2019–2020 MARIN COUNTY CIVIL GRAND JURY

Climate Change: How Will Marin Adapt?

September 11, 2020

COUNTY OF MARIN

A Note about the Coronavirus Pandemic

The 2019–2020 Marin County Civil Grand Jury is issuing its reports during the unprecedented conditions of the COVID-19 pandemic. We are well aware that Marin County is in crisis and that critical public health concerns, operational difficulties, and financial challenges throughout the county have a greater claim to government attention right now than the important issues raised by this Grand Jury.

We are confident that, in due course, Marin will come through this crisis as strong as ever.

Climate Change: How Will Marin Adapt?

SUMMARY

Our planet is warming, glaciers and ice sheets are melting, sea levels are rising, we are witnessing more extreme weather events and wildfires, and ecosystems are being altered. The future pace of climate change is uncertain, but the trends are ominous. In Marin, a modest 10-inch sea level rise could reach 700 buildings and 8 miles of roads along the bay, and a 60-inch rise, combined with a 100-year storm surge, could inundate 12,000 buildings and 130 miles of roads.[1] According to one recent study, Marin County could lose as many as 10,000 homes to sea level rise by 2100.[2] In addition, public health will be threatened by more vector-borne disease, our environment will become less suitable for evergreen forests and more hospitable to highly flammable shrubs, and lower-income households will be disproportionately affected by heat waves and floods.

Efforts to address climate change fall into two categories: "Mitigation" measures reduce greenhouse gas emissions to slow climate change, while "adaptation" measures such as seawalls guard against the consequences of climate change.

Significant mitigation work has been done in Marin, but plans for adapting to climate change have taken a back seat and have focused almost exclusively on sea level rise. Are Marin's county, city, and town governments doing enough to adapt to climate change? That is the question at the heart of this report.

This investigation was started in 2019, prior to the COVID-19 pandemic, and the financial strength of Marin's public agencies will likely be significantly impaired in the short term. But the need for long-term planning and action is not diminished. The Grand Jury hopes that agencies addressed in this report will strongly consider implementing the jury's recommendations as soon as they are able to do so.

The Grand Jury makes several interrelated, but not interdependent, recommendations to help Marin move forward in its climate change efforts, including the following:

- The county, in collaboration with the municipalities and other Marin agencies affected by climate change, should convene a multi-jurisdictional task force charged with developing a countywide adaptation strategy appropriate for adoption by each participant.
- The county government should consolidate all of its mitigation and adaptation programs in a new office that would coordinate and unify climate change efforts at the county level.

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[1] BVB Consulting LLC, *Marin Shoreline Sea Level Rise Vulnerability Assessment,* Bay Waterfront Adaptation & Vulnerability Evaluation (Marin County Department of Public Works, June 2017), pp. 25, 43, 63, https://www.marincounty.org/-/media/files/departments/cd/planning/sea level rise/baywave/vulnerability-assessment-final/final_allpages_bvbconsulting_reduced.pdf?la=en.

[2] Climate Central and Zillow, *Ocean at the Door: New Homes and the Rising Sea*, research brief, July 31, 2019, downloadable supporting data, accessed October 8, 2019, https://www.climatecentral.org/news/ocean-at-the-door-new-homes-in-harms-way-zillow-analysis-21953.

- The Marin Climate & Energy Partnership should expand its mission beyond greenhouse gas reduction to include adaptation planning support for the cities, towns, and other members.
- The county should study the feasibility of reorganizing the Marin Flood Control and Water Conservation District into a new agency governed by the county and all 11 cities and towns, with an expanded mission that includes climate change adaptation projects.

APPROACH

The Marin County Civil Grand Jury investigated the actions taken by Marin's county, city, and town governments to prepare for the potential consequences of climate change, assessed the adequacy of those efforts, and has recommended additional actions that would enhance the county's ability to meet the climate challenge.

In carrying out this investigation, the Grand Jury—

- Interviewed elected officials, department heads, and staff in the Marin County government and in Marin's city and town governments, as well as representatives from various climate-related organizations in Marin and the Bay Area.
- Reviewed reports, studies, plans, and California state guidance documents dealing directly or indirectly with climate change.
- Attended community meetings focused on various efforts throughout the county to reduce greenhouse gas emissions and plan for the potential effects of climate change.

The more the Grand Jury delved into climate change, the greater its appreciation for the complexity and evolving nature of the topic, as well as for the individuals throughout the county who are dedicated to confronting this global challenge at the local level. The Grand Jury was under no illusion that it could master all aspects of the subject or provide foolproof recommendations for the best path forward. But the Grand Jury hopes that the issues and suggestions raised in this report will increase awareness and prompt thoughtful discussion.

