspective**, we review the history and the transportation planning profession’s perspective on ProximateCommute™ (now called Closer Commutes).

In **Part 4, Implementing Closer Commutes – process, costs/benefits & risk management considerations**, we describe the implementation process, then discuss an employer’s potential implementation costs and benefits, and other considerations associated with a Closer Commutes long commuting reduction program.
Part 1. Research on the effects of long commutes

Peer-reviewed research from many countries indicates that longer commutes are linked to increased worker stress, unhappiness, sedentary living (lack of exercise) and obesity, and pollution exposure, leading to reduced productivity and job dissatisfaction, illness and absenteeism, and domestic conflicts among other impacts. Specifically studies have identified correlations between long commutes and these outcomes:

**Physical health**
- obesity or adiposity [severe or morbidly overweight] (Jacobson et al., 2011) (Jilcott et al., 2010) (Lopez-Zetina et al., 2006) (Hoehner et al., 2012) (Sacker et al., 2014) (Sugiyama et al., 2016)
- higher daily exposure to particulate matter and black carbon (Karanasiou et al., 2014)
- more visits to general practitioner (Künn-Nelen, 2016)
- lower cardiorespiratory fitness (Hoehner et al., 2012) and higher cardio-metabolic risk (Hoehner et al., 2012) (Sugiyama et al., 2016)
- higher blood pressure (Novaco et al., 1979)
- chronic fatigue (Kageyama et al., 1998)
- diabetes mellitus (Tsujii et al., 2015)
- self-reported poor health, serious backache, headaches, sleep disorders and fatigue (Hämmig et al., 2009)

**Mental health**
- anxiety and depression, lack of energy and optimism (Hämmig et al., 2009)
- chronic stress, being in a sympathodominant state (Kageyama et al., 1998)
- increased stress and anxiety (Pohanka et al., 2004)
- lower sense of well-being (Stutzer et al., 2008)

**Activities**
- reduction in sleeping, physical activity and food preparation which over time may contribute to obesity and other poor health outcomes (Christian, 2012)
- less physical exercise (Künn-Nelen, 2016) (Hoehner et al., 2012) (Nomoto et al., 2015)
- fewer sleeping hours (Nomoto et al., 2015)

**Work Performance**
- increased sickness absence (Ala-Mursula et al., 2006) (Künn-Nelen, 2016)
- longer average paid time loss days due to work-related injury (Fan et al., 2013)
- fewer working hours (Nomoto et al., 2015)
- more accidents (Pohanka et al., 2004)
- lower job satisfaction and decreased intention to stay with same employer (Steinmetz et al., 2014)

**Social life**
- less access to social capital (Besser et al., 2008); less time with friends (Sandow, 2011); and social isolation (Pohanka et al., 2004)
- higher time- and strain-based work-life conflict [WLC] (Hämmig et al., 2009)
- strain on relationships and likelihood of divorce (Sandow, 2011)
- low social participation and low general trust (Mattisson et al., 2015)

[Note: Part 2 provides various methods for quantifying the financial effects of long commuting for the commuter and for society.]
1a. Studies published in the scientific literature

Ala-Mursula et al., 2006

This 2000-01 study explored the associations of working hours (paid, domestic, commuting, and total) with sickness absence, and examined whether these associations vary according to the level of employee control over daily working hours. Prospective cohort study among 25,703 full-time public sector employees in 10 towns in Finland. **Long commuting hours were related to increased rates of sickness absence.**

Besser et al, 2008

The suggested declining trend in social capital among Americans could be due, in part, to long commute times associated with urban sprawl. In 2007, the 2001 National Household Travel Survey (NHTS) was used to determine the association between commute time and socially-oriented trips, a proxy measure of social capital, while controlling for individual-level and regional-level characteristics. Socially-oriented trips were those taken to: attend school/religious activities; attend social/recreational activities; visit friends/relatives; go out for entertainment; attend funerals/weddings/social events; exercise/play sports; attend to family/personal obligations; participate in organizational meetings; or transport someone.

Higher commute time (>20 minutes) was significantly associated with no socially-oriented trips (adjusted OR=1.17, 95% CI=1.09–1.25). The strongest association was among 90+ minute commuters (adjusted OR=1.50, 95% CI=1.16–1.94).

Conclusions: **This study suggests that individuals with longer commutes have less access to social capital, as indicated by fewer socially-oriented trips.**

Christian, 2012

This study examined individuals' trade-offs between health-related activities and commuting time. A cross-section of 24,861 working-age individuals employed full-time and residing in urban counties is constructed from the American Time Use Survey (2003-2010). **Spending more time commuting is associated with a reduction in aggregate health-related activities including sleeping, physical activity and food preparation.** These results indicate that longer commutes are associated with behavioral patterns which over time may contribute to obesity and other poor health outcomes.
Fan et al., 2013


This study examined 149,110 incident claims while adjusting for multiple risk factors in a large sample of Washington State workers’ compensation claims during 2002-2008.

**Compared to those who live in the Urban Core, workers in other areas [i.e., longer commuters] experienced longer average paid time loss days due to work-related injury.** The association between residential location and long-term disability was significant and persisted after controlling for injury nature, socio-demographic, employment-related, and claim administrative characteristics.

Hämmig et al., 2009


The aim of the present cross-sectional study was to examine work- and nonwork-related factors and physical and mental health outcomes associated with combined **time- and strain-based work-life conflict (WLC)** among adult employees living and working in Switzerland as well as possible gender differences in this regard. The analysis was restricted to 4,371 employees aged 20 to 64 years.

12.5% of the study population had a high or very high WLC score. Prevalence rates are clearly above average in men and women with higher education [and] long commuting time to work.... In both men and women, WLC is associated with several physical and mental health problems. Employees with high or very high WLC show a comparatively high relative risk of self-reported poor health, anxiety and depression, lack of energy and optimism, serious backache, headaches, sleep disorders and fatigue.

Hoehner et al., 2012


This cross-sectional study included 4297 adults who had a comprehensive medical examination between 2000 and 2007 and geocoded home and work addresses in 12 Texas metropolitan counties.

**Commuting distance was negatively associated with physical activity and cardiorespiratory fitness, and positively associated with BMI, waist circumference, systolic and diastolic blood pressure, and continuous metabolic score in fully adjusted linear regression models.** Commuting distance was adversely associated with physical activity, cardiorespiratory fitness, adiposity [severe or morbidly overweight], and indicators of metabolic risk.

Jacobson et al., 2011

The study found that vehicle use (measured in annual vehicle-miles traveled) correlated as high as 99 percent with annual obesity rates.

Jilcott et al., 2010

We examined correlations between percentage of rural residents, commute times, food retail gap per capita, and body mass index (BMI) among North Carolina residents. Individual-level BMI was positively associated with county-level commute times and food retail gaps. This suggests that longer commute times and greater retail gaps may contribute to the rural obesity disparity.

Kageyama et al., 1998

To investigate the possible effects of long commuting time and extensive overtime on daytime cardiac autonomic activity, the short-term heart rate variability (HRV) both at supine rest and at standing rest of 223 male white-collar workers in the Tokyo Megalopolis was examined. Workers with a one-way commute of 90 min or more exhibited decreased vagal activity at supine rest and increased sympathetic activity regardless of posture, and those doing overtime of 60 hr/month or more exhibited decreased vagal activity and increased sympathetic activity at standing rest. These findings suggest that chronic stress or fatigue resulting from long commuting time or extensive overtime caused these individuals to be in a sympathodominant state.

Karanesiou et al., 2014

Commuting is considered as one of the high-exposure periods among various daily activities, especially in high vehicle-density metropolitan areas. There is a growing awareness of the need to change our transportation habits by reducing our use of cars and shifting instead to active transport, i.e. walking or cycling. A review was undertaken using the ISI web of knowledge database with the objective to better understand personal exposure during commuting by different modes of transport, and to suggest potential strategies to minimise exposure. The air pollutants studied include particulate matter [PM], black carbon [BC] and particle number concentration. We focused only in European studies in order to have comparable situation in terms of vehicle fleet and policy regulations applied. Studies on personal exposure to air pollutants during car commuting are more numerous than those dealing with other types of transport, and typically conclude by emphasising that travelling by car involves exposure to relatively high particulate matter, PM exposure concentrations. Thus, compared to other transport methods, travelling by car has been shown to involve exposure both to higher PM and BC as compared with cycling. Widespread dependence on private car transport has produced a significant daily health threat to the urban commuter.
Künn-Nelen, 2016

This paper analyzes the relation between commuting time and health in the UK. The study indicates that... subjective health measures are clearly lower for people who commute longer. A longer commuting time is, moreover, related to more visits to the general practitioner. Effects turn out to be more pronounced for women and for commuters driving a car. For women, commuting time is also negatively related to regular exercise and positively to calling in sick.

