

# THE WESTERN URBAN LANDSCAPE AND CLIMATE CHANGE

BY

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*The withdrawal by the United States from the Paris Climate Accords leaves American cities and states as the agents for change in reaching the world goal of less than two-degrees Celsius increase over the pre-industrial levels. While some states, notably California, have stepped up, climate change response has largely been taken by cities, which will also bear the brunt of climate change effects.*

*This Article surveys the efforts of six Western American cities, namely Los Angeles, San Francisco, Phoenix, Salt Lake City, Seattle and Portland to deal with climate change and uses four “markers” (i.e., transportation, land use, public services, and facilities and energy generation) to evaluate those responses.*

*None of the cities reviewed achieve an outstanding grade in all four categories, and correlatively, none do poorly in all four categories. Instead, there are programs to be emulated in each of these cities.*

*The conclusions suggest that other cities may wish to adopt selective programs from these cities as their own economic circumstances and political will may allow.*

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## I. INTRODUCTION

The impacts of global climate change or climate destruction (CD), both negative and positive, are rapidly manifesting themselves throughout the American West. These impacts include sea-level rise along the Pacific Coast,<sup>1</sup> decreased winter snow pack,<sup>2</sup> more frequent

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<sup>1</sup> William V. Sweet et al., *Sea Level Rise, in* I CLIMATE SCIENCE SPECIAL REPORT: FOURTH NATIONAL CLIMATE ASSESSMENT 334 (Donald J. Wuebbles et al. eds., 2017), <https://perma.cc/QSQ9-NH3V>. Oregon and Washington face less projected sea-level rise compared to California because the coast is rising, but this rise could be offset by a cataclysmic earthquake. NAT'L RESEARCH COUNCIL 2012, SEA-LEVEL RISE FOR THE COASTS OF CALIFORNIA, OREGON, AND WASHINGTON: PAST, PRESENT, AND FUTURE, 2012, at 105 (2012). Pacific Coast cities, however, are less at risk compared to urban areas on the lower

and longer droughts,<sup>3</sup> more frequent 100-year-plus flood events,<sup>4</sup> more intense forest fires as the fire season lengthens,<sup>5</sup> shifts in crop production,<sup>6</sup> and ecosystem changes.<sup>7</sup> To date, most research has focused on the negative impacts of CD on the region's non-urban landscape; less attention has been devoted to how the region's urban areas will be affected.<sup>8</sup> CD poses a major challenge to urban areas that are on the front line of climate change and requires multiple CD

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Atlantic Coast and face less of an existential threat than low-lying islands elsewhere. See MAYA K. BUCHANAN ET AL., ENVIRONMENTAL RESEARCH LETTER 12: AMPLIFICATION OF FLOOD FREQUENCY WITH LOCAL SEA LEVEL RISE AND EMERGING FLOOD REGIMES 4 (2017); KATHLEEN SULLIVAN SEALEY ET AL., WILL MIAMI SURVIVE? THE DYNAMIC INTERPLAY BETWEEN FLOODS AND FINANCE (Springer eds., 2018); see also Jonathan Hahn, *Can South Florida Adapt to Rising Sea Levels Before it's Too Late?*, SIERRA (Dec. 21, 2018), <https://perma.cc/9TJE-R9K2>; Kenneth Brower, *The Atolls of Arkansas*, SIERRA (Dec. 27, 2018), <https://perma.cc/RH8U-TQTK>; RANDALL S. ABATE, CLIMATE CHANGE IMPACTS ON OCEAN AND COASTAL LAW: U.S. AND INTERNATIONAL PERSPECTIVES (Randall S. Abate ed., 2015).

<sup>2</sup> Phillip W. Mote et al., *Dramatic Declines in Snowpack in the Western US*, NPJ CLIMATE & ATMOSPHERIC SCI., March 2018, at 1, 4.

<sup>3</sup> Recent scientific studies of the link between CD and drought are briefly summarized in PETER FOLGER & BETSY A. CODY, CONG. RESEARCH SERV., R43407, DROUGHT IN THE UNITED STATES: CAUSES AND CURRENT UNDERSTANDING 15 (2014).

<sup>4</sup> Hilda Blanco et al., *Southwest*, in CLIMATE CHANGE IMPACTS IN THE UNITED STATES: THE THIRD NATIONAL CLIMATE ASSESSMENT 469 (J.M. Melillo et al. eds., U.S. Glob. Change Research Program 2014).

<sup>5</sup> John T. Abatzoglou & A. Park Williams, *Impact of Anthropogenic Climate Change on Wildfire Across Western US Forests*, 113 PROC. NAT'L ACAD. SCI. 11,770, 11,771 (2016); see also S. Hamway, *OSU Climate Change Report a Mixed Bag for Central Oregon Forests*, THE BEND BULL. (Nov. 27, 2018), <https://perma.cc/HM9H-YYT6>.

<sup>6</sup> A great deal of attention has been focused on possible shifts in premium wine production northward, especially as California warms. See Emily Benson, *The Wine Industry's Battle with Climate Change*, HIGH COUNTRY NEWS (May 1, 2017), <https://perma.cc/3GV4-PVWA>. For an in-depth analysis of possible varietal shifts as well as improved varietals, see Adeline A. Ugaglia & Stéphanie Peres, *Knowledge Dynamics and Climate Change Issues in the Wine Industry: A Literature Review*, 24 J. INNOVATION ECON. & MGMT. 105, 106 (2017).

<sup>7</sup> Peter M. Groffman et al., *Ecosystems, Biodiversity, and Ecosystem Services*, in CLIMATE CHANGE IMPACTS IN THE UNITED STATES: THE THIRD NATIONAL CLIMATE ASSESSMENT, *supra* note 4, at 196.

<sup>8</sup> The Fourth National Climate Assessment devotes only three pages to cities both in the summary and full report and does little more than note that cities are taking adaptive actions., Susan Herrod Julius et al., *Built Environment, Urban Systems, and Cities*, in 2 IMPACTS, RISKS, AND ADAPTATION IN THE UNITED STATES: THE FOURTH NATIONAL CLIMATE ASSESSMENT 92–94 (David R. Reidmiller et al. eds., U.S. Glob. Climate Research Program 2018). More recently, international focus has been on the metrics of assessing climate change in order to have uniform standards of the measures to meet the challenge, notwithstanding the lack of active participation by the United States. See *COP24: Key Outcomes Agreed at the UN Climate Talks in Katowice*, CARBON BRIEF, <https://perma.cc/4J4A-SEB4> (last visited Nov 9, 2019). Matthew C. Fitzpatrick and Robert R. Dunn project the impacts of climate change on 540 urban areas by identifying analogous current urban areas to show the expected future impacts in an area. Matthew C. Fitzpatrick & Robert R. Dunn, *Contemporary Climatic Analogs for 540 North American Urban Areas in the Late 21st Century*, NATURE COMMS. (Feb. 12, 2019) All six areas studied in this article can expect considerably warmer climates by 2080. *Id.*

response strategies. However, the post-2017 absence of any federal climate change policy and the limited number of state initiatives, means that urban areas, even in the West, are the prime candidates to cope with CD.<sup>9</sup>

Two principal strategies exist to deal with the adverse impacts of CD in urban areas: mitigation and adaptation.<sup>10</sup> Mitigation attempts to roll back greenhouse gas emissions to stabilize the climate. CD adaptation accepts temperature rise as inevitable and attempts to minimize damage from the worst impacts. Cities are involved in both strategies and in many actions will implement both of them. For example, the reduction of automobile use will cut greenhouse gas emissions and help lower temperatures in urban heat islands. We believe that, in the end, urban areas will have no choice but to adapt to CD because of the utter failure of the United States and the international community to roll back greenhouse gas emissions to the level necessary to stabilize the climate.<sup>11</sup> Adaptation will not be easy. Western cities must adapt as they face continued population growth and pressing social equity issues such as homelessness and housing affordability. Many strategies clash with those adopted by cities to cope with the transition of the West from a commodity production colony to the most urbanized region in the country, a change that accelerated after World War II. The West has both courted unlimited growth and venerated low-density suburbs and “cool” urban neighborhoods, with the

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<sup>9</sup> See, e.g., PATRICIA SALKIN & JOHN NOLAN, CLIMATE CHANGE AND SUSTAINABLE DEVELOPMENT IN A NUTSHELL 171–73 (West 2011). For an early, pre-2017, survey of land-use control strategies available to cities, see Alice Kaswan, *Climate Change Adaptation: Exploring the Federal Role*, 47 JOHN MARSHALL L. REV. 509, 513–15 (2013). CD affects far more urban than rural residents. In a press release of December 8, 2016, U.S. Census Bureau observed that “rural areas cover 97 percent of the nation’s land area but contain 19.3 percent of the population (about 60 million people).” U.S. Census Bureau, *New Census Data Show Differences Between Urban and Rural Populations* (Dec. 8, 2016), <https://perma.cc/7QYF-Q2FA>. The critical nature of the absence of federal policy has profound consequences on life and living in the United States. See David Malakoff, *Climate Change Poses Major Threat to U.S., New Government Report Concludes*, SCI. MAG. (Nov. 23, 2018, 2:00 PM) <https://perma.cc/T742-PYSV>. Despite efforts to ignore or bury this report, Coral Davenport, *Trump Administration’s Strategy on Climate: Try to Bury Its Own Scientific Report*, N.Y. TIMES, Nov. 25, 2018, at A1, the report has engendered renewed debate over national climate policy. See Coral Davenport & Kendra Pierre-Louis, *U.S. Climate Report Warns of Damaged Environment and Shrinking Economy*, N.Y. TIMES, Nov. 24, 2018, at A1.

<sup>10</sup> For a discussion on a third strategy, carbon sequestration, see Alan Brickley et al., *Climate Change and Oregon Law: What is to be Done?* 33 J. ENV. L. & LIT. 235 (2018). However, this strategy is generally associated with rural areas and is not considered further in this article.

<sup>11</sup> After a three-year period of stability, greenhouse gas emissions rose two percent in 2017 and the graph of expected temperature rise is ever upward. CORINNE LE QUERE ET AL., GLOBAL CARBON PROJECT 405, 426 (2017); *California Leads Substantial Efforts to Curb Climate Change*, ECONOMIST (Sept. 15, 2018), <https://perma.cc/EW4C-VEEN> (outlining the case for increased focus on local adaptation as opposed to mitigation by showing the very small amount of greenhouse gas emissions reductions that are likely to result from local initiatives worldwide).

result that this growth has often exposed people to the loss of life and property. Western urban-lifestyle choices have enabled and created strong legal, political, and social expectations that will spur fierce opposition to many CD adaptation strategies and resistance to climate migration as well.<sup>12</sup>

The West is the most CD-sensitive region in the United States and states and their urban areas in the region, especially along the Pacific Coast, have paid considerable attention to the need to transition to a decarbonized economy. Metropolitan areas have focused on specific projected impacts such as sea-level rise or increased heat, but there have been few general discussions of how both CD mitigation and adaptation will impact the urban landscape. This article is a step toward filling this gap.

Following this Introduction, Part II sets out the likely adverse and positive impacts of CD and how they may impact the urban landscape. Part III notes the lack of consensus as to CD response. Part IV surveys how six western metropolitan areas are adapting to CD. Four of them are on the politically “blue” Pacific Coast, Seattle, Portland, the San Francisco Bay Area, and Los Angeles; the other two are in the “purple-red” West, Phoenix and the Wasatch Front from Logan to Provo, Utah. The survey reviews the climate change responses of each city through four “markers”: transportation, land use, infrastructure, and energy. Part V urges policy makers to re-think their assumptions in the light of the dangers posed by CD and some of the actions taken by the cities included in this Article’s survey. Finally, Part VI presents our conclusions.

## II. THE BIBLICAL AGENDA: DROUGHTS, FIRES, FLOODS, PESTS, AND CONTINUED IN-MIGRATION

### A. *Consumptive and Non-Consumptive Water Use Stress*

The paradox of the urban American West is that it has thrived in a generally harsh, water-short climate. CD scenarios predict that the West’s water supplies are likely to continue to shrink or become unstable in many areas. The intermountain West will be hardest hit by declining snow packs.<sup>13</sup> However, the wetter-warmer-less water scenario

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<sup>12</sup> The story of Del Mar, California, a beach community north of San Diego that faces serious erosion problems, is illustrative. In 2017, the city considered a climate change plan that included retreat, but fierce opposition from property owners followed. The California Coastal Commission urged inclusion of retreat options in the plan, but in May 2018, the city dropped the “R” word from its plan. Instead, it will reply on the increasingly controversial strategy of beach expansion. Phil Diehl, *Del Mar Stands Firm Against ‘Planned Retreat’*, S.D. UNION TRIB. (May 22, 2018, 12:40 PM), <https://perma.cc/9R9X-9C9X>.

<sup>13</sup> Philip W. Mote et al., *Dramatic Declines in Snowpack in the Western US*, NPJ CLIMATE & ATMOSPHERIC SCI., Feb. 2018, at 2.

is not a reliable guide for every part of the West. Some areas will experience a wilder ride. Northern and Central California may experience more rainfall, but more extended droughts as well.<sup>14</sup> The Pacific Northwest will, on the whole, be less adversely impacted by CD-induced water stress. But, even green and wet Western Oregon will experience increased water stress.<sup>15</sup> These impacts will ultimately affect, often adversely, both rural and urban land values, and the failure of cities to adapt may accelerate declines in property values.<sup>16</sup>

Increased water stress will impact all uses: the conservation of water resources, municipal and industrial uses, and even irrigated agriculture will face stress.<sup>17</sup> Cities have been able to accommodate population increases because residential demand is a relatively small slice of the water pie and because urban uses have long enjoyed a “super preference” for needed water supplies.<sup>18</sup> For example, the doctrine of prior appropriation, which all western states follow, tries to prevent the acquisition of water rights if there is no plan to put the water to beneficial use within a relatively short period of time.<sup>19</sup> Courts have created an exception to this anti-speculative rule and have allowed growing cities to perfect water rights for anticipated future growth.<sup>20</sup> Existing rights may be condemned, and cities generally have the financial resources to acquire agricultural rights without regard to the consequences of dewatering rural areas.<sup>21</sup> The question is whether cities can continue to use irrigated agricultural lands as municipal and industrial “reservoirs.”

Irrigated agriculture faces increased stress because “[i]n many areas, streamflow and reservoir storage effects are expected to reduce

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<sup>14</sup> Daniel L. Swain et al., *Increasing Precipitation Volatility in Twenty-First Century California*, 8 NATURE CLIMATE CHANGE 427 (2018).

<sup>15</sup> U.S. ENVTL. PROT. AGENCY, SAVING WATER IN OREGON (2017), <https://perma.cc/P2M4-E3C7>. For an extensive review of CD and prospective Oregon responses, see generally Brickley et al., *supra* note 10, at 260–61.

<sup>16</sup> The initial evidence of property value declines comes from the Atlantic coast, but people are beginning to speculate about declines in the extreme arid West. See, e.g., Cally Carswell, *What Are We Doing Here: Drought, Dread and Family in the American Southwest*, HIGH COUNTRY NEWS (Aug. 6, 2018), <https://perma.cc/9JYJ-XUUK>. See generally ROBERT MENDELSON, LINCOLN LAND INST., CLIMATE CHANGE AND LAND VALUES 79 (Gregory K Ingram & Yu-hung Hong eds., 1st ed. 2011); Sara Anderson et al., *The Critical Role of Markets in Climate Change Adaptation* 1 (Hoover Inst., Econ. Working Paper 18107, 2018).

<sup>17</sup> OFFICE OF SUSTAINABILITY & CLIMATE, U.S. FOREST SERV., ECOLOGICAL DROUGHT IN THE INTERMOUNTAIN REGION 1 (2017), <https://perma.cc/6537-XX6V>.

<sup>18</sup> See A. Dan Tarlock, *We Are All Water Lawyers Now: Water Law's Potential but Limited Impact on Urban Growth Management*, in WET GROWTH: SHOULD WATER LAW CONTROL LAND USE? 57, 58 (Craig Anthony Arnold ed., 2005) [hereinafter *We Are All Water Lawyers Now*]; see also A. Dan Tarlock & Sarah B. Van de Wetering, *Water and Western Growth*, 59 PLAN. & ENVTL. L. REV. 5, 3 (2007).

<sup>19</sup> *Water Law: An Overview*, NAT'L AGRIC. L. CTR. <https://perma.cc/G2YB-HKM9> (last visited Sept. 26, 2019).

<sup>20</sup> See *We Are All Water Lawyers Now*, *supra* note 18, at 62.

<sup>21</sup> *Id.* at 59.

water supplies for traditional peak irrigation water demands during the summer and fall growing seasons.”<sup>22</sup> The shrinking supply could “intensify efforts by agriculture to adopt new strategies to hang on to existing entitlements” and thus make the acquisition of new urban supplies more costly and difficult. For example, “[a]gricultural interests could abandon their efforts to block the development of a coherent U.S. food and water policy in the name of food security.”<sup>23</sup> The United States currently has no coherent water or food policy,<sup>24</sup> which places the nation out-of-step with the international water community.<sup>25</sup>

Aquatic ecosystems face various stresses from CD.<sup>26</sup> Reduced flows can increase pollution levels and threaten the survival of various fish species.<sup>27</sup> Since the 1960s, states have worked to improve instream flows and aquatic ecosystems through instream flow appropriations, water reserves, state wild and scenic rivers, minimum flow standards, dam removal, and other river restoration programs.<sup>28</sup> The constituency for these programs is predominately urban. Thus, efforts to shift water from rural to urban uses will face new legal and political constraints.

### *B. Floods and Sea Level Rise*

Both wet and dry western cities will see a lot more unwanted water in built areas from floods and sea-level rise. In the Pacific Northwest, west of the Cascades, “simulations project widespread increases in flooding for the twenty-first century because of the combined effects of increasing cool season precipitation and rising snow levels during storms associated with warmer temperature.”<sup>29</sup> “Arizona’s monsoon rainfall is becoming more intense even as daily average rainfall in parts of the state has decreased, according to a new study. Increasingly,

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<sup>22</sup> C.D. Schaible & M.P. Aillery, *Challenges for US Irrigated Agriculture in the Face of Emerging Demands and Climate Change*, in COMPETITION FOR WATER RESOURCES 44, 51 (Jadwiga R. Ziolkowska & Jeffrey M. Peterson eds., 2017).

<sup>23</sup> A. Dan Tarlock, *Western Water Law and the Challenge of Climate Disruption*, 48 ENVTL. L. 1, 17 (2018).

<sup>24</sup> See generally Water Management for Rural Areas, 7 U.S.C. § 2204c (2012) (illustrating the incoherent food and water policies in place in the United States).

<sup>25</sup> See Tarlock, *supra* note 23, at 18 (discussing the growing use of the water-food nexus to shape water policy in Europe, Africa, Asia and South America).

<sup>26</sup> MEGAN M. FRIGGENS & CARLY K. WOODLIEF, ROCKY MOUNTAIN RESEARCH STATION, FINAL REPORT: SYNTHESIS OF AQUATIC CLIMATE CHANGE VULNERABILITY ASSESSMENTS FOR THE INTERIOR WEST 4, 20 (2015).

<sup>27</sup> P.G. Whitehead et al., *A Review of the Potential Impacts of Climate Change on Surface Water Quality*, 54 HYDROLOGICAL SCI. J. 101, 103 (2009).

<sup>28</sup> See, e.g., Or. Watershed Enhancement Bd., *Effectiveness Monitoring: Small Dam Removal*, OREGON.GOV, <https://perma.cc/RJM5-JZYB> (last visited Nov. 2, 2019).

<sup>29</sup> Eric P. Salathé et al., *Estimates of Twenty-First-Century Flood Risk in the Pacific Northwest Based on Regional Climate Model Simulation*, 15 J. HYDROMETEOROLOGY 1881, 1882 (2014).



extreme storms threaten the region with more severe floods and giant dust storms called haboobs.”<sup>30</sup>

### C. Forest Fires

Forest fire policy is one of the most contentious scientific policy issues in the West.<sup>31</sup> However, there is increasing consensus that CD has lengthened the annual fire season and has doubled the cumulative area in the western United States that would have otherwise “naturally” burned.<sup>32</sup> From there, everything is up for debate including the benefits of forest fires and whether there will be feedback loops. In the short run, fires could be intense and frequent, as California and much of the West experienced in 2018, and then decrease in size as forests dry out and less fuel is available to feed the fire. Property damage from U.S. fires from 2007–2017 has been estimated at \$5.1 billion.<sup>33</sup> But, what we do know is that forest fires are a major land use problem, driven by land use and other public policies that encourage people to locate in at-risk areas without fully understanding the risks.<sup>34</sup> More people are moving to urban areas interfacing with forests. This phenomenon raises the same issue that flood plain settlement raises: should these people be allowed in fire risk zones, where the incidence of accidental or human-caused conflagration occurs more often?

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<sup>30</sup> Bobby Magill, *Global Warming is Fueling Arizona’s Monstrous Monsoons*, CLIMATE CENT. (Aug. 4, 2017), <https://perma.cc/VL9L-BJSK>.

<sup>31</sup> Alexandra D. Syphard et al., *The Relative Influence of Climate and Housing Development on Current and Projected Future Fire Patterns and Structure Loss Across Three California Landscapes*, 56 GLOBAL ENVTL. CHANGE 41 (2019); see also Leigh Barton, *Let it Burn: An Argument for an Adaptive Resilience Approach to Federal Wildfire Management in the Western United States*, 30 GEO. ENVTL. L. REV. 695, 712 (2018).

<sup>32</sup> John T. Abatzoglou & A. Park Williams, *Impact of Anthropogenic Climate Change on Wildfire Across Western US Forests*, 113 PROC. NAT’L ACAD. SCI. 11,770 (2016), <https://perma.cc/GK9W-F5XN>.

<sup>33</sup> INS. INFO. INST., FACTS + STATISTICS: WILDFIRES (2019), <https://perma.cc/ZP9S-CMPP>.

<sup>34</sup> Tania Schoennagel et al., *Adapt to More Wildfire in Western North American Forests as Climate Changes*, 114 PROC. NAT’L ACAD. SCI. 4582, 4587 (2017) (“The majority of home building on fire-prone lands occurs in large part because incentives are misaligned, where risks are taken by homeowners and communities but others bear much of the cost if things go wrong. Therefore, getting incentives right is essential, with negative financial consequences for land-management decisions that increase risk and positive financial rewards for decisions that reduce risk. For example, shifting more of the wildfire protection cost and responsibility from federal to state, local, and private jurisdictions would better align wildfire risk with responsibility and provide meaningful incentives to reduce fire hazards and vulnerability before wildfires occur.”); see also William P. Edwards, *The New Normal: Living with Wildland Fire*, 33 NAT. RES. & ENV’T 30 (2019) (recommending a policy based on fire suppression and the development of more fire-resistant forest ecosystems).

### D. Population Growth

All western metropolitan areas are experiencing continuing population growth from outside and within the region.<sup>35</sup> Even as U.S. birth rates decline<sup>36</sup> and immigration slows,<sup>37</sup> western cities will likely benefit from a demographic and political tilt to the South and West. This includes established cities and a few “cool” smaller urban areas thriving as tourist and retirement centers. St. George, Utah, the winter home of Mormon leader Brigham Young, is the poster child of a new western urban center.<sup>38</sup>

Throughout the West, all urban areas, old and new, continue to drain the region’s rural population, especially younger migrants.<sup>39</sup> There are many reasons for urban growth. For example, after World War II, the small Boise, Idaho metro area primarily served the southern Idaho farm economy, but today it is the nation’s fastest growing area with a population of 670,000.<sup>40</sup> California and Washington residents are especially attracted to the area because of its less hectic pace, good employment opportunities, lower (but rising) house prices compared to the West Coast, and its tradition of political conservatism.<sup>41</sup> Lifestyle migrants may soon be joined by climate ones.<sup>42</sup> For example, economic opportunity is the current driver of the Eugene-Vancouver, British Columbia corridor’s growth, but the relative ability of the area to adapt to climate change compared to other areas of the West may induce further population growth.<sup>43</sup>

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<sup>35</sup> WILLIAM H. FREY, BROOKINGS INSTIT., POPULATION GROWTH IN METRO AMERICA SINCE 1980: PUTTING THE VOLATILE 2000S IN PERSPECTIVE 5 (2012).

<sup>36</sup> BRADY E. HAMILTON ET AL., NATIONAL VITAL STATISTICS SYSTEM, BIRTHS: PROVISIONAL DATA FOR 2018 (2019).

<sup>37</sup> See Jynnah Radford, *Key Findings About U.S. Immigrants*, PEW RESEARCH CTR.: FACTTANK (June 17, 2019), <https://perma.cc/B7GX-BUQS>.

<sup>38</sup> David DeMille, *St. George, Utah, is the Nation’s Fastest-Growing Metro Area*, *Census Says*, USA TODAY (Mar. 22, 2018), <https://perma.cc/2TJ4-LK9H>.