BACKGROUND: THE CHALLENGE OF CLIMATE CHANGE

There is broad scientific consensus that human actions over the past century or more—particularly the burning of fossil fuels and land-use practices such as deforestation and food

production—have been changing Earth's climate. Both globally and locally, the signs of climate change are increasingly evident:

- Worldwide, the years 2015–2019 were the five warmest years on record,[3] and May 2020 tied with May 2016 as the warmest May on record.[4] From 1895 to 2018, the average temperature in Marin County increased by 2.3°F.[5]
- Over the past century, sea level in the Bay Area rose by about 8 inches, and the rate of sea level rise has accelerated significantly since 2011.[6]
- The 2012–2016 California drought resulted in the most severe moisture deficits in the last 1,200 years and a record-low Sierra snowpack.[7]
- Fueled by drought-parched trees and shrubs and driven by high winds, California's 2017 and 2018 wildfires were the deadliest and costliest in state history.[8] Marin was spared the flames, but not the smoke and soot. The threat of fires in 2019 led PG&E to shut off electric power to almost the entire county for multiple days.
- In March 2018, Marin County Public Health issued a warning that potentially lethal levels of shellfish toxins, probably caused by "an increasingly unpredictable climate," were detected in the waters of Drakes Bay and north of Stinson Beach.[9] Other climate-related county health advisories in recent years have included alerts about infectious diseases such as West Nile and Zika virus.[10]

According to California's latest Climate Change Assessment, annual average temperatures in the Bay Area will likely increase by approximately 4.4°F by the middle of this century and 7.2°F by the end of the century—unless there are significant efforts throughout the world to limit or

[3] National Oceanic and Atmospheric Administration, "2019 Was 2nd Hottest Year on Record for Earth Say NOAA, NASA," news release, January 15, 2020, https://www.noaa.gov/news/2019-was-2nd-hottest-year-on-record-for-earth-say-noaa-nasa.

[4] National Oceanic and Atmospheric Administration, National Centers for Environmental Information, "State of the Climate: Global Climate Report for May 2020," June 2020, accessed June 17, 2020, https://www.ncdc.noaa.gov/sotc/global/202005.

[5] Steven Mufson, Chris Mooney, Juliet Eilperin, and John Muyskens, "Extreme Climate Change Has Arrived in America," *Washington Post,* August 13, 2019, https://www.washingtonpost.com/graphics/2019/national/climate-environment/climate-change-america/.

[6] David Ackerly, Andrew Jones, Mark Stacey, and Bruce Riordan (University of California, Berkeley), *San Francisco Bay Area Summary Report,* California's Fourth Climate Change Assessment, CCCA4-SUM-2018-005 (January 2019), p, 31, https://www.energy.ca.gov/sites/default/files/2019-11/Reg_Report-SUM-CCCA4-2018-005_SanFranciscoBayArea_ADA.pdf.

[7] Ackerly et al., *San Francisco Bay Area Summary Report,* p. 17.

[8] Mark Northcross, "Rebuild to Fail or Rebuild to Adapt: How CRA Lending Can Guide Climate Change Disaster Response," Strategies to Address Climate Change Risk in Low- and Moderate-Income Communities, *Federal Reserve Bank of San Francisco Community Development Innovation Review,* 14, issue 1 (2019): p. 39, https://www.frbsf.org/community-development/files/CDIR_vol_14_issue_1_.pdf.; and Steve Gorman, "Year's Most Destructive California Wildfire Declared Extinguished after Two Weeks," Reuters, November 7, 2019, https://www.reuters.com/article/us-california-wildfire/years-most-destructive-california-wildfire-declared-extinguished-after-two-weeks-idUSKBN1XI0BA.

[9] County of Marin, "Public Health Warning for Shellfish Toxins," news release, March 7, 2018, https://www.marincounty.org/main/county-press-releases/press-releases/2018/hhs-shellfishtoxins-030718.

[10] Richard Halsted, "Marin Supervisors Receive Harrowing Report on Climate Change, Sea Level Rise," *Marin Independent Journal,* April 13, 2019, https://www.marinij.com/2019/04/13/marin-supervisors-receive-harrowing-report-on-climate-change-sea level-rise/.

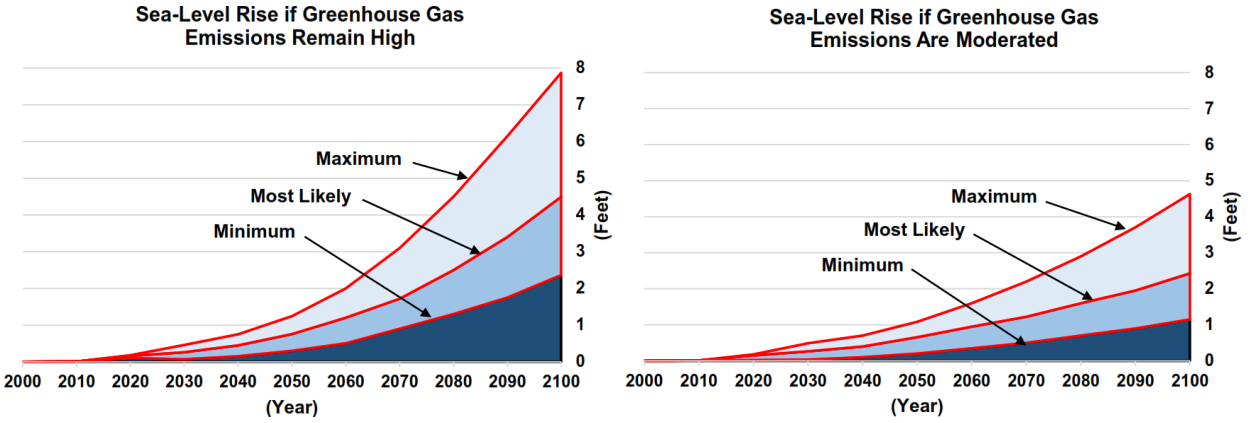
reduce greenhouse gas emissions. Even with significant reduction efforts, the temperature increase is projected to be approximately 3.3°F by mid-century and 4.2°F by century's end.[11]

