University of Cincinnati

Date: 3/28/2015

I, Russell Best, hereby submit this original work as part of the requirements for the degree of Master of Community Planning in Community Planning.

It is entitled:
U.S. City Climate Action Plans: Planning to Reduce Vehicle Miles Traveled?

Student's name: Russell Best

This work and its defense approved by:

Committee chair: Carla Chifos, Ph.D.

Committee member: Leah Hollstein, Ph.D.
U.S. City Climate Action Plans: Planning to Reduce Vehicle Miles Traveled?

A thesis submitted to the Graduate School of the University of Cincinnati in partial fulfillment for
the degree of Master of Community Planning

School of Planning
College of Design, Architecture, Art, and Planning (DAAP)

By
Russell Best
Bachelor of Urban Planning, University of Cincinnati

Cincinnati, OH
March 2015

Thesis Committee:
Carla Chifos, PhD, AICP
Leah Hollstein, PhD
Abstract

Are U.S. city climate action plans planning to reduce vehicle miles traveled? Reducing the need to drive (fewer miles and fewer trips) specifically and significantly reduces greenhouse gas emissions. The urban planning profession identifies a broad portfolio of policies that reduce greenhouse gas emissions. What land use or planning policies have the most significant impact on reducing greenhouse gas emissions and addressing climate change? Thirty U.S. climate action plans are selected for this analysis. A majority of the plans in this analysis integrate public transit accessibility, distance to transit, street network and intersection design, parking or congestion management, transit-oriented or mixed-use development, destination or job accessibility, or job-housing balance planning strategies. However, most achieve only fair to poor levels of success at explicitly linking these strategies to reduced vehicle miles and emissions. Climate action plans might serve their most virtuous purpose not by becoming yet another set of policies, actions, and strategies, but by synthesizing and precisely repacking existing or future initiatives. Planners need to harness strategies that cut through the clutter. Until more climate action plans drill down on specific and significant land use choices explicitly linked to reducing vehicle miles driven, these plans are largely just codifying things that were likely to happen anyways.
Contents

Illustrations v
Introduction 1
Literature Review 3
   Specific and Significant Strategies 3
   Strategies are Complicated 5
   Strategies Defined 11
   Climate Action Plan Analyses 14
Methods and Data 21
Analysis 34
Limitations 59
Conclusion 60
References 63
Illustrations

Figures

1. U.S. 2012 GHG emissions by sector 1
2. Albuquerque 36
3. Los Angeles 37
4. Cincinnati A 39
5. Cincinnati B 40
6. Cincinnati C 41
7. Juneau A 43
8. Juneau B 44
9. Portland A 45
10. Portland B 46
11. Portland C 47
12. Dubuque 50
13. Sacramento 51
14. San Diego 52
15. Miami 53
16. Austin A 55
17. Austin B 56

Tables

1. Specific and significant strategies defined 14
2. Specific and significant strategies defined and coded 23
3. Plan geography and context 25
4. Plan name, year, scope, participants, and other plans referenced 26
5. Plan overall GHG, transit or land use, VMT reductions  32
6. Plan link to specific and significant strategies  33
7. Summary of plan link to specific and significant strategies  34
8. Regional summary  57
9. Year adopted and rating  58
10. Average geography and context by plan rating  58
Introduction

The year 2014 was the warmest on record since 1880. Atmospheric carbon dioxide (CO₂) and average global temperature continue to rise, arctic and land ice continue to shrink, global sea level is rising, and forest cover is decreasing (NASA 2015). Climate change impacts include dangerous weather variability (hot and cold, extremes storms), sea-level rise and loss of coastal lands, food and water hardships, air-quality and public health degradation, and population migration. These impacts “make it imperative that planners and policymakers work immediately to implement new policies to address climate change” (APA 2011). The planning profession identifies a broad portfolio of policies that reduce greenhouse gas (GHG) emissions. What land use or planning policies (strategies or choices) have the most significant impact potential to reduce GHG emissions and address climate change?

Figure 1. U.S. 2012 GHG emissions by sector

In 2012, U.S. GHG emissions totaled 6,526 million metric tons of carbon dioxide equivalents (MMTCO₂e), 82 percent of which was carbon dioxide (as opposed to other GHGs
such as methane, nitrous oxide, and fluorinated gases), of which transportation accounted for nearly one-third (28 percent) of the sources of emissions (EPA 2014). Only electricity generation (32 percent) as a source accounted for more emissions, followed by transportation, then industry (20 percent), commercial and residential (10 percent), and agriculture (10 percent).

Reducing household light-duty vehicle travel—vehicle miles traveled (VMT) or vehicle trips—can significantly impact GHG emissions reductions. Studies indicate that modifications to the built environment (land use choices) can reduce the need to drive twenty to forty percent, consequently reducing emissions (APA 2011; Ewing et al. 2008).

More recent planning literature indicates that the most significant reductions in transportation GHG emissions from reductions in VMT must move beyond unspecified “density” and “compact development patterns” strategies (Brownstone 2008; Cervero and Murakami 2010; Ewing and Cervero 2010; Byahut 2012; Kim and Brownstone 2013; Miller 2013; Ewing et al. 2008, 2014A, 2014B). At the very least, increases in density or “upzoning” should be regional, not just local in scale (Kim and Brownstone 2013). Land use diversity, street network connectivity, transit accessibility, and more are specific and significant strategies to reduce GHG emissions through reduced VMT at a local level (Byahut 2012). An increase in density alone does not ipso facto reduce household vehicle miles traveled.

The U.S. Conference of Mayors Climate Protection Agreement, launched in 2005, aimed to meet Kyoto Protocol GHG emissions reductions targets (reduce emission by at least seven percent below 1990 emissions by 2012). Many cities and municipalities signed on to this agreement and other similar climate networks. Cities and municipalities are beginning to develop planning documents aimed squarely at meeting agreement targets and promoting actions to reduce GHG emissions, many creating standalone climate action plans (CAPs). Have planners integrated specific and significant strategies (modifications to the built environment, or land use choices) to reduce VMT in CAPs? Have CAPs explicitly identified land use diversity, street network connectivity, transit accessibility, regional density, or other more specific and
significant as land use choices to reduce VMT and reduce GHG emissions? Have planners integrated any of these specific and significant strategies identified in the literature to reduce VMT in CAPs?

First and second generation CAPs include a wide variety of emissions reduction goals, only voluntary actions, vague implementation strategies, weak linkages to motor vehicle use, overly-rely on unspecified or awareness and education actions, lack regional coordination, tend towards easy but high-visibility projects and short-term wins, and do a poor job explicitly linking actions to reduction targets (Wheeler 2008; Bassett and Shandas 2010; Boswell, Greve, and Seale 2010; Dierwechter 2010; Tang et al. 2010; Krause 2011a and 2011b; Hamin, Gurran, and Mesquita Emlinger 2014). There seems an opportunity to further study CAPs to see if specific and significant land use choices are being better integrated into CAPs to reduce VMT and reduce GHG emissions. Put another way, reducing the need to drive (fewer miles and fewer trips) specifically and significantly reduces GHG.

Are U.S. city CAPs explicitly making this connection and subsequently outlining modifications to the built environment (land use choices) to make this happen? More simply, are U.S. city CAPs planning to reduce VMT? Planning and related climate action literature identifies that annually over one billion MTCO2e is emitted from household vehicle use, and that there are specific and significant land use choices that can impact and reduce these VMT, thus reducing GHG emissions. A content analysis will determine if these selected U.S. city CAPs are planning to reduce VMT.

Literature Review

Specific and Significant Strategies

In 2012, U.S. GHG emissions totaled 6,526 MMTCO2e, and nearly one-third (28 percent) of the sources of all GHG emissions were from transportation (EPA 2014). On-road vehicles—
as opposed to aircraft, ships and boats, and rail—accounted for over three-fourths (75.5 percent) of total transportation emissions in 2011, and household “light-duty” vehicles (passenger cars and light-duty trucks) accounted for nearly three-fourths of these on-road vehicle emissions. Household light-duty vehicles accounted for over half (54.8 percent) of all transportation greenhouse gas emissions. Put another way, over 1,000,000,000 metric tons of CO₂ equivalent (MTCO₂e) is from household vehicle use—no paltry amount. Based on 2011 Federal Highway Administration data, the EPA calculates that 4.75 MTCO₂e is emitted per household vehicle every year. The U.S. Department of Transportation’s 2011 report National Household Travel Survey 2009: Summary of Travel Trends identified that there were nearly 210,780,000 total household vehicles in the U.S., which traveled approximately 2,250,000,000,000 miles, over more than 233,000,000,000 trips.

Ewing et al., in their widely-cited 2008 report for the Urban Land Institute Growing Cooler: The Evidence on Urban Development and Climate Change, concluded that “the evidence on land use and driving shows that compact development will reduce the need to drive between 20 and 40 percent… as a rule of thumb, it is realistic to assume a 30 percent cut in VMT with compact development” (9). The report further concluded: “Making reasonable assumptions about growth rates, the market share of compact development, and the relationship between VMT and CO₂, smart growth could, by itself, reduce total transportation-related CO₂ emissions from current trends by 7 to 10 percent in 2050. This reduction is achievable with land use changes alone” (9).

Following the EPA’s calculations and the Growing Cooler conclusions, it could be generally stated that compact development or smart growth could reduce total household VMT per year by around 670 billion miles (30 percent of 2.25 trillion miles), and likely lower the average CO₂e emitted per household vehicle per year from 4.75 metric tons to something closer to 4.3 metric tons. This is not meant to be a precise calculation; it’s meant merely to illustrate the magnitude of the issue at hand. It could be quite a significant trend reversal if achieved,
considering that since 1969 the number of U.S. households has almost doubled, workers and drivers on the road have more than doubled, and total household vehicles have tripled (DOT 2011). Over four decades, significantly more households have more workers and drivers with more cars (something that is unlikely to subside), yet land use changes alone could still significantly reduce vehicle miles traveled and reduce greenhouse gas emissions.

Growing Cooler was “based on an exhaustive review of existing research on the relationship among urban development, travel, and the CO₂ emitted by motor vehicles” (2008, 1). The term “compact development,” referred to “higher average ‘blended’ densities,” mixed (diverse) land uses, strong population and employment centers (job-housing balance), interconnected streets, “and the design of structures and spaces at a human scale” (Ewing et al. 2008, 1). Smart growth and new urbanist theories best captured the report’s conceptualization of compact development: walkable neighborhoods, public transit, residential, retail, restaurants, and more, with an aversion to sprawl. Structural equation modeling (SEM) with historical data from 84 urban areas deduced, “the elasticities of urban VMT with respect to different urban variables” (Ewing et al. 2008, 12). “Under a low-carbon scenario of higher densities, higher gasoline prices, less highway expansion, and more transit service,” Growing Cooler argued, “the nation can come close to a climate-stabilizing CO₂ path by 2030” (Ewing et al. 2008, 12). Vehicle miles driven was “one leg” of the “three-legged stool” to reduce transportation CO₂ emissions, the other two “legs” being vehicle fuel economy and carbon content of the fuel itself, two approaches not under the purview of urban planners.

Strategies are Complicated

Quite expectedly, additional research has supplemented, complemented, and challenged Growing Cooler’s conclusions. While there has been consistent agreement on reducing VMT as the best overarching transportation measure to reduce household
transportation GHG emissions, the specific strategies to do so and the significance of such strategies to best reduce VMT have been debated. Since Growing Cooler, studies have shown that density (compact development) alone does not necessarily reduce vehicle miles and that the effect of development density on travel is "complicated," to say the least (Brownstone 2008; Cervero and Murakami 2010; Ewing and Cervero 2010; Boarnet et al. 2011; Hanlon, Howland, and McGuire 2012; Levine et al. 2012; Weitz and Crawford 2012; Byahut 2012; Yang et al. 2012; Echenique et al. 2012; Chatman 2013; Lee and Lee 2013; Kim and Brownstone 2013; Miller 2013; Burge et al. 2013; Ewing et al. 2008, 2010, 2014A, 2014B).

Reid Ewing has expanded on his own research with other researchers, notably to highlight the most significant travel variables by pooling other studies and conducting their own empirical studies. Ewing and Cervero (2010) found travel variables such as destination accessibility, street network design and intersection density, and land use diversity to be significant strategies to reduce VMT. Statistically, these strategies were generally inelastic variables to reduce VMT; however, they were the most significant among what are considered the “5 Ds” of built environment variables (density, design, diversity, destination accessibility, and distance to transit), and together represent a significant impact. Density alone, or unspecified “compact development” and distance to downtown tend to be proxies for other built environment variables, such as diversity (land use mix, jobs-housing balance), design (intersection and street density), destination accessibility (job accessibility by car or transit, distance to downtown), and distance to transit (nearest stop). Ewing et al. (2014A) reinforced Ewing and Cervero’s 2010 findings: “density, the D variable that generates the most controversy, has the smallest impact on VMT. Destination accessibility has the largest. Measures of diversity, design, and distance to transit are intermediate” (7-8).

Brownstone (2008) found that “the magnitude of the link between the built environment and VMT is so small that feasible changes in the built environment will only have negligible impacts on VMT” (1). Kim and Brownstone (2013) then found that regional density, such as
“moving a household from a suburban to an urban area reduces household annual mileage by 18 percent,” was a significant impact. This was concluded by using data from the U.S. Department of Transportation’s National Household Travel Survey 2001 report and creating a model to test built environment variables. Miller (2013) notes the positive impact of linear corridor planning in European cities, like Copenhagen and Stockholm, a specific street network connectivity and destination accessibility strategy.

Cervero and Murakami (2010) reviewed data of 370 urbanized areas and found that high population densities were associated with reduced VMT; unfortunately, this reduction could be offset by dense roadway infrastructure and limited destination accessibility. Cervero coined this the “Los Angeles effect,” as Los Angeles averages high population density but relatively high VMT.

Studies were demonstrating nuanced, sometimes conflicting, and for some, confusing implications. “Let’s Go LA” blog, chronicling “transportation, land use, and economics” in southern California pointed out in January 2014 (“LA Land Use Patterns Help Reduce VMT”) that Brownstone’s 2008 paper “Key Relationships Between the Built Environment and VMT” was being used in testimony against Washington State’s Growth Management Act. Apparently missed in the testimony was Brownstone’s more recent exploration of density and VMT study with Kim (2013), which again validated regional density (such as growth management and containment) as a specific and significant strategy to reduce VMT by eighteen percent.

Millard-Ball (2014) reviewed the assumptions underlying the Institute for Transportation Engineers’ (ITE) Trip Generation Manual, now in its 9th edition. “By estimating the number of vehicle trips that will be attracted to a proposed development, planners and engineers can analyze a project’s impact on traffic congestion, air quality and global climate change,” Millard-Ball introduced (2014, 2). “This seemingly mundane process—trip generation analysis—profoundly shapes the physical form and financial feasibility of urban development.” He compared ITE trip generation rates to the trip generation rates empirically gathered in the
National Household Travel Survey 2009, and found that ITE overestimated trip generation from certain land use types by 55 percent. “Rethinking the assumptions behind trip generation studies,” he concluded, “may not only avoid wasting resources on over-sized roadways, but can also support efforts to promote transit-oriented, livable communities” (2014, 21). Millard-Ball is one of many to point out the difficulty of quantifying trip generation and VMT.

Other controversies stood as well. There was somewhat of a spat in Planning magazine October 2012 in response to the publishing of an Echenique et al. 2012 Journal of the American Planning Association article “Growing Cities Sustainably: Does Urban Form Really Matter?” From studying English city regions, the authors concluded: “While the prototypes (i.e., compaction, sprawl, edge expansion, and new towns) were indeed found to differ in their sustainability, no one form was clearly superior” (121). Additionally, “the change to ‘white collar’ lifestyles and associated population growth dominates the impacts on the natural environment and resources, far overwhelming those attributable to spatial urban form,” essentially arguing socioeconomic characteristics impact sustainability far more significantly than any modification to the built environment, land use choices, or “urban form” (121). Reid Ewing contented that the article was not properly peer reviewed, and that he would have written that the authors simulation, “ran counter to the vast majority of the empirical studies on the topic” (43). JAPA editor Randall Crane replied: “Professor Ewing considers the lead article in JAPA’s spring issue ‘weak’ and speculates that the cause is a biased review process. Yet, by focusing on the subtitle, Ewing misses the article’s main point. Even worse, he then misreads JAPA’s mission by a mile” (43).