<sup>39</sup> Leah Todd, *Infographic: Where in the West Young People are Moving*, HIGH COUNTRY NEWS (Oct. 16, 2017), <https://perma.cc/433A-FJHS>.

<sup>40</sup> Don Holley, *Booming Boise: Idaho City is Growing at a Feverish Pace*, THE HILL (Apr. 24, 2018, 02:30 PM), <https://perma.cc/ZM73-C9MR>.

<sup>41</sup> See CRAIG SHAUL, IDAHO DEPT OF LABOR, IDAHO ECONOMIC OUTLOOK AND REVENUE ASSESSMENT COMMITTEE (2018).

<sup>42</sup> There is no uniform definition of a climate migrant. For example, people forced from their homes by climate change-caused inundation do not qualify as refugees under current international law, which defines refugees as those who must flee for their lives to avoid political persecution. This Article does not discuss the question of whether those who voluntarily migrate within the United States to seek a more stable climate have any legal status. *But see* Jennifer Kingson, *Portland Will Still Be Cool, but Anchorage May Be the Place to Be*, N.Y. TIMES (Sept. 22, 2014), <https://perma.cc/T3CM-5ZSR>; Prashant Gopal, *America’s Great Climate Exodus is Starting in the Florida Keys*, BLOOMBERG (Sept. 20, 2019) at <https://perma.cc/4GVA-VGBJ>.

<sup>43</sup> See ALISON SAPERSTEIN, CLIMATE CHANGE, MIGRATION, AND THE PUGET SOUND REGION: WHAT WE KNOW AND HOW WE COULD LEARN MORE 6 (Univ. of Wash. Climate Impacts Grp., 2015) (discussing potential climate change-based migration to Puget Sound).

States must accept this growth. All U.S. citizens have a right to travel, which includes a right to locate in any state they choose.<sup>44</sup> At most, state and local land use authority can be used to distribute and to time the distribution of population within a state. A few lower federal courts have upheld timed growth ordinances and occasional population caps based on limited water resources against right to travel arguments.<sup>45</sup>

### *E. Public Health*

The West will face the risk of CD-enhanced public health problems. These include illness caused by the inability of individuals to withstand heat stress, increased air pollution, increased water-borne diseases from flood and other extreme rain events, and new dangers from vectors, animal wastes, insecticides, and mosquito-borne and bacterial illnesses.<sup>46</sup> The link between adaption and land-use planning is more indirect than other adaptation responses, but there is a link. A Washington State study recommends improved “community planning and design to support and promote healthy built environments and healthy living,” including more urban vegetation and open space and the provision of new infrastructure in vulnerable areas.<sup>47</sup>

## III. NO CONSENSUS ON THE URBAN LANDSCAPE

How will CD change the urban landscape and how should cities adapt? Western cities have long adapted to the changing west, primarily the continuing population boom. Are these strategies compatible with CD adaptation? If not, what changes must be made, and can they be made? There are no easy answers to these questions because there is no consensus on how adaptation will impact the urban landscape. We have endless studies of the impacts of CD on urban areas such as increased heat islands<sup>48</sup> and infrastructure.<sup>49</sup> There are many options to mitigate greenhouse gas emissions. We also have useful efforts to envision an

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<sup>44</sup> *Edwards v. California*, 314 U.S. 160, 164 (1941).

<sup>45</sup> See A. Dan Tarlock, *Western Water Law, Global Warming, and Growth Limitations*, 24 LOY. L. REV. 979, 1008 (1991).

<sup>46</sup> WASH. STATE DEP'T OF ECOLOGY, PUB. NO. 12-01-004, PREPARING FOR A CHANGING CLIMATE: WASHINGTON STATE'S INTEGRATED CLIMATE RESPONSE STRATEGY 47, 49 (2012).

<sup>47</sup> *Id.* at 55.

<sup>48</sup> See Mark McCarthy et al., *Climate Change in Cities Due to Global Warming and Urban Effects*, 37 GEOPHYSICAL RES. LETTERS, May 2010, at 1, 3.

<sup>49</sup> Susan L. Cutter et al., *Urban Systems, Infrastructure, and Vulnerability*, in CLIMATE CHANGE IMPACTS IN THE UNITED STATES, *supra* note 4, at 283.

adaptive urban form,<sup>50</sup> but serious efforts to link CD research and spatial planning are just beginning to emerge.<sup>51</sup>

The closest useful model we have is the sustainable cities movement that initially grew out of the environmental movement, especially Ian McHarg's book, *Design with Nature*.<sup>52</sup> For decades, especially in Europe, there have been extensive efforts to envision and develop sustainable cities.<sup>53</sup> In general, these have the following physical and social characteristics: denser development, less energy and waste-producing materials consumption, the transition to renewable energy sources, more public transit, especially light rail networks, less automobile use and more walking, more urban open space especially to absorb rainfall, and retreat from putting populations in disaster risk areas.<sup>54</sup>

The drive to create sustainable cities is reflected in the United Nations Sustainable Development Goal (SDG) 11: "Make cities inclusive, safe, resilient and sustainable."<sup>55</sup> The specific targets do not mention CD but many support CD adaptation. These targets include:

By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations: women, children, persons with disabilities and older persons

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By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including

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<sup>50</sup> Stephen Sheppard, *Landscape Visualization and Climate Change: The Potential for Influencing Perceptions and Behavior*, 8 ENVTL. SCI. & POL'Y 637, 643 (2005).

<sup>51</sup> Jeremy Carter et al., *Climate Change and the City: Building Capacity for Urban Adaptation*, 95 PROGRESS PLAN., July 2015, at 1, 7; see also Yunfang Jiangi et al., *A Review of Urban Planning Research for Climate Change*, 9 SUSTAINABILITY, Dec. 2017, at 1, 7.

<sup>52</sup> IAN MCHARG, DESIGN WITH NATURE (1970). McHarg's book was widely praised but its impact on city design is minimal. For a positive evaluation of a development he designed in Texas, see Bo Yang & Shujuan Li, *Design with Nature: Ian McHarg's Ecological Wisdom as Actionable and Practicable Knowledge*, 155 LANDSCAPE & URB. PLAN. 21, 22 (2016).

<sup>53</sup> See generally Jacobus A. Du Pisani, *Sustainable Development - Historical Roots of the Concept*, 3 ENVTL. SCI. 83, 85 (2006) (discussing the historic demand for sustainability in Europe).

<sup>54</sup> UNITED NATIONS DEPT' OF ECON. & SOC. AFF., WORLD ECONOMIC AND SOCIAL SURVEY: SUSTAINABLE DEVELOPMENT CHALLENGES 53–63; see also Simon Elias Bibri & John Krogstie, *Smart Sustainable Cities in the Future: An Extensive Interdisciplinary Literature Review*, 31 SUSTAINABLE CITIES & SOC'Y 138 (2017) (Accepted Manuscript, 14); Jeff Winmill, *How U.S. Cities Seek to Use 100 Percent Renewable Energy*, 32 NAT. RES. & ENV'T, Winter 2018, at 13, 14 (2018).

<sup>55</sup> *Sustainable Development Goal No. 11: Make Cities inclusive, safe, resilient and sustainable*, UNITED NATIONS, <https://perma.cc/4JMM-SYHP> (last visited Nov. 9, 2019).

water-related disasters, with a focus on protecting the poor and people in vulnerable situations

By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management

By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities<sup>56</sup>

As western growth began to explode in the 1970s, cities made efforts to control and channel urban growth in more sustainable ways. Efforts to encourage a CD-resilient western urban landscape can draw upon on-going efforts to reduce greenhouse gas emissions. Western cities have begun some efforts to merge sustainable urbanism and CD mitigation and adaptation, but no western urban area can be deemed “sustainable.”<sup>57</sup> The gap between the magnitude of the problem and CD mitigation goals is too wide. For example, Los Angeles wants to reduce temperatures by 3 degrees Fahrenheit over the coming two decades, although research forecasts suggest that temperatures will be 8.2 degrees warmer than they were in 1981.<sup>58</sup> These efforts remain largely aspirational and may be futile in part because the acceptance of low density development and the automobile as the primary mode of transportation undercut them.

The West’s urban centers score low on sustainability because they have practiced decades of unsustainable urban growth. America remains deeply wed to the automobile, a choice supported by decades of law and federal and state policies.<sup>59</sup> Of the ten U.S. cities with the highest proportion of people of who bike or walk to work, only three are in the West: San Francisco, Seattle, and Portland are in the 12–14% range.<sup>60</sup> Most western cities have on the whole welcomed explosive growth on the theory that benefits outweigh the costs. Las Vegas, Phoenix, and Salt Lake City adapted by accepting growth and encouraging low-density sprawl, leaving it to the next generation to deal with the consequences.

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<sup>56</sup> *Id.*

<sup>57</sup> See, e.g., KERRIE ROMANOW ET AL., CLIMATE SMART SAN JOSE: A PEOPLE CENTERED PLAN FOR A LOW-CARBON CITY 10 (2018).

<sup>58</sup> INT’L PANEL ON CLIMATE CHANGE, SPECIAL REPORT: GLOBAL WARMING OF 1.5 DEGREES C: SUMMARY FOR POLICYMAKERS (2018), <https://perma.cc/78ZY-HKE2>. For an American Western City analogy, see Alex Hall, *The Climate Change in the Los Angeles Region*, CLIMATE SENSITIVE RES. SPOTLIGHT, <https://perma.cc/5NK7-2R9C> (last visited Nov. 11, 2018).

<sup>59</sup> John Pucher & Ralph Buehler, *Cycling Towards a More Sustainable Transport Future*, 37 TRANSPORT REV. 689, 689–92 (2017).

<sup>60</sup> Adele Peters, *The Top Ten U.S. Cities Where The Most People Bike and Walk to Work*, FAST CO. (Mar. 2, 2016), <https://perma.cc/CN33-LXG8>.

There have been pockets of efforts to manage growth. Boulder, Colorado and Portland, Oregon tried to follow the European vision of a city with a sharp differentiation between urban and rural areas and denser urban development.<sup>61</sup> Other smaller cities tried a variety of strategies to limit sprawl. The San Francisco Bay Area, the city and many older suburbs, used traditional zoning to keep many areas at pre-World War II densities and scale even as tech industries located there, pushing development to the exurban fringe. Historic preservation has evolved from the protection of places of genuine historic or architectural interest to the preservation of old, basically pre-war, residential neighborhoods.

Two dynamics are forcing cities to revisit all prior strategies: CD and the housing affordability crisis. A CD adaptive or resilient city would be a denser place with more multi-family buildings and fewer single-family homes. There would be some less dense areas, primarily in fire and flood risk zones.

The push for compact, denser cities will face opposition from multiple fronts. Efforts to curb outward expansion of metropolitan-urban jurisdictional boundaries will, of course, be fiercely resisted by the real estate industry. Established neighborhoods will oppose increased density. Environmentalists will cite the growing evidence that urban open spaces, backyards, parks, and flood ways are a significant and uncounted source of carbon sequestration.<sup>62</sup> Continued outward urban growth is also, ironically, driven by cool, relatively dense urban centers along the Pacific Coast. As these cities become more expensive and property markets become more competitive, more people are pushed into the suburbs, as well as to other cities in the intermountain West.<sup>63</sup>

At a deeper level, growth is seen as inevitable. Since the early exploration of the West, many have pondered the question of whether the region's harsh climate and uneven distribution of rainfall pose any limits on human settlement.<sup>64</sup> Western Americans have answered this question with a resounding no. Technology, especially air conditioning and investment in carry-over water storage, have removed the debate on limits from serious political discussion. CD has ignited the debate among a few scholars and triggered some legislative response such as "show-me-the-water" laws,<sup>65</sup> but there is no serious discussion of

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<sup>61</sup> Samuel R. Staley et al., *A Line in the Land: Urban-Growth Boundaries, Smart Growth, and Housing Affordability*, in *URBAN-GROWTH BOUNDARIES* (Reason Public Policy Institut., Policy Brief No.11, Oct. 1999).

<sup>62</sup> Michael W. Strohbach et. al., *The Carbon Footprint of Urban Green Space - A Life Cycle Approach*, 104 *LANDSCAPE & URB. PLAN.* 220, 221 (2012).

<sup>63</sup> Reid Wilson, *Booming City Economies Push Middle Class Out*, *THE HILL* (Jan. 27, 2018), <https://perma.cc/S7SA-SMPP>; see also Justin Fox et al., *Millennials Are Driving the Suburban Resurgence*, *BLOOMBERG L.* (Aug. 25, 2017), <https://perma.cc/H3WL-YT98>.

<sup>64</sup> A. Dan Tarlock, *A Brief Examination of the History of the Persistent Debate about Limits to Western Growth*, 10 *HASTINGS W. NW. J. ENVTL. L. & POL'Y* 155, 155 (2004).

<sup>65</sup> California has laws linking new, large development approvals and available water supply. A. Dan Tarlock, *How California Local Governments Became Both Water Suppliers*

stopping Western growth. The current political issue is framed as a housing affordability “crisis” caused by rising real estate prices in major and medium sized metropolitan areas throughout the West.<sup>66</sup> The solution seems to be more housing, not fewer people.

#### IV. ADDRESSING CLIMATE CHANGE IN SELECTED URBAN AREAS IN THE AMERICAN WEST

As noted, we have selected six urban areas in the American West to examine how each addresses climate change. Three of them are in the Pacific Northwest or Mountain States, while the remaining three are in California or the Southwestern desert. We chose them by three primary criteria. First, they represent different climate and geographic zones and thus face different impacts and risks. For example, Phoenix is located in the area which will face the most severe water impacts compared to the two cities in the Pacific Northwest. Second, they contain a significant portion of the West’s urban population; their metropolitan area populations range from 18.1 million for Los Angeles to 1.14 million in Salt Lake City.<sup>67</sup> We recognize that metropolitan areas contain multiple local governments, but have generally concentrated our analysis to the largest city in each region, with the exception of the San Francisco Bay Area. Third, all cities recognize the CD risks that they face but responses vary considerably, providing both positive and negative lessons. We chose the four markers, transportation, land use, infrastructure, and energy, because they represent the major, but not exclusive, vital urban services and resources that face the risk of substantial adverse CD impacts. To the extent that information is available, we have attempted to undertake the analysis of each of our four “marker” issues. Following that discussion, we will compare these urban area responses and posit some conclusions that might be useful in the American and international contexts.

##### A. San Francisco

The greater San Francisco Bay Area is home to over 7,000,000 people spread over nine counties and 101 cities.<sup>68</sup> San Francisco itself

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*and Planners*, 4 GOLDEN GATE U. ENVTL. L.J. 7, 14, 25 (2010). But the laws played almost no role in the response to the 2012–2016 drought. See A. Dan Tarlock, *California Adapts to Prolonged Drought: Any Lessons for the Humid Midwest?*, 51 VAL. U. L. REV. 519, 519 (2017).

<sup>66</sup> Conor Dougherty, *California Housing Problems Are Spilling Across Its Borders*, N.Y. TIMES (March 20, 2018), <https://perma.cc/DJL9-CCHR>.

<sup>67</sup> *Los Angeles, California Population 2019*, WORLD POPULATION REV., <http://worldpopulationreview.com/us-cities/los-angeles-population/> (last visited Oct. 10, 2019); *Salt Lake City, Utah Population 2019*, WORLD POPULATION REV., <https://perma.cc/835T-NTEN> (last visited Nov. 9, 2019).

<sup>68</sup> *Bay Area Census, Selected Census Data from the S.F. Bay Area*, METROPOLITAN TRANSP. COMM’N, <https://perma.cc/AM7U-EU59> (last visited Nov. 9, 2019).

has a population of around 885,000 and is only the second-largest city in the region, behind San Jose.<sup>69</sup> San Francisco and the region continue to grow, but decades long, rapid population growth has slowed due to high housing costs. A few counties are even experiencing small net out migration. The region has been at the forefront of CD mitigation and adaptation awareness and planning,<sup>70</sup> but a coordinated approach to adaptation such as retreat from areas at risk from sea level rise, a better public transportation network, and increased transit-oriented density has eluded it.

### 1. Transportation

San Francisco adopted a transit-first policy in 1973,<sup>71</sup> and the result is a decent rapid transit system consisting of the Bay Area Rapid Transit (BART) subway, and a streetcar and bus system.<sup>72</sup> The greater region lacks a system adequate to its population and job centers. The root problem is that there is no metropolitan authority with binding regulatory powers or a single regional transportation authority with the power and vision to construct a European net system. It has a planning authority, the Association of Bay Area Governments (ABAG).<sup>73</sup> ABAG's 2040 plan calls for more rapid transit, but its efforts are largely aspirational.<sup>74</sup> Thus, the Bay Area remains an automobile-dependent area with increasingly longer commute times for most residents.<sup>75</sup> Only about 10% of the region's commuters use public transit, much of it concentrated in San Francisco, compared with an average of 49% for the European Union.<sup>76</sup> The reason is the failure of BART. BART began as a five-county effort to link all the major suburban areas to San Francisco. However, the two coastal counties, San Mateo and Marin, soon dropped

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<sup>69</sup> DEP'T OF FIN., STATE OF CALIFORNIA, CALIFORNIA TOPS 39.9 MILLION RESIDENTS AT NEW YEAR PER NEW STATE DEMOGRAPHIC REPORT (2019) (Population Estimates for California Cities).

<sup>70</sup> See BAY AREA CLIMATE & ENERGY RESILIENCE PROJECT, BAY AREA CLIMATE ADAPTATION & RESILIENCE: NINE COUNTY-LEVEL SNAPSHOTS, PROJECTS, PLANS, STRUCTURES & NEEDS 5–10 (2014) (setting out the standard laundry list of CD-adaptation strategies such as transit-oriented development and more open space for carbon sequestration).

<sup>71</sup> *Transit-First Policy*, SFCTA, <https://perma.cc/7DEE-CDQM> (last visited Nov. 9, 2019). For the current version, see San Francisco City Charter, § 8A.115 (2018).

<sup>72</sup> The iconic cable car system has been reduced to two lines, and the \$7.00 fare is paid almost exclusively by tourists, with locals boarding for a regular Muni fare. Brock Keeling & Alice Wong, *How to Get Around SF if You Don't Own a Car*, CURBED SF (Aug. 22, 2019, 9:33 AM), <https://perma.cc/SK8V-Z6BH>.

<sup>73</sup> See METRO. TRANSP. COMM'N & ASS'N OF BAY AREA GOV'TS, PLAN BAY AREA 2040, at 24–25 (2017).

<sup>74</sup> *Id.* at 28–29.

<sup>75</sup> See *Commute Time*, METRO. TRANSP. COMM'N, <https://perma.cc/U2LD-4UL4> (last updated May 2018).

<sup>76</sup> *Commute Mode Choice*, METRO. TRANSP. COMM'N, <https://perma.cc/8WL7-93CG> (last updated May 2018); Feargus O'Sullivan, *Breaking Down the Many Ways Europe's City-Dwellers Get to Work*, CITYLAB (Oct. 18, 2017) <https://perma.cc/URH5-5XUP>.



out, while San Mateo and Santa Clara continued to be served by the Southern Pacific's Peninsula line, which is now part of Cal Transit.<sup>77</sup> Three lines were built in the East Bay, but they are convenient for only a small percentage of the suburban population, and in 2017 the Board of Directors of BART refused to extend the line to populous Livermore in Alameda County.<sup>78</sup>

## 2. Land Use

California does not have statewide land planning authority, and the Bay Area has only a voluntary association of governments.<sup>79</sup> However, the state plays an increasingly important role in local land use planning for three reasons. First, the legislature has imposed a number of planning mandates on local governments. Second, in some important areas, local authority has been preempted.<sup>80</sup> Third, the state's greenhouse gas emission laws have major implications for local land use authority, discussed in Part IV. San Francisco has strict building height limits in most areas outside of the downtown except in the former industrial areas and piers south of downtown near the Bay.<sup>81</sup> In short, the Bay Area, especially San Francisco, is now paying the price for decades of preserving low-density suburbs and an unreasonable confirmation and continuation of a pre-World War II residential and commercial urban footprint.<sup>82</sup>

San Francisco and the region are facing a housing affordability crisis that has major implications as to how the city and region respond to CD. Bay Area housing costs are the highest in the nation, and the Bay Area has by the far the biggest gap between demand and supply compared to Southern California and Sacramento.<sup>83</sup> San Francisco for example, added only 26,770 new housing units between 2005 and 2015

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<sup>77</sup> *A History of BART: The Concept is Born*, BART, <https://perma.cc/N4J8-D77E> (last visited Nov. 9, 2019).

<sup>78</sup> Michael Cabanatuan, *BART Board Votes Down Extension to Livermore*, SFGATE, <https://perma.cc/5734-FJFV> (last updated May 24, 2018, 11:30 PM).

<sup>79</sup> See Hing Wong, *Regional Governance in the San Francisco Bay Area: The History of Association of Bay Area Governments*, 10 FOCUS, Sept. 2013, at 61.

<sup>80</sup> For example, 2015 legislation prohibits a city or county from imposing a vehicular parking ratio, inclusive of handicapped and guest parking, in excess of 0.5 spaces per bedroom on a development that includes the maximum percentage of low- or very low-income units. CAL. GOV. CODE § 65915(p) (2019).

<sup>81</sup> Madeline Stone, *This Is What San Francisco Could Look Like If It Had Enough Housing for Its Growing Population*, BUS. INSIDER (May 22, 2014), <https://perma.cc/5C6P-HMHY>.

<sup>82</sup> See, e.g., Gabriel Metcalf, *The San Francisco Exodus*, CITYLAB (Oct. 13, 2013), <https://perma.cc/L9NL-ECLW> (describing the link between the preservation of pre-World War II neighborhoods and high housing costs).

<sup>83</sup> MAC TAYLOR, LEGISLATIVE ANALYST'S OFFICE, CALIFORNIA'S HIGH HOUSING COSTS: CAUSES AND CONSEQUENCES 22 (2015). For a perceptive analysis of the causes and state efforts to address the problem see Christopher S. Elmendorf, *Beyond the Double Veto: Land Use Plans as Preemptive Intergovernmental Contracts*, 71 HASTINGS L. J. (forthcoming 2019).

and most of these were high rises in the South of Market former industrial area.<sup>84</sup> One byproduct of the environmental movement in the 1970s was numerous, on-going municipal efforts to deflect the population surge that threatened the “California-life style” of low density residences designed for indoor–outdoor living far from places of employment.<sup>85</sup> Most cities adopted various “Not in My Backyard” (NIMBY) strategies, enabled by the intense reviews required by the California Environmental Quality Act<sup>86</sup> (CEQA), by freezing most single-family zones and allowing limited multi-family development, despite the efforts of regional bodies that have tried to develop regional plans and coordinate major public and private developments.<sup>87</sup> A combination of high land costs, building fees, a lengthy environmental review process under CEQA, stringent growth controls, and Proposition 13<sup>88</sup> have produced statewide cumulative NIMBYisms, especially in the Bay Area:

Over two-thirds of cities and counties in California’s coastal metros have adopted policies (known as growth controls) explicitly aimed at limiting housing growth. Many policies directly limit growth—for example, by capping the number of new homes that may be built in a given year or limiting building heights and densities. Other policies indirectly limit growth—for example, by requiring a supermajority of local boards to approve housing projects. Research has found that these policies have been effective at limiting growth and consequently increasing housing costs. One study of growth controls enacted by California cities found that each additional growth control policy a community added was associated with a 3 percent to 5 percent increase in home prices.<sup>89</sup>

Politically, high housing costs have created a backlash against long standing NIMBY policies. A Yes in My Backyard (YIMBY) movement is growing; but housing advocates face a strong environmental backlash supported by the state’s environmental impact statement law which

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<sup>84</sup> Kriston Capps, *Blame Zoning, Not Tech, for San Francisco’s Housing Crisis*, CITYLAB (Mar. 11, 2016), <https://perma.cc/DK95-UQKN>.

<sup>85</sup> BILL LANE, JR. & BERTRAND M. PATENAUDE, *THE SUN NEVER SETS* 111 (2013) (autobiography of the founder of *Sunset Magazine*, which had a major influence on how post-World War II Californians and other westerners cooked, designed their homes and outdoor living space, and traveled).

<sup>86</sup> CAL. PUB. RES. CODE § 21000–21189.57 (West 2019).

<sup>87</sup> Kenneth A. Stahl, “*Yes In My Backyard*”: *Can a New Pro-Housing Movement Overcome the Power of NIMBYs?*, 41 ZONING & PLAN. L. REP. 3 (2018).

<sup>88</sup> CAL. CONST. art. XIII A, §§ 1–7. Proposition 13, adopted in 1978, froze property values at 1976 levels and increases were limited to no more than 2% a year. When the property was sold, it was reassessed at 1% of the sale price, and the 2% yearly cap became applicable to future years. Proposition 13 shifted local tax revenues to fees and special taxes, encouraged fiscal zoning as cities favored hotels and strip malls over new residential development; it also fueled NIMBYism. Henry Grabar, *These Graphs Explain Why California’s Proposition Thirteen Regime is the Worst*, MONEY BOX (Sept. 22, 2016), <https://perma.cc/3HB3-EZED>.