Ongoing global warming, in turn, will increase the volume of water in oceans through thermal expansion and the addition of meltwater from glaciers and ice sheets, resulting in rising seas throughout the world. In the Bay Area, assuming emissions worldwide are moderated, median sea level rise is projected to be about 8 inches by 2050 and 2.4 feet by the year 2100. But if emissions remain high, sea level rise by 2100 would likely be about 4.5 feet, and it could approach 8 feet. Figure 1 shows sea level rise projections for the Bay Area under the two scenarios: continued high emissions and moderate emissions.

As sea level rises, more and more land along the shoreline will flood and then remain permanently underwater. But that will just be the new baseline. On top of that baseline will be the periodic flooding caused by El Niño events, king tides, large waves, stream runoff, and storm surges. For example, storm surge in California can elevate sea level by as much as 3 feet, temporarily transforming a 1-foot sea level rise into a 4-foot sea level rise.[12]

Low-lying shoreline communities along the bay and in West Marin—including homes, businesses, utilities, ferry facilities, marinas, boat launches, and roads—will be directly affected by sea level rise. The severity of the impacts will be determined by the magnitude and timing of

Figure 1. Projections of Sea Level Rise in the San Francisco Bay Area, 2000–2100



Note: For each scenario, the minimum sea level rise levels will occur with near certainty, the most likely levels represent the statistical averages, and the maximum levels are statistically plausible but less likely. The high emissions scenario is commonly referred to as the business-as-usual scenario and technically called Representative Concentration Pathway (RCP) 8.5. The moderate emissions scenario is technically called RCP 4.5.
Source: Based on D. W. Pierce, J. F. Kalansky, and D. R. Cayan (Scripps Institution of Oceanography), *Climate, Drought, and Sea Level Rise Scenarios for the Fourth California Climate Assessment*, California's Fourth Climate Change Assessment, CCCA4-CEC-2018-006 (August 2018), Figure 43 and Table 5, https://www.energy.ca.gov/sites/default/files/2019-11/Projections_CCCA4-CEC-2018-006_ADA.pdf.

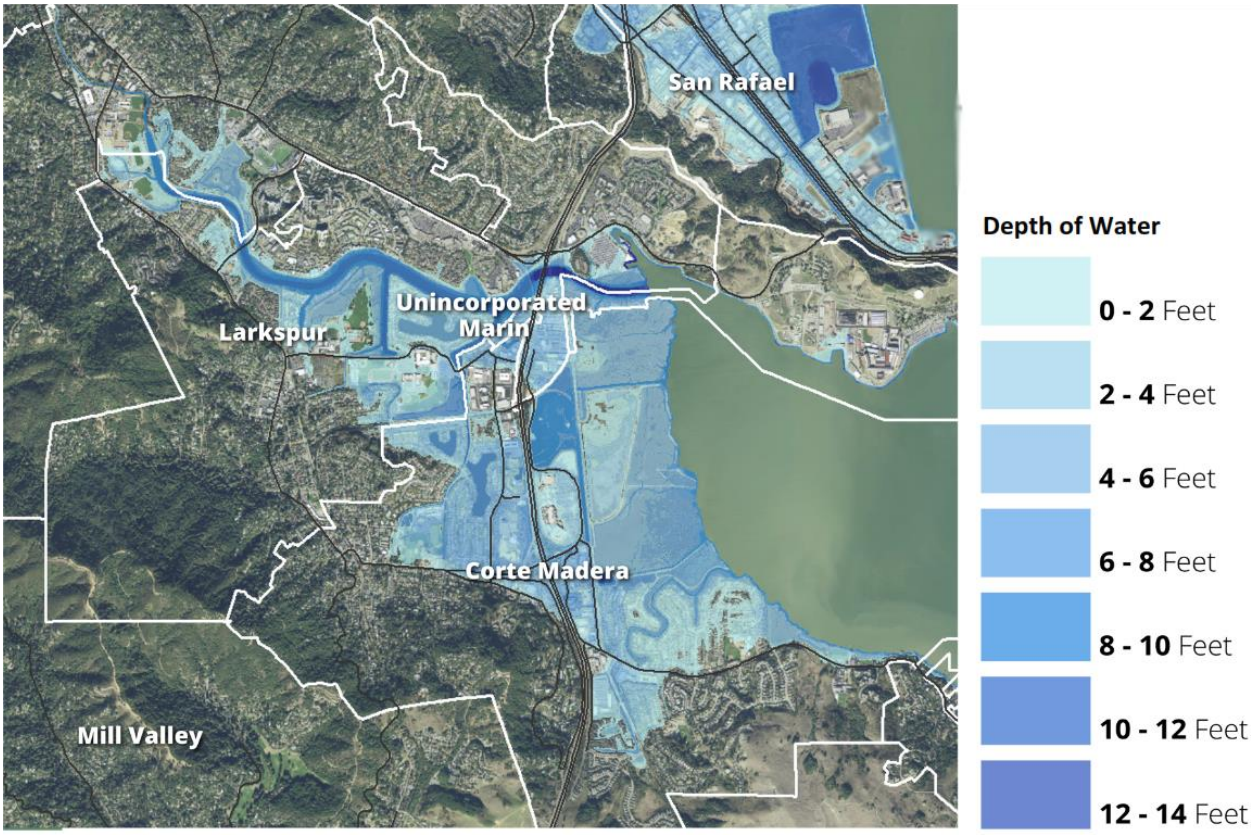
[11] Ackerly et al., *San Francisco Bay Area Summary Report*, p. 14.
[12] G. Griggs, J. Árvai, D. Cayan, R. DeConto, J. Fox, H. A. Fricker, R. E. Kopp, C. Tebaldi, and E. A. Whiteman (California Ocean Protection Council Science Advisory Team Working Group), *Rising Seas in California: An Update on sea level Rise Science* (California Ocean Science Trust, April 2017), p. 17, http://www.opc.ca.gov/webmaster/ftp/pdf/docs/rising-seas-in-california-an-update-on-sea-level-rise-science.pdf.

