DETAILING THE ATTITUDE & CULTURE OF COMMUTE TRIP REDUCTION IN THE WORKPLACE: A MULTIMETHOD APPROACH

by

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A Thesis
Submitted in partial fulfillment
Of the requirements for the degree
Master of Environmental Studies
The Evergreen State College
December 2021

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ABSTRACT

Detailing the Attitude and Culture of Commute Trip Reduction in the Workplace:
A Multimethod Approach

Jacob Meyers

Time is running out. The clock is ticking…with each passing day and year the world continues down a path to a decidedly warmer future. The ramifications and devasting effects of climate change already loom large with record droughts and super-sized weather events. And every day billions of people get up and drive to work. According to the International Energy Agency, the transportation sector accounts for roughly 25% of all CO2 emissions. To subvert the negative aspects of transportation—namely traffic congestion, air pollution, and greenhouse gas (GHG) emissions—Washington State passed legislation in 1991 to reduce the number of single-occupancy vehicles (SOV) on roadways. The legislation, the Commute Trip Reduction (CTR) Law, aimed to tackle the three problems just mentioned by encouraging employees to utilize alternative commutes such as carpooling, vanpooling, work-from-home (telecommuting), and riding the bus. This thesis analyzed the CTR Law, specifically addressing the main barriers preventing employees from taking an alternative commute to work.

A multi-method approach incorporating quantitative survey data, qualitative interviews with Employee Transportation Coordinators (ETCs), and autoethnographic narratives unraveled how workers perceive CTR while examining the interconnection between climate change, the transportation sector, the workplace, and the economy. Results indicated CTR programs are effective at reducing the number of SOV commutes, as the statewide drive-alone rate in Washington State declined from 65.6% to 57.2% from 2008 to 2018. However, the SOV rate within Thurston County increased by 3.2% during the same time period. Across the state, bus transit and carpooling were the two most commonly used alternative commutes in 2017/2018, at 15% and 8%, respectively. A survey of ETCs conducted in Thurston County on December 17, 2019, revealed carpooling and telecommuting to be the most popular commutes. Survey responses and interviews with ETCs revealed culture, flexibility, family/personal obligations, time, and the lack of bus accessibility as the main barriers to successful CTR utilization and implementation. And so every day billions of people get up and drive to work.

Or so it was. The COVID-19 pandemic created an unprecedented shift to work-from-home when in June 2020 42% of U.S. workers were telecommuting. The implications and opportunities presented due to the COVID-19 pandemic and its effect on the modern work environment are also included in this thesis. Contemporary data and statistics along with personal narratives and interviews form a collection of information which uniquely place CTR solutions at the forefront in the fight against climate change.

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Acknowledgements

Not everything that is faced can be changed,
but nothing can be changed until it is faced.
-James Baldwin

Reflecting on the past two years will take some time. Developing a topic and research that I have tremendous passion for also took time. From writing my Candidacy paper in the Winter of 2018 to last few sentences of the Epilogue, I've given so much of my time and energy into the thoughts, words, and sentences contained within these pages. Researching, designing, and writing a thesis is not easy. I told my good friend Tyson just the other day, "Whoever said writing a thesis isn't a contact sport—was a liar!" This after resting my arm in the same position for too long, and hurting my elbow. But perhaps the real contact lies upon your heart and spirit.

There are so many people to thank for helping me accomplish this monumental task. I begin by sending a sincere and heartfelt thank you to my parents. I would not be here without you. Thank you for your emotional and financial support.

To my father: I know you just really care, and I love you. Thank you for always being there when I really need you.

To my mother: words can't express how much you mean to me. Thank you for always believing in me and teaching me how to be kind.

Thank you to my brother, Ben, and his fiancé, Jami, for your kind, listening ears.

I'd like to thank some of my friends: Andrew, Doogie, Alex, Shadé, Jesse, Jenna, Jamie, Andrew, Hannah, Rose, Nicolette, Keoki, Nora, and Emily. Each of you has been there for me at times when I needed support, a kind word, or a shared laugh. Heartfelt thanks to you all.

To my mentor and friend, Amalia: thank you for sharing your healing, your wisdom, and love.

To my dear Ari: thank you for your endless support. You always believed in me, especially when I did not believe in myself. Thank you for all the tennis, all the love, and for your friendship.

To my buddy Tyson: Dude. I can't believe we did it (finally!). You are salt of this Earth, and the best friend I could've asked for. Thank you for keeping me grounded.

Many thanks to my coworkers at the Sustainability in Prisons Project for their guidance and support during my time in the MES program. As well as a heartfelt thank you to the staff and faculty at Evergreen and in the MES program, so many of whom aided me on my journey. Thank you Kevin, Andrea, and Averi for all you do!

I'd also like to express my sincere thanks and gratitude to both the Thurston Regional Planning Council and the Washington State Department of Transportation for providing much of my data. With special thanks going out to Paul Brewster and Michael Wandler.

Thanks to all of the ETCs I interviewed and surveyed. Your time and your thoughts are so valued and appreciated.

Finally, I could never have accomplished this thesis with my friend and thesis advisor, Kathleen Saul. Kathleen, once again I'm at a loss for words. Your belief in me is unparalleled. Thanks for sticking with me to the very end. Thank you for all of your feedback. Thanks for all the suggestions and edits. But most of all thank you for your kindness and dedication to all the students you work with. We are so lucky to have you.

And last but not least: I want to thank you, dear reader, wherever you are. This thesis is for you and all of the other countless, beautiful souls out there who are struggling. To those whose hearts are broken, may you find healing. To those whose spirits are dampened, may you find hope. To all the people out there working to make the world a better place, thank you. You have my love.

Blessed be the story-tellers, music-makers, and artists at life,
for they are the true light of the world.

Blessed be the tender-hearted who mourn and grieve
the wars we've fought, the lives we've lost,
may peace ride in on the river of their tears
-Jan Phillips

Chapter 1. Preface

Time to Redefine

It's Tuesday, and another rainy day in Olympia. You're staring worriedly at your computer screen, trying and failing to suppress the long list of tasks running 'round the periphery of your mind. The screen constantly reminds you of the minutes passing by; it's almost 7 o'clock in the evening. Perhaps a quick shot of caffeine will be of assistance in the long night ahead. You head into the kitchen and grab the last remaining soda can from the pantry. And then, there you are…standing over the trash can, scissors in hand; there's *nothing* like spending an *additional* 30 seconds cutting apart a 6-pack ring of plastic into an array of much smaller plastic pieces when your latest school paper [thesis/work project/presentation/business trip] is due in less than 24 hours. There is still much to be done: sentences to review, slides to alter, and perhaps a lot is riding on that pitch tomorrow in order to secure that contract you've been diligently pursuing for months.

Let's put aside the fact you are woefully hoping that this small act even makes a f*cking difference. Another thought pushes to the forefront of your mind, "How many times over the last couple of weeks have I had to say to myself: 'breathe'?"

Inhale. *Exhale*. It's now 7:05 p.m. Dinner remains unprepped and uncooked. The laundry you intended on starting is still waiting for you in the hamper, and the floor has not been vacuumed in weeks.

Maybe you have kids…and in 30 minutes or less, you have to leave and pick them up from soccer practice. Surely the prospect of *another, additional* load of laundry is already forming. The 30 minutes pass by quickly, but the carpet is clean and you feel a smidgen of

satisfaction by purging one task from your brain's crap pile. You stop by Vic's Pizza on the way home from soccer in lieu of cooking dinner. It happens.

Question: How often do you, your partner, your friends, or coworkers mutter something to the tune of: "There's not enough time in the day"?

Even after a vacation or your average two-day weekend, you still find yourself wondering how it went by so quickly?

You. Are. Not. Alone.

But why? Why is this so?

More than anything our culture has adopted the notion that *time* is a commodity to be bought and traded. Time is sold and sacrificed. TIME IS MONEY. And if you aren't making money, and if you aren't being productive, you are not participating in our capitalistic economy nor are you a welcome member of this society. In their book, *Metaphors We Live By*, Lakoff & Johnson detail the power these metaphors have in shaping our culture which in turn shapes our reality…

However, before going any further, I'd like to introduce myself:

My name is Jacob Meyers.

I am a graduate student at The Evergreen State College. For the past several years I have split my time: working for the Sustainability in Prisons Project, examining the interdisciplinary nature of environmental studies in the Master of Environmental Studies (MES) program, and more recently perfecting the art of fine Belgium waffle making. I fell in and out of love. I adopted a puppy, turned thirty, and juggled all of the responsibility and most of the fun of being a young working professional in the Pacific Northwest. The story in the beginning is mine. And, it's also

yours. It's the same dreadful story *every Monday morning*, and the same exhausted story every Friday afternoon.

For the record, I don't normally purchase soda. Very rarely, in fact. But that day, I had rushed to the store to pick up some soda for the MES student association's Environmental Film Series. I bought a bunch of different of soda: Dr. Pepper, Pepsi, A&W Root Beer, along with a few others as over 40 people were expected to attend! The cans were an intentional purchase. Normally, 2-liter bottles are the standard for such events, but I couldn't bring myself to purchase *more plastic* than I usually do when I know all of it is ending up in a landfill at present. Fortunately, the Pepsi came in a paper board box, but all the others had those lovely plastic rings (of death) around their neck.

I'll admit. I spend a great deal more time thinking about my consumption habits and ecological footprint than your average citizen, especially considering my area of study. And yet, I know I'm not alone in feeling helplessly caught in the day-in, day-out grind of 21st century American life. I come back from an hour-long walk with my dog (hoping to get some much-needed exercise and rejuvenate my mental energy) only to be ready for a nap. In fact, since I entered into the workforce full-time, if I don't *have* to be somewhere in the morning, I rarely want to get out of bed. I'm perpetually tired. I dream and long for a week where all I do is rest. Eat, sleep, and *rest*. And I just turned 30!!

Back to my soda purchase and the MES film screening which set all of these events in motion. *Redefining Prosperity: The Gold Rushes of Nevada City*, a documentary by filmmaker John de Graaf, tells the story of a mining town's transformation into a progressive, environmental and citizen-centric community while fostering post-mining economic success. Personally, I believe the film falls short of being uplifting as there's a clear focus on *economic*

growth and *economic prosperity*. Furthermore, in the end, Nevada City had a large homeless population, with many residents needing to work two-to-three jobs just to make ends meet. But the film's title and some of the interviews within did raise an important question: how do we define prosperity? It is based on how big your last paycheck was? If you bought a new TV on Black Friday? Or if you got the latest iPhone?

Or, is prosperity giving our children a chance to see an orca on the Salish Sea? Or maybe having a summer without massive wildfires? And winters with ample snowpack in the Cascades?

I really want all of these things. I know you want them too. But sometimes I eat at McDonald's.[1] On occasion, I will purchase a 6-pack of soda with plastic rings of death (though I'm more of a beer drinker to be honest).

Every day I feel pushed to the limit of what any of us can realistically accomplish in a mere sixteen waking hours. As a result our countries, our states, our cities, and all the people that make them what they are…we must confront some important questions:

1) ***What do we value?***

2) ***And how do we define prosperity?***

In the 21st century our globalized economy has reached heights never before seen in human history. We bear witness to a market that receives goods and services faster than ever with 2-day shipping (sometimes even 2-hour shipping!), instant on-demand streaming, and self-checkout at stores. Accommodations I'm very thankful for, and I'm guessing you are too. But

[1]Beef production requires 28 times more land per calorie consumed than the average of other livestock, with ruminants in general accounting for 47% of production-related greenhouse gas (GHG) emissions from agriculture in 2010 (Ranganathan et al., 2016). A 2019 UN Special Report on Climate Change and Land recommends eating less meat stating that by 2050 dietary changes could offset between 0.7 and 8 billion tons of carbon dioxide equivalent each year (Mbow, 2017). Higher global temperatures driven by rising concentrations of GHGs in the atmosphere will result in winters with less snowpack as well as hotter summers with more frequent wildfires.

there are a growing number of people who recognize that these amazing accommodations come with heavy environmental costs.

Professor of Sociology at Boston College, Juliet Schor, has been documenting extreme consumption patterns since the 1990s. Journalist Naomi Klein's book, *This Changes Everything: Capitalism vs. Climate,* was a national bestseller. The aforementioned John de Graaf is most well-known for his film, *Affluenza*, which highlights America's material obsession and shocking consumption habits. A portion of my graduate studies has also been devoted to this subject, and I like those before me, found an indisputable relationship between work, consumption, and environmental degradation (See Appendix 1).

So I ask you: do we want to maintain our cycle of working and spending, working and spending, *working* and *spending*? Or, do you think we could live in communities where we grow and share our food? Where an individual's life is *worth more than a paycheck* each month, and where there are *more employment opportunities* and *fewer* homeless individuals. I want to be able to walk my dog, spend time with my friends and family, take care of my household chores *AND* work to create more community and a healthier environment. I believe you want this too. This is *our story*. The only question that remains is: what's the next chapter going to look like?

My hope is for a little ***less work*** and a little ***more time***.

Chapter 2. Introduction

"We are running out of time" is a phrase heard with more and more frequency these days. People often use it with respect to the infinite number of environmental issues in today's fast-paced, globalized, and highly mechanized society. We are running out of time to save the Orcas; running out of time to save the rainforest; but more than anything, we are running out of time to stave off global climate change—or as some people, including the Climate Reality Project, call it, "The Climate Crisis." "Crisis" may indeed be more appropriate as mounting evidence suggests that Earth is on track for a warming of far greater than 2-degrees Celsius (Meinshausen et al., 2009; McGlade & Ekins, 2015; USGCRP, 2018). The 2018 report by the Intergovernmental Panel on Climate Change (IPCC), *Global Warming of 1.5°C*, certainly echoes this sentiment with the very first line of the press release stating, "Limiting global warming to 1.5°C would require rapid, far-reaching and unprecedented changes in all aspects of society" (IPCC, 2018). During a period of time when we must reduce emissions, global emissions continue to climb ever higher (McGlade & Ekins, 2015; UNEP, 2018; UNEP, 2020).

Far-reaching, rapid change in society seemed to be a daunting and bleak task as we welcomed a new year and decade on January 1, 2020. In the early days of January 2020, the United States of America and Iran seemed on the brink of unleashing World War 3, a bitter impeachment trial embroiled the President of the same "United States", and just one month earlier the 2019 United Nations Framework Convention on Climate Change ended "with finger-pointing, accusations of failure and fresh doubts about the world's collective resolve to slow the warming of the planet—at a moment when scientists say time is running out for people to avert steadily worsening climate disasters" (Amanpour, 2020; Sullivan, 2020; Dennis & Harlan, 2019, emphasis added).

Most of the world remained unaware that a deadly new coronavirus had emerged in Wuhan, China during the fading breaths of the preceding decade. The newly discovered virus caused what would later be called coronavirus disease 2019, or abbreviated: COVID-19. In a few short months, the outbreak that began in China would be declared a global pandemic by the World Health Organization on March 11th (World Health Organization, 2021). Coincidentally on the same day, NBA player Rudy Gobert would test positive for COVID-19 effectively shutting down all major sports and further turning the world on its head (Lewis, 2020; Gay, 2020).

The events that have transpired in the days and months since mid-March, 2020, have been collectively painful, heartfelt, frustrating, confusing, isolating, and inspiring. However, they have made one thing abundantly clear: rapid, far-reaching, and unprecedented changes in all aspects of society are possible (and perhaps overdue).

I originally set out to highlight one solution, Commute Trip Reduction, out of seemingly hundreds of solutions that aim to mitigate or alleviate anthropogenic climate change. Commute Trip Reduction (CTR) encourages individuals to change their behavior and more specifically the mode of transportation used to go to and from work. This can manifest in several ways: taking the bus, walking, riding a bike, carpooling, or skipping the commute altogether and working from home (also known as telework or telecommuting). The main idea is simple: to reduce the number of single-occupancy vehicles on the road.

Why is it beneficial to have fewer cars on the road? Two relatively straightforward reasons include increased safety and reduced traffic congestion. Fewer cars mean fewer accidents and less traffic. Furthermore, the transportation sector currently accounts for 29% of energy consumption worldwide, and a whopping 65% of all oil consumption (IEA, 2019a). So fewer cars would mean reduced reliance on oil and reduced greenhouse gas emissions. Petroleum

and gasoline products are very useful for transporting human beings and our abundant goods across the globe, due to the energy they release from combustion; however, as hydrocarbons, they emit water and carbon dioxide, a potent greenhouse gas, during the combustion process (Donev et al., 2021). As explained in Chapter 3, carbon dioxide emissions play a major part in warming the planet. CTR programs, therefore, provide beneficial outcomes for human beings and the planet. As a result of CTR, people benefit in the form of less time spent in traffic as well as saving money on gasoline and car maintenance, all while ideally creating a better work-life balance. The planet also stands to benefit from CTR through reduced greenhouse gas emissions which accelerate global warming and threaten the livelihood of millions of species on Earth.

This thesis details the attitude and culture surrounding 'Commute Trip Reduction programs'. These programs are designed to increase participation in many different kinds of 'alternative commutes' (biking, walking, carpooling, etc.), and thereby reduce the number of single-occupancy vehicles on our streets and roads. Successful programs would, in turn, alleviate traffic congestion and release lower levels of greenhouse gases into the environment.

In examining the culture behind these programs including the mindset and perceptions of employees in the workplace—the unraveling of *why individuals do or do not participate in these programs* and alternative modes of transportation—this thesis dives into semi-uncharted waters. Although the first HOV (high occupancy vehicle) lane opened in 1969 and gained widespread popularity in the mid-1980s and 1990s, Americans clearly still love the freedom and autonomy that comes from owning and operating a motor vehicle. As an example, 268 million cars were registered in the U.S. in 2016, and yet only 157 million citizens registered to vote (Statista, 2021a; Statista, 2021b). Part of this thesis research endeavors to understand why people are so attached to driving their cars.

With so many cars on the road, it is unsurprising that within the transportation sector cars and light trucks account for 34% of transportation emissions in the United States, even more than trucking and freight transportation combined (25%) (IEA, 2019b). However, within the state of Washington, passenger cars accounted for a majority of transportation emissions in 2015, or 51.7%. Transportation emissions from cars have declined by only 2.7% since 1990 when they accounted for 54.4% of emissions suggesting progress with respect to taking cars off the road has been slow to stagnant within Washington State. As a whole, the transportation sector is responsible for the most greenhouse gas (GHG) emissions in the state. From 2016-2018, the transportation sector accounted for 45% of Washington's GHG emissions, with on road gasoline from cars accounting for 22.1% alone (Washington State Department of Ecology, 2021a).

All of this is especially concerning considering the state enacted one of the first commute trip reduction laws in 1991. The subsequent pages of this thesis address the reasons why. In detailing the attitude and culture of commute trip reduction programs in the workplace, I reveal what works or does not work within these programs, and illuminate some of the main obstacles which have and continue to prevent these programs from establishing firm roots within our work environment and culture. I also discuss ideas that can reshape our modern work environment and the American-made disaster that has become our morning and evening commutes.

In addition to tackling the topic of commute trip reduction, this thesis also utilized an emergent research design. A convergent mixed-methods approach evolved into a multimethod method approach which included: several types of survey data, qualitative interviews, and an autoethnographic narrative woven throughout.

As noted, while working on this project, something rather unexpected happened: the COVID-19 pandemic. After more than a year of examining various literature, designing the

study, exploring trends of survey data, identifying a general lack of progress, administering my own survey, and conducting interviews, everything about the world—including the workplace and the morning and afternoon commutes that go with them—changed.

The novel coronavirus, COVID-19, has shown everyone (albeit somewhat heavy-handedly) that our modern work environment can look much different than it did at the beginning of 2020.

As a society, we first became aware of the impacts of COVID-19 as people became sick and died, first in China and then worldwide. Social distancing, isolation, and quarantine to prevent the spread of the virus followed. Next came widespread economic collapse as once-vibrant businesses shuttered their doors and millions of people were furloughed or laid off by employers. Even churches and synagogues closed their doors. All but the most essential jobs came to a screeching halt. For those still fortunate enough to have a job, working came to mean staring at computer screens and making phone calls at home. Zoom meeting after Zoom meeting after Zoom meeting.

In turn, this dramatic, far-reaching, and unprecedented event had a profound effect on our environment, and it did not take long. Air pollution levels in Delhi, Beijing, Sao Paulo Brazil, London, and Los Angeles dropped from toxic to clean levels. In Delhi, the air quality index (AQI) is routinely well over 200, but for the duration of coronavirus lockdown in March and April, Delhi's AQI was frequently below 20. Clear air is yet one more benefit to taking millions of cars off the road. Likewise in March 2020, Los Angeles saw its cleanest month of air quality on record including 18 consecutive days of WHO target air quality, the longest such stretch the city's seen since 1995 (Ellis-Petersen et al., 2020; IQAir, 2021). There were other noticeable environmental effects. Animals began roaming in areas they had previously avoided because of

all the people milling about (Lewis, 2020; Brito, 2020). Fish (not dolphins[2]) could be seen swimming in the Venice canals (One of my favorite artists even wrote a song about it! "The Venice Canals" by Passenger) due to decreased boat traffic (Rizzo, 2020). By mid-April scientists already predicted that the coronavirus would cause the largest annual fall in carbon dioxide (CO_2) emissions ever recorded (Evans, 2020). All of these stories, anecdotes, and scientific findings collectively divulge that what we do and don't do, and how we go about doing our work does indeed affect us all—people, animals, and the planet. Climate change and the coronavirus pandemic just make this all the more obvious. The stakes are high. There are many players at the table. Commute Trip Reduction is one of many different hands available for us to play.

As indicated earlier, the guiding research question throughout this thesis is: *"How do workers perceive Commute Trip Reduction programs?"* Perceptions encompass a multitude of factors. Thoughts, feelings, and attitudes along with accumulated knowledge (or lack thereof), plus interactions with the environment influence our perceptions. These perceptions in turn play a huge role in shaping our day-to-day reality. Therefore, when I ask about and detail the perceptions of CTR programs in the workplace, I am really asking about all of the above: attitudes, feelings, culture, environmental factors, and knowledge—all coming together to form perceptions of what, why, and how we commute to and from work. Ultimately, it's these perceptions that determine behaviors and shape the world we live and work in every day.

[2] Back in March, 2020, in the early stages of lockdown due to COVID-19 there were numerous reports and articles citing that dolphins had returned to the canals of Venice, Italy. This turned out to be false; the dolphins garnering attention were actually filmed in Sardinia, Italy (Daly, 2020). My personal narrative, *March 21, 2020*, gives mention to this false information.

And because time *is* of the essence, here is a quick preview of what is to come. I begin broadly, discussing the macro-scale topics that provide context for this subject. I explain how this research on CTR ties into the bigger frameworks of climate change, economics, and culture. The focus then narrows back to commute trip reduction with an overview of relevant laws and definitions—and particular emphasis on CTR programs in Washington State. I summarize key concepts, what is and is not required by CTR programs in the State, and clarify why the Washington State Department of Transportation plays a key role in both facilitating and overseeing the programs. Before going into the results, I highlight the methods and methodology used to develop and acquire several types of data. Then, in the Results chapter, I break down each data type section by section before integrating the main findings and noting comparisons or contrasts. Finally, my Discussion and Conclusion bring it all back together, noting key takeaways, apparent flaws, and future recommendations.

Chapter 3. Literature Review

3.1 A Climate in Crisis

In April of 2020, during the worldwide pandemic brought on by COVID-19, our country and countries around the world celebrated the 50th Anniversary of Earth Day, from home. However, despite being much older than 50, the Earth appears to be going through a mid-life crisis. The subject of many scientific papers, and much debate and disagreement in the political atmosphere and broader community, climate change looms large over this thesis and the Earth's future.

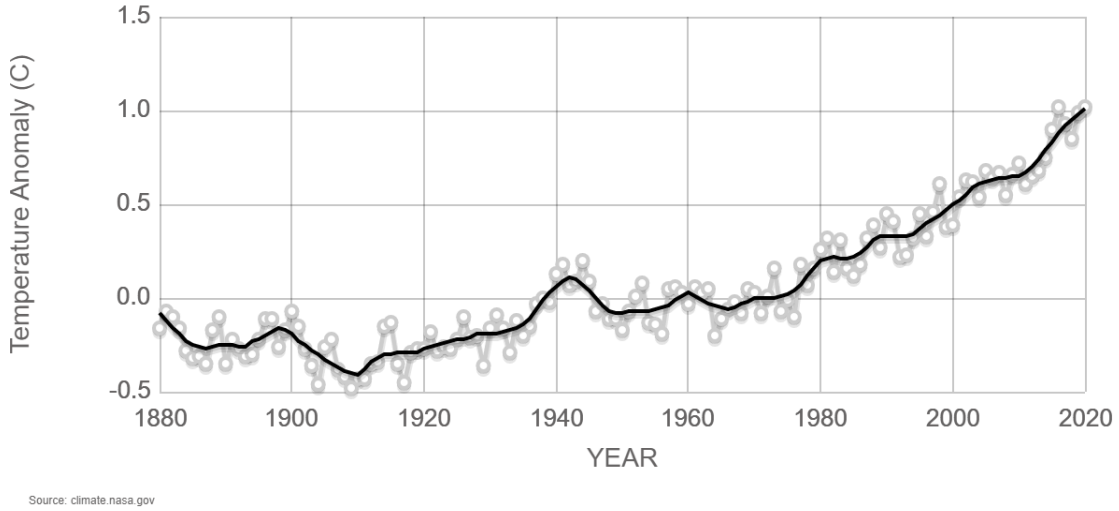
The first Earth Day, April 22nd, 1970, occurred long before people spoke widely about climate change, or even global warming. It took place before electric cars, the IPCC, and several months before the Environmental Protection Agency (EPA) was established (EPA, 2021c). Many people (including the EPA) credit Rachel Carson's groundbreaking book *Silent Spring*, published in 1962, with laying some of the groundwork in advance of the first Earth Day in 1970. Her book sold more than 500,000 copies in the first six months and was published in 24 countries (Ganzel, 2007). Carson did not mince words in establishing a critical relationship between chemical pollution of the environment and public health.

Participation in Earth Day grew from 20 million Americans in 1970 to more than 200 million people around the globe by 1990 (EPA, 2021c). Earth Day 2000 saw climate change begin to take center stage in the environmental movement. But 20 years later, progress on mitigating climate change feels illusory. In fact, 19 of the warmest years have occurred since 2000, with the lone exception being 1998. Additionally, every year since 2014 ranks as *one of the warmest ever recorded.* The year 2019 brought the second warmest global temperatures on record (National Centers for Environmental Information, 2020). That was, however, until 2020

became either the second warmest year ever recorded, or tied with 2016 for the warmest year ever, depending on whom you ask. (NOAA, 2021a; Thompson, 2021). Nevertheless, it is an unsettling trend.

Figure 1**.**

Temperature Change Over the Last 100 Years

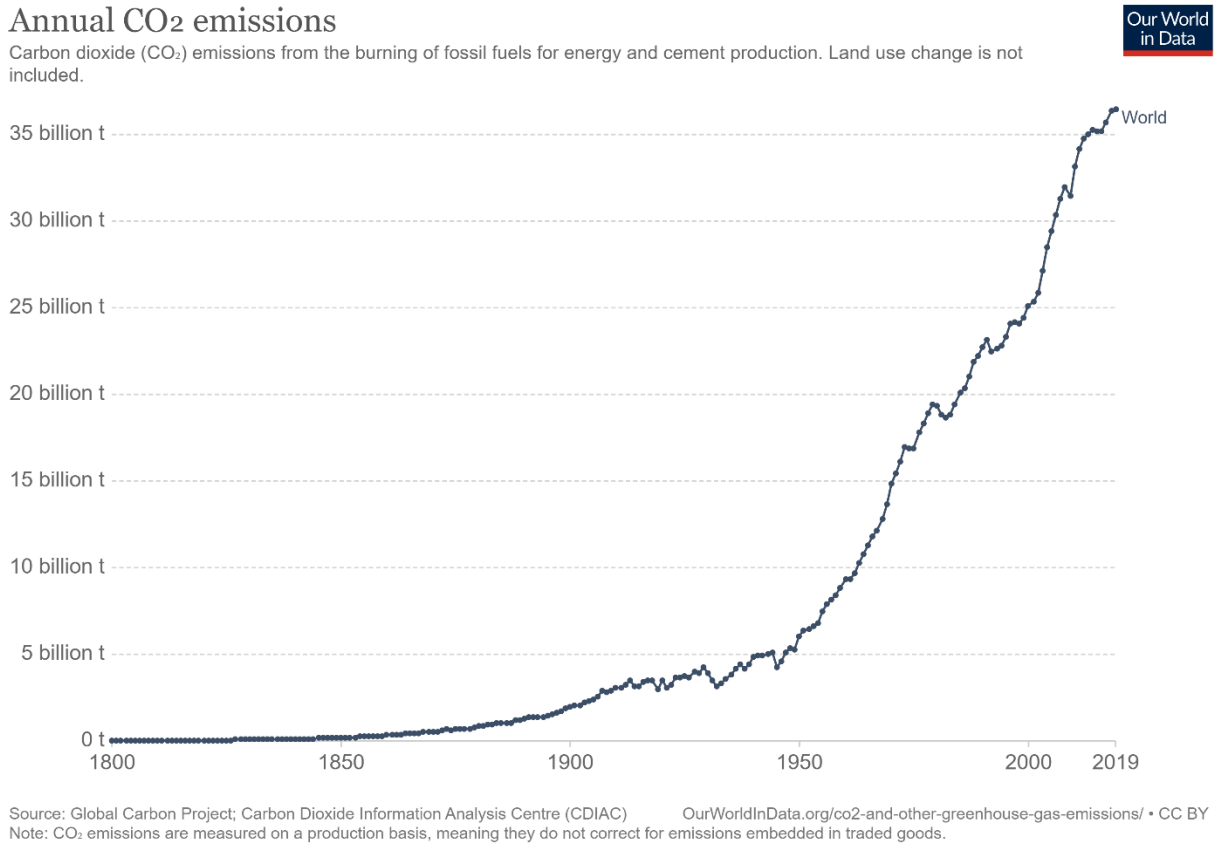


Note. The graph above shows global temperature changes over the last 100 plus years. As of 2020, the average global temperature has risen by more than 1°C since 1880.

The language utilized by the 2018 IPCC report, *Global Warming of 1.5°C*, implies the chance of limiting global warming to 1.5°C is fairly small. Meinshausen et al. (2009) forecasted the likelihood of exceeding 2°C to be 53-87% if global greenhouse emissions remained at levels 25% above 2000 levels by 2020. Unfortunately, 2018 saw a 2.7% increase in carbon dioxide (CO_2) emissions compared to 2017, which had already reached a new high. Given global CO_2 emissions have, on average, *increased* by 2.1% each year since 2000 (IEA, 2018), limiting warming to 1.5°C could be considered fantasy; a warming of more than 1.5°C seems inevitable.

Figure 2.

Yearly Global CO_2 Emissions



Note. Annual CO_2 emissions have risen dramatically over the past 200 years, and especially so in the past 50 years by increasing more than sixfold from 1950 to 2000. When compared to Figure 1, the rise in CO_2 concentration quite well mirrors the rise in global temperature over the last 50 years.

Limiting warming to 2°C is beginning to look equally unlikely. Since 2000, global CO_2 emissions have increased by an astounding 41% to a record 32.53 gigatons[3] (Gt) of CO_2 in 2017 (EDGAR, 2011). Emissions then rose an additional 1.7% to another record high of 33.1 Gt of CO_2 in 2018, followed by a more modest increase of 0.6% in 2019 (IEA, 2019b; Friedlingstein et al., 2019).

[3] 1 Gigaton = 1 billion tons

Overall greenhouse gas emissions follow a similarly troubling pattern. Emissions of methane (CH_4) and nitrous oxide (N_2O) both increased between 1% and 6% annually from 2000-2005 (Olivier et al., 2017). By 2008, methane emissions had increased another 5% while nitrous oxide increased an additional 2% from 2005 levels (Olivier et al., 2017). If these trends continued to 2020 and beyond, there is almost no chance of avoiding 2°C of warming.

However, the rate of growth in greenhouse gas (GHG) emissions may be starting to decline. In 2014, global greenhouse gas emissions increased by only 1% from 2013. Then in 2015-2016 growth slowed down to 0.2% and 0.5%, respectively (Olivier et al., 2017). When factoring in that 2016 was a leap year and 0.3% longer, this three-year trend could be indicative of a possible leveling out of greenhouse gas emissions. However, according to Olivier et al., "such slow annual emission increases have only occurred in 2015, during the global economic recession in 2008–2009, and during the major global financial crisis in 1998 that resulted from the Asian financial crisis." The trend may not continue. Plus, Meinshausen and colleagues (2009) calculated that even if GHG emissions stay within 125% of their 2000 levels by 2020, there is still a 75% likelihood of a 2°C of warming.

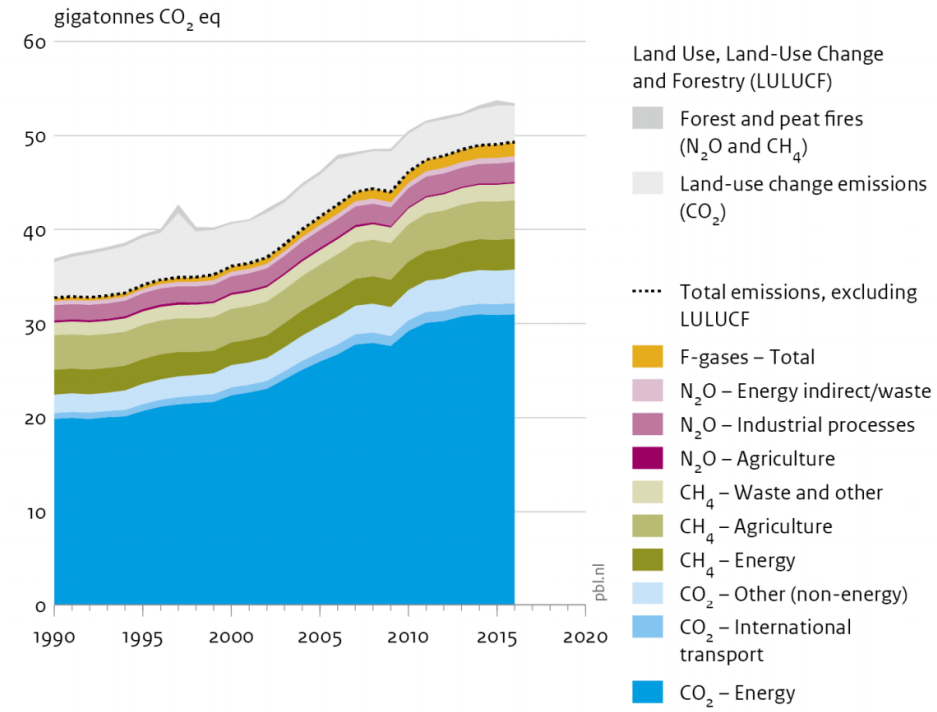
In reality, 2016 global GHG emissions reached 49.3 gigatons (Gt) of CO_2 equivalent (CO_2e) (without even accounting for emissions due to land-use change). This represents an increase of more than 40% from 2000's total GHG emissions of around 35 Gt CO_2e (Olivier et al., 2017). So even if the rate of global emissions growth was starting to decline (which it's not), the magnitude of that decline simply isn't enough. We must reverse this trend of *increasing* global emissions and begin *decreasing* emissions as soon as possible.

This is where COVID-19 has possibly done some good. Despite the tragic loss of life and economic hardships brought about, the virus put the world on course to *decrease total emissions*

for the first time since the 2009 economic crisis and only the second time since 1990 (Olivier et al., 2017). Scientists projected 2020 would have the largest ever annual decrease in GHG emissions due to the COVID-19 pandemic (Evans, 2020), which is precisely what happened (IEA, 2020b).

Figure 3**.**

Global Greenhouse Gas Emissions by Type of Gas and Source



Source: EDGAR v4.3.2 (EC-JRC/PBL 2017); Houghton and Nassikas (2017); GFED 4.1s (2017)

Note. Total greenhouse gas emissions from 1990 to 2015. The dotted black line in the figure below shows total annual emissions over time. The only decrease was in 2009 and is largely attributed to the economic recession. Notice that this figure does not distinguish or single out domestic transportation emissions, as it does for international transport.

How did COVID-19 decrease emissions? Stay-at-home orders resulted in millions of people working from home and severely limited travel, which resulted in a dramatic drop in emissions. Bear in mind, the transportation sector accounts for nearly one-third of all emissions

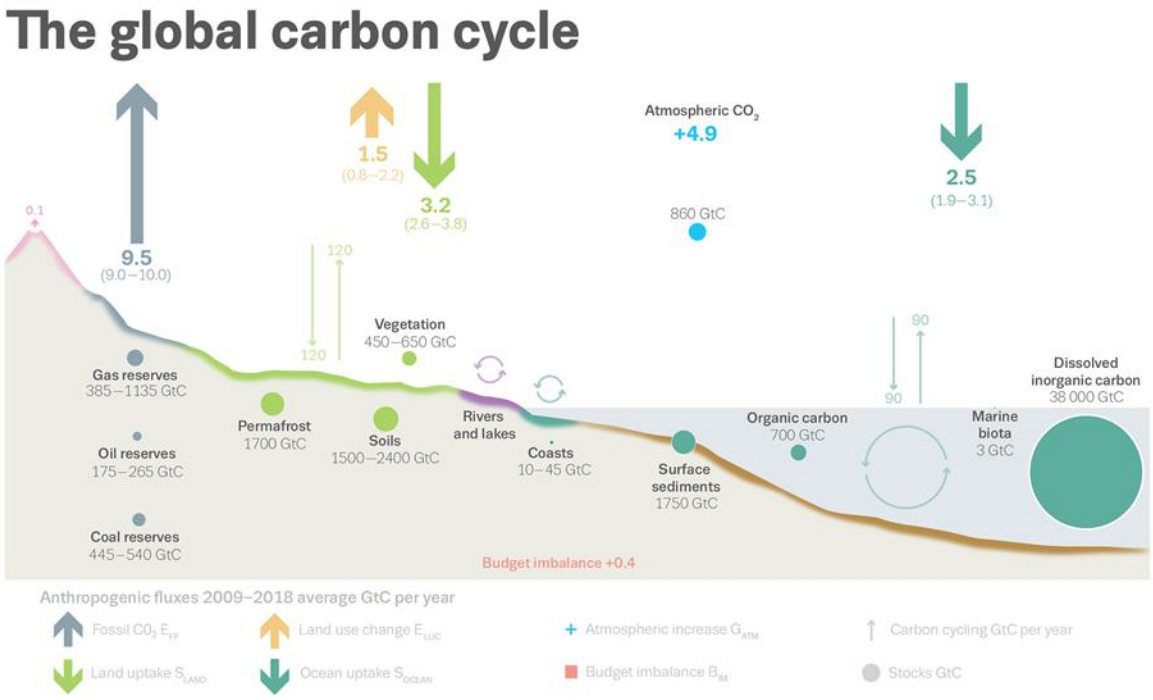
in the United States and around the world. Commuting patterns and behaviors have a huge impact. When people around the U.S. and abroad started to stay home, not only did the cost of airline tickets plummet but highway traffic also dropped off precipitously (Leonhardt, 2020; Seaney, 2020; Ankel, 2020; Harrington, 2020; Stumpf, 2020). This rapid behavior shift affected billions of people as well as the Earth system as a whole.

In discussing the Earth system, we need to be particularly mindful of the global carbon system especially when examining climate change and greenhouse gas emissions. The law of conservation of mass states matter cannot be created or destroyed. When fossil fuels are burned, the carbon within does not disappear. Rather, the carbon is displaced from one form into another and in the case of the gasoline used to power our cars from a liquid into CO_2 gas.

The carbon system accounts for how carbon dioxide (CO_2) emissions redistribute throughout the atmosphere, ocean, and terrestrial biospheres (Le Quere et al., 2017). While the global carbon system has historically been balanced (carbon sinks equal to carbon emissions), the dramatic surge of CO_2 released into the atmosphere has created an imbalance.

Figure 4**.**

The Global Carbon Cycle



Note. Disruption of the global carbon cycle caused by anthropogenic activities has resulted in an average imbalance of 0.4 Gt CO_2 each year from 2009–2018. As the figure shows, the two main carbon sinks are the ocean and the biosphere (labeled land uptake). Once the ocean reaches its carrying capacity, and without a dramatic increase in vegetation, atmospheric CO_2 will continue to rise. Source: Friedlingstein et al., 2019.

Fossil fuels (whether coal, petroleum, or natural gas) are composed of carbon long buried underground or underwater. By the process of combustion, these fuels are converted from long dead organic matter and into additional free carbon, which is then thrown into the global cycle. As Figure 4 above shows, there is a limit to the natural carbon sinks of the Earth System. The intense burning of fossil fuels has created an imbalance of four Gigatons of CO_2 in the last decade alone, further increasing the amount of atmospheric CO_2 (Friedlingstein et al., 2019). However, when tens of millions of people began working from home during the COVID-19 pandemic, the demand for oil and gasoline dropped precipitously. Hundreds of millions of

tailpipes remained stationary in driveways all over the world, leading to dramatic decreases in CO_2 emissions during March and April 2020.