Lopez-Zetina et al., 2006

Obesity and physical inactivity are known to be risk factors for many chronic diseases including hypertension, coronary artery disease, diabetes, and cancer. We sought to explore the association between an indicator of transportation data (Vehicle Miles of Travel, VMT) at the county level as it relates to obesity and physical inactivity in California.

Data from the California Health Interview Survey 2001 (CHIS 2001), the US 2000 Census, and the California Department of Transportation were merged to examine ecological correlations between vehicle miles of travel, population density, commute time, and county indicators of obesity and physical inactivity.

By rank bivariate correlation, obesity and physical inactivity were significantly associated (p<0.01). By rank analysis of variance, the highest mean rank obesity was associated with the highest rank of VMT (p<0.01). Similar rank patterns were observed between obesity and physical inactivity and commute time.

This analysis adds to the growing evidence supporting the association between VMT (Vehicle Miles of Travel, a measure of automobile transportation) and obesity.

Mattisson et al., 2015
[https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4509867/]

We investigated the relation between commuting time and mode, and social participation and general trust in other people as measures of social capital, using data from public health surveys conducted in 2004 and 2008 in Scania, Sweden: in all, 21,088 persons ages 18 to 65 and working at least 30 hr per week. Commuting by car was significantly associated with a higher prevalence of low social participation and low general trust compared with active commuting, and the association increased with the duration of commuting time. In contrast, public commuting was not significantly associated with decreased social capital measures except among long-duration commuters, who reported lower social participation. The overall pattern was similar for men and for women.
Nomoto et al., 2015

This study investigates the effects of long-time commuting and long-hour working on lifestyle including sleeping, physical exercise, breakfast, smoking, alcohol intake and mental health. In this cross-sectional study, data were collected from 146 school teachers in Tokyo. The results indicated that longer commuting time was significantly associated with shorter working hours, less physical exercise and fewer sleeping hours.

Novaco et al., 1979

Conditions of transportation were investigated as sources of psychological stress as they affect the physiology, task performance, and mood of commuters. Participants in the study were 100 employees of industrial firms. In multiple regression analyses, the distance and speed of the commute to work were found to account for significant proportions of variation in blood pressure.

Pohanka et al., 2004

Greater air pollution contributes to higher asthma and other lung disorder rates. An increased dependence on the automobile encourages a more sedentary lifestyle and can potentially contribute to obesity. The increased danger and stress of long commutes can lead to more accidents, anxiety, and social isolation.

Sacker et al., 2014
A Sacker, Flint E, Cummins S (2014). "Associations between active commuting, body fat, and body mass index: population based, cross sectional study in the United Kingdom," The British Medical Journal. 2014;349:g4887 [http://www.bmj.com/content/349/bmj.g4887]

Cross sectional study of data from the wave 2 Health Assessment subsample of Understanding Society, the UK Household Longitudinal Study (UKHLS). The exposure of interest, commuting mode, was self reported and categorised as three categories: private transport, public transport, and active transport. The analytic samples (7534 for body mass index (BMI) analysis, 7424 for percentage body fat analysis) were drawn from the representative subsample of wave 2 respondents of UKHLS who provided health assessment data (n=15 777).

Results from multivariate linear regression analyses suggest that, compared with using private transport, commuting by public or active transport modes was significantly and independently predictive of lower BMI for both men and women. Results for percentage body fat were similar in terms of magnitude, significance, and direction of effects.

Conclusions: Men and women who commuted to work by active and public modes of transport had significantly lower BMI and percentage body fat than their counterparts who used private transport. These associations were not attenuated by adjustment for a range of hypothesised confounding factors.
Sandow, 2011

The study covers more than two million Swedes who were married or cohabiting in 2000, and the results are based on Statistics Sweden's registry data for these individuals from 1995 and 2005.

Summary: commuting to work can be advantageous in terms of income and career opportunities, and it presents a good alternative to moving. But long commuting times also entail less time for family and friends and can lead to stress and health problems. Pair relationships are also jeopardized, and the risk of separation is 40 percent higher among long-distance commuters than among other people.

Stutzer et al., 2008

We find that people with longer commuting time report systematically lower subjective well-being. This result is robust with regard to a number of alternative explanations.

Shekarrizfard et al., 2016

This study applied integrated transportation, emissions and atmospheric dispersion models to evaluate individuals' air pollution exposure in Montreal, Canada. Results indicate that, on average, individuals increased their exposure by 23-44% while commuting and conducting activities out of home.

Steinmetz et al., 2014

Using data from the Wage-Indicator web survey (N = 5,323), regression models were used to estimate healthcare employee’s intention to stay for Belgium, Germany and the Netherlands. In particular, working part-time hours, overtime and a long commuting time decrease the intention to stay with the same employer. The analysis also shows that job dissatisfaction is a strong predictor for the intention to leave, next to being a woman, being moderately or well educated, and being promoted in the current organization. Attention to working and commuting times can complement attention to wages and wage satisfaction to increase employees' intention to stay. These results indicate that it is important to consider workers' satisfaction with overtime hours, part-time work, and commute travel time, in addition to wage satisfaction, in order to manage health workforce retention.
Sugiyama et al., 2016

This study examines associations of time spent sitting in cars with markers of cardio-metabolic risk in 2,800 Australian adults (age range: 34-65). Compared to spending 15 min/day or less in cars, spending more than 1 hr/day in cars was significantly associated with higher BMI, waist circumference, fasting plasma glucose, and clustered cardio-metabolic risk, after adjusting for socio-demographic attributes and potentially relevant behaviors including leisure-time physical activity and dietary intake. This indicates that prolonged time spent sitting in cars, in particular over 1 hr/day, is particularly detrimental.

Car commuters have been shown to have higher odds of being overweight or obese, compared to non-car commuters (Laverty et al., 2013; Lindstrom, 2008). Frequent car use for commuting and errands has been associated with higher BMI (Pendola and Gen, 2007). A recent review has shown that longer car use (measured in time or in distance) was significantly associated with higher weight status in eight out of 10 studies (McCormack and Virk, 2014). Longitudinal studies have also found frequent and longer car use to be associated with greater weight gain and higher cardiovascular mortality (Sugiyama et al., 2013; Warren et al., 2010). These studies, however, have used predominantly self-reported adiposity measures. One study reported distance between home and work to be associated with a metabolic syndrome risk score derived from objectively-assessed biomarkers (Hoehner et al., 2012).

Tsuji et al., 2015

Researchers studies 5,908 commuting workers in Osaka, Japan. The use of public transportation (compared to car driving) was associated with lower prevalence of excess body weight, hypertension and diabetes mellitus.

UK Office for National Statistics, 2014
1b. Selected further reading

Brain, 2016

Cassidy, 1992

Delmelle, 2013

European Policy Brief, 2008

Evans et al., 2002

Fenz et al., 2013
Z Feng, Boyle P (2013). "Do long journeys to work have adverse effects on mental health?" Environment & Behavior. Advance online publication. doi:10.1177/0013916512472053 [Cross Ref]

Flood et al., 2005

Gatersleben et al., 2007

Kluger, 1998
Koslowsky et al., 1995

Lyons et al., 2008

Newman et al., 2014

Novaco et al., 1990

Sandow, 2013

Sandow et al., 2010
1c. Examples of popular media articles about the effects of long commutes

Dirksen, 2001

When asked to name the worst part of our day by happiness researchers, we consistently name commuting as at least one of our least favorite activities ... Swiss economists Bruno Frey and Alois Stutzer found that “people with longer commuting time report systematically lower subjective well-being.”

... The rewards associated with longer commutes — a bigger house, a higher salary or better schools — don’t fully compensate for the sacrifices we end up making by working so far from home (e.g., less time with family, and health issues like back pain, higher cholesterol, weight gain and anxiety).

... “You can’t adapt to commuting, because it’s entirely unpredictable,” explains Harvard psychologist Daniel Gilbert. “Driving in traffic is a different kind of hell every day.”

... Frey and Stutzer found that to be compensated for a one-hour commute — as opposed to none at all — you would need to make a 40-percent higher salary. The extra income might help with overall happiness, especially if it helps to pay for more enjoyable experiences, but a longer commute can also affect those things that rank high in happiness studies: your relationships. Harvard political scientist Robert Putnam can even offer a calculation. “There’s a simple rule of thumb: Every 10 minutes of commuting results in 10 percent fewer social connections. Commuting is connected to social isolation, which causes unhappiness.”