the sea level rise. For example, a modest 10-inch sea level rise alone could reach 5,000 acres, 700 buildings, and 8 miles of roads along the bay. But a 60-inch sea level rise, combined with a 100-year storm surge, could inundate 18,000 acres, 12,000 buildings, and 130 miles of roads.[13] According to a recent study by Climate Central and Zillow, as many as 10,000 Marin homes would be subject to annual flooding by 2100 under a high emissions scenario. The study also found that almost 50 homes built in the county between 2010 and 2016 are at risk of flooding by 2050 under almost any plausible scenario.[14]

As Figure 2 shows, a 4-foot rise in sea level will cause a large portion of the Larkspur and Corte Madera area—including a lengthy stretch of U.S. Highway 101—to be permanently flooded. Some low-lying areas will be flooded to a depth of 10 feet or more.

Adapting to higher sea levels will be costly no matter what measures, such as managed retreat or shoreline protection, are taken. One estimate for Marin County anticipates spending $1.1 billion

Figure 2. Sections in the Larkspur-Corte Madera Area Vulnerable to 4-Foot Sea Level Rise



Source: Reproduced with slight modifications from Marin County, *Adaptation Land Use Planning*, February 2020, p. 12, https://www.marincounty.org/-/media/files/departments/cd/slr/alup0228.pdf?la=en.

[13] BVB Consulting LLC, *Marin Shoreline Sea Level Rise Vulnerability Assessment,* pp. 25, 43, 63.
[14] Climate Central and Zillow, *Ocean at the Door*.

by 2040 to construct 133 miles of seawalls to protect communities from the effects of sea level rise.[15] This estimate is only for seawalls, and does not include other costs, such as necessary changes to infrastructure, relocation or protection of utilities and sanitation facilities, or modification of roads or structures. A proposed seawall for Belvedere, including relocation of utilities and related work, carries an estimate as high as $27.4 million.[16]

More than any of the other expected consequences of climate change on Marin, sea level rise may be the easiest to visualize and has received the most detailed attention by planners. That is why this report, in discussing the effects of climate change on the county and programs to address them, discusses sea level rise in greater depth. But other projected impacts of climate change are also concerning. For example:

- **Health Impacts.** Public health will be threatened by more extreme heat events and wildland fires; increased air pollution, vector-borne disease, indoor mold, and pollen; longer and more frequent droughts; flooding and landslides from sea level rise and more intense winter storms; and release of contaminants from flooded hazardous waste sites. Potential disruption of the transportation network could hamper people's ability to move away from danger. It could also interfere with access to healthcare, as well as the ability of hospitals, clinics, and emergency responders to operate.
- **Ecosystem Impacts.** The quantity and quality of water in creeks will suffer from longer dry seasons, more frequent and severe droughts, and catastrophic wildfires, negatively affecting invertebrates, fish, amphibians, and other animals. The Bay Area environment will become less suitable for evergreen forests, including redwoods and Douglas fir, and more favorable for vegetation such as chamise chaparral, a shrub that is particularly flammable during hot, dry weather, further increasing the danger of wildland fires.
- **Socioeconomic Impacts.** Regional socioeconomic inequity will be exacerbated because lower-income and minority households, which disproportionately live in locations more vulnerable to climate and other environmental risks, will have greater difficulty preparing for and recovering from heat waves, floods, and wildfires.[17]

Although the timing and magnitude of climate change are uncertain, it is happening, and it will affect the quality of life of everyone who lives in, works in, or visits Marin. What are we doing as a community to meet this challenge, and what more should we be doing? These are the questions at the heart of this investigation.