Before the Industrial Revolution, early increases in atmospheric CO_2 resulted primarily from land-use change – through deforestation and the release of carbon from within tree land sinks (Ciais et al., 2013). Emissions from fossil fuel burning did not become the primary source of carbon emissions until around the 1920s when concentrations of atmospheric CO_2 were around 300 parts per million (ppm) (La Quere et al., 2017; Joos & Spahni, 2008). By 1958, the first recorded observations at Mauna Loa, atmospheric CO_2 checked in at 316 ppm. As emissions continued to rise in the 20th century, so did the amount of CO_2 in the atmosphere. The last time the National Oceanic and Atmospheric Administration (NOAA) recorded an average monthly CO_2 reading at Mauna Loa of less than 350 ppm was back in October of 1988 when Phil Collins' 'A Groovy Kind of Love' was #1 on the Billboard Hot 100 (Billboard, n.d.). CO_2 concentrations in the atmosphere have remained above 400 ppm since September 2016 (Tans & Keeling, 2021). And in May 2021, the observatory recorded a new high of 419 ppm (NOAA, 2021b).

Overall, as laid out here and elsewhere, much of the research, information, and trends regarding climate change, global warming, and atmospheric CO_2 are troubling. One bit of good news is that we have yet cross the parts per million tipping point where physical-chemical properties would absolutely ensure a warming of least 2°C. According to Denning (2018), doubling concentrations of atmospheric CO_2 results in about 3°C of average global warming; therefore, mathematically once the Earth reaches 455 ppm of CO_2, staying within 2°C will be impossible. As such, the planetary boundary of the carbon cycle remains, for the moment, unbroken. However, the science clearly indicates that immediate, drastic, and far-reaching actions be taken to avoid irrevocable climate catastrophe.

Furthermore, the scientific data and information presented demonstrates the importance of identifying, developing, and promoting more policies and practices, such as commute trip reduction (CTR) programs, aimed at reducing GHG emissions. The average passenger vehicle emits 411 grams of CO_2 per mile driven. Over the course of year, the average vehicle then emits 4.6 metric tons of CO_2 per year (EPA, 2021a). With over 270 million passenger cars in the U.S. and more than one billion worldwide, CO_2 emissions from transportation quickly add up to an enormous amount and a big problem when trying to limit GHG emissions (Statista, 2021a; Chesterton, 2018). In the pages ahead, I detail exactly how large of a role the transportation sector plays and explain how CTR became a commonsense solution to a number of problems associated with large metropolitan development, including rising CO_2 emissions. But before looking at the history surrounding CTR including what constitutes a CTR program, we must first address the main driver of climate change and the transportation sector: the economy.

3.2 Economic Growth does not Serve Us or the Planet (the True Cost of Economic Growth)

Quite possibly the most important climate solution hinges upon a radical rethinking of the economy. Our economic system and policies play a huge role in shaping just about every aspect of our world including the environment and how we live day in and day out. After several years of relatively small increases, global CO_2 emissions rose by 1.7% in 2018 to a new high of 33.5 Gt CO_2. A 2.3% increase in energy consumption was the main factor in the increase, and according to the IEA was chiefly driven "by a robust global economy" (IEA, 2019b). Global CO_2 emissions then rose again to another new high in 2019 before falling in 2020 amidst an unprecedented pandemic and economic turmoil (IEA, 2020a; Ritchie & Roser, 2020; Hausfather, 2019; Evans, 2020). Curiously, emissions of greenhouse gases only decrease during economic downturns and recessions.

As such, global pandemics notwithstanding, business-as-usual economics, along with the push to increase the standard of living for billions of people across the globe, remain the biggest culprits of continued greenhouse gas (GHG) emissions. This remains true despite microeconomic shifts in various cities and states across the United States and the World. The 2019 UN Report, *Lessons from a Decade of Emissions Gap Assessments*, makes this point rather poignantly by titling one chapter: "A decade lost – essentially no change in global emissions trend" (UNEP, 2020). The report highlights the fact that current global greenhouse gas emissions are almost identical to business-as-usual (BAU) projections for 2020 made almost a decade earlier (Christensen & Olhoff, 2019). Recall that total GHG emissions in 2016 were close to 50 Gt of CO_2 equivalent (CO_2e). In 2018 total GHG emissions (including those from land-use change) reached a record high of 55.3 Gt CO_2e compared to 56 Gt CO_2e projected by the UN Emissions Gap Reports. Given that emissions decrease in times of economic downturn such as in 2008-2009 during the financial collapse and in 2020 during a global pandemic, it's readily apparent how intwined the economy is to GHG emissions. What's more, the BAU projections were based on the assumption that from 2005 on, no new climate policies are being put in. As the report states, "The effects of climate policies have been too small to offset the impact of key drivers of emissions such as economic growth and population growth" (Christensen & Olhoff, 2019, p. 3).

These findings by the UN place a huge emphasis on not only enacting new climate policies and solutions but also strengthening existing policies and programs such as commute trip reduction (CTR). Recall that the transportation sector accounts for 29% of all energy consumption and more than 65% of all oil consumption, and the emphasis on CTR programs becomes even more apparent. And yet, BAU economics puts workers and economies in the difficult circumstance of trying to achieve smaller ecological and carbon footprints while at the

same time contributing to economic growth and expansion. In *Economic Growth & Environmental Impact* (Appendix 1) I refer to Schnaiberg's *Treadmill of Production* (Schnaiberg & Gould, 1994) as being one of the major underpinnings of both modern-day capitalism and the current climate crisis. Schnaiberg and Gould surmised that economic growth relies heavily on economic expansion coupled with increased extraction and environmental degradation.

Subsequent studies suggest Schnaiberg & Gould's theory to be true. In 2009, Rockström and colleagues developed the concept of 'Planetary Boundaries' which denote the safe operating space for nine essential planetary systems such as biodiversity, freshwater use, and climate change. In their groundbreaking paper, Rockström et al. (2009) found that the boundaries of three systems (biodiversity, climate change, and the nitrogen cycle) have already been exceeded. More recently, other scientists have confirmed the work of Rockström et al. while taking the Planetary Boundary concept and applying it with a corporate sustainability lens (Whiteman et al., 2013) or used the boundary framework in comparison to meeting basic human needs (O'Neill et al., 2018).

Additionally, a plethora of research exists documenting a clear link between gross domestic product (GDP), the most frequently used measure for economic growth and development, and GHG emissions. Tucker (1995) looked at the relationship between GDP per capita and CO_2 emissions for 137 countries from 1971 to 1991. A *significant, positive relationship was found in each of the 21 years*. Numerous studies have also found similar results. Holtz-Eakin & Selden (1992), Azomahou et al. (2006), and Moomaw & Unruh (1997) all indicate a clear, significant relationship between GDP and CO_2 emissions, with the latter two also flagrantly questioning the legitimacy of an Environmental Kuznets Curve. Even the World Bank's 1992 report titled *Development and the Environment* acknowledges the link noting that a

reduction in global GDP may be necessary to "stabilize" greenhouse gas emissions (World Bank, 1992, p. 160).

Looking at Table 1 below, the relationship between GDP and CO_2 emissions is hard to miss. The table lists the top ten countries in terms of GDP in 2019.

Table 1.

The Top 10 Countries by GDP and Their Associated CO_2 Emissions

Country	GDP Ranking by Country	Total Nominal GDP in 2019 (in billions of US dollars)	Emissions Ranking by Country	Total CO_2 Emissions in 2019 (in billions of tons of CO_2)
United States	1	21.43	2	5.28
China	2	14.34	1	10.2
Japan	3	5.08	5	1.11
Germany	4	3.86	7	0.701
India	5	2.87	3	2.62
United Kingdom	6	2.83	17	0.370
France	7	2.72	19	0.324
Italy	8	2.00	18	0.337
Brazil	9	1.84	13	0.466
Canada	10	1.74	11	0.577

Note. The correlation between GDP and CO_2 emissions is readily apparent when graphed or viewed side-by-side. Also notice that the United States. and China account for a disproportionate amount of both GDP and CO_2 emissions. Sources: World Bank, 2021; Andrew & Peters, 2021.

Immediately apparent is the huge discrepancy between the United States and China and all other countries. It's no coincidence that the two largest economies also have the highest CO_2 emissions. In fact, the US and China made up more than 40% of the world GDP in 2019 (World Bank, 2021). Likewise, out of the 36.44 billion tons of carbon dioxide emitted in 2019 (therefore excluding other GHGs), the US and China accounted for 15.45 billion tons of CO_2 or 42.4% of

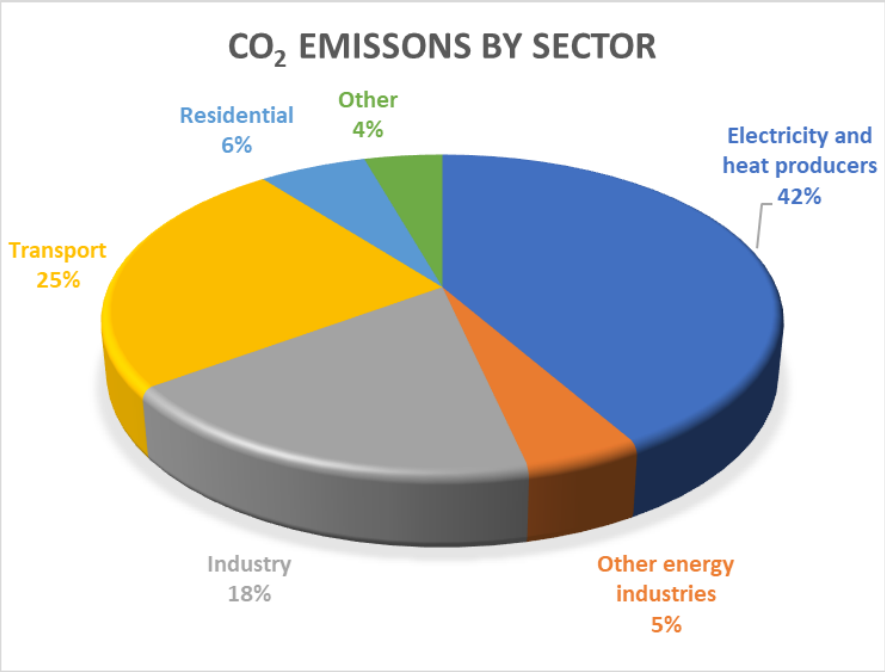
all CO_2 emissions that year. Except for France, Italy, and the United Kingdom, every other country's emissions ranking falls within five spots of its GDP ranking. The correlation between GDP and GHG emissions is one not to be ignored and shows how reliant our economic systems of production are on fossil fuels.

3.3 Transportation and Economic Growth

A substantial portion of both greenhouse gas (GHG) emissions and energy consumption can be attributed to the transportation sector, as has been previously noted. The exact amount and percentage of emissions varies depending on the source, year, or specific measurement. Globally, reports reveal that the transportation sector accounts from anywhere from 14% to almost one-third of all GHG emissions (Wang & Ge, 2019; EPA 2021b). Although, when specifically looking at CO_2 emissions, the latest data from the International Energy Agency (IEA) suggests that the transportation sector accounts for about one-fourth of all CO_2 emissions as Figure 5 below indicates (IEA, 2021a).

Figure 5.

Global CO_2 Emissions by Sector



Note. IEA data from 2019 illustrates that the transportation sector accounts for the second-most CO_2 emissions by sector, trailing only electricity and heat production. Source: IEA, 2021a.

The IEA also estimates that 29% of all energy consumption occurs due to the transportation sector (IEA, 2021a). Almost all of this energy (more than 90%) comes from the consumption of petroleum-based products such as gasoline, jet fuel, and propane (EIA, 2021).

Transportation fuel consumption heavily depends on the number of miles people drive each year. As of 2015, the number of vehicles in use totaled more 1.28 billion worldwide, with nearly a billion being passenger cars (OICA, 2021). By 2018, the number of vehicles in the world was estimated to be more than 1.42 billion, with over 276 million cars in the United States alone (Chesterton, 2018; *How many cars are in the world?* n.d.; Statista, 2021a). According to the U.S. Department of Transportation, the average person in the United States drove 13,476 miles in 2018 (USDOT, 2018). That may not seem like a lot, but collectively it amounts to

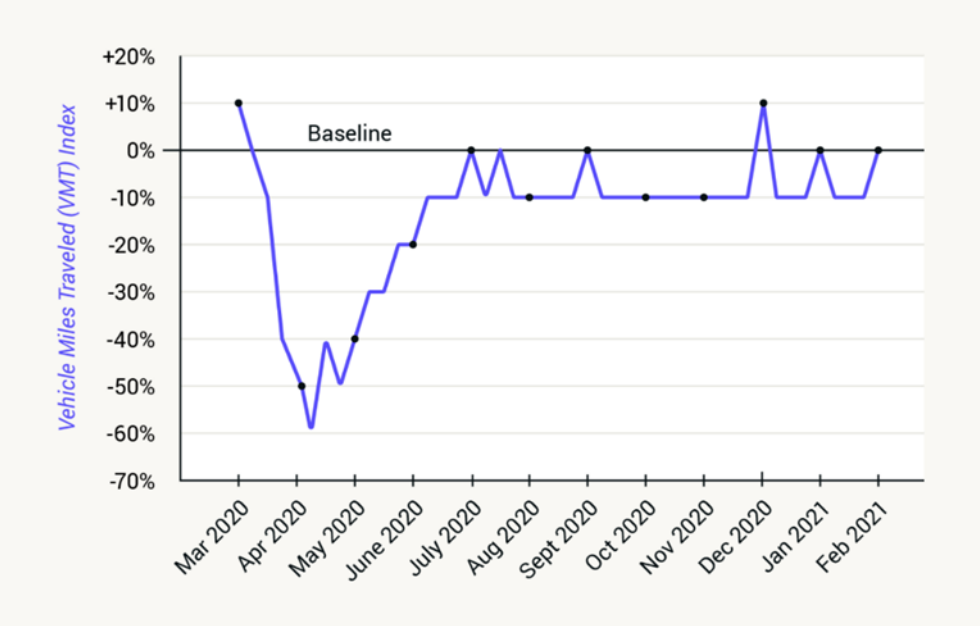
almost 3 trillion miles each year or more than 17,000 trips to the sun and back again. Considering the average passenger vehicle emits 404g of CO_2 per mile, that equates to over a billion tons of CO_2 every year (EPA, 2021a).

Again, that is just in the United States. Canadians account for 9,562 miles per year—a distant second but still substantial amount; Australia (8,555), Italy (8,256), and France (7,424) round out the top five, checking in at third, fourth, and fifth, respectively (Kopestinsky, 2021). However, a study by Liu et al. (2017) reveals that China is now likely at least second in annual miles driven, and actually ahead of the United States when it comes to miles driven per vehicle. Moreover, China has been the world's largest car market since 2009, adding more than 23 million cars to roadways every year, and in 2013 overtook the United States in freeway miles (Cox, 2019).

All of this is crucially important because not only does mobility via passenger cars and air travel make up enormous proportion of an individual's ecological and carbon footprints, but the numbers also appear to be trending in the wrong direction. Average miles driven in the United States reached a record high of 14,300 miles in 2019 (Covington, n.d.). Additionally, the average length of our work commutes—both in terms of physical miles and time spent—continues to increase in the United States (more on this later). Furthermore, despite a significant drop in vehicle miles driven during the lockdowns of a once-in-a-generation pandemic, travel by car returned to its pre-pandemic baseline levels in March of 2021 (Lieb, 2021).

Figure 6.

Changes in VMT Since the Beginning of the COVID-19 Pandemic



Note. The COVID-19 pandemic precipitated a sharp decline in travel during the initial months of lockdown in the Spring and early Summer of 2020. By April, 2020, VMT had plummeted to nearly 60% below the baseline levels. However, by July 2020, millions of people reverted to their driving ways; 2021 would see a return to pre-pandemic levels of travel. Source: Covington, n.d.

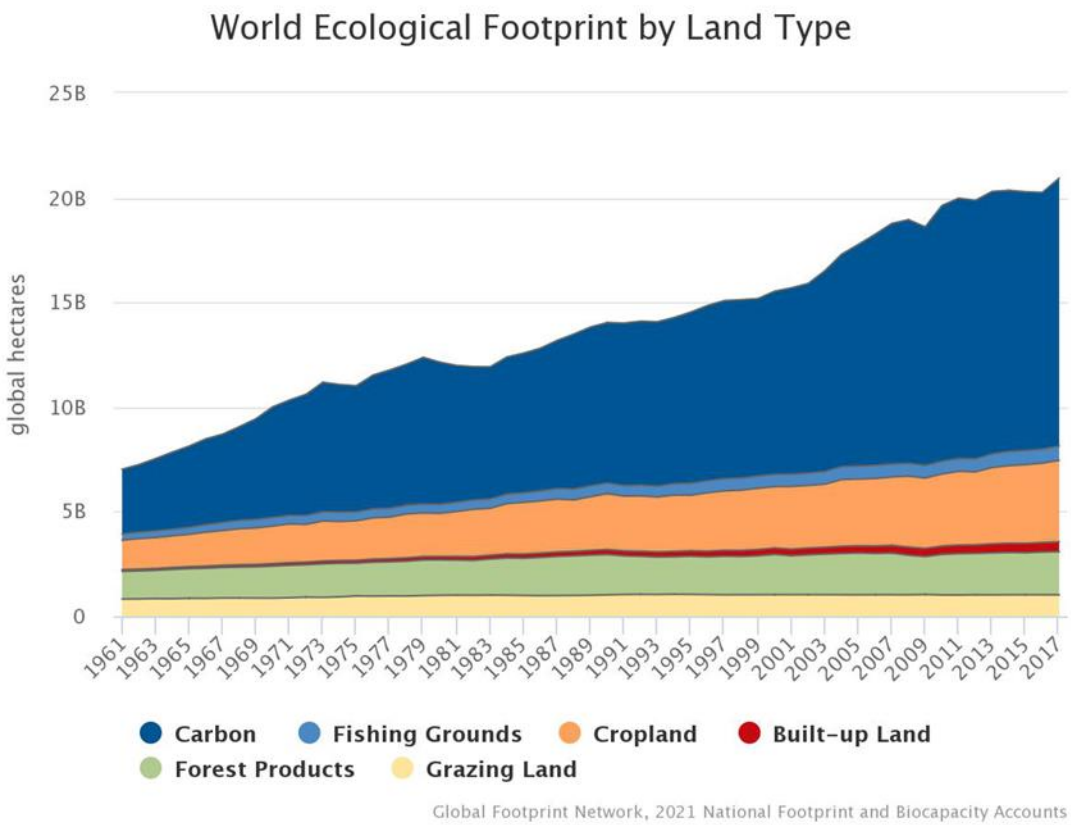
Economic rebound is largely to blame for the turnaround in vehicle miles traveled. In looking at the effect of annual hours worked, Hayden and Shandra (2009) found a significant relationship between the GDP per capita and ecological footprint (EF) per capita (ecological footprint being a measure of the amount of land required to sustain an individual's consumption). At the time, the United States had the highest GDP per capita as well as the highest EF per capita at 9.8 hectares per person. Again, a significant percentage of that comes from the transportation sector and the number of miles driven by US citizens every year. Knight et al. (2013), York, Rosa, and Dietz (2003a) reported the same positive relationship between EF and GDP in their findings. Likewise, a different study by York et al. (2003b) narrowed the variables to GDP per capita and CO_2 emissions, still finding a significant, positive relationship between the two. All of

this underscores the link between the economy, transportation, ecological footprint, and carbon footprint. The science overwhelming supports that economic growth is driving global emissions and the transportation sector is leading the way.

The figure below illustrates how much of the world's ecological footprint results from carbon emissions, and how carbon emissions dominate the landscape as it pertains to ecological footprint and environmental degradation.

Figure 7**.**

World Ecological Footprint by Land Type



Note. The figure demonstrates the steady growth of carbon-based ecological degradation since the 1960s. Despite small dips in the 1970s, the 1980s, and during the 2009 financial crisis, the world's ecological footprint continues to rise higher and higher. Worryingly, carbon emissions continue to account for a greater percentage of that ecological footprint. Source: Global Footprint Network, 2021.

The steady growth in emissions and carbon footprint largely comes from consumption. Consumption of fossil fuels persists throughout every fabric of our society—in every purchase and consumer good. Whether purchasing a new t-shirt, buying and eating an apple, or purchasing a new Apple MacBook Pro—every consumer good has both an ecological footprint and a carbon footprint. A single t-shirt for example requires more than 2,000 liters of water to produce, corresponding to its ecological footprint (Schor, 2011; World Wildlife Fund, 2013). Jeans require even more water at more than 3,700 liters per pair.

The problem is that water use also comes with a carbon footprint attached. According to the United Nations Environment Programme, 3,700 liters of water also amounts to 33.4 kg of CO_2e emissions—emissions that come from pumps that move water, plants that treat water, and appliances and machines that use water (World Bank, 2019). It's estimated that water use accounts for 5% of all carbon emissions in the US (Griffiths-Sattenspiel & Wilson, 2009). For comparison, the production of clothing accounts for 10% of all carbon emissions, the majority of which is attributable to the high energy consumption of textile production (The Conscious Club, 2019).

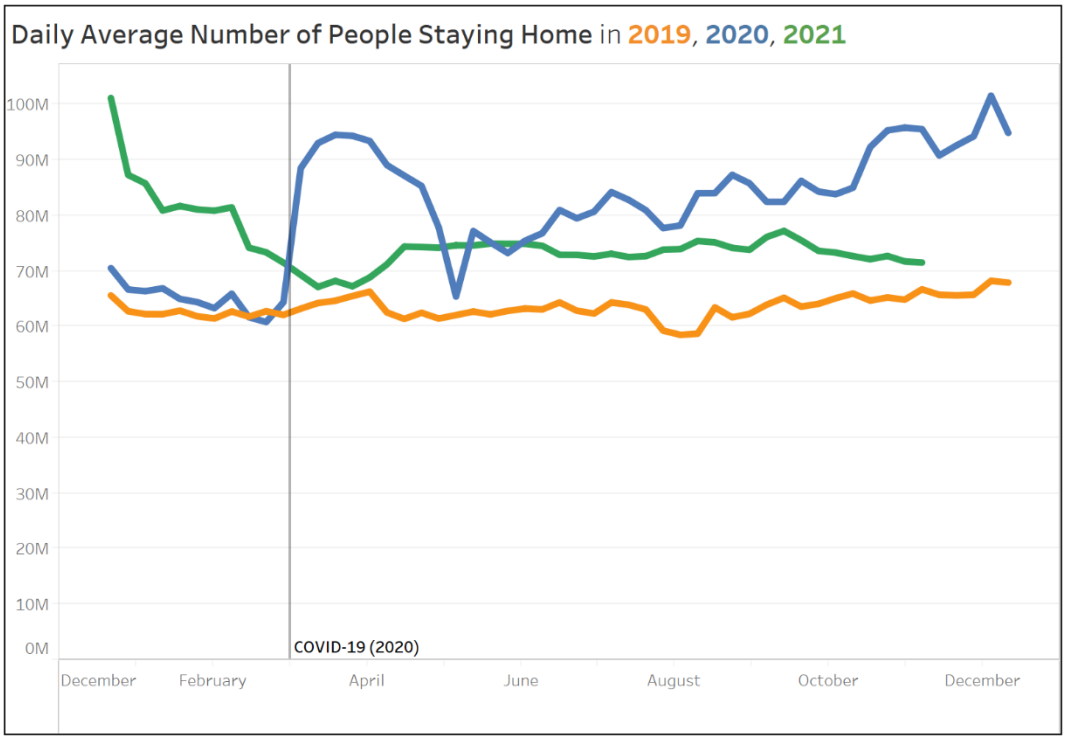
Again, it is extremely difficult to extricate almost any aspect of society from the use of fossil fuel. Furthermore, as it is within the fashion industry, emissions remain consistent across all industries when analyzing the carbon footprint of goods. Consequently, while an individual can marginally reduce their carbon footprint by choosing an in-season apple over an imported banana, the difference is not as dramatic as one might imagine. We can only attribute 0.3 kg more CO_2e per kg with bananas than with apples (Ritchie, 2021). Interestingly, when it comes to the emissions linked to goods such as apples and bananas, transportation typically only accounts for 11% of emissions (Weber & Matthews, 2008). This highlights how emissions from the

transportation sector do not all have the same impact. The difference between locally sourced goods and imported goods is dwarfed by the impact of our personal commute choices, further cementing the importance of CTR and transportation demand management. Additionally, CTR programs, when compared to freight and international travel, provide the individual consumer much more agency.

With such a large percentage of GHG emissions attributable to the economy and more specifically the transportation sector, it's no coincidence that during the 2020 COVID-19 pandemic global CO_2 emissions declined by 5.8%. Amid the pandemic and a turbulent economy, 2020 had the largest percentage drop in annual emissions since World War II (IEA, 2021b). Chief among the reasons for the sharp decline was the drop in emissions from the transportation sector. While air travel, in particular international air travel, made up a significant portion of the decline, the absence of road travel also made a substantial impact. With lockdowns issued across the globe and quarantining becoming part of daily vernacular, millions of cars came to an abrupt and lengthy stop.

Figure 8.

Daily Average Number of People Staying Home, 2019-2021



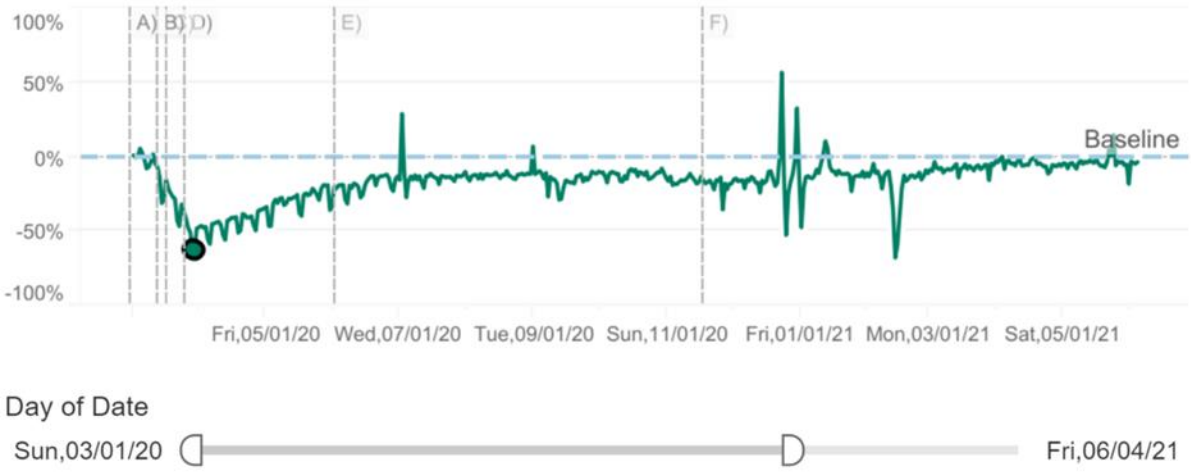
Note. Notice the abrupt increase of more than 20 million people in the United States staying at home at the outset of the COVID-19 pandemic in March 2020 compared to March 2019. In addition, despite a drop in late May 2020, the work-from-home trend continued throughout the rest of the year and into 2021. However, by the end of 2021 the number of people staying home is approaching 2019 pre-pandemic levels. Source: Bureau of Transportation Statistics, 2021.

Although road travel dropped precipitously during the early stages of the pandemic, more generalized road travel (i.e. not for work) rebounded during the second half of 2020. Specifically, here in Washington State, highway traffic was down an astonishing 63% at the end of March 2020 (WSDOT, 2021). However, this dramatic decline of travel by car was short lived and slowly rebounded over the next few months. WSDOT reports that by June 2020 highway traffic was reduced 20% when compared to June 2019. Highway traffic and travel remained below average over the rest of the year, staying consistently between 10 to 20% below 2019 levels. Although as of June 2021, highway traffic is only down 5% compared to the same time in

June 2019, indicating a return to pre-pandemic travel is both imminent and inevitable (WSDOT, 2021).

Figure 9.

Washington State Daily Highway Traffic



Note. A) 2/29 – State of Emergency declared B) 3/12 – Schools Closed C) Ban on gatherings of 50+ people D) 3/25 – Stay Home, Stay Healthy order goes into effect E) 6/1 Stay Home, Stay Health order expired F) New statewide restrictions. The highlighted green dot represents the lowest traffic volume during the pandemic, Sunday, March 29th, 2020, when traffic was down 63% compared to 2019 (The 68% drop on February 13th, 2021, was due to heavy snowfall). Traffic volume would slowly begin to rise thereafter, remaining below normal throughout 2020. In April, 2021, highway traffic returned to pre-pandemic levels. *Baseline year is defined as March 2019 to February 2020. Source: WSDOT, 2021.

Based on the data from WSDOT, the COVID-19 pandemic only temporarily halted individuals from driving their personal vehicles. And while people's approach to their work commutes was changing dramatically, many still felt the urge to travel for vacation or to visit friends and family. Perhaps more alarming is the fact that many people in Washington State have continued to abandon the use of transit, which as of June 2021 remains more than 50% lower than June 2019 (WSDOT, 2021). I revisit both of these important and concerning trends in the Discussion. However, there is no questioning the extraordinary effects of the COVID-19 pandemic on almost every facet of the transportation sector and our society at large. In fact, if

anything the pandemic made the link between the economy and the transportation sector even more readily apparent.

Furthermore, the COVID-19 pandemic fundamentally brought CTR to the forefront of employees' minds, with work-from-home/telework/telecommuting in particular gaining unprecedented traction and importance. The survey data and interviews collected for this thesis all came before the pandemic, before the corresponding lockdowns and remarkable surge in telecommuting. Nevertheless, the results certainly represent an important reminder of the perceptions, attitudes, and barriers to CTR before the COVID-19 pandemic. Additionally, the dramatic and rapid shift work-from-home can serve as a guiding light as we aim to reduce GHG emissions moving forward. Overall, oil demand fell 10% in 2020 compared to the demand in 2019. This resulted in a 1,100 Mt drop in CO_2 emissions within the transportation sector, almost a 14% drop from 2019 and accounting for over 50% of the global drop in CO_2 emissions (IEA, 2021b). In fact, the IEA cites the recovery of road transport activity, particularly in emerging economies, during the second half of 2020 to be "one of the principal drivers of the rebound in emissions." As climate change looms large over the next decade and beyond, the evidence overwhelmingly points to the need for solutions like CTR in order to reduce emissions.

3.4 CTR Background

With the backdrop of a planet on the precipice of ecological ruin and a societal culture heavily focused on economic productivity, our focus turns to one potentially critical link between the two: the morning and afternoon commute. Throughout mankind's history, economies and the manner people perform work has been predicated on available technology. Advances in technology spurred revolutionary changes in how and where people live and work. During most of the last two thousand years, work was constrained by two critical conditions: work was done

in-person or limited by mode of travel—typically either walking or via horseback (Perkins, 2017). It was not until the Industrial Revolution of the late 19th century that new technology made it possible for work to be done differently, and more importantly this allowed workers to commute longer distances than ever before. Railroads and electric street cars transformed cities and country sides around the world making it possible for individuals to travel distances ten to twenty times faster than on foot. For the first time, people could live in one location and work in another. Early railroads and electric street cars, along with the advent of factory work, profoundly transformed work as we know it today—creating the morning and afternoon commute.

The advent of the bicycle and an affordable motorized car, Ford's Model T, further served this new movement towards splitting an individual's work from their residence. Compared to the more 270 million cars registered in 2020, there were only 80,000 registered passenger vehicles in 1900. Though by 1920, the number of registered vehicles had ballooned to almost 10 million (Caplow et al., 2001). However, nothing shaped the modern commute or dramatic rise of car ownership quite like the design and innovation of freeways and expressways. Large expressways with multiple lanes for traffic and smooth, paved roads allowed even faster speeds and longer travel distances. Before modern highways and freeways, cars were mostly utilized for leisure or when the well-to-do needed to commute from their country villas to the nearest train station. When highways became commonplace across the country after World War II, travel became easier and more accessible to more people. Cheap farmland outside the city quickly became city suburbs and allowed families to commute to the city in the morning and return home for dinner (Hanchett, 2000). Furthermore, in 1950 it was uncommon for households

to have more than one car, but by the year 2000 just about half of all car-owning households had two or more vehicles (Caplow et al., 2001).

This 20th century trend of more cars, more roadways, and more vehicle miles traveled overlapped with an increasing population as well. From 1950 to 1990, while the total number of people living in central cities in the United States declined by 17 percent, the population of metropolitan areas increased by 72 percent (Baum-Snow, 2007). The decrease in the number of people living in the central city coupled with an overall increase indicates most of the growth occurred in the suburbs. Coincidentally, as more people migrated to the suburbs and began commuting for work, cities across the country started to encounter more congestion on highways and freeways.

In the 1980s the term "wasteful commuting" emerged as some researchers like Hamilton & Röell (1982) noted that the majority of people in many U.S. cities had longer actual commutes compared to optimal commuting models. While Hamilton & Röell's work mainly sought to question the urban economic models of the day, and even though their findings were debated (White, 1988; Small & Song, 1992), they generated incredible interest in urban planning and the inextricable link between job locations, housing, and the commute in-between. Commute times and vehicle miles traveled (VMT) started to gain the attention of policy makers and researchers alike.

Corresponding with the dramatic geographic migration was the green movement brought about by pervasive smog in cities such as Los Angeles and New York City, and Rachel Carson's *Silent Spring*, mentioned above. Finally, in 1990 the federal government amended the Clean Air Act of 1963 to provide even more standards for regulating environmental hazards such as acid rain, toxic air pollutants, and the depletion of the ozone ("Clean Air Act", n.d.; EPA, 2020). A

perfect storm was brewing. A confluence of factors from a growing population to the upswing in car ownership to a much more environmentally conscious populace, drove the desire to take action against poor air quality and unbearable traffic congestion.

3.5 CTR in Washington State

In Washington State, a similar story was unfolding. The state of Washington actually created the first agency dedicated to environmental regulation in the country creating the Washington State Department of Ecology on February 23rd, 1970, almost ten months before the founding of the U.S. Environmental Protection Agency (Washington State Department of Ecology, 2021b). Likewise, Washington State's Clean Air Act of 1957 also predated implementation at the federal level. A significant achievement and a step in the direction of environmentalism and toward public health, the act was mostly exploratory in nature, providing cities, towns, and counties with the authority to adopt ordinances and survey the air quality of their region. Notable, however, was the bend toward maintaining economic and industrial growth. Evidence lies in the opening policy statement:

> It is the public policy of the state to maintain the highest practical standards of purity of the air in order to promote public enjoyment of the state's natural scenic and outdoor recreational resources, to foster and develop public health, and to facilitate the growth of desirable natural agricultural plant and animal life, *all consistent with maximum employment and full industrial development of the state* ("Air Pollution Control Districts", 1957, emphasis added).

In 1957, the state's legislators did not understand the fact that industrial development and air purity are fairly incongruous. Updates to the law in 1967 and 1969 created incremental change; the 1967 legislation amended policy statement including the replacement of "full industrial

development" with "to the greatest degree practical…promote the economic and social development of the state" ("Washington Clean Air Act", 1967, p. 1233-1234). The 1969 bill would go slightly further listing urbanization and industrialization as reasons individual towns, cities, and counties are unable to take corrective measures independently. Also included for the first time in 1969 was the term "emissions standards" ("Air Pollution Control – Washington Clean Air Act Amended", 1969, p. 1180-1182).

In the 1980s the Washington State legislature enacted legislation which imposed more specific penalties and fees to curb pollution and air contaminants; the state also started compiling emissions reports and inventories on various pollutants ("Ecology Procedures Simplification Act of 1987", 1987, p. 326). As a matter of fact, it's estimated that in 1988 motor vehicles accounted for over 40% of the Washington State's air pollution (Kadesh & Roach, 1997). Lawmakers across the state had started to become more aware of environmental threats.

Despite motor vehicles largely contributing to air pollution, population growth was partly to blame. From 1981 to 1991, the number of people living in the vicinity of Puget Sound increased by 22%. However, while the population in the region increased by 22%, the number of registered vehicles increased by 40%. So, yes, more people flocked to the area, but there were also a lot more people driving. People were driving farther as well as VMT increased an astounding 82% (Kadesh & Roach, 1997, p.1218). All of this suggests operating and owning a motor vehicle, while already common, was rising quite dramatically during this time period both in the Puget Sound Region and across the United States at large.

However, even with strong government leadership and preemptive legislation within Washington State to address the growing pollution problem, another contributing factor was actually the 1990 federal Clean Air Act, spurring the state into even more formal action. The

Environmental Protection Agency deemed the Seattle metro area to be in violation of federal air quality standards (Kadesh & Roach, 1997). The following year, in 1991, Washington State's legislature finally passed a bill aimed at reducing traffic congestion, air pollution, and reliance on imported petroleum. The legislation, House Bill 1671, also known at the Commute Trip Reduction (CTR) Law was the first legislation of its kind (Currently: RCW 70A.15.4000 – RCW 70A.15.4110). State legislators believed these goals—reducing congestion, air pollution, and petroleum consumption—could be accomplished by reducing the number of single-occupancy vehicle trips in counties experiencing the highest levels of congestion and automobile emissions. This from the legislature:

> The legislature finds that automotive traffic in Washington's metropolitan areas is the major source of emissions of air contaminants. This air pollution causes significant harm to public health, causes damage to trees, plants, structures, and materials and degrades the" quality of the environment ("Highway Access Control and Transportation Demand Management, 1991, p. 8-9).

Without a doubt, HB 1671 positioned the deleterious environmental effects and air pollution specifically as the principal driving forces for the legislation. Plus, the lawmakers emphasized reducing traffic congestion chief among solutions, and evidenced by this key finding:

> Increasing automotive traffic is also aggravating traffic congestion in Washington's metropolitan areas. This traffic congestion imposes significant costs on Washington's businesses, governmental agencies, and individuals in terms of lost working hours and delays in the delivery of goods and services. Traffic congestion worsens automobile-related air pollution, increases the consumption of fuel, and degrades the habitability of many of Washington's cities and suburban areas. The capital and environmental costs of

> fully accommodating the existing and projected automobile traffic on roads and highways are prohibitive. Decreasing the demand for vehicle trips is significantly less costly and at least as effective in reducing traffic congestion and its impacts as constructing new transportation facilities such as roads and bridges, to accommodate increased traffic volumes ("Highway Access Control and Transportation Demand Management", 1991, p. 9).

The passage of House Bill 1671 marked a significant environmental milestone as Washington State acknowledged fuel consumption as a major source of air contamination. In regards to Washington's air pollution and traffic congestion problems, clear skies were on the horizon.

3.6 Defining Commute Trip Reduction (CTR) & Understanding the CTR Law

At this juncture, I have outlaid several themes related to this thesis including:

- The escalating climate crisis and impetus for much-needed rapid action
- The link between the economy and greenhouse gas (GHG) emissions
- How the transportation sector contributes to a significant proportion of GHG emissions
- How the COVID-19 pandemic dramatically altered our work commutes and reduced emissions
- The history surrounding CTR including the rise of the automobile and subsequent traffic congestion

Yet before moving on and focusing on where CTR stands today, an overview of the law itself is necessary. A basic understanding of the CTR law including definitions of key words and phrases provides context and comprehension. First a definition of commute trip reduction (CTR):

> Reducing the number of drive alone commute trips through the use of alternative modes of transportation such as riding the bus, walking or biking, sharing the ride via a carpool

> or vanpool, or skipping the commute altogether by working from home (telework/telecommuting) or compressing your work week (e.g. working four, ten-hour days).

Also as it pertains to CTR programs in Washington State, a 'commute trip' is defined as:

> Trips made from a worker's home to a worksite during the peak period of 6:00 a.m. to 9:00 a.m. on weekdays ("Highway Access Control and Transportation Demand Management", 1991, p. 10).

The definition of a commute trip comes from the original CTR legislation of 1991, also known as House Bill 1671. Note the focus placed on morning commutes from 6:00 a.m. to 9:00 a.m. A primary feature of the CTR Law related to number of employees at organizational worksites and employees commuting during the morning rush hour. All private or public employers with over one hundred or more full-time employees who "begin their regular work day between 6:00 a.m. and 9:00 a.m. on weekdays for at least twelve continuous months during the year" were required to implement programs to reduce single occupancy commuting ("Highway Access Control and Transportation Demand Management", 1991, p. 10); these employers would be labeled as "affected worksites." Collectively, these definitions placed a heavy emphasis on the more traditional nine to five, Monday thru Friday work commutes in order to curb ever-increasing traffic congestion. Additionally, all counties within Washington State were required to implement a commute trip reduction plan for these major employees (again those with over one hundred affected employees).

The bill also laid the foundation for the Transportation Demand Management Technical Committee, formally known as the Commute Trip Reduction Board, which serves an oversight committee steering the progress and implementation of the CTR requirements. The realization of

the Commute Trip Reduction Board was a critical step in ensuring the CTR Law had staying power and formal legal oversight.

The other crucial aspect of the bill required affected worksites to submit a description of their program(s) to their respective geographic jurisdiction within six months. Most notably, it required worksites to submit the name, location, and telephone number of their CTR coordinator. Displaying names, locations, and numbers of employees responsible for the distribution of CTR related programs is perhaps one of the most long standing and impactful results of the original CTR law since the CTR coordinators would in many ways become the backbone of the CTR legislation. Now known as Employee Transportation Coordinators (ETCs), these people disseminate information to employees pertaining to alternative commutes and are responsible for submitting an annual report of their employee's CTR progress. They are the public face of CTR programs. Additionally, the ETCs served as a critically important aspect of my research as much of my data stems directly from ETC knowledge and experience.