Evangelista, 2014

A survey of about 5,000 knowledge workers in the U.S., Europe and the Middle East indicates that given the choice between a 10 percent wage raise or the ability to work from home two or three days a week, 53 percent would pick the work from home option.

Ingraham, 2016

Speaking more abstractly, there's a huge pool of more or less untapped human potential currently locked up in long commutes. Thought experiment: Let's say we could wave a magic wand and reduce the commute times of the most extreme commuters -- those commuting for 90 minutes or longer one way. And let's say we could reduce their typical commute from 90 minutes down to, say, 30 minutes -- closer to the national average.

Consider the transformational effect this would have at the individual level, giving these folks two hours of their day back. And then multiply that two-hour time savings by the 250 work days
in a typical year -- that's 500 extra hours a year. **Multiply that by 3.6 million workers, and you come out to about 1.8 billion man-hours of potential productivity released back into the economy. That's the time-equivalent of 900,000 full-time jobs.**

Now if you give a person two free hours, he's probably not going to spend that time working. He'll watch TV or play Candy Crush or drink beer with his friends, or do other things that are not necessarily productive. But over time, that person will have more time to be civicly engaged. He'll have more time to take care of his kids or his health or his marriage. He'll be better-rested, and a better worker for it. The benefits are potentially limitless.

**Lowrey, 2011**


Researchers at Umea University in Sweden reported that **couples in which one partner commutes for longer than 45 minutes are 40 percent likelier to divorce, and that people with long transit times suffer from disproportionate pain, stress, obesity, and dissatisfaction.**

First, the research proves the most obvious point: We dislike commuting itself, finding it unpleasant and stressful. In 2006, Nobel laureate Daniel Kahneman and Princeton economist Alan Krueger surveyed 900 Texan women, asking them how much they enjoyed a number of common activities. Having sex came in first. Socializing after work came second. Commuting came in dead last ... A survey conducted for the Gallup-Healthways Well-Being Index found that **40 percent of employees who spend more than 90 minutes getting home from work “experienced worry for much of the previous day.”** ... Workers with very long commutes feel less rested and experience less “enjoyment,” as well.

Long commutes also make us feel lonely. Robert Putnam, the famed Harvard political scientist and author of Bowling Alone, names long commuting times as one of the most robust predictors of social isolation ... The *Gallup survey*, for instance, found that **one in three workers with a 90-minute daily commute has recurrent neck or back problems** ... When we spend more time commuting, we spend less time exercising and fixing ourselves meals at home.

According to research from Thomas James Christian of Brown University, **long commutes also tend to increase the chance that a worker will make “non-grocery food purchases”—buying things like fast food—and will shift into “lower-intensity” exercise. It is commuting, not the total length of the workday, that matters, he found.** Take a worker with a negligible commute and a 12-hour workday and a worker with an hour-long commute and a 10-hour workday. The former will have healthier habits than the latter, even though total time spent on the relatively stressful, unpleasant tasks is equal.

... Researchers at the University of California, **looked at the relationship between obesity and a number of lifestyle factors, such as physical activity. Vehicle-miles traveled had a stronger correlation with obesity than any other factor.**

University of Zurich economists Bruno Frey and Alois Stutzer found that **for an extra hour of commuting time, you would need to be compensated with a massive 40 percent increase in salary to make it worthwhile.**

**Morin, 2014**


A University of Waterloo study published in *World Leisure Journal* discovered a direct link between commute time and well-being: **people with the longest commutes have the lowest overall satisfaction with life** ... People who spend the most time on the road experience higher
levels of stress because they constantly feel hurried. Many of them spend much of their time on the road worrying about all the activities they’re missing. Traffic congestion tops the list for reasons why commuters experience increased stress. The lack of physical leisure time was a close second. People with rigid work hours and lower incomes were particularly susceptible to decreased life satisfaction associated with long commutes. Women and individuals with a partner also experienced a greater negative impact due to the stress associated with time away from family.

... A 2008 study published in the American Journal of Preventative Medicine found that people with longer commutes, particularly over 90 daily minutes, were less likely to spend time with friends, were more likely to miss children’s school activities and less likely to eat dinner with friends and family. This tends to increase stress and decrease life satisfaction.

Pinola, 2011

We all know that driving to and from work every day is costly, but exactly how much of a toll does each mile of commuting take on your finances? This True Cost of Commuting graphic breaks it down. Taking stats and calculations previously mentioned by Mr. Money Mustache, the infographic illustrates just how expensive commuting is. Each mile you live from work costs $795 in commuting expenses per year (assuming a driving cost of 34 cents per mile and factoring time lost with a salary of $25 per hour). $795 a year for just one mile! You could buy a house worth $15,900 more with that, as Mr. Money Mustache pointed out in his article, since $795 would cover the interest on a 5% mortgage rate.

Pinola, 2015

We all know that spending hours commuting sucks—it’s not only expensive, it can also take its toll on your health. A happiness researcher has quantified just how much happier we could be if we cut our commutes: about $40,000 happier.

The number comes from National Geographic fellow and author of Thrive: Finding Happiness the Blue Zones Way Dan Buettner. In an interview with NPR, Buettner says: “When you look at Americans’ day-to-day activity ... the top two things we hate the most on a day-to-day basis is, No. 1: housework and No. 2: the daily commute in our cars. In fact, if you can cut an hour-long commute each way out of your life, it’s the [happiness] equivalent of making up an extra $40,000 a year if you’re at the $50- to $60,000 level. Huge ... [So] it’s an easy way for us to get happier. Move closer to your place of work.”
Part 2. Calculating the costs of long commutes

Long-term long distance commuting particularly in a private vehicle (i.e. not public transit) has many significant effects, as shown in Part 1. The percentage of people using cars has been investigated by Sugiyama et al., 2016:

“The proportion of adults who use a car as the main form of transport to work or for other commuting purposes is high: 86% in the USA and 78% in Australia (Australian Bureau of Statistics, 2012; McKenzie and Rapino, 2011). Even in European countries, which can have more-compact urban environments and more accessible public transport, the majority of trips are made by cars. For example, cars are used for 64% of all instances of travel in the UK, and 53% in Sweden (Transport Analysis, 2012; UK Department of Transport, 2013). Car use is not only high in frequency, but can also be substantial in duration. Australian household travel surveys show that adults spend on average more than 50 min/day in a car (Ironmonger, 2008), with up to 18% of men and 12% of women spending more than 2 h/day (Sugiyama et al., 2012).”

Across the Abbotsford-Mission, Vancouver and Victoria CMAs, 69% of commuters are travelling by car, truck or van, according to Statistics Canada’s 2011 National Census data.

In Part 2a, we present various mechanisms being used to measure the direct financial effects of commuting.

In Part 2b, we examine ways to measure external costs.
2a. Calculating the direct financial costs of commuting

Caitlin Millar (2015), *What is the Full Cost of Your Commute?*, Moving Forward, Discourse Media (http://movingforward.discoursemedia.org); at http://movingforward.discoursemedia.org/costofcommute. This journalism project about Metro Vancouver transportation includes estimates of commuting internal and external costs, as illustrated below. The study’s sources are available at http://movingforward.discoursemedia.org/cost-of-commute-calculator-data. The website includes the following images.

![Diagram showing the costs of commuting in Vancouver](image)

*This figure indicates the estimated total costs (including internal and external costs) of a typical commute in Vancouver by walking, cycling, public transit and automobile travel.*
This figure compares the internal and external costs of a typical commute in Vancouver by walking, cycling, public transit and automobile travel.
Mr. Money Mustache (2011), *The True Cost of Commuting* ([http://lifehacker.com/5848665/the-true-cost-of-commuting](http://lifehacker.com/5848665/the-true-cost-of-commuting)). This financial advisor estimates that direct commuting costs average at least 17¢ per automobile-mile, if using a “super thrifty paid-off economy car.” They also calculate that a working couple could afford a home that costs US$954,000 more if they have a 19-mile-shorter commute. See accompanying infographic.
Commuter Solutions Commute Cost Calculator (www.commutesolutions.com/commute-cost-calculator). This calculator uses standard U.S. data sources to calculate the costs of commuting by automobile.

This website calculator estimates a drivers’ commuting costs taking into account commute frequency, distance, fuel type, vehicle depreciation and parking costs.

The Canadian (http://caa.ca/car_costs) and American Automobile Associations (http://exchange.aaa.com/automobiles-travel/automobiles/driving-costs) provide documents and calculators for estimating vehicle costs. Because they reflect relatively new vehicles (the types their members own) with high depreciation and comprehensive insurance coverage, their estimates tend to have relatively high fixed costs compared with the fleet average.
Commuter Costs Calculator ([www.tps.ucsb.edu/commuter-cost-calculator](http://www.tps.ucsb.edu/commuter-cost-calculator)) by the Transportation & Parking Services at the University of California, Santa Barbara. This calculator calculates various costs of automobile commuting (fuel and parking, vehicle ownership costs, and carbon emission costs), and compares them with the costs of other modes.

