A COMPARATIVE ANALYSIS OF LOCAL CLIMATE ACTIONS PLANS IN CALIFORNIA

A Culminating Project Presented to the Department of Public Policy and Administration at California State University, Sacramento in Fulfillment of the Requirements for the Degree of

MASTER OF PUBLIC POLICY AND ADMINISTRATION

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Executive Summary

The first section begins with introducing and outlining the history of the global efforts to combat climate change and global warming. The scope of discussion is then narrowed, first to briefly touch on the United States efforts to address climate change, then to discuss California's efforts to fight against climate change and global warming in the past 20 years. Following the introduction of larger efforts to curb climate change, the policy tool of local efforts to address the issue is introduced, called Climate Action Plans. A Climate Action Plan or CAP is then briefly defined. The section concludes with a short outline of the rest of the report.

The second section outlines the past and current research regarding Climate Action Plans. First, this section sketches the details of a Climate Action Plan. Then, the literature on the purpose and need for local climate action and policies is summarized. The next two areas of research on climate action plans are focused on why and how local governments adopt these plans. The final area of relevant research is a brief summary of areas for future research and emerging trends in this policy area.

The third section outlines the approach to choose 20 different Climate Action Plans from California cities and counties. Then, this section explains how these selected plans were analyzed, the methodology behind the scales to compare the different plans, and the challenges faced in this research.

The fourth section includes analysis of the 20 selected Climate Action Plans that were randomly selected. This analysis collects common themes**,** finds uncommon or novel ideas, and points out gaps in some plans. The common themes that are present in these plans are then compared to the summarized existing literature. Novel ideas that are present in multiple plans and have evidence of success are then suggested for future further implementation and research.

This section concludes with broad policy implications and how lessons learned from the adoption and implementation of these plans can contribute to the broader efforts to combat climate change and global warming.

The final section begins with a summary of key findings regarding California local Climate Action Plans. Those findings are compared to the existing literature, contributing to the already published and reviewed knowledge base on this policy subject. Next, this section summarizes the key policy implications for local government leaders and policymakers as they undertake drafting or updating their own plans. Finally, this section concludes with final remarks with wider connections to national and international efforts on climate change.

Section 1: Introduction

Beginning in the second half of the 20th century, policymakers, scientists, and many others have been concerned with the Earth's warming climate and how that might impact life and society on the planet. In 1972, the first United Nations summit on global warming took place. Called the United Nations Conference on the Human Environment, this meeting of global leaders marked the first time that environmental issues took center stage at the U.N. Following that meeting, dozens of international summits and conferences have taken place and ended with various protocols and agreements to address global warming and climate change impacts (United Nations, European Commission, December 2023).

The fifty years following the 1972 summit have seen many major developments in global climate change policy. The United Nations quickly chartered the International Panel on Climate Change which has evolved over the years, includes nearly 200 countries, and creates reports that monitor global temperature rise and ways to mitigate adverse effects. Some of the major protocols that have been developed include the Montreal and Kyoto Protocols, and the Paris Climate Agreement. Among many other items, these reports and guidelines have inventoried greenhouse gas (GHG) emissions by signatory countries, and outlined reductions needed in GHG emissions to slow global warming. The fundamental principle that many of the reports follow and encourage member countries to strive for, is to work towards limiting global temperature increases to 1.5 degrees Celsius per year compared to pre-industrial levels (United Nations Climate Change Conference, 2015).

Zooming in, the United States has at different times aligned its own climate policies with that of the UN. Being the second largest emitter of carbon dioxide into the atmosphere, many argue that action on the part of the United States is necessary and essential to curb climate

change and reduce the severity of its worst impacts. However, forward thinking, and sensible climate policy is largely dependent on the political situation in the federal government. Broad and active engagement in climate change policy has been halting in the U.S, especially during times of Republican control. Recently, the Republican stance on climate change has ranged from outright denial of the global warming, to promoting burning "clean coal" and natural gas as viable solutions to curb global warming. Some positive movement on climate change has occurred recently with the investments and commitments made in the Inflation Reduction Act in 2022, but implementation and adoption of sweeping federal policy is further halted by voluntary, elective federal programs and the federalist system that allows states to run their own programs and create their own policies.

In 2006, California passed AB 32, the Global Warming Solutions Act. This legislation was the first long term GHG reduction effort in the country. The law dictated that the state Air Resources Board adopt a plan to reduce GHG emissions from the state to 1990 levels by 2020. This plan, called the Scoping Plan, was required to be updated every five years and to include accurate annual GHG inventories of the state. This goal was achieved four years ahead of schedule in 2016 due in large part to widescale state run programs such as the Cap-and-Trade Program and the Low Carbon Fuel Standard. Subsequently, further legislation was introduced in the state Senate to go even further than AB 32 (California Air Resources Board, 2018).

In 2016, SB 32 was passed and signed into law. This new statute extended the purview of AB 32 and required a reduction of all GHG emissions from the state to 40% of 1990 levels by 2030. Even while this goal has yet to be achieved, new statewide targets are continuing to be released. In 2017, the Air Resources Board adopted a target in their 2017 Scoping Plan Update to reduce GHG emissions to 80% below 1990 levels by 2050 (2017 Scoping Plan, November,

2017). Additionally, in 2018, the Governor signed an Executive Order that targets statewide net zero carbon emissions by 2045. The 2017 Scoping Plan Update also includes extensive encouragement for local governments such as cities and counties to adopt their own plans to reduce GHG emissions from their area.

The California Air Resources Board (CARB) in its most recent Scoping Plan Update in 2022 has outlined how and why local actions are critical to addressing and adapting to climate change. The report outlines that local governments should reduce GHG emissions in the sectors they are majorly responsible for and can make substantial impacts in. In response to all of the state, federal, and international pressure, as well as local motivators such as constituents and non-profit organizations, counties and cities are increasingly adopting climate mitigation and response plans (2022 Scoping Plan, November 16, 2022). These plans are most commonly called Climate Action Plans or CAPs. Beginning roughly a decade ago and now spreading to local governments and states across the globe, CAPs commonly target three main sectors, transportation, energy generation, and building electrification and energy efficiency. These plans are usually thorough and very ambitious but rarely binding to higher authorities. For example, a county may adopt a new general plan every roughly every decade and alongside, or sometimes within, they will also release a Climate Action Plan. These plans commonly inventory the GHG emissions from the jurisdiction, then the plans outline methods to reduce GHG emissions from each sector, sometimes including a percentage reduction goal originating from a past baseline measurement.