Parking management, congestion pricing, transit oriented development, mixed-use development, priority funding, development impact fees, and regional containment policies have been explored in a number of recent JAPA-published studies and other literature. San Francisco’s SFpark, and demand-responsive parking rate adjustment program, was studied, notably by Pierce and Shoup (2013), who found performance-based parking management
(adjusting curbside parking prices based on demand and time of day) could reduce congestion and VMT—all as a result of not having to cruise for parking. Car-sharing programs can reduce vehicle ownership and parking demand, by as much as a dozen vehicles being taken off the road for each car-sharing vehicle (Engel-Yan and Passmore 2013; Martin, Shaheen, and Lidicker 2010). Transit oriented development presents prospects for reduced vehicle ownership and miles traveled. However, as Chatman (2013) put it, “Does TOD need the T?” He found that auto ownership, commuting, and grocery trip frequency were substantially lower among households living in new housing near rail stations compared to those in new households farther away. But rail access does little to explain this fact. Housing type and tenure, local and sub-regional density, bus service, and particularly off- and on-street parking availability, play a much more important role. (2013, 17)

Ewing and Hamidi (2014) assessed the direct and indirect effects on vehicle miles traveled of the Portland Westside Mix light rail transit, and found a transit multiplier of 3.04, a reduction in three VMT for every vehicle mile reduced due to transit ridership—that “building rail lines with supportive local government land use policies… can slow the growth of auto use” (123). Gasoline price increases can increase transit ridership as well, up to 21 percent in areas of higher density and regional containment policies, versus only about an eight percent increase in transit ridership in areas of “mean density” and no regional containment policies (Lee and Lee 2013). Ewing et al. (2010) explored traffic generated by mixed-use developments, and found that centrally located mixed-use developments (MXDs), small and large, generate shorter vehicle trips compared to outlying suburban developments.

Other authors presented mixed reviews of policy mechanisms like priority funding, development impact fees, and regional containment policies. Hanlon, Howland, and McGuire (2012) studied Maryland’s Priority Funding Program (PFA) and determined its aim to reduce sprawl by providing incentives to steer urban growth (increase regional density) had mixed results, and that market pressure for development was inconsistent with PFA incentives. Burge et al. (2013) explored Albuquerque’s zone-based impact fee program on residential permits. “The program mitigated sprawl by reducing the share of construction occurring near the urban
fringe and by increasing the share in more centrally located areas, but there is no evidence the program increased core development” (Burge et al. 2013, 235). Spillover effects to adjacent communities without impact fees actually exacerbated regional sprawl, highlighting the need for regional density policy coordination (Burge et al. 2013).

Comparing and contrasting “fast versus close,” “Getting Where You Want to Go in U.S. Metropolitan Regions,” Levine et al. (2012) concluded that density—being closer to where one wants to go, even when congestion slows traffic—trumps further but faster transportation options (for instance, a long-distance highway commute). Weitz and Crawford (2012) measured job sprawl in U.S. metropolitan regions, or job accessibility. They found that between 2001 and 2006, among 358 U.S. metro regions, 227 (63 percent) experienced job gain, yet a decrease in job accessibility. This included nine regions with urban containment policies, in which Weitz and Crawford found that none improved proximity of jobs to populated places. Boarnet et al. (2011) in their chapter of the Lincoln Institute of Land Policy’s Climate Change and Land Policies, studied the Southern California Association of Governments travel diary data in the context of California’s Senate Bill 375 requiring metropolitan planning organizations to develop sustainable community strategies and reduce GHG emission. Their investigation soundly determined that job accessibility is far more significant in reducing VMT than density alone. In other words, “regional access is a more appropriate focus than neighborhood population density if the objective is VMT or GHG reduction” (Boarnet et al. 2011, 180).

Byahut (2012), like Kim and Brownstone (2013), based her dissertation on the influence of land use characteristics on household travel related emissions analysis as indicated through the use of a household travel survey—only the survey was regionalized to southwest Ohio’s Hamilton County. Her analysis, which quantified a magnitude of land use characteristic impacts on VMT was developed using a dataset from the Cincinnati Area Geographic Information System (CAGIS), and included 545 total households representing 14,269 household vehicle trips, an average of 32.43 vehicle miles traveled daily. Byahut created two land use mix entropy
indexes within a half-mile radius of the location of each trip generated (she called each land use diversity entropy index LUMix1 and LUMix2, where LUMix1 considered land use mix over a blanket half-mile, while LUMix2 only considered land use mix with actual vehicular or pedestrian access within the half-mile radius). Her results indicated that socioeconomic characteristics were the most important determinate of vehicle miles traveled, followed by land use diversity (particularly for LUMix2, which took into account street network connectivity), then transit accessibility (a transit stop less than two miles walkable), then proximity to central business district. She found that density alone was not a significant impact on VMT, and that proximity to the central business district (downtown) was likely a proxy for other “Ds”. Based on her land use mix entropy indexes model, every one percent increase in LUMix2 index, a household travels 0.712-0.798 fewer miles daily, thus improving land use mix (diversity) among properties with actual vehicular or pedestrian access within a one half-mile radius has the potential to reduce GHG emissions 24-36 percent.

**Strategies Defined**

Nearly all of these studies reference the challenge of controlling for socioeconomic (income, employment status, education—the financial resources to purchase cars and fuel) and residential self-selection factors (that people will just live where they please and travel how they please—that modifications to the built environment will or already have dictated where someone chooses to live, rather than change their behavior). Brownstone, in particular, analyzed this issue by reviewing the literature:

Households choose their residential (and work) locations based, among other things, on their preferences for different types and durations of travel. The observed correlations between higher density and lower VMT may just be due to the fact that people who choose to live in higher density neighborhoods are also those that prefer lower VMT and more transit or non-motorized travel. If this is the case, then forcing higher densities may not lead to anywhere near the reduction in VMT “predicted” by observed correlations. (2008, 1)
In the end, Brownstone concluded, “This suggests that more direct fuel and congestion taxes will be more effective for controlling vehicle emissions and congestion” (2008, 1).

Predictable travel, such as trips to work, school, and church, only accounts for about thirty percent of all household travel (DOT 2011). The other two-thirds of trips are for unpredictable reasons: social, recreation, family, errands, and shopping. Trip chaining or “multi-purpose tours” is notoriously difficult to control for, as most people do combine multiple stops in a single trip (for instance, one trip to run an errand, see a friend, then go to work). Nevertheless, quantitative studies have substantiated specific modifications to the built environment (land use choices: one of the legs of the three-legged stool to reduce transportation CO2 emissions) by elasticity and index measures that do reduce VMT.

The most recent Intergovernmental Panel on Climate Change (IPCC), Working Group III analysis, as reviewed by University of Pennsylvania Professor Eugenie Birch (2014) in the JAPA notes that “while economic drivers are the strongest determinants of GHG emissions, place-based policy options have the greatest impact on GHG emissions… scientists systematically identify key items of spatial planning that will make a difference: infrastructure investments, shaping urban form through managing density, land use mix, connectivity, and accessibility” (185). This is a rather broad conclusion. However, the IPCC’s particular notation of the need for land use mix, connectivity, and accessibility is consistent with much of the most recent planning and transportation literature.

Ewing and Cervero (2010) in JAPA, an update of their 2001 paper of the same name published in the Transportation Research Record “Travel and the Built Environment,” probably stands as one of the most comprehensive and credible articulations of the most effective modifications to the built environment (land use choices) to reduce VMT. Their literature identifies measuring the weighted average elasticities of VMT as one of the most consistent and effective ways to link modifications to the built environment to reductions in VMT. Again, their
findings note that distance accessibility (to jobs and downtown), land use diversity, street network design, and distance to transit are the most important land use choices to reduce VMT.

Although there appears to be a continued lack of consensus as to exactly which policies and land use choices most reduce VMT, a few themes emerge. The most specific and significant strategies identified in the literature to reduce VMT, and thus reduce GHG emissions, suggest (1) destination accessibility to jobs and downtown, (2) street network design and intersection density, and (3) land use diversity. (4) Proximity to downtown and (5) regional density can be used as well, but are typically identified as proxies for other strategies. The key is that these land use choices are more specific and significant than broadly identifying “density” or “compact development patterns” as strategies. Policy mechanisms such as priority funding, development impact fees, and regional containment have questionable significance—the biggest criticism (likelihood of ineffectiveness) seems to be associated with complications related to regional coordination. Parking management and congestion pricing are other levers to alleviate vehicle miles traveled, chiefly by reducing the time needed to cruise for parking.

Transit-oriented development (or simply “oriented development”) and mixed-use development tend to be broadly effective strategies, but upon closer study, reveal the importance of destination accessibility, diversity, design, and distance to transit.

Table 1, Specific and significant strategies defined, is my interpretation and categorization of the best strategies to reduce VMT and GHG in the literature. While there is some overlap between categories, such as land use diversity and mixed-use development, this is my best attempt to frame the varying strategies in the literature to conduct a CAP analysis. Some categories, such as transit-oriented or mixed-use development, may appear to be “strange bedfellows.” As noted in the table, a category such as transit-oriented (TOD) and mixed-use (MXD) development differs from land use diversity or public transit accessibility in that TOD and MXD are project- or district-focused—a contained or identifiable development project.
Table 1. Specific and significant strategies defined

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Destination or job accessibility, job-housing balance</td>
<td>time-to-work reductions, accessible employment centers</td>
</tr>
<tr>
<td>Land use diversity</td>
<td>varying land uses (mixed, but not project-focused), proximity to amenities and services</td>
</tr>
<tr>
<td>Street network and intersection design</td>
<td>complete streets or new urbanist ideas, compact walkability, neighborhood corridor development</td>
</tr>
<tr>
<td>Public transit accessibility, distance to transit</td>
<td>multimodal travel options, reducing distance to public transit, expanding transit networks</td>
</tr>
<tr>
<td>Transit-oriented or mixed-use development</td>
<td>&quot;oriented&quot; development focused on specific projects and districts</td>
</tr>
<tr>
<td>Parking or congestion management</td>
<td>reducing parking supply, relaxing minimum requirements, demand-responsive pricing</td>
</tr>
<tr>
<td>Priority funding, impact fees, or regional containment</td>
<td>economic incentives for infill development, disincentives for greenfield development, growth boundaries</td>
</tr>
</tbody>
</table>

Determined from literature review

Climate Action Plan Analyses

Have planners integrated any of these specific and significant strategies identified in the literature to reduce VMT in CAPs? Plan making is quite obviously a “strategic point of intervention” for planners with regard to energy and climate challenges (APA 2011). Are U.S. city CAPs explicitly planning to reduce VMT? Have CAPs identified destination or job accessibility, job-housing balance, land use diversity, street network and intersection design, public transit accessibility, distance to transit, TOD or MXD, parking or congestion management, priority funding, impact fees, or regional containment as strategies? Or do CAPs merely pay lip service to strategies for density, compact development patterns, smart growth, complete streets, new urbanism, and other trendy planning catchphrases? Do U.S. city CAPs even link land use choices and reductions in VMT and GHG emissions?

I don’t mean this as merely tongue-in-cheek. There’s a significant risk that planners are undermining their own goals and objectives if stated planning policies are, at best, generic or ubiquitous; at worst, ineffective or irrelevant, even harmful. As Reid Ewing barbed in Planning October 2012: “Recall the words of Minnesota Rep. Michelle Bachman, a founder of the Tea Party Caucus: ‘They [smart growth advocates] want Americans to move to the urban core, live in tenements, and take light rail to their government jobs. That’s their vision for America’” (43).
Simply being “smart growth advocates” is an unfortunate caricature of the aims and ideals of planning. While urban planners do not need to take up the mantle of transportation engineer or technocrat, planners and planning must do best to understand what policies drive real change. Reducing the need to drive can significantly reduce GHG emissions. The most specific and significant ways to reduce the need to drive focus on reducing VMT, which include some technocratic elasticity and index measures of land use choices.

In the U.S. to date, over 1,000 city mayors have signed the U.S. Conference of Mayors Climate Protection Agreement, originally launched in 2005 by Seattle Mayor Greg Nickels aimed at meeting Kyoto Protocol greenhouse gas emissions reductions targets (reduce emission by at least 7 percent below 1990 emissions by 2012). This agreement, along with other environmental and sustainability commitments, has spurred many cities and municipalities to create CAPs to reduce GHG emissions. The Climate Protection Agreement specifically outlines twelve actions cities should take, three of which are specific to transportation or land use. ICLEI Local Governments for Sustainability is an additional global network of cities, towns, and metropolises dedicated to sustainability and tackling climate change. The APA’s framework for planning and climate change expects best possible science; local, regional, national, international collaborative strategies; mitigation and adaptation actions; communication, citizen participation and engagement.

Wheeler (2008) looked at a sample of first generation CAPs to emerge post-Kyoto Protocol and found a wide variety in emissions reduction goals, voluntary actions, few resources actually committed, and vague implementation strategies. He found a need for more specific strategies aimed at motor vehicle use (changing driving behavior, reducing vehicle miles traveled). More recent CAP research indicates plans include a high level of awareness strategies but limited specific actions, lack regional coordination, over-rely on unspecified strategies (“enhanced transit… compact community design… green building codes”), tend towards high-visibility projects (such as tree planting) and short-term wins (like weatherization or
municipality fleet upgrades), and tend to do a poor job of explicitly linking mitigation actions to emissions reduction targets (Bassett and Shandas 2010; Boswell, Greve, and Seale 2010; Dierwechter 2010; Tang et al. 2010; Krause 2011a and 2011b; Hamin, Gurran, and Mesquita Emlinger 2014).

Krause (2011a and 2011b) conducted two original surveys in efforts to assess GHG reducing activities being implemented in U.S. cities and the extent of local commitment to climate protection. One study was a 2010 web-based survey with 329 city respondents across the U.S.; the other, a web- and phone-based survey of 53 Indiana municipalities. Both of these studies were done under the veil of general environmental and sustainability inquiries—not climate protection. The smaller-scale Indiana survey used a “municipal climate protection index” (MCPI) created largely from relevant academic literature. The study found that between 10 percent and 73 percent of Indiana municipalities were engaged in some GHG emissions reduction activity tied to the MCPI. But these were mostly activities like curb-side recycling and yard waste composting, and bike lanes or hike and bike trails (Krause 2011b). “Fewer than 5 percent have performed a greenhouse gas inventory, developed a reduction plan, or given climate-protection efforts a designated budget” (Krause 2011b, 57). Similarly, the larger U.S.-wide survey found that cities were mostly implementing “low-hanging fruit” emissions reductions measures: uncontroversial, inexpensive, implicit in their greenhouse gas emissions impacts (such as energy efficiency activities), provision of services (garbage and recycling, for instances), or distribution of information (awareness). Krause found that governments lacked policy entrepreneurs, had limited professional capacity, and internal coordinating problems. Most specific GHG emissions reduction efforts were ad hoc, project-based, and not necessarily characterized as part of a broader climate protection effort (Krause 2011a). Awareness activities were strong, analysis was fair, but actual climate actions were rare.

Bassett and Shandas (2010) recognized that CAPs could reduce GHG emissions “through legislation, regulatory action, and voluntary or incentive programs,” yet:
To date, planning scholars have paid little attention to climate change as a planning problem, and the planning literature contains little discussion of the potentials and pitfalls of this emergent type of planning. Specifically, we have little detail on the range of strategies and policies being adopted under the rubric of climate action planning or how such plans differ from place to place. (Bassett and Shandas 2010, 436)

They were interested in exploring how much climate action plans represented planning “innovation” versus merely “[repacking] old initiatives” (Bassett and Shandas 2010, 436). Their research built off of first-generation state and local level plans analyzed by Wheeler (2008). Bassett and Shandas specifically considered the role policy innovation and entrepreneurship might play at the local level, such as whether or not climate networks like the ICLEI Local Governments for Sustainability Cities for Climate Protection Program were acting “as a homogenizing force in planning, limiting innovation through standardization,” or facilitating “the development of robust place-based strategies that reflect local biophysical, political, and economic realities” (2010, 437). Bassett and Shandas selected twenty U.S. city CAPs, one to three from each of the ten EPA-identified geographic planning regions, and categorized plan policies based on their breadth (“the array of climate-relevant policies identified for adoption”) and depth (“how fully developed, justified, and operationalized each of the plan’s proposed policies or actions were”). A graduate student also interviewed sixteen key informants.

They found a wide variety in what constitutes a CAP, ranging from the amount of text to whether or not they were standalone documents or sections of a broader comprehensive or sustainability plan. Some plans were spearheaded by planning departments and commissions, others by working groups and steering committees, and others with heavy involvement from universities and foundations. “The most common actions the reviewed plans recommended that local governments take themselves fell within transportation, energy efficiency, and renewable energy categories” (Bassett and Shandas 2010, 440). The authors developed seven scoring categories to evaluate each plan, with three of the seven being (1) transportation, (2) solid waste recycling, and (3) land use. Adopting zoning ordinances to reduce auto use and
enhancing transit services were identified in a majority of plans: 55 percent and 80 percent, respectively, of plans reviewed identified these as policies or actions.

Particular to transportation-related strategies, Bassett and Shandas’ research only went so far as to specify zoning ordinances to reduce auto use as general mentions of compact development (increasing density, removing lot-size minimums), TOD ordinances, or parking maximums. Enhancing transit services was identified as anything mentioned in the plans along the lines of extended hours, extended lines for transit services, alternative transportation (such as bicycle programs), and travel demand management policies (flex-work hours, telecommuting, rideshare programs). Efforts to reduce VMT were apparently linked only to increased bicycle and pedestrian infrastructure, which a majority of plans reviewed did mention. Their review did not drill down to specific and significant land use choices to reduce VMT as identified in other literature, such as destination accessibility, street network design and intersection density, land use diversity, proximity to downtown, or regional density.