The Washington State Energy Office (WSEO) compiled one of the earliest reports on the effects of the CTR Law in 1995. Uniquely featured within this report were pre-CTR single occupancy vehicle (SOV) rates as well as pre-CTR average vehicle miles traveled (VMT). SOV rates were weighted based on the number of employees at each worksite and ranged from 33% within the Seattle Central Business District to 89% within Rural Snohomish County. CTR zones within Seattle had noticeably lower SOV rates compared to zones within other counties, and accounted for three out of the five lowest SOV rates before the CTR law took effect. In contrast, rural zones within Snohomish, King, and Pierce Counties all had SOV rates above 80% (Washington State Energy Office, 1995). The data from the 1995 report already shows a noticeable difference in drive alone rates between city centers with more accessible public

transportation and less developed rural areas. The original table from the WSEO report containing all pre-CTR SOV rates can be found in Appendix 2.

Archived CTR reports to the legislature were difficult to obtain. I was unable to access the preliminary December 1995 report as well as the reports from 1999 and 2005. I managed to track down a 1997 report by Brian Lagerberg, who currently serves as the Director of the Public Transportation Division at the Washington State Department of Transportation, on the assessment and implications of Phase 1 of the CTR Law. Early findings hint at success for the CTR Law and its corresponding program (Lagerberg, 1997). Notably, the overall drive alone rate at affected worksites decreased from 72% in 1993 to 68% in 1995, with 70% of worksites decreasing their SOV rates. Additionally, transit use increased by 23% whereas carpooling increased by 10% (Lagerberg, 1997).

Lagerberg (1997) also reported the removal of more than 12,000 vehicles from state roads during peak commuting hours each day—vehicles which would have totaled more than 300,000 miles of driving by employees every day. That amounted to more 33,000 metric tons of carbon dioxide not released year by those vehicles each year. However, Lagerberg noted, "The relatively small percentage of the trips targeted by this program significantly limits its ability to achieve significant reductions in the policy goal arena" (Lagerberg, 1997, p. 39). With this quote, Lagerberg acknowledges what has become a well-known and significant conundrum: work commutes only account for only a fraction of all vehicle trips.

The 2015 CTR Report to the Legislature estimated work trips only account for 16% of all trips, with CTR affected sites representing a modest 4% (Washington State Commute Trip Reduction Board, 2015). Nevertheless, over the course of a year, the CTR program in 1995 resulted in a reduction of 80 million miles not driven by employees. Those miles correspond to

an estimated 23.5 million liters of gasoline not burned and savings worth more than $9 million after taxes. Lagerberg concluded that for every one dollar invested into the CTR programs, employees who utilize alternative modes of transportation ended up saving four dollars.

Also foundational to the report, Lagerberg (1997) compiled a list of important lessons learned during Phase 1 of the CTR program. Key among them was a high turnover rate of employees and ETCs (as high as 30 to 50% in some counties). High turnover rates required employers to use additional resources on training and educating incoming employees instead of on program improvement. Another concern/finding was of arbitrary, unattainable goals. As Lagerberg noted, "The reduction levels chosen for goals within the CTR law are arbitrary. They are based more on what employers "should" attain rather than on an assessment of what is possible or required to achieve some measurable effect on congestion, air quality, or energy consumption" (Lagerberg, 1997, p. 41). Essentially, he was lamenting the fact that if an employer failed to meet their goals in 1995, it only served to make meeting future goals in 1997 and beyond more of a challenge. Further complicating matters were baselines largely derived from estimated models. Curiously, more than 80% of the baseline numbers were derived via modeling the 1980 census, but in turn, the data being gathered and measured against these baseline goals came from surveys. As such, the measuring of success differed from the goals set indicating success, making it hard to determine actual success. It's very likely that the original 1999 goal of a 35% reduction in SOV rates was extended to 2005 in part due to these reasons.

Finally, one other interesting finding came from a survey in which over 80% of employers identified public awareness as a "high-priority issue," more than twice the response of the next highest issue (Lagerberg, 1997). This identified a possible lack of awareness within the workforce, and helps explain in part why people may not have taken advantage of CTR-based

commutes. Lack of awareness goes hand-in-hand with what I noted above in regard to CTR trips being only a fraction of all commutes, and also one of Lagerberg's final takeaways. More generalized public awareness can potentially reduce the education and training costs associated with new employees and new ETCs, while also broadening the impact of the CTR program beyond work commutes.

An area that remains unresearched and unclear is how employee participation in CTR programs affects those same employee's commutes outside of work. Do employees with one eye on financial savings and the other on the environment, opt for fewer commutes in other areas of their lives? Or perhaps employees use CTR as an excuse to take more trips outside of work? It's very similar to the diametric response of work time reduction, with individuals on one hand potentially drastically limiting emissions though low-intensive activities or on the other hand increasing emissions by flying and traveling more. In both instances, more research is needed.

At any rate, despite some early success of the CTR program, a study by Lovrich et al. (1999) revealed that the goal of reducing SOV rates by 35% by 2005 still remained "quite far from being met." Lovrich and colleagues also concluded that based on survey results Washington had achieved only a modest 7% reduction in SOV rates through 1999. This connects back to Lagerberg's concern about goal measurement and the difficulty in evaluating CTR programs, and was also observed elsewhere (Sanford & Ferguson, 1991).

However, the main focus of Lovrich et al.'s work entailed identifying what factors—if any—determine whether an individual is more likely to switch to an alternative commute from driving a SOV (Lovrich et al., 1999). In particular Lovrich and colleagues sought to create a profile of people that switch to alternatives from driving alone, labeling these individuals as "switchers". They surveyed more than 900 employees at 16 organizations with CTR programs.

These organizations represented both large and small worksites, public and private institutions, and were from western, central, and eastern parts of Washington State.

Interestingly, Lovrich et al. found that the single greatest predictor of switching to an alternative commute was the extent of CTR program exposure. Simply, the more exposure to the CTR program by their employer, the more likely employees were to switch to and utilize a non-SOV commute. This finding also appeared prominently in Edson (1989) as well as in the Gilmore Research Group's 1996 report prepared for the Washington State Energy Office (Gilmore Research Group, 1996). Collectively, the research substantiates why CTR awareness was a "high-priority" issue in Lagerberg's 1997 report.

Other characteristics of "switchers" included: more pro-environmental attitudes, more importance placed on cost savings while less importance on family time, and they tend to live further from work when compared to SOV commuters. Lovrich et al. also noted survey data from WSDOT which shows that people who commute by vanpool typically have significantly longer commutes than those who drive alone or use other forms of transportation. Likewise, people who carpool also report having longer commute distances than individuals who use other modes of transit (Lovrich et al., 1999). Meanwhile, the open-ended comments of the individuals surveyed corroborate the survey results, where more than 80% of "switchers" mentioned either convenience, the environment, or cost savings as reasons for switching. Interestingly, almost one-third (31%) of all comments referred to convenience which is typically associated with driving alone and not with alternative commutes.

In contrast, the most common reasons given for switching back to driving a SOV: loss of a carpool opportunity, changes in work schedule, or changes in worksite location or place of residence. A large number of people felt the need to have their own car in order to run personal

errands and/or manage family responsibilities. Finally, respondents who drive alone cited a lack of or nonexistent alternatives or work schedules that made transit impractical.

Lovrich and colleagues (1999) also conducted an Ordinary Least Square analyses pertaining to the perceived costs/benefits of commute alternatives. The majority of factors centered around three topics: convenience, flexibility, and time—revealing several critical themes. The analysis confirmed that SOV commuters placed an emphasis on convenience and flexibility. The ability to leave in the event of a family emergency or to get to a doctor's appointment are two frequently cited examples of flexibility and the perceived benefits of driving alone. On the other hand, individuals who carpool or vanpool placed less importance on convenience and flexibility. Moreover, bus and transit users actually view public transportation as being relatively convenient. It seems much like the phrase "beauty is in the eye of the beholder," so too is convenience. In any event, perceptions surrounding convenience play a critical role in shaping an individual's commute choices.

Related to time, commuter views on traffic or availability of parking also play a role in travel decisions. People who do not believe congestion is very bad are more likely to drive alone. Likewise, if parking is readily available, commuters are likely to give less consideration to alternate commutes like transit, vanpool, or carpool, and will more likely opt to drive alone (Lovrich et al., 1999). Finally, as mentioned above, Lovrich et al. (1999) found a plethora of evidence supporting the impact of environmental attitudes on transportation decisions. Several findings included:

- People are more likely to use the bus or other public transportation if they perform more environmental activities (The same is true regarding biking and walking to work).

- People are more likely to switch from driving alone to another transportation mode if they have more pro-environmental attitudes
- People are more likely to support a drive alone surcharge if the perform more pro-environmental activities, they think it is important to set a good environmental example (the single strongest predictor), and they think other people to not attach much importance to setting a good environmental example.
- People are more likely to drive alone if they do not believe it is important for employers to show environmental concern (Lovrich et al., 1999, p. 19-20).

While debate remains over the exact extent and correlation between environmental attitudes and environmental behaviors, the report by Lovrich et al. (1999) definitively adds more evidence in support of a significant relationship than against one[4].

3.7 Where CTR Stands Today

Despite years of environmental planning and leadership within the State of Washington, progress has remained fairly stagnant in regards to reducing the State's greenhouse gas (GHG) emissions and reducing the number of single occupancy vehicles on our roads and freeways. In 2018 Washington emitted more than 99 million metric tons (MMT) of CO_2e, or equivalent to the annual GHG emissions of over 18.3 million passenger vehicles (Washington State Department of Ecology, 2021a; The Association for the Advancement of Sustainability in Higher Education, 2009). In fact, between 2010 and 2018, GHG emissions in Washington State rose 3.3%. And while overall GHG emissions in Washington State have dropped by 8.3% since 2000, the State's GHG emissions still remain 10% higher than in 1990—failing to meet the 2020 goal of reducing

[4] Lovrich et al. (1999), prepared by the Washington State Transportation Center in coordination with the Washington State Department of Transportation, examines a wider array of CTR research prior to 2000 and also contains a useful annotated bibliography.

emissions to 1990 levels. All of this indicates that despite a short-term decrease during the 2000s, efforts to reduce the Washington State's GHG emissions have resulted in modest success—an unfortunate development considering the fact Washington State passed legislation to reduce greenhouse gas emissions in 2008.

In addition to the overall GHG emission profile, emissions within the transportation sector have remain almost identical to GHG emissions in 2000 (44.73 MMT CO_2e in 2018 compared to 44.87 MMT CO_2e in 2000), while actually increasing by 18% since 1990. This figure is all the more troubling as the State has recognized consumption of fuel to be a major source of air contamination and GHG emissions since at least 1991 and the passage of House Bill 1671, the Commute Trip Reduction Act. That legislation, as we know, aimed to reduce traffic congestion, air pollution, and energy consumption while limiting reliance on petroleum.

Since then, Washington State has remained committed to implementing and increasing CTR programs, most recently through Governor Jay Inslee's 2016 Executive Order 16-07: Building a Modern Work Environment. Primarily focused on increasing flexibility and mobility in the workplace, the Executive Order placed a great deal of emphasis on telework and flexible work hours, recognizing that the flexibility offered through remote work can improve employee wellness, create a better work/life balance while maintaining a supportive and productive work environment, increased job satisfaction, and engagement. The Order also acknowledged that modern work strategies like telework and flexible hours not only save taxpayers money but "these strategies are proven to empower employees to be productive, regardless of location and time" ("Building a Modern Work Environment", 2016).

Building a Modern Work Environment also laid out specific target goals for increasing the utilization of telework and flexible hours within state agencies. Telework within state

agencies was expected to increase from 8.8% in 2015 to 9% in 2017, while the goal for flexible hours was to increase from 21.2% in 2014 to 40% in 2017. Notably, however, for these target goals, telework was defined as any employee who teleworks at least one to two times per month. One final interesting anecdote, the Executive Order mentions the ability of CTR-centered approaches to provide resiliency during emergencies as stated, "Whereas, mobile work, telework, and flexible work hours provide state government the ability to be ***resilient*** and ***responsive*** during emergencies and natural disasters" ("Building a Modern Work Environment", 2016, emphasis added). Without question the COVID-19 pandemic highlighted this important truth unlike anything we had ever experienced before. In fact, by June 2020, an astounding 42% of the entire United States workforce was working from home according to Stanford research Nicholas Bloom (Bloom, 2021). An amazing, rapid and dramatic shift as before the pandemic telework only accounted for about 5% of all workdays (Wong, 2020).

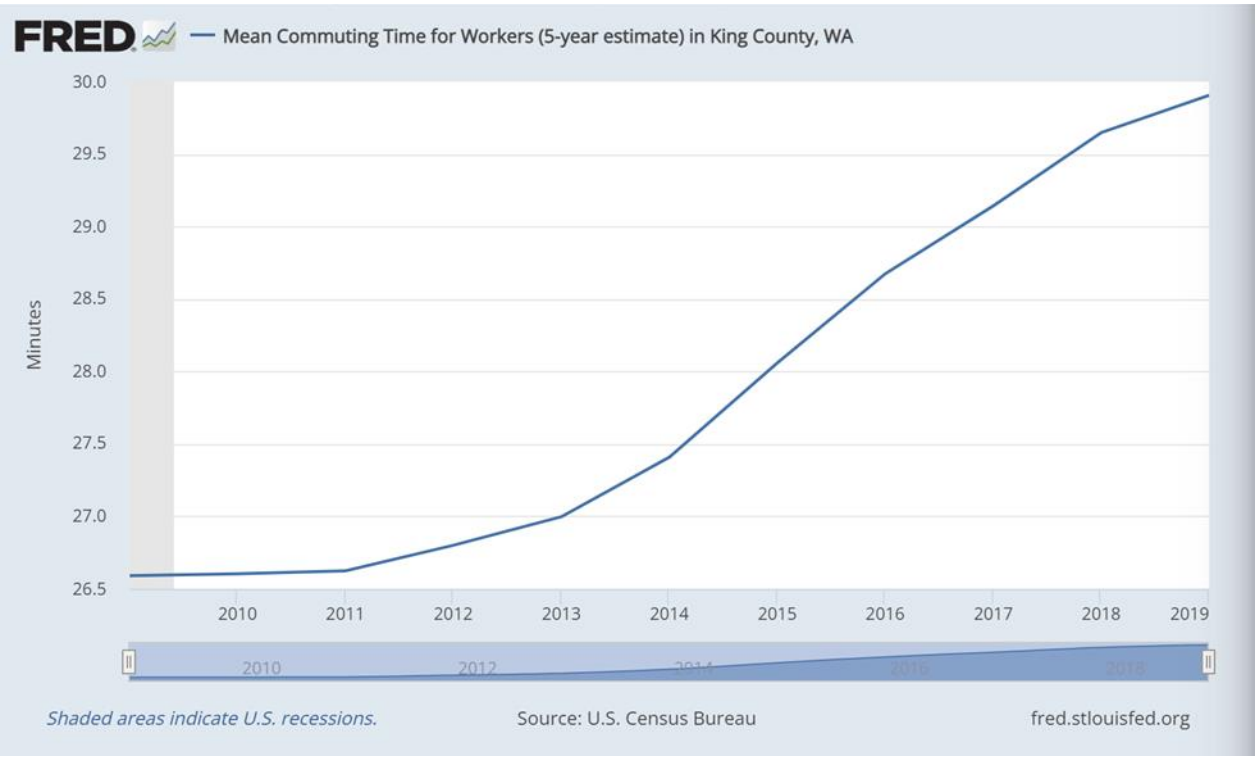
While CTR is major point of emphasis in Executive Order 16-07 and has been for years within Washington State, CTR programs still face a lot of opposition—remaining a point of contention for employers. Telework in particular historically encountered considerable resistance from mangers who felt unable to properly monitor the productivity of employees working from home (Pérez et al., 2002). Of course, this historical reluctance was before the COVID-19 pandemic forced many employers to adjust. Furthermore, even though implementation at state agencies has been somewhat successful (and also mandatory), many private companies viewed CTR programs as an added burden (Lagerberg, 1997; Kadesh & Roach, 1997).

Other obstacles exist in addition the slow progress of successful CTR implementation. Increases in commute times and distances persist across much of the United States. The following two figures (below) demonstrate a steady increase in the average commute times for

workers in King County, WA, and here in Thurston County, WA. The commute times in Thurston County are nearly on par with King County despite having a significantly lower population density and traffic volume than King County.

Figure 10.

Average Commute Times for Workers in King County, 2010-2019

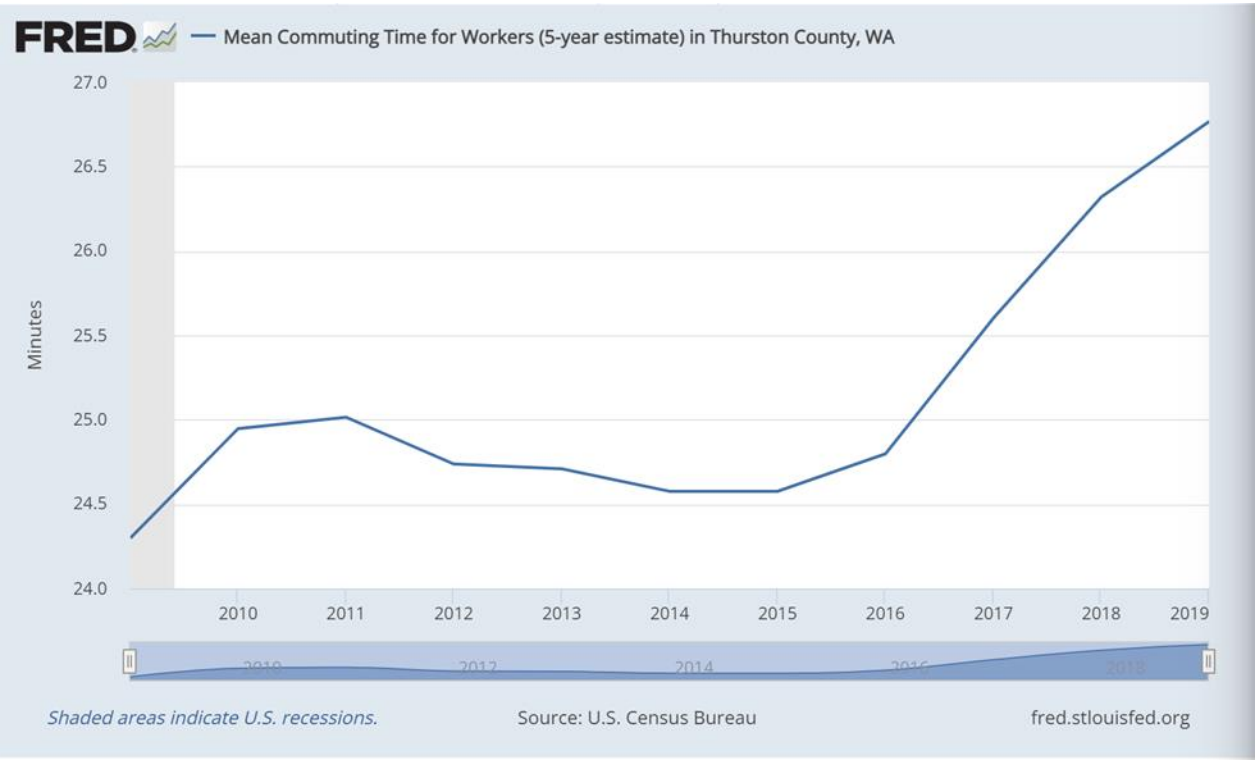


Note. Commute times in King County, WA, continue to rise at a pretty dramatic rate. Workers in the county have added nearly four additional minutes to their one-way commute in the past decade.

Part of the reason for King County's lengthy commute time can be attributed to Seattle congestion. The average one-way commute in the Seattle area was 28.4 minutes in 2018, ranking 2nd among U.S. cities (Savransky, 2019). Assuming a five-day work week and two weeks of paid-time-off, that amounts to nearly 237 hours spent commuting each year! And while Seattle is at the upper end of commute times, the trend exists throughout Washington State.

Figure 11.

Average Commute Times for Workers in Thurston County, 2010-2019

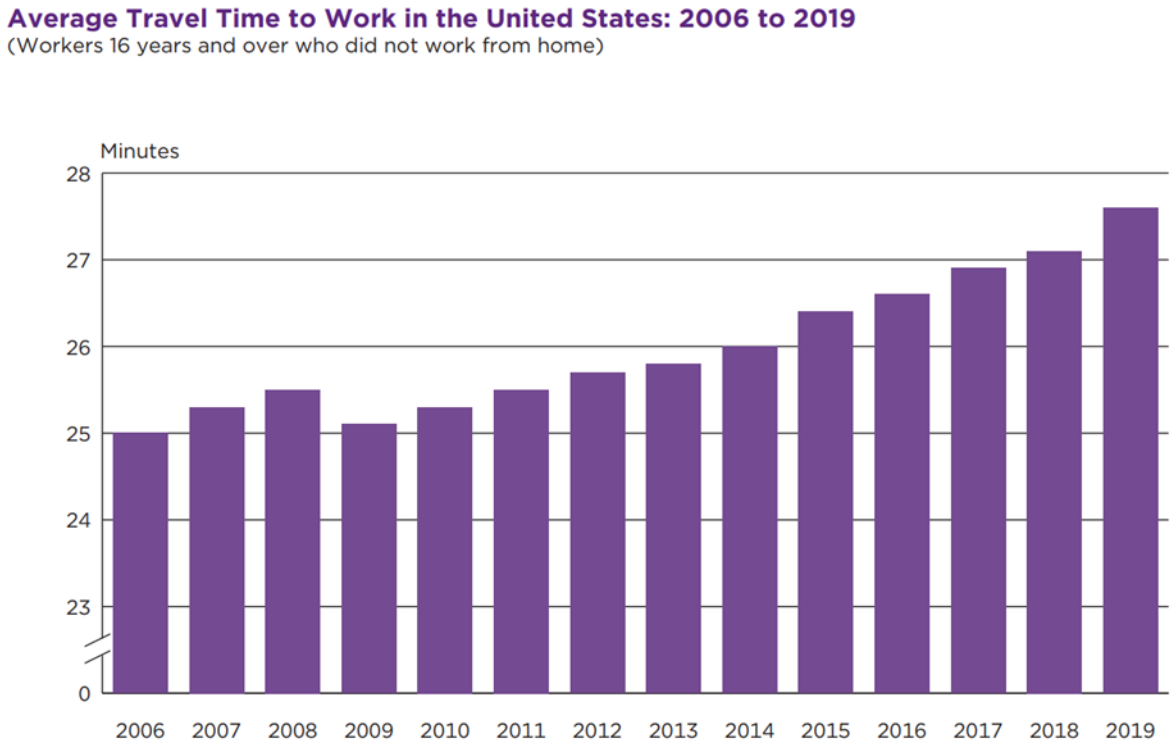


Note. Commute times in Thurston County, WA, also continue to rise at a significant rate. After a slight decline beginning in 2011, the average one-way commute has gone up exponentially since 2015. Overall, it amounts to in the three additional minutes in the past 10 years.

As the figure above illustrates, even here in Thurston County, commute times have skyrocketed in recent years. In 2019, the average one-way commute in the county checked in at 26.77 minutes and the national average is not too far off. Following a record-setting one-way commute of 27 minutes in 2018, the United States established new record high of 27.6 minutes in 2019 (Ingraham, 2019; Burd et al., 2021). Incredibly this means the average commute across the United States is only 48 seconds less than Seattle's commute time.

Figure 12.

Average Commute Times for Workers in the United States, 2006-2019



Note. The figure shows how its not just commute times in Washington State that continue to grow exponentially but all across the country. The United States established a new record high commute of 27.6 minutes in 2019. Based off a five-day work week and two weeks off, the average U.S. worker spends 230 hours commuting every year! Sources: Burd et al., 2021; U.S. Census Bureau, 2006 to 2019 American Community Surveys, 1-year estimates.

Relative to 2009, in 2019, the average person has added more than two minutes to their commute each way. While two minutes may not seem substantial, consider that the extra 96 seconds Seattleites spend each day amounts to almost seven additional hours spent commuting over the course of a year. Furthermore, according to the Seattle Times compared to 1980, U.S. workers have added almost one hour their weekly commute, equivalent to more than one full workweek of commuting over an entire year (Ingraham, 2019). Meanwhile in the city of Los

Angeles, famous for treacherous commutes and traffic congestion, and ranked 1st among U.S. cities, a commuter sits in his or her car for an average of 31.8 minutes.

Unfortunately, it's not just commute *times* that are increasing. The average *length* of work commutes, known as vehicle miles traveled (VMT), continues to become greater and greater. As mentioned earlier in this review, Americans drive more miles each year than practically anyone else. The average annual VMT per household rose nearly 60% in the 40 years between 1969 and 2009—from 12,423 miles per year to 19,850 miles per year (McGuckin & Fucci, 2018). This can be explained in part due to the fact the average number of vehicles per household was 1.16 in 1969, compared to 1.86 vehicles per household in 2009 (McGuckin & Fucci, 2018). Even though VMT per household has more or less leveled off in the decade since, the average adjusted trip length to/from work reached a record high of 12.8 miles in 2017—up from 9.4 miles in 1969, 11.0 miles in 1990, and 12.2 miles in 2009 (McGuckin & Fucci, 2018, p. 20). What's more, the United States is also seeing a rise in so called "super" and "mega" commutes. Moss & Qing (2012) define "super commuters" as anyone who works in the core county of a metropolitan area but lives beyond the boundaries of that area. Rapino & Fields (2013) meanwhile define "mega commuters" as individuals who commute more than 50 miles to work one-way and travel 90 minutes or more.

Almost every county and associated metropolitan area analyzed by Moss & Qing (2012) showed a dramatic rise in super commuting over the previous decade. Manhattan, Los Angeles, and Chicago saw a 70.3, 79.9, and 42.1 percent increase over an 8-year period, respectively. Harris County (Houston) recorded an astounding 101.5% increase in super commuting over eight years. In comparison, super commuting in King County (Seattle) increased by 56.9% over the same time frame (Moss & Qing, 2012). Moss & Qing also noted that extreme super commuters

are becoming “increasingly common” in both the Northeast Corridor and in the Pacific Northwest (Moss & Qing, 2012).

Overall, Rapino & Fields (2013) found that 5% of all commutes for full-time U.S. workers are “long” commutes. Of those, 2.41% or 1,713,931 can be categorized as “extreme”, 3.15% or 2,241,915 as “long-distance”, and 0.82% or 586,805 as “mega” commutes (Rapino & Fields, 2013). Their research revealed that the typical mega commuter is more likely to depart for work before 6 a.m., be male, older, married, make a higher salary, and have a spouse that does not work (Rapino & Fields, 2013). Interestingly, however, while mega commuters are traveling much farther distances compared to other commuters, the drive alone rate is significantly less. From 2006 to 2010, the average drive alone rate in the United States for mega commuters was 68.3% compared to 81.9% for all other commutes (Rapino & Fields, 2013). Nevertheless, the simple fact the terms “super” and “mega” commuting even exist is cause for alarm let alone that both commute types continue trending higher.

In summary, GHG emissions in Washington State failed to meet their 2020 target, with the Transportation Sector showing no sign of decline. VMT and average commute times across the United States keep on increasing in length. “Super” and “mega” commutes have become more commonplace for workers in large metropolitan areas during the 21st century. All while global climate change poses a very real and present danger. All of these factors uniquely position CTR-like programs to make a substantive contribution to improve employee and environmental well-being. Nevertheless, progress within Washington State has been slow. This despite a considerable history of environmental leadership and a commitment to both reducing GHG emissions while at the same time increasing the use of alternative, mobile, and flexible commutes. House Bill 2815 (Washington State’s 2008 Session Law entitled *Greenhouse Gas*

Emissions) and Executive Order 16-07 fall in line with Washington's environmental legacy and reaffirm those commitments in recent years. The deployment of ETCs and the implementation of CTR programs had achieved some success. Nonetheless, barriers remain. Certainly, the COVID-19 pandemic brought about rapid and dramatic shifts to the CTR landscape, which I reexamine in the Discussion and Conclusion. First, however, let's explore and assess the attitude and culture surrounding CTR programs before COVID-19 disrupted daily life.

Dancing Boy, Part 1

After speaking about work time reduction, most people assume I'm naïve, lazy, or that I just want to sit on my ass and drink beer. It is true. I do enjoy sitting down and enjoying a good beer (or two), but lazy? I'm not lazy. Naïve? Perhaps. Most of the work I do will never show up in a bottom line or in an annual report or even in our nation's GDP. You won't see it on the news. And yet, that doesn't mean it is any less real or any less valuable.

Born into an unconventional family dynamic, I grew up questioning the worth of my existence. Right or wrong, logical or not, is no matter. I was born out of an affair between a married man and a woman who was not his wife. I grew up in the small, single-parent-home of my mother. On the weekends I would stay with my still-married father and his wife, who I would come to call my step-mother. Both of my parents (and my step-mother) loved and adored me, but growing up in this chaotic environment was not easy as there was much conflict and fighting. I frequently wondered if the world would better off without me. At the core of my being lied an irrational thought: it was all my fault. If I hadn't been born and so fractured life for these people, they would've all been better off. This is a narrative 30 years later, I still have trouble shaking. As a result, I grew up thinking the only thing I could do to make my existence worthwhile was to be a force of light in a world that seemed so dark and scary.

The news constantly floods us with messages of hate and violence. Growing up in a large city, shootings and stabbings would headline the evening news. I have uncomfortable memories of both my mother's house and her car being broken into. The sight of a broken windshield. Or returning home to see all of your possessions ransacked and strewn about…it's almost as unnerving as witnessing it firsthand. Even at fun events such as going to baseball games, I remember seeing the homeless, the downtrodden, and down-on-their-luck individuals that large cities seem to all-to-often ignore. And then of course I'll never forget the only day my mother was waiting for me at the bus stop. The images of two enormous and magnificent towers turning to dust and ash still lingers in my mind—along with the thousands of poor souls which were buried within them.

What is a young boy to do? Amidst so much hate and fear, what can anyone do?

I suppose there is no correct response. All I can share with you is how I responded.

When I walked by a homeless person asking for money on the Clemente bridge, I was compelled to help. I'd tug on my dad's arm and my father knowing how much it meant to me—he'd give me a dollar to put in their cup. I'm not entirely sure what good it did. Perhaps not very much. It didn't solve the poverty or homelessness problems of the city. But, it was *something.* However small, it meant something and changed something within me. It gave me hope and instilled love in my heart. My hope is that it did something of the same to the those on receiving end of this small gesture. Over time, I started to believe that by doing more and more of these little acts of kindness (in Judaism we call them mitzvahs) I could maybe just maybe feel like my life had worth. That there is good and value in my existence. And with every mitzvah (little blessing), perhaps the world that seemed so dark and full of fear might become just a little bit brighter and full of love. Perhaps heartbreak could become healing.

I did this within my family as well. If I could be kind and loving to my family, then maybe they could be kind and loving to one another too? I discovered early on that grown-ups and kids alike respond well to humor and laughter. So I learned to be silly. It's funny how simple laugh or a quick smile can take the worst pain and make it more manageable. Sure, I had to learn the hard way that humor isn't appropriate for every situation. Sometimes I would get into trouble when I didn't know when enough was enough. I was a fairly literal embodiment of the 'class clown' for many, many years. Even today, I stand at the ready and jump at the opportunity to say something funny.

What I didn't realize at the time was that there was also a cost. People will write you off. They label you: shallow, arrogant, and stupid. But I am none of those things. Sometimes I feel people look at me and think, "He's so full of himself." And I admit, at times I can appear quite self-centered. I'm always talking, interjecting, and making jokes—all while desperately seeking approval and acceptance. Externally I come across as arrogant and gregarious, but internally I'm saying, "Love me! Like me! Accept ME!". How is that for a good joke? You spend so much time worrying and thinking about others and what others might think of you, only to been as someone who by all appearances doesn't.

However, being the social creatures we are: every relationship and interaction is a push and a pull between selfish and selfless. We absolutely need one other, yet most everything my generation was told is about being independent and tough and going it alone. What a bunch of bullshit. If there is one thing the novel coronavirus has made abundantly clear: it's how much we long to connect with one another. It's the immense value that lies in a hug or a simple handshake. Every great thing humans have ever done, has been done together. Putting a man on the moon—

it took a team (a really large team!). The civil rights movement—a nation. To fight coronavirus and climate change—it will take the entire world working together.

Going back to the line: “Love me! Like me! Accept ME!”

What that line says to me is that for too long, I’ve lived in the fear of my insecurities. That I’m not enough just as I am. And while capitalism has afforded us of the Global North a great many luxuries and technological innovations that make our lives “easier”, it has stripped us of our worth as human beings.

Society has told millions and millions of individuals that their worth is solely attached to what they produce and what they consume. I am only viewed as a contributing member of society if I buy a bunch of stuff or take things from the earth or alternatively offer others the opportunity to do the same. Of course there are notable exceptions as not all professions rely on extracting materials. There are professions such as doctors, psychologists, and social workers whose main value lies in their service to others. However, their worth is still assigned a different value than say sanitation workers or grocery clerks. Once again COVID-19 is showing us how flawed this perspective is. Let us not forget this lesson. Let us not be so quick to get back to “normal.” Particularly when normal was so flawed and not working for so many.

Chapter 4. Methods & Methodology

This study builds on established mixed methods research designs and is best described as a multimethod approach (Creswell & Plano Clark, 2007; Hesse-Biber & Johnson, 2015). A multimethod research design incorporates and mixes multiples forms of quantitative and/or qualitative research (Creswell & Plano Clark, 2007). This thesis contains multiple elements of each. The research topic arose out of a position paper written in early 2018 for the Master of Environmental Studies (MES) program.

The paper, discussed in the previous chapter and contained in Appendix 1, links economic growth to environmental impact through a concept known as *'Work Time Reduction'*. Work time reduction (WTR) and Commute Trip Reduction (CTR), while fundamentally distinct concepts, have a fair amount of interaction and overlap, perhaps none more important than the mutually desired outcome of mitigating anthropogenic impacts on the environment. A significant interest in reducing environmental impact thus emerged alongside these concepts, as evidenced in my personal narrative, highlighted in the Preface and integrated throughout the thesis.

From the literature review we know that CTR programs have been operating in Washington for several decades. These programs encourage employees to commute in alternative ways rather than driving alone. Data from the Washington State Department of Transportation (WSDOT)—and analyzed in the subsequent Results chapter—signals a decrease in the statewide drive alone rate over the last decade. Questions remain, however. Do employees enjoy their morning and afternoon commutes? Do they prefer riding in a vanpool? What has led to a decrease in the drive alone rate, and why has it taken so long to achieve? Why are people reluctant to leave their cars and take the bus? Why do some CTR programs attract dozens of employees to participate while others struggle to stay intact?

So many questions remain unanswered and the majority of them revolve around employee attitudes and perceptions, which in turn help shape the workplace culture. Thus, the overarching research question driving this thesis is:

How do workers perceive Commute Trip Reduction programs?

To breakdown this primary research question into simpler and easier-to-test questions, I created two secondary research questions:

1. What makes a Commute Trip Reduction program successful? (Question 1)
2. What enables and/or prohibits the use of alternative forms of transportation? (Question 2)

These secondary questions enable more precise analysis of how workers perceive CTR programs. With these questions in mind, let's address how I went about answering them. My research methods can be broken down into the following parts:

1. Quantitative survey data. I conducted one survey myself in conjunction with the Thurston Regional Planning Council (TRPC). I surveyed a small sample of Employee Transportation Coordinators (ETC) on a number of issues related to commute trip reduction. I also included survey data from TRPC and WSDOT.
2. Qualitive interviews with ETCs from state and municipal agencies in Washington state. I acquired additional qualitative data from several open-ended questions on the survey I conducted with ETCs.
3. Incorporation of the already-mentioned narrative pieces. The narrative parallels major themes and compliments my research findings.

The following sub-sections provide greater detail on specific methods used. Explanations of research methodology (and their significance) are also included.

4.1 Narratives

Phillip Pullman, author of *His Dark Materials,* once said, “After nourishment, shelter and companionship, stories are the thing we need most in world” (Phillip Pullman Quotes, n.d.). Interestingly, stories typically play a role in the three aforementioned human needs. Behind every relationship lies a story. Every homeless person, billionaire executive, and everyone in between has a story to tell. Storytelling, it could be said, is our oldest profession, going back thousands of years. Researchers have dated cave drawings in France and Germany as being tens of thousands of years old. While interpretations vary, many scholars believe ancient rock art conveys narratives and messages about the human experience (The British Musuem, 2019). A recent a cave drawing discovered in Borneo in 2018 was determined to be more than 40,000 years old (Zimmer, 2018). That same year, Hoffmann and colleagues revealed several cave paintings in Spain are more 64,000 years old using uranium-thorium dating (Hoffmann et al., 2018).

Fast-forward several thousand years and human beings have gotten quite creative and particularly diligent with storytelling. According to the most recent Bowker Reports the number of self-published books continues to rise at an increase of about 40% annually, including a 263% increase between 2013 and 2018. That amounts to more than 1.6 million books being self-published in 2018 (Bowker, 2019), and when factoring in the more than 300,000 books which are published traditionally—that’s almost 2 million books each year (Piersanti, 2020)! Two million stories, and that’s in the United States alone.

Furthermore, despite declining circulation, the World Association of Newspapers and News Publishers represents more than 18,000 newspapers worldwide (World Association of News Publishers, n.d.). However, in the 21st century, stories are no longer confined to print or

in-person sharing. We live in a society captivated by social media and up-to-the-second breaking news, where billions of people constantly stream, update, and pour out their hearts and their stories to the world at large via the Internet. According to Facebook's 2019 Annual Report, at least 2.5 billion people use their site at least once per month and another 1 billion plus doing the same on Instagram (Facebook, 2020; Statista, 2018).

Storytelling doesn't just end up online, nor is it confined to any one medium. We tell ourselves stories every day. Our thoughts, our actions…the labels and judgements we place upon ourselves and the world around us…all of it comes together to form a story. Moreover, our collective history, culture, and politics are part of a much larger story that we share as a society. Put simply: life is one big story.

In an academic setting, stories are sometimes an afterthought. Much research, particularly within the natural sciences, strives for impeccable objectivity. Yes, there is a beginning, middle, and end, but sometimes there is meaning missing within the pages. In contrast, narrative research focuses on the lived experiences and stories of individuals. While narratives primarily emerged from literature, their use has become more commonplace within the subject disciplines of history, sociology, anthropology, education, and they have even found their way into quantitative studies (Cresswell, 2013).

Narrative researchers collect stories through interviews, observations, documents, pictures, and more. Therefore, the story is co-constructed between the researcher and participant. The main idea being to convey an individual's *experience* which can either shed light on their own individual identity or as part of a collective experience (i.e. a phenomenon such as friendship or poverty). For example, autobiographies like Michelle Obama's *Becoming* allow a

reader to explore her identity, whereas a book such as Rachel Naomi Remen's *Kitchen Table Wisdom* is a collection of stories on the phenomenon of love.

Within academia, the term autoethnography is frequently used for narrative research in which researchers are also the subject (Cresswell, 2013; Schwandt, 2001). A principle of autoethnography research is that the researchers themselves are valid and knowing subjects (Cresswell, 2013). The term autoethnography is used in lieu of autobiography because the self-data is included as part of an investigation into a phenomenon or culture at large—it's not the sole focus. Holman Jones et al. (2013) list four reasons for incorporating autoethnography: as a comment or critique of culture, to contribute to existing research, to embrace vulnerability, and to create a relationship with audiences. Furthermore, using the researcher's personal experience can potentially connect the reader to cultural context in a way quantitative research might find challenging. Autoethnography provides immense value by describing experience through storytelling and is a way to make research more engaging and accessible (Ellis, 2004; Brinkmann, 2017; Schwandt, 2001).

The autoethnographic narratives presented in this thesis demonstrate themes within our culture that play a large role in determining how we work and live. The personal stories I share push back on the cultural expectations of excessive labor and industry hard work. The anecdotes highlight my own fears and battles with perfectionism, mental health, and self-worth.

4.2 Mixed Methods

In addition to the personal narratives already presented and just explained, this thesis also includes "more traditional" mixed methods incorporating quantitative and qualitative data. The quotation marks remind us that modern qualitative and quantitative research is less than five hundred years old. In contrast, narrative storytelling dates back thousands of years. In fact,

research containing both qualitative and quantitative data was not very common until the 20th century (Creswell & Plano Clark, 2007; Pelto 2015; Fetters, 2016).

Take away the autoethnographic narrative from my thesis, and what remains is a fairly standard mixed methods design. Mixed method research includes both qualitative and quantitative modes of inquiry. In this thesis I do the same, providing convergent qualitative and quantitative data. Also known as triangulation design, this research method provides a more complete picture of a particular subject by collecting varying types of data (Creswell & Plano Clark, 2007): the qualitative data picks up what the quantitative data potentially leaves out, or vice versa. Additionally, each type of data can be used to compare and/or validate results of the other type. In respect to this research on commute trip reduction programs, I directly compared results from the quantitative data to results from the qualitative data. However, given the abundant nature of quantitative data surrounding commute trip reduction, I leaned more toward a quantitative validation design. That is to say, the qualitative data acquired was used to validate the quantitative data and to expand our understanding of why commute trip reduction programs are or are not successful.