Policy experts and climate scientists agree that the problem of climate change and its aftereffects need to be addressed at all levels of government and society. Proverbial wisdom tells us that international coalitions, country and state governments, and local Boards and Councils all

need to pull their weight in curtailing global warming and adapting to climate change impacts that are already inevitable. Clean air, reasonably moderate and infrequent storms, and a livable planet for future generations are parts of human existence that have been taken for granted for all of human history. However, recent climate studies are presenting signs that these features of life on Earth may not always be reliably present. This trajectory is the most often used example of the principle of the Tragedy of the Commons. This theory posits that a common good, such as clean air, is freely usable by all in a community and non-excludable to anyone. But the tragedy is that without intervention and/or regulation, that common good will be depleted or diminished by the community members acting in their own self-interest. While most international organizations and governments across the world have recognized the need for action to maintain a healthy and livable climate, this principle also relies on smaller entities such as county and city governments to address their emissions at a local level.

Thus, it is important to examine the policies that are outlined in local CAPs and begin to analyze their breadth and effectiveness. In doing so, policy makers will more fully understand the scope of the issue of climate change and importantly, they will ensure that the problems are being responded to at all levels of society.

The main goal of this research is to analyze the common policy objectives set forth by California cities and counties. This effort will provide an overview of what sectors are commonly targeted by local governments to reduce GHG emissions. Second, this research will begin to explain whether these efforts by local governments are effective in their goals. This research is guided by one fundamental question and several smaller directions of inquiry. First, what are local governments, cities and counties, in California doing to address and adapt to climate change? Second, are these efforts successful or are they falling short? Third, are the policies and

efforts being launched by local governments effective in aggregate to the larger issue of regional global warming. And finally, what else should local governments be doing to address climate change in their region and more broadly in their state or country.

Following this introduction, this research will continue with a literature review, a review of California CAPs, a discussion and analysis section, and finally, concluding remarks with directions for future research.

Section 2: Literature Review

This chapter outlines the past and current research regarding Climate Action Plans. First, this section will outline the details of a Climate Action Plan. Then, the literature on the purpose and need for local climate action and policies will be summarized. The next two areas of research on climate action plans are focused on why and how local governments adopt these plans. The final area of relevant research is a brief summary of areas for future research and emerging trends in this policy area.

Climate Action Plans (CAPs)

A Climate Action Plan is a detailed report published by a local jurisdiction that commits to climate change policies and GHG reduction programs. These plans usually mimic a state or national plan and focus on emissions reductions. CAPs normally come through the general plan of the jurisdiction, or alongside the release of the general plan (Hui, Smith, Kimmel, 2019). The four main components of United States CAPs include a GHG inventory, and three main reduction strategies. A GHG inventory commonly accounts for emissions that are produced by the jurisdiction or activities that commonly take place within the jurisdiction. Common sources of GHG emissions from a city include transportation, industrial processes, energy generation, and solid waste management. Consequently, the first main reduction strategy usually targets the transportation sector. Policies that are common from within CAPs to reduce transportation related GHG emissions include jurisdiction fleet electrification, construction of new public transit, and fostering a reduction in vehicle miles traveled. The second main reduction strategy present in CAPs is building electrification and energy efficiency policies. This commonly takes shape by tasking the local electric utility to electrify residential and commercial building appliances. Frequently local governments will also require new construction to use all electric

appliances, energy efficient processes, and include green spaces. The final common reduction strategy present in most CAPs is to reduce emissions in the local waste management department. This process usually includes committing to electric refuse vehicles, converting landfills into recycling centers, encouraging composting, and investing in carbon sequestration from burning refuse. In one study, out of 50 CAPs analyzed all included strategies addressing energy efficiency of buildings and new construction, vehicle fleet electrification, and reducing GHG emissions from power generation systems (Stone, Vargo, and Habeeb, 2012).

Climate Change and Local Context

In recent years the focus on global temperature rise and climate change impacts have been centered on the global, international level. Headlines commonly remark on the "Earth's warmest year on record" or the yearly headlines on polar ice receding to the farthest distance ever recorded. While these reports are important to remember, sub-national and localized warming is also essential to keep in mind. New studies are released at an increasing pace on localized warming and its impact on crop growth, migration, and the natural environment. Localized temperature increases are especially severe over large cities across the globe. GHG emissions from primarily tailpipe emissions from vehicles but also industrial practices have created smog clouds over urban areas that trap ambient heat, also compounded on top of the lack of forestation and greenery that naturally absorb GHGs like carbon dioxide. Thus, large urban cities have warmed at more than twice the rate of the planet in the last fifty years. This "urban heat island" has been well researched and studied and has led to climate scientists and policymakers to focus on and encourage climate change policy and adaptations at the local level (Stone, Vargo, and Habeeb, 2012).

Theoretically local climate actions can have significant impacts to address global climate issues. The major international coalition of local jurisdictions, the Global Covenant of Mayors for Climate and Energy, recently released collected data on commitments to reduce greenhouse gas emissions. From their membership, the Covenant can account for a total reduction of 1.9 billion metric tons of carbon dioxide or other equivalent greenhouse gases from a total of 9,000 cities across the globe (Aboagye and Sharifi, 2023). While these pledges are ambitious, research shows that the outcome of many bold climate policies fail to reach their initial targets. Jurisdictions with on-track reductions usually come from more modest CAP reduction goals. Inversely, more ambitious reductions goals are less likely to be met in future years. Furthermore, more ambitious local government plans are more common in more ambitious states or countries that surround the locality (Hsu et al, 2020).

The Role of Local Governments

A recent World Economic Forum report found that in future decades, more than 80% of the world's population is going to live in cities. That change is going to be felt most directly in Asian and African cities where material consumption is expected to skyrocket in the next three decades. In this case, “material consumption” pointedly refers to the increase in construction and infrastructure development in these growing cities. Concrete production, paving roads and large flat spaces for parking lots and buildings, and other growth and development practices are going to increase the GHG output of these growing countries. This construction will also coincide with increased GHG emissions from transportation as these cities’ growth patterns develop into urban sprawl. This urbanization is expected to bring increasing responsibility and forward-thinking climate planning to local governments. Energy efficiency, urban land use planning, and low-

carbon resource efficient cities are going to be imperative for future climate change policies concerning large urban areas (Venditti, 2022).