Boswell, Greve, and Seale (2010) similarly reviewed thirty U.S. city climate action plans. They identified the origins of climate action planning, tracing it back to the 1983 Brundtland Commission and United Nations World Commission on Environment and Development’s definition of “sustainable development,” through the emergence of the United Nations Framework Convention on Climate Change in the early-1990s, to the emergence of state and municipal climate protection networks in the early-2000s. They looked more closely at the process of local governments conducting GHG emissions inventories and linking the inventories to a plan. They identified “technological, social/behavioral, legislative and regulatory, demographic, and economic” influences on GHG emissions beyond the direct purview of planners and CAPs (Boswell, Greve, and Seale 2010, 454). They fully recognized the problems associated with properly inventoring current emissions and forecasting: “to misjudge the amount of local mitigation needed” (2010, 454). The selected plans were not limited to those signatory to ICLEI Local Governments for Sustainability Cities for Climate Protection Program or
the U.S. Conference of Mayors Climate Protection Agreement, although a vast majority are signatories to these commitments and members of their networks. Category information including municipal and demographic, planning process and public participation, inventory structure and content, plan structure and content, mitigation actions, and adaptation actions were analyzed, with specific variables identified.

While they found that nearly all plans included a basic climate-science primer, reviewed potential local and regional impacts, conducted a GHG emissions inventory, identified reduction targets and emissions forecasts, and articulated mitigation policies, programs, and actions, far less than half (27 percent) identified adaptation policies, programs, and actions, or addressed financing, and only 47 percent mentioned anything about monitoring and evaluation (Boswell, Greve, and Seale 2010). They found that it was uncommon for plans to explicitly link plan policies, programs, and actions to expected GHG emissions reductions. The City of Cincinnati’s plan was one of the few they analyzed that quantified and documented expected transportation emissions reductions through measures such as increased bicycling. “Several communities plan to reach their reduction targets by counting on single, large proposed actions such as offshore wind farms or significant changes in the fuel mix of local energy providers,” which are both beyond the purview of planners (Boswell, Greve, and Seale 2010, 459).

More recent literature published in *JAPA* has not directly reviewed U.S. city CAPs like Wheeler (2008), Bassett and Shandas (2010), or Boswell, Greve, Seale (2010), however has looked at similar climate planning areas such as legislation, property rights, taxation, and funding. Barbour and Deakin (2012) looked very specifically at California’s Senate Bill 375, similar to Boarnet et al. (2011), and reinforced the need to bridge the regional-local divide to combat sprawl. Trapenberg Frick (2013) highlighted the efforts of Tea Party and property-rights advocates at pushing back against the very regional planning efforts needed to bridge the regional-local divide. Plan financing, as Boswell, Greve, and Seale (2010) also found, was largely ignored in CAPs and a huge bone of contention similarly identified by Trapenberg Frick.
Trapenberg Frick looked at regional planning efforts in the San Francisco Bay Area and Atlanta, and found that taxation and funding proposals in both areas were opposed, and that “some claims by conservative opponents overlap with those of progressive groups like the Sierra Club” (2013, 190). Strategies for well-intentioned regional planning efforts were characterized as “pleasant-sounding names camouflage[ing] top-down, centralized planning programs” (Trapenberg Frick 2013, 195). Hamin, Gurran, and Mesquita Emlinger (2014) identified similar barriers to climate adaptation studying smaller cities and towns in coastal Massachusetts that instead focused more on hazard mitigation—protecting private property, something much more alluring to property-rights advocates.

Jepson and Haines (2014) reviewed and analyzed zoning ordinances for 32 U.S. cities using ICLEI Local Governments for Sustainability membership data to better understand how sustainability goals were being achieved, and scored nine categories of sustainability principles with a total of 53 corresponding regulatory items. Containing the largest number of regulatory items, Burlington, VT’s zoning ordinances contained 33 of 53 possible; on average, only eighteen regulatory items were contained in the 32 ordinances reviewed. Three of the nine sustainability principles related directly to land use or transportation: (1) encourage higher density development, (2) encourage mixed use, and (3) encourage transportation alternatives. Only fourteen percent of all zoning ordinances reviewed included higher density items such as infill development, small lot residential, or purchase or transfer of development rights. Nearly forty percent of the ordinances included mixed-use regulatory items. Only about thirty percent of the ordinances included transportation alternative regulatory items, the most common being shared parking (72 percent).

“One of the most derogatory comments that can be made to a city planner is that the main tangible product of his or her work—the plan—simply ‘sits on a shelf.’ Urban planning would seem to have limited value if the plans fail to be implemented, and are not dusted off and used by city staff, elected officials and developers” (Millard-Ball 2013, 5). Plans must not just be
implemented, but play a causal role in achieving their aims (Millard-Ball 2012 and 2013).
Millard-Ball studied municipal climate action plans in California and found “the preferences of residents, business owners, city staff and elected officials over environmental policies appear to offer a more convincing causal explanation than does planning for the implementation of specific measures to reduce greenhouse gas emissions” (2013, 30). In other words, cities are using climate plans to codify policies that were likely to happen anyway (Millard-Ball 2012 and 2013). Criticisms like this have ignited interest in seeing if CAPs really are relevant.

Are cities “simply acting in according with pre-existing preferences, and climate plans might best be interpreted as a signal of these altruistic preferences rather than an independent causal mechanism,” or “repacking existing initiatives” (Millard-Ball 2012, 32; Bassett and Shandas 2010, 436)? It is difficult to say. But it is clear that the jury is still out on whether or not most CAPs are actually moving the needle, and most CAP studies have not really drilled down on specific transportation and land use policies. There seems to be an opportunity to further study U.S. city CAPs to see if specific and significant land use choices are being better integrated into plans to reduce VMT and reduce GHG emissions.

## Methods and Data

Similar to Bassett and Shandas (2010), Boswell, Greve, and Seale (2010), and Jepson and Haines (2014) zoning ordinance review, I read and evaluate the content of thirty U.S. plans. Most of these plans explicitly identify as city CAPs. However, some are broader sustainability, comprehensive, or GHG inventory reports with climate actions nested within, from major cities that do not explicitly have a “climate action plan.” I feel it important to include some of these, as they represent major urban areas (such as New York and Atlanta). I identified and accessed these plans by simple web-based search. Each plan was purposefully selected from each of the National Oceanic and Atmospheric Administration (NOAA) climate regions across the U.S. and
most major metropolitan statistical areas to represent a range of sample cities. I also refer to the White House’s 2014 release, “16 U.S. Communities Recognized as Climate Action Champions for Leadership on Climate Change,” and purposefully selected a handful of these community plans (Boston, Miami, Dubuque, Minneapolis, Oberlin, Salt Lake City, San Francisco, and Seattle). One plan is actually a grouping of three similar plans among a small city/suburban alliance (Hazel Park-Southgate-Ypsilanti, MI). Miami is composed of both the Miami-Dade County and Southeast Florida Regional Climate Change Compact plans. Content analysis will determine if these plans are planning to reduce VMT with any specific and significant land use choices identified in the literature.

For each plan, I provide geography and context for the city, the plan name, year (adopted or most recently revised), and geographic/municipal scope of the plan (for instance, city-proper or including neighboring counties). Then, I discuss overall GHG emissions reductions expected, transportation or land use reductions explicitly linked to expected emissions reductions, and VMT reductions expected if explicitly articulated. Finally, I provide a summary of the observed link between the specific and significant strategies identified in the literature to reduce vehicle miles and GHG emissions, noting which strategies are in each plan (if any), and a breakdown of the percentage of plans analyzed containing the specific and significant strategies. All of the data is presented in tables 3-7.

Specific and significant strategies identified in the literature to reduce VMT and GHG emissions are categorized and coded for analysis in plans as provided in Table 1, displayed here again in Table 2 with their accompanying code referenced in the data analysis. Plans are analyzed looking especially for baseline GHG emissions inventory data, transportation and land use strategies, and expected links between these strategies, emissions reductions, and vehicle miles traveled reductions. All but one plan (Baltimore) is reviewable by Adobe Portable Document Format (PDF), allowing words and phrases to be directly searched in the document. Most plan documents are upwards of 100 pages or more—a combination of extensive technical
text, data, graphics, tables, and charts. If climate action plan strategies or reductions are not explicitly articulated, they are likely not captured for data analysis. Each plan has to do a good job clearly spelling out its intended transportation and land use strategies to reduce VMT.

Table 2. Specific and significant strategies defined and coded

<table>
<thead>
<tr>
<th>Strategy Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Destination or job accessibility, job-housing balance [DJHB]</td>
<td>time-to-work reductions, accessible employment centers</td>
</tr>
<tr>
<td>Land use diversity [LUD]</td>
<td>varying land uses (mixed, but not project-focused), proximity to amenities and services</td>
</tr>
<tr>
<td>Street network and intersection design [SNID]</td>
<td>Complete Streets or New Urbanist ideas, compact walkability, neighborhood corridor development</td>
</tr>
<tr>
<td>Public transit accessibility, distance to transit [TADT]</td>
<td>multimodal travel options, reducing distance to public transit, expanding transit networks</td>
</tr>
<tr>
<td>Transit-oriented or mixed-use development [TODMXD]</td>
<td>&quot;oriented&quot; development focused on specific projects and districts</td>
</tr>
<tr>
<td>Parking or congestion management [PCM]</td>
<td>reducing parking supply, relaxing minimum requirements, demand-responsive pricing</td>
</tr>
<tr>
<td>Priority funding, impact fees, or regional containment [PFIFRC]</td>
<td>economic incentives for infill development, disincentives for greenfield development, growth boundaries</td>
</tr>
</tbody>
</table>

Determined from literature review

Table 3, Plan geography and context, provides an overview of each analyzed plan’s corresponding NOAA climate region, Metropolitan Statistical Area (MSA) with estimated 2013 population and the percentage population change since 2010, city 2013 estimated population and the percentage change since 2010, city area in square miles, and city persons per square mile (density). The population and square mileage data is from the U.S. Census Bureau. This information is intended to provide general reference to the magnitude of each corresponding plan and context for emissions and VMT data. Clearly, a much larger city and MSA would expect more emissions than a smaller municipality and vice versa.

Table 4, Plan name, year, scope, participants, and other plans referenced, provides additional contextual information for each plan. The plan name, year adopted or most recent update, scope (city-proper, neighboring counties, or metropolitan area as noted), an overview of most participants included in the plan’s creation and implementation, and other notable plans referenced are the categories introduced here. In many plans, substantial reference is made to other planning documents, such as transportation or comprehensive plans separate from the
CAP. Reviewing each climate action plan results in the data. This data—particularly the participants and other plans referenced—is by no means exhaustive. There may be a contributing working group, government agency, college or university, or resident survey overlooked. The intent is to capture the general range of participants and relevant planning documents. Some climate action plans are more deliberate than others in highlighting all participants, contributing constituents, and supplementary plans.
<table>
<thead>
<tr>
<th>City</th>
<th>Climate Region</th>
<th>MSA Pop. 2013; % Δ from 2010</th>
<th>City Pop. 2013; % Δ from 2010</th>
<th>City Sq. Miles</th>
<th>City Persons / Sq. Mile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albuquerque</td>
<td>Southwest</td>
<td>902,797; +1.46%</td>
<td>556,495; +1.9%</td>
<td>189</td>
<td>2,908</td>
</tr>
<tr>
<td>Atlanta</td>
<td>Southeast</td>
<td>5,522,942; +3.96</td>
<td>447,841; +6.6%</td>
<td>133</td>
<td>3,154</td>
</tr>
<tr>
<td>Austin</td>
<td>South</td>
<td>1,883,051; +8.25%</td>
<td>885,400; +9.2%</td>
<td>298</td>
<td>2,653</td>
</tr>
<tr>
<td>Baltimore</td>
<td>Northeast</td>
<td>2,770,738; +2%</td>
<td>622,104; +0.2%</td>
<td>81</td>
<td>7,672</td>
</tr>
<tr>
<td>Boston</td>
<td>Northeast</td>
<td>4,684,299; +2.57%</td>
<td>645,966; +4.6%</td>
<td>48</td>
<td>12,793</td>
</tr>
<tr>
<td>Chicago</td>
<td>Ohio Valley</td>
<td>9,537,289; +0.7%</td>
<td>2,718,782; +0.9%</td>
<td>228</td>
<td>11,842</td>
</tr>
<tr>
<td>Cincinnati</td>
<td>Ohio Valley</td>
<td>2,137,406; +0.94%</td>
<td>297,517; +0.2%</td>
<td>78</td>
<td>3,810</td>
</tr>
<tr>
<td>Cleveland</td>
<td>Ohio Valley</td>
<td>2,064,725; -0.53%</td>
<td>390,113; -1.7%</td>
<td>78</td>
<td>5,107</td>
</tr>
<tr>
<td>Denver</td>
<td>Southwest</td>
<td>2,697,476; +5.33%</td>
<td>649,495; +8.2%</td>
<td>153</td>
<td>3,923</td>
</tr>
<tr>
<td>Dubuque</td>
<td>Upper Midwest</td>
<td>95,697; +1.89%</td>
<td>58,253; +1.3%</td>
<td>30</td>
<td>1,923</td>
</tr>
<tr>
<td>Greensboro</td>
<td>Southeast</td>
<td>741,065; +2.15%</td>
<td>279,639; +4%</td>
<td>127</td>
<td>2,132</td>
</tr>
<tr>
<td>Hazel Park- Southgate- Ypsilanti</td>
<td>Upper Midwest</td>
<td>4,294,983; +0.08% (Detroit)</td>
<td>16,615; +1.2% (Hazel Park)</td>
<td>3 (Hazel Park)</td>
<td>5,828</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>29,487; -1.9% (Southgate) (Ypsilanti)</td>
<td>7 (Southgate)</td>
<td>4,389</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>19,809; +1.9% (Ypsilanti)</td>
<td>4 (Ypsilanti)</td>
<td>4,490 (Ypsilanti)</td>
</tr>
<tr>
<td>Houston</td>
<td>South</td>
<td>6,313,158; +5.77%</td>
<td>2,195,914; +4.7%</td>
<td>600</td>
<td>3,502</td>
</tr>
<tr>
<td>Juneau</td>
<td>Alaska</td>
<td>32,660; +3.9%</td>
<td>32,660; +3.9%</td>
<td>12</td>
<td>2,702</td>
</tr>
<tr>
<td>Kansas City</td>
<td>Ohio Valley</td>
<td>2,054,473; +1.99%</td>
<td>467,007; +1.6%</td>
<td>315</td>
<td>1,460</td>
</tr>
<tr>
<td>Los Angeles</td>
<td>West</td>
<td>13,131,431; +2.19%</td>
<td>3,884,307; +2.4%</td>
<td>469</td>
<td>8,092</td>
</tr>
<tr>
<td>Louisville</td>
<td>Ohio Valley</td>
<td>1,262,261; +1.93%</td>
<td>609,893; +2.1%</td>
<td>325</td>
<td>1,837</td>
</tr>
<tr>
<td>Miami</td>
<td>Southeast</td>
<td>5,828,191; +4.23%</td>
<td>417,650; +4.5%</td>
<td>36</td>
<td>11,136</td>
</tr>
<tr>
<td>Minneapolis</td>
<td>Upper Midwest</td>
<td>3,459,146; +3.01%</td>
<td>400,070; +4.6%</td>
<td>54</td>
<td>7,088</td>
</tr>
<tr>
<td>New York</td>
<td>Northeast</td>
<td>19,949,502; +1.77%</td>
<td>8,405,837; +2.8%</td>
<td>303</td>
<td>27,013</td>
</tr>
<tr>
<td>Oberlin</td>
<td>Upper Midwest</td>
<td>2,064,725; -0.53%</td>
<td>8,390; +1.3%</td>
<td>5</td>
<td>1,685</td>
</tr>
<tr>
<td>Pittsburgh</td>
<td>Northeast</td>
<td>2,360,867; +0.18%</td>
<td>305,841; +0.04%</td>
<td>55</td>
<td>5,521</td>
</tr>
<tr>
<td>Portland</td>
<td>Northwest</td>
<td>2,314,554; +3.56%</td>
<td>609,456; +4.4%</td>
<td>133</td>
<td>4,375</td>
</tr>
<tr>
<td>Sacramento</td>
<td>West</td>
<td>2,215,770; +2.77%</td>
<td>479,686; +2.8%</td>
<td>98</td>
<td>4,762</td>
</tr>
<tr>
<td>Salt Lake</td>
<td>Southwest</td>
<td>1,140,483; +4.3%</td>
<td>191,180; +2.5%</td>
<td>111</td>
<td>1,678</td>
</tr>
<tr>
<td>San Diego</td>
<td>West</td>
<td>3,211,252; +3.33%</td>
<td>1,355,896; +4.2%</td>
<td>325</td>
<td>4,020</td>
</tr>
<tr>
<td>San Francisco</td>
<td>West</td>
<td>4,516,276; +3.8%</td>
<td>837,442; +4%</td>
<td>47</td>
<td>17,179</td>
</tr>
<tr>
<td>Seattle</td>
<td>Northwest</td>
<td>3,610,105; +4.48%</td>
<td>652,405; +7.2%</td>
<td>84</td>
<td>7,251</td>
</tr>
<tr>
<td>Washington, DC</td>
<td>Northeast</td>
<td>5,949,859; +4.79%</td>
<td>646,449; +7.4%</td>
<td>61</td>
<td>9,857</td>
</tr>
<tr>
<td>Winston-Salem</td>
<td>Southeast</td>
<td>650,820; +1.47%</td>
<td>236,441; +3%</td>
<td>132</td>
<td>1,734</td>
</tr>
</tbody>
</table>