<sup>89</sup> TAYLOR, *supra* note 83, at 16.

applies to land use decisions.<sup>90</sup> For example, in 2017, a bill to preempt local zoning and allow eight story buildings near rail and high-frequency bus stops was strongly opposed by the Sierra Club.<sup>91</sup> The tension between low and increased density runs throughout land use plans in California. For example, San Francisco is still trying to hang on to low-density, hip neighborhoods as it tries to increase “affordable” housing units. The San Francisco plan for a small enclave in the Mission District is illustrative:

South Park is an attractive, affordable mixed-use neighborhood. The commercial spaces are occupied by small retail, wholesale, artisan, office and service businesses. A number of artists have established live/work studios in commercial buildings. In addition, a number of residential hotels and apartments are being rehabilitated as low- and moderate-income affordable rental housing. This should continue and when possible, infill development should be compatible in scale and mixture of use with the existing neighborhood.<sup>92</sup>

### 3. *Infrastructure*

Three of San Francisco’s and the rest of the Bay Area’s problems related to infrastructure are sea-level rise, water availability, and flooding.

#### *a. Sea-Level Rise and Consequent Impacts on Land Use and Infrastructure*

The Bay Area will be severely impacted by sea-level rise. Estimates range from a three to five foot rise to ten feet at storm surge.<sup>93</sup> Until relatively recently, the Bay’s shoreline has not been intensely developed. The shore (or “mud flats,” as they used to be called) is unattractive, not swimmable, and cold and windy. However, the decision to preserve open space in the hills on either side of Bay has pushed development to the shore, and much of San Francisco’s new growth is in the old port and industrial area.<sup>94</sup> To complicate matters, as the Bay rises, much of the shore is simultaneously sinking at a faster rate than previously

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<sup>90</sup> Stahl, *supra* note 87, at 10.

<sup>91</sup> Conor Dougherty & Brad Plumer, *A Bold, Divisive Plan to Wean Californians From Cars*, N.Y. TIMES (Mar. 16, 2018), <https://perma.cc/558N-ZKCL>.

<sup>92</sup> S.F. PLANNING DEP’T, SOUTH OF MARKET AREA PLAN, RES 2.3 (2005).

<sup>93</sup> WORKING GRP. OF THE CAL. OCEAN PROT. COUNCIL SCI. ADVISORY TEAM, RISING SEAS IN CALIFORNIA: AN UPDATE ON SEA-LEVEL RISE SCIENCE 25 (2017). *But see* Brian Barth, Am. Planning Assoc., *The Silver Lining of Sea-Level Rise*, PLAN. MAG. (Aug./Sept. 2018), <https://perma.cc/YK5Z-VN2X> (sea-level rise may also provide planning opportunities).

<sup>94</sup> S.F. PLANNING DEP’T, *supra* note 92.

predicted.<sup>95</sup> Subsidence estimates range from 48 to 166 square miles.<sup>96</sup> San Francisco's Sea Level Rise Plan has identified most of its coastline as sea level vulnerability zones, defined as "shoreline areas that could be exposed to 66 inches of permanent SLR [Sea Level Rise] inundation with temporary flooding from a 100-year extreme tide IF no adaptation measures or actions are taken."<sup>97</sup> However, from a regional perspective, as with transportation and land use, there is no coordinated approach to deciding what a CD-adjusted shoreline should look like.<sup>98</sup>

The range of projected rise is a matter of crucial concern to the real estate industry. Naturally, higher, model-based estimates are contested. Local government discretion to mandate precautionary building standards has been blunted by a 2015 California Supreme Court decision, which holds that climate change is not an environmental impact under CEQA.<sup>99</sup> Efforts to implement a policy that may include a combination of more expensive building costs and retreat will invite takings challenges.<sup>100</sup> Not surprisingly, studies suggest greater use of a range of new levees, dams, and barriers at the mouths of creeks, resilient new buildings, and transition zones to adapt while continuing to push people toward the shoreline. In the end, a combination of market discipline and high insurance costs may make it easier to deflect waterfront development.

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<sup>95</sup> Robert Sanders, *Sinking Land Will Exacerbate Flooding From Sea Level Rise in Bay Area*, BERKELEY NEWS (Mar. 7, 2018), <https://perma.cc/65LS-JWVR>.

<sup>96</sup> Manoochehr Shirzaei & Roland Bürgmann, *Global Climate Change and Local Land Use Subsidence Exacerbates Inundation Risk to the San Francisco Bay Area*, 4 SCI. ADVANCES 1 (2018).

<sup>97</sup> CITY AND CTY. OF S.F., SAN FRANCISCO SEA LEVEL RISE ACTION PLAN 6 (2016).

<sup>98</sup> MARK LUBELL, CLIMATE READINESS INSTITUTE THE GOVERNANCE GAP: A NEW REPORT ON ADAPTING TO SEA-LEVEL RISE IN SAN FRANCISCO BAY 32 (2017).

<sup>99</sup> Cal. Bldg. Indus. Ass'n v. Bay Area Air Quality Dist., 362 P.3d 792 (Cal. 2015). The court concluded that CEQA "does not provide enough of a basis to suggest that the term 'environmental effects' as used in this context is meant, as a general matter, to encompass these broader considerations associated with the health and safety of a project's future residents or users." *Id.* at 800. But, it did create an exception for

proposed project risks exacerbating those environmental hazards or conditions that already exist, an agency must analyze the potential impact of such hazards on future residents or users. In those specific instances, it is the project's impact on the environment—and not the environment's impact on the project—that compels an evaluation of how future residents or users could be affected by exacerbated conditions.

*Id.* at 794.

The example cited was a new subdivision on a known fault. On remand, the Court of Appeals did not apply the exception. Cal. Bldg. Indus. Ass'n v. Bay Area Air Quality Dist., 2 Cal. App. 5th 1067 (2016).

<sup>100</sup> See Megan M. Herzog & Sean B. Hetch, *Combating Sea Level Rise in Southern California: How Local Governments Can Seize Opportunities while Minimizing Legal Risk*, 19 HASTINGS W. N.W. J. ENVTL. L. & POL'Y 463, 479–80 (2013).

*b. Water*

The San Francisco Bay Area's water suppliers import the majority of the region's water from two rivers in the Sierra Nevada Mountains. About 21% comes from groundwater withdrawals.<sup>101</sup> This has given the region a dependable supply of high quality water, but it will face four challenges in the future: 1) the decline of the Sierra Nevada snowpack, 2) the on-going fight to remove Hetch Hetchy Dam,<sup>102</sup> which supplies the City of San Francisco and much of the San Mateo peninsula, 3) a controversial state plan introduced in 2018 to dedicate more Sierra Nevada water to river and the Delta ecosystem restoration,<sup>103</sup> and 4) the 2014 legislation that imposes potential pumping limits on groundwater withdrawals.<sup>104</sup>

*c. Stormwater Runoff*

San Francisco's flood risks are concentrated in the Marina District and a few areas with drainage in the Bay. The city's Public Utility Commission has prepared a draft 100-year flood map to encourage at-risk property owners to purchase insurance.<sup>105</sup> Stormwater runoff is the primary source of pollution in San Francisco Bay. In 2015, the regional water quality control board issued an updated order to the regional permit detailing a number of steps that cities around the bay are required to take to control harmful discharges.<sup>106</sup>

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<sup>101</sup> CAL. NAT. RES. AGENCY, CALIFORNIA'S GROUNDWATER UPDATE 2013: SAN FRANCISCO BAY HYDROLOGICAL REGION 3 (2015).

<sup>102</sup> A 2006 University of California, Davis study concluded that the dam, which was the subject of one of the first preservation versus conservation fights in the early twentieth-century, could be removed and the water could be stored in other reservoirs. Sarah E. Null & Jay R. Lund, *Reassembling Hetch Hetchy: Water Supply Without O'Shaughnessy Dam*, 42 J. AM. WATER RES. ASS'N 395, 406 (2006). In 2012, San Francisco voters rejected a ballot measure to study the removal, and in 2018, a California Court of Appeals upheld the dismissal of a suit which argued that the dam's location violated CEQA because reasonable alternatives were available to make up for the loss of water storage and electricity from the dam's removal. *Restore Hetch Hetchy v. City & Cty. of San Francisco*, 25 Cal. App. 5th 865 (2018).

<sup>103</sup> CAL. DEPT OF WATER RES., CALIFORNIA WATER PLAN UPDATE 2018: MANAGING WATER RESOURCES FOR SUSTAINABILITY 1–2 (2019).

<sup>104</sup> See TARA MORAN & AMANDA CRAVEN, WATER IN THE WEST, CALIFORNIA'S SUSTAINABLE GROUNDWATER MANAGEMENT ACT OF 2014, at 1 (2015) ("Prior to the passage of the Sustainable Groundwater Management Act of 2014 (SGMA), California lacked statewide regulation of groundwater pumping or standards for groundwater management.").

<sup>105</sup> See S.F. Pub. Util. Comm'n, *Flood Maps*, S.F. WATER POWER SEWER, <https://perma.cc/9QE9-4YPV> (last updated July 1, 2019).

<sup>106</sup> Cal. Reg'l Water Quality Control Bd. S.F. Bay Region, Order No. R-2-2015-0049, Reg'l NPDES Permit No. CAS561-2008, (2015), <https://perma.cc/8W25-A62Z>.

*d. Transportation*

The Bay Area's light rail and commuter train systems have been described in Part 1. There is an important statewide initiative to limit automobile use. California is the only western state with a hard greenhouse gas emission reduction target. A.B. 32, adopted in 2006, set a target of reducing emissions to 1990 levels by 2020.<sup>107</sup> Two years later, the state enacted a law that requires transportation agencies and local governments to reduce vehicle emissions through a variety of strategies, including increased density.<sup>108</sup> The state later added an additional 40% reduction target by 2030.<sup>109</sup> The 2020 goal was met in 2016, mainly by the increased use of solar and wind power and imported hydroelectric power.<sup>110</sup> However, transportation emissions rose 2%, posing a major challenge to the achievement of the 2030 target.<sup>111</sup> Two state legislative initiatives impact local land use planning and regulation. A.B. 36 sets a goal of reducing greenhouse gas emissions to 40% below 1990 levels by 2030, so as to link local land-use decisions to transportation emissions.<sup>112</sup> Local efforts to reduce automobile use remain a minor part of the larger project:

The proposed [California Air Resources Board] Scoping Plan Update provides little guidance, however, on how local agencies can achieve the state's ambitious per capita targets. Most of the GHG reductions needed to achieve the state's 2030 and 2050 climate goals are expected to come from statewide regulations (such as the Renewable Portfolio Standard or Cap-and-Trade Program) or technological advancements (such as in electric or renewable natural gas-fueled vehicles) that are largely beyond the control of local governments.<sup>113</sup>

Senate Bill 375 gives the Air Resources Board the power to veto local land use plans that do not sufficiently try to reduce automobile use.<sup>114</sup> The Air Quality Control Board must prepare guidelines for the

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<sup>107</sup> Cal. Legis. Serv. Ch. 488 (A.B. 32) (West 2006).

<sup>108</sup> Cal. Legis. Serv. Ch. 728 (S.B. 375) (West 2008); see LOUISE BEDSWORTH ET. AL., PUB. POLICY INST. OF CAL., *DRIVING CHANGE: REDUCING VEHICLE MILES TRAVELED 1–2* (2011).

<sup>109</sup> Cal. Legis. Serv. Ch. 135 (A.B. 398) (West 2017).

<sup>110</sup> Tony Barboza & Julian H. Large, *California Hits Its Climate Goal Early - But Its Biggest Source of Pollution Keeps Rising*, L.A. TIMES (July 23, 2018, 4:50 PM), <https://perma.cc/G7MX-5PJB>.

<sup>111</sup> *Id.*

<sup>112</sup> See Rachael Medina & A. Dan Tarlock, *Addressing Climate Change at the State and Local Level: Using Land Use Controls to Reduce Automobile Emissions*, SUSTAINABILITY 2010, at 1742, 1748 (2010).

<sup>113</sup> Marc Campopiano & Shannon Cheng, *Land Use Sector and CEQA Projects Targeted for Greenhouse Gas Reductions in Proposed Scoping Plan Update*, ENV'T, LAND & RES., <https://perma.cc/QK3H-2RNT> (last visited Nov. 9, 2019).

<sup>114</sup> Cal. Legis. Serv. Ch. 728 (S.B. 375) (2008 West).

estimation of regional travel times and future housing demand.<sup>115</sup> This theoretically more accurate transportation and growth data must be incorporated into local plans to promote more sustainable cities from an air quality perspective. There has been some Air Resources Board review of local land use plans, but the impact of state review appears to be largely ineffective.<sup>116</sup> A plan to give financial incentives to cities that promoted transportation-oriented density “received a lot of pushback, and some cities have simply ignored it.”<sup>117</sup>

#### *e. Parks and Recreation*

The Bay Area has over 2,000,000 acres of protected private and public open space,<sup>118</sup> which form an important source of water retention but are vulnerable to CD risks such as biodiversity loss and increased wildfires. San Francisco’s urban parks have an important opportunity to deal with extreme heat events. “City agencies responsible for urban forestry and street trees—which could include public works, transportation, and recreation/park departments—should conduct a tree canopy “census” and identify opportunities for better shade tree coverage in underserved and intensely urbanized areas.”<sup>119</sup>

#### *f. Solid Waste and Recycling*

San Francisco is a world leader in waste reduction. The city has a goal of zero waste by 2020.<sup>120</sup> The city has diverted about 80% of waste

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<sup>115</sup> *Id.*

<sup>116</sup> Melanie Curry, *Greenhouse Gas Emissions Targets are “Largely Symbolic,” Says ARB*, STREETS BLOG CAL (Apr. 13, 2108) <https://perma.cc/5NSL-H6ZQ>; see also Robert H. Freilich & Zachary Price, *Has California’s Tri-Parite Statutory Structure Aimed at the Reduction of Greenhouse Gas Emissions and Global Warming, Linking Air Quality, Transportation, and Sustainable Land Use through Regional and Local Planning Been Successful?*, 49 URB. LAW. 453 (2017); Alejandro E. Camacho et al., *Mitigating Climate Change Through Transportation and Land Use Policy*, 49 Env’tl. L. Rep. (Env’tl. Law Inst.) 10,473 (2019).

<sup>117</sup> *Id.*

<sup>118</sup> There are 1.37-million acres of permanently protected land. The rest comes primarily from the region’s agricultural lands. BAY AREA OPEN SPACE COUNCIL, THE CONSERVATION LANDS NETWORK 1.0 PROGRESS REPORT (2014), <https://perma.cc/8PG8-R9UX>. Agricultural land consists of prime crop and grazing land. There are about 1.7-million acres of grazing land in the region. A little over one-million acres are protected by the state’s 1965 California Land Conservation Act, CAL. GOV’T CODE § 51200 (West 2019), which permanently classifies enrolled lands as agricultural for property tax purposes. PLAN BAY AREA 2040, PUBLIC REVIEW DRAFT ENVIRONMENTAL REPORT (Apr. 17, 2017), <https://perma.cc/VF5E-T9HG>.

<sup>119</sup> S.F. PLANNING & URBAN RESEARCH ASS’N, CLIMATE CHANGE HITS HOME 13 (2011); see also Clement Lau, *Nature-Based Solutions*, AM. PLAN. ASS’N, Aug./Sept. 2018 at 34, 36 (dealing with the role of parks in providing CD resiliency).

<sup>120</sup> S.F. Comm’n on the Env’t, Resolution Setting Zero Waste Date, Res. No. 002-03-COE (2003).

from landfills through a mandatory program that requires that all waste be put into three separate containers: compost, recyclable and landfill.<sup>121</sup> Residents get a 64-gallon garbage can for recyclables and only a 15-gallon garbage can for landfill waste. Recycling can only take a city so far.<sup>122</sup> To meet its goal, as the plan indicates, the city will need help from manufacturers to reduce the disposal component of a wide range of products.

#### 4. Energy

California and the City of San Francisco are leaders in the transition to renewable energy. The city has a goal of 100% renewable power by 2030 and an interim goal of 50% by 2020.<sup>123</sup> The city's goal has been extended by legislation. S.B. 100, enacted in 2018, sets a statewide goal of 100% renewable energy by 2045.<sup>124</sup> San Francisco's electricity mix is currently 46% non-large hydro renewable and large hydro and 54% fossil fuels, primarily natural gas, as well as nuclear sources.<sup>125</sup> The area's one nuclear plant is scheduled for closure and hydro is vulnerable to fluctuations from CD.<sup>126</sup> Thus, although electricity from the Hetch Hetchy reservoir will continue to serve the city, the city's plans call for increased use efficiency and distributed generation.<sup>127</sup>

#### B. Los Angeles

As Carey McWilliams observed in his 1946 classic study of Southern California, Los Angeles is a paradox, "a desert that faces an ocean."<sup>128</sup> He also went on to characterize it as a place where everything, especially water, is imported.<sup>129</sup> Desert Los Angeles metropolitan area is expected to experience an average 4.3 degrees Fahrenheit temperature rise by 2050 and 8.3 degrees by the end of the century under a business-

<sup>121</sup> S.F. Dep't of the Env't, *Zero Waste: Frequently Asked Questions*, <https://perma.cc/6T4Z-4TVH> (last visited Nov. 9, 2019). In addition, the city has initiated policies to discourage single-use plastics. *Id.*

<sup>122</sup> City and Cty. of S.F., *Mandatory Recycling and Composting Ordinance 100-09* (June 23, 2009), <https://perma.cc/G6DS-NP8U>

<sup>123</sup> *San Francisco - 100% Renewable Power by 2030*, GO100PERCENT.ORG, <https://perma.cc/Q5YV-YUUC> (last visited Nov. 9, 2019); *SF's Green Energy Goal is a Decade Ahead of Target*, S.F. CHRON., (Apr. 19, 2017), <https://perma.cc/Q5YV-YUUC>

<sup>124</sup> S.B. 100, 2017–2018 Leg. (Cal. 2018).

<sup>125</sup> GO100PERCENT.ORG, *supra* note 123.

<sup>126</sup> Peter Gleick, *National Geographic ScienceBlogs: Diablo Canyon, Climate Change, Drought, and Energy Policy*, PAC. INST. (July 15, 2016), <https://perma.cc/7H2W-NERL>.

<sup>127</sup> GO100PERCENT.ORG, *supra* note 123. This is consistent with S.B. 100, which mandates that utilities can only meet 40% of their renewables requirement from large hydroelectric facilities. CAL. PUB. UTIL. CODE § 399.30(k) (West 2002).

<sup>128</sup> CAREY MCWILLIAMS, *SOUTHERN CALIFORNIA COUNTRY: AN ISLAND IN THE LAND* 6 (Erskine Caldwell ed., 1946).

<sup>129</sup> *Id.* at 7.



as-usual scenario.<sup>130</sup> This will exacerbate air pollution, put coastal areas at risk from sea-level rise and stress its imported water supplies, especially those from the Colorado River.<sup>131</sup> The Los Angeles metropolitan area has no regional government but approximately 10 million of the 12-plus million people in the five-county metropolitan area live in Los Angeles County.<sup>132</sup>

### 1. Transportation

In Los Angeles, you are what you drive. The city is the poster child for the post World War II car culture, but the price is an average 59.2-minute round-trip commute making it the most stressful commuting city when congestion is factored in.<sup>133</sup> In theory, the city is under a state legal mandate to substantially reduce automobile use as part of the 2006 legislation that set greenhouse gas emission rollback mandates.<sup>134</sup> In the past two decades, Los Angeles has created a major light rail and state-of-the-art bus system. After the expansion for the 2028 Olympics, it will be one of the largest transit networks, second only to the New York City metropolitan area.<sup>135</sup> But, the system is losing riders on both bus and light rail lines. Between 2012 and 2016, California lost 62.2 million transit riders.<sup>136</sup> Ridership in the Southern California region has steadily fallen since 2009 and remains concentrated in only 2% of the population,<sup>137</sup> and Los Angeles's ridership has fallen 19% since 2013.<sup>138</sup> The nub of the problem is that Los Angeles has always had widely

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<sup>130</sup> *Climate Change in the Los Angeles Region*, INST. ENV'T & SUSTAINABILITY UCLA, <https://perma.cc/7JQW-UQPV> (last visited Nov. 9, 2019).

<sup>131</sup> See MCWILLIAMS, *supra* note 128, at 183.

<sup>132</sup> *Quick Facts: Los Angeles County, California*, U.S. CENSUS BUREAU, <https://perma.cc/7KM9-3DMB> (last visited Nov. 9, 2019).

<sup>133</sup> See Michael Kolomatsky, *Think Your Commute is Bad?*, N.Y. TIMES (Feb. 22, 2018), <https://perma.cc/7X9P-HQDX>.

<sup>134</sup> See A.B. 32 § 38501(h) (Cal. 2006); S.B. 375 § 65080(b)(2)(A) (Cal. 2008).

<sup>135</sup> Matt Tinoco, *The Most Anticipated Transit Projects Opening in Time for the 2028 LA Olympics*, CURBED LA (Feb. 12, 2018), <https://perma.cc/8ZMW-JKVT>.

<sup>136</sup> MICHAEL MANVILLE ET AL., S. CAL. ASS'N GOV'TS (SCAG), *FALLING TRANSIT RIDERSHIP: CALIFORNIA AND SOUTHERN CALIFORNIA* 20 (2018).

<sup>137</sup> *Id.* at 5.

The average resident of the SCAG-region made about 35 transit trips in 2016, but the median resident made none. Only a minority of the population rides transit very frequently or even occasionally. About two percent of the population rides transit very frequently (averaging 45 trips/month), another 20 percent of the population rides transit occasionally (averaging 12 trips/month), and more than three-quarters of SCAG-region residents ride transit very little or not at all (averaging less than 1 trip/month). Heavy transit use, moreover, is concentrated among the low-income population, and especially low-income foreign born residents.

*Id.*

<sup>138</sup> *Interactive Estimated Ridership Stats*, METRO, <https://perma.cc/N2KV-RFWL> (last visited Nov. 9, 2019) (showing systemwide-ridership estimates dropping from 478-million-annual-total boardings in 2013 to 383-million in 2018).

dispersed centers of employment, but the system is still designed to bring riders from outlying areas to the center. The bus system is the mainstay, carrying about three-fourths of all riders, but losing ridership as incomes rise and people switch to cars.<sup>139</sup>

## 2. Land Use

As noted above, California has no state land use agency, the very opposite of Oregon. The legislature has, however, steadily structured both the planning and regulatory process requiring a General (comprehensive) Plan with certain elements.<sup>140</sup> However, there is no direct legislative mandate to include CD adaptation in a land use plan. Moreover, the state's greenhouse gas emission legislation has led to CEQA Guidelines that incorporate greenhouse gas reductions to local plans.<sup>141</sup> The City of Los Angeles has gone much further and issued an extensive non-binding but visionary road map for CD adaptation—the pLAN<sup>142</sup>—with substantial land use implications. The pLAN recommends transportation-oriented land use plans include more transit-oriented development, changes in density and mixed use, increased transit, enhanced pedestrian and bicycle trails, and expanded incentives and opportunities for alternative modes of transportation and electric vehicle charging.<sup>143</sup> At the September 2018 San Francisco Climate Change Conference, the mayor of Los Angeles announced a new electric car purchasing cooperative among participating cities to allow bulk rate bargaining with manufacturers.<sup>144</sup>

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<sup>139</sup> See MANVILLE ET AL., *supra* note 136, at 9.

<sup>140</sup> There are seven mandatory elements of a municipal land use plan: land use, circulation, housing, conservation, open space, public facilities, and services and safety. CAL. GOV. CODE § 65302 (West 2019). The state requires both internal plan consistency and consistency between the plan and land use regulations. *Leshner Commc'ns, Inc. v. City of Walnut Creek*, 802 P.2d 317, 321–22 (Cal. 1990). However, the consistency requirement has been eroded by a court of appeals decision holding that the requirement does not apply to charter cities. *Kennedy Comm'n v. City of Huntington Beach*, 224 Cal. Rptr. 3d 655, 678–79 (Ct. App. 2017).

<sup>141</sup> Tiering and Streamlining the Analysis of Greenhouse Gas Emissions, 14 C.C.R. § 15183.5 (Cal. 2019); see GOVERNOR'S OFF. OF PLANNING AND RESEARCH, GENERAL PLAN GUIDELINES 222–26 (2017).

<sup>142</sup> CITY OF L.A., SUSTAINABLE CITY PLAN (PLAN) 4–5 (2017), <https://perma.cc/U8GT-TGEP>.

<sup>143</sup> DEP'T OF REG'L PLANNING, CTY. OF L.A., FINAL UNINCORPORATED LOS ANGELES COUNTY COMMUNITY CLIMATE ACTION PLAN 2020 ES-4 (2015), <https://perma.cc/RZ7Y-E2RL>. Notwithstanding all the efforts of the City and County of Los Angeles, the possibility of weaponizing environmental standards, including greenhouse gas emission standards, to discourage denser and more affordable housing (more recently limited by the California legislature) remains troubling. See *Ctr. for Biological Diversity v. Cal. Dep't of Fish & Wildlife*, 361 P.3d 342, 372–73 (Cal. 2015) (Chin, J., dissenting).