A primary power that local governments hold when implementing climate change policy is in land use planning. During the general plan process, there are many specific ways that local land use planning can effectively reduce greenhouse gas emissions. Although not ubiquitous in CAPs currently, research shows that amending land use planning can contribute to significant reductions in GHG emissions through more dense building patterns. For example, while looking ahead to future expansion, a city plan may zone its outlying areas with sparse residential parcels. According to many analyses, this leads to an increase in vehicles miles travelled (VMT) and vehicle traffic on local roads and highways. Eventually, this increase in traffic and VMT leads to increased GHG emissions. Another benefit of denser building patterns from climate conscious land use planning is the promotion of non-motorized transport (NMT). When residents are able to use bicycles or walk to most destinations on a daily basis, or when bicycle or walking paths are sensible and convenient, those individuals contribute less GHG emissions. Furthermore, density allows simplified and greater usage of public transit. Local governments struggle to construct and maintain a sprawling transit and bus system, but public mass transportation is much more attainable if land use planning provides for higher density living. All these improvements can be obtained individually but are extremely synergistic when the foundational policy of urban land use is utilized with the intention of reducing GHG emissions of an urban area. (Deetjen, Conger, Leibowicz, & Webber, 2018).

Drivers behind local Climate Action Plans

New emerging research shows that there are five principal factors that can explain whether or not a local government adopts a Climate Action Plan. The first of these factors is community social

capital. From organizational management literature, social capital usually refers to soft features of a government such as trust, norms, institutions, and networks. In the case of a factor leading to the drafting of a CAP, research has identified a number of these social components that positively correlate to increased CAP adoption rates. Some of these social components that relate to CAPs include substantial population size, high home ownership rates, high employment rates, racial diversity, high education levels, and moderate to high income levels. With these community social capital characteristics, jurisdictions are more likely to adopt a CAP. The second of the five factors is institutional capacity. Several studies have found that jurisdictions that have staff capacity, employ environmental or climate scientists, and enough financial resources are more likely to adopt CAPs. The third factor is political ideology. Research in the US shows that drafting and adopting climate change policies is more likely in jurisdictions controlled by Democrats and liberal leaning policymakers. However, due to the closeness between policymakers and their constituents at the local level, the citizens and residents of the jurisdiction also play a major role in CAP adoption rates. Public pressure regarding the implementation of CAPs is needed as local policymakers commonly cooperate with the needs of their constituents. The next major factor is one that is only recently studied but is the most visible effect from GHG emissions. Poor air quality is now being attributed to increased and impactful climate policy, especially at the local level. The very visual nature of poor air quality makes it easy for policymakers to win support for a proposed CAP. The final factor leading to increased drafting and adoptions of CAPs is the process of policy diffusion and increased networking. While the evidence for this theory is mixed, California presents an interesting case study for vertical policy diffusion. With the state adopting such rigorous and aggressive GHG emission reduction goals, it is not surprising to see progressive local jurisdictions following suit by releasing their own

CAPs. Figure 1 shows that CAPs adopted by cities and counties are commonly clumped around major metropolitan areas and have started to diffuse outwards from there. The combination of these five factors and particularly population size, political ideology, and institutional capacity are the factors most highly positively correlated to a higher chance of adopting a CAP (Hui, Smith, Kimmel, 2019).

Other research into local governments that already lean Democratic, but vary in size, income, and race has determined two further factors that positively correlate to increased CAP participation and adoption. First and most significant, is that local governments that employ staff dedicated to environment, energy, or climate issues are more likely to plan and adopt climate policies. Using a regression analysis to control for other variables, researchers found statistically significant positive results between the rates of CAP adoption and employing a climate officer or climate department within the organization of the local government. Similar results were also found between the adoption rates of CAPs and the presence of a university within a jurisdiction. According to the research, universities provide collaborative think tanks, laboratories, and greater capacity for research when it comes to developing ambitious climate goals. This factor, in coordination with full time climate scientists and a politically favorable environment leads to a higher adoption rate of CAPs and more ambitious policies (Bery and Haddad, 2023).

Areas for Future Research

While local CAPs have been increasingly adopted for the past two decades, they have not dramatically evolved or changed. Many modern CAPs published in the last few years have included increasingly aggressive GHG reduction goals and policy objectives, but very few have included new, forward-thinking climate policies such as adaptation strategies. According to some literature, this avenue of research, planning, and policymaking is needed to reduce the harm and

hazards of climate change impacts in the present and near future. These inevitable events can look like sea level rise, an increase in severe floods, droughts, winter snowstorms, and increasingly severe hurricanes. Adaptation policies, such as coastal sea walls, reforestation, modern building techniques, and others are needed as well as continued GHG emission reduction goals. One reason adaptation policies such as infrastructure planning have not been historically included in CAPs is possibly due to the fact that large infrastructure policies such as building sea walls and reforestation has largely fallen under the field of public works and not environmental protection. However, these two fundamental aspects of climate policy need to exist simultaneously; CAPs need to exist with GHG reduction goals as a preventative action and adaptation policies as a responsive action (Koski and Siulagi, 2016).

Local government jurisdictions also face challenges in the fight against climate change. Due to the federalist nature of government in the United States, local governments have little no power over neighboring jurisdictions, especially after crossing state lines. This presents a challenge when what is needed to combat climate change is collective action by all parties. Free riders have already emerged in recent years. States or jurisdictions who have done little to face climate change and implement policies but benefit from their neighbors who undertake sometimes expensive and challenging actions to reduce their GHG emissions. The research on this phenomenon is still new and presents an opportunity for growth.

Overall, the literature presented here shows that a lot is being done at the local level to address global warming and climate change. Although local jurisdictions vary greatly in composition, geography, politics, and need; they have also coalesced around addressing local GHG emissions in three main areas. Those areas of concern are building electrification and energy efficiency policies, transportation emissions, and solid waste management reforms. These

three policy areas are what are commonly addressed in a Climate Action Plan along with a GHG emission inventory. These plans are adopted for a variety of reasons and will only become more widespread throughout California, other states, and across the globe. This is particularly true as governments at all levels are beginning to take more and more interest in climate change policies and addressing global warming. As these policies and practices develop, the need for review and analysis of these plans will also need to continue into the future.

Section 3: Methodology and Research

This section will outline the approach to choose 20 different Climate Action Plans from California cities and counties. Then, this section will explain how these selected plans were analyzed, the methodology behind the scales to compare the different plans, and the challenges faced in this research.

Methodology of Sampling

Out of the 58 total counties in the state, ten were selected at random, and due to the fact that California is home to hundreds of cities across the state, ten cities were selected out of the 50 largest cities measured by population. In Figure 1, is a table showing the twenty localities that were analyzed. The selection was done by adding the cities and counties to a Microsoft Excel sheet and then the sample was created using Google's random number generator. The counties range from small rural counties such as Sutter and Mariposa to the most populus county in the state, Los Angeles. Included in the list are also wealthy, urban, coastal counties such as Marin, and inland agricultural counties like Imperial. The ten California cites range in population from 308,000 in Santa Ana to 164,000 in Lancaster, ranks 14 to 31 in population across the state respectively. Naturally, this random sample of cities and counties is more weighted to the larger, coastal communities. As most of California's population lives along the coast, especially in the San Francisco Bay Area and the coastline of Southern California, it is unsurprising to see random selection weight more heavily in those areas. Again, this is evident in Figure 1. There are other more rural jurisdictions that were selected during county sampling, Humbolt, Sutter, Tuolumne, and Tehama Counties all have populations under 150,000 (World Population Review, 2023).