Sources: National Oceanic and Atmospheric Administration climate regions and U.S. Census Bureau
<table>
<thead>
<tr>
<th>Plan</th>
<th>Year</th>
<th>Scope</th>
<th>Participants</th>
<th>Other Plans Referenced</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;City of Albuquerque Climate Action Plan&quot;</td>
<td>2009</td>
<td>Albuquerque metropolitan area</td>
<td>Climate Action Task Force: 60 volunteers, government, business, industry, and interest group representatives; City of Albuquerque internal staff review</td>
<td>Albuquerque’s Planned Growth Strategy</td>
</tr>
<tr>
<td>&quot;Power to Change&quot;</td>
<td>2014</td>
<td>Atlanta metropolitan area</td>
<td>Mayor's Office of Sustainability; public input</td>
<td>Atlanta Regional Commission PLAN 2040</td>
</tr>
<tr>
<td>&quot;Austin Community Climate Plan&quot;</td>
<td>2014</td>
<td>City of Austin and Travis County</td>
<td>Office of Sustainability; Community Climate Steering Committee; Technical Advisory Groups; SpeakUp Austin forums for public input and feedback; online survey</td>
<td>Imagine Austin Comprehensive Plan; Austin Strategic Mobility Plan; Austin Bicycle Master Plan and Urban Trails Master Plan (ABMP); Complete Streets Policy; The Capital Area Metropolitan Planning Organization's 2035 Regional Transportation Plan (CAMPO); Austin-Round Rock Metropolitan Statistical Area Ozone Advance Program Plan</td>
</tr>
<tr>
<td>&quot;Baltimore Climate Action Plan&quot;</td>
<td>2012</td>
<td>City of Baltimore</td>
<td>Baltimore Office of Sustainability</td>
<td>Baltimore Sustainability Plan</td>
</tr>
<tr>
<td>&quot;Greenovate Boston&quot;</td>
<td>2014</td>
<td>City of Boston</td>
<td>Climate Action Plan Steering Committee</td>
<td>Go Boston 2030; 2013 Boston Bike Network Plan</td>
</tr>
<tr>
<td>&quot;Chicago Climate Action Plan&quot;</td>
<td>2008</td>
<td>City of Chicago and six-county metro area</td>
<td>Chicago Climate Action Task Force; several hundred Chicago businesses; civic and environmental leaders; finance, communications, and research advisory committees; other public agencies; private foundations</td>
<td>Bike 2015 Plan; Chicago Pedestrian Plan; Green Urban Design Plan</td>
</tr>
<tr>
<td>&quot;Green Cincinnati Plan&quot;</td>
<td>2013</td>
<td>City of Cincinnati and Hamilton County</td>
<td>Office of Environmental Quality; Green Umbrella Action Team; Steering Committee (government, businesses, education, utilities, civic institutions, foundations, other non-profits)</td>
<td>2008 Green Cincinnati Plan; PLAN CINCINNATI</td>
</tr>
<tr>
<td>&quot;Cleveland Climate Action Plan&quot;</td>
<td>2013</td>
<td>City of Cleveland</td>
<td>Mayor’s Office of Sustainability; Sustainable Cleveland Stewardship Council; 50-member Climate Action Advisory Committee; working group members from business, government, nonprofit, and institutional sectors; resident surveys</td>
<td>Sustainable Cleveland 2019 Action and Resources Guide; Sustainable Cleveland Municipal Action Plan; Complete and Green Streets Ordinance; Bikeway Master Plan</td>
</tr>
<tr>
<td>Plan</td>
<td>Year</td>
<td>Scope</td>
<td>Participants</td>
<td>Other Plans Referenced</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>------</td>
<td>-------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>&quot;City of Denver Climate Action Plan&quot;</td>
<td>2007</td>
<td>City and County of Denver</td>
<td>Greenprint Denver Advisory Council; University of Colorado at Denver; city agencies, including Community Planning and Development</td>
<td>Solid Waste Master Plan</td>
</tr>
<tr>
<td>&quot;Dubuque Community Climate Action &amp; Resiliency Plan&quot;</td>
<td>2013</td>
<td>City of Dubuque</td>
<td>Sustainable Dubuque; Green Dubuque, Inc.</td>
<td>Dubuque Unified Development Code</td>
</tr>
<tr>
<td>&quot;Sustainability Action Plan Greensboro, North Carolina&quot;</td>
<td>2011</td>
<td>City of Greensboro</td>
<td>Community Sustainability Council; City Council; government agencies, including Housing and Community Development; Brendle Group, Inc.; Clarion Associates</td>
<td>Greensboro Comprehensive Plan; Greensboro Development Ordinance; Energy Efficiency and Conservation Strategy</td>
</tr>
<tr>
<td>&quot;City of Hazel Park Energy Action Plan,&quot; &quot;City of Southgate Climate Action Plan,&quot; and &quot;City of Ypsilanti Climate Action Plan&quot;</td>
<td>2012</td>
<td>City of Hazel Park, City of Southgate, and City of Ypsilanti (Detroit MSA)</td>
<td>Michigan Suburbs Alliance; Planning Commissions; City Councils; Warm Training Center; community organizations (e.g., Kiwanis Club); Eastern Michigan University; interviews, online engagement, public meetings</td>
<td>Hazel Park 2000 Master Plan; Southgate 2006 Master Plan; Washtenaw County-wide Transit Master Plan; Ypsilanti's Master Plan</td>
</tr>
<tr>
<td>&quot;Emissions Reduction Plan&quot;</td>
<td>2008</td>
<td>City of Houston (municipal operations only)</td>
<td>Green Houston</td>
<td></td>
</tr>
<tr>
<td>&quot;Juneau Climate Action &amp; Implementation Plan&quot;</td>
<td>2011</td>
<td>City and Borough of Juneau (CBJ)</td>
<td>CBJ Commission on Sustainability and Green Team; Deputy City Manager; Community Development, Engineering, Finance, Public Works Departments; Skilbred Consulting; Sheinberg Associates; resident survey; public focus groups and meetings; Juneau Assembly Committee of the Whole</td>
<td>2008 Comprehensive Plan; 2008 Transit Development Plan; 2009 Juneau Non-Motorized Transportation Plan;</td>
</tr>
<tr>
<td>&quot;Climate Protection Plan&quot;</td>
<td>2008</td>
<td>City of Kansas City</td>
<td>Climate Protection Plan Steering Committee; City's Chief Environmental Officers, internal staff; Environmental Management Commission; Greater Kansas City Chamber of Commerce Energy Policy Task Force</td>
<td>Comprehensive Parking Plan (in development)</td>
</tr>
<tr>
<td>&quot;Green LA&quot; and &quot;Climate LA&quot;</td>
<td>2007</td>
<td>City of Los Angeles</td>
<td>City of Los Angeles; EnvironmentLA, Environmental Affairs Commission</td>
<td></td>
</tr>
<tr>
<td>Plan</td>
<td>Year</td>
<td>Scope</td>
<td>Participants</td>
<td>Other Plans Referenced</td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>------</td>
<td>---------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>&quot;Partnership for a Green City Climate Action Report&quot;</td>
<td>2009</td>
<td>Louisville and Jefferson County</td>
<td>Partnership for a Green City; Climate Change Committee Working Groups; Louisville Metro Air Pollution Control District; industry, utilities, quasi-governmental entities, environmentalists and citizens; Louisville Metro Government; Jefferson County Public Schools; University of Louisville</td>
<td>Natural Hazards Mitigation Plan; LG&amp;E’s 2008 Integrated Resource Plan (IRP)</td>
</tr>
<tr>
<td>&quot;A Region Responds to a Changing Climate&quot; and &quot;GreenPrint Plan&quot;</td>
<td>2012</td>
<td>Palm Beach, Broward, Miami-Dade, and Monroe Counties</td>
<td>Southeast Florida Regional Climate Change Compact; Miami-Dade County; Mayors Sustainability Advisory Board; GreenPrint Core Planning Team; Climate Change Advisory Task Force</td>
<td>Regional Climate Action Plan Implementation Guide; Comprehensive Everglades Restoration Plan; Long Range Transportation Plan; Comprehensive Development Master Plan; other master plans</td>
</tr>
<tr>
<td>&quot;Minneapolis Climate Action Plan&quot;</td>
<td>2013</td>
<td>Minneapolis metropolitan area</td>
<td>Minneapolis City Coordinator, Sustainability Office; Steering Committee; Working Groups; public input</td>
<td>The Minneapolis Plan for Sustainable Growth; Comprehensive Plan; Access Minneapolis; Pedestrian Master Plan and Bicycle Master Plan</td>
</tr>
<tr>
<td>&quot;Oberlin Climate Action Plan&quot;</td>
<td>2013</td>
<td>City of Oberlin</td>
<td>Climate Action Committee; Oberlin College; City Utilities; The Oberlin Project; Policy Matters Ohio; Clinton Climate Initiative</td>
<td>Allegheny County’s 2011 Sustainability Plan; Plan PGH</td>
</tr>
<tr>
<td>&quot;Pittsburgh Climate Action Plan&quot;</td>
<td>2012</td>
<td>City of Pittsburgh and Allegheny County</td>
<td>Green Building Alliance &amp; Student Conservation Association; City of Pittsburgh Sustainability Commission; Citizens for Pennsylvania’s Future; Allegheny County; ACTION Housing, Inc.; University of Pittsburgh; Duquesne University; Carnegie Mellon University; Business Climate Coalition; Black and Gold City Goes Green Community Partners; Higher Education Climate Consortium; endowments and foundations, other civic associations</td>
<td>Allegheny County’s 2011 Sustainability Plan; Plan PGH</td>
</tr>
<tr>
<td>Plan</td>
<td>Year</td>
<td>Scope</td>
<td>Participants</td>
<td>Other Plans Referenced</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>--------</td>
<td>------------------------------</td>
<td>------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>&quot;Portland’s 2015 Climate Action Plan&quot;</td>
<td>2015</td>
<td>City of Portland and Multnomah County</td>
<td>Portland Bureau of Planning and Sustainability; other city and county agencies; Climate Action Plan Steering Committee and Equity Working Group</td>
<td>Climate Change Preparation Strategy and Risk and Vulnerabilities Assessment; Portland Plan 2012; Portland Comprehensive Plan; Portland Transportation System Plan (TSP); Portland Urban Forestry Management Plan and Urban Forest Action Plan; Portland Watershed Management Plan (PWMP); Portland Parks &amp; Recreation 2020 Vision; Metro 2040 Growth Concept and the Urban Growth Management Functional Plan; Metro Regional Transportation Plan (RTP)</td>
</tr>
<tr>
<td>&quot;Sacramento Climate Action Plan&quot;</td>
<td>2012</td>
<td>City of Sacramento</td>
<td>City of Sacramento, including Community Development Department; Ascent Environmental, Inc.; Mintier Harnish; Fehr &amp; Peers; The Energy Alliance Association</td>
<td>2030 General Plan; Green Infrastructure Master Plan</td>
</tr>
<tr>
<td>&quot;Sustainable Salt Lake Plan 2015&quot;</td>
<td>2015</td>
<td>City of Salt Lake</td>
<td>Division of Sustainability</td>
<td>2001 Energy and Transportation Sustainability Plan</td>
</tr>
<tr>
<td>&quot;City of San Diego Climate Action Plan&quot;</td>
<td>2014</td>
<td>San Diego metropolitan area</td>
<td>Environmental and Economic Sustainability Task Force; City of San Diego staff; San Diego Gas &amp; Electric Program; Krout Associates; University of San Diego School of Law</td>
<td>Regional Transportation Plan; Regional Comprehensive Plan (General Plan); Regional Bicycle Plan</td>
</tr>
<tr>
<td>&quot;San Francisco Climate Action Strategy&quot;</td>
<td>2013</td>
<td>City of San Francisco</td>
<td>Department of the Environment; other city and county agencies; community members, local businesses, national academic organizations, and international consultants</td>
<td>San Francisco General Plan</td>
</tr>
<tr>
<td>&quot;Seattle Climate Action Plan&quot;</td>
<td>2013</td>
<td>Seattle metropolitan area</td>
<td>Green Ribbon Commission; Planning and Development; Office of Sustainability &amp; Environment; City Council Energy and Environment Committee; Technical Advisory Committees; GGLO</td>
<td>Comprehensive Plan; Transportation Strategic Plan; Consolidated Plan for Housing &amp; Community Development; Transit Master Plan; Bicycle Master Plan; Pedestrian Master Plan; Neighborhood Plans; Freight Master Plan (2014)</td>
</tr>
<tr>
<td>&quot;Climate of Opportunity&quot;</td>
<td>2010</td>
<td>Washington, DC (the district)</td>
<td>District Department of the Environment</td>
<td>District of Columbia’s Comprehensive Plan; District Bicycle Master Plan</td>
</tr>
<tr>
<td>&quot;Greenhouse Gas Inventory and Local Action Plan to Reduce Emissions&quot;</td>
<td>2008</td>
<td>City of Winston-Salem and Forsyth County</td>
<td>City of Winston-Salem</td>
<td>PART Long Range Transportation Plan</td>
</tr>
</tbody>
</table>
Table 5, Plan overall GHG, transit or land use, VMT reductions, contains data that is difficult to summarize. There are many differing baseline years for GHG emissions inventories and subsequent reductions targets among the plans. Some plans articulate the Kyoto Protocol’s 1990 baseline year and seven percent reduction by 2012 target. However, it is unclear if some of these plans, many adopted prior to 2012 without any apparent update, have met this reduction target or been revised. Most plans aim long-term to reduce baseline year emissions eighty percent by 2050 with interim targets. I feel it sufficient to generalize each plan’s overall GHG emissions reduction target, as the intent is to provide a broad context for the transportation, land use, and VMT reductions. It’s difficult to clearly ascertain a baseline year for emissions reduction targets in many plans, and baseline emissions do not necessarily match a plan year date.

Table 5 Transit or land use (LU) reductions refer to the sum or percentage of GHG emissions reductions, expected in each plan, directly attributed to transportation or land use choices. Transit or land use (LU) is simply shorthand for the purpose of the table display for the observed reductions attributed to the specific and significant transportation and land use strategies. This is challenging to tease out in most cases, and some plans made no explicit connection between transportation or land use choices and projected GHG emissions reductions. Lastly, any link to projected VMT reductions is provided. This is similarly challenging to ascertain for most plans, as few did a good job identifying projected reductions. Most plans attribute baseline or current emissions to transportation or land use, and note baseline or current VMT. Projecting the impacts of planned strategies on these emissions or VMT is another story.

Table 6, Plan link to specific and significant strategies, provides the specific and significant strategy categories (see Table 1 for category details) as coded and analyzed in each plan, and an overall rating (good, fair, or poor) of each plan’s link to those strategies. The data set created is a result of reading and synthesizing anywhere from dozens to hundreds of actions.
(strategies) in each plan. A plan, simply by virtue of including a wide variety of strategies, doesn't necessarily do a good job linking those strategies to expected emissions or VMT reductions.