Ottawa Ride Match Commuter Cost Calculator ([www.ottawaridematch.com/Public/PublicPage.aspx?ItemName=CommuteCost&FileType=ASCX](http://www.ottawaridematch.com/Public/PublicPage.aspx?ItemName=CommuteCost&FileType=ASCX)). This calculator estimates fuel, maintenance and tires, fixed vehicle costs, and carbon emissions for automobile commuting.

BC Transit Calculate my Commuter Costs ([https://bctransit.com/central-fraser-valley/about/sustainability/calculate-my-commuter-costs](https://bctransit.com/central-fraser-valley/about/sustainability/calculate-my-commuter-costs)). This calculator estimates automobile commuting fuel, parking and vehicle depreciation costs, and potential savings from transit commuting.

Walkscore Commute Cost Calculator ([www.walkscore.com/commute-cost-calculator](http://www.walkscore.com/commute-cost-calculator)) estimates the time and money costs of commuting, and therefore the potential savings of reduced commute distances. It implies that these savings can be invested in a more valuable house.

The “Vehicle Costs” chapter of *Transportation Costs and Benefit Analysis* ([www.vtpi.org/tca/tca0501.pdf](http://www.vtpi.org/tca/tca0501.pdf)). This report discusses various types of vehicle costs. The table below summarizes vehicle cost categories.

### Vehicle Costs Categories

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>Typical Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle operating costs</td>
<td>Fuel, oil and tire wear.</td>
<td>15-20¢ per vehicle-mile. Higher under congested conditions.</td>
</tr>
<tr>
<td>Other distance-based costs</td>
<td>Distance-based maintenance and depreciation, mileage lease fees, additional crash and citation risk costs.</td>
<td>10-20¢ per vehicle-mile.</td>
</tr>
<tr>
<td>Special fees</td>
<td>Parking fees and road tolls.</td>
<td>Varies.</td>
</tr>
<tr>
<td>Vehicle ownership costs</td>
<td>Time-based depreciation, financing, insurance, registration fees and taxes.</td>
<td>$3,000-5,000 per vehicle-year.</td>
</tr>
<tr>
<td>Residential parking</td>
<td>Residential parking costs, which are minimal for residents who can park free on the street, and costly for those who use a parking garage.</td>
<td>$0-2,000 per vehicle-year.</td>
</tr>
</tbody>
</table>

*Automobiles involve various types of costs. Different types of analysis consider different types of costs.*
Note on Part 2a

Various calculators estimate vehicle costs and therefore the savings from commuter travel reductions. Many estimates only consider fuel, which typically average about 10-20¢ per vehicle-mile, and some consider parking fees and road tolls, but few consider vehicle maintenance and mileage-based depreciation which typically average 20-40¢ per vehicle-mile. Few consider the higher fuel and maintenance costs for driving under congested, urban-peak conditions. Fixed costs are often ignored, although a few use automobile-association total average costs which range from 50-80¢ per mile. Some calculators estimate carbon emissions, and a few monetize these costs, but other external costs are generally ignored. As a result, most calculators underestimate the full costs of urban-peak driving, and therefore the full benefits of commute travel reductions, although a few (those that use automobile association average cost estimates) may somewhat overestimate marginal vehicle costs.
2b. Calculating the external (social) costs

External (also called social) impact refers to benefits and costs to other people. Automobile travel imposes various external costs, including traffic and parking congestion, uncompensated crash damages imposed on others, and pollution emissions (some of the previously cited commuter calculators include estimated costs of climate change emissions, but no other external costs). These costs tend to be particularly high under urban-peak conditions. As a result, reducing urban peak vehicle travel can provide increased external benefits. The following references include estimates of motor vehicle external costs.

American Automobile Association infographic (undated), “Money that could stay in the local economy” annually

According to AAA, Americans spend on average $8,485 each year on their cars. Seems like a lot of money, doesn’t it? And most of that money leaves your local economy. What if you were able to get rid of a car and spend—or invest—that money in your community? What if 15,000 people decided to make that same decision? That’s exactly what happened in Washington, D.C. From 2005 to 2009, the District’s population increased by 15,882 people while car registrations went down by close to 15,000 vehicles. Living in a walkable city has value beyond personal convenience—it also allows more of your money to stay closer to home while reducing your carbon footprint. With better information, can we make our cities more intelligent? We can. What makes a city intelligent? You do.
Becker et al, 2012


This report estimates the external costs of automobile travel, including accidents, noise, air pollution and climate change emissions. It concludes that motor vehicle travel imposes significant net external costs, beyond user charges and taxes.

**Figure 2.2-1 Average External Costs From Cars Per 1,000 VKT By Country**

![Graph showing average external costs from cars per 1,000 VKT by country](image)

This graph illustrates estimated external automobile costs in various European countries.

Dachis, 2015


“The hidden costs of congestion are between $500 million and $1.2 billion a year for the Metro Vancouver area... [W]hen congestion causes people not to travel it stifles the key benefits of living in a city, like learning face-to-face, finding better jobs, and sharing services and infrastructure. These are collectively called agglomeration benefits.”

Gill and Lawson, 2016


“Road congestion in many Canadian cities is high, adversely affecting our economy and quality of life.”

The following table is in 2006 dollars and applies to the Greater Toronto Hamilton Area.
Metrolinx, 2008


“According to a study commissioned by Metrolinx on the economic costs of congestion in the GTHA, in 2006 the annual cost of congestion to commuters was $3.3 billion [including increased commuting costs, accidents, emissions, and delays] and the annual cost to the economy was $2.7 billion [including reduced employment, increased operating expenses, and reduced industry revenues]. If nothing is done to improve the transportation system, this cost can be expected to increase significantly, with population growth bringing about an increase in daily traffic demand and thus exacerbating the level of congestion. Under current trends, the cost of congestion experienced by GTHA residents is forecast to increase considerably by 2031, resulting in an increase in costs from $3.3 billion per year to $7.8 billion. The cost to the economy would experience a similar increase, with a reduction in Gross Domestic Product (GDP) due to excess congestion rising from $2.7 billion in 2006 to $7.2 billion in 2031.” – from page 6

Litman, 2009

T Litman (2009), Transportation Cost and Benefit Analysis; Techniques, Estimates and Implications, Victoria Transport Policy Institute (www.vtpi.org/tca).

This is a comprehensive study of transportation benefit and costing, and a guidebook for applying this information. It includes detailed analysis of various transport costs and benefits. These impacts are described in detail and categorized by various attributes: whether they are internal or external, fixed or variable, market or nonmarket. Using the best available data, it provides monetized estimates of twenty three costs for eleven travel modes under three travel conditions. This study indicates that on average a third of automobile costs are external and about a quarter are internal but fixed; the portion of costs that are external are much higher under urban-peak (e.g., commuting) conditions.

The figure below illustrates Litman’s estimate of various automobile costs under urban-peak conditions, including internal (blue) and external ( , 14¢ in congestion delay imposed on other motorists, 7¢ worth of air pollution damages, 6¢ in uncompensated traffic accident damages, 7¢ in resource (primarily fuel) production external costs, 3¢ in roadway subsidies, 2¢ in barrier effect (delay to pedestrians and cyclists), 2¢ worth of traffic services (traffic policing, emergency response and street lighting financed through general taxes), 2¢ of greenhouse gas emissions,

<table>
<thead>
<tr>
<th>Table 3: Estimate of Costs of Excess Congestion in the GTHA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Component</td>
</tr>
<tr>
<td>--------------------------------------</td>
</tr>
<tr>
<td>Time cost—auto users</td>
</tr>
<tr>
<td>Time cost—transit users</td>
</tr>
<tr>
<td>Vehicle operating costs</td>
</tr>
<tr>
<td>Accident costs</td>
</tr>
<tr>
<td>Emission costs</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

Source: HDR Decision Economics.
and 1¢ each of water and noise pollution damages. These costs tend to increase with city size and density.

**Average Costs Per Urban-Peak Automobile-Mile** (Litman 2009)

![Graph showing average costs per urban-peak automobile-mile.]

This figure illustrates the estimated costs of average automobile travel under urban-peak conditions, including internal (user) and external (costs imposed on other people) costs.

**MASSPIRG, 2015**


This report describes and quantifies various economic, social and environmental benefits what could result from policies that reduce driving and improve other modes. It estimates that each one percentage point reduction in vehicle travel below current state forecasts will provide $20 billion worth of savings and benefits for the State’s residents over a 15-year period, “a sum that is understated because it includes only those benefits that can be readily quantified in dollar terms per mile driven and excludes benefits such as lower carbon emissions and public health benefits such as reduced obesity.”