	Jurisdiction	Date Adopted	Baseline Year	Milestones
Cities	Moreno Valley	2012	2007	2020
	Santa Ana	2015	2008	2020, 2035
	Oceanside	2019	2013	2020, 2030, 2050
	Santa Clarita	2012	2005	2020
	Lancaster	2016	2010, 2015	2020, 2030, 2040, 2050
	Fremont	2012	2005	2020
	Santa Rosa	2012	2007	2015, 2020, 2035
	Chula Vista	2017	2005	2020, 2030
	Elk Grove	2019	2013	2020, 2030, 2050
	Ontario	2023	2020	2030, 2050
Counties	Humboldt	2022	2015	2030
	Tehama	2009	2008	2020, 2028
	Riverside	2019	2017	2030, 2050
	Tuolumne	2022	2019	2030, 2040, 2050
	Monterey	2022	2019	2030
	Marin	2020	2018	2030
	Imperial	2021	2005, 2012, 2018	2020, 2030, 2040, 2050
	Sutter	2010	2008	2020, 2030
	Los Angeles	2014	2010	2020
	Santa Clara	2023	2017	2025, 2030, 2035, 2045

Figure 1-Overview of Selected CAPs

Of the plans sampled many were five to fifteen years old and some jurisdictions did not have information publicly available that communicated whether plans were in the process of being updated. Furthermore, plans ranged in complexity, scope, and overall design. Nonetheless, all plans included at the very least an inventory of GHG emissions from the jurisdiction. All measured their output in emissions using million metric tons of carbon dioxide or other equivalent gases, or MTCO2e. Jurisdictions varied on what baseline they used to measure their current GHG emissions against due to the fact that inventories and subsequent plans were drafted at different time. Following the creation of a baseline, jurisdictions then forecasted how GHG emissions would be emitted in a 'business as usual approach' with no reduction measures included. Then the plans include target reduction milestones with varying levels of ambition. Nearly all plans include ambitious reduction targets, striving for a significant percentage below their baseline inventory by a target year such as 2035 or 2050. The most ambitious jurisdictions followed California's lead and are striving for net zero targets, 40%, and even 80% reductions below the baseline for that local jurisdiction.

Due to the variety of jurisdictions and that variety being reflected in their Climate Action Plans, comparing actual reduction amounts or planned reduction amounts between different jurisdictions would be unfair. Even cities or counties of similar size and geography could have a variety of differing characteristics that would impact their local climate and subsequent policies to address GHG emissions. As laid out in previous research and in the previous section, the factors leading to adoption of CAPs are varied. This research is consistent with adoption trends of CAPs in California. The earliest adopters of CAPs in California were large, urban, coastal cities and counties, with left leaning leadership. Climate policies and CAPs then diffused from

those centers outwards, leading to many communities up and down the coast of California showing the highest density of CAPs. This trend can be seen visually Figure 2 (Hui, Smith, Kimmel, 2019).