A triangulation design requires that data from both research methods are collected at or around the same time. The quantitative data used for this thesis was collected in 2018 and 2019, save for the data coming from the Washington State Department of Transportation (WSDOT), which has been collecting CTR data for over a decade. A small portion of the qualitative data was collected through open-ended short answer questions through the survey conducted on December 17, 2019. I collected the remainder and bulk of the qualitative data over a 4-week period from January 21 - February 23, 2020 through in-person and phone interviews. In following the convergent triangulation design, all of the data was analyzed at the same time, with

a goal of limiting any potential bias or leading questions, and observing similarities and differences rather than create them. Furthermore, this allowed equal weight to be given to both modes of inquiry with the focus being on a more thorough and complete understanding of the commute trip reduction picture.

4.3 Quantitative Data

I obtained quantitative data from three different sources: annual report data from the Thurston Regional Planning Council (TRPC), survey data from the Washington State Department of Transportation (WSDOT), and an in-person survey conducted by this researcher on December 17, 2019. Referenced earlier, the 2006 Commute Trip Reduction Efficiency Act designated WSDOT as the principal agency tasked with overseeing CTR progress within the state. This 2006 bill also outlined plans for agencies to develop CTR programs and made recommendations for evaluation. As such, since 2007-2008, WSDOT has surveyed affected worksites across Washington State every two years, collecting survey data on CTR for over a decade (WSDOT, n.d.).

The data from WSDOT surveys serve as a starting point for understanding the CTR landscape in Washington. Ten years of data accumulation makes it possible to notice trends over time. Additionally, one of the main benefits of quantitative data research (and survey research especially) is the ability to acquire a large sample. Large samples in turn allow for generalization, which means the results are more likely to be representative of the population at large or a specific population segment (Creswell & Plano Clark, 2007).

The WSDOT survey data is available for nine counties across Washington: Clark, King, Kitsap, Pierce, Snohomish, Spokane, Thurston, Whatcom, and Yakima. Due to differences in geography, population density, and a range of rural and urban counties, the data allow for even

further comparisons to be made with respect to places of similar demographic and geographic conditions. The WSDOT data came from a 2019 document based on a Statewide CTR Aggregate Report from WSDOT (Washington State Department of Transportation, 2019).

In Thurston County, the Thurston Regional Planning Council (TRPC) has taken over primary responsibility of collecting survey data from affected worksites. As a part of the CTR Law, Employee Transportation Coordinators at affected worksites submit annual reports to TRPC, who in turn gave me access to their data. These reports are collected from worksites at the end of every year and are geared toward understanding the types of CTR programs offered at each worksite. In contrast, WSDOT collects survey data focused on the number of people that use alternative commute types and which ones they use. The TRPC data used for this thesis came from a document titled, *Incentives, Subsidies, Schedules – 2018* (Thurston Regional Planning Council, 2019). The document contains information on whether worksites in Thurston County encourage or offer alternative commute programs and alternative schedules, such as flex hours (deviating from the traditional 9:00 a.m. to 5:00 p.m. by starting or ending a shift earlier/later) or a compressed work week (working four, 10-hour days per week). Information on incentives and subsidies offered within the county is also included.

The final piece of quantitative data analyzed for this thesis came from a survey I designed and administered in collaboration with the TRPC. The in-person survey took place on December 17, 2019, at a TRPC Employee Transportation Coordinator Networking event. Each respondent had 15 minutes to complete the survey, with the majority completing the survey in about 10 minutes. The survey consisted of 11 questions in all. Eight of the 11 questions were various forms of Likert-like scale, yes/no, ordinal, and open-ended quantitative based questions.

Two questions were open-ended short answer, and the remaining question was a categorical demographic question on age (can be found as Appendix 3).

Lastly, while quantitative data is frequently thought of as objective, most survey data is in fact subjective as it pertains to individual's thoughts, behaviors, and attitudes to various experiences and behaviors (Leavy, 2017). This is of particular interest regarding my research questions on the attitude and perceptions of CTR programs, and lends further support for utilizing this research method.

4.4 Qualitative Data

While the quantitative data gathered through interviews provided much of the foundation for understanding Washington State's CTR efforts and how much progress has been made over the past decade, the qualitative data explains why. Qualitative research approaches help us ascertain the meaning and depth behind many questions regarding human behaviors and experiences. This data details the attitude and culture of commute trip reduction, the experiences surrounding ETC attitudes and the underlying components of an individual's work culture—their schedules, commutes, responsibilities, activities, family life circumstances, and worksite factors.

As mentioned in the preceding chapter, researchers have used data from WSDOT and the Federal Highway Administration (National Household Survey Data) to examine commuting. They have examined average commute times and traffic congestion. Others have performed correlations and regressions to determine the typical profile of various commuters. However, there is practically no research on the qualitative causes and effects of commuting. Individuals and households are frequently asked about the length of their commute, how they commute, and perhaps given scales for rating tangential aspects of commuting such as their stress levels or environmental attitudes. Rarely are they asked interview questions regarding what the

commuting experience is actually like. Moreover, this thesis differs from past work in that it probes what contributes to an individual's decision to use a particular type of commute. It also examines how work expectations, schedules, and family circumstances influence an individuals' morning and afternoon commutes.

I conducted eight interviews with ETCs at worksites in Thurston County. Interviews occurred between January, 2020 and February, 2020 and took place both over-the-phone and in-person. Out of the eight interviews, four were in-person and four were over-the-phone. Each ETC was asked the same series of questions (Appendix 4). ETCs were explicitly told that their personal information would remain confidential. The average length of time for each interview was 30-45 minutes. Naturally, follow-up questions arose during conversations and as such several interviews exceeded one hour in duration.

The interviews and open-ended survey questions aimed to address the primary and secondary research questions and more. Namely, what are the underlying factors influencing our commute behaviors that quantitative data from surveys might be missing?

March 21, 2020

After a 10-14 day hiatus, I am back working on my thesis. As of today the death toll has surpassed over 10,000 worldwide and the number of cases is fast approaching 300,000. New York, California, and Illinois are among several states imposing a shelter-in-place order effective Sunday, March 22nd.

Meanwhile reports are already coming out suggesting the dramatic reduction of pollution and greenhouse gas emissions in China and Italy, two nations at the heart of the unfolding drama. The entire Wuhan region and all of Italy has been shut down for weeks (months in China's case).

In Venice, there are reports showing the return of wildlife to the canals—dolphins present where none had been.

Here in Olympia, Washington: restaurants, bars, and most non-essential business have shut their doors. Most people have been working from home for about a week. Toilet paper is missing from most grocery store shelves like in other places around the country.

It's not all bad news, however. Many community members are stepping up and reaching out. A new group emerged on Facebook called "The Olympia Community Aide Collective." (And is still going strong over a year later). Neighbors are giving rides, offering to run errands, and freely extending vegetables from their garden or food from their pantry. The local food bank continues to receive donations, and donations to organizations in general have seen an uptick. Bernie Sanders mobilized his supporters to raise millions of dollars to support relief efforts.

That said, it's been difficult to stay focused. Friends and family and millions across the country and world are anxious, scared, and suffering. I myself had an emotional breakdown earlier this week, and found myself in state of panic for the better part of a day. I've posted inspirational messages on Facebook, reached out to family and friends, continued to walk my dog—stopped to chat with my neighbors (at a safe distance), followed the news religiously at times, and felt compelled to get outside and exercise while we still can. It's been a busy and distracting couple of weeks. Not the least of which is the fact that everything I've been working on and researching for the better part of three years is finally being realized due to a worldwide pandemic. The world is quickly coming face to face with questions such as:

"What is it that is truly essential?"

"What is it we value?"

"What could a modern work environment look like?"

and “What is the appropriate work-life balance?”

In the coming weeks and months, as the very fabric of business-as-usual is disrupted, society has been given a tremendous opportunity (amidst widespread uncertainty, struggle, and despair) to reevaluate our shared future. What does success and failure look like? Can we become more resourceful and more dependent? Can we recognize our collective struggle and shared happiness? What would it look like if we were to work (in the traditional sense) less and play more? If we were to get more exercise, grow more food, and spend more time with friends and loved ones?

These are choices we can make. We decide. We choose. And perhaps more than anything these choices comes down to asking ourselves: “What do we value?”

Chapter 5. Results

Understanding the attitude and culture behind Commute Trip Reduction (CTR) programs is not an easy task. Like any psychological, behavioral, economic, or sociological phenomenon concerning human beings—the answer is never simple. This holds true for my research and research question:

How do workers perceive Commute Trip Reduction programs?

At first glance, this question may appear simple and straightforward. However, as noted in the introduction, perceptions coalesce from a number of factors. Once again to truly and holistically unpack and answer the question, I generated secondary research questions:

1. What makes a Commute Trip Reduction program successful? (Q1)
2. What enables and prohibits the use of alternative forms of transportation? (Q2)

I answered both questions utilizing each of the three main methods outlined in Chapter 4: quantitative, qualitative, and narrative.

In this chapter, I begin with an analysis of the three sources of quantitative data. Subsequently, the qualitative data from my in-person survey is reviewed and analyzed. Finally, I wrap things up with a thorough examination of my interviews with Employee Transportation Coordinators (ETCs).

5.1. Quantitative Results

As noted, the quantitative data comes from three sources: the Thurston Regional Planning Council (TRPC), the Washington State Department of Transportation (WSDOT), and an in-person survey conducted on December 17, 2019. In the following sub-sections, I report findings from each dataset. It is worth noting now, however, that while the WSDOT data contains

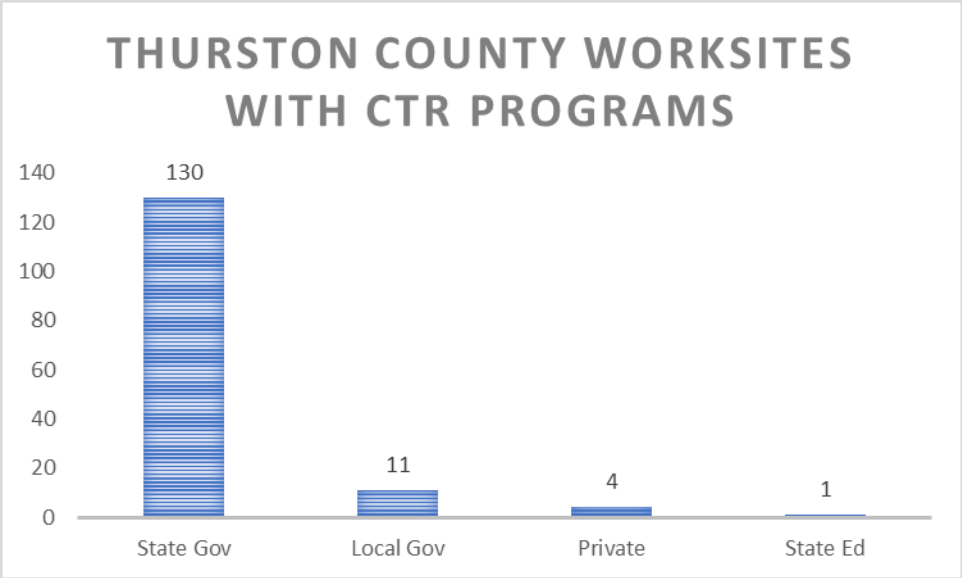
information from across Washington, I focused primarily on data from Thurston County so as to overlap and make comparisons with the data coming from TRPC.

5.1.a Thurston Regional Planning Council – Incentives, Subsidies, Schedules

CTR Worksite Demographics

Figure 13.

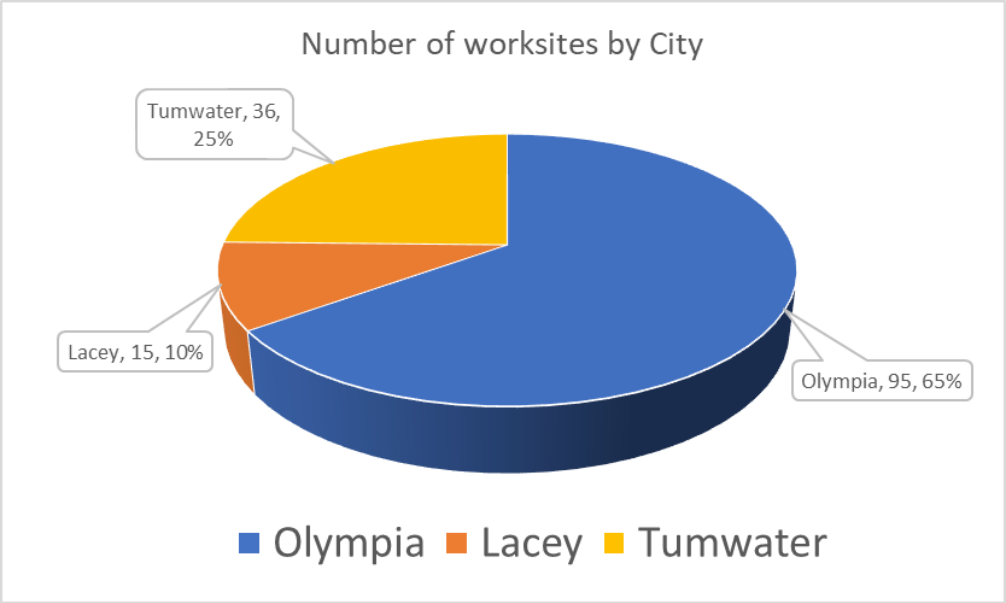
Thurston County CTR Worksite Type



Note. Out of the 146 CTR worksites, 130 are State Government Agencies, totaling an overwhelming majority, or 89% of worksites in Thurston County. Another eleven (11) are Local Government Agencies, which leave four private worksites and one (1) state education worksite (The Evergreen State College).

Figure 14.

Thurston County CTR Worksite Location

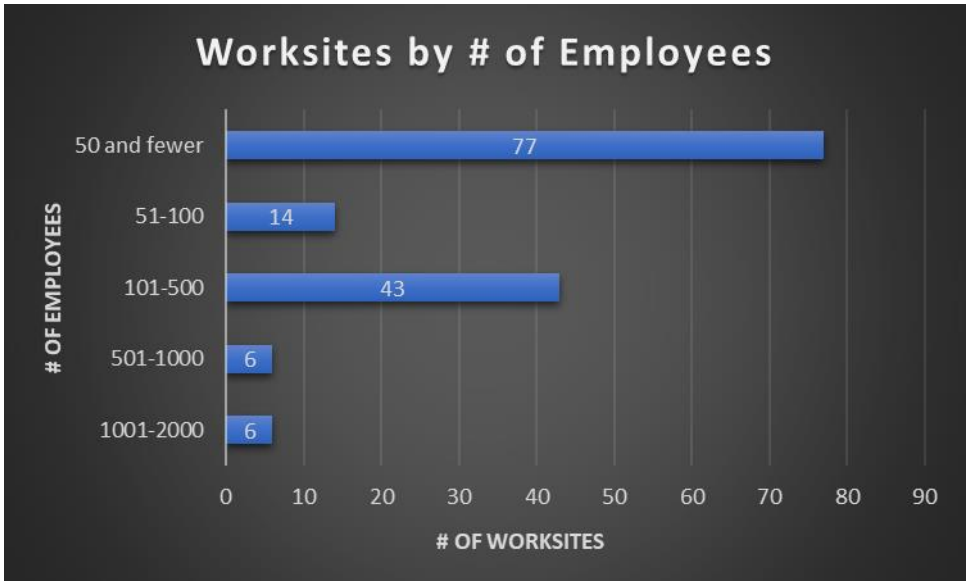


Note. The overwhelming majority of CTR affected worksites in Thurston County are located in Olympia, WA.

Approximately two-thirds—or 95 out of 146—of affected CTR worksites were located in Olympia, WA, with 36 (25%) and 15 (10%) in Tumwater and Lacey, respectively. This highlights why one of the main congestion points in Thurston County during the morning and afternoon is around Exit 105 on Interstate-5, the exit for Olympia, the Capital Campus, and the Olympia waterfront. In addition, of the 95 worksites in Olympia, 81 belong to State Government Agencies, which makes sense given Olympia is the state capital. However, this causes further congestion near the Capital Campus, a point also emphasized by ETCs in my interviews. Recall from the Literature Review that reducing congestion was and remains one of the primary goals behind CTR legislation. Congestion and limited parking at worksites are two facets of work that can be addressed by CTR programs, which provides real value to workers, cities, and the environment.

Figure 15.

Number of Employees at CTR Worksites in Thurston County



Note. The annual report data contained six worksites with over 1,000 employees and one more coming close with 953 (Department of Ecology). Including the Department of Ecology, six agencies had between 500-1000 employees. 44 agencies were between 100-500, and 14 agencies between 50-100 workers.

The total number of employees at each worksite varied quite dramatically, from a worksite with one employee (the Washington State Criminal Justice Training Commission) to the Department of Labor & Industries which had 1,985 employees at the end of 2018. The majority of worksites had under 50 employees, 77 out of 146 or 53%. Of those, an overwhelming majority, 50 worksites, had between 10 and 40 employees, accounting for just over a third of the overall total. Within this employee bracket (10-40), the average number of employees was 20.8 or just shy of 21 employees per worksite. In contrast, the number of employees of all 146 worksites averaged 172.7 employees. This was more a reflection of the handful of agencies like the Department of Ecology and Department of Labor and Industries driving up the mean, demonstrating the power of statistical outliers. The median of all the worksites was 41 employees, and provided a more accurate central tendency of affected worksites in Thurston County.

Alternative Schedules

There are three main strategies for reducing work-related commutes and/or reducing traffic congestion that revolve around an employee's work schedule: working from home or telework, a compressed work week (i.e. working 10 hours a day, four days a week), and flex scheduling (shifting the start or end of the workday so as to avoid rush hour). While affected worksites are required to have a CTR program, they do not have to offer or encourage every particular CTR modality. In the annual reports submitted to TRPC, ETCs in Thurston County were asked to disclose if their worksite offers specific CTR programs, and whether or not their employer encouraged their use. Encouraging use in this context drives to the heart of my research question—the attitude and culture of CTR programs in the workplace.

Table 2.

Alternative Schedules Offered & Encouraged at CTR Worksites in Thurston County

CTR Type	Worksites offered	Percent of Total	Worksites Encouraged	Percent Encouraged
Telework	132	90%	34	23%
Compressed Work Week	137	94%	35	24%
Flex Schedule	142	97%	39	27%

Note. Despite more than 90% of CTR worksites in Thurston County offering telework, compressed work weeks, and flexible scheduling, only roughly 25% of worksites actually *encourage* their use.

Table 2 above reveals that while more than 90% of affected worksites in Thurston County offered scheduling incentives, such as working from home (telework) and compressed workdays, only about 25% of worksites actually *encouraged* their use. Again, this was pre-COVID-19, and in the days and months following many of these agencies had to mandate working from home. What remains to be seen is what will happen moving forward.

Monetary Incentives

The incentives for taking the bus or joining a vanpool are typically in the form of a cash reimbursement. The data shows that of the five alternative commute options, vanpool was the most frequently offered monetary incentive—offered at 59% of worksites. However, a greater number of employees used carpooling for their commute, with nearly 2,400 employees using and receiving some kind of cash reimbursement or incentive in 2018.

Out of 146 worksites, a total of 91 (62%) offered at least one form of CTR incentive, while 55 (38% of worksites) offer no financial incentives whatsoever. After carpooling, vanpooling (6.8%) was the second most commonly-used form of alternate commute incentive followed by riding the bus (4.4%). However, due to the novel coronavirus, COVID-19, all regular bus trips were suspended as of April 13th, 2020 (likewise, most worksites suspended carpooling); bus service would return on June 21, 2020 with reduced schedules (Intercity Transit, 2020). I address the effects of COVID-19 on transit ridership in the Discussion section.

Table 3.

Number of Employees Receiving Monetary Incentives by Alternative CTR Type

CTR Type	Worksites Offering	% of Total Worksites	# of Employees at Offered Sites	# of Employees Receiving Cash Incentives	% of Employees Receiving Incentives at Offered Sites
Bus	53	36%	12352	547	4.4%
Vanpool	86	59%	16439	1121	6.8%
Carpool	59	40%	12555	2395	19.1%
Walking	56	38%	12467	146	1.2%
Bicycling	58	40%	12548	289	2.3%

Note. Carpooling (19.1% of employees where offered) is by far the most utilized CTR incentive at Thurston County worksites, followed by vanpool (6.8%) and bus (4.4%). The number of employees receiving walking or bicycling cash reimbursement is comparatively small.

A major difference across the CTR programs made readily apparent by the TRPC annual report data and Table 3 above was the inconsistency of available CTR financial incentives and reimbursement to employees that choose an alternative commute. For example, while vanpool is offered at 59% of worksites, the only financial CTR incentive at 29 worksites is for vanpools, accounting for only 20% of the affected worksites in Thurston County. That means at 57.5% of worksites, the only available incentive is vanpool or nothing at all. Overall, less than 5% of the more than 25,000 employees with CTR programs in Thurston County receive a vanpool financial incentive. Keep in mind the vast majority of these worksites are state agencies and have been required to have CTR programs. As such, the actual number of individuals receiving a vanpool reimbursement across all worksites in the county was likely much, much lower.

Due to the fact employers have flexibility in how they run and operate their CTR programs, the general lack of continuity and consistency presents an obvious problem for engaging individuals in alternative commutes such as vanpooling and carpooling. In addition to worksites that don't provide any financial incentives, there was also a huge discrepancy in the amount of money offered between various worksites. Some riders within a vanpool can receive a different reimbursement amount simply because they work for different agencies. In an extreme example, the Office of Administrative Hearings, reimbursed its employees up to $255 for participating in a vanpool. Concurrently, the DSHS Division of Child Support and the Office of the Insurance Commissioner's Special Investigations Unit are among the 60 organizations that offered no vanpool reimbursement at all (Thurston Regional Planning Council, 2019). Out of the 86 worksites that include vanpool as part of their CTR program, only four offered a reimbursement of up to $255. The problems with varying vanpool reimbursement comes up again later in my ETC interviews.

Meanwhile, the same inconsistencies present within other types of alternative commutes. Out of the worksites that offer a bus incentive, the range of monthly reimbursement was significant. In total 53 sites offer an incentive to ride the bus, but 11 of those sites either had no cash incentives or didn't specify a reimbursement amount for their employees. Meanwhile five worksites offer employees more than $100 per month to ride the bus, with the overall average being close to $49 per month.

Reimbursements for carpooling, walking, and bicycling, followed similar trends. twenty-five percent of worksites that have carpooling programs did not offer a monthly reimbursement. For those who wanted to walk or bike to work, again around 25% of worksites did not offer a financial incentive as part of their CTR program. And that is just of the organizations offering carpooling, walking, and biking. If we added the number of worksites not providing a financial incentive to the worksites not offering a particular CTR type, close to 70% of affected worksites provided no monetary incentives for taking the bus, riding a bike, walking, or carpooling.

Table 4.

Distribution and Range of Monetary Incentives by CTR Type

CTR Type	# of Worksites Offering	Highest Monthly Max Paid (in USD)	Lowest Monthly Max Paid (in USD)	Range (in USD)	Avg Monthly Max Paid (in USD)	# of Worksites Offering with No Cash Incentive	% of Worksites Offering With No Cash Incentive
Bus	53	125*	2	123	48.87	11	20.7%
Vanpool	86	255	30	225	78.81	22	25.6%
Carpool	59	92*	2	90	42.52	15	25.4%
Walk	56	92*	2	90	38.83	15	26.8%
Bike	58	92*	2	90	42.34	14	24.1%

Note. Table 4 breaks down the financial incentives of worksites that offer CTR reimbursement. Notice the large range ($90 or more for each CTR type) of cash reimbursements *Intercity Transit was excluded from the Highest Monthly Max Paid as an outlier and conflict of interest. Intercity Transit is a main partner of TRPC and offers a maximum of $150 per month for using an alternative commute.

Table 4 (above) shows the extent to which worksites varied with regards to their CTR program monetary reimbursements. Depending on where a person worked, the difference in incentive for walking to work could be as much as $90. If riding the bus, the difference could be over $100 per month; for a vanpool, over $200 per month. Over the course of the year—those discrepancies can add up to a difference of more than one thousand dollars.

The last two columns on the right in Table 4 correspond to an even bigger incongruity, which represents number of worksites that claim to offer the aforementioned alternative CTR programs but do not provide employees with any financial backing or incentives. Second from right are the number of worksites that do not reimburse employees at all for participating in the respective CTR program type; and the last column on the right indicates that about 25% of all worksites with alternate commute programs offer no monetary reimbursement of any kind.

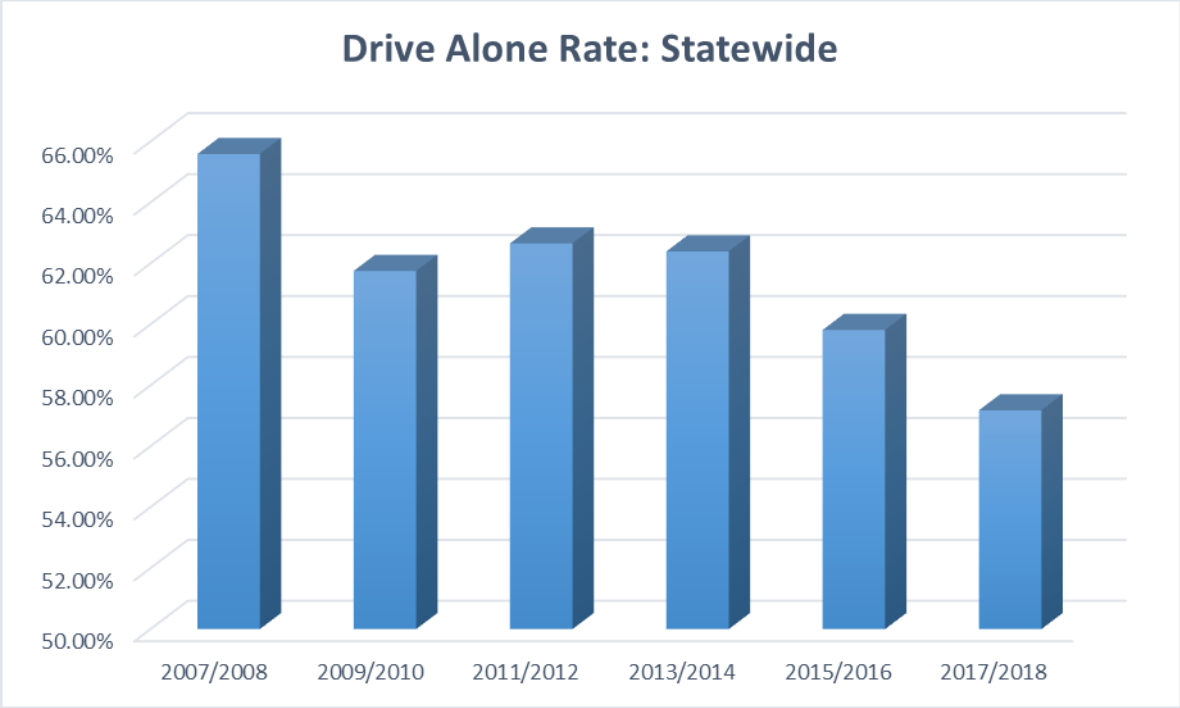
5.1.b Washington State Department of Transportation – Statewide CTR Report

Positive signs appear when we expand the scope from Thurston County to the state level. One of the most encouraging and important findings was the statewide drive-alone rate. The drive-alone rate equals the percentage of commute trips at affected worksites which are NOT utilizing some kind of alternative commute. Essentially, it's the percentage of commute trips whereby employees use a single occupancy vehicle (SOV) or *drive alone*. The drive-alone rate across Washington State declined by 8.4% from 65.6% of trips in 2007/2008 to 57.2% in 2017/2018. However, it is worth pointing out that in Thurston County the drive-alone rate *increased* from 2008 to 2018 by 3.2%.

In addition to the drive-alone rate declining at worksites in Washington State with CTR programs, so too did the average number of miles per commute trip and the average daily greenhouse gas (GHG) emissions per employee.

Figure 16.

Statewide Drive Alone Rate



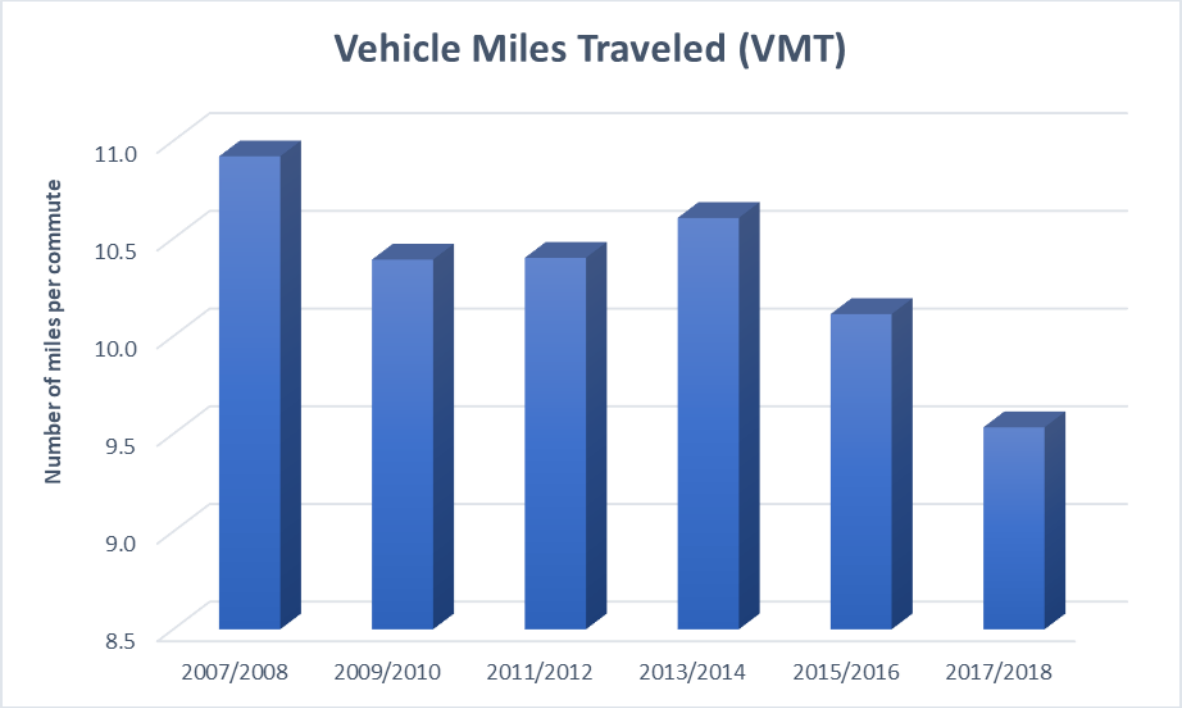
Note. Figure 16 shows the success of the CTR Law statewide. At CTR worksites across Washington State, the drive alone rate dropped by 8.4% over 10 years.

Figure 17 and Figure 18 (below) illustrate the strong correlation between vehicle miles traveled (VMT) and greenhouse gas emissions. As VMT dropped so did the amount of greenhouse gases released into the atmosphere. Again, it is important to mention that this data only accounts for affected worksites, meaning worksites with over 100 affected employees, including most state agencies and worksites within urban growth areas. As such, the true drive alone rate in the state is likely much higher. Likewise, the actual length of commutes across the state and the average amount of daily GHG emissions would also be higher. Nonetheless, these three trends are encouraging particularly when the average length of time for a one-way

commute reached a new high of 27.6 minutes in 2019 (Burd et al., 2021), largely the result of more workers with long distance commutes and more cars idling in congested areas.

Figure 17.

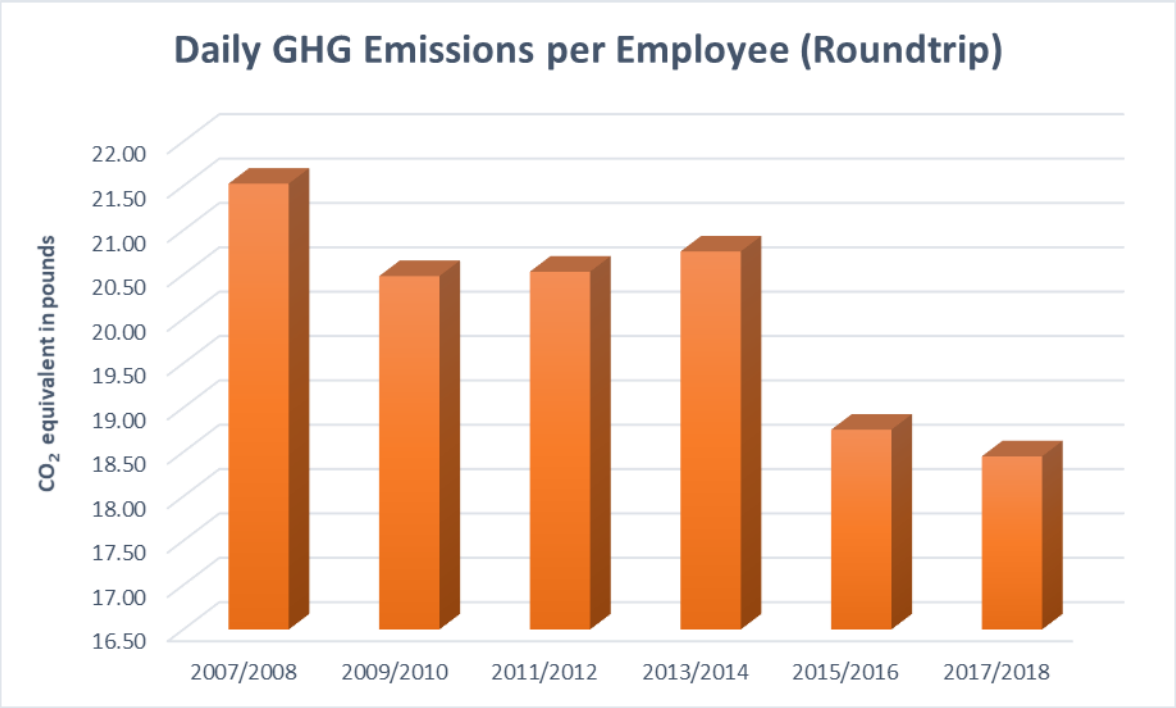
Average Vehicle Miles Traveled per Employee Commute Trip



Note. Figure 17 demonstrates that employees at worksites with CTR programs end up taking shorter commutes over time. The downward trend of VMT over the last decade suggests employees might become more consciousness in regard to their commuting behavior over time.

Figure 18.

Average Daily GHG Emissions of Employees at CTR Worksites

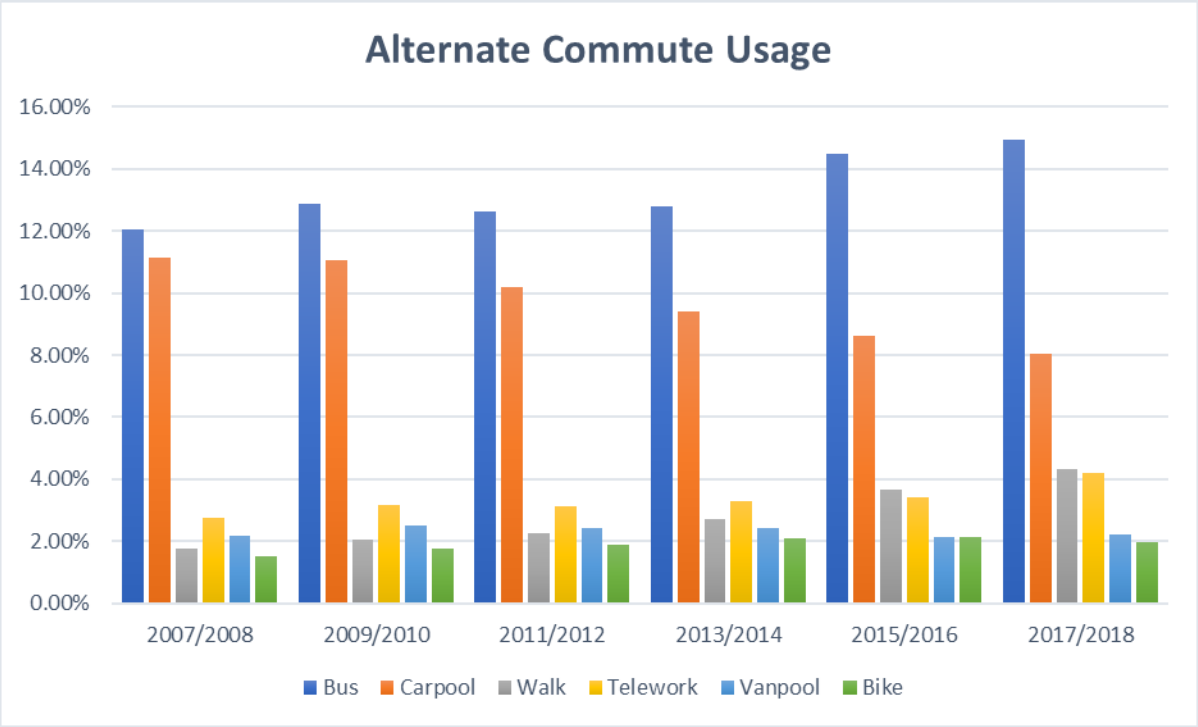


Note. Figure 18 reveals and demonstrates a similar trend to Figure 17. Over time, employees at worksites with CTR programs reduce their amount of daily GHG emissions. The correlation and relationship between VMT and daily GHG emissions is clear and obvious when comparing the two Figures side-by-side.

In lieu of driving alone, taking the bus is the preferred mode of CTR across the state. In 2017-2018 bus ridership accounted for almost 15% of affected employee commute trips, up from 12% in 2007-2008. Riding the bus was followed by carpooling, walking, and telecommuting, which accounted for 8%, 4%, and another 4% of all trips respectively in 2017-2018. Figure 19 below shows the most commonly used alternative commutes and their usage rate over the past decade.

Figure 19.

Percentage of CTR-based Trips at CTR Worksites in Washington State



Note. Riding the bus is the most commonly used alternative commute across Washington State, with 14.95% of employees taking the bus at CTR worksites in 2017-2018. Following bus transit, carpooling was the most frequently used, accounting for 8.02% of employee trips in 2017-2018.

It's important to note that while the upward trend of bus ridership across the state is encouraging, it coincided with a decline in carpooling at an almost identical rate. This drop-off in carpooling effectively offset the increase in bus ridership. Also, despite walking and working from home both increasing over the ten-year period from 2008 to 2018, employees walking to work accounted for only 4.33% of commute trips in 2017-2018 and work-from-home just 4.2%. Due to the COVID-19 pandemic, the number of people riding the bus, carpooling, and working from home would all change dramatically in 2020; carpooling and bus ridership plummeting while employees began to telework like never before. More analysis on the impact of COVID-19 comes in the Discussion section.

Finally, even though riding the bus was the most common alternative commute in Washington State, usage rates varied quite dramatically in specific counties. In Thurston County for example, carpooling accounted for 7.82% of all employee trips at CTR worksites in 2017-2018. In contrast, the percentage of employees taking the bus stood at just 2.26% in 2017-2018. The survey of ETCs on December 17, 2019, and interviews with ETCs provide much insight into why Thurston County differs from the state averages including the lack of bus ridership.

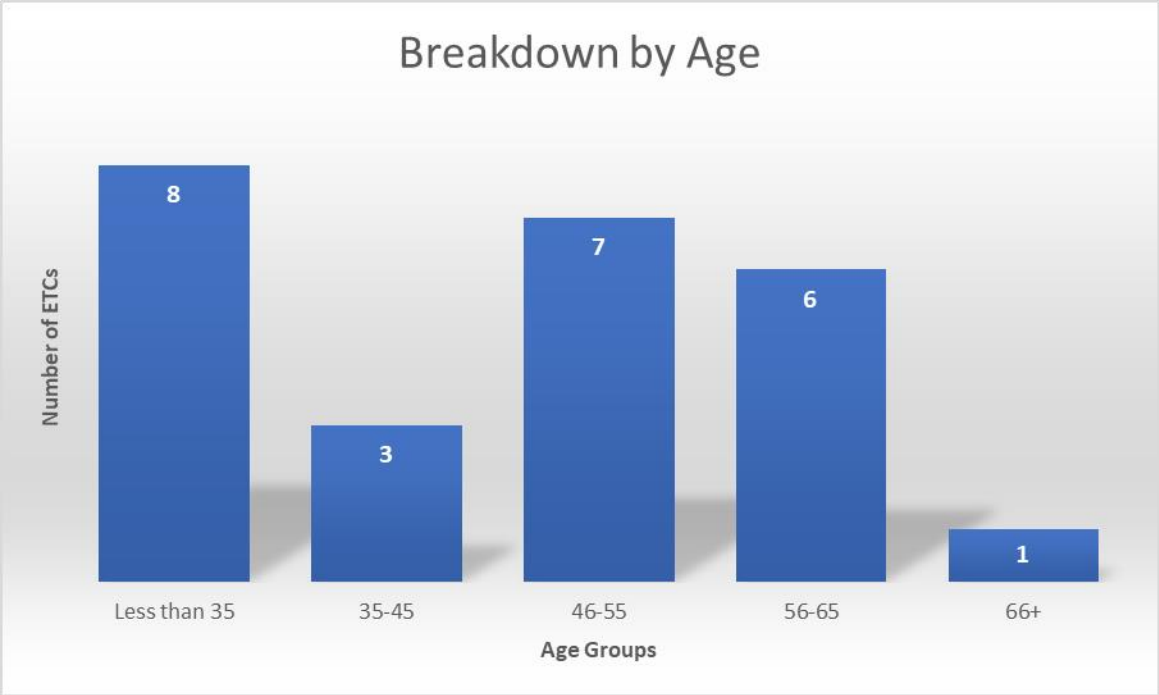
5.1.c December 17th Survey Results

In conjunction with the Thurston Regional Planning Council (TRPC), I conducted an in-person survey at an Employee Transportation Coordinator (ETC) networking event on December 17, 2019. The survey consisted of 11 questions in total. Please refer to Appendix 3 to review the full survey.