Starting with the state’s official driving forecasts, a one percentage point reduction in the growth rate of driving from 2015 to 2030 would bring major economic, environmental, and public health benefits, with annual savings increasing each successive year.

By 2030, the combined savings would reach $2.3 billion annually, consisting of:

- $857 million less spent at the pump
- $785 million less spent on fewer automobile collisions and resulting consequences
- $446 million less spent on vehicle repair
- $224 million less spent on road repair.

To make a rough projection, consider that Massachusetts has about 6.8 million residents. Metro Vancouver with its population of 36.4% of the State of Massachusetts, could have savings of CAD $1.12 billion per year from a 1% reduction in vehicle travel. Greater Victoria with its population of 5.3% of MA’s, might save CAD $163 million per year from a 1% reduction in vehicle travel.
Ricardo-AEA, 2014
   This study for the European Commission provides a comprehensive overview of approaches for estimating the external costs of transport, and recommends a set of methods and default values for use when conceiving and implementing transport pricing policy and schemes. The study also provided technical support to the Commission services to carry out an impact assessment of strategies to internalise transport external costs. It covers external environmental, accident and congestion costs for various motorized transport modes. The focus was on the marginal external costs of transport activity as a basis for the definition of internalisation policies such as efficient pricing schemes. The Handbook does not include information on the existing taxes and charges and does not include information on infrastructure costs. It updates research by Maibach et al., (2008) as an output of the IMPACT study.

Smith et al., 2009
This study by the NZ Transport Agency was to inform local authorities about the costs and benefits of transport modes. It provides estimates of various cost, including vehicle costs, infrastructure, operating, travel time, accident risk, health impacts, and pollution costs, which can then be applied to the number of vehicles and the distance they travel. This quantitative exercise is supplemented by contextual discussion of some important issues in urban transport including drivers of the transport mix, the relationship between land use and transport planning, and road space and traffic management.

Swiss ARE, 2010
This Swiss government sponsored research program estimates various transportation costs, including accidents, noise, building damages, environmental damages (air pollution, climate, natural and landscape damages) and traffic congestion.

Transport Canada, 2008
This report summarizes the results of Transport Canada’s Full Cost Investigation (FCI) project, which included a number of studies concerning various transportation costs, including costs of vehicle ownership and operations, infrastructure ownership and operations (including land opportunity costs), congestion, accidents and environmental costs. The table below summarizes
these cost estimates. Estimates that “congestion delay” costs the Canadian economy $5.17 billion annually in inefficiencies.

### Social Cost Estimates by Major Mode (Billion of 2000CA$)

<table>
<thead>
<tr>
<th>Mode</th>
<th>Accidents</th>
<th>Congestion Delay</th>
<th>Air pollution</th>
<th>GHG</th>
<th>Noise</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road</td>
<td>$15.78</td>
<td>$5.17</td>
<td>$4.73</td>
<td>$3.68</td>
<td>$0.22</td>
<td>$29.59</td>
</tr>
<tr>
<td>Rail</td>
<td>$0.30</td>
<td>Not covered</td>
<td>$0.44</td>
<td>$0.19</td>
<td>$0.00</td>
<td>$0.93</td>
</tr>
<tr>
<td>Marine</td>
<td>$0.06</td>
<td>Not covered</td>
<td>$0.54</td>
<td>$0.24</td>
<td>Not covered</td>
<td>$0.84</td>
</tr>
<tr>
<td>Air</td>
<td>$0.10</td>
<td>Not covered</td>
<td>$0.03</td>
<td>$0.47</td>
<td>$0.03</td>
<td>$0.64</td>
</tr>
<tr>
<td>Total</td>
<td>$16.24</td>
<td>$5.17</td>
<td>$5.74</td>
<td>$4.58</td>
<td>$0.26</td>
<td>$32.00</td>
</tr>
</tbody>
</table>

*This table summarizes estimated non-market costs of various modes in Canada.*

### Urban Transportation Task Force, 2012


“Traffic congestion is a growing problem in Canada. It is becoming acute in our largest cities, which are seeing record commute times that compare poorly with equivalent-sized cities in other countries. It is a growing problem in medium-sized cities.

“Congestion reduces Canadians’ quality of life and also has environmental costs. The waste of energy in gridlocked traffic and the production of greenhouse gases and other pollutants are harmful to the Canadian environment. Perhaps most importantly, congestion has substantial economic costs. Decisions on investments and jobs hinge on the quality of transportation infrastructure and the free flow of goods and people in and through our cities. Congestion increases current costs and discourages future investments.”

### Table 1-1: Annual Congestion Costs (in $ Millions) in Canadian Cities (2006)

<table>
<thead>
<tr>
<th>City</th>
<th>50% Congestion Threshold</th>
<th>60% Congestion Threshold</th>
<th>70% Congestion Threshold</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vancouver</td>
<td>$518 M</td>
<td>$652 M</td>
<td>$755 M</td>
</tr>
<tr>
<td>Edmonton</td>
<td>$85</td>
<td>$103</td>
<td>$120</td>
</tr>
<tr>
<td>Calgary</td>
<td>$149</td>
<td>$171</td>
<td>$180</td>
</tr>
<tr>
<td>Winnipeg</td>
<td>$73</td>
<td>$100</td>
<td>$125</td>
</tr>
<tr>
<td>Hamilton</td>
<td>$13</td>
<td>$24</td>
<td>$37</td>
</tr>
<tr>
<td>Toronto</td>
<td>$1,298</td>
<td>$1,672</td>
<td>$2,014</td>
</tr>
<tr>
<td>Ottawa-Gatineau</td>
<td>$220</td>
<td>$304</td>
<td>$380</td>
</tr>
<tr>
<td>Montreal</td>
<td>$697</td>
<td>$811</td>
<td>$910</td>
</tr>
<tr>
<td>Quebec</td>
<td>$63</td>
<td>$89</td>
<td>$118</td>
</tr>
<tr>
<td>Total</td>
<td>$3,116 M</td>
<td>$3,927 M</td>
<td>$4,640 M</td>
</tr>
</tbody>
</table>

*Source: Transport Canada*
Note on Part 2b

Automobile commuting imposes various external costs (costs imposed on other people). Estimates of these costs vary depending on the scope of impacts considered (some estimates only consider congestion and pollution costs, others are more comprehensive), vehicle type (larger and older vehicles impose higher costs) and travel conditions (costs tend to increase with city size and density). Typical estimates range from about 20¢ per mile considering just congestion and pollution, to more than 60¢ per mile considering additional external costs including parking subsidies, uncompensated traffic accident damages, resource production externalities, roadway and traffic service subsidies, barrier effect (delay to pedestrians and cyclists), water and noise pollution.
Part 3. A transportation planning perspective

Within the transportation planning profession, proximate commuting refers to programs like Closer Commutes that allow employees of multi-worksite organizations to be assigned to worksites closer to their homes in order to reduce commuting costs and provide multiple other benefits to the employees, employers, society and environment. Proximate commuting is classified as a commute trip reduction (CTR) strategy, which is a subcategory of transportation demand management (TDM).
3a. ProximateCommute\textsuperscript{sm} – a lauded, but underused strategy, and proof-of-concept for Closer Commutes

Proximate commuting programs derive from ProximateCommute\textsuperscript{sm}, a consulting business and program developed by Gene and Carolyn Mullins of Seattle. ProximateCommute\textsuperscript{sm} was first field-tested by Mullins & Associates in Seattle in the mid-1990s. Recognized for its effectiveness, ProximateCommute\textsuperscript{sm} won awards as diverse as the US Environmental Protection Agency’s Innovative Use of Technology Award and the Goldwater Institute’s Most Cost-Effective Traffic Reduction Measure. In 2007, \textit{TIME} magazine cited the program as one of the planet’s best ideas to address global warming.

Despite the accolades, ProximateCommute\textsuperscript{sm} practices appear to have been adopted by only two employers (Starbucks and Boeing) and neither fully embraced the strategy. It has never been promoted on an industry-wide basis nor across a metropolitan region. Its introduction (or not) by an employer was generally considered the purview of human resources managers. Several recent studies have examined its potential effectiveness, but these are not widely known, even within the transportation planning profession.

ProximateCommute\textsuperscript{sm} proposed three ways a multi-worksite employer could orchestrate shorter commutes for its employees:

1. New Hire Placement – Assign new hires to sites near their homes.
2. New Job Placement – Include proximity as a criterion for filling job openings.
3. Job Swap – Allow qualified employees to swap job sites providing their commute distances and/or times are reduced.