<sup>144</sup> *Mayors Launch EV Purchasing Cooperative for Municipalities*, GOV'T FLEET (Sept. 11, 2018), <https://perma.cc/XDK3-9SFW>.

### 3. Infrastructure

Los Angeles's primary infrastructure needs are developing alternatives to its dependence on automobile use which continues to plague the region with smog as well as greenhouse gas emissions. The primary additional infrastructure problems are sea-level rise along the heavily used and populated coast, continued water security, stormwater runoff, and waste disposal. In the twentieth century, Los Angeles concluded that it could not rely on its rivers and aquifers to grow and began to import water from distant areas of California and the Colorado River.<sup>145</sup> Now, it is debating whether to reduce its dependence on these stressed and contested imports.<sup>146</sup>

#### *a. Sea-Level Rise and Consequent Impacts on Land Use and Infrastructure*

In contrast to the San Francisco Bay Area, which developed away from the Bay, Los Angeles has intensely developed its Pacific coastline for a harbor, power plants, beach tourism, and residential development. A projected rise of 1.6 to 6.6 feet will have considerable adverse impacts.<sup>147</sup> Coastal cliffs could crumble at double the rate from between 1930–2000 and substantial amounts of beach will be inundated.<sup>148</sup> With respect to sea-level rise, the 2018 Resilient Los Angeles report indicates that future land use plans will incorporate “the best available coastal climate and tsunami science in coastal planning and land use policy development.”<sup>149</sup>

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<sup>145</sup> Nat'l Audubon Soc'y v. Super. Ct. of Alpine Cty., 658 P.2d 709, 713 (Cal. 1983).

<sup>146</sup> “Given the increasing stress on resources . . . water issues have slipped back to the forefront of the policy arena, with rival water bonds proposed by Governor Schwarzenegger and State Senator Perata during the recent special session. The renewed interest is warranted, particularly in Southern California, where water supplies for the decades ahead face substantial risks and challenges.” GREGORY FREEMAN, L.A. CTY ECON. DEV. CORP., SECURING RELIABLE WATER SUPPLIES FOR SOUTHERN CALIFORNIA 6 (2008).

<sup>147</sup> REINHARD E. FLICK, CITY OF LOS ANGELES COASTAL ISSUES RELATED TO FUTURE MEAN SEA LEVEL RISE 2 (2013), *reprinted in* UNIV. OF S. CAL. SEA GRANT PROGRAM, SEA LEVEL VULNERABILITY STUDY FOR CITY OF LOS ANGELES app. 1 (2013), <https://perma.cc/7CYN-YRD5>.

<sup>148</sup> *See Sea Level Rise Could Double Erosion Rates of Southern California Coastal Cliffs*, U.S. GEOLOGICAL SURV. (July 9, 2018), <https://perma.cc/9ZEE-Q898>; *see also* Patrick W. Limber et al., *A Model Ensemble for Projecting Multidecadal Coastal Cliff Retreat During the 21st Century*, 123 J. GEOPHYSICAL RES. EARTH SURFACE, 1566, 1576–77, 1584 (2018) (researchers used historical sea cliff erosion data from the 1930s and 2000s to calibrate mathematical cliff retreat models and observed that cliff erosion could increase on average in Southern California by 27–185% by 2100).

<sup>149</sup> CITY OF L.A., RESILIENT LOS ANGELES 128 (2018), <https://perma.cc/L8X4-6YJ4>. For suggested adaptation strategies see Herzog & Hecht, *supra* note 100.

*b. Water*

Los Angeles imports 85% of its water from three sources: the Eastern Slope of the Sierra Nevada Mountains, the Colorado River, and Northern California.<sup>150</sup> The rest comes from groundwater.<sup>151</sup> The story of Los Angeles's thirst for water has been chronicled by historians and by the iconic movie, *Chinatown*.<sup>152</sup> CD and the need to protect the environment limit an expansion of Eastern Slope and Colorado River diversions, and groundwater pumping is limited by a complex set of settlements to prevent mining and salt water intrusion. The area's future water problems will be exacerbated by the legacy of the area's Midwest settlers who replicated a landscape suitable for a climate with year-round rain. The City of Los Angeles uses 39% of its water for outdoor and landscaping application, much of this going to non-native and non-climate-appropriate species such as turf grass.<sup>153</sup> In 2018, the state legislature adopted a goal of limiting indoor personal water use to 55-gallons per person per day by 2020 and falling to 50 gallons by 2030, and imposed drought-planning requirements on cities.<sup>154</sup>

Metropolitan water providers are debating two different solutions. The first is to finance the major costs of the California Water Fix, one or two tunnels under the California Delta, which will ship more dependable water to Central Valley farmers and Los Angeles.<sup>155</sup> The second is that Los Angeles could return to reliance on local supplies and become water sufficient. The plan requires the greater use of recycled water, pioneered by Orange County, the increased capture of stormwater, more aggressive conservation, and more low impact development to increase infiltration into groundwater basins.<sup>156</sup> California's north-south, environment-agriculture water wars, however, continue unabated.

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<sup>150</sup> *Los Angeles Depends on Imported Water*, SIERRA CLUB ANGELES CHAPTER, <https://perma.cc/935V-J7B6> (last visited Nov. 9, 2019).

<sup>151</sup> *Water Sources*, L.A. CTY. WATERWORKS DIST., <https://perma.cc/ZQF9-BUYR> (last visited Nov. 9, 2019).

<sup>152</sup> The standard history of efforts to bring water to Los Angeles from afar is chronicled in, NORRIS HUNDLEY, JR., *THE GREAT THIRST: CALIFORNIANS AND WATER—A HISTORY*, at xviii, 121–66 (Univ. of Cal. Press rev. ed. 2001); see also Jon Wilkman, *William Mulholland Gave Water to LA and Inspired 'Chinatown'*, THE DAILY BEAST, <https://perma.cc/LS85-BU23> (last updated July 12, 2017).

<sup>153</sup> L.A. DEP'T OF WATER & POWER, URBAN WATER MANAGEMENT PLAN 40 (2010), <https://perma.cc/B7XG-XJRT>.

<sup>154</sup> S.B. 606, 2017–2018 Leg. (Cal. 2018) (amending various sections of the California Water Code). The legislation imposes a duty on water utilities to develop supply targets, CAL. WATER CODE § 10608.28 (West 2010), and imposes civil liability on users who disobey emergency use restrictions, CAL. WATER CODE § 377 (West 2019).

<sup>155</sup> *Delta Conveyance*, CAL. DEP'T OF WATER RES.'S, <https://perma.cc/8KJD-FSKP> (last visited Nov. 9, 2019).

<sup>156</sup> CITY OF L.A., *supra* note 149, at 108–12.

*c. Stormwater*

Although Los Angeles receives only an average of 15 inches of rain per year, it has experienced several floods along the Los Angeles River.<sup>157</sup> Upstream dams were built between 1920 and 1957, and after the disastrous flood of 1938, the River was also completely channelized.<sup>158</sup> There are proposals to restore the Los Angeles River to a free-flowing stream, and to recapture the runoff to supply the city.<sup>159</sup> This would expose many properties to damage in a 100-year flood, but the pLAN proposes to “identify priority areas to incorporate green infrastructure into the public right of way to promote benefits such as increasing local water supply, decreasing pollution from urban runoff, and reducing the heat island effect.”<sup>160</sup>

*d. Solid Waste*

California has a goal of 75% solid waste recycling, composting, or source reduction waste by 2020.<sup>161</sup> Los Angeles has gone further. It requires a tripartite waste separation similar to San Francisco’s system. The 2015 pLAN sets a goal of zero waste by 2030, which includes a 90% landfill diversion rate by 2025 and 95% by 2035.<sup>162</sup> The city’s target is not unrealistic, with a 2012 diversion rate of 76.4%.<sup>163</sup> In 2016, an NGO developed a tool to tailor investments in green infrastructure and open space to the climate mitigation needs of specific neighborhoods.

*e. Parks and Recreation*

The pLAN recognizes the importance of increased open space and green infrastructure. Investments will include increased tree planting in underserved neighborhoods, the expansion of open space along the Los

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<sup>157</sup> *Los Angeles River—The Unpredictable!*, WATER AND POWER ASSOCS., <https://perma.cc/VG9W-VXA9> (last visited Nov. 9, 2019).

<sup>158</sup> Stephen R. Van Wormer, *A History of Flood Control in the Los Angeles County Drainage Area*, 73 S. CAL. Q. 55, 81, 86–89 (1991).

<sup>159</sup> Judith Lewis, *The Lost Streams of Los Angeles*, L.A. WEEKLY (Nov. 8, 2006), <https://perma.cc/8UTG-EJUK>; Monte Morin, *DWP to Unveil Plan to Capture Storm Runoff*, L.A. TIMES (June 24, 2015), <https://perma.cc/C659-AET9>.

<sup>160</sup> CITY OF L.A., *supra* note 149 at 110.

<sup>161</sup> CAL. PUB. RES. CODE § 41780.01 (West 2012).

<sup>162</sup> pLAN, *supra* note 142, at 9, 44. The recent restrictions on importation of recyclables by China threatens the realization of the objectives of all Canadian and American solid-waste recycling programs, however. See *What You Need to Know About China Waste Import Restrictions*, SOLID WASTE ASS’N OF N. AM., <https://perma.cc/G6U8-LE2L> (last visited Nov. 9, 2017).

<sup>163</sup> CITY OF L.A., ZERO WASTE PROGRESS REPORT 3 (Mar. 2013).

Angeles River by completing 32 miles of public access by 2025, and an increase in urban agriculture of 50% by 2035.<sup>164</sup>

*f. Transportation*

The pLAN sets substantial but ultimately achievable targets, in light of the magnitude of increasing automobile greenhouse gas emissions, and its modest goals to reduce automobile use. Los Angeles's public transit system is described in Part I. The pLAN sets three goals to reduce automobile use. First, the pLAN sets a goal of reducing vehicle miles traveled by 10% in 2035.<sup>165</sup> Second, it will increase bicycle sharing,<sup>166</sup> and third, it sets a goal that 65% of new construction will be transit oriented by 2035.<sup>167</sup> Additional measures include an expansion of the city's electric vehicle fleet.<sup>168</sup> In 2018, Los Angeles introduced BlueLA, an electric car ride-sharing program that has been expanded to cover low-income neighborhoods in Central Los Angeles.<sup>169</sup>

*4. Energy*

Los Angeles gets its electricity from a wide range of sources generated both in and out of state. Following the pLAN, Los Angeles Water and Power has set a goal of 100% renewable energy by 2045.<sup>170</sup> The city's goal has basically been adopted by the state, as described above.

*C. Phoenix*

Phoenix is the largest city in a metropolitan region of over 4,400,000 people.<sup>171</sup> It is also among the fastest warming cities in the country.<sup>172</sup> The area is a prime example of the aggressive pursuit of

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<sup>164</sup> pLAN, *supra* note 142, at 87.

<sup>165</sup> *Id.* at 58.

<sup>166</sup> *Id.* at 55.

<sup>167</sup> *Id.* at 52. There are still many other transport-oriented sources of greenhouse gases and pollution, however. A report by Alexandar Cohan et al., *High-Resolution Pollutant Transport in the San Pedro Bay of California*, 2 ATMOSPHERIC POLLUTION RES. 237, 237 (2011), indicates that transportation of goods from the Port of Los Angeles creates a risk to nearby inhabitants.

<sup>168</sup> pLAN, *supra* note 142, at 78. Los Angeles has started a municipal purchasing cooperative. See GOV'T FLEET, *supra* note 144.

<sup>169</sup> Mark Tinoco, *How to Use LA's All-Electric Car-Share Program*, CURBEDLA (April 24, 2018), <https://perma.cc/86V9-38H7>.

<sup>170</sup> CITY OF L.A., L.A.'S GREEN NEW DEAL: SUSTAINABLE CITY PLAN (2019) <https://perma.cc/7SGT-RKBQ>.

<sup>171</sup> *Population of the Phoenix Area, Arizona (Metro Area)*, STATISTICALATLAS, <https://perma.cc/5GFA-67CW> (last updated on Nov. 9, 2018).

<sup>172</sup> Ranking differs slightly, but Phoenix fluctuates between first and second, behind Reno, Nevada. *Phoenix is Fastest-Warming City in US, Meteorologist Says*, KTAR NEWS (Sept. 20, 2017), <https://perma.cc/4U44-GK73>; *Fastest Warming Cities in the United States*

growth and sprawl. There is no metropolitan planning authority. The history of efforts to see the collection of cities outside of Phoenix as a metropolitan area, which began in 1970, is largely one of voluntary efforts to coordinate economic development efforts by competing cities.<sup>173</sup> Phoenix and the region are taking baby steps to adapt to CD by reducing greenhouse gas emissions, but it is the only city in our study in which there is a serious discussion of whether it will be habitable in the future. It has been described as “Death Valley, but with subdivisions.”<sup>174</sup> Or as a sustainability blog put it, “[i]f cities were stocks, you’d want to short Phoenix.”<sup>175</sup>

### 1. Transportation

Phoenix has always been a poster-child for sprawl, but the area has invested in both new freeways and a light rail system, which opened in 2008.<sup>176</sup> New freeways have kept the average commute time under thirty minutes for most Maricopa County residents.<sup>177</sup> Light rail and express bus service transit has benefitted those who live near it, but Phoenix, like all other western cities, remains automobile dependent. In 2017, transit ridership carried about 5% of daily commuters, mainly on bus routes.<sup>178</sup> At present, there is a single line that runs from north central Phoenix, past the airport, to Tempe, home of Arizona State University, and ends in Mesa.<sup>179</sup> In 2015, Phoenix voters approved a \$31 billion extension plan that will bring a new line to south Phoenix by 2023 and a new line to the west as well at extensions at either end of the existing line.<sup>180</sup> Phoenix, however, had the second highest growth in transit ridership both on light rail and bus routes.<sup>181</sup> This offers some

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*Due to Climate Change*, WORLDTLAS.COM, <https://perma.cc/7HTL-AMSD> (last updated Nov 9, 2017).

<sup>173</sup> Rob Melnick & John Stuart Hall, *Regional Roles and Relationships: A Fifty-Year Evolution of Governance in Metropolitan Phoenix*, in GOVERNING METROPOLITAN REGIONS IN THE 21ST CENTURY 185, 194–196 (Don Phares ed., 2009).

<sup>174</sup> William Yardley, *A Building Boom and Climate Change Create an Even Hotter, Drier Phoenix*, L.A. TIMES (Mar. 27, 2017), <https://perma.cc/QM7F-CBWQ>.

<sup>175</sup> William deBuys, *The Least Sustainable City: Phoenix as a Harbinger for Our Hot Future*, GRIST.ORG (Mar. 17, 2013), <https://perma.cc/FG7V-7DS9>.

<sup>176</sup> Jessica Boehm, *Ten Years and \$2B Later, What is the Future of Light Rail in Metro Phoenix?*, ARIZ. REPUBLIC (Dec. 20, 2018), <https://perma.cc/J94D-H3AT>; Skip Descant, *Arizona’s Long-Range Transportation Plan Emphasizes Safety, Modernization*, GOVTECH.COM (Feb. 13, 2018), <https://perma.cc/XWN5-9YLB>.

<sup>177</sup> See Nathan J. Fish, *This Arizona City Has the Shortest Commute. How Does Yours Stack Up?*, ARIZ. REPUBLIC (Aug. 8, 2018), <https://perma.cc/9F2K-GWLH>.

<sup>178</sup> Richard Florida, *The Great Divide in How Americans Commute to Work*, CITYLAB (Jan. 22, 2019), <https://perma.cc/H8CJ-FDLT>.

<sup>179</sup> *Future Transit Corridors*, VALLEY METRO (Dec. 6 2013), <https://perma.cc/KJC4-2A3H>.

<sup>180</sup> *Id.*

<sup>181</sup> Angie Schmitt, *Only a Few American Cities Are Growing Transit Ridership — Here’s What They’re Doing Right*, STREETSBL00G (Mar. 23, 2018), <https://perma.cc/3LYS-BFXT>.

evidence that even in Phoenix, millennials are shifting away from automobile use and embracing transit-oriented development.<sup>182</sup>

## 2. Land Use

The Phoenix area has pursued an aggressive growth strategy for decades.<sup>183</sup> Phoenix and other cities competed to annex unincorporated areas of Maricopa County to harvest tax revenues to support growth.<sup>184</sup> The result is that more people are exposed to the adverse impacts of CD, which include increased heat fluxes that increase morbidity and mortality. Increased heat combined with the area's vulnerable water supply has led some to claim that Phoenix could be uninhabitable by 2050.<sup>185</sup> CD has had virtually no impact on land-use planning. Growth management and NIMBYism is almost unknown in the area. Maricopa County's 2016 comprehensive plan, Vision 2030, calls only for "[s]ensible, balanced and economically efficient land use patterns" because they "are important for Maricopa County to have successful long-term growth and a high quality of life."<sup>186</sup> The closest the plan comes to CD is a brief mention of the need to reduce air pollution to improve public health between 2000 and 2015.<sup>187</sup>

## 3. Infrastructure

### a. Water

Phoenix's biggest adaptation problem is finding water to sustain itself.<sup>188</sup> The original Native Americans sustained themselves from the Salt River, and the white settlers, who were primarily farmers, followed the practices of the HoHoKam.<sup>189</sup> The construction of the upstream Roosevelt Dam between 1903 and 1911 allowed the city to slowly grow.<sup>190</sup> It was not until 1950 that the city reached 100,000 people and

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<sup>182</sup> SERENA UNREIN & DIANE E. BROWN, *BIKES, TRAINS & LESS DRIVING: TRANSPORTATION TRENDS IN ARIZONA* 11 (2014), <https://perma.cc/UL3X-DQHN>.

<sup>183</sup> Melnick & Hall, *supra* note 173; *see also* Kevin Kane, *A Century of Land-Use Change in Metropolitan Phoenix* (May, 2015) (unpublished Ph.D. dissertation, Arizona State University), <https://perma.cc/4XBQ-6ZJK>.

<sup>184</sup> Carol E. Hiem, *Border Wars: Tax Revenues, Annexation, and Urban Growth in Phoenix* 4 (Univ. of Mass. Econ. Dep't Working Paper Series, 2006), <https://perma.cc/6UWL-27QN>.

<sup>185</sup> deBuys, *supra* note 175.

<sup>186</sup> MARICOPA CTY. BD. OF SUPERVISORS, *MARICOPA COUNTY VISION 2030, COMPREHENSIVE PLAN 26* (2016).

<sup>187</sup> *Id.* at 6.

<sup>188</sup> *See* Glen M. MacDonald, *Water, Climate Change, and Sustainability in the Southwest*, 107 *PROC. NAT'L ACAD. SCI.* 21,256, 21,262 (2010).

<sup>189</sup> MARICOPA CTY. BD. OF SUPERVISORS, *supra* note 186, at 18.

<sup>190</sup> James M. Barney et al., *City of Phoenix History*, CITY OF PHX., <https://perma.cc/EV42-9VLL> (last visited Nov. 9, 2019).



was the 99th most-populated city in the country.<sup>191</sup> The influx of residents after World War II began the transition of Phoenix from an urban-agricultural area to the country's sixth largest city.<sup>192</sup> The city gets its water from two primary sources, the Colorado River via the Central Arizona Project (CAP), and the Salt and Verde Rivers via the Salt River Project.<sup>193</sup> A small percentage comes from groundwater, and the area has been mining its aquifers for years despite legislation enacted in 1980 requiring that the area's aquifers achieve safe-yield.<sup>194</sup> Study after study predicts that the average annual supply of the Colorado River, which supplies some 40-million people in seven states, will decrease as CD intensifies.<sup>195</sup> To complicate matters, Arizona's share of the Colorado River, which is used primarily by the CAP, is subordinated to California's share, the price for California's support of the CAP legislation.<sup>196</sup>

Phoenix and the surrounding area have taken only modest steps to encourage water conservation. The Midwestern and eastern migrants to the Valley of Sun brought with them the concept of a humid landscape of lush lawns. Today, about half of all household water use goes to irrigating lawns, but residents are voluntarily adopting xeriscaped yards.<sup>197</sup> Water consumption peaked in 2002, and it has declined 15% since then while population has increased by 14%.<sup>198</sup> Yet, the Phoenix Metro area has still not come to grips with potential adverse impacts of CD in an arid region.

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<sup>191</sup> *Id.*

<sup>192</sup> *Id.*

<sup>193</sup> See ROBERT AUTOBEE, BUREAU OF RECLAMATION, *THE SALT RIVER PROJECT 2* (1993). The Salt River Project was one of the first projects authorized by the Reclamation Act of 1902. Initially, the upstream storage dams supplied agricultural users in the Phoenix area, but the project is a major factor in the area's post-World War II urban growth. *Id.*

<sup>194</sup> ARIZ. REV. STAT. ANN. § 45-401 (1980); see also LEONARD KONIKOW, *GROUNDWATER DEPLETION IN THE UNITED STATES (1900-2008)* 25 (2013) (explaining that for decades, Arizona mined its aquifers to grow Phoenix. Arizona's politicians and water managers pinned their hopes of establishing a right to use Colorado River water and build an aqueduct from the River into Phoenix and Tucson. The Supreme Court awarded Arizona a right, *Arizona v. California*, 373 U.S. 546 (1963), but California blocked passage of the legislation to fund and build the aqueduct until Arizona agreed to pass legislation to stop mining its urban aquifers. The Act spurred the shift of water from agricultural to urban use and allowed the Phoenix area to decrease its water use and decrease the rate of mining, but southern Arizona remains a groundwater stressed region).

<sup>195</sup> See Brad Udall, *Climate Change is Shrinking the Colorado River*, *THE CONVERSATION* (June 13, 2017), <https://perma.cc/A9LE-L3XZ>.

<sup>196</sup> See ARIZ. CHAMBER FOUND., *POLICY BRIEF: WATER IN ARIZONA: OUR PAST, PRESENT, AND FUTURE* 6, 16 (2018) (telling the story of Phoenix's successful efforts to create a metropolis in a desert).

<sup>197</sup> Fernanda Santos, *An Arid Arizona City Manages Its Thirst*, *N.Y. TIMES* (June 16, 2013), <https://perma.cc/BNZ3-CWGF>.

<sup>198</sup> Alexandra Arboleda, *Water Conservation: What Are Arizona Cities Doing to Reduce Consumption?*, *GREENLIVING*, Apr. 2017, at 13.

### *b. Stormwater Runoff*

Phoenix receives only an average of 8 inches of rain a year,<sup>199</sup> but experiences severe flood events during the Monsoon season. The city's 2015 flood management plan makes no mention of CD. Avoiding future damage from anticipated increased flood events would be a challenge because of the amount of land area paved and the location of buildings and infrastructure in at risk areas. To take one example, "many highways in metropolitan Phoenix were intentionally built in depressions for noise abatement. As a result, highways designed in this way require pumping stations to remove standing water during rain events."<sup>200</sup>

### *c. Solid Waste*

Phoenix lags far behind the Pacific Coast cities in solid waste management. For example, state law and a Phoenix ordinance specifically prohibit the city from providing recycling pickup for apartment complexes of over 30 units.<sup>201</sup> Private waste collection for recycling remains uneven. In 2013, the Public Works Departments Reimagine initiative announced a zero-waste goal by 2050.<sup>202</sup> In 2015, the diversion rate was 20%, but the Department has set an interim goal of 40% of waste by 2020.<sup>203</sup> Phoenix would do well to study Los Angeles's integrated public and private waste diversion program.

## *4. Energy*

The Valley of the Sun is surprisingly old school in the sources of fuels used to generate electricity and is a net exporter of energy to California. Coal, natural gas, and nuclear are the three primary sources of electricity.<sup>204</sup> However, the future of the state's electricity sources is in flux. In 2006 Arizona's Governor, Janet Napolitano, adopted a CO2 reduction goal of returning to 2000 levels in 2020, and dropping to 50% below these levels by 2040 by executive order.<sup>205</sup> Since 2006, Arizona has had the goal of 15% of its electricity from renewables by 2025.<sup>206</sup>

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<sup>199</sup> See Santos, *supra* note 197.

<sup>200</sup> OMAR AL RABISI ET AL., ARIZ. STATE UNIV., SAFE-TO-FAIL ADAPTATION STRATEGIES FOR PHOENIX-AREA ROADWAYS UNDER INCREASING PRECIPITATION 16 (2016).

<sup>201</sup> ARIZ. REV. STAT. ANN. § 49-746 (2016); PHX., ARIZ., ORDINANCES. § 27-21C (2014).

<sup>202</sup> CITY OF PHX., DEPT OF PUB. WORKS, ZERO WASTE, <https://perma.cc/E4AT-7XM3> (last visited Nov. 9, 2019).