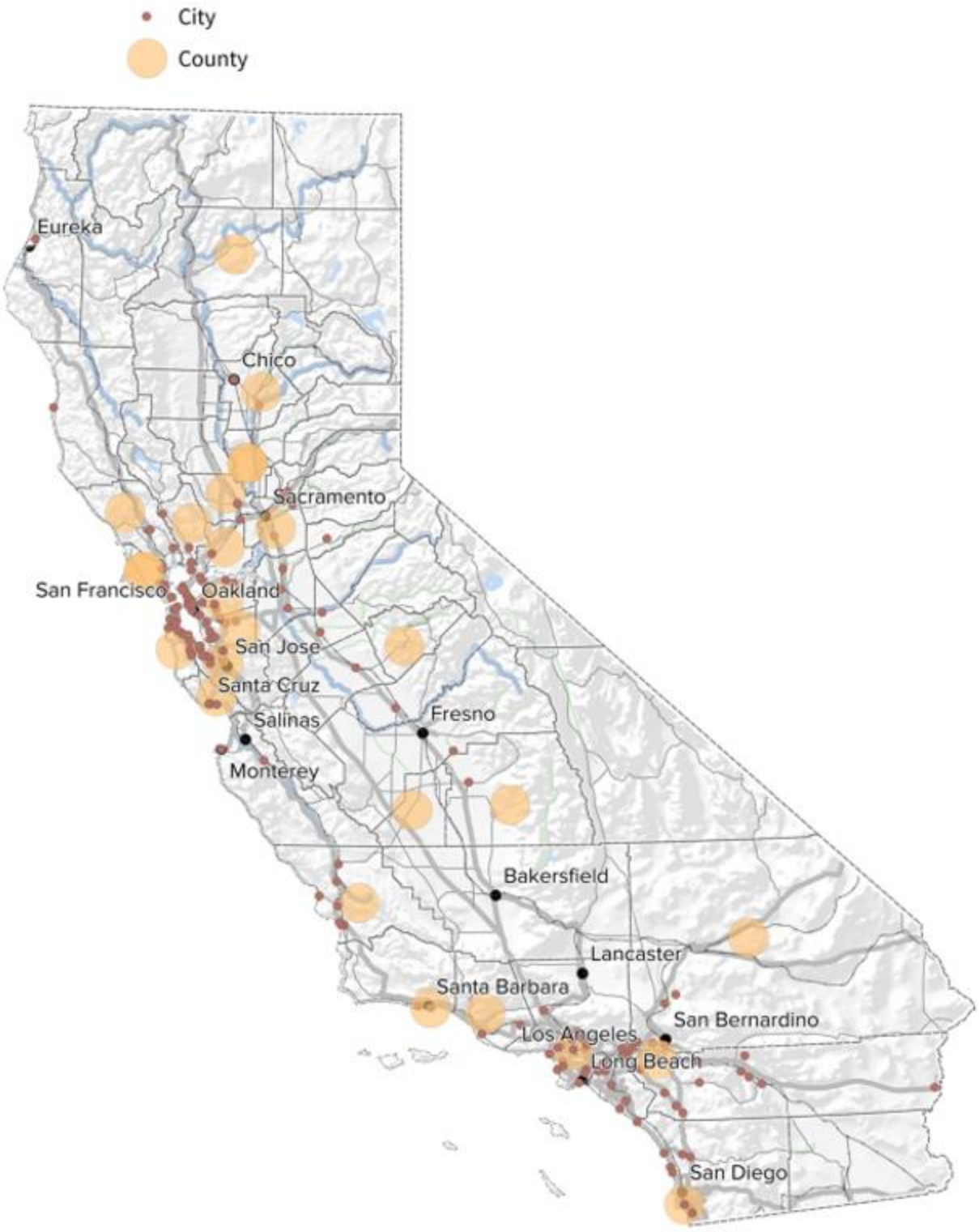

Figure 2-Map of California Climate Action Plans

Challenges

The first primary challenge in undertaking this research was out of the 54 counties in California, some did not have any Climate Action Plan. This was first found when a rural county in the eastern Sierra Nevada Mountains was selected. After further research it was found that even in 2024 many of these rural counties did not have any published CAP had collaborated with other rural counties to collectively inventory their GHG emissions only. This forced the researcher to remove two of the counties first selected, Inyo County and Del Norte County. Two more counties were randomly selected using the same methodology and added to the sample.

Another main challenge was the inconsistency between the 20 CAPs that were selected. Nearly 15 years ranged between the oldest published plan and the most recent plan. This presented issues in analysis but more importantly the information some of the older plans presented was out of date or irrelevant, such as a plan proposed and adopted to support California's original AB 32 goal which has been reached and further goals have been adopted by the state. Further considerations needed to be made to account for inconsistencies between plans in terms of policies and projected goals. Los Angeles County, with a population of almost 10 million people and the largest county in the state, has necessarily different goals compared to Mariposa County, population 17,000. Mariposa County, however demographically different from Los Angeles County, still has climate concerns, namely wildfires and subsequent smoke, different from the concerns of other more urban and populated counties. Finding criteria that would assess the plans of each of these counties, those that are in between these extremes, and the ten city plans as well was extremely challenging.

Methodology of Analysis

After randomly selecting the 20 CAPs, each plan was then analyzed and then scored on two different zero to three scales. The first scale to measure the breadth of the CAPs is a long-range planning (LRP) measurement of the GHG reduction target within the CAP. A score of zero on this first scale signifies that the CAP contains no goal to significantly reduce overall GHG emissions from the jurisdiction. Although uncommon in CAPs from California cities and counties, plans without significant long term reduction strategies usually come from lower population cities or rural counties. CAPs of these nature usually only inventory the GHG emissions from the jurisdiction or add a GHG inventory to their overall general plan. The LRP score increases by one depending on how many long term reduction targets the jurisdiction sets. For example, Elk Grove in its plan sets three reduction milestones, 2020, 2030, 2050. Thus, Elk Grove has a score of 3 for its LRP. This scale is derived from Hui, Smith, and Caroline in their much broader 2019 article titled, *Think Globally, Act Locally: Adoption of Climate Action Plans in California.*

Another zero to three scale was then applied to the same CAPs based on the major reduction strategies included in their plans. Adapted from the above scale, this measurement tool assesses CAPs based on the breadth of the policies included within the plan. Every plan analyzed here includes some form of three standard reductions areas, building electrification, transportation, and solid waste management. To measure the ambitiousness of the selected plans, this scale increases by one for each reduction area aside from the standard three. For example, multiple plans recognize that land use planning plays a significant role in GHG emissions from the transportation sector. If a jurisdiction planned to amend or adopt a more densely populated land use plan with a concerted effort to reduce vehicle miles traveled, they would receive a point on this scale. CAPs across the state of California usually include reduction areas or policies

beyond the normal three and usually these policies are linked in some way to the contextual factors of the jurisdiction. For example, some of the rural counties and cities included in this analysis adopted measures such as climate-friendly agricultural practices or enhanced wildfire protection and mitigation efforts. While these measures may not be appropriate for dense urban centers, those jurisdictions adopted their own right-sized policies such as electric buses and trams for regional transportation. Each of these scales and a rubric to determine scoring is included in Figure 3 and 4.

Scores	LRP Rubric (0-3)	Ambitiousness Rubric (0-5)
0	Indicates that the CAP contains no goals to significantly reduce overall GHG emissions by a target date.	Indicates that the CAP contains no significant plans to reduce GHG emissions outside of building electrification/efficiency, transportation, and solid waste management.
1	Indicates that the CAP contains one major goal to significantly reduce overall GHG emissions by a target date.	Indicates that the CAP contains one significant strategy to reduce GHG emissions outside of building electrification/efficiency, transportation, and solid waste management.
2	Indicates that the CAP contains two goals to significantly reduce overall GHG emissions by separate target dates.	Indicates that the CAP contains two significant strategies to reduce GHG emissions outside of building electrification/efficiency, transportation, and solid waste management.
3	Indicates that the CAP contains three goals to significantly reduce overall GHG emissions separate target dates.	Indicates that the CAP contains three significant strategies to reduce GHG emissions outside of building electrification/efficiency, transportation, and solid waste management.
4	n/a	Indicates that the CAP contains four significant strategies to reduce GHG emissions outside of building electrification/efficiency, transportation, and solid waste management.
5	n/a	Indicates that the CAP contains five or more significant strategies to reduce GHG emissions outside of building electrification/efficiency, transportation, and solid waste management.

Figure 3-Rubric for CAP Scoring

	Jurisdiction	LRP Scale (0-3)	Ambitiousness Scale (0-5)	Total
Cities	**Moreno Valley**	1	2	3
	Santa Ana	2	2	4
	Oceanside	3	3	6
	Santa Clarita	1	1	2
	Lancaster	3	5	8
	Fremont	1	3	4
	Santa Rosa	3	5	8
	Chula Vista	2	1	3
	Elk Grove	3	0	3
	Ontario	2	0	2
Counties	**Humboldt**	1	2	3
	Tehama	2	1	3
	Riverside	2	3	5
	Tuolumne	3	3	6
	Monterey	1	2	3
	Marin	1	3	4
	Imperial	3	1	4
	Sutter	2	1	3
	Los Angeles	1	3	4
	Santa Clara	3	2	5

Figure 4- LRP and Ambitiousness Scales

Section 4: Analysis and Discussion

This section will include analysis of the 20 selected Climate Action Plans that were randomly selected. This analysis collects common themes**,** finds uncommon or novel ideas, and points out gaps in some plans. The common themes that are present in these plans were then compared to the summarized existing literature. Novel ideas that are present in multiple plans and have evidence of success are then suggested for future further implementation and research. Finally, this section will conclude with broad policy implications and how lessons learned from the adoption and implementation of these plans can contribute to the broader efforts to combat climate change and global warming.