Closer Commutes is a modern re-working of that 1990s program. Key changes include the following:

- \textbf{new technology} – a free web app and access to Google Maps’ global GIS mapping database provides for free, highly accurate commuting calculations; peer-to-peer swap match identification can be set up online; publicity to employees can be orchestrated through internal (closed, private) social media apps;

- \textbf{broader in scope} – will be promoted sector-wide and across entire metro regions (not limited to individual multi-worksite employers as before);

- \textbf{ease to implement at low cost} – DIY toolkit provided for employers to implement themselves, rather than the need for a consulting contract as in the 1990s (was >$100,000 in fees);

- \textbf{positioned as an occupational health and safety [OH&S] issue} – the extensive scientific research on the mental, physical and social effects of long commutes has been assembled in an annotated bibliography; employers’ adoption of Closer Commutes and other TDM programs could be quickly mandated through a Cabinet Regulation to BC’s \textit{Workers Compensation Act}, for example;

- \textbf{research conducted to quantify the potential scope for change and the related financial numbers} – a survey was conducted of all Royal Bank employees in South Vancouver Island, a cross-tabulated dataset was commissioned from Statistics Canada, and impact calculation methodologies have been identified; and

- \textbf{promotion directly to politicians and to federal, provincial and municipal government ministries/ agencies with environmental, labour, transportation, education and economic mandates}.
Although some multi-worksite employers do offer their workers some input on worksite location, CloseCommute Systems’ investigations over four years did not reveal any employer, in any sector, that was comprehensively addressing its employees’ commuting problem or potential for improvement. To be truly effective, a program must command executive commitment, and implement route mapping software and worksite location policies, both to consider optimal locations for new hires and to help existing workers shift worksites. Generally such shifts for existing employees should be offered only to volunteering employees, and only occur if workers consider themselves better off. Collaboration with applicable unions and employee associations is necessary. CloseCommute Systems Inc. is building a consulting toolkit for human resources (HR) departments wanting to implement an integrated commute-reduction program.

In March 2017, CloseCommute Systems test-launched a web app (at www.closecommute.com) for long commuters to identify closer worksite options themselves and to then petition their employer for a transfer. The app was designed to also pair up peers performing the same job who would mutually benefit from switching with the other employee (a “swap match”) – so there needn’t be a wait for an opening. Additionally the app offered long commuters alternative closer worksites with other employers, thereby greatly expanding the potential for commute-reduction to a much wider swath of society, and not limiting opportunities to only those savvy employers who adopt the requisite polices and practices. The uptake of the web app by long commuters was quite low (attributed to our limited funds for publicity) so CCSI is focusing its resources on the toolkit and promoting the concept to regional agencies.
3b. Proximate commuting/Closer Commutes as a transportation agency planning solution

Transportation demand management (TDM) is a general term for various strategies that affect travel activity (when, how, where and how much people travel) in order to increase transport system efficiency. One major category of TDM strategies is commute trip reduction (CTR) programs that encourage commuters to reduce peak-period automobile travel. Proximate commuting is a CTR strategy.

Commute trip reduction strategies that improve commuting options, such as flextime, telework, transit and ridesharing benefits, and proximate commuting, tend to reduce commuting costs and stress. As a result, employers implement these strategies to increase worker productivity and satisfaction. Studies described below indicate that workers sometimes prefer commute flexibility over wage increases.

In addition, TDM is increasingly used to reduce transportation problems including traffic and parking congestion, accident risk and pollution emissions, and to support strategic planning objectives such as improving mobility for non-drivers and supporting more compact urban development. Many transportation agencies manage or financially support TDM programs as an alternative to expanding roads and parking facilities. Various documents and websites promote TDM and commute trip reduction programs, some of which include a reference to proximate commuting. Below are a few examples.

**FHWA, 2013**
The Federal Highway Administration Active Transportation and Demand Management (http://ops.fhwa.dot.gov/publications/fhwahop13042/appl.htm) promotes various TDM strategies for improving highway efficiency, including a reference to proximate commuting.

**FHWA, 2003**

This guide describes how employers can implement commute trip reduction strategies, including proximate commuting.

**Hendricks, 2011**

This guidebook describes how transportation demand management strategies can be implemented through local land development processes. It includes several references to proximate commuting.
CRPTA, 2012

The *Pace Commuter Toolkit* ([www.pacebus.com/pdf/vanpool/Pace_Commuter_Toolkit_for_Employers.pdf](http://www.pacebus.com/pdf/vanpool/Pace_Commuter_Toolkit_for_Employers.pdf)) by the Chicago Region Pace Transit Agency helps employers encourage commuters to walk, bike, rideshare and use public transit. It describes incentives such as transit benefits, free/preferred parking, proximate commutes, flexible work schedules and worksite amenities such as childcare, bike racks, showers and sidewalks.

**Note**

These publications indicate that transportation agencies increasingly support TDM as a way to help increase transportation system efficiency and solve various problems. A few TDM initiatives mention Gene Mullins’ proximate commuting strategy, but none provide detailed information about how to implement it.
3c. Impacts of commute trip reduction programs

This section describes how proximate commuting, Closer Commutes and other commute trip reduction programs can affect travel activity.

Proximate commuting reduces commute distances, and therefore commuter travel time and expenses plus external costs such as the traffic congestion, accident risk and pollution emissions. Worksite location flexibility may also allow some commuters to shift from driving to other modes, for example, if they can choose locations that are more convenient to reach by walking, cycling or public transit. The following publications describe case studies that measured or discussed these impacts.

FHWA, no date

The Commuter Choice Decision Support System provides information on various CTR strategies, including Live Near Your Work and Proximate Commute programs. It describes various ways to support these program including housing down payment assistance, location-efficient mortgages and rent subsidies. It describes these programs as particularly applicable to banks, grocery stores, retail outlets, and other employers with many worksites.

Giery, 2003

This study investigated the benefits and obstacles to employers and the public for the development of proximate commuting programs. It describes the often-cited Key Bank case study (G Mullins and C Mullins (1995), Proximate Commuting: A Demonstration Project of a Strategic Commute Trip Reduction Program, WA-RD 400.1, Washington State Department of Transportation). The report also describes the Detroit, Michigan survey that explored the viability of proximate commuting by a commercial bank’s employees (Rodriguez (2000) describes this study in more detail). A survey of 148 bank tellers at 29 branches with 117 useful responses found that approximately 25% of employees were interested in taking advantage of the program.

The report details a survey of Florida Bank of America employees concerning their interest in proximate commuting. Although the Bank already informally allows employees some worksite location flexibility, there are additional opportunities for reducing commute distances. It discussed various benefits of proximate commuting and obstacles, including matching employees with specific branch needs, and some workers’ preferences for more distant work locations. It calculated the trip reduction potential at various bank branches, which typically range from 10–20%. The report also provides specific recommendations for proximate commuting program implementation.
Mullins & Mullins, 1995


This seminal report describes the Key Bank of Washington proximate commuting demonstration project. During the 15-month demonstration project, nearly 500 non-exempt employees at thirty Key Bank of Washington branches in King, Snohomish and Pierce counties were given the opportunity to enroll in a proximate commuting demonstration program and be considered for voluntary reassignment to branches closer to their homes.

Results showed:

• 17% (1 in 6) of eligible employees enrolled in the program
• 65% reduction in commute miles for transferred participants
• 33% reduction in the longest commute per branch
• 17% reduction in average commute miles for all branch employees (includes non-participants)

Additional savings per participant:

• $2,626 in commute expense savings (1995 dollars)
• 216 commute hours saved (five 40-hour weeks)
• 6,566 commute miles eliminated
• 313 gallons of gas saved
• 387 pounds of pollution reduced
• 5,940 pounds of carbon dioxide eliminated

These results indicate that proximate commuting is a viable, low-cost method for significantly reducing employee commute time, distance, expense and stress, and can increase work force productivity.

Mullins & Associates, 1994

www.proximatecommute.com is the website for Mullins & Associates, Inc. ProximateCommute Mapper was a software program developed in 1994 by Mullins & Associates, Inc. designed to help multi-site employers identify more proximate (closer) commute options. The software used Euclidean distance calculations, as it predated easily accessible spatial mapping technology (such as Google Maps) by over a decade.

Mullins & Associates/ProximateCommute™ studies reported:

“From a 300-employee survey at a Washington state employer:

• 96% said the company would benefit by employees having shorter commutes
• 92% support or strongly support a company test of proximate commuting
• 87% are very/somewhat interested in having their same job at a closer site
• 76% are very/somewhat likely to participate in a proximate commuting program
• 90% would benefit from working closer to their homes.”