<sup>203</sup> *Id.*

<sup>204</sup> Arizona Energy Fact Sheet, SW. ENERGY EFFICIENCY PROJECT (2016), <https://perma.cc/5878-MR25>.

<sup>205</sup> Exec. Order No. 2006-13 (Ariz. Sept. 7, 2006).

<sup>206</sup> Arizona, W. INTERSTATE ENERGY BD., <https://perma.cc/4SHK-CX7S> (last visited Nov. 9, 2019).

However, a 2018 ballot initiative,<sup>207</sup> opposed by utilities and the Navajo Nation,<sup>208</sup> would raise the goal to 50% by 2030.

#### D. Portland, Oregon

This urban area has grown quickly and has been a magnet for young, college-educated persons, especially millennials.<sup>209</sup> Portland politics are notoriously progressive and the area is Democratic,<sup>210</sup> environmentally oriented,<sup>211</sup> activist,<sup>212</sup> and a bit weird.<sup>213</sup> Given its

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<sup>207</sup> *Arizona Proposition 127, Renewable Energy Standards Initiative*, BALLOTEDIA (2018), <https://perma.cc/WN8S-CYRG>.

<sup>208</sup> In 1970, the Navajo Nation leased tribal land to four utilities to build a coal-fired plant in northern Arizona. A coal mine on the reservation supplies the plant, which is a major source of employment for both the Navajo and Hopi tribes. The plant was built after the plans for two cash-register hydroelectric dams at either end of the Grand Canyon to power the CAP were abandoned. The plant has been a major source of regional air pollution, and coal is now less economical compared to alternative sources of energy. The four utilities that own the plant closed the plant on November 18, 2019 because it could not compete with natural gas. Ryan Randazzo & Shondiin Silversmith, *Navajo Generating Station – the Largest Coal Plant in the West – has Shut Down*, AZ CENTRAL (Nov. 18, 2019), <https://perma.cc/V9F9-KGZX>. The CAP will acquire substitute electric power from a large solar facility and from the Salt River Project. For an interesting recent decision from Australia where the environmental impacts of coal mining militated for denial of a new coal mine, see *Gloucester Res. Ltd. v Minister for Planning* [2019] NSWLEC 7 (Austl).

<sup>209</sup> See Richard Florida, *Is Portland Really Where Young People Go to Retire?*, CITYLAB (Sept. 25, 2012), <https://perma.cc/KL2C-FSN6>. Florida also notes:

Of the largest 50 U.S. metro areas, only Portland and Seattle ranked in the top 15 metros for each period analyzed, 1980 to 2010, with the highest rate of attracting and retaining YCE migrants. This statistic not only underscores the Portland metro's competitiveness in attracting and retaining college-educated talent, but also showcases the consistency of Portland's YCE migration patterns. Other metro areas, including Austin, Denver, and Phoenix, also demonstrated an impressive ability to attract and retain YCE migrants during this period, but also experienced 'bust' periods where YCE migration flows ebbed.

Id.

For a more skeptical view, see Claire Cain Miller, *Will Portland Always be a Retirement Community for the Young?*, N.Y. TIMES (Sept. 16, 2014), <https://perma.cc/FF8F-5CFJ>.

<sup>210</sup> Oregon hasn't voted for a Republican presidential candidate since 1984, Or. Sec'y of State, *Oregon Blue Book: Votes Cast in Oregon for United States President 1860–2016*, <https://perma.cc/KKS2-BG62>, and hasn't elected a Republican Governor since 1982, Or. Sec'y of State, *Oregon Blue Book: Governors of Oregon*, <https://perma.cc/VX56-823W>. Portland, located in Multnomah County, is the center of this blue-state orientation. Or. Sec'y of State, *Oregon Blue Book: Voter Registration by County* (Nov. 6, 2018), <https://perma.cc/BT8D-B83T>.

<sup>211</sup> Oregon is known for environmental leadership in legislating the bottle bill to require a deposit for return of many bottled drinks, for asserting public ownership of dry sand beach areas on the Pacific Coast and for landmark land-use planning legislation. See Edward J. Sullivan, *The Quiet Revolution Goes West: The Oregon Planning Program 1961–2011*, 45 J. MARSHALL L. REV. 357 (2012). It is also likely the Oregon Legislature will pass a cap-and-trade bill, as well as other climate change legislation during its 2019 session. See Ted Sickinger, *Will 2019 be the Year Oregon Gets Climate Change Bill to Finish Line?*, OREGONLIVE (Dec. 16, 2018), <https://perma.cc/M9FL-K4NB>; *Energy and Climate Change*,

demography and political history, it is not surprising to find responsiveness to climate change here.

### 1. Transportation

Besides the city itself, there are other prominent actors in urban transportation within Portland's boundaries. The State of Oregon, acting through the Oregon Department of Transportation, deals with state interests in roads, mass transit, port facilities, pipelines, and other components of transportation networks.<sup>214</sup> However, that agency is also bound in exercising its land use responsibilities according to the Oregon Statewide Planning Goals and their interpretation by the administrative rules of the Oregon Land Conservation and Development Commission.<sup>215</sup> Taken together, those standards mandate multiple responses to climate change, including mandatory transportation systems plans integrated with other components of the local comprehensive plan, objectives of reducing automobile dependence and vehicle-miles traveled (VMT),<sup>216</sup> accommodation of pedestrians, cyclists,

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OREGON.GOV, <https://perma.cc/M9FL-K4NB> (last visited Sept. 24, 2019) (stating the current Governor's proposals for increased energy efficiency and electric vehicle use). However, the comparative racial homogeneity of the State results in differing views on the environment, as well as social equity. Rachel Levelle, *Confronting the Whiteness of Environmentalism*, 350PDX (June 29, 2017), <https://perma.cc/TV3Z-S7DB>. Combining planning and environmentalism, Portland has become a national icon. See Amanda Suutari, *USA – Oregon (Portland) – Sustainable City*, ECO TIPPING POINTS PROJECT (June 2006), <https://perma.cc/NT9E-Y6VG>.

<sup>212</sup> The Portland area has a history of protests stretching back to the diversion of Vietnam War-era protest to a meeting of the American Legion in 1970 to a love-peace gathering in distant McIver Park, see Matt Love, *40 Years Ago, Gov. McCall got the Bands to Play in Oregon*, OREGONLIVE (Aug. 21, 2010), <https://perma.cc/724Z-GDGG>, to protests by women against the inauguration of President Trump using their signature "Pussy Hats," see Doug Brown, *Police Blasted and Tear Gassed an Inauguration Day Protest*, PORTLAND MERCURY (Jan. 25, 2015), <https://perma.cc/KSU3-MHDN>.

<sup>213</sup> See, for example, the notorious *Portlandia* sketch on "Colin the Chicken," *Portlandia: Farm* (IFC Jan. 11, 2011).

<sup>214</sup> See generally OR. REV. STAT. § 184.610–635 (laying out the Oregon Department of Transportation's duties and authorities). The Department maintains a climate change website. *Transportation and Climate Change*, OREGON.GOV, <https://perma.cc/UKP9-29PV> (last visited Nov. 9, 2019).

<sup>215</sup> Edward J. Sullivan, *The Connection Between Land Use and Transportation: The Oregon Experience*, 48 URB. LAW. 839, 850–51 (2016). The State of Oregon has adopted policies to recognize the combined role of land use and transportation measures to meet climate change. See *Oregon Statewide Transportation Strategy*, OR. DEPT OF TRANSP., <https://perma.cc/ZL7M-5XTM> (last visited Oct. 30, 2019).

<sup>216</sup> Portland has incorporated VMT reduction into its 2035 Comprehensive Plan in Policy 9.5. CITY OF PORTLAND, 2035 COMPREHENSIVE PLAN GP9-8 (2018) [hereinafter 2035 COMPREHENSIVE PLAN] ("Reduce VMT to achieve targets set in the most current Climate Action Plan and Transportation System Plan, and meet or exceed Metro's mode share and VMT targets."). More recently, the California Department of Transportation (Caltrans) had adopted a VMT measure as well. Undated Memorandum from Jeremy Ketchum, Acting Chief, Caltrans Division of Environmental Analysis to Caltrans Directors, *Switch from LOS to VMT* (on file with authors).

and the transportation-disadvantaged, and a requirement of concurrency for transportation facilities to serve newly-planned development.<sup>217</sup> The city has included these requirements in its planning and regulatory documents and has responded to climate change by adopting its own plans.<sup>218</sup>

In addition, because the city is part of the Portland Metro Region, it is subject to expectations of an elected regional government that has, and uses, extensive planning and land use regulatory powers.<sup>219</sup> Thus, the regional government is a major factor regarding transportation in the city.<sup>220</sup> Finally, the Tri-County Transportation District (Tri-Met) is a state agency responsible for providing mass transit for the region.<sup>221</sup> That agency too has a focus in addressing climate change as a significant part of its mission.<sup>222</sup>

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<sup>217</sup> Sullivan, *supra* note 215, at 848–52; *see also* OR. DEP'T OF TRANSP. (ODOT), 1 OREGON TRANSPORTATION PLAN 58–59 (2006). ODOT has also promoted climate change mitigation as part of its mission. *Greenhouse Gas Emissions Reduction Toolkit*, OREGON.GOV, <https://perma.cc/3TEN-VD8K> (last visited Nov. 9, 2019). The state transportation program's commitment to respond to climate change has been favorably reviewed. *See, e.g.*, REBECCA LEWIS & ROBERT ZAKO, NAT'L INST. FOR TRANSP. & CMTYS., NITC-RR-789, ASSESSING STATE EFFORTS TO INTEGRATE TRANSPORTATION, LAND USE AND CLIMATE CHANGE 25–26 (2017) (describing Oregon as a leader in land-use planning both historically and currently, and commending recent programs).

<sup>218</sup> *See, e.g.*, CITY OF PORTLAND & MULTNOMAH CTY., CLIMATE ACTION PLAN PROGRESS REPORT (2017); *Climate Action Plan*, CITY OF PORTLAND: PLAN. & SUSTAINABILITY, <https://perma.cc/TP53-PYRM> (last visited Nov 9, 2019) (“In 1993, Portland was the first U.S. city to create a local action plan for cutting carbon. Portland’s Climate Action Plan (CAP) is a strategy to put Portland and Multnomah County on a path to achieve a 40 percent reduction in carbon emissions by 2030 and an 80 percent reduction by 2050.”).

<sup>219</sup> For example, former Director of the city’s Bureau of Planning and Sustainability, Gil Kelley, and others, explored Metro’s powers to change the face of the region. GIL KELLEY ET AL., ACHIEVING SUSTAINABLE, COMPACT DEVELOPMENT IN THE PORTLAND METROPOLITAN AREA: NEW TOOLS AND APPROACHES FOR DEVELOPING CENTERS AND CORRIDORS 1 (2009). (To date, most of these powers have been untested.)

<sup>220</sup> Oregon Metro’s Climate Smart Strategy has multiple references to transportation, two of which are indicative of this. OR. METRO, CLIMATE SMART STRATEGY 19–27 (2014), <https://perma.cc/3EDM-LUCQ>. One such strategy is to “use technology to actively manage the transportation system” so as to manage traffic and congestion interactively on major thoroughfares in the region, while another is to “secure adequate funding for transportation investments.” *Id.* Metro has the power to direct and enforce regional aspects of transportation planning, OR. REV. STAT. § 268.390(1)(c), which it exercises through its Regional Transportation Plan. *See* OR. METRO, 2018 REGIONAL TRANSPORTATION PLAN (June 29, 2018), <https://perma.cc/T23V-BXN4> (mapping out regional planning in the area). The Metro Regional Transportation Plan identifies Metro as the regional planning agency responsible for allocating federal funds and states that \$3.4 billion dollars from federal sources are expected for the region between 2014 and 2040. *Id.* at 2.

<sup>221</sup> OR. REV. STAT. § 267.010–.390 (2019).

<sup>222</sup> TRI-MET, LIVABLE PORTLAND: LAND USE AND TRANSPORTATION INITIATIVES 5–6 (2010), <https://perma.cc/CN3W-GFZX> (noting legislative requirements for reduction of greenhouse gasses). The report strongly suggests that greater use of mass transit would have a profound effect on emissions. *See also*, URBAN LAND INST., LAND USE AND DRIVING: THE ROLE COMPACT DEVELOPMENT CAN PLAY IN REDUCING GREENHOUSE GAS EMISSIONS (2010), <https://perma.cc/R7HE-NPYP>.

In 2015, the City of Portland, along with its local partner, Multnomah County, adopted a CAP<sup>223</sup> that deals with multiple issues, including transportation, addressing with particularity distances among urban uses, forms of transportation, and fuels used.<sup>224</sup> Among other things, the CAP promoted planning with climate change in mind, connected streets, enhanced pedestrian and bicycle connections, efficient movement of freight, fuel efficiency, and carbon reductions.<sup>225</sup> The newly adopted Portland Comprehensive Plan (2018) uses the CAP as a “foundation” document for framing and administering its binding policies.<sup>226</sup>

## 2. Land Use

The city’s 2035 Comprehensive Plan is replete with references to climate change and the city’s responses in sections dealing with design and development,<sup>227</sup> the economy,<sup>228</sup> environment and watershed health,<sup>229</sup> as well as with public facilities and services and

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<sup>223</sup> CITY OF PORTLAND & MULTNOMAH CTY., CLIMATE ACTION PLAN: LOCAL STRATEGIES TO ADDRESS CLIMATE CHANGE 10 (2015), <https://perma.cc/8MML-AL97>. Additionally, the city has encouraged citizen participation in its climate change response. *Id.*

<sup>224</sup> *Id.* at 70–87. The plan observes:

Transportation of goods and people accounts for nearly 40 percent of Multnomah County carbon emissions. To achieve the 2050 goal of reducing local carbon emissions by 80 percent below 1990 levels, significant transportation-related reductions must be achieved through coordinated land use policies and the development of infrastructure for low-carbon transportation[.]

*Id.* at 71.

<sup>225</sup> *Id.* The city acknowledged significant assistance from federal sources in providing climate change related data, as that data existed as of January 19, 2017. See City of Portland Bureau of Planning and Sustainability, *City of Portland Publishes U.S. EPA’s Website on Climate Change*, CITY OF PORTLAND (June 12, 2017), <https://perma.cc/65WY-SR5T>.

<sup>226</sup> 2035 COMPREHENSIVE PLAN, *supra* note 216, at I-3; see 2035 Comprehensive Plan, CITY OF PORTLAND: PLAN. AND SUSTAINABILITY, <https://perma.cc/7RLY-RUMX> (last visited Nov. 9, 2019). Climate change is an issue addressed in this plan on multiple occasions, as well as in the 2018 recommended version of the city’s Transportation System Plan. CITY OF PORTLAND, BUREAU OF TRANSP., PORTLAND 2035: TRANSPORTATION SYSTEM PLAN (2018). Other actions, such as the 2017 City of Portland Electric Vehicle Strategy, are based on climate change considerations, CITY OF PORTLAND, 2017 CITY OF PORTLAND ELECTRIC VEHICLE STRATEGY (2016), and the city’s Parking Management Policy § 9.55 in its 2035 Comprehensive Plan, 2035 COMPREHENSIVE PLAN, *supra* note 216, at § 9.5. Nevertheless, Portland continues to have significant transportation issues, as exemplified by efforts to replace the Interstate Bridge over the Columbia River to connect Vancouver, Washington and Portland, Oregon more efficiently. The project floundered in 2013 over disagreements on scope of the project, its costs, and debt allocation, at least some of which arose over proposals to include mass transit on the new bridge. See *The Columbia River Crossing: Bridge of Sighs*, THE ECONOMIST (April 6, 2013), <https://perma.cc/XVQ4-QGQS>.

<sup>227</sup> 2035 COMPREHENSIVE PLAN, *supra* note 216, at GP4-14–15.

<sup>228</sup> *Id.* at GP6-1–22.

<sup>229</sup> *Id.* at GP7-1–18.

transportation.<sup>230</sup> The city funds its Bureau of Planning and Sustainability with climate change response as a major expenditure factor.<sup>231</sup> And true to its political culture, Portland inserted social equity into its climate planning.<sup>232</sup>

As with transportation, Portland has direction from other agencies in dealing with climate change. The Oregon Land Conservation and Development Commission (LCDC) may adopt, interpret and apply statewide or metropolitan standards to which local plans must adhere.<sup>233</sup> That agency produced certain reports and recommendations to deal with climate change;<sup>234</sup> however, not much has been done with regard to binding standards. Metro, rather than Portland, sets the urban growth boundary for the city and the region.<sup>235</sup> The spatial arrangement of land uses, however, remains a function of city government.<sup>236</sup> The city's process for increasing density and providing for infill is underway and will likely result in an increase in residential density.<sup>237</sup> The likely increase in density is a response to the lack of affordable housing in the region,<sup>238</sup> a victim of its desirable location.

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<sup>230</sup> *Id.* at GP8-1–29.

<sup>231</sup> CITY OF PORTLAND, BUREAU OF PLANNING AND SUSTAINABILITY FISCAL YEAR 2018–19 REQUESTED BUDGET (2017), <https://perma.cc/Z4H7-BUQ8>.

<sup>232</sup> CITY OF PORTLAND, CLIMATE ACTION THROUGH EQUITY (2016), <https://perma.cc/6RGC-HFK6>.

<sup>233</sup> See Sullivan, *supra* note 211, at 369–74.

<sup>234</sup> *Climate Change Resources*, OR. DEPT OF LAND CONSERVATION & DEV., <https://perma.cc/RSE4-VGDA> (responding to state climate change legislation by adopting an interim climate change strategy). More recently, the Commission adopted administrative rules setting 2040 greenhouse gas reduction targets for metropolitan areas of the state. See OR. ADMIN. R. § 660-044-000 (2019). However, the state expressly rejected a petition to adopt rules to deal with sea level rise associated with climate change. Land Conservation and Dev. Comm'n, Meeting: Response to Petition for a New Statewide Planning Goal 20: Climate Change – Sea Level Rise (July 29–31, 2009). The Department also produced a toolkit for local governments to deal with climate change. DEPT OF LAND CONSERVATION & DEV., COOL PLANNING: A HANDBOOK ON LOCAL STRATEGIES TO SLOW CLIMATE CHANGE 3 (2010). The Department has also participated in efforts of the Oregon Global Warming Commission to provide suggestions for mitigating climate change. Oregon Global Warming Commission, *Working Together to Take on Climate Change in Oregon*, KEEP OR. COOL, <https://perma.cc/4FJX-7GR9> (last visited Sep. 26, 2019).

<sup>235</sup> OR. REV. STAT. § 268.309(3) (West 2019); see also *Urban Growth Boundary*, METRO, <https://perma.cc/PUD9-2MRJ> (last visited Nov. 9, 2019).

<sup>236</sup> Gerrit Knapp et al., *Metro's Regional Land Information System: The Virtual Key to Portland's Growth Management Success*, 1, 2 (Lincoln Inst. of Land Policy, Working Paper No. WP03GKI, 2003), <https://perma.cc/BGJ2-FQZ9>.

<sup>237</sup> The Concept report, adopted by the City Council in 2017, posits that there will be an additional 123,000 new households to be accommodated and proposes a new mix of additional attached and multifamily housing. CITY OF PORTLAND, BUREAU OF PLANNING & SUSTAINABILITY, RESIDENTIAL INFILL PROJECT: CITY COUNCIL FINAL CONCEPT REPORT 2 (2017). Not surprisingly, some residents object to the increase in density and changes in their neighborhoods. *What is Portland's Residential Infill Project and What Does it Mean for Eastmoreland?*, KEEP EASTMORELAND FREE, <https://perma.cc/GUR2-2MK8> (last visited Nov. 9, 2019).

<sup>238</sup> See Rebecca Small, *You are Here: A Snapshot of Housing Affordability in Greater Portland*, METRO (Nov. 1, 2017), <https://perma.cc/MH7T-TKS8>.

### 3. Infrastructure

The efficient delivery of infrastructure services is a core function of municipal government; however, that delivery now necessarily involves municipal responses to climate change as well. Recurring heat waves in Chicago<sup>239</sup> and the effects on the New York City subway infrastructure by Superstorm Sandy<sup>240</sup> are recent examples of the impacts of climate change on municipal infrastructure.

What constitutes “infrastructure” is important, for it tells us what must be done to respond holistically to climate change. The European Commission is considering a broad definition of the term:

The term “infrastructure” usually refers to physical assets in a wider range of policy areas, including communications, emergency services, energy, finance, food, government, health, education, civil protection, transport or water. Buildings, from private households to schools or industrial installations, are the most common type of infrastructure and the basis for human settlement. In addition, network infrastructure is crucial for the functioning of today’s economy and society, notably infrastructure for energy (e.g. grids, power stations, pipelines), transport (fixed assets such as roads, railways or airports), ICT (e.g. data cables) and water (e.g. water supply pipelines, reservoirs, waste water treatment facilities). They are sets of interconnected networks, which facilitate the production and distribution of goods and economic services, and form the basis for the provision of basic social services.<sup>241</sup>

Chapter 8 of the Portland Comprehensive Plan<sup>242</sup> deals with infrastructure and climate change. Goal 8.C concerns resiliency and provides, “[p]ublic facilities and services are reliable, able to withstand and recover from catastrophic natural and manmade events, and are adaptable and resilient in the face of long-term changes in the climate,

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<sup>239</sup> See Seth Borenstein, *Study Shows Deadly Heat Waves are Becoming More Frequent*, CHI. TRIB. (June 19, 2017), <https://perma.cc/RSJ6-DYFK>; *Midwestern Heat Wave September 2017*, CLIMATE SIGNALS, <https://perma.cc/W8YP-7799> (last updated Dec. 4, 2018); Katherine Hayhoe et al., *Climate Change, Heat Waves, and Mortality Projections for Chicago*, 36 J. GREAT LAKES RES. 65, 66 (2010).

<sup>240</sup> See N.B., *The Subway, After Sandy*, THE ECONOMIST (Oct. 28, 2013), <https://perma.cc/FUA9-C78P>; Frank Eltman, *5 Years after Superstorm Sandy, Experts Say No US City is Remotely Prepared for Climate Change*, ASSOCIATED PRESS (Oct. 24, 2017), <https://perma.cc/9G7E-5BST>; Robinson Meyer, *Climate Change Will Bring Major Flooding to New York Every 5 Years*, THE ATLANTIC (Oct. 24, 2017), <https://perma.cc/RN2W-F98C>; Patrick McGeehan & Winnie Hu, *Five Years After Sandy, Are We Better Prepared?*, N.Y. TIMES (Oct. 29, 2017), <https://perma.cc/TV7S-MDVK>; see also JOHN MCARTHUR ET AL., WASH. STATE DEPT OF TRANSP., WA-RD 772.1, CLIMATE CHANGE IMPACT ASSESSMENT FOR SURFACE TRANSPORTATION IN THE PACIFIC NORTHWEST AND ALASKA (2012).

<sup>241</sup> *Adapting Infrastructure to Climate Change*, at 4–5 SWD (2013) 137 final (Apr. 16, 2013), <https://perma.cc/D2P9-6ERF>.

<sup>242</sup> See CITY OF PORTLAND, BUREAU OF PLANNING & SUSTAINABILITY, COMPREHENSIVE PLAN UPDATE: DRAFT RECOMMENDED PLAN GP8–10 (2015).



economy and technology.”<sup>243</sup> Three public facilities are uppermost in the public mind (water, sewer, and stormwater disposal) and the city has given significant attention to them.<sup>244</sup> The city’s response to climate change covers multiple fields, as follows.

*a. Water*

Portland’s water supply largely comes from the Bull Run Watershed in the Cascade Mountains<sup>245</sup> and the Portland Water Bureau, which operates the city’s supply system, recognizes the risks to that supply from climate change.<sup>246</sup> In view of these risks, the Portland Water Bureau has begun a multifaceted program not only to deal with supply fluctuations, but also to reduce its emissions drastically.<sup>247</sup>

*b. Stormwater: Combined Sewer Outflow Program*

Portland’s sewer system was prone to overflows when extensive rainfalls occurred, thus polluting its rivers and sloughs.<sup>248</sup> To remedy this pollution, the city separated its sewage and stormwater systems at a cost of \$1.44 billion as part of its biggest public works project.<sup>249</sup>

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<sup>243</sup> *Id.*; see MULTNOMAH CTY., CLIMATE CHANGE PREPARATION STRATEGY 11, 16 (2014) (stressing such varied issues as energy use for disadvantaged populations in heat waves, the effects of flooding on stormwater detention facilities, and the need for sedimentation controls in water supplies); see also CITY OF PORTLAND & MULTNOMAH CTY., CLIMATE CHANGE ACTION PLAN 2009: YEAR ONE PROGRESS REPORT 4–5 (2010) (cataloging the initial steps taken by the City of Portland and Multnomah County to meet climate change).

<sup>244</sup> See KAVITA HEYN & NICHOLAS MCCULLAR, CLIMATE CHANGE RESILIENCY PLANNING FOR WATER, WASTEWATER, AND STORMWATER IN PORTLAND, OR 3–5 (2018).