Common Themes

The three most common policy objectives in the 20 analyzed Climate Action Plans are policies designed to reduce GHG emissions through building electrification, transportation reforms, and solid waste management improvements. These objectives are consistent with the current research on CAPs and align with national, state, and local Plans.

Building electrification, while initially broad, is narrowed and detailed throughout many of the plans that were analyzed. The most common strategy within this policy area was to incentivize the replacement of GHG emitting home appliances with electric alternatives. This strategy most commonly called for replacing gas stoves with electric or induction cooktops. Fifteen out of the 20 that were selected included some sort of system to replace gas stoves with an electric or induction stove. Other common strategies to reduce GHG emissions through building electrification include ordinances to require that all new commercial and/or residential construction include energy efficient heating and cooling systems (13 out of 20), solar panel

incentives on new and existing construction (6 out of 20), many educational campaigns on the benefits of building electrification (11 out of 20).

Transportation reforms are also broadly defined in California CAPs and include many initiatives depending on the needs of the local communities that adopt these plans. The most common target within the plans is a reduction in vehicle miles travelled (VMT) throughout the jurisdiction. Sixteen out of the 20 that were selected included a call for some reduction in VMT in their CAP. Other common transportation policies that are detailed in the selected plans include education campaigns encouraging non-motorized transportation (11 out of 20), increasing and improving public transportation (10 out of 20), introducing and sponsoring rideshare programs (10 out of 20), and reducing vehicle idling throughout the jurisdiction (7 out of 20).

The third and final broad policy objective present in all 20 selected plans is addressing the solid waste industries of local communities. The most common general policy is to reduce waste going into local landfills. The 20 cities and counties each set out to achieve this goal in several different ways. The most common strategy presented in these plans to reduce overall waste are education campaigns on composting, recycling, and better consumption patterns (16 out of 20). Other methods to generate less waste include improving access to composting containers (10 out of 20), and simplifying the disposal of compost and recycling through centralizing local disposal sites of general waste, recycling waste, and lawn and garden waste (11 out of 20). These strategies are all in an effort to create less general waste that would sit in landfills for future decades and while generating GHG emissions during the decomposition process or through the burning of refuse. Reusing recycled materials or composting food scraps and lawn and garden materials creates less GHG emissions and is a more renewable process. Also included in some plans related to solid waste management is the construction and

implementation of methane capture technology at some facilities (3 out of 20). This process, while uncommon at the moment, is a promising policy to directly reduce GHG emissions in this sector of a local jurisdiction. As garbage or waste is burned, some landfills are capturing the gases that are emitted, filtering them, and reusing or sequestering the methane and other harmful carbon based gases that trap heat and warm the climate.

These three common strategies present in the California CAPs are the most common GHG reduction measures presented in the literature. Specifically, transportation GHG reduction measures through reducing VMT, use of public transit, active transportation, and rideshare programs are the most common that appear in the literature. These measures are also present in some form in almost all the 20 CAPs that were analyzed. Building electrification and efficiency was also a very commonly suggested category in the literature, but in practice that category was very broadly used by the jurisdictions. Some governments narrowly defined their scope in this category, electing to only electrify government owned buildings and vehicles, while other jurisdictions also encouraged and incentivized broader commercial and residential electrification. Less common in the research, in practice, and in scope by the jurisdictions was the inclusion of reductions in the solid waste management sector. This reduction category was also predicted to yield far lower GHG reduction amounts than the other two categories, both in the literature and in practice. Of these three categories, transportation reforms and building electrification and efficiency should continue to be included in all local plans. Solid waste management is a valid source of GHG emissions to target but should be incorporated with other smaller categories of emissions, such as agricultural practices and production, water use and reclamation, and reforestation.

New Ideas

Throughout the 20 selected CAPs, several policies and projects that did not appear in the literature were included in the more modern or recently updated plans. These new policies included an emphasis on improving water use efficiency, water conservation, the use of California's Renewable Portfolio Standard (RPS), adjustments to local agricultural practices to reduce GHG emissions, and land use policy changes.

Water use and water policy has been a common policy issue in California and throughout the West for much of the 21st century. For this reason, it should not come as a surprise that many local jurisdictions are concerned with their future water use and supply. Accordingly, many included measures within their CAPs to address the water use of their residents and businesses in their communities. The most common strategy adopted was to capture and reuse runoff after storms and from residential use. While not potable, this water would then be recycled by the jurisdiction for use in landscaping and construction. Further efforts would be made to educate the public on water conservation and encouraging low flow fixtures and appliances, especially during summer months. These strategies are not widely present in the current academic research on CAPs, but some plan authors and consultants argue that using reclaimed water and reducing overall water use does reduce the carbon footprint of the community and help to reach lower local temperatures, even without a direct reduction in GHG emissions.

For example, Chula Vista is relying on education campaigns and city ordinances to limit landscaping water waste, increasing water savings and efficiency, and implementing plans to reuse storm runoff and gray water. These systems are being put into place to specifically reduce the amount of imported water they receive as a community. These strategies, although unquantified, reportedly reduce the carbon footprint of Chula Vista by requiring less 'upstream'

filtering and purification of their water supply. Furthermore, Santa Rosa's water conservation and water capture measures are planned to reduce their total emissions by roughly 0.65% in 2035. While these reduction measures are modest, it is important to remember that water conservation and use reductions have been very important during past droughts in California and these measures are commonly necessary even without the slight GHG reduction they add to a community's CAP. This reality presents a win-win situation for CAP authors. They could potentially achieve GHG reductions, however modest, with multiple co-benefits to their communities.

While not present in a majority of plans as a major policy lever, some jurisdictions are relying on California's Renewable Portfolio Standard program. This program, run by the California Energy Commission and the California Public Utilities Commission, requires that all utility companies operating in the state report the proportion of renewable non-carbon emitting energy of their total power supply. Furthermore, the state is requiring that utilities meet certain thresholds of renewable generation by past and future dates (California Public Utilities Commission, 2024). While this program is independent of the CAP process underway in many jurisdictions, some councils and boards are claiming the reductions taking place as a result of the RPS requirement and including them in their plans (RECON, Oceanside Climate Action Plan, 2019.