“City of Seattle (selected departments), percentage of employees not working at site nearest their homes:

• 75% – Community centers employees
• 89% – Library employees
• 96% – Fire department employees.”

“Other Washington and California employee commutes analyzed, percentage of employees not working at site nearest their homes:

• 73% – Starbucks (limited sample size)
• 83% – Key Bank
• 84% – Washington State Liquor Stores

The Effects of Long Commutes and What To Do About Them – An Annotated Bibliography
Prepared by CloseCommute Systems Inc. 11 July 2018 ver 12
• 89% – Bank of America, Los Angeles (limited sample size)."

"Studies of multi-site employers have found that on average about 80% of their branch employees could work at an employer site nearer their homes. A national survey by CareerBuilder found that nearly half of the workers surveyed considered their commute unsatisfying or stressful, and that 36% would take a 10% or greater pay cut to work closer to home."

"An analysis conducted in Seattle found that over 50% of regional employees work for multi-site employers ... Both public and private employers benefit by having employees who are likely to stay with the employer longer, arrive at work on time more often and be more productive while they are on the job. The workers experience less risk of being in an auto accident, are exposed to less auto emissions and suffer less commute-related stress."

"Employees who have “converted” from long commutes to short commutes expressed a definite improvement in their job satisfaction and an overall improvement in their day-to-day quality of life."

"The Environmental Protection Agency reports that 46% of the U.S. population regularly breathes polluted air and that 55% of air pollution-caused cancer cases are attributed to motor vehicles. The potential environmental impact in reducing auto emissions via ProximateCommute™ is significant and the cost is minimal compared to other alternatives."

"The ProximateCommute™ program allows more people to work in or near their own neighborhoods. It increases the time available for parents to spend with their children at the beginning and end of each workday. It improves community air quality and employer operational efficiency, while reducing a daily burden for individuals. It enhances the quality of life for employees, employers and the community."

"From a ProximateCommute™ project involving 30 Seattle bank branches and 500+ employees: average annual participant savings: $2,626 in commute expense, 216 commute hours (equivalent to five 40-hour weeks), 6,566 commute miles, 313 gallons of gas, 387 pounds of auto emissions, and 5,940 pounds of carbon dioxide."

Pryne, 2002


This newspaper article by Eric Pryne summarizes the Key Bank case study.

Rodriguez, 2000 & 2001 & 2002


Daniel Rodriguez’s dissertation examined the theoretical and planning implications of a proximate commuting program, which reduces commuting through voluntary employee relocations to different job sites. Data from case studies of bank employees in Bogatá, Colombia and Southeastern Michigan were used to evaluate these employees’ willingness to participate.
The study categorizes commute travel into wanted and unwanted excess components. Wanted excess commuting is commuting that people have accepted as a tradeoff for having access to other desired destinations or activities. Unwanted excess commuting is not desired and so is amenable to reduction if workers are allowed to relocate. The analysis suggests that 18% of Bogatá and 5% of Southeastern Michigan tellers’ commuting is excess. The study develops a model for estimating potential vehicle travel and emissions reductions from proximate commuting.


These articles by Eric Scigliano describe various examples and studies of proximate commuting, development of Mullins & Associates Inc.’s ProximateCommute™ program and Key Bank demonstration project, potential benefits, and obstacles to its implementation. “[Mullins] found that, on average, only 20 percent [of all workers studied] – 4 percent of firefighters in one big city – worked at the branch nearest their homes.”

Summary

These studies and articles point to the need for and effectiveness of proximate commuting programs. Such programs tend to be popular with employees, and can provide significant vehicle travel reductions. In some cases, a switch may also allow the commuter to shift from driving to alternative modes such as walking, cycling, ridesharing and public transit, which can provide additional benefits, such as reduced parking and vehicle ownership costs.
Part 4. Implementing Closer Commutes – the process, costs/benefits & risk management considerations

Implementing a Closer Commutes program need not be onerous nor expensive for the employer, and the investment to modernize HR policies and procedures could be recouped within a year through reduced absenteeism, higher morale and productivity, and other improvements.

Implementation process

Here is a recommended basic implementation process for the employer:

- A baseline analysis is undertaken to establish the current employee commuting situation ("commuting burden") and reveal the potential for improvement. That analysis would also identify existing policies and any internal barriers to address.
- CloseCommute Systems Inc. will be providing a toolkit to assist human resources professionals to introduce appropriate policies and practices related to hiring, internal transfers and swap matching.
- Where employees are members of a union, buy-in by their union will be essential. In particular the impacts on seniority rights must be clarified, and re-negotiated where necessary.
- Clear communication from the executive level to all staff is necessary to emphasize full corporate commitment. It can be stated that reducing commutes is a win-win-win-win situation for employee, employer, the community and the environment. A sample memo to staff is included in the toolkit.
- Some fields will need to be defined in the employer’s HR software (PeopleSoft, Ariel, etc.) to store commuting distances and durations. The values can be calculated individually using Google Maps or a similar free app, or this can be automated through an API. The toolkit has a spreadsheet application that will generate commuting information for dozens of applicants and locations instantly.
- Ongoing program costs consist primarily of the additional administrative effort required by HR managers to be aware of and improve their workers’ commute situations. Simply by considering proximity for new hires and internal transfers, significant improvement can result (potentially in the range of 15% of overall burden within 18 months, depending on the rate of turnover).
- Identifying and offering 1-to-1 peer swap matches will create more immediate and extensive positive impact. Swaps could be timed to minimize disruption to operations (teachers would swap schools during the summer months, for example, and retail workers during quieter sales periods). Such a worksite exchange program could be transformative for an organization’s morale and productivity.
- An annual tally of employee commuting burden is generated to inform the organization’s annual reporting of social and environmental impact.
Costs/benefits

Following the ProximateCommute™ demonstration project for Key Bank, Gene Mullins noted that, “Human Resources representatives reported that the placement of new employees closer to their homes ... required little to no additional effort on their part. Branch managers recognized that they were now getting more new employee candidates who had shorter commutes than before and expressed great appreciation for the improvement. Several commented that this would benefit their operations through reduced tardiness as well as reduced turnover.” (Mullins & Mullins, 1995)

CloseCommute Systems expects that all program implementation costs will be recovered by the employer within a year. In light of the thoroughly documented adverse effects of long commutes (see Part 1), CCSI posits that a commute reduction program should trigger improvement from previous expense levels for hiring, retention, training, absenteeism, tardiness, extended health benefits, parking and low productivity, while also dramatically improving corporate environmental and social responsibility indicators.

Risk management

For an employer, there are risk management considerations related to both implementing and not implementing a Closer Commutes program. Interviews with HR and union executives found many wondering if there could potentially be some pushback about seniority from employees who do not swap locations. Most interviewees thought having the seniority procedures resolved, and having any swaps being voluntary, should reduce the risk to “minimal” compared to potential benefits.

By not implementing commute reduction measures, firstly a corporation or agency may become at a competitive disadvantage with respect to recruitment and retention, and to brand image. Secondly, as more jurisdictions introduce or increase carbon taxes (and/or cap-and-trade) and other emissions disincentives, employers may find themselves subjected to financial ramifications for not addressing “excess” or “unnecessary” employee commuting – however that may be defined. Thirdly, an employer not taking reasonable steps to mitigate the adverse health and safety risks associated with long commutes for its employees could potentially face lawsuits from employees whose health has been compromised. It could be seen as a prudent decision therefore to act now to reduce future financial liability.

The risk of not implementing would become moot if/when all large multi-worksite employers are required – by an Occupational Health & Safety regulation, for example – to assess and take reasonable steps to shorten/green employees’ commutes. Employers then would be considering not only Closer Commutes, but also carpooling, transit pass subsidies, secure bike storage, flexible scheduling, telecommuting, remote offices, and other transportation demand management strategies.