<sup>245</sup> *Bull Run Watershed*, PORTLAND WATER BUREAU, <https://perma.cc/8XEM-25DW> (last visited Nov. 9, 2019).

<sup>246</sup> KAVITA HEYN & WHITNEY WINSOR, CLIMATE RISKS TO WATER UTILITY BUILT ASSETS AND INFRASTRUCTURE 5–6 (2015); see also RICHARD N. PALMER & MARGARET HAHN, THE IMPACTS OF CLIMATE CHANGE ON PORTLAND’S WATER SUPPLY 64 (2002).

<sup>247</sup> The Water Bureau has an ambitious program to reduce carbon emissions, promote renewable energy, and support car-free transport and appears to be a model for other city bureaus. *Carbon Emissions*, PORTLAND WATER BUREAU, <https://perma.cc/88N2-6QY8> (last visited Nov. 9, 2019). The Bureau issues annual carbon footprint reports as well. *Carbon Footprint Reports*, PORTLAND WATER BUREAU, <https://perma.cc/2Y84-WLP4> (last visited Nov. 9, 2019).

<sup>248</sup> See Beth Slovic, *Portland’s \$1.4 Billion Big Pipe Project Comes to an End After 20 Years*, OREGONLIVE (Nov. 26, 2011), <https://perma.cc/ABJ5-HDJ8>.

<sup>249</sup> *Id.*; see also JENNIFER BELKAMP WILLIAMSON, BES RESILIENCY MASTER PLAN AND CLIMATE CHANGE PLANNING FOR CIP PROJECTS (2017).

*c. Public Transportation*

Portland has a light rail system, consisting of five lines, all of which run through the downtown area.<sup>250</sup> One of the first (and also the most notable) projects, connecting Portland Airport with the downtown area, had a construction cost of over \$125 million and has eight-million riders per year.<sup>251</sup> The newest project, which includes land acquisition, planning, permitting, and construction, will cost between \$2.6 and \$2.8 billion.<sup>252</sup> These public transportation projects are expensive, but they do reduce emissions and vehicle trips.<sup>253</sup> In addition, Portland has a streetcar system for its central city area that further responds to climate change.<sup>254</sup> Nevertheless, many challenges remain to the area's roads, bridges, and tunnels.<sup>255</sup>

The Portland City Council recently severely limited the transport of fossil fuels by restricting the siting of new fossil fuel depot facilities.<sup>256</sup> Initially overturned in *Columbia Pacific Building Trades Council v. City of Portland*,<sup>257</sup> the ordinance was upheld on appeal.<sup>258</sup> The city has also addressed the movement of goods and the inclusion of sustainable freight practices in its response to global warming.<sup>259</sup>

Other transportation facilities within the city affected by climate change are handled by other public or private agencies and include rail facilities,<sup>260</sup> ports,<sup>261</sup> health care,<sup>262</sup> and electricity.<sup>263</sup>

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<sup>250</sup> *MAX Light Rail*, TRAVEL PORTLAND (Aug. 1, 2013), <https://perma.cc/Y4EY-QKBY>.

<sup>251</sup> BIPARTISAN POLICY CTR., INFRASTRUCTURE CASE STUDY: PORTLAND AIRPORT MAX RED LINE 2 (2016).

<sup>252</sup> Ambar Espinoza, *Investing in the Southwest Corridor*, METRO (Apr. 18, 2018), <https://perma.cc/W7EQ-5UJ9>.

<sup>253</sup> According to TriMet, the Portland transit system, 45% of commuters take public transit at rush hour, amounting to a 22% reduction in vehicle miles traveled and carbon emission reductions of 60%. *Making Transit More Sustainable*, TRIMET, <https://perma.cc/5GLZ-EGUD> (last visited Nov. 9, 2019).

<sup>254</sup> See PORTLAND BUREAU OF TRANSP., PORTLAND STREETCAR: STRATEGIC PLAN 2015–2020, at 6 (2015).

<sup>255</sup> See Bill Lascher, *The Next Generation of Infrastructure*, NEXT CITY (Jan. 20, 2014), <https://perma.cc/QP36-6GUT>; HEEJUN CHANG ET AL., OTREC RR-11-21, FUTURE FLOODING IMPACTS ON TRANSPORTATION INFRASTRUCTURE AND TRAFFIC PATTERNS RESULTING FROM CLIMATE CHANGE 23–24, 26 (2011).

<sup>256</sup> Portland, Or., Ordinance 188,142 (2016); see also CITY OF PORTLAND, FOSSIL FUEL TERMINAL ZONING AMENDMENTS 1 (2016).

<sup>257</sup> LUBA No. 2017-001 (July 19, 2017), *rev'd & remanded to 412 P.3d 258* (2018), *reh'g denied* 434 P.3d 29 (2018).

<sup>258</sup> *Columbia Pac. Bldg. Trades Council v. City of Portland*, 412 P.3d 258, 272 (Or. Ct. App. 2018).

<sup>259</sup> CITY OF PORTLAND, BUREAU OF TRANSP., CENTRAL CITY SUSTAINABLE FREIGHT STRATEGY (Oct. 2012).

<sup>260</sup> To the extent that state or local governments in Oregon regulate railroads, the Oregon Department of Transportation undertakes that role and includes consideration of climate change. OR. DEP'T OF TRANSP., OREGON RAIL STUDY 105–06, 162–63 (2010). Nevertheless, the city and Multnomah County have included such facilities as part of its climate change response. MULTNOMAH CTY., *supra* note 243, at 7–9; CITY OF PORTLAND & MULTNOMAH CTY., *supra* note 218, at 23, 33–34.

*d. Parks and Recreation*

Leisure venues and facilities are not exempt from Portland's climate change responses—the city has surveyed these assets and striven to meet new challenges from wildfires to reduced water fountain use.<sup>264</sup>

*e. Solid Waste and Recycling*

Portland does not provide these services directly; instead, it regulates solid waste service providers and has included waste reduction as part of its overall climate change response.<sup>265</sup>

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<sup>261</sup> The Port of Portland administers the airport and river ports within Portland and has also demonstrated concern over climate change in undertaking these functions. PORT OF PORTLAND, PORT OF PORTLAND AIR QUALITY IMPROVEMENT AND EMISSION REDUCTION STRATEGIES 1 (2015); PORT OF PORTLAND, ENVIRONMENTAL OBJECTIVES AND TARGETS: 2016-2017; INT'L INST. FOR SUSTAINABLE SEAPORTS, ENVIRONMENTAL INITIATIVES AT SEAPORTS WORLDWIDE: A SNAPSHOT OF BEST PRACTICES 1 (2013).

<sup>262</sup> Preparing for the adverse results of climate change, such as flooding, fires, and windstorms, is a standard practice to meet these likely events. *See, e.g.*, Mahmood Nekoie-Moghadam et al., *Tools and Checklists Used for the Evaluation of Hospital Disaster Preparedness: A Systematic Review*, 10 DISASTER MED. & PUB. HEALTH PREPAREDNESS 781, 785 (2016); *Sustainable and Climate-Resilient Health Care Facilities Toolkit*, U.S. CLIMATE RESILIENCE TOOLKIT, <https://perma.cc/MDQ6-XP5A> (last updated July 16, 2018). The Oregon Health Authority addresses these facilities on a statewide level. *Integrating Health Equity Considerations into Climate Change Planning*, OR. HEALTH AUTH., <https://perma.cc/CK45-FPKF> (last visited Nov. 9, 2019).

<sup>263</sup> Most of the City's electricity comes from private, investor owned entities; however, the City has included their efforts within its climate change responses. CITY OF PORTLAND & MULTNOMAH CTY., CLIMATE ACTION PLAN 27–58 (2009) (emphasizing a need to reduce electrical consumption and the role of local government operations in achieving that end); CITY OF PORTLAND & MULTNOMAH CTY., *supra* note 223, at 127, 144, 153 (emphasizing, inter alia, increased use of electric vehicles, renewable energy sources and onsite electrical generation).

<sup>264</sup> CITY OF PORTLAND & MULTNOMAH CTY., CLIMATE CHANGE PREPARATION STRATEGY: RISK AND VULNERABILITIES ASSESSMENT 23, 57 (2014); *see also* Anthony Bencivengo et al., *Vulnerability and Climate Change Adaptation Planning: Heat and Floods in Portland, Oregon* 11–12 (Reed College, Environmental Studies Department Junior Seminar, 2017), <https://perma.cc/UDL9-PLFY>.

<sup>265</sup> In 2017, the city established a 2030 solid waste goal so that 90% of all solid-waste generated, including food scraps, will be recovered or recycled (compared with 70% in 2017) and the total amount of waste generated per person will be reduced by one third. CITY OF PORTLAND & MULTNOMAH CTY., *supra* note 264, at 37–42, 59; *see also* CLIMATE ACTION PLAN: LOCAL STRATEGIES TO ADDRESS CLIMATE CHANGE, *supra* note 223, at 26, 89, 92; CITY OF PORTLAND, *Solid Waste Management*, <https://perma.cc/6CL3-M2SK> (last visited Nov. 9, 2019); CITY OF PORTLAND, *Garbage, Recycling and Composting*, <https://perma.cc/Q27J-D8BN> (last visited Nov. 9, 2019).

#### 4. Energy

Unlike water, electricity and natural gas are mostly supplied to Portland customers by investor-owned, rather than publicly owned, utilities.<sup>266</sup> Thus, the city participates in much of the planning and delivery of energy through the implementation of state energy policy.<sup>267</sup> The city has a number of its own energy efforts as well, as outlined in its *Climate Action Plan*.<sup>268</sup>

#### E. Salt Lake City

This intermountain city is among the twenty-five fastest growing cities in the United States,<sup>269</sup> and sees itself as the “Crossroads of the West,” where the business and tax climate also make the city an excellent place to do business and to retire.<sup>270</sup> The State of Utah in

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<sup>266</sup> Portland General Electric and Pacific Power are the two major electrical supply sources for the city, while Northwest Natural is the principle supplier of natural gas. See OR. DEPT OF ENERGY, 2018 BIENNIAL ENERGY REPORT 7 (2018). This situation is different from that of Seattle, where public utilities supply much of that city’s energy. See *Public Power: A Tradition*, SEATTLE.GOV, <https://perma.cc/4ZJE-8QLB> (last visited Sept. 5, 2019).

<sup>267</sup> Oregon’s energy policies are extensive and ambitious and stress, among other things, production and use from renewable sources (including wind, solar, wave, geothermal, biomass, and others), addressing climate change and greenhouse gas emissions, reduction of transportation emissions with a zero-emission goal for carbons, and energy use monitoring and efficiency standards for home and business. See Or. Dep’t of Energy, *Home*, STATE OF OR., <https://perma.cc/X5CC-DCFF> (last visited Nov. 9, 2019).

<sup>268</sup> See generally CITY OF PORTLAND & MULTNOMAH CTY., *supra* note 264, at 58–69. The city’s Bureau of Planning and Sustainability notes that the cleanest energy is that which is not used and emphasizes energy reduction at homes and businesses, producing energy through solar and other means, and considering energy use in everyday life. See *Clean Energy*, PORTLAND BUREAU OF PLAN. & SUSTAINABILITY, <https://perma.cc/7K37-F63B>. It has led by example with actions involving its own facilities. PORTLAND BUREAU OF PLANNING & SUSTAINABILITY, GREEN BUILDING IMPLEMENTATION GUIDE 2 (2010). The city has also developed a fleet strategy regarding use of electric vehicles, *Electric Vehicles the Portland Way*, CITY OF PORTLAND, <https://perma.cc/SMY2-2BVD> (last visited Nov. 9, 2019), and emphasized the use of building codes and energy assessments to enliven the public consciousness over climate change. See PORTLAND, OR., MUN. CODE § 5.01–.10 (2018) <https://perma.cc/Z9T6-WUUS>.

<sup>269</sup> Samantha Scharf, *Full List: America’s Fastest-Growing Cities 2018*, FORBES MAG. (Feb. 28, 2018), <https://perma.cc/6LC5-ZJK9>.

<sup>270</sup> Forbes Magazine evaluates the city’s desirable and non-desirable characteristics:

Scenic state capital and city of 194,000 wedged between Great Salt Lake and two mountain ranges. Median home price \$294,000. Cost of living 8% above national average. PROS: Very high rank on Milken Institute list of best cities for successful aging. Above-average number of doctors per capita. Strong economy. No state estate /inheritance tax. Very walkable and bikeable, with good mass transit, including light rail. Strong volunteering culture. Known for outdoor activities. Home of University of Utah. CONS: Poor air quality. Serious crime rate above national average. State income tax on Social Security earnings.

*25 Best Places to Retire in 2018*, FORBES, <https://perma.cc/X48G-J5TJ> (last visited Nov. 9, 2019). Forbes also counts Salt Lake City as the third best big city in terms of new jobs in

general, and Salt Lake City in particular, have a good economy and a business-friendly climate,<sup>271</sup> especially for the tech industry, which is a significant reason for its healthy economy.<sup>272</sup>

But despite its reputation as a solidly “red state,” Utah in general, and Salt Lake City in particular, have shown a willingness to deal with climate change. The city has established a Sustainability Department and website, SLC Green,<sup>273</sup> which highlights its climate change management program and points to other similar public and private efforts.<sup>274</sup> More specifically, the city is seeking to become “climate positive,” so that its electricity needs are fully met by renewable sources by 2032, on its way to reducing all energy-related greenhouse gas emissions by 80% by 2040.<sup>275</sup> We review the city’s climate change response, using our four “markers.”

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2018. *The Best Big Cities for Jobs*, FORBES, <https://perma.cc/G5B4-Y73K> (last visited Nov. 9, 2019).

<sup>271</sup> See Matt Hilburn & Michael Stachitus, *Economic Development, in ECONOMIC REPORT TO THE GOVERNOR 81* (2018); *5 Facts About Utah’s Strong Pro-Business Climate*, DAVID ECCLES SCH. OF BUS. (July 22, 2015), <https://perma.cc/H3UE-K5X8>; Patrick Sisson, *Salt Lake City, Downtown Booming, Brushes off Conservative Image*, CURBED (Mar. 20, 2018, 1:00 PM), <https://perma.cc/UUG3-F2GZ>.

<sup>272</sup> Forbes Magazine also places the Salt Lake City as fourth in creation of tech jobs. *The Best Cities for Tech Jobs*, FORBES, <https://perma.cc/E746-QAGJ> (last visited Sept. 6, 2019); see also Brynne Ramella, *The State of B2B Tech in Salt Lake City in 2019*, G2 (Jan. 17, 2018), <https://perma.cc/KY8W-99PV>; Nick Kolakovski, *Salt Lake City Among Tech’s New STEM Hotbeds*, DICE (Jan. 17, 2018), <https://perma.cc/EW5G-XQFB>.

<sup>273</sup> *Sustainability*, SLC.GOV, <https://perma.cc/WAQ6-ERG3> (last visited Nov. 9, 2019). The website, inter alia, deals with the city’s efforts in air quality, climate, energy, waste management, food, and business. In addition, the mayor devotes significant attention to climate change in her blog. See, e.g., Sophia Nicholas, *Coming Together on Climate*, SLC MAYOR’S BLOG (May 13, 2018), <https://perma.cc/G9BC-YAA7>.

<sup>274</sup> These efforts include the Utah Climate Action Network, which describes itself as a partnership between government, research institutions, non-profits/foundations, faith-based organizations, the private sector, and individuals working to address climate change in Utah, *About the Network*, UTAH CLIMATE ACTION NETWORK, <https://perma.cc/4G9D-DYYW> (last visited Sept. 6, 2019), and Path to Positive Utah, which describes itself as comprised of a diverse group of trusted community leaders from local government, public health, higher education, faith, non-profit, and business, *Path to Positive Utah*, <https://perma.cc/2GNT-46RD> (last visited Nov. 9, 2019) (“Path to Positive Leaders seek to understand, prepare for, and raise awareness about the risks and solutions of climate change.”).

<sup>275</sup> The city states that it is prioritizing a near-term transition to clean, renewable energy to remove carbon pollution from electricity generation that makes up over half of the community carbon footprint. The city’s long-term climate goals are set out in its publication, SALT LAKE CITY CORP. DEPT OF SUSTAINABILITY, CLIMATE POSITIVE 2040 2 (2017). In a joint resolution adopted by the city’s Mayor and City Council, the city sought to achieve two interrelated goals: 1) 100 X 2032: 100% renewable energy for community electricity supply by 2032 (goal includes 50% renewable electricity for municipal operations by 2020); and 2) 80 X 2040: 80% reduction in community greenhouse gas emissions by 2040, compared to the 2009 Baseline Goal includes at least 50% reduction in community footprint by 2030. *Id.*; see also Randy Rogers, *Salt Lake City Commits to Zero-Carbon Power Plan*, SUSTAINABLE CITY NETWORK, Apr. 2018, at 3, 6, <https://perma.cc/FJJ5-BAWQ>.

## 1. Transportation

The city's Climate Positive 2040 Plan highlights transportation as one of its principal areas of action, emphasizing increased use of public transportation (through adoption of its Transit Master Plan and cooperation with the Utah Transit Authority), promoting active transportation activities (such as walking and biking), accelerating the use of electric vehicles, and reducing air transportation emissions.<sup>276</sup>

The city's Transit Master Plan establishes four "top priorities" as a means of meeting its climate change goals, namely a "frequent transit network," building on the city's grid pattern to increase night transit service and service on heavily-used corridors, to adopt pilot programs for employee shuttles, on-demand shared ride services and transportation for the disabled, enhanced bus corridors and the implementation of a variety of transit-supportive programs, and transit access improvements that overcome barriers to using transit.<sup>277</sup>

The city has also taken significant steps to promote the use of electric vehicles, including (but not limited to) producing a document to show how this mode of transportation may be advanced.<sup>278</sup> On the ground, the city has multiple public charging stations for these vehicles<sup>279</sup> and has removed user charges to facilitate their use.<sup>280</sup> It appears that the city has a goal of reducing VMT.<sup>281</sup>

## 2. Land Use

While the planning documents for Salt Lake City discuss best practices, recommend concrete actions to deal with the city's carbon

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<sup>276</sup> The city approaches transportation issues related to climate change from a reduction of greenhouse gas perspective. See CLIMATE POSITIVE 2040, *supra* note 275, at 6.

<sup>277</sup> SALT LAKE CITY DIV. OF TRANSP. ET AL., SALT LAKE CITY TRANSIT MASTER PLAN, KEY MOVES (2017). The plan itself contains detailed recommendations as to capital facility investments and corridor improvements for public transit, access to transit by pedestrians and bicycle users, car sharing, park and ride facilities, parking management, fair and pass programs, and integration of the city's transit goals in land use planning and urban design. *Id.*

<sup>278</sup> UTAH CLEAN ENERGY ET AL., ELECTRIFIED TRANSPORTATION ROADMAP, BEST PRACTICES AND CLEAN AIR SOLUTIONS GUIDE FOR LOCAL GOVERNMENTS IN UTAH 2 (2018).

<sup>279</sup> *Electric Vehicle Charging Stations*, SALT LAKE CITY, <https://perma.cc/BS8A-SWFB> (last visited Nov. 9, 2019).

<sup>280</sup> Katie McKellar, *Salt Lake City Eliminates Fees at Electric Vehicle Charging Stations*, DESERET NEWS (Mar. 2, 2018), <https://perma.cc/KNC7-QSRX>.

<sup>281</sup> See VICKI BENNETT & TYLER POULSON, SALT LAKE CITY, UTAH: A WHITE HOUSE CLIMATE ACTION CHAMPIONS CASE STUDY 3 (2015) (supporting private efforts to reduce VMT and implement *SLC Green*). The city's Green Energy and Sustainable Transportation Plan contains a technical memorandum detailing the connection between VMT reduction and its carbon footprint through a number of transportation and land-use strategies. SLCGREEN, SALT LAKE CITY ENERGY AND TRANSPORTATION SUSTAINABILITY PLAN 46 (Jan. 27, 2011). Otherwise, VMT does not appear to play a role in the plan. See generally, Schultz et al., *Understanding the Economics of Transportation in Utah*, UTAH DEP'T OF TRANSP. (Dec. 2010), <https://perma.cc/7VYS-H2SG>.

footprint, and point the city in the right direction to meet climate change goals, many of these plans are not binding and ultimately leave the decision makers the option to ignore these steps. The 2015 Plan Salt Lake speaks to a shared citywide policy vision:<sup>282</sup>

The purpose of Plan Salt Lake is to:

- Establish and articulate a citywide vision for Salt Lake City;
- Identify the commonly held values of our community;
- Establish a framework for future community master plans and element plans (also known as thematic plans) to carry out the Vision; and
- Set targets and identify metrics to help measure our success over time.<sup>283</sup>

Utah’s enabling legislation requires that local governments have a master plan, but describes that document as advisory, so that local governments decide whether to follow that plan in their zoning schemes.<sup>284</sup> Exceptions include some land use actions (conditional uses and some subdivision regulations) and public uses, for which the plan is binding.<sup>285</sup> Thus, zoning and rezoning are not bound by the plan.<sup>286</sup> Nevertheless, the city has done much to realize the plan’s vision and strategies.<sup>287</sup>

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<sup>282</sup> *Plan Salt Lake*, SALT LAKE CITY, <https://perma.cc/49GR-Q8MA> (last visited Nov. 9, 2019).

<sup>283</sup> *Id.* at 4. The plan sets out thirteen “guiding principles” to realize a 2040 Vision for the city in each element (e.g., transportation) and community plan; however, the plan allows for individuation of this shared vision, saying that “each neighborhood and individual community within Salt Lake City is unique, each community will help carry out the Vision in its own unique way.” *Id.* Other plans, such as CLIMATE POSITIVE 2040, *supra* note 275, have excellent land use recommendations on sustainable food and controlling solid waste; however, they are just that: recommendations.

<sup>284</sup> UTAH CODE ANN. § 10-2-401 (West 2019).

<sup>285</sup> *Id.* §§ 10-2-405–406.

<sup>286</sup> While the plan contains metrics of success, its 2040 targets appear to be aspirational in nature. *Plan Salt Lake*, *supra* note 282, at 42–43. Similarly, the implementation tools are a list of possible means to realize the plan without specific policy direction. *Id.* at 44–45; *see also* SLCGREEN, *supra* note 281.

<sup>287</sup> The city has made significant land use changes to help achieve sustainability goals. SLC has rezoned the land along its transit corridors to promote higher density, removed density limitations in a number of zoning districts, added incentives to promote affordable housing through a streamlined approval process at transit stations, removed barriers that prevented solar energy production, and modified landscaping requirements to require water conservation and efficiency. As a result of these land use changes, 97% of all housing units approved in 2017 are within ¼ mile of transit and within walking distance to a mixed-use neighborhood center. SALT LAKE CITY, SALT LAKE CITY PLANNING DIVISION ANNUAL REPORT 3, 8–9 (2017), <https://perma.cc/YT29-G8PW>. Moreover, the city’s staff points out that there are a number of ordinances, executive orders, and other

This is an unfortunate result. The city recognizes the relationship of climate change, greenhouse gas reduction, and land use, but responds only in terms of new growth, rather than retrofitting existing facilities or accommodating additional density:

Research shows that implementing land use patterns that are compact and efficient, with a mix of land uses and connectivity to transit networks, can reduce VMT through shorter trip lengths and a greater share of bicycle, pedestrian, and transit trips. Quantification of this strategy required calculating the difference between Salt Lake City VMT in 2005 (the base year) and 2020 (the future year threshold), to determine the amount of VMT attributable to new growth. *This was due to the assumption that existing land use patterns would not change significantly between the base year and future year, and that the opportunity for changing land use patterns lay in new developments only.* VMT from new growth was then reduced by a range of 7%–15%, based on review of the data sources listed above.<sup>288</sup>

It appears that the decision makers and their staff know what must be done and have the intentions (in the form of plan policies) to achieve desirable outcomes, but now seem unwilling to bind the city to those outcomes.

### 3. Infrastructure

As with the other cities surveyed in this paper, Salt Lake City is aware of the need to change its infrastructure provisions to meet climate challenges.

#### a. Water

Utah is an arid state and the effects of a hotter climate and less snowpack are generally recognized,<sup>289</sup> however, there are relatively few

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administrative rules relating to the energy and emissions reduction goals of the city, including LEED Gold for new construction, net-zero energy municipal buildings, comprehensive energy management requirements, and certain sub-sections (e.g., Air Quality and Climate Change) of the Comprehensive Sustainability Policy that have been made part of its regulatory program. Telephone Interview with Tyler Poulson, Senior Energy & Climate Program Manager, Salt Lake City Dep't of Sustainability (June 14, 2018).

<sup>288</sup> SLCGREEN, *supra* note 281, at 47 (emphasis added). While the Plan is described as a “draft,” the authors were assured that this version was final and was adopted administratively. The city also explains that the assumptions were made for modeling purposes to generate a quantifiable result, rather than to express policy preferences. Telephone Interview with Tyler Poulson, *supra* note 267. Moreover, this plan contains an appendix demonstrating the relationship of a compact city as a means of meeting climate change challenges.