Throughout many of the selected plans, adjustments to agricultural practices were present. More common in counties and agricultural communities, but still present in some city plans, jurisdictions recognized the GHG emissions from the farming and agriculture sector. The most common policy was to encourage new crops that use less water and to shift away from animal agriculture which can be a large emitter of GHGs. Agriculture adjustments and efficient

water use, recapture, and reuse present local jurisdictions with another win-win strategy as each measure compliments each other and has multiple co-benefits. Another strategy was the encouragement to reforest fallow or underused farmland and allow for native trees and plant life to sequester carbon from the atmosphere and reduce the urban heat island effect. These ideas were briefly mentioned in some research on CAPs but not highlighted as common and relied upon strategies (Los Angeles Department of Regional Planning, Los Angeles Community Climate Action Plan, 2014). However, in California with its vast farmland and agricultural communities, it is not surprising to see this sector addressed in many of the 20 plans.

Climate and transit conscious land use policies are increasingly popular with urban and suburban governments. Land use policy centered on reducing transportation emissions is present in a majority of the city CAPs and several county CAPs that were analyzed. Land use policy to improve a local climate, centers on designating suburban parcels with higher density housing to reduce suburban sprawl and excessive traffic coming into and out of the city center. Furthermore, these high density housing developments are then usually planned to be serviced by public transportation to further reduce transportation emissions. While land use policies are very prevalent in public policy research, targeting land use as a policy lever to improve local climates is a relatively new idea. With the main power for land use and future developments lying in the hands of local governments, it is promising that many are considering high density development to improve local climates and including these ideas in their CAPs.

Comparative Analysis

The main contrasts between the analyzed CAPs are largely bucketed into differences between urban and rural communities, and differences between affluent communities and less affluent communities. A striking difference between urban and rural community CAPs is the focus on the

protection of natural land, especially from wildfires, in rural communities, and reforestation efforts and emphasis on transportation reform to reduce smog and the urban heat island effect.

Another main difference is that rural communities tended to use education campaigns, incentives, and optional initiatives and pledges, while urban communities and populated cities relied more on ordinances changes, regulations, general plan amendments, and land use designations. For example, Tuolumne County and Los Angles County introduce similar policy goals but differ in their methods to achieve those goals. In Tuolumne County, they include four main strategies to reduce GHG emissions, further broken down into nine measures, with many smaller strategies and actions within these measures. Out of these nine measures and the sub-goals within them, Tuolumne includes only one new mandatory ordinance, to reduce natural fuel sources around structures and spaces. The rest of the measures and actions are to be accomplished through incentives, encouragement, optional opportunities, or collaborative efforts with other organizations. On the other hand, Los Angeles County has many more strategies with larger scopes, understandably with its much larger size and population compared to Tuolumne. Out of the 26 broad measures that Los Angeles County plans to implement or accomplish, eight are mandatory programs or new ordinances. Although many of the climate goals and objectives between these two counties are similar, their methods of achieving their reductions differ.

Interestingly, there is little difference in the transportation reforms between sparse rural communities and densely populated areas. One might expect that two different counties with vastly different transportation patterns would address the transportation sector and its emissions in different ways. Los Angeles County in their CAP focuses heavily on reducing VMT, vehicle idling, and encouraging public transit and non-motorized transit, likely due to the dense smog that the area is well known for. However, Sutter, Humboldt, and Tuolumne Counties also

highlighted those measures in their transportation reform goals, despite lacking the vast networks of highways and surface streets for which Los Angeles County is well known.

Policy Conclusions

From this research and with the perspective of the already established literature on CAPS, there are two primary takeaways for policymakers and local government leaders when drafting or updating their Climate Action Plans. First, only five out of the 20 analyzed plans included any substantive mention of climate adaptation, an important and necessary component for future plans, to address climate change today and in future decades. Second, California is using land use planning as a policy tool with their Climate Action Plans to address urban and suburban GHG emissions from the transportation sector. The use of this policy in climate action planning is becoming more popular recently in national reports from policy centers and the federal government. California jurisdictions that are using climate conscious land use planning should be further analyzed as a case study or example for other local governments to potentially follow.

In the context of this research and climate policies altogether, adaptation commonly refers to what is being done to combat the present and current changes of a changing climate. The most common example of climate adaptation is the construction of sea walls to abate rising sea levels, especially during storm seasons. Other examples of climate adaptation or climate resilience, includes mandatory water conservation and restrictions, “Spare the Air” days during the hottest months when smog and other pollutants are highest, and reforestation to reduce localized warming (Rakley, Fremont Climate Action Plan, 2012). Five plans include substantive adaptation strategies as well as GHG reduction measures. Those five jurisdictions are Marin, Monterey, and Tuolumne Counties, and the cities of Fremont and Santa Rosa. While 20 plans out of the hundreds from the state of California may not be an indicative sample, it is still worrying

that in a coastal state, with frequent droughts and wildfires, that only a handful of jurisdictions have measures to face the present impacts of climate change within their overall CAPs. The strategies that these plans propose align with the research on adaptation efforts, especially for coastal and arid climates like that of Southern California. Future CAPs and plan authors should be following in the example of these jurisdictions by including substantive adaptation and resiliency strategies in their plans, to not only look towards the future but also to address the current conditions in their community. Problems such as sea level rise, increasingly common extreme weather, and global warming need to be addressed on all fronts. Present challenges need to be faced with present solutions, and future localized and global warming needs to be confronted with ambitious long-term solutions.

The other primary takeaway from the literature and the research into specific California CAPs is that the local jurisdictions of this state are using land use designations to consciously reduce transportation based GHG emissions. Present in multiple city CAPs and even a few county plans as well, this method involves designating future dense housing developments closer to the city center. Not only does the strategy discourage suburban sprawl that would lead to dense traffic and vehicle idling into and out of the city center, but also it allows for simpler and more efficient public transportation routing. Transportation emissions produce some of the most toxic GHG emissions in the form of smog and these emissions are also some of the most visible to everyday residents of local communities. Policymakers and leaders of local governments should consider adjusting their land use policies to encourage dense localized development, especially if they are concerned with transportation emissions from local highways and traffic. An argument that local leaders and policymakers could use in the face of detractors and opposition, is that even if these costly or difficult measures in CAPs do not majorly contribute to

global temperature decreases, the plans will still improve local air quality and life in the community.

Finally, Figures 1 and 4 show that nearly all jurisdictions set milestones targets dates ranging between 2020 and 2050. Many selected multiple years in between that range to benchmark their reductions against. This common trend resulted in most jurisdictions having a long-range planning score of two or three, with the more recently updated or published plans pushing back their final reduction target to as late as 2050. However, there were wider scores in the ambitiousness scale. The most common reduction measure outside of the expected three, which resulted in the ambitiousness score, was amendments and adjustments to the jurisdiction's land use plans. Many jurisdictions included measures to address water use and create more efficient water consumption methods. Another very common reduction measure was to task the municipal utility that powers the jurisdiction with electricity or natural gas with adopting renewable energy generation. These common measures resulted in many jurisdictions receiving a score of 1-3 but some jurisdictions listed a wide array of reduction strategies. Lancaster, Santa Rosa, and Tuolumne County all outperformed their peers when measured by the amount of reduction strategies outside of the norm.