(end)
ROADS are congested
• infrastructure expensive to expand
• people doing the same job are passing each other

WORKPLACE
• aff ordability
• sanity
• healthier
• quality of life
• safer
• happier
• increased trust
• more social interactions

NEW SHORT ROUTE
• closer to daycare & schools
• parent is healthier, less stressed
• more quality time for family & community
• keeps families connected
• keeps money in the community
• can bike, walk or take local transit

NEW CLOSE ROUTE
• closer to daycare & schools
• parent is healthier, less stressed
• more quality time for family & community
• keeps families connected
• keeps money in the community
• can bike, walk or take local transit

THE SCIENCE IS CLEAR – SEE ANNOTATED BIBLIOGRAPHY OF PEER-REVIEWED STUDIES.
• StatsCan commuting flow dataset shows extensive unnecessary commuting.
• CloserCommutes’s confidential audit of employee commuting burden for RBC Royal Bank confirms potential for work swaps.
• Greater than 5% reduction of total commuting traffic is projected; could boost regional economy by over $100 million p.a.
• Toolkit and training for employers being developed. Not onerous to implement, many benefits including reduced costs and higher productivity.
• Recommend Provincial initiative using existing mechanisms: WorkSafeBC + Translink + BC Transit. First step is conducting pilot projects.
Closer Commutes Pilot Project for South Vancouver Island School Districts 61, 62 & 63 – draft only, for discussion purposes

It is proposed that the three South Vancouver Island School Districts [Greater Victoria #61, Sooke #62 and Saanich #63] conduct a joint pilot project to explore and test the “Closer Commutes” commute reduction/greening strategy as a potentially permanent employee wellness policy for their teachers and other employees. The concept of Closer Commutes aka “green lateral exchange/transfers” has been advocated by the BC Teachers’ Federation since 2007 but has never been given an operational trial.

Research has revealed that:

- There are significant negative effects of long commutes, for individuals, their families, employers, the community, the economy and the environment [see Effects of Long Commutes: An Annotated Bibliography].

- More than 79% of South Vancouver Island teaching professionals – about 4 out of 5 – are not working at a close school [based on StatsCan data].

- The Closer Commutes policy authorizes the HR department to identify and facilitate one-for-one location exchanges by peers so both employees have a shorter commute. These exchanges would be voluntary and offered on a “same job, same pay, same benefits, same seniority, same pension” basis. Efforts will also be made to assign new hires and consider transfer opening candidates to minimize their commutes.

- Closer Commutes has low implementation cost, is straight-forward and can yield impressive results. A pilot project of this strategy at US bank branches demonstrated over 17% reduction in total employee commutes over a 15-month trial [WA State Department of Transportation report on Proximate Commuting].

- Research indicates that employees with shorter commutes are likely to be mentally and physically healthier, less stressed, better rested and less prone to absenteeism. This suggests that the classroom experience could be improved for the students of participating teachers [see Effects of Long Commutes: An Annotated Bibliography].

- There is potential for cost savings for School Districts, especially with respect to reducing absenteeism expenses. BC spends over $150 million annually on absenteeism [Deloitte, 2012].

- This matter is within the authority of the individual School Districts and their employees, and their employees’ union locals and associations.
Proposed Pilot Project Components

1. As a preliminary step, the three School Districts will use a provided toolkit to analyze employee data (home location, worksite location, job classification and specialties) to establish the baseline total employee commuting burden, and potential for improvement through job exchanges. This work could be performed in August 2018.

2. An ad hoc working group of HR directors and Union reps will be formed. The working group could include observers from other interested parties including the Ministry of Education, BCPSEA, BCTF and others. The group will consider the report on the existing commuting burden and potential, and decide whether to proceed with the next steps.

3. The working group will then identify applicable HR policies and procedures and contract clauses, and recommend revisions – provisional for the pilot where appropriate – for School Boards’ and Unions Locals’ approval.

4. The working group would then schedule a pilot test of the proposed procedures (and IT toolkit) with a limited sample of teachers and support staff – perhaps 10 primary grades teachers, 10 secondary grades teachers, and 10 support staff positions – during the 2018-2019 school year.

5. The pilot test would be appropriately monitored, and a report on the results delivered to the School Districts. The report would have recommendations about making permanent HR policy updates and negotiating contract revisions, and a draft implementation schedule.
Secretariat

CloserCommutes.org has been working on an implementation toolkit which would be used in this pilot, comprised of these components:

1. **secretariat capability** to ensure smooth implementation, maintain momentum and measure effectiveness (including baseline and progress data), and ensure liaison with key stakeholders in the Ministry, BCPSEA, BCTF, Unions and others

2. a science-based **business case** that can be presented to executives and HR specialists of Districts and Unions, and to Trustees – to achieve endorsement and approval to proceed this year with an identified subset of the total employee population. The business case includes:
   - **endorsements** of the Closer Commutes strategy from executives and HR professionals, academics and other business and community leaders,
   - a **summary of scientific research** into the effects of long commutes, plus
   - **local research** – such as the Royal Bank South Vancouver Island study (which dispels the “we don’t have a problem at our organization” myth) and the StatsCan commuting flow dataset (which dispel the “everyone commutes in one direction” myth)

3. a **guide** for HR professionals with implementation directions, communications samples, policy templates, details about complementary commute reduction strategies, etc.

4. a **spreadsheet tool** that can import accurate commuting data (from GoogleMaps APIs) in real time for dozens of employees/candidates and their home and work locations, by any mode of transport, on any work schedule

5. marketing and **communications expertise** to reach long commuters through School District and Union channels.

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Metro Vancouver Teachers: where they live vs. where they work

The introduction of a Closer Commutes program for larger employers is being recommended to BC Cabinet. The program would encourage employers in all sectors to modernize their human resources practices to facilitate closer/greener commutes for many of their workers. A key component of Closer Commutes calls on multi-worksite employers to identify and allow pairs of workers performing the same duties to switch work locations so each can have a shorter commute. Peer-reviewed research clearly show shorter commutes are beneficial to the worker, the employer, the community, the economy and the environment. Proponents believe that within two years, worksite swaps could reduce commutes for over 5% of all commuters – over 40,000 commuters in the Metro Vancouver area – with a focus on the longest commuters.

Following are some examples from the education sector using data from Statistics Canada*.

**Burnaby**
There are 2,790 teaching jobs within Burnaby City census area.
2,485 residents of this census area are teaching professionals of whom 825 [33%] work within Burnaby and 1,660 [67%] work elsewhere. Examples:
- 305 teachers living in Burnaby commute to work at schools in Surrey while 115 teachers commute from Surrey to Burnaby teaching positions
- 175 commute to Coquitlam vs 180 who commute to Burnaby from Coquitlam
- 115 commute to Richmond vs 60 commuting from there
- 725 commute to Vancouver vs 670 peers commuting the opposite direction
- 40 commute to Delta vs 80 commuting in
- 80 commute to Port Moody vs 130 commuting in
- 70 commute to New Westminster vs 180 commuting in
- there are similar patterns to and from all other census areas.

**Proponents of Closer Commutes believe there is an opportunity** to explore peer exchanges/transfers to shorten the commutes of 1,660 Burnaby teachers and the same number of their peers who commute into this city. That would be up to 3,320 closer commutes.

*(All data from Statistics Canada*, counts rounded to nearest 5.)*

**Vancouver (City of)**
7,460 teaching jobs
7,965 teachers live there of whom 4,700 [59%] work in Vancouver and 3,265 [41%] work elsewhere. Examples:
- 510 commute to jobs in Surrey vs 200 who commute from Surrey
- 80 commute to New Westminster vs 725 peers who commute in the opposite direction
- 210 commute to Coquitlam vs 220 commuting in from there
- 20 commute to Maple Ridge vs 20 who commute from Maple Ridge
- 125 commute to Delta vs 170 who commute from Delta
- 600 commute to Richmond vs 420 who commute into Vancouver
- 75 commute to Port Coquitlam vs 85 who commute in from there
- 235 commute to North Vancouver vs 325 who commute from North Vancouver
- 270 commute to West Vancouver vs 85 commuting in

**The statistics show there is an opportunity** to investigate peer swaps to shorten commutes of 3,060 Vancouver-resident teachers and the same number of their teaching peers who commute into Vancouver. That’s potentially 6,120 closer commutes.
More examples:

**West Vancouver**
915 teaching jobs
405 teachers live there of whom only 145 [36%] work in West Vancouver

**North Vancouver**
2,010 teaching jobs
2,680 teachers live there of whom about 1,020 [38%] work in North Vancouver

**Coquitlam**
2,000 teaching jobs
2,010 teachers live there of whom 705 [35%] work in Coquitlam

Across the Mission-Abbotsford & Vancouver census metropolitan areas, over **17,500 teaching professionals are not working within their area of residence.** It is postulated that most of their commutes could be shortened at minimal cost to school boards. Research indicates teachers would be mentally and physically healthier and more productive, with fewer absences. The BC Education system spends over $150 million annually to cover for teachers’ absences.

The teachers’ unions have advocated for this commute reduction concept for over a decade. In 2007, the **BC Teachers’ Federation passed a resolution:** “That locals be encouraged to negotiate, as a mid-contract modification, a clause to support green lateral exchange/transfers between districts.”

All numbers are derived from a Statistics Canada dataset commissioned by CCSI, based on the 2011 national census. This cross-tabulated dataset is available without charge to researchers.

For more information about a proposed Closer Commutes program for BC, please contact:
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