The age breakdown among survey respondents reveals that the largest group of respondents (eight or about 29%) fell into the "Less than 35 years of age" category. However, combining two of the brackets, almost half (46%) of those surveyed fell between the age of 46 and 65. On average, the ETCs had been with their current employer for about 10 years and had been in their role as an ETC for slightly more than four years.

Figure 20.

Number of ETCs by Age Bracket at CTR Worksites in Thurston County



Note. Most of the ETCs surveyed were less than 35 years of age. However, a large number of ETCs (13) fell between 46 and 65 years of age.

When asked to rank the three most popular types of alternative commutes at their worksite, the ETCs indicated telework was the most popular, followed closely by carpooling. Items ranked 1st received three points, if ranked 2nd, two points were assigned. Finally, alternative commutes ranked 3rd were given one point. The table below (Table 5) shows the weighted relative popularity of the available commute options.

Table 5.

Most Popular Alternative Commutes as Ranked by ETCs

Telework	32
Carpool	31
Flexible Hours	24
Bus	24
Vanpool	23
Compressed Work Week	20
Biking	14
Walking	6

Note. ETCs ranked the top-3 most popular alternative commutes utilized by employees at their worksites. Three points were awarded for a 1st place ranking; two points for 2nd place; one point for 3rd place. Table 5 once again demonstrates the popularity and employee preference for carpooling (2nd in the weighted rankings) in Thurston County. However, telework narrowly edged out carpooling as the top choice for employees in the county.

An overwhelming number of ETCs—25 out of the 28 surveyed—believed CTR programs were effective at reducing greenhouse gas emissions. Only one of the 28 did not think so, and the other two left the question blank. Interestingly, of those three individuals who did not recognize the greenhouse gas impacts of CTR programs, two of three acknowledged that they had not sent an email, spoken to a fellow employee, given a presentation, or conducted a promotional event about CTR in the past month. They were not engaged in the CTR program. Meanwhile, of the 25 ETC's that believe their programs were effective at reducing emissions, only five claimed to have not engaged in the any of the aforementioned ETC duties in the past month. One of these ETC's (ETC 2) had just started working for their employer in the past month, which leaves four out of 24, or only around 17% who had not performed any ETC related tasks. Of those four, none gave their manager a rating of 4 (involved) or 5 (very involved) when asked, on scale from 1-5, *how involved is your manager with your CTR program?*

These results begin to answer one of my secondary research questions: *What makes a commute trip reduction program successful (Q1)?* Tangential to manager involvement, if an ETC is not invested or does not believe in the merit/value of Commute Trip Reduction, the program may not be successful. Granted, the sample size in this research is incredibly small, but two out of three ETC's not performing any ETC related tasks in the past month is noteworthy. In contrast just 17% of ETCs who believe CTR programs were effective in limiting emissions did not perform any ETC related tasks. As we will see later from the ETC interviews, a primary concern and impediment to the success of CTR programs is that it falls into the category of "5% otherwise duties assigned" within every Employee Transportation Coordinator's job—seriously hampering the amount of time any ETC is able to devote to their worksite's CTR program.

In any event, regardless of the reason, employee engagement would likely be higher if CTR-related tasks were being performed. Manager involvement could be a determining factor. Out of the six ETCs who rated their manager as being involved or very involved, only two had not engaged in CTR-related tasks over the past month. Once again, it is important to point out that ETC 2 had been an ETC for less than one month at the time of my survey. As such, four of the remaining five performed ETC related tasks over the past month: three had sent emails to their coworkers, four had spoken to a coworker in person about CTR, and one have given a presentation to their coworkers/manager. Again, the sample size is small, but there's a stark contrast between ETCs who believe CTR programs were effective but did not have the same level of involvement from their manager. Excluding ETC 2, every ETC who did not perform an CTR-related task either rated their manager's involvement as low or did not think CTR programs are effective at reducing greenhouse gas emissions. Table 6 (below) speaks to this phenomenon and serves as a visual reference.

Table 6.

How Manager Involvement and ETC Beliefs Impact CTR Task Performance

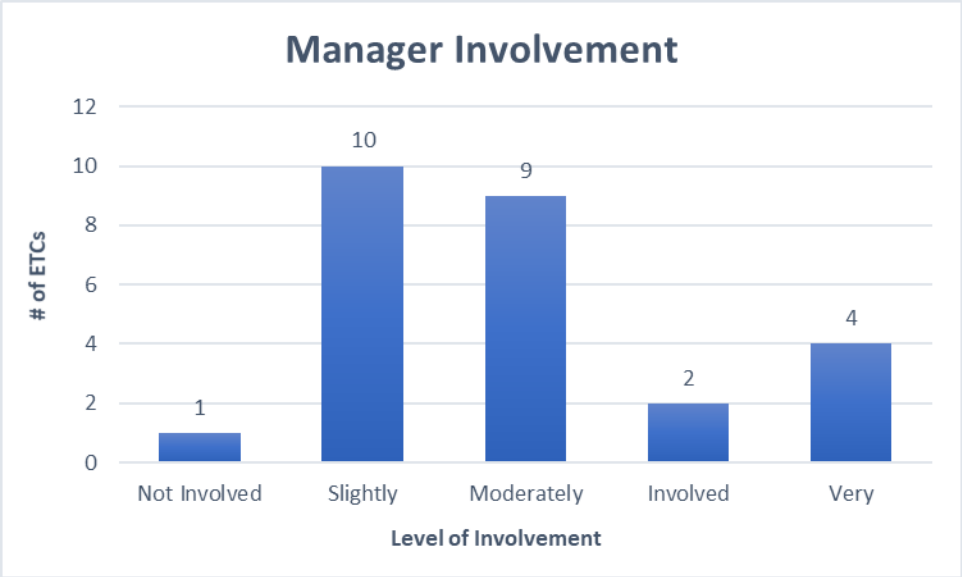
ETC #	Manager Involvement	CTR Effective (Y/N)	CTR tasks performed the past month
ETC 2	5	Yes	No*
ETC 7	5	Yes	Yes
ETC 3	5	Left Blank	Yes
ETC 5	5	Left Blank	No
ETC 6	4	Yes	Yes
ETC 16	4	Yes	Yes
ETC 18	3	Yes	No
ETC 28	3	Yes	No
ETC 12	2	Yes	No
ETC 25	2	No	No
ETC 26	Left Blank	Yes	No

Note. Manager involvement and whether or not an ETC believes CTR programs are effective at reducing GHG emissions might explain and potentially predict the likelihood of an ETC following through with their CTR responsibilities. Every ETC (except ETC 2) who rated their manger's involvement as *involved* (4) or *very involved* (5) AND believed CTR programs were effective at reducing GHG emissions had performed CTR-related tasks in the past month. ETC 5 rated their manger's involvement as *very involved*, but left the question about CTR effectiveness blank, and did not follow through on any ETC-related tasks. *All of the ETCs which reported not performing any ETC tasks either had low manager involvement or did not think CTR programs were effective.* *ETC 2 was excluded from the sample due to being at their position less than one month.

Overall, participants rated manager involvement inconsistently, with the majority of ETCs reporting low to moderate manager involvement as the figure below underscores. To ensure confidentially and remove any possible backlash of rating their managers poorly, the survey did not require participants to disclose the organization they worked for. Unfortunately, as a result, there was no way to know if lower manager involvement or employer support correlates to lower participation and engagement in CTR programs.

Figure 21.

Level of Manager Involvement in CTR

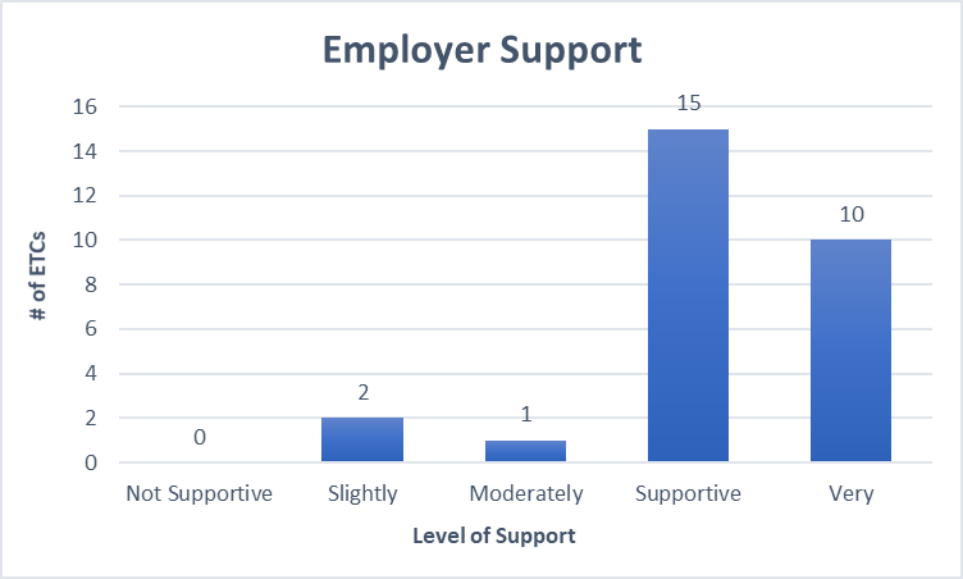


Note. ETCs rated their manager's involvement in their worksite's CTR program very inconsistently. The majority of ETCs (10) stating their manager was *slightly involved*, with another nine ETCs saying their manager was *moderately involved*.

That said, the contrast between manager involvement and employer support was striking. While manager involvement at worksites varied, employer support did not. As shown in Figure 22, out of the 28 surveyed, 25 ETCs rated their employer as supportive (4) or very supportive (5) on a scale from 1-5. A larger sample size would yield more information on whether both employer support and manager involvement definitively play a role in making a CTR program successful. Furthermore, forgoing confidentiality would enable future research to determine if these two traits correlate to successful CTR programs and employee engagement.

Figure 22.

Level of Employer Support in CTR



Note. In contrast to manager involvement, employer support was extremely consistent across the ETC's worksites. 25 out of 28 ETCs (89%) rated their employer as being *supportive* or *very supportive*.

Finally, and perhaps one of the more interesting findings, was a moderately positive correlation between the number of years as an ETC and using an alternative commute. Running a correlation in R, I acquired a correlation coefficient of 0.25. This means the longer an employee is an ETC, the more likely they are to use an alternate commute and suggests a possible behavior change as an ETC increases their knowledge and exposure to Commute Trip Reduction programs. Alternatively, ETCs that use an alternate commute are more likely to remain a ETC for a longer period of time. Either way, it implies retaining an ETC could lead to a more successful CTR program as behavior change is one of the most influential and determining factors for shifts in attitude, perception, and future behavioral change (Kaiser et al., 1999; Davidson, 1995).

5.2 Qualitative Results

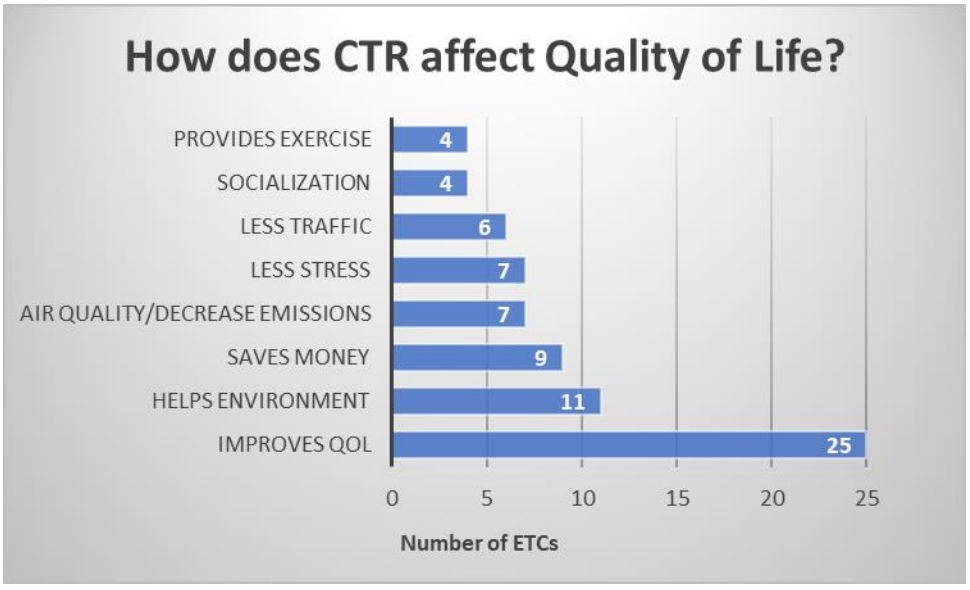
Qualitative data came two sources: two open-ended questions from my survey and formal interviews with eight ETCs.

5.2.a Open-ended questions from December 17th Survey

To further understand the attitude and culture of CTR programs, I asked survey respondents two open-ended questions. The first tied directly to my main research question of how do workers perceive CTR programs: *How do you think CTR programs affect quality of life?* The connection and intersection between how we commute to work and its impact on our day-to-day lives is mostly absent from TRPC and WSDOT survey data. Twenty-five of the 28 survey responses reported CTR programs as having a positive effect on quality of life (QOL).

Figure 23.

Benefits of CTR Programs and CTR Commutes on Quality of Life



Note. The benefits of CTR mentioned by ETCs were numerous. In total, 25 out of 28 ETCs (89%) noted some kind of positive association or quality of life (QOL) improvement due to CTR programs/commutes. 11 ETC responses refer to the positive effect of CTR on the environment, with seven specifically mentioning improved air quality or decreased GHG emissions. Financial savings (9 ETCs) was the second most frequently cited specific benefit of CTR on quality of life, followed a reduction in stress (7 ETCs).

Roughly 89% of ETCs attributed some at least one QOL benefit to CTR programs. The most frequently cited benefit mentioned was to the environment, with 39% of ETCs mentioning positive environmental outcomes as a result of CTR programs, and 25% of ETCs specifically noting that CTR programs led to a decrease in emissions and improved air quality. Saving money on gasoline and/or car repairs also featured prominently in the results, and aside from the environmental benefits of CTR programs money was the second most common response. Other responses included improved quality of life due to less traffic and less stress; and finally, several ETCs noted that CTR programs such as biking and walking could provide exercise whereas vanpools and carpools allow for more socialization.

Of the three ETCs who did not think CTR programs affect quality of life, two left the question blank. The other, ETC 26, had this to say:

"I haven't seen the quality of life affected unless I'm not looking in the right direction."

In contrast, some ETCs were notably more positive:

ETC 19: *"Definitely improves quality with reducing stress."*

ETC 21: *"The people I know who participate in CTR <u>LOVE IT</u> and are much happier as a result."*

ETC 28: *"When things line up, schedule, work tasks conducive to completion at home, benefits are numerous."*

The second open-ended question more specifically targeted secondary research 2 (Q2): *What enables of alternative forms of transportation?* On the survey, ETCs were asked to describe what they felt were the main barriers to using commute alternatives. In my analysis, I uncovered five main themes: culture, flexibility, family/personal obligations, time, and the lack of bus accessibility. Secondary themes that emerged included barriers due to physical location, lack of

information, and concerns about bike safety or lack of bike lines. The difference distinguishing primary and second themes stems from the frequency of words and phrases corresponding to each theme. The word cloud below, Figure 24, illustrates the relative weight with which each theme appeared, the larger words having appeared more often.

Figure 24.

Main Barriers to Using Alternative Commutes

Note. Content analysis revealed several themes in regards to the main barriers to using commute alternatives. Figure 24 visualizes the relative frequency with which these themes appeared. Culture and the need for flexibility appeared the most often in ETC responses, with family responsibilities and time also featuring prominently in survey responses.

Culture was by far the more cited reason or barrier to using an alternative commute. At the same time, it is undeniably vague. This is one example of a response that was coded as pertaining to culture:

> ***ETC 28:*** *"Production employees cannot telework, but flex schedules offer value. Management trust in employees to be productive, bus and/or vanpool phobias, and no easy bus access."*

This ETC's response questions whether managers trust their employees—a consistent cultural struggle in the workplace. Additionally, bus and/or vanpool phobias also checks the box as a cultural problem. For many people, riding the bus or taking any form of mass transit is often

associated with being a part of the lower socioeconomic class and carries a negative connotation alongside it (Bogren & Sampson, 2015; Furillo, 2018). Buses and vanpools can also expose individuals to uncomfortable encounters with strangers, which was something that came up in my interviews as well. Note that ETC 28's response also highlighted the theme of lack of bus access.

In addition to trust, other words descriptive of and coded for culture included: convenience, freedom, control and time. The following two quotes provide other examples of culture serving as a barrier to using alternative commutes:

> ***ETC 2:*** *"Management, agencies, and companies not allowing or implementing alternatives."*
>
> ***ETC 6:*** *"Knowledge of the program; ability to change work schedules; adapting to requirements of CTR."*

In the first example (ETC 2), it's the 'not allowing or implementing alternatives' which was coded for control and culture. In second, the '[in]ability to change work schedules' prompted coding for freedom and culture. Speaking of freedom, America's cultural love for cars was evident:

> ***ETC 10:*** *"Perceived freedom that comes from operating a personal vehicle."*
>
> ***ETC 11:*** *"People want to drive their own cars."*
>
> ***ETC 25:*** *"Busy lives – appointments to attend, family obligations, and people just love being able to come and go as they please. Plus we love our cars!"*

"We love our cars!" ETC 25 sums up one of the most challenging barriers to successful CTR programs. As much as people want to do right by the environment, habits and cultural norms stand very much in the way. One ETC summarizing succinctly:

ETC 1: *"Habits. And not wanting to change their habits."*

We will revisit the American love and affinity for cars again in the ETC interviews and then again in the Discussion. ETC 25 also spoke to another critical barrier and theme: busy lives. Cities that never sleep. The hustle. The bustle. Detailed in the literature review, Americans have been trending toward working longer hours over the past few decades. As a result, many people are constantly running from one appointment to the next. Busy schedules, lengthy to-do lists, plenty of errands to run, and seemingly not enough time in the day. That's the American way. The problem is that our fast-paced society does not take time to rest, and by and large considers sustainability as an afterthought (De Graaf, 2003; Sandberg et al., 2018; Silova et al., 2019; Alexander, 2015). Cars help us navigate this fast-paced lifestyle. And for some, they facilitate getting more done. As one individual put it:

ETC 21: *"Not enough time on lunch to run errands using the bus, so people choose to drive."*

Two others echoed a similar sentiment for their reasons to drive alone:

ETC 14: *"Having appointments or errands."*

ETC 17: *"Busy life schedules."*

At this point, it should be clear how interrelated the main barriers/themes are. 'Busy life schedules' is both emblematic of a fast-paced culture and a driving force for needing transportation flexibility. Having a family bears additional responsibility and commitments. As ETC 25 stated above oftentimes attending to personal family matters, appointments and errands creates a strong desire for people to drive alone. The following responses highlight the intersection of family and flexibility:

ETC 21 added: *"Child care or child-related obligations."*

ETC 19: *"Flexibility and family member needs."*

With increasingly busy, full, and complicated lifestyles, flexibility goes from being something we desire to being something we practically need. There is only so much time in a day. Likely realizing this conundrum one ETC wrote:

ETC 20: *"Commitments, time, [and] inconvenience."*

The previous comments also illustrate the link between the family, culture and time. Likely realizing the intersection of every one of these themes, one ETC simply wrote:

ETC 15: *"Time."*

When breaking down and coding ETC responses culture, flexibility, family responsibility, and time were the main themes uncovered. Without a doubt the latter three (flexibility, family, and time) are core components of our work culture in the United States. Expectations of productivity presses employees to use their time wisely which can be challenging while also maintaining family or other life responsibility outside of work. Not having enough time or even feeling like you don't have enough time places a great amount of stress on having transportation freedom and flexibility. All of these barriers point in the direction of driving to work. The path of least resistance is to get in the car and go—not taking the time to ride the bus or organize a carpool. And the results clearly show how interconnected the barriers truly are. Together culture, family obligation, the desire for flexibility, and the crunch for time play off one another and create the perfect conditions for a society heavily reliant on automobile use.

5.2.b Interviews with Employee Transportation Coordinators

The answers to my questions in eight interviews with Employee Transportation Coordinators (ETC) share many of the same themes as I found in the responses to the

December 17 ETC Survey. As a reminder, the interviews took place from mid-January, 2020, to late February, 2020. All eight worksites were located in Thurston County and within the Olympia-Lacey-Tumwater area more specifically.

Themes surrounding family, personal obligations, and the constraints of busy lives featured prominently. The importance and regard for time emerged again, and quite substantially, as did the perceived need for flexibility to handle life's circumstances. The following pages describe these themes in detail and focus on the heart of my primary research question: *How do workers perceive CTR programs?*

Commute Trip Reduction Defined

Already aware of the vast differences among CTR programs at worksites across the state and county, I was curious to know how the ETCs defined CTR. Definitions are important; they demonstrate the foundation of an individual's knowledge, and can reveal potential biases and/or ideological leanings. As such, by asking the ETCs to define CTR, I hoped to expose any discrepancies amongst their knowledge of CTR and also shed light on any biased predispositions. CTR as defined by ETCs:

> ***ETC 1:*** *"Commute trip reduction is a program to educate and encourage staff members to try alternate transportation modes other than driving alone. To benefit them and their communities, to reduce pollution, to save wear and tear on their cars, and to save money."*
>
> ***ETC 2:*** *"So CTR, obviously the definition is commute trip reduction, and our goal behind that as an agency and this office is to take cars off the road to reduce congestion, take cars off the road to reduce emissions, and then obviously parking for us is a big deal. So those are the three things that we focus on when we talk to people about CTR."*

ETC 3: *"To me what that represents is we're saving the environment. We're saving resources, we're cutting down on pollution, and we're just trying to make everything economical for everyone. As well as just trying to make it a better place, especially in Washington. So I think it's kind of a multi-faceted program."*

ETC 4: *"It's actually a law. We're all legally…I guess all state agencies are legally required to have some kind of commute trip reduction program and have an employee transportation coordinator for each job site. But it's basically to encourage staff members and employees to use alternative forms of transportation. Potentially I guess to encourage them in all sorts of different ways. There's a lot of flexibility with the program."*

ETC 5: *"I would define commute trip reduction as a way to find an alternative way to getting to work. Whether it be bus, walking, biking, carpool, vanpool, just something to make it a little bit easier."*

ETC 6: *"Commute trip reduction is a program that's pretty much established by the governor to reduce carbon emissions on the road and congestion. So it is basically an initiative to find alternative methods of commuting to work."*

ETC 7: *"I think historically it has been trying to reduce drive alone commutes, you know legally, from the hours of 6 to 9—the peak hours—to the SUV commutes from 6 to 9 and then in afternoons. I think recently it is broadened and DOT is trying to broaden it to more of not just to work but to other…to weekends and events and things like that."*

ETC 8: *"What we want to do is get people off the road…It's about reducing the volume of people on the road…so their commute time will be better and the environment will be better."*

All of the ETCs responses seemed appropriate, relevant, and on topic. Seven of the eight ETCs referenced either encouraging alternative forms of transportation or reducing drive alone vehicles. Four ETCs specifically mentioned reducing emissions or pollution. Three of the ETCs (ETC 4 & 7) referred to the legality of CTR, with one ETC (ETC 6) describing CTR as "pretty much established by the governor." Mentioning the legality of CTR unprompted is noteworthy as it could be suggestive of forced compliance and a potential bias. However, on the whole, these responses confirm all ETCs had common foundational knowledge of CTR.

What does CTR mean to you?

In addition to having the coordinators define CTR, I asked them what CTR means to them. The idea being twofold: for one, the question centers around and answers my primary research question about employee perception of CTR programs. And second, as with having ETCs define CTR, I believed it was another question which might uncover bias or extreme viewpoints.

However, I did not encounter any answers indicative of bias or otherwise very strong opinions. In fact, several ETCs responded by describing CTR as 'positive'. Two went further specifically mentioning how CTR reduces congestion and traffic, with one (ETC 6) again stating that less cars on the road means less emissions.

Notably, one response from ETC 4 alluded to some frustration with the CTR law. In particular, this coordinator noted how differing incentives and subsidies among various state agencies is quite frustrating, *especially when their own agency does not provide the funding needed*. ETC 4 highlighted a very important point, and what they mentioned was actually one of several additional themes identified during the analysis of the ETC interviews (in addition to the eight themes identified earlier from the short answer survey questions). The CTR law requires

that all state agencies maintain a commute trip reduction program and designate an employee transportation coordinator, but beyond these two primary measures there is an incredible amount of flexibility. Each worksite or agency has the opportunity to determine what works best for them and not be so heavy handed by imposing hard-to-implement programs. This is great practice in theory, but as we will see later in this chapter the flexibility and open-ended nature of CTR programs creates a lot of confusion and substantial problems.

Other themes also emerged amid the responses to this question. The difficulty of maintaining a work/life balance (another theme identified earlier) surfaced again here. Two ETCs specifically spoke to the challenges of balancing a busy personal life with work:

> ***ETC 2:*** *For me it's something that you want to push because you wanna' help reduce congestion. I mean everybody has a reason to be home in a timely manner whether it be you have pets, kids, family. That work-life balance thing…it's hard to do that if you're sitting in traffic for two hours a day.*
>
> ***ETC 3 added this:*** *It's really hard to be accommodating when trying to do flex schedules to have a work/life balance. So a lot of people do four 10s, some people do early 9s, some people do 8 to 5. Some people telecommute, which is great for the people that can, but not everybody can do that.*

Notice how each coordinator references juggling work and their personal life with a different mindset. ETC 2 seemed to approach alternative commutes as something positive and a way to alleviate some of the stress and burdens of the workday by cutting down on traffic congestion. In contrast, ETC 3 viewed telecommuting and alternate schedules as something more of a luxury and potentially an added burden.

The idea of CTR programs placing an additional burden or requiring extra effort on the part of employees was either mentioned directly or alluded to by several other ETCs. For example, ETC 1's approach at their worksite was to provide education and awareness so their co-workers' alternative commutes would be as easy as possible:

> *Asking what their commute is like and where they're coming from? To then be able to take that information and find out what the best fit is for them—because there's not a perfect commute out there—it's just kind of getting their temperature and [knowing] what they are willing to do and try out. The more that we can streamline it and make it easy for them to try something, I think the more people are going to be willing to give it a go.*

One can infer from this response a general sense of disinterest or unwillingness from employees. Additionally, lack of information and awareness was yet another theme identified in the short answer survey responses; it plays into the difficulty and inconvenience of maintaining an alternative commute. Inconvenience was a critical theme, and one that becomes even more evident later in this chapter when discussing ETC responses to the barriers to CTR programs.

And finally, ETC 7 stated that for them, "[i]t is all about climate change and trying to do what you can for the environment."

Climate change—the driving force of this thesis research. While ETC 7 was the first coordinator to directly address climate change in their interview, they were far from the last, as climate change and the environment surfaced in almost every interview.

<u>What is a CTR program anyway?</u>

As mentioned in the previous section, no two CTR programs are exactly alike. Each worksite determines the type of incentives, subsidies, and alternative work schedules they wish to offer employees. Some workers are encouraged to work from home while others may not be.

One worksite may offer a flexible start time or a compressed work week (CWW) whereas others do not. Employees at some agencies can have their bus fare covered; however, employees at another will receive $1.50 for each bus ride or nothing at all. Table 7 below illustrates the types of schedules and incentives offered at each of the interviewed ETC's worksites. In the interest of ETC confidentiality, the organization names have been replaced with a randomly assigned letters.

Table 7.

Alternative Schedules Offered & Encouraged at Interviewed ETC Worksites

Interviewed ETC Worksites	Telework Offered	Telework Position	CWW Offered	CWW Position	Flex Offered	Flex Position
Worksite J	Formal	Allowed	Formal	Allowed	Formal	Allowed
Worksite K	Formal	Allowed	Formal	Allowed	Formal	Allowed
Worksite L	Formal	Encouraged	Formal	Encouraged	Formal	Encouraged
Worksite M	Formal	Encouraged	Formal	Encouraged	Formal	Encouraged
Worksite N	Formal	Allowed	Formal	Allowed	Formal	Allowed
Worksite O	Formal	Allowed	Formal	Allowed	Formal	Allowed
Worksite P	Formal	Allowed	Formal	Encouraged	Informal	Allowed
Worksite Q	Formal	Allowed	Formal	Allowed	Formal	Allowed

Note. All 8 worksites of the ETCs I interviewed have formal telework, compressed work week (CWW), and flexible work (Flex) schedules (with the exception of Worksite P not having a formal flexible work program). However, only two worksites have programs officially endorsing and encouraging their use—Worksite L & Worksite M.

The eight worksites shown above represent a very small sample of the 146 worksites in Thurston County for which there is data. However, notice that only two of the eight formally *encourage* employees to work from home, utilize a compressed work week, and employ flexible scheduling. That result was not a total surprise if we recall out of 146 worksites only 23%, 24%, and 27% encouraged telework, compressed work weeks, and flexible scheduling, respectively.

Furthermore, Tables 8 and 9 demonstrate quite a lot of variation in monetary reimbursement for using alternative commutes, as was the case for Thurston County overall. The

range and unequal distribution of available monetary incentives is extreme, even among a small sample of worksites.

Only three of the eight offer a bus reimbursement. Six offer vanpool reimbursement; and half of the worksites offer carpool, walking, and biking reimbursements. Also, the range of payments among the eight sites is over $100 for each type of CTR alternative.

Table 8.

Monetary Incentives Offered at Interviewed ETC Worksites by CTR Type

CTR Type	# of Worksites Offering	Reimbursement Range (in USD)
Bus	3	100
Vanpool	6	100
Carpool	4	117
Walk	4	117
Bike	4	117

Note. The financial incentives offered at interviewed ETC worksites corresponds and is similar to the overall distribution within Thurston County. As was the case across Thurston County, vanpool was the most frequently offered CTR reimbursement at interviewed ETC worksites (6 worksites). Also similar to earlier results, the range of financial reimbursement also varied quite dramatically across the eight worksites.

Table 9.

Percentage of Employees Receiving Monetary Reimbursement at Interviewed ETC Worksites (And Max Monthly Reimbursement in USD)

	Bus		Vanpool		Carpool		Walk		Bike	
Worksite J	Yes	0.38% $50/month	Yes	0.38% $50/month	Yes	4.9% $33/month	Yes	0.38% $33/month	Yes	0.38% $33/month
Worksite K	No	N/A	No	N/A	No	N/A	No	N/A	No	N/A
Worksite L	No	N/A	Yes	1.1% $50/month	Yes	7.6% $33/month	Yes	2.8% $33/month	Yes	2% $33/month
Worksite M	Yes	1.7% $69/month	Yes	5.3% $130/month	Yes	14.8% $69/month	Yes	0.4% $69/month	Yes	0.71% $69/month
Worksite N	Yes	3% $150/month	Yes	1.5% $150/month	Yes	7.7% $150/month	Yes	1.5% $150/month	Yes	3% $150/month
Worksite O	No	N/A	Yes	N/A	No	N/A	No	N/A	No	N/A
Worksite P	No	N/A	Yes	2.1% $50/month	No	N/A	No	N/A	No	N/A
Worksite Q	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Note. The first column within each CTR type indicates if a reimbursement incentive is offered at a worksite. The second column contains the percentage of employees at that worksite who receive a reimbursement each month on the first line, and the maximum amount an employee could receive each month below. Of the ETCs I interviewed, only half had worksites that offered reimbursement for utilizing an alternative commute. There was also a very large difference in the reimbursement amount between Worksite N and all the other worksites. Finally, this sample also suggests that carpool is the most popular and utilized alternative commute.

Other differences emerged from ETC responses as well. Some worksites offered unique methods and incentives to increase employee participation. For instance, according to ETC 1: "So we communicate first and foremost that you can earn an extra $5 a day if you choose to do an alternate transportation mode."

Meanwhile, at ETC 2's worksite, a different reimbursement policy existed. They explained: "So it's a $1.50 each way so they get $3 a day. It's added to their paycheck, so it is taxed. It is that fringe benefit." This fringe benefit was even smaller at the worksites of ETC 7 and ETC 8 where the reimbursement was only $0.75 each way.

At the same time 75 cents is likely preferable to Worksites K, O, P, and Q, which do not offer any monetary reimbursement program for walking, biking, carpooling, or taking the bus. However, all of these worksites typically will provide ORCA and STAR (State Agency Rider) passes for public transit, although only ETC 3 and ETC 6 mentioned them in their interview, meaning lack of information could be a contributing factor. ORCA and STAR passes allow employees to ride transit services (such as train, bus, and ferry) free of charge in various Washington State counties, with passes being available to all state agency employees (Interagency CTR Board, 2002). For instance, the STAR pass provided unlimited rides through Mason, Gray's Harbor, and Thurston counties. However, when InterCity Transit (Thurston County's transit operator) moved to fully free fares on January 1, 2020, some agencies are no longer bothering with the STAR pass program as ETC 6 explained.

> ***ETC 6:*** *We used to participate in the STAR program. However, now that InterCity Transit has gone toward its five-year program with free busing, we really don't do anything with that anymore. It's just people can ride the bus at their leisure. For folks in Pierce, Snohomish, and King County we offer ORCA pass. The ORCA pass is good. It's similar to a general computer pass, which is good for some of the ferries, some of the water taxis, and the bus system and such up there.*

Unfortunately, not all worksites make a strong commitment toward these programs. The only incentive at the worksite of ETC 5 was 25 parking spots closer to the building reserved for those who carpool. Their response:

> ***ETC 5:*** *"We don't necessarily have any incentives. Um, so it's basically based off of what type of incentives that InterCity Transit provides. Because we don't have any other incentives other than a guaranteed parking spot for the CTR parking."*

Recall in the previous section, *What does CTR mean to you?*, I referenced the inconsistencies between CTR programs and the frustration noted by ETC 4 in regards to what CTR means (to them). The qualitative data from my interviews definitively paralleled the quantitative data included earlier in the *Incentives* section (5.1.a) and in the tables above. ETC 4 offered this explanation and insight:

> *I kind of appreciate that they made it flexible because [of] the needs for each worksite, you know? The people in the rural areas are going to have different needs and different access to transit and stuff like that than people in cities. But the problem is that it's so different, it varies so widely. So people get upset about how there's some work sites like the Department of Ecology, and people get people get reimbursed for using transit and I'm trying to get that here but I came on right as they were redoing the budgets, the next biennium budgets, and we didn't get that in the budget so I have to wait to try to get that going again.*

The comment above further illustrates how and why flexibility, and inconsistency among these CTR programs, can be ineffective and problematic. The theme of flexibility (which had historically been thought to aide CTR program success) as a barrier was one of the most significant findings of my research. Instead of acquiring funding for their worksite's employees, ETC 4 told me, "They scrounged up enough money that we can buy gift cards and so basically I'm tracking people's commutes and then people can enter into a monthly drawing." Instead of reimbursement, two employees are randomly given a gift card once per month. ETC 4 adds, "And people can only win once per year."

Continuing my conversation with ETC 4, I discovered more evidence of CTR flexibility and variance being inequitable. When asked directly about the CTR programs at their worksite, the full picture really started to emerge.

> ***ETC 4:*** *Well when I got here there was nothing. And I…so part of the reason the person from HR asked me to do this, too, is I used to live in [Seattle]…when I first started here I was actually commuting down from Seattle and so the first six months I was driving and then I found out about vanpools, and so I was actually in a vanpool for over 2 years. And it was it was frustrating because I at some point learned that people in my vanpool that their…they were getting, they were basically, their vanpool was covered by their agency through Commute Trip Reduction, or at least partially covered. And I, you know, it was over $100 a month and so…*
>
> ***Me:*** *Over the course of a year…*
>
> ***ETC 4:*** *That's a lot of money. And so, I don't know, yeah…It was really frustrating.*

Imagine commuting with a group of people everyday for over two years and then finding out the people sitting next to you had been receiving more than $100/month in financial compensation! That's more than $2400 over two years. They continued:

> *I had a hard time even tracking down the person who and it might have been even the person before the last person was the ETC here. You know it's hard. If somebody isn't passionate about this stuff, doesn't have experience with it, it's added to their jobs. It's not something that they've…You know it's sort of been given to them rather than something they're excited about working on. And because of the flexibility there's no right way to do it. And so it really, it really depends on the person who takes it on.*

This quote reinforces several other themes as well as highlighting the challenging situation facing many ETCs. Generally speaking, ETC duties are assigned to one employee at each worksite. From my interviews with ETCs and several discussions with employees at TRPC and DOT, ETC duties are given to lower-level employees such as receptionists or administrative workers. The tasks and responsibilities are added to their job in addition to their other position responsibilities. As ETC 4 points out, if someone were not extremely interested and passionate, it would be entirely feasible the CTR tasks to be ignored or not prioritized. ETC 7 had this to say on the subject:

> ***ETC 7:*** *And in Thurston County the problem is that the ETCs, there are many, many agencies that just the ETC is just something they have to do. They don't give them any time or any resources. And it's 5% other duties as assigned, that's what they call it. There is no support.*

ETC 8 would confirm this when they acknowledged:

> ***ETC 8:*** *"So it's like one of my other duties as assigned. So it's not like a primary part of my job. I don't spend a lot of time thinking about it, if that makes sense."*

And then later in the interview adding:

> *"Like I said this is sort of an add on to my job. It's not it's not like my primary role…for me it's just like the 12th thing on my list."*

Further commentary on ETC duties being assigned and the negative impact this has on CTR success follows in the Discussion section.

Finally, one other difference among the CTR worksites within my smaller ETC sample involved employer support. In the ETC survey (5.1.c December 17th Survey Results), although manager involvement varied quite drastically, employer support did not. Among the ETCs I interviewed, however, a greater degree of variation seemed to emerge.

Table 10.

Employer Support on Scale from 1 to 5 by Interviewed ETCs

	Employer Support
ETC 1	5
ETC 2	5
ETC 3	4.5
ETC 4	3.5
ETC 5	4.5
ETC 6	3
ETC 7	5
ETC 8	N/A

Note. While 89% of ETCs from the December 17, 2019, survey rated their employer's support as a 4 (*supportive)* or a 5 (*very supportive)*, that was not the case with the ETCs I interviewed. Asking the question verbally may have afforded more nuance as three ETCs did not pick whole numbers, instead opting to go between two choices (e.g. 4.5).

It's possible the interview setting provided a more comfortable space or perhaps the dialogue beforehand primed ETCs to express more nuance with their responses. The explanations as for why also varied but touched on aforementioned themes such as location, family burdens, and either a really positive or somewhat lacking organizational culture of support. When asked to explain their reasoning for giving a 4.5 out of 5, ETC 5 shared this:

> *Um, just because there's a lot of employees in our building that have scheduling issues. They have to pick up their kids from school or they have to drop them off in the morning, and a lot of them think that can't really participate in carpool/vanpool because of their*

situation. And there's not…there's not a lot of support or back up to give them other options for that.

Their reply again highlighting how having a family can be a barrier to taking an alternative commute. Meanwhile, in clarifying why they rated their worksite a 3 out of 5, ETC 6 revealed a lackluster organizational culture of support surrounding CTR:

ETC 6: *So we do have the policies in place that help folks with commute trip reduction if they're so interested. We just don't schedule any kind of CTR events. And we have a CTR board out but it's not like it's a central talking point.*

Contrast that response with ETC 2 who rated their worksite a 5:

It's definitely supported. We did have a increase about two years ago. We went from a dollar each way to $1.50. It was a pretty easy process to get that bumped up, so the support there was great. We're gonna be asking for another one in this next fiscal year. We're gonna try to go to $2 each way. And then were going to try to bump this [vanpool reimbursement] to $150.

So what is a CTR program? It depends. Some programs encourage flexible schedules and working from home whereas most do not (despite formally allowing both). At some worksites, vanpool ridership is strongly encouraged and efforts are being made to fully reimburse participants. Meanwhile many worksites struggle to simply find funding for the use of an alternate commute via a cash incentive. No CTR program is the same, and it bears repeating that the variation from one worksite to the next, be it through available funding, management support, or the (dis)interest of an ETC in CTR, is a major hindrance to successful CTR programs. The next section focuses exclusively on these barriers among others.

Main Barriers to CTR Programs

I've discussed numerous barriers to the successful implementation of CTR programs in the workplace so far including: flexibility of programs, work culture, family responsibilities, lack of information and access, and the crunch of time. This section provides detail and directness by openly asking ETCs what they felt were the main barriers. Their responses paralleled many of the earlier themes. Collectively, the main barriers were thought to be bus access, education & awareness, convenience, commute safety, having children, time, and finally the fast-paced culture of American life.