DISCUSSION

Mitigation and Adaptation: Two Essential Pillars of a Climate Change Strategy

Actions to address climate change are generally divided into two categories:

> **Mitigation—**These are actions to reduce greenhouse gases and other causes of climate change. They include reducing energy use, converting to low-carbon energy sources, and

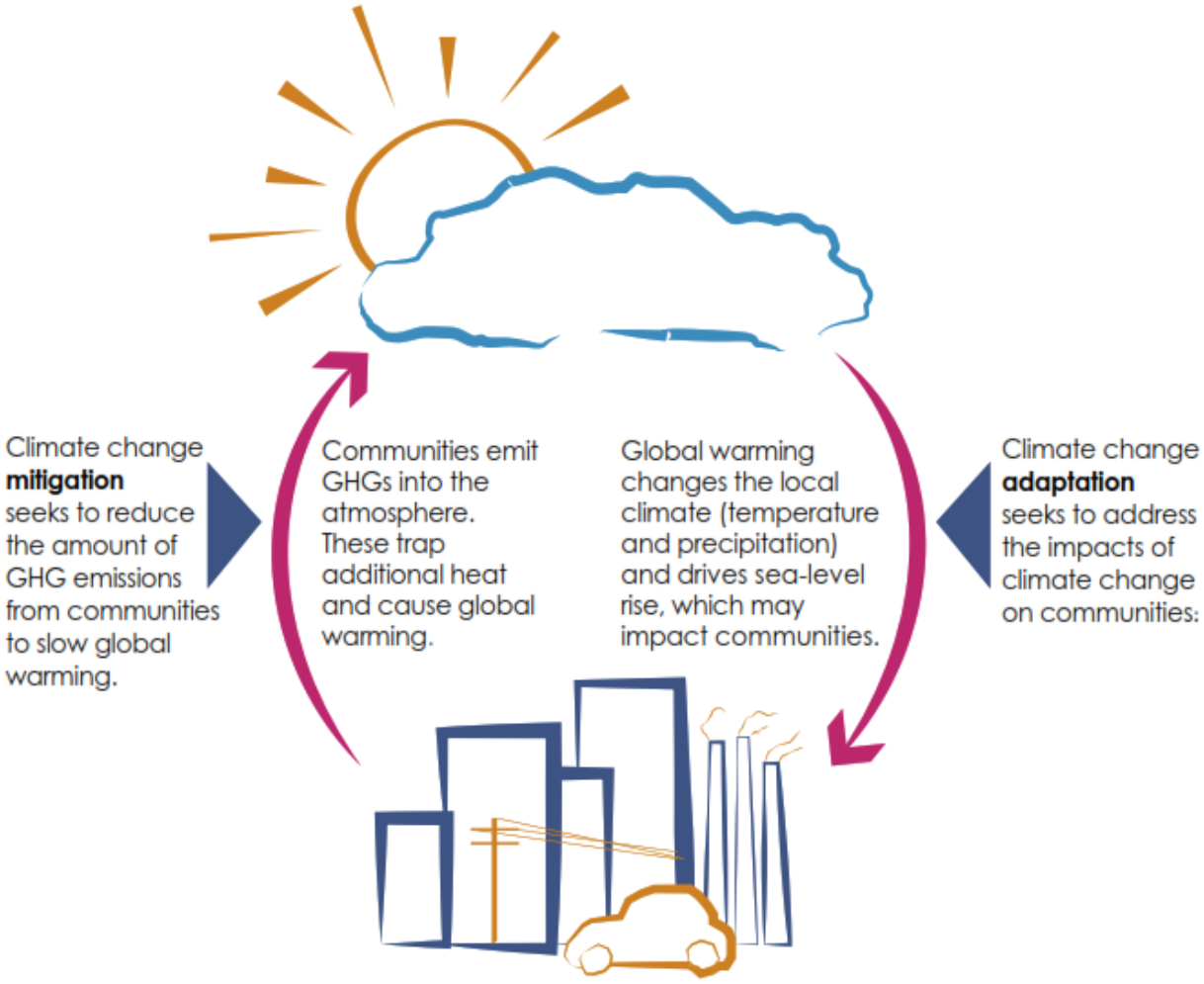
[15] Sverre LeRoy and Richard Wiles, *High Tide Tax: The Price to Protect Coastal Communities from Rising Seas*, Center for Climate Integrity, June 2019, www.climatecosts2040.org.
[16] "Cost," Belvedere Sea Wall, accessed April 18, 2020, https://belvedereseawall.org/cost/.
[17] Ackerly et al., various pages.

expanding forests and other "sinks" that remove and sequester carbon dioxide from the atmosphere.

Adaptation—These are actions to protect people and places from the effects of climate change. They include building seawalls, restoring shoreline wetlands, relocating buildings and highways to higher ground, preparing for impacts on human health, preventing and preparing for wildfires, and diversifying crops.

Figure 3 depicts the relationship between mitigation and adaptation. In some cases, these approaches overlap. For example, the restoration of shoreland wetlands can both reduce tidal flooding and increase carbon sequestration.

Figure 3. Roles of Mitigation and Adaptation Efforts in Addressing Climate Change



Source: Reprinted with minor modifications from California Governor's Office of Emergency Services, *California Adaptation Planning Guide*, final public review draft, March 2020, p. 16, https://www.caloes.ca.gov/HazardMitigationSite/Documents/APG2-FINAL-PR-DRAFTAccessible.pdf.