The good, fair, or poor rating reflects a combination of the important strategies in each plan and the link to expected reductions. This is a subjective assessment. There is not a certain threshold of the number of specific or significant strategies included in a given plan, magnitude of expected GHG or VMT reductions attributable to transportation or land use reductions, or other similar measures that absolutely determines these ratings. This rating is meant to generally reflect how well these linkages are articulated in each CAP. In other words: how easy is it for the reader to identify transportation and land use strategies to reduce VMT and GHG, and is there any clear connection to expected reductions? In many cases, this is a reflection of how well a given plan displays or communicates its strategies.
<table>
<thead>
<tr>
<th>City</th>
<th>Overall GHG Reduction</th>
<th>Transit or LU Reduction</th>
<th>VMT Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albuquerque</td>
<td>7.44 MMTCO(_2) e by 2050</td>
<td>25-100% by 2050</td>
<td>Not noted</td>
</tr>
<tr>
<td>Atlanta</td>
<td>15% by 2020</td>
<td>Not noted</td>
<td>Not noted</td>
</tr>
<tr>
<td>Austin</td>
<td>Net-zero by 2050 (14.5 MMTCO(_2) e)</td>
<td>7.475 MMTCO(_2) e by 2050</td>
<td>6 billion less by 2050</td>
</tr>
<tr>
<td>Baltimore</td>
<td>15% by 2020</td>
<td>Not noted</td>
<td>Not noted</td>
</tr>
<tr>
<td>Boston</td>
<td>25% by 2020 and 80% by 2050</td>
<td>1.35 MMTCO(_2) e by 2020</td>
<td>5.5% less by 2020</td>
</tr>
<tr>
<td>Chicago</td>
<td>25% by 2020 and 80% by 2050</td>
<td>5.01 MMTCO(_2) e by 2050</td>
<td>Not noted</td>
</tr>
<tr>
<td>Cincinnati</td>
<td>24% by 2020 and 7.1 MMTCO(_2) e by 2050</td>
<td>360,000 MTCO(_2) e per year by 2050</td>
<td>3.33 billion less by 2050</td>
</tr>
<tr>
<td>Cleveland</td>
<td>16% by 2020, 40% by 2030, 80% by 2050</td>
<td>251,500 MTCO(_2) e per year by 2030</td>
<td>Not noted</td>
</tr>
<tr>
<td>Denver</td>
<td>4.44 MMTCO(_2) e by 2020</td>
<td>410,000 MTCO(_2) e per year by 2020</td>
<td>25% less by 2020</td>
</tr>
<tr>
<td>Dubuque</td>
<td>1.3 MMTCO(_2) e by 2030</td>
<td>520,000 MTCO(_2) e by 2030</td>
<td>10% less by 2030</td>
</tr>
<tr>
<td>Greensboro</td>
<td>Stabilize to 2010 emissions by 2020</td>
<td>181,000-403,000 MTCO(_2) e by 2020</td>
<td>10% less by 2020</td>
</tr>
<tr>
<td>Hazel Park-Southgate-Ypsilanti</td>
<td>50% by 2050</td>
<td>10,170 MTCO(_2) e by 2020</td>
<td>346,642 less by 2020</td>
</tr>
<tr>
<td>Houston</td>
<td>Not noted</td>
<td>1,741 MTCO(_2) e per year</td>
<td>140 million less</td>
</tr>
<tr>
<td>Juneau</td>
<td>25% by 2032</td>
<td>100,000 MTCO(_2) e by 2032</td>
<td>8% less by 2032</td>
</tr>
<tr>
<td>Kansas City</td>
<td>30% by 2020 and 80% by 2050</td>
<td>165,000 MTCO(_2) e per year by 2025</td>
<td>Not noted</td>
</tr>
<tr>
<td>Los Angeles</td>
<td>35% by 2030</td>
<td>Not noted</td>
<td>Not noted</td>
</tr>
<tr>
<td>Louisville</td>
<td>7% by 2012</td>
<td>920,000 MTCO(_2) e per year by 2025</td>
<td>20% less by 2020</td>
</tr>
<tr>
<td>Miami</td>
<td>10% by 2015 and 80% by 2050</td>
<td>500,000 MTCO(_2) e per year by 2025</td>
<td>5% less per year</td>
</tr>
<tr>
<td>Minneapolis</td>
<td>15% by 2015 and 30% by 2025</td>
<td>265,500 MTCO(_2) e per year by 2025</td>
<td>3% less per year</td>
</tr>
<tr>
<td>New York</td>
<td>30% by 2030</td>
<td>Not noted</td>
<td>Not noted</td>
</tr>
<tr>
<td>Oberlin</td>
<td>50% by 2015, 75% by 2030, net-zero by 2050</td>
<td>400 MTCO(_2) e per year</td>
<td>2.5% less per year</td>
</tr>
<tr>
<td>Pittsburgh</td>
<td>20% by 2030</td>
<td>Not noted</td>
<td>Not noted</td>
</tr>
<tr>
<td>Portland</td>
<td>40% by 2030 and 80% by 2050</td>
<td>1 MMTCO(_2) e per year by 2030</td>
<td>30% less per year</td>
</tr>
<tr>
<td>Sacramento</td>
<td>15% by 2020, 38% by 2030, 83% by 2050</td>
<td>159,401 MTCO(_2) e per year by 2030</td>
<td>35% less per year in new development</td>
</tr>
<tr>
<td>Salt Lake</td>
<td>20% by 2020, 50% by 2040, 80% by 2050</td>
<td>46,000 MTCO(_2) e per year by 2020</td>
<td>6.5% less per year</td>
</tr>
<tr>
<td>San Diego</td>
<td>15% by 2020 and 49% by 2035</td>
<td>18% by 2020</td>
<td>Not noted</td>
</tr>
<tr>
<td>San Francisco</td>
<td>25% by 2017 and 40% by 2025</td>
<td>289,948 MTCO(_2) e per year by 2030</td>
<td>260 million less by 2030</td>
</tr>
<tr>
<td>Seattle</td>
<td>Net-zero by 2050</td>
<td>1.8 MMTCO(_2) e per year by 2030</td>
<td>20% less per year by 2030</td>
</tr>
<tr>
<td>Washington, DC</td>
<td>30% by 2020 and 80% by 2050</td>
<td>Not noted</td>
<td>Not noted</td>
</tr>
<tr>
<td>Winston-Salem</td>
<td>7% by 2012</td>
<td>Not noted</td>
<td>Increased 14.8% 2000-2006</td>
</tr>
</tbody>
</table>
Table 6. Plan link to specific and significant strategies

<table>
<thead>
<tr>
<th>City</th>
<th>Rating</th>
<th>Specific and Significant Strategy Categories in Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albuquerque</td>
<td>Fair</td>
<td>DJHB, LUD, SNID, TADT, TODMXD, PCM, PFIFRC</td>
</tr>
<tr>
<td>Atlanta</td>
<td>Poor</td>
<td>SNID, TADT, TODMXD</td>
</tr>
<tr>
<td>Austin</td>
<td>Good</td>
<td>DJHB, LUD, SNID, TADT, TODMXD, PCM, PFIFRC</td>
</tr>
<tr>
<td>Baltimore</td>
<td>Poor</td>
<td>TADT</td>
</tr>
<tr>
<td>Boston</td>
<td>Good</td>
<td>DJHB, LUD, SNID, TADT, TODMXD, PCM, PFIFRC</td>
</tr>
<tr>
<td>Chicago</td>
<td>Fair</td>
<td>DJHB, TADT, TODMXD, PCM</td>
</tr>
<tr>
<td>Cincinnati</td>
<td>Fair</td>
<td>SNID, TADT, TODMXD</td>
</tr>
<tr>
<td>Cleveland</td>
<td>Fair</td>
<td>LUD, SNID, TADT, PCM</td>
</tr>
<tr>
<td>Denver</td>
<td>Good</td>
<td>TADT, TODMXD, PCM</td>
</tr>
<tr>
<td>Dubuque</td>
<td>Good</td>
<td>SNID, TADT, TODMXD, PCM</td>
</tr>
<tr>
<td>Greensboro</td>
<td>Good</td>
<td>LUD, SNID, TADT, TODMXD, PCM</td>
</tr>
<tr>
<td>Hazel Park-Southgate-Ypsilanti</td>
<td>Fair</td>
<td>DJHB, LUD, SNID, TADT, TODMXD, PCM</td>
</tr>
<tr>
<td>Houston</td>
<td>Poor</td>
<td>DJHB, LUD, SNID, TADT, TODMXD, PCM, PFIFRC</td>
</tr>
<tr>
<td>Juneau</td>
<td>Fair</td>
<td>DJHB, LUD, SNID, TADT, TODMXD, PCM</td>
</tr>
<tr>
<td>Kansas City</td>
<td>Poor</td>
<td>SNID, TADT, PCM, PFIFRC</td>
</tr>
<tr>
<td>Los Angeles</td>
<td>Fair</td>
<td>DJHB, LUD, SNID, TADT, TODMXD, PCM</td>
</tr>
<tr>
<td>Louisville</td>
<td>Fair</td>
<td>DJHB, TADT, TODMXD, PCM</td>
</tr>
<tr>
<td>Miami</td>
<td>Good</td>
<td>DJHB, LUD, SNID, TADT, TODMXD, PCM, PFIFRC</td>
</tr>
<tr>
<td>Minneapolis</td>
<td>Fair</td>
<td>DJHB, SNID, TADT, PCM</td>
</tr>
<tr>
<td>New York</td>
<td>Fair</td>
<td>DJHB, SNID, TADT, TODMXD, PCM</td>
</tr>
<tr>
<td>Oberlin</td>
<td>Fair</td>
<td>DJHB, SNID, TADT, PCM</td>
</tr>
<tr>
<td>Pittsburgh</td>
<td>Poor</td>
<td>SNID, TADT, PCM</td>
</tr>
<tr>
<td>Portland</td>
<td>Good</td>
<td>DJHB, LUD, SNID, TADT, TODMXD, PCM, PFIFRC</td>
</tr>
<tr>
<td>Sacramento</td>
<td>Good</td>
<td>DJHB, LUD, SNID, TADT, TODMXD, PCM, PFIFRC</td>
</tr>
<tr>
<td>Salt Lake</td>
<td>Good</td>
<td>DJHB, LUD, SNID, TADT, TODMXD, PCM</td>
</tr>
<tr>
<td>San Diego</td>
<td>Good</td>
<td>DJHB, SNID, TADT, TODMXD, PCM</td>
</tr>
<tr>
<td>San Francisco</td>
<td>Good</td>
<td>DJHB, LUD, SNID, TADT, TODMXD, PCM, PFIFRC</td>
</tr>
<tr>
<td>Seattle</td>
<td>Good</td>
<td>DJHB, LUD, SNID, TADT, TODMXD, PCM, PFIFRC</td>
</tr>
<tr>
<td>Washington, DC</td>
<td>Fair</td>
<td>DJHB, SNID, TADT, TODMXD, PCM</td>
</tr>
<tr>
<td>Winston-Salem</td>
<td>Poor</td>
<td>DJHB, SNID, TADT, TODMXD, PCM</td>
</tr>
</tbody>
</table>

Destination or job accessibility, job-housing balance [DJHB]
time-to-work reductions, accessible employment centers

Land use diversity [LUD]
varying land uses (mixed, but not project-focused), proximity to amenities and services

Street network and intersection design [SNID]
Complete Streets or New Urbanist ideas, compact walkability, neighborhood corridor development

Public transit accessibility, distance to transit [TADT]
multimodal travel options, reducing distance to public transit, expanding transit networks

Transit-oriented or mixed-use development [TODMXD]
“oriented” development focused on specific projects and districts

Parking or congestion management [PCM]
reducing parking supply, relaxing minimum requirements, demand-responsive pricing

Priority funding, impact fees, or regional containment [PFIFRC]
economic incentives for infill development, disincentives for greenfield development, growth boundaries

Determined from literature review
Analysis

Table 7, Summary of plan link to specific and significant strategies, is a repacking of the data in Table 6 to clearly show which plans are good, fair, or poor at linking specific and significant strategies, and to show the percentage of plans that contain each strategy. Table 8, Regional summary, repacks data from Table 6 as well. As indicated in Table 7, of the thirty plans analyzed, thirteen plans are rated as good, eleven plans as fair, and six plans as poor. Only 43 percent of plans analyzed do a good job integrating specific and significant transportation or land use strategies (choices) to reduce VMT, thus reducing GHG emissions. Thus, 57 percent of plans were fair or poor.

Table 7. Summary of plan link to specific and significant strategies

<table>
<thead>
<tr>
<th>Good</th>
<th>Fair</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austin</td>
<td>Albuquerque</td>
<td>Atlanta</td>
</tr>
<tr>
<td>Boston</td>
<td>Chicago</td>
<td>Baltimore</td>
</tr>
<tr>
<td>Denver</td>
<td>Cincinnati</td>
<td>Houston</td>
</tr>
<tr>
<td>Dubuque</td>
<td>Cleveland</td>
<td>Kansas City</td>
</tr>
<tr>
<td>Greensboro</td>
<td>Hazel Park-Southgate-Ypsilanti</td>
<td>Pittsburgh</td>
</tr>
<tr>
<td>Juneau</td>
<td>Los Angeles</td>
<td>Winston-Salem</td>
</tr>
<tr>
<td>Miami</td>
<td>Louisville</td>
<td></td>
</tr>
<tr>
<td>Portland</td>
<td>Minneapolis</td>
<td></td>
</tr>
<tr>
<td>Sacramento</td>
<td>New York</td>
<td></td>
</tr>
<tr>
<td>Salt Lake</td>
<td>Oberlin</td>
<td></td>
</tr>
<tr>
<td>San Diego</td>
<td>Washington, DC</td>
<td></td>
</tr>
<tr>
<td>San Francisco</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seattle</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Specific and Significant Strategy</th>
<th>% of Plans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public transit accessibility, distance to transit [TADT]</td>
<td>93%</td>
</tr>
<tr>
<td>Street network and intersection design [SNID]</td>
<td>80%</td>
</tr>
<tr>
<td>Parking or congestion management [PCM]</td>
<td>80%</td>
</tr>
<tr>
<td>Transit-oriented or mixed-use development [TODMXD]</td>
<td>73%</td>
</tr>
<tr>
<td>Destination or job accessibility, job-housing balance [DJHB]</td>
<td>63%</td>
</tr>
<tr>
<td>Land use diversity [LUD]</td>
<td>47%</td>
</tr>
<tr>
<td>Priority funding, impact fees, or regional containment [PFIFRC]</td>
<td>37%</td>
</tr>
</tbody>
</table>

Public transit accessibility and distant to travel is the most common (93 percent) strategy in the plans, followed by street network and intersection design (80 percent), and parking or congestion management (80 percent). Fewer plans mentioned strategies for transit-oriented or mixed-use development (73 percent) or destination or job accessibility and job-housing balance...
(63 percent). Land use diversity (47 percent) and priority funding, impact fees, or regional containment (37 percent) are the least common strategies.

Although only 43 percent of the plans analyzed are rated as good at linking specific and significant strategies to reduce VMT and GHG emissions, a majority of plans do contain a majority of the strategies. The issue, which is demonstrated in Table 4, is that while most plans mention these strategies, they do not do a good job linking the strategies to expected reductions. Albuquerque’s plan, for instance, mentions all seven categories of strategies; however, it does a poor job linking these strategies to expected reductions and provides vague recommendations. As provided in Table 4, the "City of Albuquerque Climate Action Plan" (2009) does not explicitly note any expected vehicle miles traveled reductions, and its expected GHG emissions reductions attributed to transportation or land use choices is a very broad 25 to 100 percent by 2050. Albuquerque’s plan has a “ballpark rankings” for expected costs, emissions impact, timing/payback, and level of effort to implement, but these are very vague and don’t make a connection to VMT. Other Albuquerque plan strategies are equally vague. Figure 1 illustrates this point; showing Albuquerque’s transportation strategy one is to, “become the most walkable and bicycle friendly city in the southwest,” and strategy five is to, “develop streets in Albuquerque that meet a broad range of sustainability objectives.” These are goals, not specific strategies. Many plans seem to struggle with this issue.

Los Angeles’ planning effort appears to illustrate a similar point: the struggle to adequately link or quantify expected emissions and vehicle miles reductions. Plans “Green LA” and “Climate LA” (2007) map out a good variety of transportation and land use strategies. However, both fail to explicitly link these strategies to reductions. Figure 2 presents a section of the “Climate LA” plan, with a goal to create a more livable community and the associated land use action to promote high-density housing close to major transportation stops. But it is simply noted that “potential reductions in GHG emissions resulting from this item cannot be calculated at this time.”
Transportation

Transportation is the fastest growing source of U.S. greenhouse gas emissions, accounting for 47% of the net increase in total U.S. emissions since 1990. It has been estimated that transportation sources account for 29% to 59% of total U.S. greenhouse emissions in 2006.

In the U.S. economy, transportation is second only to electricity generation in terms of the volume and rate of growth of greenhouse gas emissions. (Sources: U.S. Environmental Protection Agency, Environmental Defense Fund, Pew Center on Global Climate Change.)

Personal automobiles are a primary source of emissions. Automobile use is a complex challenge with deep roots in socioeconomic, personal mobility, culture, status and values, safety, lifestyle patterns and expectations. Evolving to a more sustainable and low-emission transportation will take time, but with steady work it can be achieved.

A strategic shift of transportation priorities to alternate modes of transportation will assist the City of Albuquerque in achieving its sustainability and climate change strategies and short-, mid- and long-term goals.

The city also needs to systematically move from conventional fuels to alternative fuels to power its transportation network in order to achieve its energy and emissions reduction goals.

Reducing emissions from idling cars can be accomplished by ensuring steady traffic flow on arterials, through better planning and execution during road repairs and by City-wide anti-idling education and legislation.

Transportation Working Group's Framework

- Alternatives to the automobile: Provide alternatives to the automobile, including:
  - Pedestrian trails, amenities and infrastructure
  - Cycling networks, amenities and infrastructure
  - Car-pooling and car-sharing services
  - Transit systems
  - Land-use patterns that encourage walking and bicycling
  - Refining the City’s land use policies to support convenient transit within a comfortable walking distance of every home and business within the city.
- Vehicles and fuels: Support more efficient vehicles and cleaner fuels.
- Parking: Address parking policies and parking supply to ensure that parking supports sustainability objectives.
- Street design: Refine street design standards to make the city safer and more pedestrian and bicycle-friendly.
- Communications: Promote education and new paradigms for Albuquerque residents and businesses on more sustainable transportation options.