Overall, bus access was the most frequently cited barrier to CTR—as it was referenced by seven of the eight ETCs. "Getting the timing right" to not miss the bus and get to work on time can be tricky as ETC 4 explains:

> *"I also feel like using buses in the city can be [a main barrier to CTR]…to get the timing right depending on where you are going…"*

Location can be a determining factor as well. Depending on where someone lives, taking the bus may not be a viable option. ETC 4 continued saying:

> "*Transit is not great here yet. And especially out to the rural areas. I used to live out near 40th and Libby, and the nearest bus stop is 2 miles away."*

ETC 2 shared a similar statement adding, "In my personal scenario there is no bus line that goes right there." Taking the bus not only necessitates getting the timing right but it also requires someone to live in the right location. And then there's one final problem—riding the bus is slow and takes too much time! ETC 1 sharing:

> *"Its about an hour, little over an hour if I were to take the bus. And I'm just waiting."*

In fact, most of the ETCs I interviewed commented on the fact that bus transit was very time-consuming. It appears taking the bus has become the 21st century equivalent to watching paint dry; and in a fast-paced, global society where time is precious and to-do lists are long, many people view riding the bus as a waste of time. ETC 7 had a particularly strong response to the lack of reliable transit and how long it can take:

> "*I think in Thurston County it's because the bus system is horrible. You know, I won't say horrible. But I can jog home faster than I can take the bus. I jog very slow."*

In addition to lackluster bus access and efficiency, bus transit can sometimes give rise to concerns with safety as noted earlier in this chapter. ETC 4 shared this, "It's interesting just like the demographic of who's on the bus. I mean could see how some people might not feel comfortable or something like that." Then adding:

> *I've had a couple experiences on the bus where there was somebody who was…There was some erratic behavior…I was nervous and a person actually got asked to leave the bus.* But again this is pretty unusual. *You know it's like that one thing here and there. But that could…that would definitely…I could see how that could strongly impact somebody, if they don't feel safe riding the bus.*

Safety concerns were another main barrier for several ETCs and did not solely pertain to bus transit. Walking and bicycling were also considered unsafe for a number of ETCs. ETC 1 had this to say:

> *"Safety is huge for me for me to be able to be out on my bike. So I'm waiting for that opportunity for me to feel comfortable."*

ETC 2 also reported feeling unsafe biking or walking due to safety concerns. In particular, ETC 2 discussed how the lack of sidewalks in places prevents them from even considering walking,

and citing it as being “pretty dangerous.” ETC 4 revealed earlier in our conversation about the difficulties they have experienced when biking into work. When asked about biking without a bike lane, they shared this:

> *I don’t prefer it because what I've experienced is that people think that you should be on the sidewalk or something and it's actually legally…you are legally allowed to take up a whole lane. I've noticed if there's no bike lane and I'm pretty close to the curb, people will get really close to me. And if I take up the whole lane they don't do that. They may speed up around me and go into the other lane. I definitely notice that a lot.*

Complicating things a to a degree can be traffic, with ETC 4 adding:

> *“So typically I would take up a whole lane, but people don't like that especially in the morning when there's a fair amount of traffic.”*

ETC 4 then shared a particularly troubling incident with me:

> ***ETC 4:*** *That traffic circle is strange…I try to use hand signals but it also like requires you to take your hands of your…and you're going downhill so your getting speed so…But a car, a car…And luckily I wear a bright yellow helmet and I had been wearing this safety vest that goes over my coat, and like yellow gloves or whatever…And it was, it was light out, it wasn't dark. It was in the fall or something like that. But I came through, [and] a guy didn't know what I was doing and he like slammed on his brakes. And then got pissed. And like got up really close behind me, and was like (nervous laughter)…and uh…and then as soon as we made it through onto Jefferson, I got into the bike lane and he sped up really fast and zipped around me. He was like way, way fast and way close to me.*
>
> ***Me:*** *Just aggressive sort of?*

ETC 4: *Super aggressive. And then of course he works in this building because it's a small world. And so he pulls in and then I…I'm on my bike and I pull right in fairly close after him. I was so mad about the whole thing. I ended up talking to the guy about it. It was later in the day or whatever but…*

Me: *And how did that go?*

ETC 4: *It was…Not.. It was…I…I…(clearly frustrated)…I don't know….I actually talked to my boss about whether I should do it or not…'cause being a woman… And clearly this guy got super pissed in the car…but also, like I have road rage sometimes too. Like especially trying to drive up to Seattle and traffic and you know…I understand road rage, but it was pretty scary.*

ETC 4 then adding:

The thing we have to remember is [when] you're driving, you're in a big metal box and you've got air bags and stuff. When you're on a bike, you are pretty vulnerable. There's nothing protecting you. I think we forget that.

Eventually, ETC 4 opened up and relayed how the conversation with the aggressive driver went:

ETC 4: *When I talked to him. He did actually say, he actually said, "Thank you for wearing bright colors." And like, "I definitely saw you." So that was good, but it was kind of an intense conversation. I think it's hard. I think there's a lack of clarity on what we're supposed to do. I think some people feel like bikes shouldn't go through the traffic circle, but you are legally allowed to…*

Me: *I think most people who don't bike just don't like bikers.*

ETC 4: *Yeah, or they feel like they're getting in their way, or they think they're supposed to be on the sidewalk. When, a lot of cities—at least—it's actually illegal to be on the*

sidewalk. I don't know. There's just a disconnect. That conversation with the guy, it was pretty intense at first 'cause I think we both felt sort of self righteous, and that we were both right. By the end of the conversation, there was a little bit more understanding. I was like, "Hey, I know. I'll make sure to signal. I'll try to make sure I'm following the rules, and this, that, and the other. And just be aware that were really vulnerable." I was trying to give him some of my perspective too. And it was better by the end of the conversation, but it was intense.

Another barrier noted by ETCs was having children and the corresponding childcare obligations, something which has been discussed previously. ETC 5 shared their view on this subject:

ETC 5: *Employees have definitely said that it would be nice to have availability and flexibility. Same thing with the CTR program, where they weren't able to have…I guess someone that's going to be there for them if they do have to drop off their children at school or daycare or anything like that. I guess a lot of staff aren't feeling supported in the way they can actually use CTR because they have children.*

Several ETCs brought up the lack of education surrounding available commute alternatives. ETC 2 provided this thoughtful response:

ETC 2: *Education and awareness. Actually consistent education and awareness. So they [the employees] might have heard about something but something that's consistent and tailored towards them. It's one thing for general information, but if it's not speaking to the person—they've got too many things on their plate, on their to-do list—I think that's a barrier if it's not consistent, tailored education and awareness.*

Awareness ties into our culture of busy lives (as does road rage and choosing to drive alone instead of biking or riding the bus). When so many employees are already juggling so many

responsibilities, it can be difficult to find the time and attention needed to devote to an alternative commute. Much like the recently discussed burden of the ETC role itself being added on an individual employee's work plate, alternate commutes can be a burden on all employees. This is especially true if the employees do not have the necessary information to make things a little easier and straightforward. Though ETC 3 still describes a challenge even when employees have all the information in their answer:

> ***ETC 3:*** *We have boards. We have information. They get emails. But I think people get so busy on things. I just wish that they had more of an opportunity to slow down long enough to really think about being able to do this.*

Once more, our culture is present as a clear and obvious impediment. ETC 8 agreed, sharing a similar belief:

> ***ETC 8:*** *I think it's the culture and individualism, really. I think it's like people wanting control of things. I think that's the biggest thing because people are always in a hurry. I think it has very little to do with like what's out there.*

Both ETC 3 and ETC 8 spoke to the busy and frenetic culture so often associated with life in the United States and increasingly around the world. Increasingly, technology and globalization drive companies and their employees more productivity, more efficiency, and speed. Finally, bring some of the themes of culture, time, bus access, and convenience ETC 6 spoke to the stark difference in the amount of time between taking the bus and driving a car.

> ***ETC 6:*** *For me, it's the convenience. Like I said I would ride the bus to work, I have no issue doing that. But if my normal commute takes me—it's only 18 minutes in the morning and maybe about 20 minutes in the afternoon—if that stretches out to an hour and forty-five minutes? I'm not gonna ride the bus.*

Commuting: Getting to work on time & the afternoon rush

I asked ETCs to describe their typical morning and typical afternoon. The goal was to identify the adjectives, feelings, and emotions associated with a typical commute. Additionally, I structured the questions in a very open manner, allowing the ETCs to reveal various constraints or aspects of their mornings and afternoons that they might not typically associate with their work life.

Early mornings

Several ETCs detailed having to get up very early in morning, but the reasons why varied. ETC 2 spoke about having to get children ready for school and out the door. ETC 3 had a lengthy commute and takes part in a compressed work week, which means an earlier start time.

> ***ETC 3:*** *I get up get up at 4:45 a.m. Get myself ready to have a quick breakfast, head out the door, and then I drive to work to be here by 7:00 a.m. Because I work from 7:00 a.m. to 5:00 p.m. And then I have every other Friday off.*

They are not the only early riser. ETC 2 also woke up early:

> ***ETC 2:*** *So, I've got a morning routine where I wake up 4:45 a.m. 'cause my shift starts at 6:00 a.m., and I'm only 5 minutes away. So you get up, you get ready, you shower, you do all that stuff. Go downstairs, have breakfast. At that time is when my daughter moseys on down 'cause like I said we carpool in here, and then she rides the transit out.*
>
> ***Me:*** *How old is your daughter if I may?*
>
> ***ETC 2:*** *She's 16 and a half. Almost seven months or so. So she could be driving on her own if she wanted to.*
>
> ***Me:*** *Wow. I'm sorry. Man, what kid wants to get up at 4:45 in the morning?*
>
> ***ETC 2:*** *She's just a different kind of kid. I mean she is full-time running start at SPSCC...*

After gushing about their kid for a bit, ETC 3 continued:

> *Our plan is to leave the house by 5:40 a.m. That puts us here at 5:45 a.m. Get in the car, we come down Old Highway 99. There's a stoplight that we turn left at, and then we're here. That early in the morning there's hardly anybody on the road to begin with. We get here at 5:45 a.m., and we start our day. She has to hang out till about 6:30 a.m. You know she's usually either doing homework or looking at TikTok videos or whatever she has to do in the morning. And then she just walks right out here and catches the bus.*

ETC 8 got up early in order to hit the gym before work:

> *So I go to the gym from 5:30 a.m. to 6:30 a.m., and at 7:00 a.m., I leave the gym and go there [to the office], so that when I'm here [at the office] at 7:30 a.m., I have not been on the freeway at all.*

Four of the other five ETCs woke up between 5:45 a.m. and 6:30 a.m., and all of them are out the door between 7:15 a.m. and 7:45 a.m. When asked for some adjectives to describe their mornings, the ETCs had a variety of responses. ETC 2 relayed that their morning routine and commute was "quiet" and "almost boring" while also noting that there just weren't many cars on the road. Likewise, ETC 8 responded saying "It's calm" and "really calm" when they don't take the freeway. ETC 1 described their morning as typically being, "Relaxing." Additionally they stated:

> ***ETC 1:*** *I would call it routine 'cause it is a routine. Kind of depending on what I have on my plate for the day, it could be you know amping myself up. The commute in general is pretty you know not [stressed]…I'm normally listening to music or podcasts so it feels personal, the commute.*

All ETCs knew exactly what time they needed to be out the door in order to arrive at work on time. ETC 3 demonstrated this meticulousness in their response saying, “I try to leave my house by 6:10 a.m., 6:15 a.m. at the latest.” I also thought it was interesting that ETC 6 had calculated the length of their commute very precisely noting, “On an average day, 18 minutes,” when asked how long it takes to get to work. ETC 5 described their morning as, “Busy.” Meanwhile ETC 4, who biked to work framed their commute positively saying, “I get a little exercise outside. And it wakes me up on the way to work so I like it, for the most part, and my commute is not stressful.” Overall, despite slight differences in what times individuals got up, and a variety of morning routines, the morning commutes for the majority of ETCs tended to be either laid-back or stress free, with the exception of ETCs 3 and 5. Afternoon commutes, however, were a different story.

Afternoon Madness

ETC 2 expressed wildly different experiences between their morning and afternoon commutes. They described their morning as “quiet” “almost boring,” as a 5-minute commute starting at 5:45 a.m. should be. However, when I asked ETC 2 about the afternoon, a very different picture emerged:

> *That's kind of a different story, too. In the afternoon...I’m usually out of here at 3:30 p.m. and you can see…You know in the morning I feel like you don’t see hardly anybody. But because of everybody's different scheduled shifts, you start seeing traffic from about 3:00 p.m. all the way through 6:00 p.m. So even when I'm headed home—if I'm headed straight home. Kids are in sports so I don't necessarily head straight home. I'm usually going to a basketball game or dance competition or whatever is going on for the day. But if I was going straight home, Highway 99 is just a line of traffic starting at 3:00 o'clock.*

Commenting on the line of traffic on Highway 99, ETC 2 said there was “definitely frustration.” They explained further:

> *Every day I think when is the city of Tumwater gonna widen this road and make it two lanes. I just don't understand. You've got big semi-trucks that are trying to turn in off the airport road there. And I just have to sit there and wait. And everybody behind has to sit and wait because there's no turn lane in the middle.*

When I specifically asked for a couple of adjectives to describe the afternoon commute ETC 2 reiterated the trouble and strain of the afternoon traffic saying, “I mean it's just frustrating. You know depending on how the day went, you’re kind of maybe in a bad mood.” Also, its worth noting how most of the time ETC 2 did not head straight home but rather moved on to other activities—be it a basketball game or a dance competition. This directly related to the need for flexibility described elsewhere in this thesis. They would go on to explain further:

> ***ETC 2:*** *A lot of times in the afternoon we are rushed. We are that family where the kids do have two to three different type of sporting activities.” Whether it is a basketball…like last night for instance, I went from here straight over to Bush middle school, which is just down the road here. Watched my son play basketball and then jumped in the vehicle and drove him to his personal trainer workout. You know and that’s an average day for us. That they have one or two and sometimes even three events that we gotta go to. And then my daughter had practice in the middle of all that too, so it’s just crazy.*

ETC 2 finally summarized by saying, “It’s organized chaos.” ETC 3 also expressed a difference between the morning and the afternoon. Asked about what the traffic is like coming up to Tumwater from Napavine, they said, “Not as much as if I were coming Southbound from like

Seattle or Tacoma…but it's usually fairly steady." But then asked about the afternoon, ETC 3 asserted:

> ***ETC 3:*** *When I'm coming in at 6:30 in the morning, there's not as many people. A lot more people are getting off at 5 o'clock at the same time I am—that work 8 to 5. So there's a more common thread of people leaving to go back Southbound.*

Asked specifically about their commute, and I again found out that the afternoon was frequently not a straight shot home. ETC 3 sharing:

> *I usually run errands after work. Anywhere from grocery shopping to…you know I have six grandkids. So I could be stopping to take care or stopping to see them or doing something of that nature. Or it could just be a doctor's appointments. It could be a variety of things, but I do a lot of that before I get home.*

Stopping to run errands or go to a doctor's appointment again highlights why many workers have a perceived need for flexibility. Before making it to errands and appointments, however, it could be a real struggle to simply get out of the parking lot. ETC 5 communicated this about their afternoon experience:

> ***ETC 5:*** *Afternoon, it definitely takes a little bit especially getting out of the parking lot because a lot of people leave at the same time… Sometimes it takes about 5-10 minutes to just get on to the main road…It's a little hectic getting out of work. But I mean it's okay I guess. Just a normal day. Yeah…I've pretty much come to expect that there's going to be traffic coming out of the parking lot.*

ETC 6 shared a similar experience saying, "The traffic's a little bit more faster moving in the afternoon which is fine except leaving the parking garage…there's just…a bit of a bottleneck

leaving the parking garage." When asked about the bottleneck, they replied, "It's just a fact of life. You just have to accept that everybody is getting off at the same time. So…that's life." ETC 8 shared this story about leaving work in the afternoon:

> ***ETC 8:*** *[If] I leave at 4:30 p.m., it's crazy. If I leave at 5:00 p.m., it's even worse. There's just a lot of people. It's actually really hard to get out of complex on the Capital Blvd because there's so many cars.*
>
> ***Me:*** *Just making a right?*
>
> ***ETC 8****: Yes… crossing Capital Blvd to get over is really hard, and people do not want to let you in which is super annoying to me.*
>
> ***Me:*** *So 4:30 p.m. is crazy.*
>
> ***ETC 8:*** *4 o'clock is fine. Three minutes to four is even better. So you know like we've got it down to a science.*

"We've got it down to a science." Unquestionably, the afternoon commute has a very different dynamic than the morning. ETC 8 even asked their boss for a flexible schedule due to the heavy afternoon traffic.

> ***ETC 8:*** *I said, "Can I work 7:30 a.m. to 4:00 p.m.?" Because I think it takes me twice as long to get home pretty much.*
>
> ***Me:*** *What's five o'clock [like]?*
>
> ***ETC 8:*** *Five o'clock is crazy pants.*

Some, like ETC 1 and ETC 8, made the conscious decision to avoid the highway all together. If for some reason they needed to get on the highway, it wasnot a pleasant experience. ETC 8 described what life on I-5 near Olympia can be like sometimes:

ETC 8: *I have had many of examples of people trying to get off at Exit 107 that are just driving like maniacs. I had one guy that like cut me off 'cause he didn't get over when he was supposed to.*

Me: *Been honked at a few times?*

ETC 8: *Oh yeah. And actually there's been a couple of accidents and one that I almost got in myself all around [Exit] 107 because people were driving really fast and then had to put on their brakes.*

Car accidents do indeed spike during the afternoon rush hour, and several studies indicate that congestion not only increases driver stress but also aggressive driving (Hennessy & Wiesenthal, 1999; Johnson & McKnight, 2009). Accidents and aggressive drivers can be traumatic. Though for some people, traffic congestion is off-putting in and of itself, as ETC 1 recounts, “But if I do and when I do once a week, I’m sitting for long enough than I would like to.” ETC 2 adding, “I mean you get pissed. You honestly do get pissed from sitting there.”

Whether it is a long list of errands, a jam-packed schedule of afterschool sporting events, or a desire to spend some extra quality time with family, the afternoon commute can be hectic, stressful, and downright unpleasant for many people. ETC 1 summarized the change from morning to afternoon succinctly saying, “There's a little bit more of a higher stress that happens, and people trying to get where they need to go.”

A crunch for time

The hectic nature of the afternoon commute is due, in part, to increasingly busy lifestyles of many individuals here in the United States and a perceived lack of time. Also, a key bridge connecting the desire for flexibility with family responsibility, available free time is both a limiting factor and highly sought after. Time as a theme underlies and interacts with almost every

other theme. Many of the quotations above divulged clear references to time. In this section, I revisit several ETC responses from earlier in this chapter through the lens of time and highlight other instances uncovered across many different interview questions. Interview after interview details time really is of the essence.

Let's begin by revisiting the time difference between driving and riding the bus. Earlier when discussing main barriers to CTR, ETC 7 spoke about the lackluster bus system in Thurston County. They said, "You know I won't say horrible. But I can jog home faster than I can take the bus." The length of time between taking the bus and other commuting options is certainly an issue. Recall ETC 6 speaking about the convenience of driving, "It's only 18 minutes in the morning and maybe about 20 minutes in the afternoon—if that stretches out to an hour and forty-five minutes? I'm not gonna ride the bus." In this instance, it's hard case to make for riding the bus with over an hour difference in commuting, which would be more than two hours difference each day. ETC 2 illuminates why many workers opt for a shorter commute duration claiming, "Everybody has a reason to be home in a timely manner whether you have pets, kids, or family."

Everyone has a reason to be home. It is a powerful incentive and sentiment—perhaps even more important than money from a fringe benefit or a desire to conserve resources to aid the environment. ETC 8 also spoke to this desire, saying, "It's more important for me to be with my son than it is for me to be on the freeway." Then adding, "Which is why I choose to live where I live and to commute how I commute. Versus taking the bus, which I could do, but it would take me an hour and a half."

When asked what other employees have shared about CTR programs, ETC 7 told me, "It's not convenient," and "It takes too much time." ETC 6 would likely agree. Remember, when asked about the main barriers to CTR, they replied, "For me, it's the convenience."

Convenience, flexibility, and control all factor into the time crunch many workers feel in their day-to-day lives. Elaborating on the culture of individualism here in the United States, ETC 8 shared this:

> ***ETC 8:*** *I can't see people anytime soon going, "Yes I'd love to give up complete control of my commute so that I can you know get off the road." People would much rather get off at 3:30 p.m. Come in at 6:00 a.m. and get off at 3:30 p.m. than get off the road all together. You know what I mean? So I think people don't want to give up control. I think it's the culture.*

ETC 8 felt the culture of individualism and control was a main barrier to CTR program success. Part of their response to the question about barriers included "people are always in a hurry." And, as mentioned throughout this chapter, family life is a huge contributing factor. If you recall, ETC 2 really highlighted the link between time and family responsibilities when they said, "A lot of times in the afternoon we are rushed. We are that family where the kids do have two to three different type of sporting activities."

In these instances where families are rushed or hurrying from one errand to the next or just wanting to spend more time with their children, alternative transportation such as taking the bus, biking, or being in a vanpool is very impractical and just not desirable. One of the latter questions I asked all ETCs was '*Why CTR programs don't gain more traction?'*—a similar yet a slightly different wording compared to '*What are the main barriers?'* ETC 7 said:

> ***ETC 7:*** *Again, it all comes down to it's not as convenient to do those other options. There's a lot involved with being a bike rider. There's a lot involved with being a vanpooler. Yeah, it's just convenience. And it becomes more convenient when there's traffic and it takes you longer to get home.*

I asked ETC 7 if they would be more specific and explain what they meant by convenience. They replied, “Time. And if they have other things to do during the day.” ETC 7 adding, “No, it is time. That’s what it is. And I was in a vanpool and when people were five minutes late, it annoyed you.” ETC 7 detailed how one person in their vanpool was always five minutes late and “she was always sorry.” However, to ETC 7 “even five minutes was annoying.” Finally, they said, “You know when you wanna get home, you wanna get home.”

Summarizing the immense challenge of being an ETC with limited resources and available time while attempting to combat the hectic work-life, fast-paced culture most US citizens live by, ETC 7 said to me at one point during our interview:

“You know, there are people that…they will die with a steering wheel in their hands.”

More Cars, More Emissions: The climate change connection

As has been discussed at length, the convenience and timesaving capacity of cars comes with a cost. Specifically, it comes at a cost to the environment in the form of greenhouse gas emissions and air pollution. I asked all of the ETCs about this relationship, first asking if they believed in anthropogenic (human induced) climate change. All eight ETCs responded saying “yes.” I also asked the ETCs:

“How important is climate change to you? On a scale from 1 to 5 with (1) being ‘not at all’, (2) slightly , (3) moderately, (4) very, and (5) extremely.”

As well as:

“How much personal responsibility do you feel for limiting your emissions? On a scale from 1 to 5 with (1) being ‘none at all’, (2) slightly , (3) moderately, (4) very, and (5) extremely.”

Table 11.

Interviewed ETCs Views on Climate Change

	Believe in Climate Change (Y/N)	How important? (1 to 5)	How much personal responsibility? (1 to 5)
ETC 1	Y	5	5
ETC 2	Y	4.5	4
ETC 3	Y	5	4
ETC 4	Y	4	4
ETC 5	Y	4	3
ETC 6	Y	3	1
ETC 7	Y	5	5
ETC 8	Y	5	5

Note. Every ETC interviewed believed in climate change, and all but one stated climate change was either *very important* (4) or *extremely important* (5) to them; with four out of eight (50%) rating climate change as being *extremely important*. Most of the ETCs also expressed a good degree of personal responsibility to limiting emissions with only ETC 5 and ETC 6 not responding with a 4 or 5 on a scale from 1 to 5.

As you can see from the table above seven out of eight responded that climate change is either very or extremely important to them. ETC 2 adding, “Yeah, I mean it’s my job, so I do believe in it.” ETC 5 shared this analogy with their answer: “Very important, just because it's beneficial for our Earth to take care of it. It’s like taking care of your dogs or like taking care of your pets.” ETC 8 said, “Oh absolutely. I’m not a denier that’s for sure.” Meanwhile ETC 7 affirmed their point several times over saying emphatically, “YES, yes yes yes yes yes.”

The remaining ETC, ETC 6, responded that climate change was of moderate importance. Similarly, when asked about the personal responsibility the majority of ETCs described feeling either very responsible or extremely responsible. Only two out of the eight responded otherwise, ETC 6 again being one of them stating that they do not feel responsible at all. More on ETC 6’s response in a moment. ETC 5 was the only other ETC not rating their level of responsibility as a 4 (*very responsible*) or a 5 (*extremely responsible*), responding with a 3 (*moderately*

responsible). Additionally, when asked to clarify their answer, ETC 5 suggested their answer was more due to not following through regularly rather than not feeling responsible.

Back to ETC 6. Overall, during the course of the interview, ETC 6 was very pragmatic and provided concise, straightforward answers to the majority of questions. Therefore, the following exchange did not come as a surprise:

> ***Me:*** *How much responsibility do you feel personally to limiting your emissions?*
>
> ***ETC 6:*** *Zero*

Asked if they would explain:

> ***ETC 6:*** *Yeah you know on a personal level I don't feel responsible for it. Just because when we have bigger corporations that are polluting 10x more than the average driver could ever produce in a lifetime. I don't I feel it is incumbent on drivers per say to reduce our emissions when we're doing nothing about the coal industry or big oil industries that are far more polluting our environment than drivers are.*

Of all the ETCs I interviewed, it's worth nothing, ECT 6 provided the lowest rating when asked to rate the effectiveness of CTR on a five-point scale (with 1 being *not effective* and 5 being *extremely effective*). ETC 6 answered:

> *I'm gonna say slightly effective (2) because like I said it does have benefits. If you look at the city of Los Angeles back in the '80s, it was a mess. And they kind of cleaned up their air quality, so it works there on a local level. But like I said I'm not a big fan. I'm kind of skeptical because on a global scale it doesn't make a difference.*

Several other ETCs felt CTR was *moderately effective* (3). ETC 8 clarifying, "I think there would need to be a lot more incentives, and they need to be publicized a lot better, and they need more attention paid to them."

Finally, a few ETCs had thoughtful albeit more positive opinions regarding the connection between greenhouse gases, air pollution, climate change, and CTR:

> ***ETC 1:*** *I mean we all breathe the same air so it effects me because of the amount of cars that are on the road. That's how I view it. The less cars on the road, the cleaner our air is going to be.*

At the same time, one ETC believed that the CTR program and the role of an ETC all boils down to climate change:

> ***ETC 7:*** *"For me it's all about climate change and trying to do what you can for the environment."*

April 21, 2020

How do you measure a day in a life? Is a day defined by the number of hours worked? By the amount of money made? The number of meetings one has? Or the number of words put to paper a computer screen? What about the number of blessings?

Chapter 6. Discussion

Without question, the attitude and culture surrounding commute trip reduction (CTR) have changed dramatically from the outset of this thesis to its completion. The COVID-19 pandemic changed everything. The 21st century workplace will never be the same. However, before addressing the aftermath of the COVID-19 pandemic, its effect on this thesis, and the applications within the workplace, let's first examine some of the most significant results as they pertain to my original research questions and methodology.

My research uncovered a host of information pertaining to the attitude towards and culture of CTR in the workplace. Notably:

- The statewide drive alone rate (SOV) continued to decline among worksites with CTR programs, reaching a record low of 57.2% of work trips in 2017-2018.
- Before the pandemic, bus transit and carpooling were the most utilized alternative commutes across Washington State, and accounted for 15% and 8%, respectively, of all affected CTR commutes in 2017-2018.
- Short answer survey responses and interviews revealed the main barriers to using an alterative commute relate to themes of culture, time, family and personal obligations, a desire for commute flexibility, and bus accessibility.
- Culture appeared as a barrier to CTR in several ways. Noteworthy ideas mentioned by Employee Transportation Coordinators (ETCs) include:
    - *"People want to drive their own cars"*
    - *"Busy life schedules"*
    - *"Commitments, time, inconvenience"*

    - *"People wanting control of things. I think that's the biggest thing because people are always in a hurry."*
- Interviews identified the flexibility of CTR program implementation as an additional barrier. Too much flexibility creates a lack of consistency, which can be both confusing and frustrating for ETCs and employees.
- Interviews highlighted that afternoon commutes tend to be far more stressful and chaotic than morning commutes.
- Program awareness and financial incentives lead to better program outcomes (i.e. increased participation) and reduce SOV work trips, findings that echo the research of Lagerberg (1997) and Lovrich et al. (1999).
- A moderately positive correlation ($r = .25$) between the number of years as an ETC and use of an alternative commute suggests knowledge and exposure may lead to a change in behavior.

A Convergent Design

Circling back to the one of the underlying components of this thesis, the convergent mixed methods design, I now compare and contrast the quantitative and qualitative results. One noticeable discrepancy pertains to a principal theme of this thesis: the work culture within the United States. Fast-paced and competitive work dynamics place a large emphasis on a 'do-it-all mindset', where productivity and transportation (whenever and wherever) are essential. Both the qualitative and quantitative data demonstrated aspects of this philosophy, though each did so in a different manner.

The quantitative data revealed that CTR programs lead to a decrease in the employee drive alone rate over time, indicating the mere presence of CTR-like programs possibly

influences and changes employee behavior as it pertains to commute choices. Nevertheless, recall how early CTR reports detailed CTR goals, such as a 35% reduction in the SOV rate, were not being met initially. Lovrich et al. (1999) found that after almost five years the SOV rate had achieved a 7% reduction. The data acquired from the Washington State Department of Transportation (WSDOT) for this thesis goes back to 2007-2008, with an SOV rate of 65.6% at that time. It's unclear how much progress was made between 1999 and 2007. Lovrich et al. (1999) reported the progress made but not the actual SOV rate and I was unable to track down the statewide SOV baseline. Nonetheless, the data from WSDOT showed a modest reduction of 8.4% in the drive alone rate over a decade. Both Lovrich et al. (1999) and the WSDOT data highlight an important point: arbitrary and lofty goals created with an expectation of immediate results stem from a culture focused on productivity.

In a culture heavily focused on results and productivity, we often define success in terms of achieving immediate results. In the case of CTR, early goals were not met. Progress was slow, but that does not mean there was not progress. The SOV rate declined from 65.6% of all trips in 2007/2008 to 57.2% of trips in 2017/2018. Vehicle miles traveled fell from 10.9 miles per trip to 9.5 miles over the same time period, resulting in the daily GHG per employee to decrease by three pounds (from 21.53 to 18.45).

At the same time, the qualitative data helps to explain why the CTR goals experienced only modest success initially. For example, employee desire for freedom and flexibility directly connects to the gradual, sluggish progress of the CTR programs. As explained earlier, many people want to drive their own cars, to come and go as they please. ETCs also discussed having incredibly busy lives with appointments and errands after work. With so many responsibilities, and time being a limiting factor (or even the perception of time as a limiting factor), many ETCs

and employees opt for a time-saving car ride in lieu of biking, walking, or riding the bus. As such our cultural focus on productivity and checking off to-do lists create heavy reliance on transportation, and a reluctance to use commute alternatives.

Curiously, CTR programs might benefit from a little more unproductivity. Or at least an organizational culture that doesn't obsess over times sheets and is accepting of occasional tardiness. What if commute choices and the time spent getting to and from work actually counted towards our week's work? Some companies and state agencies allow vanpool commuters to count their trip if they work during the ride; but maybe commutes should count even if someone is not answering emails or chooses to listen to a podcast. Carpools and vanpools also allow employees the opportunity to bond over conversation, which can lead to team building while fostering creativity and innovation. Counting commutes as part of the workday creates an incentive that might be more appealing than gas reimbursement, as many individuals from my survey and interviews cited time as a limiting factor. So why not give people their time back?

Furthermore, many of my conversations with Employee Transportation Coordinators centered around the problems, challenges, and barriers of achieving CTR program success. Obviously, part of this can be attributed to the focus of my research, and yet part was due to the ETCs I interviewed, who came ready to air grievances as well as discuss shortcomings of the CTR law (and subsequent program implementation).

Thus, the short answer survey questions and interviews confirmed the results of the quantitative data as well as leaving little doubt that CTR and Transportation Demand Management (TDM) still face many hurdles.

Flexibility: Complicated yet Essential

One of the most frequently cited obstacles to successful CTR implementation was flexibility. Incredibly, my research uncovered the importance of flexibility in two separate, distinct ways. First, as recently noted above, many employees desire flexibility in their workdays. Typically, this gets expressed in the form of flexible working hours. Many workers want the freedom to show up to work earlier or later to begin their workday. Likewise, leaving early for a doctor's appointment or staying late to finish up a project is equally valued. Oftentimes, such schedule flexibility will then require an employee to drive alone. For example, I spoke to ETC 3 who commutes from Chehalis up to Tumwater and leaves the house as early as 6 a.m. They work 9 or 10-hour days to compress their work week in order to have every other Friday off. Although there is a direct bus line from Centralia to Tumwater, there is not a direct line from Chehalis and would require the ETC to transfer. The other problem lies in the frequency and consistently of buses. Twin Transit, which operates the route, only has one bus departing every 90 minutes. If an employee finishes their work at 2:30 p.m. and the next bus doesn't leave until 4 p.m., would they still be inclined to use the alternate commute at the expense of 90 minutes of their time? Would you? Almost every ETC I spoke to suggested lengthy bus rides and transfers were deterrents to using an alternative commute. Recall how ETC 7 observed transit in Thurston County left much to be desired.

ETC 3 also explained how they frequently run errands, go shopping, and dote on their grandchildren after work, further complicating the situation and ultimately dissuading them from anything but driving alone. Our increasingly busy, over-scheduled 21st century lives coupled with cultural beliefs such as YOLO (You Only Live Once) and "Keeping up with the Jones's" (or more aptly the Kardashians in this day and age) only serve to reinforce the desire for

flexibility in our lives. And at this moment in time, it almost certainly means flexibility in our transportation choices, which, in turn, means owning a car and driving from here to there and everywhere.

Every ETC I interviewed expressed how valuable freedom and flexibility were with respect to transportation. These results completely fall in line with Lovrich et al. (1999) who found convenience and flexibility to be the single best predictor of an individual driving alone. The only two ETCs I interviewed who utilized an alternative commute with regularity displayed above average concern for the environment, including one individual who had been an ETC for over fifteen years.

The second critical aspect regarding flexibility pertains to the flexibility allotted to each individual worksite affected by the CTR Law (RCW 70A.15.4000 – RCW 70A.15.4110). The legislation required affected worksites to have a program and have an ETC but beyond that, worksites were intentionally given a lot of autonomy in designing their programs ("Highway Access Control and Transportation Demand Management"). The underlying idea for this approach was that what works for one organization or worksite might not work well at another. While likely true overall, I identified the lack of consistency across CTR worksites as an extremely problematic barrier to CTR success. All of my data indicated this to be a problem. The quantitative data from Thurston Regional Planning Commission (TRPC) demonstrated the gross inconsistency of financial incentives and reimbursement across worksites. For instance, workers at four offices can receive up to $255 per month to offset the cost of their vanpool whereas employees at ten other government offices receive reimbursements of only $100/month. Meanwhile, employees at 78 out of 146 worksites in Thurston County do not receive financial incentives for vanpool or one isn't even offered at all. So while discrepancies between worksites

vary significantly in terms of financial compensation, many more worksites don't even have a specific program or incentive at all—a theme that played out for every alternative commute type (vanpool, bus, carpool, etc.)

On top of that, the data from TRPC suggests that organizations offering financial incentives by and large have employees taking advantage and receiving them. As highlighted in the Results section, the majority of worksites with CTR programs in Thurston County did not provide monetary incentives for alternative commutes. Vanpool was the only one offered at more than 50% of worksites (59%). Out of 146 worksites in Thurston County, only 53 worksites have a bus incentive, 86 have vanpool, 59 have carpool, 56 have walking, and 58 have a biking incentive. What I failed to mention earlier, however, is how often employees utilize alternative commute incentives at worksites where they are present. Using vanpool as an example, of the 86 worksites offering an incentive, 68 or 79% of the worksites have employees that receive a reimbursement each month. A good question to ask is, "Which came first?" Did these worksites offer vanpool incentives because employees were already using vanpools and requested it? Or did a number of employees start using vanpool after incentives became available? These are questions for future research.

Nevertheless, it does appear that employees take advantage of incentives when offered for vanpool—and for other alternate commute trip types too. The percentage of employees receiving financial incentives for carpooling, walking, bicycling, and riding the bus, while not as high as the percentage of employees utilizing vanpool, still indicate strong usage. Out of all the worksites offering carpooling incentives, 66% have employees receiving reimbursement. Bus and bike incentive rates are slightly lower with 53% of worksites reporting that employees are receiving monthly reimbursement. Finally, the walking incentive usage rate is quite lower than

other types with only 46% of worksites reporting employee utilization. The fact it costs a lot of money to be in a vanpool likely contributes to the employees taking advantage of reimbursements. Vanpool offers the highest monthly reimbursement at up to $255/month. Vanpool reimbursement also average out the highest payments at $82.8/month. In contrast walking pays the smallest monthly average of $44.5/month which is just slightly lower than biking at $45.2. All of this illustrates the large discrepancy between alternative CTR types, and as such it makes a lot of sense as to why more employees would seek vanpool reimbursement in comparison to any other type of CTR.

Taking vanpooling out of the equation, the numbers still suggest when CTR reimbursement is offered, employees will take advantage and use an alternative commute. This is a critical point and must not be overlooked. Furthermore, it also underscores the problem with so much flexibility in CTR program administration. Some flexibility within the CTR program is fine, but more consistency across worksites would enable and encourage more employees to use an alternate commute. It might be unrealistic for each worksite or organization to provide the funding necessary for this to happen, which is likely also part of the problem. Therefore, a statewide reimbursement pool of funding might be a better approach. If participation across worksites remains flexible, that's okay. It is far more important to provide all available CTR options and reimbursements to every employee. CTR is not going to be successful when some worksites have raffles for small prizes or a $5-10 gift card each month as an incentive and others guarantee $50 every month. A chance of winning a $5 gift card provides a very different type of motivation than does guaranteeing someone $50 or even $100 on a regular basis.

Interviews with ETCs further hammer home this point, continuing the indictment of flexibility. ETC 4 explained the frustration of finding out other people in their vanpool received

far greater compensation, and how off-putting the realization was. ETC 2 spoke to the challenges some organizations have in finding funding for CTR incentives. ETC 4 confirmed this with a story of only managing to acquire funding for the aforementioned monthly raffle of a gift card. In addition to creating confusion for new ETCs or workers that switch agencies, by not setting any baseline minimum funding for these programs the state suggests CTR is not a priority. Dedicated funding for CTR programs sends a message to ETCs and employees. A message that CTR is important and that the state values employee participation, be it a financial or time commitment.

At this juncture in the CTR/TDM movement (and in line with reducing traffic congestion and greenhouse gas emissions), the flexibility allowed by the CTR Laws seems counterproductive. If the state of Washington wants to make more significant progress surrounding CTR, at the very least making sure incentives are available at all worksites has the potential to make a real difference. Keep in mind according to Lagerberg (1999), every dollar spent on CTR programs ends up saving employees four dollars. To maximize participation, highlighting the short-term and long-term benefits is also key. There is a cost to being an environmentalist—of both time and money. More consistent financial incentives to employees have the potential to persevere the long-term health of the air we breath while limiting greenhouse gas emissions.

Another Thought on Funding

Aside from inconsistent financial reimbursements, there is another clear barrier to CTR implementation within the financial realm. Currently, all Employee Transportation Coordinators (ETCs) are given their role assuming it represents just 5% of their duties, or approximately 2 hours per week (and based on my interviews and survey responses it's unlikely most ETCs

manage even that). One notable exception is at the Washington State Department of Transportation (WSDOT), which has one full-time employee designated to promoting CTR within the department and ETCs at all of its branch worksites. Another is the Department of Labor and Industries (L & I), which has an entire team devoted to transportation demand management (TDM). Not surprisingly, both WSDOT and L & I have robust CTR programs with many employee participants.

Instead of delegating the role of ETC to an employee with a lot of other job responsibilities, following WSDOT's lead and creating full-time ETC positions at all worksites could significantly improve CTR results. In my interviews, numerous ETCs spoke of the difficulty of finding the time to perform their CTR-related tasks in addition to their regular job duties. ETC 4 describes this challenge saying, "I think it's hard. It's hard 'cause people only have limited amount of time to spend on it." If ETC positions became full-time (or even part-time), it would allow the ETC to dedicate more time to helping each individual employee determine a commute that works for them (and hopefully works better for the environment too). ETCs would also have more time to collaborate with one another, making it even easier to coordinate riders and thus for more vanpools and carpools to exist. Full-time ETC positions would also likely solve additional problems such as ETC turnover and questions related to an ETC's interest or passion for the work around CTR. Several ETCs I interviewed spoke to the difference a dedicated ETC can make. ETC 4 added this: "You know so it's basically, it's whatever somebody is willing and able and motivated to do with the program." Plus, at many worksites, being a CTR is an obligation and a burden, as ETC 7 had shared:

> ***ETC 7:*** *And in Thurston County the problem is that the ETCs, there are many, many agencies that the ETC is just something they have to do. They don't give them any time or*

any resources. And it's 5% other duties as assigned, that's what they call it. There is no support."

Creating full time ETC positions eliminates these issues. For one, there would no longer be competing responsibilities for the ETC's time. All of their job responsibility would boil down to improving their worksites' CTR program, ensuring employees have the information and resources they need to achieve a better work/life balance, and allowing CTR programs to succeed in the ways the state legislature originally intended, thereby dramatically reducing greenhouse gas emissions and improving air quality in the state. Secondly, as full-time jobs tend to require passion and a desire for the role, unmotivated ETCs should become a thing of the past.