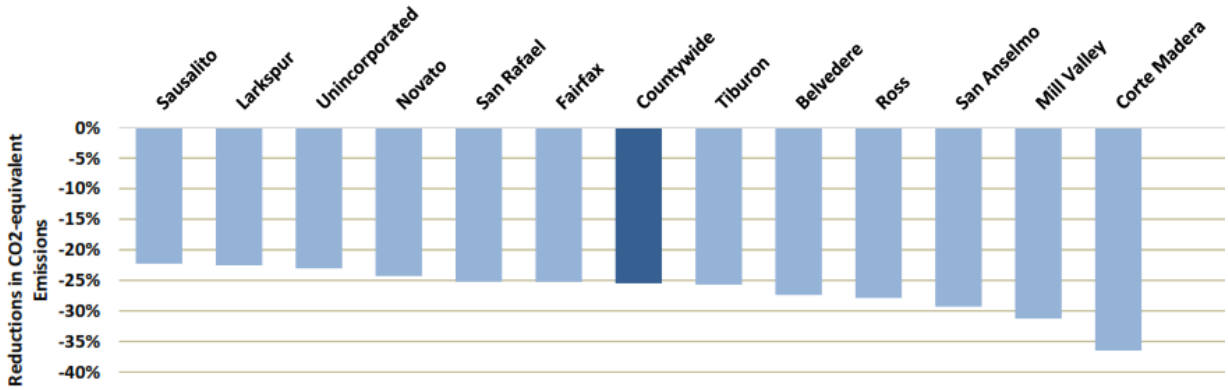
As the moderated emissions graph in Figure 1 shows, if net emissions of greenhouse gases can be reduced, future sea level rise (and, by implication, other negative effects of climate change) will be reduced. That is why mitigation efforts are so important.

Figure 1 also shows that reducing greenhouse gas emissions can only lessen, not eliminate, the effects of climate change. Even under the most optimistic scenarios, sea levels will continue to rise and our environment will be altered. As NASA states, "Carbon dioxide . . . lingers in the atmosphere for hundreds of years, and the planet (especially the oceans) takes a while to respond to warming. So even if we stopped emitting all greenhouse gases today, global warming and climate change will continue to affect future generations."[18] That is why adaptation efforts are just as crucial as mitigation efforts.

Mitigation Programs in Marin

Mitigation efforts started in Marin in 2002 when the county resolved to join the Cities for Climate Protection Campaign. Since then, Marin's county, city, and town governments have all developed climate action plans focused on reducing greenhouse gas emissions. Innovative mitigation initiatives—such as Marin Clean Energy (now called MCE), Electrify Marin, the Marin Solar Project, the Marin Energy Watch Partnership, Resilient Neighborhoods, and Drawdown: Marin— all have had a positive impact or show promise for further progress. From 2005 to 2018, according to Marin Climate & Energy Partnership data, countywide greenhouse gas emissions decreased by 25 percent.[19] Figure 4 provides a breakdown of the emissions reduction by jurisdiction.

Figure 4. Greenhouse Gas Emissions Reductions in Marin County, by Jurisdiction, 2005–2018



Source: Based on June 19, 2020, data from Marin Climate & Energy Partnership, "Marin Tracker," accessed June 29, 2020, http://www.marintracker.org/. Note that this chart is based on the raw Marin Tracker data and differs slightly from a similar chart on the Marin Climate & Energy Partnership website.

[18] NASA, "Responding to Climate Change," no date, accessed November 27, 2019, https://climate.nasa.gov/solutions/adaptation-mitigation/.
[19] Marin Climate & Energy Partnership, "Marin Tracker," accessed June 29, 2020, http://www.marintracker.org/.

As a community, we must continue our resolve to shrink our carbon footprint. A more detailed overview of Marin's mitigation efforts is set forth in Appendix A, and a list of the primary governmental organizations and programs in Marin involved with climate change is included in Appendix B.

Adaptation Planning Efforts in Marin

Formal planning for how Marin will need to adapt to climate change did not begin until mid-2014 when the county government formed the Collaboration: Sea-level Marin Adaptation Response Team (C-SMART) to research the potential impacts of sea level rise on West Marin and to work with coastal communities to plan for those impacts. By 2018, C-SMART had completed both a vulnerability assessment[20] and a report presenting possible options for accommodating, protecting against, or retreating from the threats of sea level rise.[21] As of March 2020, C-SMART's priorities included working with the California Coastal Commission to finalize an updated Local Coastal Program that will enable C-SMART to create a comprehensive adaptation plan for the coastal shore.

A similar but separate county project was started in September 2015 to assess the potential impacts of sea level rise on Marin's eastern shoreline. This project was dubbed the Bay Waterfront Adaptation and Vulnerability Evaluation (BayWAVE). In 2017, BayWAVE completed an assessment of the potential impacts of sea level rise on Marin's bayside communities through the end of this century.[22] Based in part on that assessment, in early 2020 the county published a guide detailing the land-use planning tools available to adapt to rising sea levels.[23]

With vulnerability assessments completed for both the ocean and bay sides of Marin, we have a good understanding about which portions of the county's critical infrastructure will be affected by sea level rise and the extent to which private property is at risk under various scenarios. So, at least with respect to sea level rise, important groundwork has been laid for the development of adaptation strategies.

Marin Should Take a Fresh Approach to Adaptation Planning

Public servants in Marin's county government and local communities have generally done outstanding work on climate change, but the county lacks a comprehensive approach to climate change adaptation planning. Most of Marin's municipalities do not yet know how to approach this difficult task. The adaptation planning process needs a reboot.