<sup>289</sup> See, e.g., Utah Rivers Council, *Climate Change – Rising Temperatures Threaten Utah’s People, Rivers and Wildlife* (2012), <https://perma.cc/V8RS-UEXN> (proposing a



measures beyond recommendations for these resources.<sup>290</sup> The subject is barely touched on in the Climate Positive 2040. The city's water utility assisted in preparing a report showing the alarming decrease in runoff and thus water availability.<sup>291</sup> The city's public utilities agency concurs and is responding through conservation and other measures.<sup>292</sup>

### *b. Stormwater*

While Salt Lake City does not have the rainfall that characterizes the Pacific Coast, it does get some rainfall and the city appears to appreciate the need to capture the same and its use to recharge aquifers.<sup>293</sup>

### *c. Public Transportation*

The city's efforts are described above under *Transportation* and do not have the kind of regional or state elements found in Washington or Oregon. Nevertheless, the city has identified alternative transportation,

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detailed climate change adaptation plan for the state); Emma Penrod, *Abysmally Dry, Warm Conditions Across Utah May be a Glimpse of the State's Future*, *Water Experts Say*, SALT LAKE CITY TRIB. (Feb. 11, 2018), <https://perma.cc/WT5H-7F9F> (discussing, inter alia, progressively higher air temperatures and their effects on snowpack). The EPA's disturbing analysis of water impacts on the state from climate change, *What Climate Change Means for Utah*, U.S. ENVTL. PROT. AGENCY (Aug. 2016), <https://perma.cc/879P-HVHZ> (last visited Nov. 9, 2019), was deleted from that agency's website when the current administration took office but has been preserved by activists who reposted it.

<sup>290</sup> Indeed, the city's utilities department 2017 Annual Report mentions climate change only in passing. SALT LAKE CITY DEP'T OF PUB. UTIL. ADMIN., SALT LAKE CITY PUBLIC UTILITIES 2017 ANNUAL REPORT (2017), <https://perma.cc/7CZG-P3XA>. However, the city's Utilities Department does provide an educational program and incentives for water conservation. See *Conservation*, SALT LAKE CITY, <https://perma.cc/HD8K-9A5Y> (last visited Nov. 9, 2019). The city does have a Water Conservation Master Plan, however, that plan appears to be a compilation of best management practices and other non-binding recommendations. SALT LAKE CITY, 2014 SALT LAKE CITY WATER CONSERVATION MASTER PLAN 59–69 (2014).

<sup>291</sup> Tim Bardsley et al., *Planning for an Uncertain Future: Climate Change Sensitivity Assessment toward Adaptation Planning for Public Water Supply*, 17 EARTH INTERACTIONS 1, 2 (2013).

<sup>292</sup> Emily Greenhalgh, *Laura Briefer Talks About Preparing Salt Lake City's Water Supply for a Changing Climate*, CLIMATE.GOV (Feb. 12, 2014), <https://perma.cc/ER3X-A9AP>. Laura Briefer is the Water Resources Manager with the Salt Lake City Department of Public Utilities, co-author of *Planning for an Uncertain Future*, *supra* note 291, and is working out the implications of that report that found that every degree Fahrenheit of warming in the Salt Lake City region could mean a 1.8–6.5% drop in the annual flow of streams that provide water to the city.

<sup>293</sup> See UTAH STATE UNIV., 2017 PROGRESS REPORT: ASSESSMENT OF STORMWATER HARVESTING VIA MANAGED AQUIFER RECHARGE TO DEVELOP NEW WATER SUPPLIES IN THE ARID WEST: THE SALT LAKE VALLEY EXAMPLE (2017).

particularly public transportation, as a significant element in its response to climate change.<sup>294</sup>

#### *d. Parks and Recreation*

While these facilities are important to the life and economy of the city,<sup>295</sup> there is little separate discussion of these facilities by city agencies.<sup>296</sup> Salt Lake County also provides these facilities for the cities within the county's boundaries.<sup>297</sup>

#### *e. Solid Waste and Recycling*

Salt Lake City understands, and has planned for, the reduction of solid waste and encouragement of recycling as part of its overall response to climate change. As part of its Climate Positive 2040 Plan, the city projects to have “zero waste” by that year and has enacted a number of binding regulations to achieve that goal.<sup>298</sup> The city's Department of Sustainability has elaborated on these efforts<sup>299</sup> and has

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<sup>294</sup> SLCGREEN, *supra* note 281, at 23.

<sup>295</sup> See, e.g., Eddie Pells & John Leicester, *Climate Change Hits Winter Olympic Preparation, Forcing Utah-Trained Athletes to Head to Other Continents*, SALT LAKE TRIB. (Dec. 18, 2017), <https://perma.cc/27N8-TFEL>; Mike Gorrell, *Report: Global Warming Hits Utah's Ski Industry Hard*, SALT LAKE TRIB. (Dec. 17, 2012), <https://perma.cc/XF6M-C84F>; Hilary Smith, *Research Spotlight: Matthew Brownlee, Parks, Recreation, and Tourism*, SUSTAINABLE UTAH (Jan. 19, 2015), <https://perma.cc/LZ6D-JVDL> (interviewing Professor Brownlee, University of Utah, regarding research on climate change and park and recreational facilities).

<sup>296</sup> For information on the city's parks and recreational facilities, including its significant urban forestry program, see *Salt Lake City Parks and Public Lands*, SALT LAKE CITY, <https://perma.cc/9J98-A8FU> (last visited Nov. 9, 2019). As city facilities and services, they are subject to the same internal sustainability requirements, along with climate and energy goals, as other city facilities and services. Telephone Interview with Tyler Poulson, Salt Lake City Department of Sustainability (June 6, 2018).

<sup>297</sup> SALT LAKE CTY., SALT LAKE COUNTY 2015 PARKS & RECREATION FACILITIES MASTER PLAN (Sept. 1, 2015).

<sup>298</sup> CLIMATE POSITIVE 2040, *supra* note 275, at 10. In the interim, the city has a goal of diverting, recycling or composting 70% of the waste stream by 2025. (In 2015–2016, the city's Waste and Recycling Program diverted 40% of residential waste.) In addition, the city has adopted ordinances to deal with recycling for construction, multifamily, business, and special event waste. *Id.* Solid Waste reduction and recycling plays a significant role in the city's efforts to reduce greenhouse gasses. See Randy Rodgers, *Salt Lake City Commits to Zero-Carbon Power Plan*, 27 SUSTAINABLE CITY 6, 10 (2018).

<sup>299</sup> See *Salt Lake City Sustainability, Waste & Recycling*, SLC.GOV, <https://perma.cc/S3DF-DGX7> (last visited Nov. 9, 2019). The program deals with source separation of waste from recycling and has programs for compost, glass, other recyclables, food waste, and hard-to-recycle items. See also SALT LAKE CITY SUSTAINABILITY DIV., SALT LAKE CITY GREEN: 2015 STATE OF SUSTAINABILITY 9–10 (2015). Under “achievements” that year, the city noted its past and future efforts at waste reduction:

In 2011, the City Council passed a resolution to minimize the amount of waste sent to the landfill and maximize the amount of material recycled into the best and

set solid waste fees in a way to encourage waste reduction and recycling.<sup>300</sup>

#### 4. Energy

Much of the reason for Salt Lake City's extraordinary efforts regarding climate change comes from its need to assure cleaner air.<sup>301</sup> Under its *Climate Positive 2040 Plan*, the city works with other jurisdictions in its airshed to promote best practices in providing information for energy efficient buildings and reduction of transportation and industrial emissions.<sup>302</sup> The city has set a goal of 50% of its municipal electricity coming from renewable sources by 2020 and 100% of that energy for the community from renewable sources by 2032.<sup>303</sup> But perhaps the most significant step the city has taken was to enter into an agreement with its major local energy provider, Rocky

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highest use. Goals were set to achieve 50% diversion by 2015, 70% diversion by 2025, and total diversion by 2040. The Zero-Waste Plan encompasses the City's past and future efforts to reduce and divert waste:

- Special events recycling in 2008
- Mandatory curbside compost collection in 2010
- Construction and demolition debris recycling in 2014
- Can downsizing campaign in 2015

Mattress recycling will be added in 2016, and currently there is an ordinance under consideration by the City Council which would require recycling services for businesses and multi-family complexes. The Sanitation Program would oversee the implementation and be responsible for enforcement. The Zero-Waste plan is in the process of being updated to address food and organics diversion.

*Id.*

<sup>300</sup> Generally, the smaller the residential waste can, the cheaper the price for collection. See Salt Lake City Sustainability, *Curbside Services*, SALT LAKE CITY, <https://perma.cc/WW8N-X8HK> (last visited Nov. 9, 2019).

<sup>301</sup> Salt Lake City has had the worst air quality index in the country on some days. Cimaron Neugebauer, *Salt Lake City has the Worst Air Quality in the Nation*, KUTV (Jan. 31, 2017), <https://perma.cc/9EUE-X8PS>. In particular, Salt Lake County is a "non-attainment" area for PM<sub>2.5</sub>, PM<sub>10</sub>, and Sulfur Dioxide under the federal Clean Air Act and the Wasatch Valley configuration tends to trap emissions. See UTAH DEP'T OF ENVTL. QUALITY, UTAH DIVISION OF AIR QUALITY 2017 ANNUAL REPORT (2017). The Utah Department of Environmental Quality keeps an index of air quality in Salt Lake County, which is updated hourly. *Salt Lake County—Current Conditions*, UTAH DEP'T OF ENVTL. QUALITY, <https://perma.cc/XP4C-44ZH> (last visited Nov. 9, 2019).

<sup>302</sup> CLIMATE POSITIVE 2040, *supra* note 275, at 8. The transportation aspects of these efforts are discussed above. That Plan also contains a pie-chart showing the contribution of various emission sources in 2009 and 2015 in metric tons of CO<sub>2</sub>E, as well as the gross amounts of those discharges to show the depth of the problem. *Id.* at 3.

<sup>303</sup> *Id.* Indeed, the city "walks the talk" by putting its own operations under the same scrutiny and expectation of energy reduction. *Id.*; see also SALT LAKE CITY CORP., 2016 MUNICIPAL BENCHMARKING & GREENHOUSE GAS EMISSIONS REPORT 6 (2017).

Mountain Power, in the Clean Energy Implementation Plan<sup>304</sup> that sets out detailed steps, implementation measures, and metrics. Cooperation with the private sector is a preferred means in Utah to achieve public objections and this agreement is an excellent example.

### F. Seattle

Like Salt Lake City and Portland, Seattle is an attractive, growing city and also has a reputation for being both politically progressive,<sup>305</sup> environmentally oriented, social justice conscious,<sup>306</sup> and recently riven by controversy over dealing with its tech industries.<sup>307</sup> Amazon, Starbucks, Microsoft, and Alaska Airlines all have a major presence in the city. The mix of corporate responsibility to shareholders and to the community in which these companies are based, combined with Seattle's left-leaning politics and commitment to environmentalism, all play a role in that city's response to climate change. Let us consider how Seattle stacks up against our other communities.

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<sup>304</sup> SALT LAKE CITY CORP., CLEAN ENERGY IMPLEMENTATION PLAN 2 (2017). The plan has four focus areas: energy efficiency and conservation, use of renewable energy sources, promotion of electric vehicles and a "progressive grid" to regulate energy use and reduce pollution. *Id.*; see also Emma Pernod, *The Utah Way to Achieving 100 Percent Clean Energy*, SIERRA (July 1, 2019), <https://perma.cc/ZRC9-AFKK>.

<sup>305</sup> The dominance of Seattle and its left-leaning influence on Washington is traced in Audrey Carlsen, *Red State, Blue State: Watch 40 Years of Political Change in Washington*, SEATTLE TIMES (Sept. 1, 2016), <https://perma.cc/DX9N-WJEP>. See also James N. Gregory, *Seattle's Left Coast Formula*, DISSENT (2015), <https://perma.cc/2UM7-HB75> (tracing the relationship between technical entrepreneurs and political activists in Seattle). However, both the city and state have a more mixed political history. See, e.g., Caroline Chamberlain Gomez, *Has Seattle Always been so Progressive?*, KUOW (Jan. 24, 2017), <https://perma.cc/NQ4W-JP2K>; see also Jon Talton, *Seattle and the Progressive Paradox*, SEATTLE TIMES (Nov. 4, 2015), <https://perma.cc/8B6M-ZVBF>.

<sup>306</sup> Trendy environmentalism in Seattle has a strong component of social justice as well. See, e.g., Ellis E. Conklin, *Environmentalism for All in Seattle?* NEW AM. WKLY. (Apr. 28, 2016), <https://perma.cc/36MS-CQR9>; see also Sydney Brownstone, *How Black Lives Matter Is Changing Environmentalism, According to Seattle's New Environmental Justice Manager*, THE STRANGER (Apr. 29, 2015), <https://perma.cc/XJ2B-GQ2R>.

<sup>307</sup> Washington State does not have an income tax, so it is dependent on property taxes (for local government finance) and a sales tax (for both state and local finance). In dealing with poverty and homelessness recently, a proposal to levy a "head tax" on larger employers, measured by the number of workers they employed, was a controversial issue. Steven Hseih, *Task Force Recommends Council Adopt \$75 Million "Head Tax" to Fund Homelessness Services*, THE STRANGER (Mar. 2, 2018), <https://perma.cc/X3CR-UB2C>; see also Taylor Soper, *Seattle's Socialist Councilmember Wants to Tax Amazon and Other Big Companies to Fund Housing: Is that a Good Idea?*, GEEKWIRE (Mar. 28, 2018), <https://perma.cc/84RK-8K87>; Chuck DeVore, *Seattle's Unloosed Monsters Will Kill The Progressive Dream*, FORBES (May 16, 2018), <https://perma.cc/ZME9-D2VD>. In June 2018, the city repealed the tax. Elizabeth Weise, *In a Fast About-Face, Seattle Caves to Amazon, Overturns Landmark Corporate Head Tax*, USA TODAY (June 12, 2018), <https://perma.cc/LG24-54VH>.

### 1. Transportation

As with Salt Lake City, Seattle's Mayor's Office has embraced a leadership position in dealing with climate change, especially through a strategy called Seattle Climate Action,<sup>308</sup> which includes changes to transportation facilities and plans as part of its response.<sup>309</sup> Immediate objectives include actions to promote the use of electric vehicles and associated facilities, such as charging stations,<sup>310</sup> and a more controversial proposal to enact pricing mechanisms to encourage use of mass transit and discourage single occupancy vehicles.<sup>311</sup>

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<sup>308</sup> CITY OF SEATTLE, SEATTLE CLIMATE ACTION 4 (2018). A significant driver in this strategy is the reduction of greenhouse gasses. *Id.* at 5–6. The city has also prepared an inventory of impacts on the city's land use patterns and transportation networks as a result of sea level rise and flooding. SEATTLE OFFICE OF SUSTAINABILITY & ENV'T, CLIMATE PREPAREDNESS MAPPING INVENTORY (Aug. 24, 2015). As with Portland and Multnomah County, the Seattle effort has been aided by the principal county in the region, King County and the Washington State Department of Transportation through its Sustainable Transportation initiative. *Sustainable Transportation*, WASH. STATE DEPT OF TRANSP., <https://perma.cc/BR99-PTJC> (last visited Nov. 9, 2019); *see also* CTR. FOR SCI. IN THE EARTH SYS. (THE CLIMATE IMPACTS GROUP), ET AL., PREPARING FOR CLIMATE CHANGE: A GUIDEBOOK FOR LOCAL, REGIONAL AND STATE GOVERNMENTS 9 (2015).

<sup>309</sup> The strategy sets out familiar long-term goals of:

- Expanding transit, bicycling, and pedestrian infrastructure and services,
- Expanding charging infrastructure to foster increased adoption of electric vehicles,
- Guiding growth to walkable and transit-accessible neighborhoods, and
- Providing price signals that reflect the true cost of driving and incentivize shared and electric transportation choices.

CITY OF SEATTLE, *supra* note 308, at 8. There is little doubt that increased public transportation use would have a salutary effect on climate change. *See* SEATTLE OFFICE OF SUSTAINABILITY & ENV'T, *supra* note 308, at 41; Janna Starcic, *Can Public Transportation Save the World from Climate Change?*, METRO (Nov. 9, 2017), <https://perma.cc/X3S5-9ARE>.

<sup>310</sup> CITY OF SEATTLE, *supra* note 308, at 14–15, 20. Nevertheless, there are skeptics who suggest the city's transportation response to climate change is more hype than real. *See* Mike Eliason, *Is Seattle's Climate Action Plan A Plan Of Inaction?*, THE URBANIST (Apr. 6, 2018), <https://perma.cc/5SZU-2DL8>; John Ryan, *Sorry, Seattle, Your Climate Change 'Leadership' Hasn't Made Much Of A Dent*, KUOW (July 17, 2017), <https://perma.cc/TZV3-GW3T>.

<sup>311</sup> CITY OF SEATTLE, *supra* note 308, at 14–15, 20. Besides expected reaction from suburban and better-off communities, the city must deal with effects on lower-income communities, an effect it has recognized: "A successful and just program would support better transportation and mobility access in low-income neighborhoods, as well as pedestrian, bicycle, and transit facilities and services, in addition to transportation demand management programs." *Id.* at 14. The strategy estimates that pricing can reduce transportation emissions by 8–12% and total emissions by 5.5–8%, but adds that these figures depend on "price and other factors." Camille von Keanel, *To Meet Emissions Goals, Seattle Wants to Charge Drivers*, SCI. AM. (Apr. 6, 2018), <https://perma.cc/R7MK-VPWD>. The city's efforts to this issue will be a major driver in the social equity of its climate change response. *See* SEATTLE OFFICE OF SUSTAINABILITY & ENVTL., DRIVE CLEAN

## 2. Land Use

Seattle has evaluated the impacts of climate change on its various component communities, with particular consideration of those that are vulnerable.<sup>312</sup> But further climate change response actions indicate a lesser degree of commitment.<sup>313</sup> While there are broad references to higher densities and more compact urban areas,<sup>314</sup> these references are offset by multiple and specific references to maintaining and promoting single-family neighborhoods in the Seattle Comprehensive Plan.<sup>315</sup>

## 3. Infrastructure

Seattle has considered, and often acted upon, climate change issues that impact its services and facilities.

### a. Water

The city's Utilities Department suggests four immediate impacts of climate change: sea-level rise, extreme precipitation, heat, and hydrological impacts from faster snow runoff.<sup>316</sup> The Department responds through adaptation measures (for example, by monitoring and

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SEATTLE REPORT (Sept. 4, 2019), <https://perma.cc/3VRZ-XVNB>, which acknowledges impacts on racial and minority groups as an issue in the promotion of electric vehicles.

<sup>312</sup> See SEATTLE OFFICE OF SUSTAINABILITY & ENV'T, *supra* note 308.

<sup>313</sup> For example, the 2012 Green Ribbon Commission Recommendations had very little to say about land use, except when transportation was involved. SEATTLE OFFICE OF SUSTAINABILITY & ENV'T, GREEN RIBBON COMMISSION RECOMMENDATIONS 30 (2012); see also SEATTLE OFFICE OF SUSTAINABILITY & ENV'T, SEATTLE CLIMATE ACTION PLAN IMPLEMENTATION STRATEGY (2013); SEATTLE OFFICE OF SUSTAINABILITY & ENV'T, PREPARING FOR CLIMATE CHANGE (2017) [hereinafter PREPARING FOR CLIMATE CHANGE]. Advocating better transit options, with a few references to mixed-use communities, avoids the difficult issues around resistance to compact cities, and increased densities that usually attend climate change responses in the land-use field. However, the city has also encouraged major growth in its downtown. Amazon in particular is seen as one source of both congestion and housing issues the city faces. See Ken Kalthoff, *Amazon's Growth Leads to Congestion, Higher Cost of Living in Seattle*, NBC 5 DALLAS-FORT WORTH (Sept. 27, 2017), <https://perma.cc/53G8-5ZWK>; Madeline Stone, *Amazon is Taking over Seattle—and Residents are Calling it 'Amageddon'*, BUS. INSIDER (Apr. 11, 2017), <https://perma.cc/8PK4-MUXZ>; Hayley Peterson, *Seattle's 'Amageddon' Crisis Should Terrify the City Amazon Chooses for HQ2*, BUS. INSIDER (January 18, 2018), <https://perma.cc/699X-4NV7>.

<sup>314</sup> SEATTLE OFFICE OF SUSTAINABILITY & ENV'T, *supra* note 313; SEATTLE PLANNING COMM'N, SEATTLE TRANSIT COMMUNITIES: INTEGRATING NEIGHBORHOODS WITH TRANSIT 17, 19 (2010).

<sup>315</sup> Seattle's comprehensive plan does speak to "compact complete cities" in transit communities in Land Use Goal 63 and 279. CITY OF SEATTLE, SEATTLE'S COMPREHENSIVE PLAN: LAND USE ELEMENT 2.38, 2.40 (2005). However, Land Use Goals G8 and G9, and Policies 57, 58, 66, 80 and 94 favor the continuation of existing land use practices. See, e.g., *id.* at 2.13–2.16, 2.18.

<sup>316</sup> *Projected Climate Changes*, SEATTLE PUB. UTIL., <https://perma.cc/2DBE-LKGA> (last visited Nov. 9, 2019).

assessing environmental change and more active responses, including changes to structures and operations, incentives for reducing water consumption and the like)<sup>317</sup> and mitigation (by adhering to standards for calculating, verifying, and reporting greenhouse gas emissions).<sup>318</sup>

#### *b. Stormwater*

Seattle government is well aware of the impacts of higher precipitation and sea level rise on its drainage facilities<sup>319</sup> and proposes to meet the problem by changing codes, retrofitting facilities, and promoting onsite water storage.<sup>320</sup> For the most part, the analysis is oriented toward competent engineering solutions, with a peripheral relationship to land use policy.

#### *c. Sewers*

In addition to using the same analysis as for water,<sup>321</sup> the city is aware of the vulnerability of its wastewater system to climate change.<sup>322</sup> And, as with water, the city has embraced the adaptation and mitigation strategies proposed by its utilities department.<sup>323</sup>

#### *d. Rail*

Seattle is committed to expansion of its light-rail system<sup>324</sup> and to reduction of greenhouse gas emissions from rail-based sources.<sup>325</sup>

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<sup>317</sup> *Id.*

<sup>318</sup> *Id.*

<sup>319</sup> PREPARING FOR CLIMATE CHANGE, *supra* note 313, at 11, 26, 30, 32, 36, 38. The city also has programs to deal with combined sewage and stormwater overflows (CSO), a problem exacerbated by climate change. *Sewage Overflow Prevention*, SEATTLE PUB. UTIL., <https://perma.cc/HW9D-3AVS> (last visited Nov 9, 2019).

<sup>320</sup> SEATTLE PUB. UTIL., *supra* note 319. The city estimates that it must manage over 700-million gallons of storm water each year through its Green Stormwater Infrastructure Program. *GSI Methods*, 700 MILLION GALLONS, <https://perma.cc/4DAX-75R3> (last visited Nov. 9, 2019).

<sup>321</sup> See Gary Schimek, *Seattle's Drainage & Wastewater Climate Change Adaptation Strategy*, SEATTLE PUB. UTIL. (2010), <https://perma.cc/J6MZ-UZHJ>.

<sup>322</sup> An analysis undertaken by King County documents these vulnerabilities for all cities in the county. WASTEWATER TREATMENT DIV., KING CTY. DEP'T OF NAT. RES. & PARKS, *Vulnerability of Major Wastewater Facilities to Flooding from Sea-Level Rise* (2008), <https://perma.cc/QP5M-SMYB>.

<sup>323</sup> King County handles Seattle's wastewater and has made provisions for overflows in its emergency management strategies. KING CTY., KING COUNTY STRATEGIC CLIMATE ACTION PLAN: PREPARING FOR CLIMATE CHANGE 104–05 (2015).

<sup>324</sup> Greg Hanscomb, *In the Battle Against Climate Change, Seattle is on the Front Lines*, GRIST (June 2, 2015), <https://perma.cc/WM8N-NZRH>; David Roberts, *Talking Climate Policy, Transit, and High-Speed Rail with Washington Gov. Jay Inslee*, VOX (Apr. 25, 2017), <https://perma.cc/AP5M-GAXR>.

*e. Port Facilities*

From nearly the beginning, the Port of Seattle has committed itself to support the city's response to climate change<sup>326</sup> and has continued that effort in all of its facilities.<sup>327</sup>

*f. Electricity*

Climate change impacts, such as higher summer temperatures, less snowpack, and greater energy use have profound impacts on the city's electrical utility, Seattle City Light,<sup>328</sup> and have influenced counter-strategies.<sup>329</sup> The utility has self-assessed its climate vulnerabilities<sup>330</sup> and has published plans to deal with climate change.<sup>331</sup> The plans are promising, but there are fewer results to show.