Third, recall from my ETC survey how manager support and manger involvement differed quite a lot. Manager support was there, with 25 out of 28 ETCs responded they felt either supported or very supported by their manager. However, manager involvement varied considerably. If ETCs' roles and responsibilities were the entirety of their jobs, it stands to reason that their managers would take a more active interest in their progress. Ultimately, it would also likely establish CTR as a core and foundational aspect of each organization and worksite that utilizes an ETC in a full-time part-time capacity.

"On the road again, Just can't wait to get on the road again" (Willie Nelson)

From Nat King Cole with "(Get Your Kicks on) Route 66" to the Beach Boys' "Little Deuce Coupe", cars zoomed into American pop culture in the 1950s and 60s. People moved from the declining urban centers to the suburbs, bought cars, ate hamburgers in those cars, and listened to songs about cars and the joys of and freedom associated with driving. "Americans are a race of independent people," claimed Roy Chapin, co-founder of the Hudson Motor Company and former President of the National Automobile Chamber of Commerce (Sparrow, 2019). In

fact, since its founding, independence and freedom have been two terms ubiquitously associated with the United State of America and its citizens. Unquestionably, however, freedom of choice and freedom of transportation bear much culpability as impediments to CTR success. The problem is that Chapin, along with many early automotive pioneers, led the country along a path which resulted in personal vehicles with extremely polluting combustion engines becoming inextricably linked to almost every facet of society.

The freedom associated with cars also brought about reliance on them and to an extent, necessitated having cars. Many jobs require a driver's license and access to a personal vehicle for someone even to be considered a qualified candidate. Other people need cars to get work where bus access is limited, and risk being fired if they miss the bus. Large discount stores and supermarkets are firmly rooted in the idea of people driving and loading their vehicles full of goods, something impossible for those relying on buses, bikes, or their own two feet. It begs the question if cars have truly set us free or simply allowed us to be slaves to the demands of society? Revisiting responses from ETCs may provide an answer. "Busy life schedules," said one ETC. "We are that family where the kids do have two to three different type of sporting activities," said another. "Everybody has a reason to be home in a timely manner whether you have pets, kids, or family," thought a third ETC.

The demands on "free time" in American culture can be intense. A majority of the ETCs interviewed and surveyed speak to the fact they are rushed, juggling much responsibility, and ultimately forced to make the choice between driving a car and saving time or using an alternate commute and possibly saving a little money. Most choose the former. Time is the one commodity a person can never get back. ETC 6 summarized one of the main obstacles to successful CTR implementation when they said of their commute, "It's only 18 minutes in the

morning and maybe about 20 minutes in the afternoon—if that stretches out to an hour and forty-five minutes? I'm not gonna ride the bus." Walking or biking create similar problems as time can be a limiting factor for both, with walking being further dependent on living in a location proximate to your work—an extra hurdle in so far as many jobs exist in locations with housing costs unaffordable for many. There is a reason so many people commute to Seattle but don't live in Seattle. Buses also mean having to look at and build your life around schedules. If you are off by just a little bit, which certainly happens from time to time, it can mean being an hour or more late for work.

Control and the flexibility to come and go is certainly another contributing factor. Whether it's to go to an appointment or run errands, driving allows employees more control over when and where they can go. And as mentioned earlier in this chapter, flexible hours also play a role in people opting to drive. Some ETCs also cited "habits" and people just being so accustomed to driving to work. For many the morning and afternoon commutes are synonymous with driving a car. And ultimately for some people, they just want to drive. Again, as one ETC put it, "There are people that will die with a steering wheel in their hands."

With driving such an ingrained aspect of day-to-day life, for CTR programs to truly thrive and experience high level engagement, a massive cultural shift is likely needed. Washington State has taken legislative action like few others across the county. Efforts to curb SOV and strengthen the perception of CTR appeared to gained momentum through the governor's executive order in 2016. And yet, there is still significant room for improvement. In Washington State and across the country, the transportation sector continues to be up one of the largest sources of GHG emissions. CTR programs have proved effective where and when implemented, but still only account for a fraction of all automotive trips. The future of not just

our air quality but really the entire planet as we know it depends on a radical shift in our approach and use of gasoline powered cars. Now, let's take a look at how the COVID-19 pandemic momentarily made that happen.

How COVID-19 ~~Changes~~ *Should Change* Everything

Recall in 2017/2018, Washington State employees with CTR programs telecommuted 4.2% of the time. Then, in March 2020, the World Health Organization declared a pandemic. In 2020, during coronavirus lockdowns and travel restrictions, the number of people telecommuting vastly increased. For the week beginning on March 29, 2020, and ending on April 4, 2020, more than 94 million U.S. citizens stayed at home compared to 64.6 million US citizens who stayed home during the same timeframe in 2019. That essentially equates to an increase in telecommuting of 46.1%. While some of the people staying at home had lost their jobs, many more were finally allowed (or rather forced) into working from the confines of their home. Stanford economist, Nicholas Bloom, confirmed that by June 2020, 42% of the U.S. workforce was working from home. Another 33% of the workforce was unemployed; leaving the remaining 25%—mostly essential workers—still leaving their house each morning to go to work (Wong, 2020).

Moreover, during the week ending on March 7, 2020, only 60.8 million US citizens were staying at home, which means in one month (from March to April, 2020) the number of people staying home rose by an incredible 55.3% (Bureau of Transportation Statistics, 2021). This sudden, rapid, and dramatic shift within the work culture and society at large had an extraordinary impact on the planet.

By early April 2020, scientists had already predicted that annual greenhouse gas (GHG) emissions would likely drop by the largest amount ever (Evans, 2020). Indeed, as predicted,

emissions dropped considerably in 2020 due to strict lockdown measures and limited travel. Le Quéré et al. (2020) estimated a decrease in global CO_2 emissions to be in the range of 4% on the low end and 7% on the high end, depending on the restrictions still in place at the end of 2020. Ultimately, according to Friedlingstein and colleagues (2020) CO_2 emissions from fossil fuels ended up decreasing by about 7% (a median estimate based on four individual studies).
A decrease in energy demand and a decline in energy-related CO_2 emissions contributed significantly to the overall drop in GHG emissions; however, more than half of the drop in CO_2 emissions was attributed to the transportation sector (IEA, 2021b).

According to the IEA, energy-related emissions decreased by 5.8%, the largest annual percentage decline since World War II. In absolute terms global CO_2 emissions fell by nearly two billion tons of CO_2, equivalent to the aggregate emissions of the European Union (IEA, 2021b). The decrease in the transportation sector emissions alone accounted for nearly 1.1 billion tons of CO_2, or the same as taking more than 400 million cars off the road.

Meanwhile, for decades, advocates of CTR programs and reducing the number of single-occupancy vehicles on roadways had been thwarted by a consistent lack of employer agreeableness in permitting employees to work from home. Unquestionably, recent advances in technology have made telework more feasible. Nonetheless, telework as a percentage of alternative commute options had remained noticeably minuscule or altogether absent for many years. In 2007/2008, telework constituted 2.8% of all employee commute trips at worksites with a CTR program in Washington State. By 2013/2014, telecommuting had increased to 3.3% percent. Finally, as mentioned above, most recently in 2017/2018 before the pandemic, work from home constituted 4.2% of alternative commutes at CTR worksites. That is a modest increase of 1.5% over a decade compared to an eightfold (from roughly 5% to 42%) increase

over a few months due to the forced circumstances surrounding a once-in-a-generation pandemic.

The transition to a work-from-home economy was swift. More importantly, for some employees and companies the successful transition to telework meant work-from-home was here to stay. Less than three full months into the pandemic here in the United States, Twitter somewhat famously announced in May of 2020 that it would allow its employees to continue working-from-home forever if they so choose (Kelly, 2020). Numerous companies followed suit, such as other notable tech companies like Amazon and Microsoft. The City of Olympia's Climate Change Coordinator relayed that telecommuting would be a permanent part of its workplace policy including an examination surrounding equity and access. Olympia also plans to help draft new policy for local businesses as well.

Despite some encouraging signs, worrying ones remain. The IEA's *Global Energy Review 2021* projects global energy-related CO_2 emissions will increase by 1.5 billion tonnes in 2021 (IEA, 2021c). After seeing a 5.8% drop in CO_2 emissions in 2020, emissions will jump back 5% in 2021. In essence, one of the few positive outcomes brought about by the COVID-19 pandemic—a sharp decline in emissions—will essentially be undone within one year. After the largest decrease in emissions in 2020, the world is on pace to have the 2nd largest increase in emissions in 2021.

According to the report the main driver is the demand for coal, which is set to rise by 4.5% in 2021 (IEA, 2021c). Largely this demand (about 70%) in is in emerging markets and developing economies turning to coal as a cheap source of energy within the power sector. It's hard to argue against the development of these countries particularly when the United States alone is responsible for close to 25% of global cumulative emissions, or more than 400 billion

tonnes of CO_2. The responsibility and burden lies squarely with the U.S., Europe, and China who collectively are responsible for more than 70% of cumulative emissions (Ritchie, 2020).

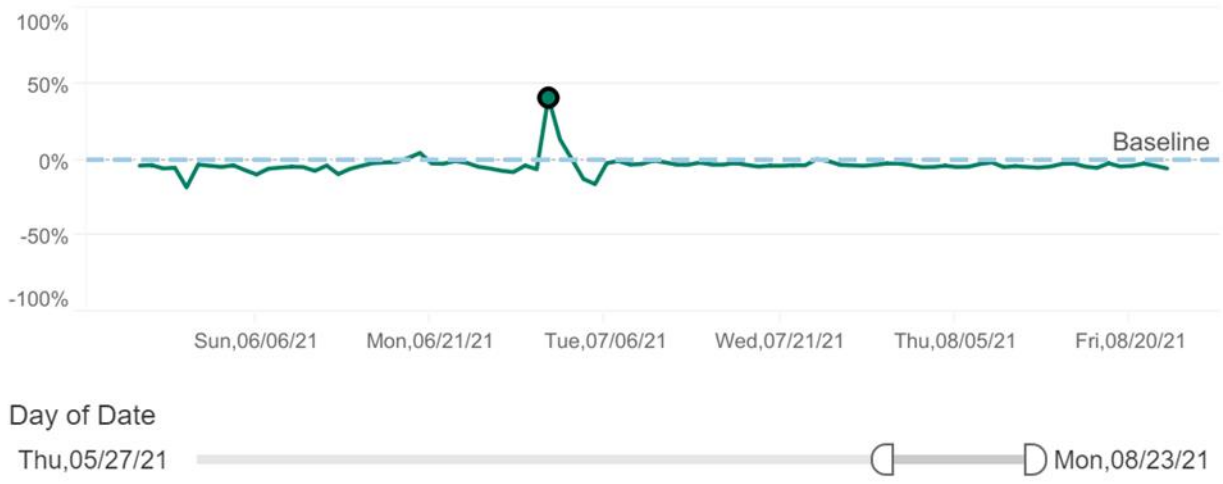
Going back to IEA report, I want to highlight the findings as they pertain to oil demand and this thesis:

> Despite an expected annual increase of 6.2% in 2021, global oil demand is set to remain around 3% below 2019 levels. Oil use for road transport is not projected to reach pre-Covid levels until the end of 2021. Oil use for aviation is projected to remain 20% below 2019 levels even in December 2021, with annual demand more than 30% lower than in 2019. A full return to pre-crisis oil demand levels would have pushed up CO_2 emissions a further 1.5%, putting them well above 2019 levels (IEA, 2021c, p. 2).

I mentioned in the Literature Review how the recovery of road transportation was one of the primary factors in GHG emissions rebounding during the second half of 2020. Now in 2021, the latest data from the IEA suggests oil demand overall is still below 2019 levels. If demand were to return to pre-pandemic levels, CO_2 emissions would rise even higher than already projected. To keep future planetary temperature increases below 1.5 ^oC (or even 2^oC), this cannot happen. And yet, many indicators point a return to normal. For example, over Memorial Day weekend, 2021, 7.1 million people passed through TSA security checkpoints, the most since March 2020 (that's also a 450% increase when compared to Memorial Day 2020's 1.3 million!) (McEvoy, 2021). In line with IEA report, air travel is still down about 23% compared to Memorial Day 2019, which saw 9.7 million people take to the skies (McEvoy, 2021). However, clearly many Americans are seeking a return to normal. In fact, AAA reported more than 37 million people traveled over 50 miles during the Memorial Day holiday weekend. That is still 6 million less than in 2019, but 14 million *more* than in 2020 (Edmonds, 2021).

Figure 25.

Highway Traffic in Washington State from May to August, 2021



Note. Traffic volume within the state of Washington returned to pre-pandemic levels in 2021. *The dramatic increase on Thursday, July 1, 2021, (the highlighted green dot above) was due to the July 4th holiday and the travel associated with that date. Source: WSDOT, 2021.

In Washington State, it's not just holiday travel that has returned to normal but day-to-day highway traffic as well. The months following Memorial Day 2021 show traffic was nearly identical to the 2019 baseline. Meanwhile, as car and airplane travel were well on their way to pre-COVID use, transit services such as ferries, buses, and trains remained lagging. It's fair to wonder if bus use will ever rebound without a serious push of incentives and a deeply rooted cultural shift.

With that said, as of August 2021, the COVID-19 pandemic remains far from over. As of August 23, 2021, only 51.8% of the U.S. population was fully vaccinated. In Washington State, that number was slightly higher with 59.5% of the population fully vaccinated and 66.7% having received one dose (Mayo Clinic, n.d.). Additionally, COVID-19 variants such as Delta and the

more recent Omicron indicate the threat of contracting COVID-19 remains very real and are likely one reason behind still stagnant use of public transportation (Kottasova, 2021).

With so many reasons given as to why people drive alone to work (and even more now due to COVID-19), working-from-home becomes essential to CTR and TDM. Telecommuting, long dismissed by managers and supervisors, has never been more critical and important to what employees want and what the environment requires. Furthermore, the infrastructure, experience, know-how, and employer reassurance pertaining to work-from-home have all improved dramatically. Granted, not all experiences with telework have been the same, and a whole host of other issues arise—such as access to a stable internet connection, child care issues, and equity—as many jobs are not possible to do remotely. However, many schools already have returned to in-person learning, meaning childcare will be less of an issue going forward. Ensuring all Americans have a stable, affordable internet access will expand access to online learning opportunities for adults and thus an opportunity to explore new types of jobs. Work time reduction is another policy solution that needs to be looked at as well.

So what does the modern work environment look like? Unquestionably, it does not look the same today in December of 2021 as it did 22 months ago in February 2020. What the future of work looks like is entirely up to us. I've presented a host of information on the attitude and culture surrounding commute trip reduction and its place in the workplace. Barriers remain. Nonetheless, creativity with respect to incentives, options, job opportunities, and information can enable greater participation in CTR programs.

Future research should revisit the attitudes, feelings, and opinions of people surrounding CTR in this post-pandemic world. I encourage all of us to continue asking and revisiting the

many questions I've laid out in this thesis. Namely, "What is it that is essential?", "What is it we value?", and "What does the modern work environment look like?"

Given the amount of data and results I've compiled, I have been unable to give attention to every finding. Nevertheless, during the time I have conducted my research and tried to find the meaning in my data, society demonstrated remarkable resilience and swift adaptability amidst extremely uncertain circumstances. Ultimately, the science is clear. Climate change and its impacts require nay demand our attention. CTR and telework in particular must unequivocally be front and center among the solutions.

Dancing Boy, Part 2

For the last several years so much of who I am, how I see myself, and how others see me has been tied to this thesis. It's been draining and exhausting at times. Telling friends, family, and new acquaintances the same thing over and over again. It's like playing the same song on repeat but for over year instead of a few hours. Recounting what it's about, why it's so important, and that I'm almost done. That last part, the almost done part uttered with evermore a grimace and pained expression as days turned into weeks, months, and…well…over a year.

Unless you've gone through the thesis/dissertation process, you may not understand. Then again, many who have or endured other long and trying tests of endurance and hard work still don't seem to get it. Some people have told me to "Just do it!" Others have encouraged me to focus on writing 100 words or one page per day. A few people have laughed. My parents have been supportive at times, and disappointed and frustrated at others. The worst voice, however, was my own. The voice in my head that told me how much I sucked. That I was a failure. A disappointment and a let down. That I was a good-for-nothing piece of sh*t, wasting both my talent and opportunity. The list goes on…

It's remarkable how easily we succumb to negative emotion and doubt. When in contrast we can be so reluctant to embrace compliments and praise.

Several years ago, I was proud to tell people that I was working toward getting my Master's degree. I'd excitedly tell anyone about the work I did at the Sustainability in Prisons Project—growing native prairie plants while working alongside incarcerated men and women to assist in habitat restoration. I didn't realize it at the time but I had fallen into the same trap I so often rebuke: I had defined myself by what I was doing. Over the last year or two, I've not had that luxury. I worked on food truck for over a year. That was kind of cool? It had its ups and downs. But now I'm unemployed. And I'm still working on getting that Master's. I don't like to talk about it. I'm even somewhat ashamed.

But here's the thing I've learned. That's okay. Sometimes I fail. Sometimes I am a disappointment. But my failures don't define me. I don't have a job, but my job doesn't define me. I am so much more than my thesis or any failed relationship. And so are you. You are more than the sum of your greatest accomplishments and your biggest regrets. You're a human being.

And by far the best thing we humans do is love.

When I think about my goals or my purpose in life? Yeah, I want to help solve climate change and I want people to drive less and to use less plastic. I'd like us to start sharing more and fighting less. I want to finish and be done with this thesis. But more than anything I want a life full of love. I want to be present for—and with—my friends, my family, and my neighbors. To love others. And be loved in return.

In Dancing Boy, Part 1, I wrote that love is relationship. That there's a push and pull to love. And love can be both self-less and selfish. Recently, I've realized that more than anything love is an interaction. An interaction between two souls.

While people think of yin and yang being the defining characteristics of Daoism, really that's not quite true. It's the interaction. There is no yin without yang. No light without darkness. The interplay between each is what defines them. A mother is not a mother without a child. We are all connected in this way: defined by our connection to each other. It is the very thing that ties us together that sets us apart.

So while we are human beings, cut from the same water, dust of the same stars, it is our relations that makes each of us special and unique. It is as a son, brother, friend, and neighbor that I become distinct from you, and you distinct from me. It is as a proud dog dad and a supportive and loving friend that I choose to be defined. Not by my shortcomings, not by my job, and not by this thesis.

That's not to say I'm not proud of what I have accomplished. Most definitely not. I have worked hard and I've kept going despite all the negative thoughts and all the times I wanted to give up. My persistence and determination defines me just as much as any of my failures, mistakes, or shortcomings. Taking two years to write a thesis? That's okay. It's part of who I am. But only part, and certainly not the most important part.

Unfortunately so many people, so many of us have been conditioned to think like what I've expressed in these pages. That we are only as good as what we have accomplished lately. You wrote a best-selling book? Okay great, when is the next one coming out? You just landed your dream job, but are you married? Do you have kids or do you own property? Because if not, you're just not really living up to expectations. Hmmm.

I'm not so sure. In fact, I disagree. Don't get me wrong family is great. Family is important. None of us would be here without family. But some families are broken. Others are dysfunctional. For some people their friends are their family. For others, its their pets; and

everyone is stranger until you get to know them. Your spouse is just a stranger until one day they aren't anymore.

The point being: kindness. Kindness is everything. Kindness is love in action. If there is one thing I hang my hat on, it's that I try my very best to be kind. It's really all we can do. I truly believe the world would be transformed with a just a little more kindness, and a little less greed. More compassion, and less resentment. A lot more love, and a lot less hate.

We all have tremendous value. It's taken me some time, but I know now my family wouldn't be the same without me. I've learned that my birth and existence may not have been planned; it may have been an accident, but it wasn't a mistake. I was never a mistake. My family would not be better off without me. In fact, if anything, I helped bring my family closer together. I'm an integral piece of my family. Just as you are an integral piece of society. No matter your job, whether or not you have kids, or a big, fancy house. And just as my family may not always be the most functional, we do our best. And my hope is you are doing your best too.

Oh! Let's still try and be a little kinder to each other, don't you think? Because even after all these years…I know without a shadow of doubt—every little act of kindness, every mitzvah, does indeed make the world a better place. And even though my worth and your worth doesn't necessarily depend on it, we'll both better for it. And the world?

Well, the world will go on shining some days…and be cloudy on others. Sometimes it will be a bit stormy. But life isn't waiting around for the storm to pass, it's about learning to dance in the rain. And perhaps learning to slow down, drive less, and maybe ride a bike?

Figure 26.

Me and My Father in 2019

Note. My dad deserves a lot of credit for instilling in me a passion for biking, an appreciation of the outdoors, and a love for the natural world.

Figure 27.

Me and My Mother in 2020

Note. Without question, I wouldn't be the person I am today without my mother. She taught me how to be kind and how to love the world as myself.

Chapter 7. Conclusion

In this thesis I sought to better understand the dynamics and landscape surrounding Commute Trip Reduction (CTR) and Transportation Demand Management (TDM). Washington State passed legislation to curb air pollution, heavy traffic, and greenhouse gas (GHG) emissions by reducing the number of single-occupancy vehicles (SOV) in 1991. This legislation, known as the CTR Law, led to programs designed to encourage and incentivize employees to switch to alternative commute options such riding the bus and carpooling. Yet, after almost three decades of CTR programs within Washington State and twenty years of survey data, it was apparent that while progress has been made, a number of barriers still exist. My goal in undertaking this research was to reveal the attitude and culture surrounding CTR in the workplace and unveil the main barriers preventing CTR programs from having a more substantial impact.

The question guiding my research:

How do workers perceive Commute Trip Reduction (CTR)?

Two secondary questions followed:

1. What makes a Commute Trip Reduction program successful?
2. What enables and/or prohibits the use of alternative forms of transportation?

The secondary questions provided a more direct focus and enabled objective analysis. To answer the questions, I utilized a multimethod research design. My multimethod approach stemmed from a convergent mixed methods design, which uses both qualitative and quantitative data. In addition to qualitative interviews, open-ended questions, and quantitative survey data, I incorporated autoethnographic narratives throughout. Each method provided immense value and a unique lens which allowed me to address my research questions wholistically. I discuss the highlights below.

Quantitative

This data derived from three sources: Washington State Department of Transportation (WSDOT) survey data, Thurston Regional Planning Council (TRPC) annual report data, and an in-person survey conducted on December 17th, 2019.

The data from WSDOT confirmed that CTR programs have been moderately effective at reducing the number of SOVs as a percentage of all work trips each day. From 2007/2008 to 2017/2018, the statewide drive-alone rate (SOV) declined from 65.6% to 57.2% of all trips at worksites with CTR programs. Likewise, the average vehicle miles traveled dropped from 10.9 miles in 2007/2008 to 9.5 miles in 2017/2018. Daily GHG emissions also dropped as a result, going from 21.53 pounds CO_2e to 18.45 pounds CO_2e over that same time period.

However, results across counties varied. Of the nine counties for which data is available, five saw their drive-alone rate *increase* over the decade from 2007/2008 to 2017/2018. Thurston County, which was of particular focus, saw its SOV rate go from 75.58% in 2007/2008 to 78.77% in 2017/2018. Only three counties—King, Kitsap, and Whatcom—have reached their target SOV rates.

Across the state, riding the bus accounted for the largest percentage of alternate commutes in 2017/2018 at nearly 15%. Riding the bus was followed by carpooling at 8%, walking at 4.3%, and telecommuting at 4.2%. King County and Kitsap County account for a lot of the overall bus share as the percent of bus trips within each county stands at 20.6% and 17.8%, respectively. In comparison, the bus share within Thurston County was only 2.3% of all trips in 2017/2018. Carpooling was the most common alternate commute in Thurston County, accounting for 7.8% of work trips in 2017/2018. This corresponded to the results from my own survey on December 17, 2021, whereby Employee Transportation Coordinators (ETCs) ranked

carpooling as the most popular form of CTR at their worksites. However, within Thurston County, even the carpooling rate had declined by 4.5% since 2007/2008.

Overall, the data from WSDOT indicates CTR program effectiveness in parts of the state, but widespread progress and changes in attitude and behavior appear to be lacking. Meanwhile, TRPC annual report data highlighted the discrepancies between worksite CTR programs. The flexibility afforded worksites in terms of what incentives their programs offer creates an array of problems. Around 50% of worksites that offer incentives have employees participating and taking advantage of the program. Notably, where incentives are lacking or missing altogether, participation is lower or nonexistent. Another miscalculation is evident when employees from different worksites are in the same vanpool receiving vastly different reimbursement amounts. The range of vanpool reimbursements was the highest among CTR incentives with some worksites offering $30 and several worksites offering up to $255 per month. Over the course of one year, differences in reimbursement incentives can amount to well over one thousand dollars. A wider, all-encompassing network of CTR program incentives would likely increase participation thereby reducing the number of cars on our roads while creating a more level, equal field of opportunity for employees.

The other striking finding from the TRPC data pertained to scheduling incentives. Telework, flexible hours, and compressed work weeks were offered at more than 90% of worksites in Thurston County, but only about one-quarter report encouraging employees to do so when asked. The meteoric rise in telework during the COVID-19 pandemic unequivocally disrupted the attitude toward telework going from something that was occasionally tolerated to being required and enforced. How the future of work-from-home and telecommuting will play out in the aftermath of the COVID-19 pandemic remains to be seen. However, based on the

direction many companies are heading and a newfound desire expressed by employees, the future of the workplace will almost certainly feature telework in an increased capacity. Add into the mix the importance and significance of telework as it relates to the environment and reducing GHG emissions, and work-from-home becomes not just a part of the new workplace environment but an essential, critical piece of it.

Based on my results, I would recommend more standardization of CTR programs and associated incentives across the state. Consistency across worksites and within agencies would almost assuredly increase employee participation. Investing in public transportation infrastructure through expanded bus access and light rail systems so as to mimic the success within King County would also likely reduce SOV rates within Washington State. Finally, worksites must shift the culture within their organizations as well. Simply offering CTR-based programs is not good enough as the repercussions from climate change become more obvious and pronounced. From department heads and directors down to managers and entry-level employees, CTR must become more widely endorsed, encouraged, and commonplace. These actions taken collectively would enable Washington State to reduce its greenhouse gas emissions while alleviating traffic congestion and improving employee work/life balance.

Qualitative

Interviews and open-ended survey questions revealed considerable insight into the attitude and culture of CTR. Content analysis of interview transcripts and survey answers yielded a number of main themes: culture, flexibility, family/personal obligations, time, and the lack of bus accessibility. These themes surfaced as the primary barriers to CTR program success and according to the Employee Transportation Coordinators (ETCs) prohibit the use of alternative forms of transportation. The Results and Discussion mention how interconnected each of these

barriers/themes are, but it still bears repeating. Cultural pressures surrounding productivity and a "do-it-all" lifestyle stimulate perceived notions of time poverty. Family and personal responsibilities only intensify the demands on an employees' time. The need for flexibility arises in order to juxtapose all of the aforementioned pressures and demands. Finally, lack of bus accessibility or bus reliability place further emphasis on personal transportation—increasing the likelihood of driving alone. Therefore, culture, the desire for flexibility, family/personal obligations, the crunch for time, and the lack of bus accessibility all come together and create the perfect storm so to speak, which prohibits many employees from using an alternative commute. Moreover, not only does American culture, family responsibility, and a perceived lack of time prevent many individuals from using an alternate commutes but they actually *encourage a culture of driving alone.*

Additionally, the demands placed upon ETCs in terms of implementing CTR programs as "5% otherwise duties assigned" further limited CTR success. Numerous ETCs spoke to a lack of available resources—be it time or financial impediments. Dedicated full-time or part-time (20 hours per week) ETCs has the potential to bring about more dramatic CTR success. Employees fully devoted to CTR programs and tasks increases opportunities for education and awareness while also rooting CTR firmly in the workplace culture.

As noted above, investing in public transportation infrastructure—specifically in bus transit—so that buses are more reliable and accessible is another solution deserving attention based on my interviews with ETCs. Asking employees to demonstrate better time management is an option, but work time reduction (i.e. a 30-hour work week) might actually be a more creative solution. With a shorter work week an employee would be able to allocate additional time to their commute.

Finally, other barriers that appeared to a lesser extent included concerns about bike safety, more specific accessibility due to physical location, and a general lack of information. A lack of information and awareness of CTR is a serious problem. The ETCs I interviewed and surveyed noted consistent information and knowledge to employees as being somewhat absent. Solutions such as a free-ride home for vanpools and carpools (whereby employees can take a taxi home in case of an emergency) do not do much to encourage employees to use an alternate commute if they do not know about them!

Furthermore, if a lack of information persists at worksites with ETCs, imagine the absence of attention to CTR at most worksites! The data and results within this thesis came exclusively from worksites with CTR programs. The barriers and obstacles of implementation arose at worksites with CTR programs. Without question, if CTR and TDM are going to succeed moving forward, there cannot be a lack of information and awareness. Without information and awareness there is no comprehension of the problem, and certainly no desire to change behavior. More funding for full-time ETCs is necessary to provide information to employees and take away one of the main barriers to using an alternative commute. Fully-funded positions will allow the CTR programs to grow and thrive. Perhaps most critically of all, establishing more jobs focused on CTR/TDM will help shape the workplace culture around CTR instead of CTR being an ancillary thought or 5% of someone's job responsibility.

Narrative

I don't know if there are clear-cut recommendations or conclusions to make regarding the narrative pieces interwoven within this thesis. I wish there was one sentence or one paragraph that could bring it all together and provide a profound "aha moment". I do know that this journey

has not been easy, and if it's any indication, this life…and the society we create, is the same. It's no so simple. And it's not easy to solve complex problems.

I do believe the themes and findings presented have meaning for our society; and I know what the modern work environment looks like moving forward is of critical importance.

And I know it's important to me (it's taken me a long time to reach this conclusion). My hope is that in sharing my story maybe it's become more important to you. And finally, I hope the stories, thoughts, sentences, and words have been enjoyed. Enjoyed and perhaps you can relate. Relate to the fact that despite all we build in our lives, despite all of the roads and all the tall buildings and everything else we build in our society that what really matters is spending time with people you love. To love and be loved. If it were only that simple.

Final Thoughts

Investing in CTR-based programs and committing to work-from-home as an integral commute choice is the most surefire approach to mitigating the impacts of climate change right now. In order to meet target dates in 2030 or 2050, reducing the number of cars on our roads and highways is a crucial first step in a long line of steps and actions needed to avert the worst scenarios of a remarkably warmer and more chaotic future climate.

Despite the attention given to policy, big companies, and big polluters, every individual consumer still bears a tremendous responsibility as our personal commute choices contribute a staggering proportion of greenhouse gas (GHG) emissions. With our energy infrastructure still heavily reliant on fossil fuels, reducing consumption through more strategic use is imperative. That is not to say we forgo reigning in the big corporate polluters or enacting new policy—we must do that as well. In fact, most of my recommendations are policy driven and rely on funding CTR program incentives and positions. Increased use of telework and the movement toward a

hybrid model (splitting one's time at home and the office) require important policy both directly within organizations and at the local, state, and federal level. However, more than anything, it requires a culture rethinking its values. That starts on the individual level. Each of us has the agency to bend the arc of our society's next chapter just a little. Our decisions matter for our future and future generations.

The COVID-19 pandemic demonstrated the importance of CTR in numerous ways. In 2020, employees quickly adopted and adapted to new ways of working. Worksites became more resilient as they adapted to remote work. Global GHG emissions dropped by the largest annual percentage since World War II. Many people were able to remain employed while gaining new insight and experience for how to make telecommuting work. With the addition of new software technology (i.e. Zoom, Microsoft Teams), increased experiential knowledge, and support, telecommuting has a place in all vocations where possible. Moving forward, work-from-home must continue to be a significant part of the CTR/TDM equation. The momentum for CTR and achieving a better balance of work and life is strong. The future of the modern work environment is here and now. Instead of CTR being a fringe workplace topic, imagine whole communities and cities committed, focused, and designed with CTR in mind. The COVID-19 pandemic showed not just how quickly society can shift, but also how resilient and adaptive people can be. It's time to adapt. We need more CTR.

Chapter 8. Epilogue

5 Years Time

Music is also a wonderful story teller. Music can speak to us on a level we ourselves didn't even realize existed.

"5 Years Time" is (in my opinion) a catchy song by the band, Noah and the Whale. It's got a nice beat and some happy-go-lucky lyrics. The song starts off by positing that in five years time, the singer could be hanging out with a woman at a zoo. The sun would be shining. And he, this woman, and all the animals will be having a good time.

"And there'll be sun, sun, sun all over our bodies

And sun, sun, sun all down our necks

And there'll be sun, sun, sun all over our faces

And sun, sun, sun, so what the heck"

He then begins to reminiscence about silly jokes and laughing about "how we used to smoke all those stupid little cigarettes and drink stupid wine. 'Cause it was what we needed to have a good time…

"But it was fun, fun, fun…"

He goes on to say that there's also a chance in five years time that he won't know her. In five years time, they might not be speaking. Before finally concluding that no matter what:

"There'll be love, love, love. Wherever you go, there'll be love."

It's a cute song. I like the way it is able to capture my imagination and wonder related to where I will be in five years time. I like that it doesn't guarantee things will work out. But what I really like about it is that regardless if things work out or not, there is the acknowledgement that there will be love.

Andy Grammar's "Wish You Pain" is quite different and starts off by saying "I hope your doubts come like monsters and terrorize your dreams. I hope you feel the lonely hopelessness 'cause no one else believes. "

He eventually builds to an explanation for wishing doubt and hopelessness upon someone admitting:

"'Cause I love you more than you could know

And your heart, it grows every time it breaks

I know that it might sound strange

But I wish you pain

Wish you pain

It's hard to say

But I wish you pain"

On a day back in May 2020, I was listening to those lyrics for the first time. Two thoughts came to mind:

One. An article I had just read that morning. And two, a poem I had wrote back in January 2020. The article is about a young journalist, Zoya Teirstein, struggling to find meaning amidst the COVID-19 pandemic. She shares a beautiful story about how over the years, her father has encouraged her to write letters to her future self.

During the pandemic, however, her father wrote a letter *to her*. Like so many of us Tierstein's father asked the question, "What does it mean?"

Teirstein then mentions a March 2020 Harvard Business Review article containing a Q & A with David Kessler, a leading expert on grief and co-author of 2014's *On Grief and Grieving: Finding the Meaning of Grief through the Five Stages of Loss*. Then in 2019, Kessler

published *Finding Meaning: The Sixth Stage of Grief.* He theorized that perhaps our old convention of "the five stages of grief" needs a slight tweaking. He suggests a sixth stage: meaning. Kessler explaining:

> *I had talked to Elisabeth [Kübler-Ross, co-author of On Grief and Grieving] quite a bit about what came after acceptance. I did not want to stop at acceptance when I experienced some personal grief. I wanted meaning in those darkest hours. And I do believe we find light in those times.*

A Different Future

There is no Anti-Christ; no mark of the Beast;
The number 666 means nothing; it's just another number.
One that comes after 665 and before 667.

There is not a 3rd World War.
There are tough times ahead and tragedy,
but it all serves to bring us all closer together.
To LOVE stronger and empathize higher.

We become more resourceful, more dependent, and more social.
We laugh more and work (in the traditional sense) less.
We play games and exercise and make sweet love.

Every year and everyday a new wave of life and love and warmth,

is breathed onto and into the Earth.

A warm summer breeze filled with peace, creativity, and unending faith.

Faith in our shared future, our successes, failures, and happiness.

One day, after we are ***all*** alight,

And we realize we're all one in the same…

Strands of the same fine silken cloth.

The Creator touches us with their/her/his huge, soft, rough, and loving hands.

And there it is:

Eden—

All around us.

This is it; this is the place. This is where my mind went upon hearing this "new song" from Andy Grammar while doing the dishes. At the time of writing this poem, I had heard mention of the novel coronavirus. But I could never have envisioned what was to come. Because this poem, this prayer was not about the coronavirus. And while it was written in the wake of the US-Iran crisis that started off the rollercoaster year of 2020, it wasn't really about that either. The poem's titled, *A different future*, because while missiles launched and hundreds of Canadians and Iranians tragically lost their lives, none of it was new. Missiles, murder, war, rape. These things happen everyday. People die everyday. It's sad, but it's true. People often say the only thing that's certain in life, is that someday you will leave it behind.

What happens after that? Well, your guess is as good as mine.

But this I do know: we are here now.

And for that reason alone, this life matters. As someone once said to me, “This ain’t no trial run.”

So…going back to Teirsten’s father and the question, “What does it mean?”

As of December 2021, the COVID-19 pandemic has claimed more than five millions lives and over 800,000 in the United States alone. Which is why it’s so very hard for me to say and I know it might sound strange:

But I’m glad this happened.

Or at least I want to be. I wish it didn’t have to happen this way. I wish we didn’t lose so many friends, loved ones, and neighbors. I wish we didn’t have to endure so much pain, suffering, and uncertainty. And I wish that so many people we’re not still scared, hurting, and fighting off depression.

But we have to find hope somewhere on the darkest of days. We need meaning. As David Kessler said, “I wanted meaning in those darkest hours.”

It means that the COVID-19 pandemic has given us an opportunity. An opportunity to stop and rest. A chance to meet our neighbors. To write our thesis. To re-examine our values. We’ve been given the time to explore and learn. To learn new things and ways of doing things and ways of being; and we can still appreciate the old ones. Some people started practicing the trombone again. Others turned to Zoom for virtual karaoke. Some played video games like the Sims. While others turned to gardening and built raised beds. Regardless of what you did or experienced during the pandemic, the reality is we’ve all become a bit more resilient.

We experienced pain.

I know it doesn’t come close to the suffering of some people experienced but I learned first-hand about the difficulty and challenges of working from home. Work-from-home (WFH),

an integral component of Commute Trip Reduction and something I've long advocated for, became immensely challenging when it was the only option. The difficulty of blending work and home life readily apparent when cleaning the house is required to get your work done. Millions of people and parents were forced to juxtapose their work with taking care of their kids and pets. Perhaps most difficult of all was establishing new relationships and boundaries with your friends, family, and within yourself.

All of it was incredibly draining and difficult. Nowadays even attending a Zoom meeting feels tiring. And all of these were lessons learned during the COVID-19 pandemic, particularly as they relate to WFH. And while fulltime WFH is viable for some, it's certainly not for everyone. Hybrid work models will be necessary and demanded by employees. 40% of the workforce need not telework everyday moving forward. However, WFH must always be an option moving forward. It is essential for providing workers the flexibility we so desire, and also critical to the eventual fate of this climate crisis.

Therein lies another silver lining due to the COVID-19 pandemic. Emissions fell dramatically in 2020 when the world came screeching to a halt for a few short months. Collectively, we adapted. Together (despite some physical distance), we survived. And when we look back on the pandemic, I think its possible we look back and see it with an more nuanced view. Perhaps not a good thing, or even a glad one. But the necessary one. The very thing that had the chance to break us—and certainly divided us—might end up saving us. If only we take the time to stop and ask ourselves, "What does it mean?"

Can we LOVE stronger and empathize higher? Can we laugh more and work less? And when we look back in five years time, can say that there was love?

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Appendices

Appendix 1

Economic Growth
&
Environmental Impact:

How work time reduction can mitigate ecological footprint in developed countries of The Global North.

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I. INTRODUCTION

Our planet is warming. In 2018, there is little room and far less time to debate the merits of and science behind anthropogenic climate change. (Dunlap & Brulle, 2015; Vince, 2014; Meinshausen et al., 2009). As society and our economies continue to become increasingly globalized and developed, consumption and the linked greenhouse gas emissions forecast a high likelihood of exceeding 2-degrees Celsius of warming (McGlade & Ekins, 2015; Meinshausen et al., 2009; Boden et al., 2017). Staring in the face of one of the greatest problems humankind has ever faced also offers the opportunity to solve one of its greatest challenges. Yet despite this growing realization, one possible solution that has not garnered enough attention is work time reduction.

While a few economists have long advocated for economic degrowth or steady-state economies (Daly, 1972; Okey et al., 2004; Schneider et al., 2010), by and large economic growth remains an unquestioned facet of society. A small but growing community of scholars suggest that a reduction in work time would scale back and slow down our growing economies in turn mitigating anthropogenic impacts on the environment (Rosnick & Weisbrot, 2007; Hayden & Shandra, 2009; Nassen et al., 2009; Devetter & Rousseau, 2011; Ashford & Kallis, 2013; Knight et al., 2013; Nassen & Larsson, 2015; Fitzgerald et al., 2015).

In the following paper, I review the current literature surrounding work time reduction (WTR), and if it is an effective policy solution for reducing consumption, or 'affluence', thereby reducing environmental impact. The main focus is on work time reduction in developed countries of the Global North. I argue WTR is critically important in these countries to reduce our consumption and ecological footprint (one of the most widely utilized dependent variables for environmental impact). However, I also explain that as countries in the Global South continue to develop, WTR is an important policy consideration to offset increases in consumption. The paper begins with a quick summary of economic growth and its link to consumption and environmental degradation. Other key methodologies and theoretical frameworks important for understanding how work time reduction interacts with affluence and environmental impact are then discussed. A brief discussion of the principal dependent (such as

ecological footprint) and independent variables typically used is included. Following that, I present the two main processes by which WTR reduces environmental impacts in developed countries of the Global North, particularly in highly 'Westernized' capitalist countries such as the United States, Canada, and Australia. Finally, for additional information on how global population growth places an even greater emphasis on solutions like WTR please see Appendix 1.