Source: "City of Albuquerque Climate Action Plan" (2009)
GOAL: Create a more livable city

Promoting higher density housing in areas close to transportation stops is an important component of the City’s General Plan. Higher density housing with good access to transit helps accommodate the City’s growing population and helps relieve traffic congestion, by increasing ridership on public transit. This policy is incorporated in several Elements of the General Plan, including the Framework Element, Housing Element, Land Use Element, which includes the 35 Community Plans, and the Transportation Element. This policy has been implemented through such citywide ordinances as the Residential Accessory Services (RAS) zone, the TIFAR ordinance, and other special ordinances targeted to the downtown.

**Lead Agency**  
Department of City Planning (Planning)

**Other Agencies**  
Los Angeles Housing Department (LAHD), Community Redevelopment Agency

### Table 22. LU1 Implementation Steps:

<table>
<thead>
<tr>
<th>Milestone</th>
<th>Completion Date</th>
<th>Quantity of Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Update Housing Element</td>
<td>September 2008</td>
<td># of units</td>
</tr>
<tr>
<td>Integrate land use transportation policies into Community Plans that are under revision</td>
<td>December 2010</td>
<td>12 Community Plan updates</td>
</tr>
<tr>
<td>Adopt citywide Density Bonus Ordinance that provides additional incentives for the development of affordable housing close to major transportation arteries</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Measure Evaluation

This strategy will help reduce vehicles miles traveled and the associated CO2 emissions, and improve quality of life. Anticipated increases in transit ridership can be translated into reduced or avoided single occupancy vehicle miles traveled (VMT), and reductions in greenhouse gas emissions can be extrapolated from that. Success will depend upon implementation of the appropriate elements of the General Plan (Framework, Housing, Land Use, and Transportation elements), as well as education and outreach about the benefits of locating housing near transit.

**GHGs Reduced**  
Potential reductions in GHG emissions resulting from this item cannot be calculated at this time.

Source: “Climate LA” (2007)
A challenge in analyzing this data results from the broad nature of many of the plans. As previously noted, many documents are upwards of 100 pages or more (some 200+ pages), with input from a wide range of constituents, and reference to a litany of other comprehensive and master plans, transportation plans, pedestrian and bicycle plans, ordinances, task forces, working groups, and so on. Previous climate action plans and other pending plans are frequently mentioned, confusing current climate action efforts with previous or future strategies.

Cincinnati’s “Green Cincinnati Plan” (2013) is an example of this struggle. This plan is a 5-year update to the city’s original 2008 “Green Cincinnati Plan,” which is more technical. The 2013 “Green Cincinnati Plan” made a point to note its “shift from GHG emissions to sustainability,” but also indicated that the new plan would focus more on broader sustainability principles and public health. This is illustrated in Figure 4. Many specific and significant strategies outlined in the 2008 plan are no longer mentioned or included as short-term, mid-term, or long-term actions. Figures 5 and 6 illustrate this point. The 2008 plan’s streetcar proposal estimated a net reduction of 4,300 MTCO$_2$e per year by 2012, nearly a 30,000 MTCO$_2$e reduction by 2028, and a reduction of 128 million VMT over a 30-year span. The 20103 plan’s transportation matrix is more reader-friendly and provides a simpler summary of transportation strategies. However, it does so at the expense of best linking strategies to reduced GHG emissions and VMT. It makes cursory mention of the streetcar: implement short-term transit plans to build the streetcar. Nowhere in the plan is the streetcar mentioned as a specific or significant strategy aimed squarely at transit, destination, or job accessibility. And nowhere in the 2013 plan are strategies like this explicitly linked to estimated emissions or vehicle miles reductions. It is understandable that cities are producing planning documents intended for a more general audience (less technical) and covering broader sustainability principles (not just GHG emissions), but the resulting lack of specific or significant actions is a weakness.
Going green attracts corporations and individuals - Being green helps our economy by maintaining and attracting talented people to our community. Folks in this “creative class” like to be green and they like to make green - they are a demographic that is highly entrepreneurial and often create new businesses and jobs. (The Green Cincinnati Plan’s focus on economic development helps implement PLAN CINCINNATI’s Guiding Policy to increase our population)

ENVIRONMENT
Natural resources have brought people to Cincinnati for generations. Part of sustainability is to maintain and preserve Cincinnati’s hillsides, vistas, wildlife, forests, trees, waterways, and other natural features for future generations of Cincinnatians. A movement to green infrastructure such as trees and greenways to help improve Cincinnati’s air and water quality also improves the aesthetics of the community and provides habitat for wildlife. Preservation of Cincinnati’s natural resources creates opportunities for healthy outdoor recreation. (The Green Cincinnati Plan’s focus on the environment helps implement PLAN CINCINNATI’s Guiding Policy to preserve our resources and facilitate sustainable development)

A SHIFT FROM GREENHOUSE GAS EMISSIONS TO SUSTAINABILITY
In the Green Cincinnati Plan (2008), greenhouse gas reduction measures were evaluated not only by their impact on greenhouse gases but also by the economic cost or benefit of the recommendation. In many cases like the enhanced curbside recycling and energy efficiency improvements in City facilities, the reduction in greenhouse gas resulted in reductions in fuel, electricity and/or natural gas usage resulting in dollar savings for the city. The recommendations were also evaluated in terms of their sustainability - in terms of its impact on the triple bottom line - how the recommendation sustains the environment, the people, and the economy of Cincinnati.

This Green Cincinnati Plan (2013) strengthens the connection between greenhouse gas emission reductions and sustainability by focusing first on the sustainability impacts of plan recommendations while not losing track of the quantifiable greenhouse gas emissions reductions. The new plan is more intentional about acknowledging and measuring when possible the recommendations’ positive effects on people’s health - through improved air and water quality or more active lifestyle; people’s wallets - through lower energy costs; and the flora and fauna of the greater environment.

Source: “Green Cincinnati Plan” (2013)
Figure 5. Cincinnati B

Climate Protection Transportation Task Team
Implement the Cincinnati Streetcar

TASK TEAM WORK GROUP RECOMMENDATIONS
Recommendation # 3
The City should construct the proposed Cincinnati Streetcar system.

Estimated Annual GHG Reduction 4,300 net tons of CO2 per year by 2012; 28,068 by 2028

Summary of specific issues - Local transportation is a large and growing generator of greenhouse gases, much of it from personal cars and light trucks. Rail transit is a strategy to enable people to save money, avoid congested highways and improve communities by providing car-competitive public transportation that stimulates urban growth in the form of dense, walkable neighborhoods. The availability of frequent, reliable public transportation may reduce the use of personal vehicles below expected levels as people begin to concentrate their activities in their own neighborhoods.

Cincinnati City Council is currently considering construction of a streetcar network. The Cincinnati Streetcar network would improve connectivity between neighborhoods and major employment, commercial, and recreational centers, as well as providing a catalyst for economic development.

Strategy/action plan - The Cincinnati Streetcar has broad political, business and civic support that may result in favorable action by Cincinnati City Council to undertake the project. No management infrastructure for owning, building and operating the Cincinnati Streetcar has been established, but city administrators have well-developed ideas on how these things should be done. The sponsor must undertake a concerted outreach effort in the neighborhoods served by the Cincinnati Streetcar to ensure that supportive land-use, transportation and economic development policies exist to maximize the benefits of the project.

Estimated greenhouse gas reduction to be achieved - An August, 2007 document titled “Economic Worthiness Study of Cincinnati Streetcar” by HDR Decision Economics provides reliable estimates of ridership and ridership growth. HDR also explicitly calculated the reduction in Vehicle Miles Traveled (VMT) over the thirty-year life of the streetcar, a total of 128,000,000 VMT.

According to the American Public Transit Association, “an average private vehicle emission rate is about 1.0 pound of CO2 per mile,” so every 2,000 VMT reduces CO2 by one ton. This suggests that the 3.9 mile Phase 1A of the Cincinnati Streetcar would reduce CO2 by 64,000 tons over thirty years in the relatively small area it serves, or 2,133 tons of CO2 per year. Extrapolating this value to Phase 1B (4.0 miles) saves an additional 2,188 tons of CO2. The grand total of CO2 reductions due to persons travelling on the Cincinnati Streetcar in Downtown, Over-the-Rhine and Uptown is 4,321 tons of CO2 per year.

In addition, dense settlement patterns reduce greenhouse gases because housing units are generally smaller, more energy-efficient, and have reduced thermal losses because of attached construction compared to older, single-family homes. Using ICLEI’s personal CO2 emission calculator and adjusting for likely behaviors of individuals living in Downtown and Uptown neighborhoods, the annual CO2 savings may range from 2.7 to 5.5 tons of CO2 per person per year. Five tons of CO2 per person per year could be used as an average for dense, walkable city neighborhoods.

The City of Cincinnati’s Streetcar Study assumes that the investment will result in 2,290 additional Downtown and OTR units over and above what is now planned. These would probably be smaller

City of Cincinnati Proposed Climate Protection Action Plan  Page 52

Source: “Green Cincinnati Plan” (2008)
Figure 6. Cincinnati C

**Transportation Implementation Matrix**

<table>
<thead>
<tr>
<th>1-2 Years (Short-Term)</th>
<th>3-4 Years (Mid-Term)</th>
<th>5-6 Years (Long-Term)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>City Leads</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Implement Short Term Transit Plans - build streetcar</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>City Partners</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Regional Transit Plan (RTP) - BTP “Super Committee” created Fall 2013 (Multiple – C&amp;G, Green Umbrella, Metro, etc.)</td>
<td>1. Regional Transit Plan (RTP) - RTP created Fall 2013 (Multiple – C&amp;G, Green Umbrella, Metro, etc.)</td>
<td>1. Regional Transit Plan (RTP) - First capital project begins 2017 (Metro)</td>
</tr>
<tr>
<td>8. Improve Pedestrian Connectivity – work with safe routes to school (3525) on missing pedestrian links and operational issues like signal timing</td>
<td>8. Improve Pedestrian Connectivity – incorporate pedestrian considerations in maintenance and new facilities (DOE)</td>
<td>11. City Fuel Efficiency - continue to purchase CNG vehicles (DPW, Clean Fuels Ohio, CNG providers)</td>
</tr>
</tbody>
</table>

**City Supports**

| 3. Implement Short Term Transit Plans - implement Metrobus and upstream transit district (Metro) | 9. Interconnect Modes of Transportation - support bike lockers near Greyhound/Megabus/Union Terminal (Museum Center 3CDC) |                       |
| 5. Best in Class Commuter Biking Plan - (Cincinnati Bike and Cincinnati bike Center) |                       |                       |
| 7. Enhance Intercity Assets - promote Amtrak, Megabus and Greyhound |                       |                       |
| 9. Interconnect Modes of Transportation - support bike lockers near Greyhound/Megabus/Union Terminal (Museum Center 3CDC) |                       |                       |

Source: "Green Cincinnati Plan" (2013)
There are plans that succeeded at being reader-friendly, accessible, and specific. The “Juneau Climate Action & Implementation Plan” (2011) is a prime example. This plan clearly provides background and emissions inventory information, emissions reduction targets, and actions and implementation, including specific actions and implementation strategies for transportation and land use. A specific transportation goal within the plan is to reduce VMT by increasing mixed-used development. Figures 7 and 8 illustrate this point. The plan further explains the reasoning to commit to this goal, provides the example that 53 percent of downtown residents walk to work compared to only eight percent of other city and borough residents, and references the 2008 City and Borough of Juneau Comprehensive Plan policies and local ordinance CBJ Title 49, which encourages creating “livable mixed-use communities with features typical of transit-oriented development.” The plan then maps out more specific short-term and long-term actions, with the responsible party identified. This is merely a glimpse into Juneau’s plan, but it demonstrates the strengths of a thorough CAP well integrated with specific and significant emissions and VMT reduction strategies; most plans miss this mark.

Some of the good CAPs—even if thorough, specific, and significant—struggle with clarity. “Portland’s 2015 Climate Action Plan,” illustrates this struggle. The current draft plan, open for public comment at the time of this writing, is a monstrous 160 pages. The document is filled with sweeping graphics, a plethora of information, and many of climate action strategies. But it is overwhelming to wade through. Portland presents perhaps the widest variety, yet still specific and significant, transportation and land use choices. Figures 9 and 10 show how the plan communicates just a portion of one of its urban form and transportation objectives. Portland’s is the only plan analyzed that very deliberately references a spatial indexing tool to measure transportation and land use. The city developed a “20-minute neighborhood index” to demonstrate access to community amenities, products, and services (walkable access within 20 minutes). This map is illustrated in Figure 11.
demand for air travel has been growing and does not show signs of slowing. Some of this increase will be offset by the phasing in of more fuel-efficient airplanes.

In Juneau, air traffic increases significantly in the summer with tourists taking flight seeing trips by float plane and helicopter.

| Strategy T7-A. Work with the aviation industry to reduce emissions and energy use |
|---------------------------------|---------------------------------|
| Short-Term Actions              | Responsible Party               |
| • Work with local aviation companies to reduce fuel consumption in aviation. | CBJ government/ Air service providers |
| • Bring local aviation companies, and possibly airplane manufacturers, together to share ideas to reduce fuel use in jets and small aircraft. | CBJ government/ Air service providers |

Goal T-8: Reduce vehicle miles driven by increasing mixed-use development

Community land use influences where and how people live and work, including where schools, services, shops, and recreation areas and facilities are located. Distances between homes and these locations, and the transportation options available, affect GHG emissions output. Land use planning that reduces the need to drive and encourages residents to use public transit and non-motorized transportation reduces GHG emissions.

Promoting dense, compact, walkable, mixed-use and transit oriented neighborhoods not only reduces car dependence but also reduces government and taxpayer expenditures on water and sewer lines, road construction and maintenance, and street lights. Denser development usually generates more property tax per unit of land for local government. Mixed-use development focuses on creating diverse and interesting neighborhoods that reduce the need to travel long distances, facilitate transit and other non-automotive travel, offer a mixture of housing types including affordable housing, make efficient use of infrastructure, promote social equity, and protect the community’s natural assets, while maintaining and reinforcing existing communities.

Many studies have linked increased residential density with reduced driving and reduced GHG emissions. Higher density mixed-use neighborhoods make non-motorized transportation and public transit more practical, while decreasing emissions and encouraging exercise. According to the 2000 US Census, 53% of people who live in the housing-dense downtown Juneau area, extending to the flats near the Federal Building, walk to work. Community-wide, only 8% of residents walk to work.

The 2008 City and Borough of Juneau Comprehensive Plan includes principles for creating livable mixed-use communities with features typical of transit oriented development. Relevant policies are 4.3, 10.2, 10.10, and 10.13.

Juneau Climate Action Plan – November 2011

Source: “Juneau Climate Action & Implementation Plan” (2011)
Local ordinance CBJ Title 49, includes several provisions designed to encourage mixed-use and transit oriented development and allowing for shared parking and parking reductions in certain areas. Some of these ideas are incorporated below.

### Strategy T8-A. Plan compact, mixed-use neighborhoods

<table>
<thead>
<tr>
<th>Short-Term Actions</th>
<th>Responsible Party</th>
</tr>
</thead>
<tbody>
<tr>
<td>Review the zoning ordinance to determine if updates are needed to promote compact, mixed-use, higher density development and provide realistic green belts or transition areas to reduce impacts from neighborhoods.</td>
<td>CBJ government</td>
</tr>
<tr>
<td>Consider increasing building height minimums or minimum residential density in transit served areas.</td>
<td>CBJ government</td>
</tr>
<tr>
<td>Provide extra assistance, and possibly an expedited permitting process, for transit oriented development.</td>
<td>CBJ government</td>
</tr>
</tbody>
</table>

### Long-Term Actions

| CBJ government |
| Continue to support development of mixed-use, walkable neighborhoods in Downtown Juneau and Douglas, West Juneau, and Lemon and Switzer Creeks, around schools, Mendenhall Mall, Auke Bay and UAS. Invest in public infrastructure that will support residential development in these areas. | CBJ government |

### Strategy T8-B. Manage parking effectively to minimize driving demand and to encourage alternative modes of transportation

<table>
<thead>
<tr>
<th>Short-Term Actions</th>
<th>Responsible Party</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluate the fee structure for public on-street and off-street parking in Downtown Juneau and support efforts to account for and capture the true and market rate for parking.</td>
<td>CBJ government</td>
</tr>
<tr>
<td>Update zoning regulations to set parking maximums instead of parking minimums only.</td>
<td>CBJ government</td>
</tr>
</tbody>
</table>

### Long-Term Actions

| CBJ government |
| Continue to reduce parking requirements, consider car-lite or car-free development in certain transit served areas; set parking maximums. | CBJ government |

Source: "Juneau Climate Action & Implementation Plan" (2011)
Figure 9. Portland A

Create vibrant neighborhoods where 80 percent of Portland and Multnomah County residents can easily walk or bicycle to meet all basic daily, non-work needs and have safe pedestrian or bicycle access to transit. Reduce daily per capita vehicle miles traveled by 30 percent from 2008 levels.