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<sup>325</sup> SEATTLE CLIMATE ACTION PLAN, 2014 SEATTLE COMMUNITY GREENHOUSE GAS EMISSIONS INVENTORY 3 (2016); Lindsay Peyton, *Port Passes Energy and Sustainability Motion, Renewing Commitment to Green Future*, WESTSIDE SEATTLE (November 6, 2017), <https://perma.cc/8T93-MPYQ>; *Port of Seattle Proclaims 'We Are Still In'*, PORT OF SEATTLE (June 27, 2017), <https://perma.cc/69L2-27PX>.

<sup>326</sup> CITY OF SEATTLE, CLIMATE ACTION PLAN 2006 14–15 (2006) (reduction of greenhouse gas emissions of diesel trucks, trains and ships); *id.* at 22 (public information); *id.* at 29 (monitoring).

<sup>327</sup> *Climate and Air Quality*, PORT OF SEATTLE, <https://perma.cc/UU68-HYG7> (last visited Nov. 9, 2019); *see also* Kit Case, *Port of Seattle Takes Action on Climate Change and Sustainability*, WASH. WORKERS' ADVISOR (Jan. 15, 2018), <https://perma.cc/6DT4-4KVR>.

<sup>328</sup> Dyer Oxley, *How Climate Change Threatens the Future of Seattle's Power Supply*, MYNW (Apr. 13, 2016), <https://perma.cc/Y55L-3KKC>.

<sup>329</sup> Kevin Schofield, *How Climate Change, Conservation and Renewable Energy are Changing Seattle City Light*, SEATTLE BUS. (Nov. 2017), <https://perma.cc/W9RR-EQRD>; *Seattle City Light Continues Preparing for Climate Change*, WASH. ENVTL. COUNCIL (May 31, 2017), <https://perma.cc/A3U9-2QGK>. The utility has now entered the electrical vehicle charging station field. Monica Nickelsburg, *Seattle City Light Installs First City-Owned Electric Vehicle Fast-Charging Stations*, GEEKWIRE (Jan. 30, 2018), <https://perma.cc/YJC2-FYM3>.

<sup>330</sup> CRYSTAL RAYMOND, SEATTLE CITY LIGHT, SEATTLE CITY LIGHT CLIMATE CHANGE VULNERABILITY ASSESSMENT AND ADAPTATION PLAN 1–2 (2015), <https://perma.cc/9Y3F-49H3>. This document is fairly specific in its identification of problem areas and proposed responses and deals with shoreline infrastructure, electricity demand, transmission and distribution, hydroelectric project operations and fish habitat restoration.

<sup>331</sup> Debra Smith, *Preparing for Climate Change*, SEATTLE CITY LIGHT, <https://perma.cc/H8ZA-SWEV> (last visited Nov. 9, 2019). These plans are somewhat non-specific and tend to point out the problem, rather than solutions:

Climate change is also likely to cause more intense rain storms in winter but drier, hotter summers. City Light is looking at how changes in extreme weather and related events such as landslides, wildfires, and floods could affect energy generation, transmission, and distribution facilities. The utility is identifying ways to prepare for these effects in order to maintain the long-term reliability of electricity as the climate changes.

*Id.*



*g. Parks and Recreation*

Through work by the University of Washington and others, Seattle has had the benefit of an excellent assessment of climate change and follow-on tasks regarding its park and recreational facilities in the State Parks system<sup>332</sup> and has made good use of that information in its park planning efforts.<sup>333</sup>

*h. Emergency Services*

The Office of Emergency Management for King County and the public health divisions of the city and county deal with public health issues in emergency situations.<sup>334</sup> The city recognizes the role of its own agencies in emergency management in its climate change blueprint, *Preparing for Climate Change*.<sup>335</sup>

*i. Solid Waste and Recycling*

As the largest city in the American Pacific Northwest, Seattle generates much waste.<sup>336</sup> The city has an ambitious plan to promote

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Given the precision of the vulnerabilities analysis, there appears to be additional follow through needed. Moreover, the use of non-renewable energy does raise questions as to the city's willingness to respond more fully to the challenges of climate change. *Greens Question 95 Percent of Seattle City Light's Carbon-Free Electricity*, WASH. POL'Y CTR. (Aug. 21, 2014), <https://perma.cc/EM3K-EZ4E>.

<sup>332</sup> CLIMATE IMPACTS GRP. ET AL., WASHINGTON STATE PARKS CLIMATE CHANGE VULNERABILITY ASSESSMENT 7 (2017). This report details impacts ranging from sea rise and other flooding, premature loss of snowpack, drought, wildfires and ecosystem changes. See also Michael Yadrick, *The Climate Deal*, GREEN SEATTLE PARTNERSHIP (June 14, 2017), <https://perma.cc/56DM-YEUS>.

<sup>333</sup> CITY OF SEATTLE, 2017 PARKS AND OPEN SPACE PLAN 1 (July 10, 2017); see also PREPARING FOR CLIMATE CHANGE, *supra* note 313, at 24–25 (detailing the necessary actions).

<sup>334</sup> KING CTY., *supra* note 323, at 124. The county's Environment Department has played a major role in the region's response to climate change. *Climate Change Impacts in King County*, KING CTY. ENV'T (May 16, 2019) <https://perma.cc/LFM8-2298>. In any catastrophic event, the Washington State Department of Health would also participate in that response. *Climate and Health*, WASH. STATE DEP'T OF HEALTH, <https://perma.cc/MQ56-RDK7> (last visited Nov. 9, 2019); *Extreme Heat Events*, WASH. STATE DEP'T OF HEALTH, <https://perma.cc/X67S-ELNX> (last visited Nov. 9, 2019).

<sup>335</sup> PREPARING FOR CLIMATE CHANGE, *supra* note 313, at 65 ("Specifically, the Seattle Hazard Identification and Vulnerability Analysis (SHIVA) identifies 18 major hazards that can produce disaster, including those directly related to climate change: extreme heat events, flooding, winter storms, wind storms and landslides. The Office's focus coordinating the community's effort to reduce impacts of the most complex and extreme presentations of climate change related hazards."); see also CITY OF SEATTLE, SHIVA – THE SEATTLE HAZARD IDENTIFICATION & VULNERABILITY ANALYSIS (2014), <https://perma.cc/V33Q-B5ZP>.

<sup>336</sup> Sara Bernard, *Why Seattle Still has a Huge Garbage Problem*, GRIST (June 15, 2015), <https://perma.cc/NU4K-4TSK> (noting that reducing waste going to landfills, and

recycling, including making recycling more convenient, launching education and outreach campaigns, providing financial incentives (the larger the garbage can, the higher the curbside fee), and discouraging or banning recyclables in garbage.<sup>337</sup> The city monitors its solid waste and recycling activities<sup>338</sup> with a view towards increasing recycling and reducing landfill disposal.<sup>339</sup>

#### 4. Energy

Seattle approaches the climate change aspects of energy as both a regulator and market participant. Seattle City Light is owned by the city and is a major participant in the city's energy market, with great hopes for the environmental community.<sup>340</sup> As a regulator, the city emphasizes traditional and sensible strategies, such as energy efficiency codes, benchmarking, "tune ups" to increase efficiency, vehicle fuel efficiency, reduced emissions, and city fleet energy.<sup>341</sup> All in all, the Seattle energy effort is not overly ambitious.

### V. THE NEED TO RETHINK ASSUMPTIONS

Western city planning and regulation is premised on the fundamental assumption that people can live where they want and how they want. For example, there is still a general consensus that we can allow people to settle in at-risk areas if adequate regulations are in

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therefore reducing methane gasses, which impact the air 25-times greater than carbon dioxide, by promoting recycling to 70% by 2022, and adjusting solid waste collection and pricing practices would reduce the 300,000 tons of solid waste going to landfills).

<sup>337</sup> Details of the City's goals, strategies and actions in the solid waste field may be found under *Solid Waste Management Plans*, SEATTLE PUB. UTILS., <https://perma.cc/6QGM-4ALU> (last visited Nov. 9, 2019).

<sup>338</sup> *Solid Waste Reports*, SEATTLE PUB. UTILS., <https://perma.cc/RF8V-8WPD> (last visited Nov. 9, 2019) (including figures on delivered solid waste, recycling, organics, and construction, demolition and land clearing debris, as well as recycling market reports). The Chinese Government has recently refused to take recycling from American markets if it is not sufficiently clean, thereby reducing the ability of public and private agencies to offset disposal costs. Adam Redling, *Chinese Government Finalizes Waste Import Restrictions*, RECYCLING TODAY (Jan. 11, 2018) <https://perma.cc/5BJV-LSC3>.

<sup>339</sup> SEATTLE PUB. UTILS., SOLID WASTE MANAGEMENT PLAN, <https://perma.cc/57DP-959B> (last visited Nov. 9, 2019).

<sup>340</sup> Schofield, *supra* note 329 (discussing the economics of a publicly owned power utility, dealing with energy pricing, conservation, power sources and policy choices and concluding that energy conservation is cheaper than power purchases). The city is also opposed to the use of nuclear energy, which gained it the ire of *Forbes Magazine*, which supports that mode of energy supply for 5% of the city's energy needs. The role played by renewable energy will continue to be a contentious issue. James Conca, *Seattle's Faux-Green City Council Rejects Both Nuclear Energy And Obama's Clean Power Plan*, FORBES (June 3, 2016), <https://perma.cc/K35L-2LXG>.

<sup>341</sup> CITY OF SEATTLE, SEATTLE CLIMATE ACTION, *supra* note 308, at 20–21; see *Climate Change*, SEATTLE OFF. OF SUSTAINABILITY & ENV'T, <https://perma.cc/89XV-VLDA> (last visited Nov. 9, 2019); see also *Building Energy*, SEATTLE OFF. OF SUSTAINABILITY & ENV'T, <https://perma.cc/22NU-TPRU> (last visited Nov. 9, 2019).

place. One expert on the regulation of building in the Wildland-Urban Interface concludes that given western growth rates, “[i]n many localities there will simply be no choice but to grow in areas prone to wildfire risk,” but there are relatively easy solutions that can “significantly reduce” the risk.<sup>342</sup>

Western urban areas have comprehensively controlled the use of land for almost a century.<sup>343</sup> However, with one major caveat, zoning regulations have not overly intruded on the choice of where and how to live. The caveat is the de facto segregation of racial minorities in places such as Phoenix,<sup>344</sup> San Francisco,<sup>345</sup> and Seattle<sup>346</sup> is an issue that CD adaptation must address.<sup>347</sup> The freedom to make living choices has been fueled by technology,<sup>348</sup> social science, and cheap gasoline.<sup>349</sup> Post-Civil War public transit, and later the automobile separated people from their place of work. Post-World War II air conditioning made the hot and arid West what it is today.

More generally, engineers convinced us that we could live in water-short areas, flood plains, and near natural areas. Social scientists posited that the single-family neighborhood was the natural climax of the evolution of the city, but inconsistently argued that neighborhoods needed to be protected from alien land uses.<sup>350</sup> Cheap gasoline helped

<sup>342</sup> Stephen R. Miller, *Planning for Wildfire in the Wildland-Urban Interface: A Guide for Western Communities*, 49 URB. L. 207, 265 (2017).

<sup>343</sup> Andrew H. Whittmore, *Zoning in Los Angeles: A Brief History of Four Regimes*, 27 PLAN. PERSP. 393, 394 (2012) (explaining how Los Angeles adopted zoning ordinances in 1921); Marc A. Weiss, *The Real Estate Industry and the Politics of Zoning in San Francisco*, 3 PLAN. PERSP. 311, 316 (1988) (stating that San Francisco adopted zoning ordinances in 1921); Anne Frantilla, *Researching Historic Land Use and Zoning*, SEATTLE MUN. ARCHIVES, <https://perma.cc/P9QP-WLW5> (last visited Nov. 9, 2019) (showing how Seattle followed in 1923, and Portland adopted its first zoning ordinance a year later); Lloyd T. Keefe, *History of Zoning in Portland 1918–1959* (1975), <https://perma.cc/WZE6-JYUZ>.

<sup>344</sup> Bob Bolin et al., *The Geography of Despair: Environmental Racism and the Making of South Phoenix, Arizona, USA*, 12 HUMAN ECOLOGY REV. 156, 160 (2005).

<sup>345</sup> Kimberly Veklerov, *The Bay Area of 1970 was Less Racially Segregated than it was in 2010*, S.F. CHRON. (May 28, 2019), <https://perma.cc/D2UU-LS5E>.

<sup>346</sup> Mike Eliason, *A Brief History of Seattle’s Anti-Urban Zoning*, MEDIUM (Mar. 1, 2018) <https://perma.cc/UKG2-J5QE>.

<sup>347</sup> Indeed, de facto racial segregation is an enduring product of local prejudice, federal housing policies, and realtor connivance in building “nice neighborhoods” that excluded the poor in general and persons of color in particular. As a result, Americans must deal simultaneously with climate change and social justice as well. See RICHARD ROTHSTEIN, *THE COLOR OF LAW: A FORGOTTEN HISTORY OF HOW OUR GOVERNMENT SEGREGATED AMERICA* 40–41, 45, 54–56, 63–65 (2017).

<sup>348</sup> Air conditioning made it possible to live comfortably in the South and Southwest. Rebecca J. Rosen, *Keepin’ It Cool: How the Air Conditioner Made Modern America*, THE ATLANTIC (July 14, 2011), <https://perma.cc/X64W-N7MQ>.

<sup>349</sup> The story has been told many times. See Martin V. Melosi, *The Automobile and the Environment in American History*, AUTOMOBILE IN AM. LIFE AND SOC’Y, <https://perma.cc/WQM3-W434> (last visited Nov. 9, 2019).

<sup>350</sup> Sociologists at The Chicago School of Professional Psychology developed the theory that the single-family neighborhood was an ecological climax. Kent Schwirian, *Models of*

extend commute ranges, although at the expense of air pollution and greenhouse gas emissions. Today, CD is forcing us to rethink the basic assumption and at least three secondary assumptions within it.

The first secondary assumption that needs to be challenged is that we should continue to encourage the geographical separation of work and residence.<sup>351</sup> Denser, more compact cities can support both CD mitigation and adaptation because they will use less energy and water. The big question is how much market and value choices, versus more aggressive density, tight urban boundaries, and the better coordination of public transit and commuting patterns, will help make cities more CD resilient and adaptable. Some urbanists pin their hopes on the millennial generation and their parents. There is some evidence that millennials drive less, are less enamored of the car, and may drive less and take public transit or shared rides to work.<sup>352</sup> Older Americans are also moving back to urban areas.<sup>353</sup> But the evidence is mixed; there are also signs that as millennials reach maturity, they are following their parents to the suburbs, especially in the Pacific Coast cities.<sup>354</sup>

A second assumption is that individuals are free to decide how much private space they want and how it should be used. A corollary is that private open space is nice but not essential, despite the thinking of nineteenth-century landscape architects and planners. CD mitigation and adaptation will require open space to be used for carbon sequestration, the reduction of heat islands, and biodiversity conservation. Arid cities such as Los Angeles have also started to incentivize a move from the yards that Midwestern settlers brought to the desert to more drought resistant landscapes.<sup>355</sup> The question is whether current efforts are enough.

The third secondary assumption that needs to be revisited is that we can outwit nature. We have allowed people to locate in areas that expose them to the loss of property and life such as flood plains and around forests, where CD will increase these risks. We are still operating on the assumption that we can build and regulate our way out of these increased risks and are blind to the risks of subsidizing construction in hazardous areas. In some coastal areas, freshwater flood plains, the rural–urban interface, retreat or prohibition of construction may be better solutions.

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*Neighborhood Change*, 9 ANN. REV. SOC., 83, 87–88 (1983). This theory found its way into the Supreme Court's landmark decision holding that zoning was constitutional. *Ambler Realty Co. v. Vill. of Euclid*, 227 U.S. 365, 394–97 (1926).

<sup>351</sup> STEVEN COHEN, *THE SUSTAINABLE CITY* 35 (2017) (asserting that “a fundamental need of the sustainable city is density of population and enterprise”).

<sup>352</sup> *Id.* at 52.

<sup>353</sup> *Id.*

<sup>354</sup> Caitlin Penna, *American Suburbs Swell Again as a New Generation Escapes the City*, WALL STREET J. (July 1, 2019), <https://perma.cc/L356-WMER>.

<sup>355</sup> Taylor Goldenstein, *A Guide to Rebates on Drought-Tolerant Landscaping*, L.A. TIMES (Apr. 16, 2015), <https://perma.cc/3D3U-99XX>.

## VI. CONCLUSION

For the most part, the response of the United States is reflected in the responses of the cities considered in this Article: ignoring or underplaying the problem, delaying consideration of the reckoning that is fast approaching and, at best, taking token steps to meet CD. The following constitutes our analysis of what must be done in each of our “marker” areas and calls out some of the halting first steps or best practices taken by these cities to deal with the problem of CD.

### *A. Transportation*

Efforts to create more sustainable cities face a wicked problem: continued reliance on the automobile as the primary mode of transportation makes it virtually impossible to mitigate and adapt effectively to CD. Cities that try to promote more use of public transportation and strategies such as more use of bicycles and ride sharing face three problems: 1) public transit ridership is falling not rising,<sup>356</sup> except for some light rail, 2) cities have followed land use policies that do not often do not promote closer work–residence patterns, and 3) cities face a large social equity problem; minorities are forced into long commutes with inconvenient public transit options.<sup>357</sup> As one of the principal drivers of CD through air emissions, public agencies must plan and regulate transportation. First, all forms of transportation must be subject to coordinated state, regional, and local transportation plans that emphasize *inter alia* mobility efficiency, reductions of emissions and VMT, connectivity, transit-oriented development, and the connection between land use and transportation. No city has solved these problems, but Portland, Oregon has some positive lessons for other cities.

Portland, Oregon is a leader here, if only because the planning structure in Oregon and the Portland Region provides an appropriate framework for the light-rail, streetcar, mass transit orientation, and reduction of automobile dependence. While San Francisco’s BART is more well known, that system must be expanded within the region to be effective. Indeed, the increasing role of Air Resources Boards in California may bring the connection between climate change and transportation to greater public awareness. Phoenix may be a late convert to mass transit, but that change is not reflected in its residential land use policies. All of the studied cities have emphasized pedestrian

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<sup>356</sup> WILLIAM J. MALLETT, CONG. RES. SERV., R45144, TRENDS IN PUBLIC TRANSPORTATION RIDERSHIP: IMPLICATIONS FOR FEDERAL POLICY 1 (2018).

<sup>357</sup> CONNIE M. RAZZA ET AL., IT’S ABOUT TIME: THE TRANSIT TIME PENALTY AND ITS RACIAL IMPLICATIONS 3 (2015) (citing Brian McKenzie & Melanie Rapino, *Supplemental Table C: Mean Travel Time to Work by Means of Transportation and Selected Characteristics, 2009*, in COMMUTING IN THE UNITED STATES: 2009 (2011)).

activity and increased car and bicycle sharing, though Los Angeles appears to appreciate that need the most.

### *B. Land Use*

As with transportation, land use planning requires state, regional, and local government participation. Without such planning, it is likely that more sprawl will occur and economic segregation will set aside islands of large-lot privilege and delay the inevitable realization that the days of the single-family lot eludes the grasp of increasingly large segments of the population. Land use planning must anticipate and foster climate resilience, carbon sequestration, and although it will be difficult, retreat from hazardous areas. Moreover, it is likely that non-land use, but related areas must be re-examined, such as property tax policies that preserve the interests of existing owners and strangle revenues to deal with a more just allocation of housing, public facilities and other goods. This effort will not be easy, as we have stressed in the case studies. Property owners will use all available tools in the zoning challenge such as takings suits, endless environmental review, and attempts to landmark anything old. In an ideal world, there would be federal and state guidelines that mandate elements of adaptation such as plan content, CD-adjusted projects for urban services and public health and property risks, the integration of public transportation planning and land use, and infrastructure resilience. But, there will be no federal guidance in the foreseeable future and no state that develops a comprehensive legislative adaptation program.

Oregon again sets the standard (although its efforts may pale in comparison to those in other parts of the world). Portland has enjoyed a nearly fifty-year-old state and regional planning system that allows CD to be addressed holistically, rather than through a piecemeal system involving balkanized municipalities. Prodded by the legislature, Portland has active plans to allow additional housing types in single-family zones.<sup>358</sup> Similar prodding is also occurring in California<sup>359</sup> in response to another American crisis—homelessness. Most of our cities have made the connection between land use and transportation and have adjusted planning and land use regulations accordingly. And Phoenix has emphasized xeriscaping as a means of adaptation;<sup>360</sup> however Phoenix may be virtually uninhabitable by that time. Climate change is significantly different from the typical problems faced by planning and land use regulation—flooding, congestion, and air quality for example all exist in a more or less confined space such as a region, a

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<sup>358</sup> H.B. 2001, 80th Legis. Assemb., Reg. Sess. (Or. 2019).

<sup>359</sup> Liam Dillon, *California Bill to Add Housing in Single-Family Home Neighborhoods Blocked by Lawmakers*, L.A. TIMES (May 16, 2019), <https://perma.cc/BQ4G-9LTE>.

<sup>360</sup> Jiachuan Yang & Zhi-Hua Wang, *Planning For a Sustainable Desert City: The Potential Water Buffering Capacity of Urban Green Infrastructure*, 167 LANDSCAPE & URB. PLAN. 339, 340 (2017).

riparian system, or an airshed. But climate change is a worldwide phenomenon and unless all nations, all states, and all cities man the oars, all will come to naught. The withdrawal of the United States from the Paris Climate Accords, the balkanization of climate change responses, and the avoidance of difficulty (such as the imposition of a carbon tax) all militate toward a depressing, and toxic, future.<sup>361</sup>

### C. Infrastructure

Efficiency in provision of public services and facilities is another aspect of CD response. For example, more efficient use of water, particularly in the more arid parts of the American West, may be significant and assisted by use of recycled water, enhancement of tree cover, and landscaping selections. Similarly, rolling out 5G cell service using existing facilities such as light poles and using less energy for those facilities is a future opportunity to meet climate change,<sup>362</sup> although that opportunity has not yet presented itself in any of the cities examined and could be the subject of state or federal preemption.

Portland, San Francisco, and Los Angeles all have sought to separate stormwater from sewage to allow for stormwater recycling.<sup>363</sup> Each of these cities has also undertaken extensive planning for water sources and distribution to promote efficiency. Portland has undertaken to limit fossil fuel terminals and distribution.<sup>364</sup> Salt Lake City and Seattle have ambitious solid waste plans and facilities, while Seattle also has extensive plans to prepare for natural disasters resulting from CD.

### D. Energy

For the most part, cities do not generate much energy, although that picture is changing. For CD purposes, cities may be more influential in the way they, and their citizens, consume energy. Put simply, the issue for cities is continued dependence on the automobile. In an effort to mitigate greenhouse gas emissions and provide secure supplies, cities and many western states are making the transition to

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<sup>361</sup> The recent failure of a carbon tax proposal in Washington illustrates the difficulties of the use of this incentive in meeting climate change. See Zack Colman & Eric Wolff, *Why Greens Are Turning Away from a Carbon Tax*, POLITICO (Dec. 9, 2018), <https://perma.cc/527T-BY3L>.

<sup>362</sup> See, e.g., Allan Holmes, *5G Cell Service Is Coming. Who Decides Where It Goes?*, N.Y. TIMES (Mar. 2, 2018), <https://perma.cc/4YP3-AVXD>.

<sup>363</sup> *Stormwater Strategies*, CITY OF PORTLAND, <https://perma.cc/H8U7-B5TY> (last visited Nov. 9, 2019); DEP'T OF PUB. HEALTH, CTY. OF L.A., *Requirements for the Installation and Pipeline Construction for Safe Reuse of Rainfall/Run-Off, Non-Potable Cistern Water and Urban Run-Off Water* 5 (rev. Sept. 21, 2009), <https://perma.cc/3GA4-JHGJ>; S.F., CAL. PUBL. WORKS CODE § 147.3 (adopted 2010).

<sup>364</sup> *About the Fossil Fuel Terminal Project*, CITY OF PORTLAND, <https://perma.cc/WKGG-QR74> (last visited Nov. 9, 2019).

renewable sources of electricity generation. However, no western city has been able to effectively reduce auto use. The California story tells all. The state met its first greenhouse gas emission target adopted in 2006 early, but transportation emissions rose 2% during that time!<sup>365</sup>

Oregon's energy planning affects the circumstances of Portland, and the efforts of the state and its Department of Energy to move away from coal and towards renewables is significant. San Francisco, Los Angeles, and Salt Lake City have similar plans and all have targets for renewable energy. Similarly, all of the cities have supported electric vehicles, ride sharing, and other alternative forms of transportation. Drone delivery and driverless cars are other potential, though not fully tested, possibilities.

The one constant for all of the six cities studied is that they are all aware of the problems posed by CD and, to a greater or lesser extent, have taken steps to meet that challenge. It remains to be seen as to whether those responses will be timely. Perhaps, the biggest incentive is that as the impacts of CD accelerate, the winners and losers from failure to adapt will be more clearly identified.

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<sup>365</sup> See Barboza & Large, *supra* note 110.