II. ECONOMIC GROWTH

The founder of modern economics, Adam Smith, believed in the power of an 'invisible hand' which in a free market economy drives people to pursue their own interests while at the same time being a benefit to society. The general thinking, reaffirmed by Dunlap and Brulle (2015), is that the market will take care of itself and favors limited restrictions or regulations (p. 72-74). Dunlap & Brulle use the United States as the classic example of a free market economy (p. 72) and addressed below, the U.S. has a disproportionally large impact on the environment. One critically important concept to understanding why this is so and why free market growth is problematic is Schnaiberg's *Treadmill of Production*.

As its very basics, the Treadmill of Production (TOP) is the unbridled expansion and production of economies leading to ever-increasing ecological degradation. This is because increased production requires an input of more and more natural resources. Schnaiberg & Gould (1994) outline seven key points to understanding the logic of the treadmill (p. 69). I have simplified and contracted these into three key points:

1. Wealth is accumulated through ownership of productive organizations that use ecological resources to expand production and increase profit

2. Workers become increasingly reliant on organizational employment through expanded production of wages and jobs (small businesses are disadvantaged competitors unless they too expand and produce more)

3. Owners invest in new technology in order to reduce labor cost and increase production to sustain profit in order to remain competitive

What results is a society where more resources need to be extracted in order to maintain profits. At the same time this precipitates more expansion, production, and consumption to support the lifestyle society has become accustomed to. Eventually, as society continues on this never-ending 'treadmill' the

environment is left degraded in its wake. As such, WTR is uniquely situated to slowdown the TOP and reduce environmental impacts through less work and less production.

Converse to the TOP, some scholars identify that the inverse may be true and that as countries develop, technological innovation (along with shifting societal thoughts on consumption) can reduce environmental impacts and resource withdrawal (Mol, 1996; Mol & Spaargaren, 2000; Fisher & Fruedenburg, 2001). This is known as Ecological Modernization Theory (EMT), and frequently linked is Grossman and Krueger's (1995) idea of an environmental Kuznets curve (EKC) which suggests the relationship between economic growth (the independent variable referred to as affluence) and environmental degradation (the dependent variable) follows an inverted U-shape. Both TOP and EMT will be addressed further in relation to affluence, work time, and environmental impact.

Some of the foremost individuals to position WTR as a potential solution to economic growth were O'Hara (1993) and Schor (1995). Schor outlines a theory she calls the 'Work and Spend' cycle. As demonstrated in Figure 1 below, in classical economic markets such as the United States and Japan, employers set worker schedules. Schor argues when productivity rises, employers offer raises in lieu of decreased work time thus leading to more spending and consumption. Eventually, the higher consumption-based lifestyle becomes accustomed to and results in a positive feedback loop or a micro *Treadmill of Production*. Altogether, Schnaiberg and Schor's theories put economic growth (affluence) center stage in the battle against environmental degradation.

III. MEASURING ENVIRONMENTAL IMPACT

There are a number of approaches to measuring the impact humans have on the environment. One of the most widely used measures has historically been greenhouse gas emissions, namely carbon dioxide emissions. The Keeling Curve has been used to demonstrate the exponential increase in CO2 emissions since 1958 (Keeling et al., 1995). Other frequently used measures of environmental impact include land-use change, deforestation, ecological footprint, biodiversity loss, energy production and consumption, as well as other greenhouse gas emissions (Sodhi & Ehrlich, 2010; Dunlap & Brulle, 2015).

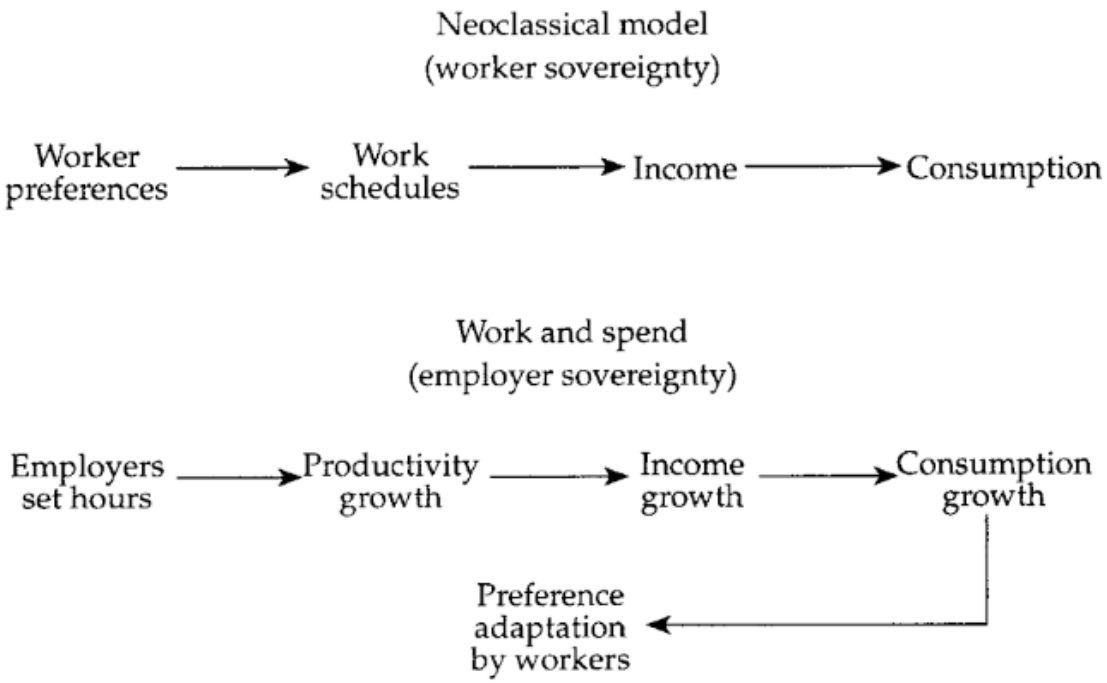

Figure 28. Models of work and consumption (Schor, 1995).

Ecological Footprint:

Recently, one of the most widely used measures of environmental impact has been ecological footprint, and particularly so in the WTR literature. Although there are a few critics (Shao & Shen, 2017; van den Bergh & Verbruggen, 1999) of ecological footprint (EF), it is generally well received in the scientific community (Knight et al., 2013). Most scholars who utilize EF point to its ability to capture a broad range of human impacts on the environment (York et al., 2003a; Wackernagel & Silverstein, 2000). EF is typically measured in hectares of land and represents the amount of land resources required to sustain one individual's consumption-based lifestyle. While there is some variability in what ultimately constitutes EF, principally it is comprised of the land use associated with living space requirements, production of products and services, and sinks for waste (York et al., 2004).

The main advantages of using ecological footprint are 1) EF captures a countries' impact by measure of consumption thereby factoring in impacts associated with importing goods from other countries 2) EF is the most comprehensive measurement available when considering the ways humans

impact the Earth (Hayden & Shandra, 2009; York et al., 2004; Wackernagel & Silverstein, 2000). In addition, EF has been shown to significantly correlate with other measures of environmental impact such as CO2 emissions, ozone depleting substances, and nuclear energy production (York et al., 2003a; York et al., 2004). Lastly, many studies on WTR use ecological footprint as the primary dependent variable measured, however other frequently used variables include CO2 emissions, carbon footprint, and energy footprint or energy consumption.

IPAT:

Utilized by the IPCC and almost all of the literature on work time reduction, IPAT provides a straightforward and simple understanding of how human activities stress the environment. Developed by ecological economics Ehrlich & Holdren in the 1970s (Ehrlich & Holdren, 1970; Ehrlich & Holdren, 1971; York et al., 2003b), IPAT is crucial to understanding why the implementation of WTR mitigates environmental impact and degradation.

The widely used formula, I = P x A x T, conceptualizes the relationship between environmental impact (I) and population (P), affluence (A), and technology (T) (Dietz & Rosa, 1994). Essentially, IPAT measures and predicts how population, affluence (often viewed in terms of production or consumption), and technology determine environmental impact.

Impact = **P**opulation x **A**ffluence x **T**echnology

Despite the advantages of both its simplicity and how it conceptualizes of the main drivers of environmental impacts, IPAT has two main limitations. For one, the equation is not suited for hypothesis testing as an accounting equation (York et al., 2003a). Second, IPAT assumes a proportional relationship between impact and population, affluence, and technology. As formulated above, IPAT assumes that a one percent increase in population results in a one percent increase in environmental impact (Shandra et al., 2004). To resolve these issues, Dietz & Rosa (1994) reformulated the IPAT equation into STIRPAT, or the stochastic (ST) impacts (I) by regression (R) on population (P), affluence (A), and technology (T). STIRPAT does not assume proportionality and allows for what is called variable elasticity. Simply, this means that a change in P, A, or T can lead to greater (or less) percent change in I. Shown below, each of

the primary variables in IPAT are given exponents denoting the elastic potential. The subscript *i* denotes differences at observational units such as households, cities, or countries. The variable a scales the model while *e* is the error term.

STIRPAT EQUATION: $$I_i = aP_i^b A_i^c T_i^d e_i$$

When the equation is put into logarithmic form, the exponents *b* and *c* become coefficients which indicate the percent change in I given a one percent change in either *b* or *c* all else being held constant.

STIRPAT in LOG FORM: $$\log\ I = a + b(\log\ P) + c(\log\ A) + e$$

For example, if *b* was 7, a one percent increase in population would imply a seven percent increase in environment impact, all else being held constant. In addition, the logarithmic form allows for hypothesis testing using regression analysis. The variable, T, meanwhile, is generally incorporated into the error term, *e*, as the scientific community has not established a consensus on valid indicators for technology (Shandra et al., 2004; York et al., 2003a; York et al., 2003b). Overall, the reformulation of IPAT into STIRPAT situates population and affluence at the forefront for empirical testing and allows researchers to explore the elastic relationship of each with respect to environmental impact. This in turn helps to shed light on whether population or affluence have greater environmental impacts. Furthermore, it is now possible to disaggregate the variable A (affluence – typically measured as GDP per capita) into various components. Affluence is often represented by terms such as annual hours worked (measuring WTR) or GDP per hour worked (measuring productivity) or the percentage of the population employed (measuring the size of the workforce). These component variables can also be tested for significance, and so WTR reduction can be measured and tested for significance independent of its effect within affluence.

IV. WORK TIME & ENVIRONMENTAL IMPACT

When looking at the literature regarding work time and environmental impact three main themes emerge. Two themes, identified by Knight et al. (2013, p. 694) as *scale* and *composition*, are the principal

ways in which WTR can reduce environmental impact. Scale addresses two problems associated with economic growth and identified in the TOP: expansion and production. Many studies suggest WTR literally scales back the economy through less work and less production (Ashford & Kallis, 2013; Knight et al., 2013). Composition, on the other hand, can be better thought of as an indirect effect of WTR policy. Discussed below, a reduction in working hours creates an increase of time affluence or "free-time". Composition, then, encompasses the environmental impacts coupled with how individuals spend their free-time. The final theme I have identified is that the dependent variables used to measure environmental impact generates some inconsistency in the literature. Whether a study uses carbon footprint, CO2 emissions, or ecological footprint for example can shift the significance of the relationship between affluence and environmental impact. This perhaps further lending support to ecological footprint (EF) as a useful methodological tool.

Scale:

Emergent from the literature, scale ties directly into the *Treadmill of Production* and capitalist growth. Knight et al. (2013) explain it succinctly as such, "more work generates greater economic output, income, and consumption" (p. 694). Theoretically then less work should result in less economic output, income, consumption and therefore cause less environment impact. For the much of the academic community in support of economic degrowth, work time is viewed as a critically important variable. (Coote et al., 2010; de Graaf, 2003; Hayden, 1999; Hayden & Shandra, 2009; Jackson, 2009; Latouche, 2009; Sanne, 2002; Schor, 1995, 2005; Speth, 2008)

Before looking at work time as a part of and independent of affluence, it is important to first understand the relationship between affluence and environmental impact. The research is pretty clear on this: affluence (universally measured as GDP per capita) is positively correlated with environmental impact, often regardless of the dependent variable being measured (York et al. 2003a; York et al. 2003b; Hayden & Shandra, 2009; Knight et al., 2013). Although, when the dependent variable is CO2 emissions some studies found support for an EKC (York et al., 2003b; Hayden et al., 2004).

All of the findings of York et al. (2003a), however, lend support to the TOP, and that economic growth and increases in affluence create more environmental pressures and impacts. Utilizing STIRPAT to analyze data from 142 countries (or 97 percent of the world's population and economic output), York, Rosa, and Dietz (2003a) found that "an increase in GDP per capita consistently leads to an increase in the ecological footprint" (p. 294). Finally, there was no evidence to suggest an EKC with respect to affluence and EF. And in contrast to EMT, urbanization had a positive quadratic relationship with EF which is the opposite of what EKC would expect.

The relationship between affluence and impact remained positive when York et al. (2003b) looked at affluence and its effect on CO2 emissions and energy footprint, again finding significant and positive relationships with each. However, when GDP per capita rose above about $2900 the relationship to CO2 emissions shifts from elastic to inelastic, meaning the growth rate starts to decline. However, the authors make the important point that CO2 emissions will still increase overall until a GDP per capita of about $61,000, a value "well beyond the range of observations" (p. 362). For reference, the United States had the highest observed value with a GDP per capita of $27,765.

Work Time Reduction:

Continuing her work on WTR as a solution to combat consumption in the Global North, Schor (2005) conducted a linear regression of annual working hours on EF for 18 OECD countries. Schor found significant positive relationship between hours of work and EF. Hayden & Shandra (2009) followed utilizing STIRPAT to determine if WTR was a viable means of limiting economic output and thereby reducing environmental impacts in 45 countries (19 high-income, 22 medium-income, and 4 low-income). Contrasting to the findings of York et al. (2003b), Hayden and Shandra (2009) find no evidence of an environmental Kuznets curve. At the same time, when testing GDP per capita (affluence) they found a positive significant correlation with EF.

Looking at high-income countries in Table 1, the United States and Canada have the highest annual hours worked per employee and the *highest* EF per capita (global ha/person). Meanwhile countries such The Netherlands, Germany, and France have relatively low EF per capita and three of the four

lowest annual hours per employee worked. On the other hand, Norway has the second lowest annual working hours but one of the highest EF per capita (6.2 ha/person). This is a good example of how WTR is one of several factors influencing environmental impact; the percentage of people working and labor productivity (GDP per hour worked), represent two other significant factors of consumption and affluence. Despite working only thirteen hours (0.95%) more than the Netherlands, Norway's EF per capita is 31.9% higher – largely due to Norway's higher GDP per hour worked and per person. Nonetheless, the United States works about 500 hours (36.2%) more than Norway and has 13% higher GDP per capita, but the U.S. has an EF per capita that is 58.1% higher (9.8 to 6.2 global ha/person).

When specifically testing the components of affluence – work time (annual hours worked per employee), labor productivity (GDP per hour worked), and employment to population ratio (the percentage of the population employed) – all three variables were found to be positive and significant with EF. Even stronger evidence in support of WTR emerged when Hayden & Shandra (2009) tested annual hours worked alongside GDP per capita and annual hours worked remained significant and positively correlated with EF. This is particularly compelling evidence as it demonstrates that even after accounting for the effect of annual hours worked on GDP per capita (affluence), annual hours worked still has an independent, positive, and significant effect on EF. Discussed further below, this indicates a compositional effect of WTR – essentially that there are indirect effects of reducing our annual working hours besides scaling back consumption.

It is also highly worth mentioning the stark differences in EF per capita between high-income nations and low-to-medium income nations, even when many low-to medium income nations are working more. South Korea, for instance, had the highest annual hours of work per employee (2,487) ha/person) but more than two and a half time less the ecological footprint per capita compared to the U.S. (3.7 ha/person compared to 9.8). Additionally, countries such as Sri Lanka and Bangladesh, which have annual work hours of 2,288 and 2,301, have an EF per capita of 0.8 and 0.5, respectively. This suggests WTR is possibly better suited and would have a more dramatic effect on higher income and more developed countries with high GDP per capita. Compared to low and medium- income countries where

Table 1. EF and components of GDP by nation in 2000.

Nation	Annual hours per employee	GDP per hour worked (US$)	Employment (% of population)	GDP per person (US$)	EF per unit output (m^2/US$)	EF *per capita* (global ha/person)
			High-income nations			
The Netherlands	1366	31.22	50.65	21,601	2.18	4.7
Norway	1379	35.54	51.28	25,133	2.47	6.2
Germany	1463	29.42	44.09	18,981	2.48	4.7
France	1493	34.81	40.93	21,277	2.58	5.5
Denmark	1511	29.14	52.17	22,969	2.53	5.8
Austria	1528	29.34	46.06	20,656	2.23	4.6
Switzerland	1583	25.19	56.13	22,381	2.14	4.8
Sweden	1614	27.02	47.58	20,759	2.65	5.5
Belgium	1622	31.91	39.89	20,649	2.57	5.3
Italy	1631	28.75	40.07	18,786	2.08	3.9
UK	1652	26.53	45.99	20,159	2.63	5.3
Finland	1664	26.33	44.56	19,528	3.23	6.3
Ireland	1695	29.25	43.85	21,741	1.93	4.2
New Zealand	1756	19.46	47.33	16,178	3.46	5.6
Japan	1780	23.24	50.88	21,051	2.04	4.3
Australia	1796	25.58	46.9	21,549	3.2	6.9
Spain	1814	22.34	38.55	15,622	2.82	4.4
Canada	1825	26.12	46.92	22,366	3.31	7.4
USA	1878	31.18	48.51	28,403	3.45	9.8
			Medium-income nations			
Portugal	1715	16.9	48.65	14,105	2.98	4.2
Hungary	1795	10.57	37.6	7,137	4.76	3.4
Brazil	1841	8.01	37.11	5,474	4.02	2.2
Argentina	1903	12.58	35.41	8,475	3.07	2.6
Greece	1919	16.26	38.68	12,070	4.14	5
Turkey	1919	10.48	32.86	6,610	3.18	2.1
Venezuela	1931	12.63	35.14	8,571	2.8	2.4
Colombia	1956	7.47	35.42	5,179	2.51	1.3
Malta	1965	17.33	37.42	12,741	3.45	4.4
Slovenia	1969	14.76	46.59	13,540	2.58	3.5
Chile	1974	13.74	36.46	9,890	2.12	2.1
Poland	1988	9.65	37.58	7,210	4.72	3.4
Slovakia	2017	10.57	38.91	8,295	3.86	3.2
Czech Republic	2022	9.93	45.53	9,144	5.03	4.6
Cyprus	2107	14.91	43.51	13,672	3.8	5.2
Mexico	2155	8.62	39.2	7,281	3.16	2.3
Estonia	2160	13.1	40.09	11,343	4.76	5.4
Thailand	2228	5.38	53.21	6,376	2.04	1.3
Malaysia	2244	8.58	42.53	8,189	2.93	2.4
Latvia	2262	8.56	39.18	7,586	4.22	3.2
Lithuania	2282	7.24	38.6	6,380	5.64	3.6
Korea (South)	2487	12.8	44.73	14,236	2.6	3.7
			Low-income nations			
Pakistan	1723	4.32	26.13	1,946	3.08	0.6
Peru	1926	5.16	36.72	3,581	2.23	0.8
Sri Lanka	2288	4.84	32.8	3,634	2.2	0.8
Bangladesh	2301	1.21	30.9	862	5.8	0.5

Table 1. Ecological footprint (EF) and the effect of WTR (annual hours worked) and other components of affluence (Hayden & Shandra, 2009).

EF is more driven by low affluence and hourly productivity (low GDP per capita and low GDP per hour worked, respectively).

Knight et al. (2013) also investigated the effects of WRT on ecological footprint, however included two additional dependent variables in carbon footprint and CO2 emissions. Foremost, they found positive and significant relationships between annual work hours and all three dependent variables, in line with the findings of Hayden & Shandra. Productivity (GDP per hour worked) and the percentage of the population employed were also positive and significant with respect to all three dependent variables. This is in line with previous research (Hayden & Shandra, 2009; Rosnick & Weisbrot, 2007, York et al., 2003a; York et al., 2003b) and further suggests the importance of WTR as a key policy solution.

Composition:

Aside from scale, another direct consequence of WTR is an increase in time affluence (Schor, 1995, 2005; Knight et al., 2013; Hayden, 1999; DeGraaf, 2003). What individuals then do with their free time is an indirect effect but of critical importance, and a growing number of scholars have highlighted this fact (Ashford & Kallis, 2013; Knight et al., 2013; Shao & Rodriguez-Labajos, 2016; Shao & Shen 2017). Ashford & Kallis (2013), review the four-day workweek as a policy measure for improving both employment and environmental conditions in Europe. While ultimately maintaining the merits of the four-day workweek to be viable, they are cautious and impart how complicated the question can be emphasizing how various leisure-time activities can differ in environmental intensity. Low-intensity activities such walking, reading, biking, and spending time with friends may be more possible and viable with increase time availability (p. 56). At the same time, Shao & Rodriguez-Labajos (2016) and Knight et al. (2013) explain there is also a possibility for an increase in time-intensive activities. Individuals and households with more leisure time could take more vacations for example, which if by air or long-distance car would have high environmental impacts. Shao & Shen (2017) state this would be more common in high-income countries compared to low-income developing countries where low-intense activities are more likely (p. 332).

Looking at empirical evidence, results of the compositional effect of WTR are mixed compared to the strong evidence in support of scale. Mentioned earlier, Hayden & Shandra (2009) found annual hours worked to be statistically significant and positively correlated with EF independent of affluence. The fact that annual hours worked is still significant implies that even after accounting for the scalar effect of affluence (GDP per capita), annual working hours is still causing a significantly positive effect on EF. This suggests a compositional effect and perhaps that an increase in time affluence affords individuals more opportunity to engage in low-intensive activities. Knight et al. (2013), also found a significant effect of annual work hours independent of GDP as work hours correlated positively with EF. However, among all three of their dependent variables (EF, CO2 emissions, and carbon footprint), the only significant relationship was between annual work hours and EF. This suggests the compositional effect of WTR reduction is more varied and and may depend on how environmental impact is measured.

One of the only studies to suggest an increase in environmental pressure, or impact, with work time reduction comes from Shao & Shen (2017). Shao & Shen utilize similar methods to both Hayden & Shandra (2009) and Knight et al. (2013) but use threshold analysis to determine the effect of annual work hours at low, medium, and high hour thresholds regimes. Also, Shao & Shen used carbon emissions and energy consumption as the dependent variables (Shao & Shen, 2017). The authors conclude that reducing work time in countries with high working hours might actually increase emissions given their findings of a significant and negative relationship between the high work time regime and carbon emissions (p. 326). While this could indicate WTR leading to an increase in high-intensive leisure activity, the coefficient for the high work time regime is small (0.05). Therefore, a 1% decrease in work time would produce a 0.05% increase in carbon emissions. Meanwhile, for mid-level work time regimes, a 1% decrease in work hours leads to a 3.49% decrease in carbon emissions. Counter to their conclusion and more in line with the findings of Knight et al. (2013), the difference between high and mid-level work regimes could be more indicative of diminishing returns more so than a complete abdication of WTR policy. A few other critiques of Shao & Shen still remain and are addressed in the discussion section.

Dependent Variables:

Noted at the beginning of the section, some of the variability regarding work time reduction and environmental impact can be attributed to the different measurements used. When ecological footprint (EF) is the dependent variable work time is consistently positively correlated (Schor, 2005; Hayden & Shandra, 2009; Knight et al., 2013). Worth mentioning again is that ecological footprint is widely used and considered to be extremely useful for capturing the wide-range of impacts humans have on the environment (Dietz et al., 2007; Wackernagel & Silverstein, 2000). Also mentioned is that EF is significantly and positively correlated with other common measures of environmental impact (York et al., 2004).

Nevertheless, when environmental impact is measured by CO2 emissions or carbon footprint, the correlational effect with respect to both annual work time and affluence isn't as clear. Some studies do find positive and significant relationships for work time and CO2 emissions (Spangenberg et al., 2002; Nassen et al., 2009; Knight et al., 2013; Rosnick, 2013). However, the results from Shao & Rodriguez-Labajos (2016) and Shao & Shen (2017) indicate a more complex relationship perhaps. Shao & Rodriguez-Labajos found some evidence of a significant positive relationships between work time and carbon emissions for developed countries but did not find any significant relationships in developing countries (p. 7). Meanwhile, Shao & Shen (2017), as discussed earlier also had mixed results. Likewise, the correlation between affluence (GDP per capita) and CO2 emissions also generates variegated support (York et al., 2003b; Shandra et al., 2004; Knight et al., 2013). Interesting to note, however, York et al. (2003a) report that EF is strongly correlated with CO2 emissions ($r = 0.99$, $p < .001$).

Lastly, when energy use or energy consumption is the dependent variable measuring environmental impact in relationship to annual work hours, the research very much indicates a significant positive relationship (Rosnick & Weisbrot, 2007; Nassen et al., 2009; Devetter & Rousseau, 2011; Nassen & Larsson, 2015; Fitzgerald et al., 2015). In their review, Rosnick & Weisbrot point out that the average American worker works more than 7 additional weeks (245 hours) each year compared the average European worker (p. 3). The authors conclude that if the U.S. followed the EU-15 in terms of

average work hours, the U.S. would consume 20% less energy (p. 7). On the other hand, if the EU-15 countries worked at U.S. levels they would have consumed 18% more energy (p. 5). Altogether, the review further emphasizes the importance of work time reduction and how it can reduce environmental impact.

V. DISCUSSION & CONCLUSION

Looking at the overall picture it becomes clear why Schnaiberg's treadmill analogy is so fitting: economies continue to grow and consume while the environment is left more and more degraded. Emerging from the literature reviewed here are several important takeaways. For one, affluence increases environmental degradation. Two, the studies on WTR demonstrate that it can be an effective policy solution to mitigate affluence and thereby reduce anthropogenic impacts on the environment. In particular, the literature is fairly strong that WTR can reduce the scalar effect of affluence (less work → less economic output → less consumption → less impact), but there is also some evidence to suggest WTR also has a compositional effect by increasing time affluence which could further reduce environmental impact.

Two studies that stand out in the literature and are opposed to WTR are Shao & Shen (2017) and Shao & Rodriguez-Labajos (2016). It important to mention the first acknowledgement in Shao & Shen is for financial support from the State Scholarship Fund from the China Scholarship Council. Also acknowledged by Shao & Rodrigueiz-Labajos, there is concern for bias given the only studies in disagreement regarding WTR have the same funding source. Furthermore, Shao & Shen (2017) is limited in the scope of their analysis – containing only 15 EU countries. The exclusion of both high-income and high annual work hour countries such as the U.S., Australia, and Japan and developing countries of the Global South make generalizations about their results difficult.

Much of the rest of the literature does support WTR as an effective policy to reduce environmental impact, with ecological footprint strongly supported in the reviewed studies. An important finding, however, is that WTR may be best suited to developed countries of the Global North. In reviewing the data of Hayden & Shandra, this is particularly evident. Mentioned above, GDP per capita

tends to weigh more heavily on EF all else being equal. Countries such as Bangladesh, Sri Lanka, and South Korea have much smaller EF than the U.S. despite working more hours. Therefore, WTR policy is likely a better strategy for reducing affluence in high-income developed countries where GDP per capita is high. The comparison between the United States and Norway detailed above serves as an example of how WTR in the U.S. could lower EF. Likewise, as evidenced by Rocknick & Weisbrot (2007), if the U.S. adopted average EU work hours, energy consumption could also be reduced by 20%.

Essential in discussions of growth and development are the implications for developing nations of the Global South. Noted in Appendix 1, most of the population growth will be in this geographic region. As these countries develop and increase their production, what model of work will they implement? The difference between following a U.S. model of growth and work time versus a model similar to the Netherlands would have wide-sweeping consequences for the environment. York et al. (2003a) state the global EF capacity of the Earth is about 2.8 hectares per person. It is simply not sustainable or possible for the world to live and work as the United States does. Thus, as countries develop WTR must be a policy consideration, one that would benefit from wide spread adoption in the Global North.

Ultimately, however, WTR in and of itself will not solve anthropogenic climate change or stop all environmental degradation. There are no silver bullet solutions. Other polices such as ride-sharing and telecommuting are also important, particularly if WTR leads to an increase in the percentage of the population employed as some scholars suggest (Ashford & Kallis, 2013; Coote et al., 2010). It is fairly evident WTR reduces ecological footprint and by all appearances mitigates environmental impact. But perhaps most importantly, WTR affords people a greater opportunity to become more sufficient and sustainable. Just as recycling does not solve our problem with plastic or single-use items, WTR does not solve all environmental impacts. But like recycling, WTR buys us time. Individuals are afforded more leisure time to pursue hobbies, creative interests, and low-intensive activities such as spending more time with family and exercising. But more than anything a reduction in work time buys us and the world more time – more time for people to proceed with intention, to develop new technologies, and implement other polices and strategies to tackle the biggest challenge *of our time*.

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Appendix 1

POPULATION GROWTH

By 2050 human population is expected to grow to more than 9 billion. In 2100, our population is likely to be around 11 billion (United Nations, 2013). While the majority of growth in population can be attributed to population momentum (about 44%), most of the growth will be in the developing countries of the Global South (Whitsell, in-class lecture, January 11th, 2018).

Ultimately, this will have huge implications both on the economy and on the environment. Consistent throughout all of the literature population correlates positively with and is one of the primary drivers of environmental impact (Dietz et al., 2007). The studies by York et al. (2003a, 2003b), Hayden & Shandra (2009), and Knight et al. (2013) all document this relationship in addition to the impacts of affluence. Several of these studies also find that population has a monotonically increasing inelastic effect (Hayden & Shandra, 2009; York et al., 2003b).

Also potentially troubling is the lack of support for urbanization mitigating environmental impact. York et al. 2003b find urbanization actually increases CO2 emissions and energy footprint monotonically, and York et al. 2003a no evidence to support an EKC for urbanization – again discovering the relationship to be positive with ecological footprint and counter to EMT theory. Similar findings are reported by Hayden & Shandra (2009) and Knight et al. (2013), where population increase is roughly proportional to ecological footprint. However, where Hayden & Shandra have strong evidence that show urbanization increases ecological footprint in all of their models "at the expense of EMT" (p. 592), Knight et al. only find urbanization to be significant and positive for CO2 emissions (Knight et al., p. 698).

Unfortunately, urbanization adds to the undeniable impacts of growing population. According to a 2014 report by the United Nations, 54% of the global population lives in urban areas. By 2050, the U.N. projects an increase of 2.5 billion people to the urban population with 90% of the increase set to happen in Asia and Africa. (United Nations, 2014). All in all, population growth and urbanization highlight the importance of policy solutions, like WTR, which aim to reduce global affluence and consumption.

Pre-CTR SOV and VMT

SOV and VMT can be calculated for each worksite that surveyed employees based on the commute trip modes and trip lengths reported in the surveys. Table 23 shows the resulting weighted average SOV rate for each zone, where each worksite's rate is weighted by the number of employees. This calculation of SOV includes the credits for telecommuting, compressed work weeks, and non-motorized commuting.

Table 23
Average SOV Rates

Zone Name	Weighted Average of SOV1	Min of SOV1	Max of SOV1	Worksites
Seattle Central Business District	0.331	0.102	0.703	74
Central Seattle	0.501	0.149	0.737	22
Kitsap County Zone	0.585	0.203	0.971	32
Bellevue Central Business District	0.590	0.408	0.77	7
North Central Seattle	0.601	0.156	0.898	29
Duwamish	0.669	0.294	0.918	24
North Seattle	0.718	0.631	0.861	14
South Seattle (Split Zone)	0.741	0.649	0.887	7
North King County	0.755	0.611	0.908	6
Thurston County Zone 1	0.765	0.65	0.933	35
Spokane County Zone 3	0.772	0.447	0.992	15
Spokane County Zone 1	0.776	0.521	0.899	33
Yakima County Zone 2 (outside Yakima city limits)	0.778	0.558	1.00	12
South King County	0.803	0.00	0.948	82
East King County	0.804	0.527	0.948	67
Thurston County Zone 2	0.811	0.69	0.961	46
Clark County Zone 1 (Urban)	0.812	0.643	0.936	33
Central Snohomish County Zone	0.818	0.655	0.964	29
Central Pierce County Zone (Tacoma-Fife Zone)	0.828	0.512	0.987	57
Clark County Zone 2 (Non-Urban)	0.836	0.709	0.922	9
Rural Pierce County Zone (Outer County)	0.840	0.597	0.963	28
Yakima County Zone 1 (within Yakima city limits)	0.849	0.756	0.948	13
Southwest Snohomish County Zone	0.862	0.744	0.92	16
Rural King County	0.868	0.749	0.969	8
Spokane County Zone 2	0.881	0.634	0.951	29
Rural Snohomish County	0.889	0.813	0.939	6

Source: Washington State Energy Office. (1995). Commute Trip Reduction in Washington: Base year worksite characteristics and programs. Olympia, WA, p. 20.

Appendix 3

ETC Survey

1. How long have you been with your current employer? _____
2. How long have you been an ETC? _____
3. Please rank, in your opinion, the*3 most popular* alternative forms of commuting at your worksite:

   1. _____
   2. _____
   3. _____

   Bus/transit, vanpool, carpool, walking, biking, telecommuting, compressed work week, flexible hours.

4. On a scale from 1 -5, how supportive is your employer of commute alternatives/CTR programs?

   1. Not Supportive 2. Slightly Supportive 3. Moderately Supportive 4. Supportive 5. Very Supportiv e

5. On a scale from 1 -5, how involved is your manager with your CTR program?

   1. Not Involved 2. Slightly Involved 3. Moderately Involved 4. Involved 5. Very Involved

6. In the past month, please indicate if you have done the following regarding CTR:
   - ☐ Sent an email to employees
   - ☐ Gave a presentation to employees/manager
   - ☐ Spoken to an employee
   - ☐ Conducted a promotional event
7. Do you think CTR programs are an effective way to reduce emissions? Yes or No
8. Do you use an alternative commute? Yes or No

Please turn over

ETC Survey

10. How do you think CTR programs affect quality of life? _____

_____

_____

11. In a couple sentences, what do you see as the main barriers to using commute alternatives?

_____

_____

_____

11. How old are you?
    - ☐ Less than 35 years old
    - ☐ 35-45 years old
    - ☐ 46-55 years old
    - ☐ 56-65 years old
    - ☐ 66+ years old

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Thank you for completing the survey!

Appendix 4

Interview Questions:

How do workers perceive Commute Trip Reduction programs? Detailing the attitudes and culture of CTR in the workplace

-What makes a Commute Trip Reduction program successful?
-What enables and prohibits the use of alternative forms transportation?
-Are there benefits and consequences on health and well-being?

Questions: (most important are in **bold**)

1. **Tell me about where you work?**
2. What you do? What is your job title?
3. How long have you been with your current employer?
    a. ETC veteran (more than 2 years)
    b. ETC novice (less than 2 years)

4. **Are you familiar with commute trip reduction (CTR) programs? Y/N**
    a. What [do you know/can you tell me] about CTR?
    b. Define 'Commute Trip Reduction'
    c. What does CTR mean you? How does CTR apply in your life?

5. **What types of CTR programs are available at your workplace?**
    a. Which alternative commute programs do you feel comfortable utilizing?
    b. Which do you not feel comfortable using?
    c. Why/why not?
    d. How often do you use a commute alternative?
    e. Have you in the last two weeks?
    f. Could you give me a few words to describe your thoughts on CTR programs?

6. **On a scale from 1-5 how supportive is your employer of commute alternatives/CTR programs? With 1 being 'Not Supportive' and 5 being 'Very Supportive'**
    a. Please explain
7. **Does your workplace offer any incentives for using commute alternatives? Would you please describe ones you are familiar with?**
    a. How do you feel about them?

8. **Please take me through a typical morning for you?**
    a. What are some adjectives that describe your typical morning?
9. How do you feel at the end of your work day?
10. **Take me through a typical afternoon for you?**
    a. How would you describe you commute home?
    b. What are some adjectives?
    c. Follow up: if stress, rushed, frantic, chaotic are mentioned…in what ways?
    d. Follow up: What do you do to relieve the stress of commuting
11. **What do you see as the main barriers to using commute alternatives?**

12. **What are your thoughts on the work culture at your office?**
    a. How about more generally here in the United States?

13. What have other employees expressed to you about CTR?

ETC QUESTIONS

14. When was the last time you emailed your coworkers about CTR?
    a. How often do you email or speak to coworkers about CTR?
15. Is your management team involved in the CTR programs?
16. On a scale from 1-5 how involved is your manager of commute alternatives/CTR programs? With 1 being 'Not Involved and 5 being 'Very Involved'

17. **Why do you feel CTR programs don't gain more traction?**

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18. Do you believe in anthropogenically-induced Climate Change?
19. **How important is Climate Change to you on a scale from:**

Not at all	Slightly Important	Moderately Important	Very Important	Extremely Important

20. **How much responsibility do you feel to limiting your emissions personally?**

None at all	Slightly Responsible	Moderately Responsible	Very Responsible	Extremely Responsible

21. Do you think CTR programs are an effective way to reduce emissions? Y/N
22. Do you think CTR programs are an effective way to reduce stress ? Y/N
23. Do you think CTR programs are an effective way to improve health? Y/N

Demographic Questions:

A. Who lives in your household?

B. How old are you?

< 35 years old | 35-45 years old | 46-55 years old | 56-65 years old | 66+

C. Income bracket:

< $15,000 | $15,001-30,000 | $30,001-45,000 | $45,001-60,000

$60,001-75,000 | $75,001-90,000 | $90,001+

Appendix 5

Letter to Participants

Dear Participant:

I am a student at The Evergreen State College. As part of my coursework as required for my Master's degree in Environmental Studies, I will be conducting a research project titled "Detailing the attitudes and culture of Commute Trip Reduction in the Workplace". The purpose of my project is to determine the factors most affecting participation in Commute Trip Reduction (CTR) programs to help inform CTR programs and incentives in the future. I will be conducting in-person or over-the-phone interviews which will last approximately 30 minutes.

Risks to you are minimal, but may include personal information and/or opinions being published in my thesis. However, I will take steps to ensure **your confidentiality is maintained**. There will be no compensation of any kind available for your participation, which is completely voluntary. You may withdraw your participation at any point or skip any question you do not wish to answer without penalty. You may not directly benefit from this research; however, we hope that your participation in the study may help better inform CTR programs and improve the quality of life for all Washingtonians.

I will not disclose personal or demographic information unless given express permission. Recordings of interviews will be deleted upon submission of my thesis. I may share part or all of this thesis with the Thurston Regional Planning Council, the Department of Transportation, and the Evergreen State College for their continued use to improve CTR programs.

As mentioned, I will use your responses as resource material for my research project on CTR programs. My work will culminate in a public presentation at Evergreen of my results. At your request, I will provide you with a copy of the thesis or thesis presentation.

Your interview, collected as part of the research, could be used for future research studies or distributed to another investigator for future research studies, with all identifiable information removed, without additional informed consent from the subject or the legally authorized representative.

If you have any questions about this project or your participation in it, you can call me at **412.414.9996.** My email address is **jacob.meyers71@gmail.com.** If you have questions concerning your rights as a research subject or experience problems as a result of your participation in this project, contact Karen Gaul, IRB administrator at The Evergreen State College, Library 2008, Olympia, WA 98505; Phone 360.867.6009.

Thank you for your participation and assistance!

Sincerely,

Jacob Meyers

Appendix 6

Informed Consent Agreement for Interviews

I, _____, hereby agree to serve as a subject in the research project titled "Detailing the attitudes and culture of Commute Trip Reduction in the Workplace". It has been explained to me that its purpose is to determine the factors most affecting participation Commute Trip Reduction (CTR) programs. The research activity I will participate in is for a thesis project in fulfillment of degree requirements.

I have been informed that the information I provide will only be used for completion of the thesis. My identity will be kept confidential and no identifying information about me will be included. The Researcher, Jacob Meyers, has agreed to provide, at my request, a copy of the final thesis and/or thesis presentation. Researcher has also informed me that the results may be shared with the Thurston Regional Planning Council and the Department of Transportation.

I understand that the risks to me are minimal, and would likely be personal information or opinions. I agree to participate in the interview and to have that interview recorded for this project. I have been told the information will only be shared with the Researcher and will be destroyed when the project is finished.

I understand that my interview, collected as part of the research, could be used for future research studies or distributed to another investigator for future research studies, with all identifiable information removed, without additional informed consent from me or a legally authorized representative

There will be no compensation of any kind available for my participation. I have been told that I can skip any question or stop the interview and withdraw my full participation from the study at any time without penalty. If I have any questions about this project or my participation in it, I can call **Jacob Meyers** at 412.414.9996 or email at jacob.meyers71@gmail.com. Likewise, if I have questions concerning my rights as a research subject or I experience problems as a result of my participation in this project, I will contact Karen Gaul, IRB administrator at The Evergreen State College, Library 2008, Olympia, WA 98505; Phone 360.867.6009.

I understand that my participation in this project is completely voluntary, and that my choice of whether to participate in this project will not jeopardize my relationship with The Evergreen State College. I am free to withdraw at any point before or during the interview. I have read and agree to the foregoing.

Signature_____ Date_____