[20] C-SMART, Marin County Community Development Agency, *Marin Ocean Coast Sea Level Rise Vulnerability Assessment*, May 2016, https://www.marincounty.org/-/media/files/departments/cd/planning/sea level rise/c-smart/2018/01_draft_title_pages_toc_va_sea level rise_18_02_05.pdf?.
[21] C-SMART, Marin County Community Development Agency, *Marin Ocean Coast sea level rise Adaptation Report*, February 2018, https://www.marincounty.org/-/media/files/departments/cd/planning/sea level rise/c-smart/2019/181211_csmart_adaptation_report_final_small.pdf?.
[22] BVB Consulting LLC, *Marin Shoreline Sea Level Rise Vulnerability Assessment*.
[23] Marin County, *Adaptation Land Use Planning*, February 2020, https://www.marincounty.org/-/media/files/departments/cd/slr/alup0228.pdf?la=en.

A Mandate for Adaptation Planning

Developing adaptation strategies is not an option; it is the law. California state law has long required each municipality and county to adopt a comprehensive, long-term general plan for the jurisdiction's physical development.[24] In October 2015, the governor signed into law Senate Bill 379, which added the requirement that jurisdictions update the so-called safety element of their general plans to "address climate adaptation and resiliency strategies." This law states that these updates must include "a set of adaptation and resilience goals, policies, and objectives" and "a set of feasible implementation measures designed to carry out the goals, policies, and objectives."[25] This requirement took effect January 1, 2017. If the required information is contained in another type of planning instrument—for example, a stand-alone adaptation plan, a climate action plan, a Local Coastal Program, land use codes, or zoning regulations—the other instrument may be incorporated into the general plan by reference.

In Marin, various planning instruments have been used, or are currently being developed, to address climate adaptation, but none of them yet meet this law's requirements. All of the climate action plans developed by Marin's municipalities and the county government focus on mitigation. Adaptation is addressed only in generalities. The county's general plan was adopted in 2007 and last amended in 2014,[26] and most of the general plans of Marin's 11 cities and towns are older. All of the general plans predate the C-SMART and BayWAVE assessments and do not present detailed adaptation measures. Several municipalities are in the process of updating their general plans, but in a survey regarding their updates, only San Rafael stated that it expects to comply with this law.[27] Under the most generous interpretation of the law, the county government must begin updating its general plan to incorporate climate adaptation strategies no later than January 1, 2022. These strategies need to cover more than just sea level rise, which means there is much more work to do.

A Commonsense Objective: A Multi-Jurisdictional Adaptation Plan

Marin's jurisdictional puzzle, geographical layout, transportation infrastructure, and other interdependencies call for comprehensive adaptation solutions. Climate change is a countywide issue, not one limited to waterfront or hillside communities. We breathe the same air, drive the same roads, benefit from common watersheds, and share central sanitation facilities, all without regard to the boundaries of our city or town or our neighborhood geography. When Highway 101 floods due to storm surge, all residents are affected, not just those living near the water. Effective planning will require countywide collaboration and coordination.

To date, however, the few forays into adaptation planning have been initiated by individual jurisdictions. These jurisdictions are not working toward a common solution, and they are taking different approaches. For example, Corte Madera has taken the initiative to develop a stand-

[24] California Government Code § 65300, accessed March 10, 2020, http://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?sectionNum=65300.&lawCode=GOV.
[25] California Government Code § 65302(g)(4), accessed March 10, 2020, http://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?sectionNum=65302.&lawCode=GOV.
[26] Marin County Community Development Agency, *Marin Countywide Plan*, November 6, 2007 (reprinted October 2014), p. 2.6–12, https://www.marincounty.org/-/media/files/departments/cd/planning/currentplanning/publications/county-wide-plan/cwp_2015_update_r.pdf?la=en.
[27] Marin County, *Adaptation Land Use Planning*, February 2020, p. 33.

alone adaptation plan. It has included representatives from the county and other local agencies, including the public works departments of San Rafael and Larkspur, on the project's advisory committee, but the town does not anticipate that the final plan (scheduled for release February 2021) will make recommendations beyond the scope of its own jurisdiction. As shown in Figure 2, Corte Madera, Larkspur, and unincorporated Marin share a common flood zone; it would be nearly impossible for Corte Madera to resolve its sea level rise flooding problems without joint action with Larkspur and the county, not to mention the Ross Valley. Corte Madera is well aware of this fact and is in ongoing conversation with the county and surrounding jurisdictions regarding the project and how to collaborate on adaptation strategies. That is constructive, but successful outcomes will require a formal commitment to joint action.

In addition to adaptation efforts in Corte Madera, there are also programs underway in Belvedere and San Rafael. The box on the next page describes these efforts.

One explanation for these individual approaches is that the process for adaptation planning is not yet well settled. As climate change concerns have grown, separate jurisdictions have grafted varying adaptation plans onto their preexisting planning instruments. Just as there was a time when climate action plans did not yet exist, such is the case today for climate change adaptation plans.

Fortunately, California's state government has been refining guidance to assist local governments and regional collaboratives in developing an effective planning process. In 2012, the state government issued its *California Adaptation Planning Guide*,[28] and a revised version was made available for final public comment in March 2020.[29] The March 2020 draft is a comprehensive document of more than 250 pages. The draft 2020 guide notes that "regional governments may also conduct adaptation work for all jurisdictions in their area, and multiple jurisdictions may collaborate on regional adaptation work."[30] The Grand Jury recommends restarting Marin's climate change adaptation planning process and believes that it should follow the roadmap set forth in the *California Adaptation Planning Guide.* The goal would be to create a single, comprehensive, multi-jurisdictional adaptation strategy for all of Marin.