Section 5: Conclusion

This section begins with a summary of key findings regarding California local Climate Action Plans. Those findings are compared to the existing literature, contributing to the already published and reviewed knowledge base on this policy subject. Next, this section will summarize the key policy implications for local government leaders and policymakers as they undertake drafting or updating their own plans. Finally, this section will conclude with final remarks with wider connections to national and international efforts on climate change.

Summary of Findings

The first primary finding from the 20 selected California CAPs is that all sampled and analyzed plans include measures to reduce GHG emissions in three sectors of local government. Those three sectors are building electrification and efficiency measures, transportation policies, and waste management practices. This common theme is confirmed by the literature and shows policy diffusion and mimicry across a variety of jurisdictions. These three common strategies do not contribute equally to reducing GHG emissions in a community. The most effective strategies come from the transportation sector, where the most GHG emissions originate by sector. Next, building electrification and home energy efficiency efforts generally account for the second most total reductions by sector. Finally, the solid waste management sector is the third most common broad reduction category but does not account for as much reduction.

The second primary finding is a confirmation of modern literature that was prevalent in the plans of California local governments. California jurisdictions included land use policies to target and reduce transportation emissions. Local CAPs are using land use designations to create higher density developments closer to urban centers or transportation hubs. The idea behind this measure is to decrease the amount of travel into and out of city centers or populated areas, especially during peak travel periods. This strategy reduces the amount of traffic, idling of

vehicles, and allows for efficient and user-friendly mass public transit. This measure is particularly significant as every local jurisdiction that was analyzed found that the transportation sector produced the most emissions in their communities. Transit oriented land use designations are being increasingly suggested by policy centers and national government reports and are reflected in the recently updated California CAPs.

One main difference between the literature on CAPs and the actual plans from local governments in California is the inclusion of many reduction measures in response to specific issues that California and other western states have been facing throughout recent years. Many of the county plans, and some city plans as well, include measures to improve and adjust water use, agricultural practices, and develop or redevelop green spaces in their communities. Targeting the above sectors in these plans is consistent with many other policy solutions in the state. Recent severe droughts, heat waves, wildfires, and other extreme weather events have put water and agriculture on the forefront of climate policy solutions in California. These measures are not common in the literature, however, due to the policy landscape and the specific issues California currently faces, it is important that these solutions are included in California CAPs.

The 20 California CAPs differ from the theoretical literature in one more primary example. The California jurisdictions, with only a handful of exceptions, are not including climate adaptation or resiliency measures in their plans. More common in communities directly on a rapidly shifting coastline such as New York, Flanders, and Jakarta, these adaptation measures include public works projects such as sea walls to reduce flooding and water damage during swells and storm surges.[1] These adaptations to Earth's changing climate are imperative

[1] For more information specifically on seawalls to abate sea level rise, flooding, or coastal erosion, visit. https://climate-adapt.eea.europa.eu/en/metadata/case-studies/implementation-of-the-integrated-master-plan-for-coastal-safety-in-flanders https://www.theguardian.com/cities/2016/nov/22/jakarta-great-garuda-seawall-sinking https://e360.yale.edu/features/new-york-city-climate-plan-sea-level-rise

for cities on coastlines or any community that is facing potential discord related to larger or more frequent extreme weather events. Adaptation measures are recommended in the literature as necessary measures to include in modern CAPs, to address not only reducing GHG emissions, but also to protect and maintain community infrastructure and the safety of residents. Without the inclusion of this element in CAPs, California communities along the coast and in areas at risk of extreme heatwaves and wildfires will continue to face the risk of devastation and hardship.

Contributions to Knowledge

This report adds an important and useful component to the already existing body of research on Climate Action Plans. Recent research suggesting land use as a GHG reduction policy is confirmed in California jurisdictions, especially cities. Jurisdictions are adjusting their traditional land use away from suburban sprawl and towards construction of higher density housing near transportation hubs or closer to the city center. Transportation as a source of emissions is the leading contributor to GHG emissions in nearly every community in the state. From the 20 analyzed plans, the transportation sector contributed between 35 and 60 percent of total community wide emissions from each jurisdiction. While jurisdictions across the country are intent on reducing vehicle miles travelled by individual drivers, many California communities are using land use as a means of curbing their transportation emissions. These jurisdictions are testing the theories being proposed in recent academic literature as well as in national reports and should be studied further to assess the effectiveness of these long-term policies in the future.

Policy Implications

Based on the expected and unexpected findings from this report, policymakers and local leaders would find valuable insights and measures to include in future development of their climate plans. Relying on transportation reforms, and building electrification and efficiency, can serve as

the basis for any climate action plan. Going forward, local leaders should consider how their communities are going to adapt to the present impacts of climate change and global warming by including adaptation and resiliency measures where applicable. Also, to reach the ambitious targets set for future decades, policy makers should consider addressing some of the root causes of GHG emissions in their communities, primarily transportation, industrial processes such as electricity generation, and residential use of carbon emitting devices. These practices are difficult to assess and abate. Amending land use policies for climate conscious transportation habits may take decades to see substantial GHG reductions. Limiting internal combustion engines, expanding the use of renewable energy, fuels, and electric or battery powered engines will take serious political willpower and include growing pains.

Final Thoughts

Climate change and global warming are perhaps the foremost policy problems of the 21st century. These issues are being faced by nearly every country in the world, and every day measures are being taken to mitigate the impacts of global warming. This problem is not necessarily being solved for the current generation of political leaders who are drafting, legislating, and signing policy. The academics, researchers, or engineers who are implementing the measures are also not necessarily the prime beneficiary of these projects. Realistically, the policies and projects to abate climate change and alleviate its worst effects are being undertaken not for the current generation, but for our children and future generations.

While the scientific evidence that the Earth is warming at an unsustainable rate is definitive, more work must be done done to limit global temperature rise. International coalitions have been working on these issues for over 50 years and these global collaborations must continue. Developed and developing nations alike are striving to limit their GHG emissions and

grow in a sustainable manner. Finally, local jurisdictions also need to maintain their efforts in the fight against climate change. It is perhaps most important that local communities limit their GHG emissions, especially as the world continues to urbanize and industrialize. If local communities can continue to grow sustainably, current and future generations will be able to grow and thrive in a vibrant, healthy environment into the 22nd century and beyond.

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