<table>
<thead>
<tr>
<th>Funding</th>
<th>Impact</th>
<th>Lead agency</th>
<th>Timeframe</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>4A Multimodal Transportation Funding</strong></td>
<td>C C C C</td>
<td>City: PBOT</td>
<td>Near-term</td>
</tr>
<tr>
<td>— Support a new state multimodal transportation funding source for transit, bicycle and pedestrian services and facilities. Advocate for including provisions that prioritize transit and multimodal designs for facilities.</td>
<td>$ E</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>4B State Transportation Funding</strong></td>
<td>C C C C</td>
<td>City: PBOT</td>
<td>Near-term</td>
</tr>
<tr>
<td>— Support adoption of a road usage and fuel efficiency charge as a long-term replacement for declining gas tax revenue.</td>
<td>$ E</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>4C City Transportation Funding</strong></td>
<td>C C C C</td>
<td>City: PBOT</td>
<td>Existing and/or ongoing</td>
</tr>
<tr>
<td>— Establish a stable funding source adequate to maintain the existing transportation system and to invest in transportation capital projects and programs that reduce carbon emissions and improve equity.</td>
<td>$ E</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>4D Youth Transit Pass</strong></td>
<td>C C C C</td>
<td>City: PBOT</td>
<td>Existing and/or ongoing</td>
</tr>
<tr>
<td>— Seek to provide transit passes to all youth, including securing funding for youth transit passes.</td>
<td>$ E</td>
<td>County: DS</td>
<td></td>
</tr>
</tbody>
</table>

### CLIMATE ACTION PLAN | 2015

<table>
<thead>
<tr>
<th>State and Regional Planning and Projects</th>
<th>Impact</th>
<th>Lead agency</th>
<th>Timeframe</th>
</tr>
</thead>
</table>
| **4E Urban Growth Boundary** — Continue to advocate for growth within the existing Urban Growth Boundary:  
  a) Prioritize elements of the Climate Smart Communities scenarios that have the greatest potential for reducing carbon emissions.  
  b) Give priority to state and local goals for carbon emissions reduction and climate change preparation in the Urban Growth Boundary and Metro's growth management decisions.  
  c) Maximize benefits and consider impacts to communities of color and low-income populations when making Urban Growth Boundary decisions.  
  d) Protect important natural resources and increase access to open space within the Urban Growth Boundary. | ![Impact] | City: BPS  
County: DCS | Existing and/or ongoing |
| **4F Orphan Highways** — Work with the Oregon Department of Transportation, legislators and other stakeholders to identify appropriate strategies for orphan highways, including changes in operations, design, management and ownership. | ![Impact] | City: PBOT | Near-term |
| **4G 2018 Regional Transportation Plan (RTP)** — Prior to the 2018 RTP, work with Metro and other local governments to:  
  a) Establish a method for projecting the lifecycle carbon emissions of land use and transportation investments. Include consideration of embodied energy, operations and maintenance.  
  b) Align regional mode share targets with carbon reduction targets and encourage the development of mode share targets specific to the varying community needs and transit infrastructure around the region. | ![Impact] | City: PBOT, BPS  
County: DCS | Mid-term |
| **4H Regional Transportation Demand Model** — Work with Metro to refine the regional travel demand model to improve projections of vehicle demand and non-auto mode share. Utilize forecasting tools and methodologies that identify investments that minimize carbon emissions. | ![Impact] | City: PBOT | Mid-term |
| **4I TriMet Service Enhancement Planning** — Participate in TriMet's Service Enhancement planning project by providing technical assistance and detailed knowledge of local community development conditions and needs. | ![Impact] | City: PBOT  
County: DCS | Existing and/or ongoing |

Portland’s land use plan calls for growth to be concentrated in a network of centers and corridors of different sizes, serving multiple neighborhoods. These “healthy connected neighborhoods” are places that support the health and well-being of residents. In these neighborhoods, people of all ages and abilities have safe and convenient access to more of the goods and services needed in daily life — grocery stores, schools, libraries, parks and gathering places — reachable on foot or by bike (see Figure 29). They are well-connected to jobs and the rest of the city by transit. They have a variety of housing types and prices so households of different sizes and incomes have more options.

Today, more than 60 percent of Portlanders are served by such centers, reducing carbon emissions and keeping money in the local economy that would otherwise be spent on fossil fuels. But this means that 40 percent of Portlanders do not have safe and convenient access to transit, commercial services, jobs, or in many areas, even sidewalks. This is especially critical in East Portland, which is home to many low-income households and a large youth population.

Transportation investments are essential to help maintain or create these centers. As the city grows, it also will be important to rethink the design of streets so they can serve multiple users and can be built in less expensive ways.

Portland’s climate action plan might be overwhelming, but it is also good. New York City’s climate action planning seems more disjointed, as all of the city’s planning efforts are included in its broad “PlaNYC” series of plans and progress reports. This is not to say that NYC’s planning is more disjointed. In fact, it is likely more uniform, as all planning efforts are under the purview of two entities: the Office of Long-Term Planning and Sustainability, and the Office of Recovery and Resiliency. The city does not have a standalone CAP. Climate mitigation and adaptation strategies are nested in the numerous PlaNYC documents, making linkages to specific and significant strategies more difficult. The city’s climate action efforts seem primarily focused on adaptation (recovery and resiliency) or mitigation strategies largely aimed at destination and transit accessibility. Such a populated, dense city does not lend as many opportunities to alter land use, so infrastructure and accessibility strategies stand out most prominently.

The Hazel Park-Southgate-Ypsilanti, MI collection of climate action plans is an intriguing project, the result of the Michigan Suburbs Alliance receiving a $50,000 grant from the Michigan Department of Environmental Quality. This grant was to develop a model process for small-city climate action plans. The three small cities, located in southeast Michigan and the greater Detroit metropolitan area, created their plans using the same plan template. Southgate and Ypsilanti referred to their plans as climate action; Hazel Park to theirs as an “energy action plan.” The plans are reader-friendly, largely focused on transit visibility and accessibility, including specific marketing campaigns aimed at increasing ridership—especially for ridesharing programs for those commuting into Detroit or to other suburbs. Bicycling and pedestrian accessibility are strongly noted, particularly as it pertains to being able to walk or bike to local restaurants, retail, and entertainment. Vehicle miles traveled is briefly touched on in two of the plans (Ypsilanti and Southgate), only referring to possible reductions from increased bike trails and bicycling amounting to 346,642 VMT less by 2020. Nearly all (345,500 VMT or 99.7
percent) of this reduction is from Ypsilanti. None of these plans make good connection to other transit or land use VMT reductions.

The "Dubuque Community Climate Action & Resiliency Plan," is a good CAP without any "bells and whistles." Similar to Juneau’s plan in content and scope, it does a good job summarizing its GHG inventory, reduction potential, and policy descriptions, including both transportation and the built environment. Although not as “sexy” as many other plans, the 2013 plan is very effective at describing strategies, identifying affected entities, current implementation status, estimated GHG emissions reductions and explanation of the reduction impact, barriers to implementation, co-benefits, and confidence or uncertainty implementing the policy or project. Figure 12 illustrates the plans complete streets policy, including reference to VMT reduction.

Austin, Miami, Sacramento, and San Diego stand out as especially good plans. Not only do they include the specific and significant transportation and land use choices sought after, they do so in a format that is simultaneously clear and comprehensive. Sacramento’s plan, somewhat like Portland’s, running 160 pages with an additional 100 pages of back matter, is similarly overwhelming to wade through and tease out all policies. San Diego’s plan does well spelling out lead departments, links to general plan policies, the strategy goal, specific action, and reduction targets. Miami’s 2010 “GreenPrint Plan” is specific to Miami-Dade County, yet also a component of the plan, “A Region Responds to a Changing Climate” (2012). The “Region Responds” plan was created by the Southeast Florida Regional Climate Change Compact to better coordinate climate change planning across Palm Beach, Broward, Miami-Dade, and Monroe Counties. The regional plan is fairly broad, but the “GreenPrint Plan” that Miami-Dade’s efforts are rooted in is excellent—a good communication document that strongly links strategies to emissions and VMT reductions. “GreenPrint” also does well demonstrating different future emissions scenarios based on the extent of plan implementation. Figures 13, 14, and 15 illustrate a glimpse of Sacramento’s, San Diego’s and Miami’s plans.
Complete Streets

1) Sector: Transportation

2) Policy name: Complete streets

3) Policy type: Local policy

4) Affected entities: City of Dubuque; residents; visitors; businesses; commuters; commercial drivers

5) Current status: Policy adopted by City Council in 2011; supported by DMATS resolution in 2010. Demonstration project in Historic Millwork District completed in 2012, supported by $5 million TIGER grant.

6) Estimated GHG reduction: 9,303-27,909 mt CO₂e annually.

7) Scope of emissions reduction: Scope 1

8) Specific description of policy: Complete streets is a planning and design process that ensures that the health, safety, and mobility of all transportation users are considered in all phases of road project planning, including motorists, pedestrians, bicyclists, public transit users, commercial vehicles, and people of all ages and abilities.

Complete streets does not mean “all modes on all roads,” nor does it require specific design features like sidewalks, bicycle lanes, or transit stops on any particular street. For each project, planners evaluate the current and future needs of all users and design accordingly. Complete streets also does not require immediate reconstruction of roads, but is implemented during regularly scheduled road construction, reconstruction, and maintenance. This allows planners and engineers to implement complete streets one project at a time, gradually piecing together a complete transportation network that efficiently serves the needs of all users.

9) Barriers to implementation: Planning standards and design manual; congruity with state and county roadways.

10) Co-benefits: The GHG reduction from complete streets is important but is not its primary benefit. The main benefit is bringing safe and convenient mobility options to citizens who are poorly served by conventional transportation and struggle every day to reach workplaces, shopping, medical care, and other essential destinations. Complete streets also can boost local commerce, improve health and fitness, and improve air quality, thereby saving money on preventable health care costs and lost work productivity. Additionally, complete streets can reduce traffic volume and congestion within the city, minimize travel times, lower fuel costs and consumption for drivers, and improve traffic safety. The full suite of potential benefits are detailed in Green Dubuque’s 2010 report on complete streets in Dubuque (Schatz 2010).

11) Explanation of GHG reduction impact:
According to several studies (Bartholomew 2009; CCAP 2010; Winkelman et al. 2009), comprehensive policies like complete streets can typically reduce vehicle miles traveled (VMT) by 10% or more. That 10% reduction is considered a baseline around which actual reductions will vary. 9,303-27,909 mt CO₂e per year represents a 5-15% decrease (assuming a 33% improvement in overall fleet fuel economy from 2007 to 2030-see section Baseline Scenario).

12) Relative confidence of GHG reduction estimate: Moderate

13) Sources of uncertainty in GHG reduction estimate: Uncertain impact on individual behavior. Higher oil prices by 2030 could significantly increase demand for alternative modes and GHG impact of complete streets.
CHAPTER 4

STRATEGY 1: SUSTAINABLE LAND USE

MEASURE 1.1: PROMOTE SUSTAINABLE GROWTH PATTERNS AND INFILL DEVELOPMENT

Action 1.1.1

Require new development within the city to demonstrate that it would reduce vehicle miles traveled (VMT)/capita by 35 percent compared to the statewide average VMT/capita based on project density, diversity, design, destination accessibility, and distance to transit.

<table>
<thead>
<tr>
<th>GHG Reduction Potential</th>
<th>Implementation Time Frame</th>
</tr>
</thead>
<tbody>
<tr>
<td>51,507 MtCO₂e/year</td>
<td>2012-2015 2015-2020 2020+ Annual Ongoing</td>
</tr>
</tbody>
</table>

Responsibility: Community Development

Target Indicators: Reduce VMT 28.6 percent per capita below 2009 statewide VMT average by 2020.

Supporting Actions:

- Continue to analyze potential for building-energy savings from the transition to more compact urban form, which tends to increase densities and multi-family housing, and decrease the average area of residential units.

- Continue pursuing local, State, and Federal grants to fund a comprehensive update of the City’s Zoning, Subdivision, and other development-related sections of the City Code in order to create designations that support more sustainable development patterns and streamline infill development.

- Implement the destination and accessibility (i.e., centers) policies of the General Plan to achieve an increase in the number of jobs and other attractions that can be reached within reasonable amounts of time by walking, biking, or transit.

- Implement the transit center policies of the General Plan to locate appropriate projects near transit and achieve an increase in the use of transit by people traveling to and from the projects.

- Implement the affordable housing and transit-oriented development policies of the General Plan to integrate affordable and below market-rate housing near transit.

- Provide CEQA streamlining benefits for residential mixed-use projects and Transit Priority Projects pursuant to State Law (SB375), consistent with 2030 General Plan.

- Work with regional partners to adopt and implement guidelines that will protect and preserve open space, prime farmland and key habitat, including wildlife and riparian corridors.

- Recognize the value of agricultural, habitat, and open space lands as carbon sinks, and establish easements and other mechanisms to preserve them.

- Support the implementation of the SACOG Sustainable Communities Strategy through implementation of the 2030 General Plan and encouraging infill development in Transit Priority Project areas.

Figure 14. San Diego

**STRATEGY 3: BICYCLING, WALKING, TRANSIT & LAND USE**

**LEAD DEPARTMENTS:** Transportation and Storm Water, Planning, General Services, Development Services, Purchasing and Contracting, Economic Development and Environmental Services Departments


**GOAL:** Increase the use of mass transit.

**ACTION 3.1:** Implement the General Plan’s Mobility Element and the City of Villages Strategy in Transit Priority Areas* to increase the use of transit.

**TARGET:** Achieve mass transit mode share of 12% by 2020 and 25% by 2035 in Transit Priority Areas.

**GHG REDUCTIONS:**

<table>
<thead>
<tr>
<th></th>
<th>2020</th>
<th>2035</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>109,895 MT/CO₂e</td>
<td>235,149 MT/CO₂e</td>
</tr>
</tbody>
</table>

**GOAL:** Increase commuter walking opportunities.

**ACTION 3.2:** Implement the City of San Diego’s Pedestrian Master Plan in Transit Priority Areas to increase commuter walking opportunities.

**TARGET:** Achieve walking commuter mode share of 3% by 2020 and 7% by 2035 in Transit Priority Areas.

**GHG REDUCTIONS:**

<table>
<thead>
<tr>
<th></th>
<th>2020</th>
<th>2035</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1,455 MT/CO₂e</td>
<td>2,194 MT/CO₂e</td>
</tr>
</tbody>
</table>

*TRANSIT PRIORITY AREA:
An area within one-half mile of a major transit stop that is existing or planned. If the planned stop is scheduled to be completed within the planning horizon included in an adopted Transportation Improvement Program or Regional Transportation Plan, as stated in Public Resources Code § 21099(a)(7). (A major transit stop is defined in Public Resources Code § 21064.3 as a site containing an existing rail transit station, or the intersection of two or more major bus routes with a frequency of service interval of 15 minutes or less during the morning and afternoon peak commute periods.)

Source: “City of San Diego Climate Action Plan” (2014)
to reach our target. While this may seem daunting, it emphasizes the need for the continuous development of initiatives that will further contribute to GHG emissions reductions in future GreenPrint updates. Better economic conditions and improved technology and innovation, as expected in the future, will serve to make this goal even more attainable.

As a coastal community identified as one of the most vulnerable to climate change, it is incumbent upon us to harden ourselves against current hazards and improve the resiliency to prepare for, respond to, and recover from, future climate change. Recent occurrences of temperature and rainfall extremes provide a glimpse of potential future impacts. These events, as well as tropical storms that periodically impact our region, can cause significant infrastructure and socio-economic damage, but they can also present important learning opportunities that provide valuable experience and knowledge for current and future progress.

GreenPrint is a 40-year journey. We are embarking upon this initial phase and will build upon our existing knowledge and experience. It is our challenge and opportunity to use this initial five-year phase to build upon successes and create a foundation to move forward. This will help provide the tools and information so critical to educating the community and decision-makers. By combining our opportunities and knowledge with the resources provided through our regional, state, and federal partnerships, we have the tools that will allow us to chip away at that gap and help our community remain strong and adapt to a new normal of a changing climate. Let us now take that knowledge and experience and turn science into action.

Figure 15. Miami

Source: “GreenPrint Plan” (2010)
Austin’s 2014 “Austin Community Climate Plan” stands out as the best plan of the thirty CAPs analyzed. It is absolutely one of the most comprehensive, accessible, reader-friendly, and technical plans that explicitly links strategies to emissions and VMT reductions. At 43 pages, it is one of the most succinct CAPs, yet simultaneously detailed, more so than many plans two or three times its magnitude. Transportation and land use sector findings (as well as findings in other sectors) weave a narrative of baseline emissions, estimated reductions, challenges and opportunities, existing plans and initiatives, individual strategies, and next steps, all summarized by a strategies matrix. It provides a great climate-science primer and background, as well as an education/awareness component, “How do I fit in?” that provides vignettes of different community constituents and their health, savings, time, and security co-benefits. The plan is easy to read, easy to understand, and hits all of the transportation and land use planning marks identified in the literature. Figures 16 and 17 illustrate the plan’s content. Austin’s plan is one of three analyzed (the others being Oberlin and Seattle) that are aiming for net-zero emissions by 2050. If their plan is any indication, they have got a good shot at doing so.

The plans rated as fair and poor tend to focus more on general sustainability (Atlanta and Baltimore) and municipal operations (Houston and Winston-Salem). Most fair and poor plans fail to adequately link strategies to emissions and vehicle miles reductions. Houston and Winston-Salem were noted as the only two plans not integrating any specific or significant land use choices to reduce emissions or VMT. This is presumably due to their focus almost entirely on municipal operations, thus primarily on energy and fuel efficiency upgrades—items outside of the purview of urban planners. Fair and poor rated plans (seventeen of the thirty plans analyzed) rely too much on awareness, unspecified strategies, and high-visibility projects. Many of these plans over-rely on pedestrian or bicycle strategies, or somewhat vague references to destination and transit accessibility, street network and intersection design, or parking (primarily by reducing available parking spaces).
Appendix C: Transportation and Land Use Sector Findings

In the United States, greenhouse gas emissions from the transportation sector mainly come from burning fossil fuel in cars, trucks, ships, trains, off-road vehicles, and airplanes. In Travis County, approximately 39% of community-wide greenhouse gas emissions come from the transportation sector, and nearly 18% of the transportation-related greenhouse gas emissions in Travis County are from on-road vehicles (cars and trucks). Off-road vehicles, rail, air traffic, and bus contribute a small amount of emissions to the community-wide total, but must also see reductions to meet the net-zero goal by 2050.

To reduce transportation sector emissions, either vehicle miles traveled must be lowered or vehicle fuel efficiency standards must improve, or both. As expressly stated in the Imagine Austin Comprehensive Plan, coordinated transportation and land use decisions provide significant opportunities for greenhouse gas emission reductions by green Austinites more options to live, work, and play in compact and connected communities. Specifically, the community must focus on solutions that prioritize affordable, mixed-use developments, along with integrated mobility options for both personal trips and work commutes.

This TAG worked with the Office of Sustainability to develop an estimate of emissions reductions for the proposed strategies and actions in this plan. Figure 3 below shows 2010 emissions for the transportation and land use sectors, estimated emissions in 2050 using a Business As Usual (BAU) trend line, and the approximate impact of the various major strategy areas. The vast majority of the emissions in this sector are associated with on-road light-duty fossil-fueled vehicles. The CAMPO 2035 plan estimates that through existing transportation programs and policies, emissions would grow above the current baseline, but be reduced substantially below the Business As Usual trend line by 2050. It is estimated that a 5% reduction from Business As Usual would need to be achieved through policy, planning, and land use policies. Another 9% reduction would need to be achieved from demand management and economic pricing strategies, as well as another 9% reduction from new infrastructure and service. The final 40% reduction from Business As Usual would be achieved by vehicle and fuel efficiencies.

This plan does not ensure these reductions, but envisions a future where they could be achieved. The transportation sector in 2050 would include substantially fewer vehicles driven per person, as well as cars that are primarily operating on renewable energy and emitting zero carbon. To the average Austinite, this would mean increased safety, lower costs, less time spent in traffic, and cleaner air.

Source: “Austin Community Climate Plan” (2014)
### Transportation and Land Use Sector Strategies and Actions

<table>
<thead>
<tr>
<th>Phase</th>
<th>Strategy Category</th>
<th>Action #</th>
<th>Actions</th>
<th>Timelines</th>
<th>Currently in an Adopted City Plan</th>
<th>Action Status</th>
<th>Participating/Developer Stakeholders</th>
<th>Owner of the Action</th>
<th>Mitigation/Adaptation Strategies/Features</th>
<th>Bans or Limits/Other Restrictions</th>
<th>Assisted Emissions</th>
<th>Auxiliary Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Infrastructure and Service</td>
<td>IS-1</td>
<td>Continue planning efforts to complete a connected network of proven high-capacity transit, including density and mobility systems, using the major projects identified in the Austin Strategic Mobility Plan and Project Connect to improve Austin’s transportation and economic connections with other major cities in Texas.</td>
<td>2015-2020, 2020-2030</td>
<td>Imagine Austin 2020 Austin Mobility Plan, 2014 Austin Strategic Mobility Plan</td>
<td>P, G, AI</td>
<td>F, BC, DL</td>
<td>A, J</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Infrastructure and Service</td>
<td>IS-9</td>
<td>Encourage shared workspaces (hotel workstations) close to where employees live.</td>
<td>2020-2030</td>
<td>2013 Austin Mobility</td>
<td>G, B, N</td>
<td>G, B, N</td>
<td>B, F, DL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Land Use</td>
<td>LU-1</td>
<td>Prioritize mixed-use development integrated with transit and the creation of compact, walkable and bikeable places with a commitment to plan transportation systems using objective analysis of environmental constraints, demand models, congestion models, safety, and full life cycle cost benefit analysis.</td>
<td>2015-2020</td>
<td>Imagine Austin Comprehensive Plan</td>
<td>P, G, B, AI, F, DL</td>
<td>A, J</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Land Use</td>
<td>LU-2</td>
<td>Promote growth within designated activity centers as identified in Imagine Austin where denser, mixed-use development supports centers and transit corridors, and incentives for infill development with long-term affordability for residents and businesses; develop an outreach program for the available incentives and enhanced property locator tools (e.g., location of efficient mortgages, tax credits).</td>
<td>2020-2030</td>
<td></td>
<td>P, G, B, AI, F, DL</td>
<td>A, J</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: “Austin Community Climate Plan” (2014)
While a majority of the plans integrate a majority of the strategies identified in the literature in some way, shape, or form (though they do not necessarily make a strong connection to expected emissions or VMT reductions), the strategy category least integrated is that of priority funding, impact fees, or regional containment (37 percent). The “City of Denver Climate Action Plan” is most unique in focusing heavily on the Denver Regional Council of Governments (DRCOG) growth boundary, statewide Pay-As-You-Drive auto insurance, and a proposed voluntary travel offset/impact fee program for vehicles and air travel. Denver’s plan links 25 percent less vehicle miles traveled and a reduction of 410,000 MTCO$_2$e per year by 2020 largely due to these strategies.

Table 8. Regional summary

<table>
<thead>
<tr>
<th>NOAA Region</th>
<th>Good Plans</th>
<th>% of Plans Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alaska</td>
<td>Juneau</td>
<td>100%</td>
</tr>
<tr>
<td>Northeast</td>
<td>Boston</td>
<td>20%</td>
</tr>
<tr>
<td>Northwest</td>
<td>Portland, Seattle</td>
<td>100%</td>
</tr>
<tr>
<td>Ohio Valley</td>
<td></td>
<td>0%</td>
</tr>
<tr>
<td>South</td>
<td>Austin</td>
<td>50%</td>
</tr>
<tr>
<td>Southeast</td>
<td>Greensboro, Miami</td>
<td>50%</td>
</tr>
<tr>
<td>Southwest</td>
<td>Denver, Salt Lake</td>
<td>67%</td>
</tr>
<tr>
<td>Upper Midwest</td>
<td>Dubuque</td>
<td>25%</td>
</tr>
<tr>
<td>West</td>
<td>Sacramento, San Francisco, San Diego</td>
<td>75%</td>
</tr>
</tbody>
</table>

Table 8, Regional summary, illustrates the NOAA climate regions associated with the good plans, and the percentage of plans analyzed in each region to be rated good. This is intended to provide a glimpse into any potential regional disparities in CAP quality. For example, there are five plans analyzed in the Northeast (Baltimore, Boston, New York, Pittsburgh, and Washington, DC), and only one plan, Boston, rated as good. Juneau is the only Alaska city analyzed, and Portland and Seattle are the only two Northwest cities. The Northwest, West, and Southwest account for over half of all the good plans, with the Southeast being the only other region with more than one good plan. The Northeast and Ohio Valley both have the most plans analyzed. However, neither region fared well; the Ohio Valley has no plans rated as good.

Table 9 illustrates the year plans were adopted (2007 to 2015) and the corresponding number of plans that rated good, fair, or poor in that given year. While thirty plans is a relatively
small sample to draw any sweeping conclusions about year adopted and plan quality, the table does suggest that plans adopted more recently are doing a better job articulating specific and significant land use choices to reduce GHG emissions and VMT.

**Table 9. Year adopted and rating**

<table>
<thead>
<tr>
<th>Year Adopted</th>
<th>Good</th>
<th>Fair</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2014</td>
<td>***</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>2013</td>
<td>****</td>
<td>*****</td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td>**</td>
<td>*</td>
<td>**</td>
</tr>
<tr>
<td>2011</td>
<td>**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td></td>
<td></td>
<td>***</td>
</tr>
<tr>
<td>2007</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Each * represents 1 plan

**Table 10. Average geography and context by plan rating**

<table>
<thead>
<tr>
<th>Geography and Context</th>
<th>Good Plans</th>
<th>Fair or Poor Plans</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSA Pop. 2013</td>
<td>2,536,221</td>
<td>4,967,007</td>
</tr>
<tr>
<td>MSA Pop. % Δ 2010-2013</td>
<td>+3.89%</td>
<td>+1.89%</td>
</tr>
<tr>
<td>City Pop. 2013</td>
<td>545,779</td>
<td>1,309,348</td>
</tr>
<tr>
<td>City Pop. % Δ 2010-2013</td>
<td>+5%</td>
<td>+2%</td>
</tr>
<tr>
<td>City Sq. Miles</td>
<td>112</td>
<td>203</td>
</tr>
<tr>
<td>City Persons / Sq. Mile</td>
<td>4,995</td>
<td>7,650</td>
</tr>
</tbody>
</table>

Table 10, Average geography and context by plan rating, summarizes data from Table 3 about MSA with estimated 2013 population and the percentage population change since 2010, city 2013 estimated population and the percentage change since 2010, city square miles, and city persons per square mile, here based on the average of those MSAs and cities corresponding to their plan rating of good, fair, or poor. New York, Los Angeles, and Chicago are the three largest MSAs in the U.S., together totaling 42.6 million people in 2013, and all three are grouped in and averaged with the fair or poor plans. On the flip side, some of the smallest MSAs and cities in this analysis (Dubuque and Juneau) are included in the good plans group. Table 9, as presented, illustrates that the good CAPs in this analysis tend to be for MSAs and cities with populations growing more rapidly than those cities with fair or poor plans, yet are significantly smaller in square mileage. Similar to Table 8, it’s difficult to draw strong conclusions from this data, but it is interesting to consider these factors.
Limitations

The most notable limitations to this research relate to its depth and breadth. In regards to depth, any one CAP can be extensively studied to determine its exact contents. Climate action plans are upwards of 100 pages or more, with input from a wide range of constituents, and reference a litany of other plans, ordinances, rules, and ideas. A handful of plan case studies could be selected to “dive deep” into associated previous CAPs, other pending plans, and various other strategic and regulatory frameworks. Most plans do not do a good job at clearly spelling out intended transportation and land use strategies (among other things) to reduce VMT. This is not to say that cities are not planning to reduce VMT. Sexy typically wins over substance, and rather than have a technical planning document sit on a shelf that never sees the public’s eye, planners (and public officials) may tend towards simplification, reader-friendliness, and general sustainability goals that overlap with clear co-benefits (parks and recreation, public health, energy bill savings). In this way, climate action plans are marketing tools for climate awareness and education. Many cities may have underlying code, ordinances, or other plans that articulate modifications to the built environment to reduce VMT and emissions, even if an analysis of their CAP doesn’t reveal much. Researching these additional policies was simply beyond the reach of this research.

In regards to breadth, over 1,000 city mayors have signed the U.S. Conference of Mayors Climate Protection Agreement. This analysis only investigated thirty U.S. city plans. Additional research could look into more plans. There could be more intentionality to select a wide variety of climate action plans from all over the U.S. There could also be a sub-focus on just one region in the country. For instance, the Ohio Valley is the only region in this analysis to not have at least one plan identified as good at integrating land use choices to reduce VMT and emissions. Why is this the case? What about the Northwest, West, Southwest, or Southeast planning processes have lent to better-defined transportation and land use planning?
Inconsistencies with baseline GHG emissions inventories and reduction targets limited the ability to fully and successfully link strategies and reduction expectations. Varying and imprecise reduction projections also frustrated this research. Some plans vacillate between concrete reduction amounts (that is, a precise MTCO$_2$e target) and percentage reductions over baseline or updated inventories (that is, a percentage of emissions reduced over a number of years), making it very difficult to keep track of total reduction targets versus sector-specific targets, and expected progress over the short-term, mid-term, or long-term. Other indicators, such as cost-benefit analyses or “bang-for-buck” on climate action investments could be reviewed.

Conclusion

The specific and significant land use choices identified in the literature to reduce VMT, thus GHG emissions, amount to at least twenty MMTCO$_2$e in reduced emissions and ten billion VMT reduced from the thirty CAPs in this analysis. This is merely a rough ballpark estimate, intended to broadly illustrate the projected impacts. Precise time-to-implement and projected date reduction targets are difficult to aggregate and ascertain. Approximately one billion MTCO$_2$e U.S. GHG emissions is attributed to household vehicle use every year, and U.S. household vehicles account for approximately 2.25 trillion VMT every year. Based on these general numbers, only 0.02 percent of total U.S. household vehicle emissions, and 0.004 percent of U.S. household VMT are targeted by the CAPs in this analysis. While this is a relatively small sampling of only thirty plans, the MSAs associated with these CAPs represent over 114 million people—over one-third of all Americans.

A majority of the plans in this analysis integrate public transit accessibility, distance to transit, street network and intersection design, parking or congestion management, TOD or MXD, destination or job accessibility, or job-housing balance planning strategies. However, most do only fair to poor at explicitly linking these strategies to the reduction of vehicle miles
and emissions. Most plans are quick to point out the environmental, health, and wellness benefits of walking and biking more, living closer to work and play destinations, and easing parking requirements to allow denser development with fewer available parking spaces. Rideshare programs are presented as fantastic community-building exercises that help residents share gasoline costs and better get to know one another while commuting together. “Complete streets,” new urbanist, and similar philosophies are definitely in vogue. But less than half of the plans in this analysis do a good job of integrating specific and significant land use choices to reduce VMT and GHG emissions.

I would not go so far as to believe that most CAPs are simply regurgitating pre-existing or altruistic preferences as some researchers suggest. There may be merit to “repacking existing initiatives,” seeing as a substantial limitation reviewing the plans in this analysis is the litany of other plans, ordinances, strategic and regulatory frameworks in a given city or region relevant to modifying the built environment, reducing miles traveled, and reducing GHG emissions. Climate action plans might serve their most virtuous purpose not by becoming yet another set of policies, actions, and strategies, but by synthesizing and precisely repacking existing or future initiatives. The CAPs rated good in this analysis did much of that, especially those that really stood out (Miami, Portland, Sacramento, San Diego, and particularly Austin). These plans effectively repacked existing and future climate actions with the added explicit connection to vehicle miles and emissions reductions.

Urban planners play disparate roles across the climate action planning landscape. With the variety of plan participants interested and subject to the gamut of sustainability and climate action efforts, the planner many times finds himself wedged between the politicians, engineers, architects, and activists. Planners need to harness strategies that cut through the clutter. Innovative tools such as Portland’s “20-minute neighborhood index” and Denver’s regional containment approaches, to name just two, illustrate strategic points of intervention for planners. Such tools are dependent on mobility (pedestrian, bicycle, vehicle, and transit) and spatial form (land use)—measures that are discrete and measurable, specific and significant. Until more
CAPs drill down on similar specific and significant land use choices explicitly linked to reducing vehicle miles driven, these plans are largely just codifying things that were likely to happen anyways.

Planners are susceptible to marginalizing their own role and potential impact on climate action. There exists a wide array of limitations linking planning strategies to reducing VMT and GHG emissions. Chief among these limitations are residential self-selection and the challenge measuring baseline and projected impacts on unpredictable travel, such as social, recreation, family, errands, and shopping. There are tools that can help identify at least cursory, ballpark estimates of VMT and GHG emissions reductions. Planners need to seek out these linkages and better articulate land use choices—something specific to urban planning—that impact reductions to VMT and GHG. Zoning ordinances, land use plans, and comprehensive plans should factor in to CAPs, and planners are uniquely positioned to incorporate these planning measures and identify effected stakeholders. While tension will always inherently exist with other professionals, politicians, and the public, planners need to leverage land use choices with co-benefits with underlying substance. What better way than to play a central role in developing, articulating, and implementing strategies that reduce the need to drive? The quality of life improvements (more time with family and friends; enjoying recreation, amenities, and services) espoused by the planning profession need to be directly linked to reduced VMT and reduced GHG. It is crucial that CAPs do a better job providing this planning substance, not just espouse the co-benefits. There is always the opportunity for planners to be visionary, but climate action requires concrete actions.
References