There is precedent in Marin for collaboration on similar planning efforts. The county updated its local hazard mitigation plan in December 2018 and, unlike previous plans, this one is "multi-jurisdictional" and covers all of Marin.[31] It was developed with input from Marin's towns and cities, and all of the municipalities formally adopted it in 2019. This could serve as a model for collaborating on a countywide multi-jurisdictional adaptation plan, which could be incorporated along with the local hazard mitigation plan into the general plans of the county, cities, and towns. That would bring coherence and efficiency to this difficult, but badly needed, effort.

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[28] California Emergency Management Agency and California Natural Resources Agency, *California Adaptation Planning Guide*, July 2012, https://www.caloes.ca.gov/HazardMitigationSite/Documents/001APG_Planning_for_Adaptive_Communities.pdf.

[29] California Governor's Office of Emergency Services, *California Adaptation Planning Guide*, final public review draft, March 2020, https://www.caloes.ca.gov/HazardMitigationSite/Documents/APG2-FINAL-PR-DRAFTAccessible.pdf.

[30] California Governor's Office of Emergency Services, *California Adaptation Planning Guide,* final public review draft, March 2020, p. 42.

[31] Marin County, *Multi-Jurisdiction Local Hazard Mitigation Plan*, 2018, https://www.marinwatersheds.org/sites/default/files/2019-10/2018-MCM-LHMP_web.pdf.

Cities and Towns Proceed Independently

In 2019, Corte Madera launched a project to develop an adaptation plan addressing both sea level rise and wildfire risk. The town engaged an outside consulting firm to lead the effort, created a dedicated website, and, as of February 2020, had held at least two community engagement events. To help guide the project, a 16-member Resilience Advisory Committee was formed, consisting of planners and other representatives from the county and other local agencies. Corte Madera anticipates completing its adaptation plan in February 2021.[32]

In 2019, Belvedere formed the Committee to Protect Belvedere's Seawalls, Levees, and Utilities to address seismic and flooding concerns, primarily along Beach Road and San Rafael Avenue. The city created a dedicated website to track the effort and has been working with outside engineers and architects on design solutions.[33] The plan would raise the height of existing seawalls by 3½ feet.[34]

San Rafael is in the process of updating its general plan and, as part of that, announced in early 2020 that it intends to include an adaptation report with that plan and to subsequently develop a comprehensive adaptation plan for the city. The city also announced its intention to adopt land use regulations, zoning overlays, and real estate disclosure requirements to address the growing risks of sea level rise. San Rafael is also working on several projects in East San Rafael to restore marshlands and possibly raise some levees in anticipation of sea level rise.

Architectural rendering of one proposed concept for a continuous seawall along Beach Road in Belvedere. The total project cost is estimated to be between $11 million and $27.4 million. (Rendering by One Architecture)

[32] "Corte Madera: Adapting to Climate Change," accessed April 23, 2020, https://cortemaderaadapts.org.
[33] Belvedere Sea Wall Project, accessed April 18, 2020, https://belvedereseawall.org.
[34] Hannah Weikel, "City Unveils Refined Plans for Extensive Seawalls Work," *The ARK*, December 25, 2019.

A Robust Framework for Moving Forward

As shown in Figure 5, the draft 2020 *California Adaptation Planning Guide* recommends a four-phase process for adaptation planning. Through the BayWAVE and C-SMART programs, Marin has tackled the second phase of the recommended planning process—assessing vulnerabilities—at least with respect to sea level rise. The third phase entails defining the adaptation framework and strategies.

But for any reboot of the planning process to be successful, it must start off on the right foot. The *first* phase outlined in the draft 2020 guide—explore, define, and initiate—has never been undertaken in Marin on a comprehensive countywide basis. Laying the groundwork in these areas will be critical to any planning effort.

As described in the guide, this first phase starts with the formation of an inclusive project task force responsible for the planning process. Consequently, the Grand Jury recommends the formation of the Marin Climate Adaptation Task Force which should be composed of representatives from county government, cities and towns, and other agencies affected by climate change. The task force should also include representatives of the public to ensure community support and representation of socioeconomically underserved areas. Ideally, the task force would have a combination of technical skills, planning skills, public engagement expertise, and financial know-how. As the initial stage of its work, the task force would define the vision for the planning project and the expected outcomes, with the primary objective being the creation of

Figure 5. Adaptation Planning Process Recommended in the Draft California Adaptation Planning Guide

Source: Reprinted from California Governor's Office of Emergency Services, *California Adaptation Planning Guide,* final public review draft, March 2020, p. 2. https://www.caloes.ca.gov/HazardMitigationSite/Documents/APG2-FINAL-PR-DRAFTAccessible.pdf.

a countywide adaptation strategy. It could be supported by one or more working groups or advisory teams representing key stakeholders. As stated in the *California Adaptation Planning Guide*, the task force should have a leader "empowered to make recommendations and/or have direct access to decision-makers."[35]

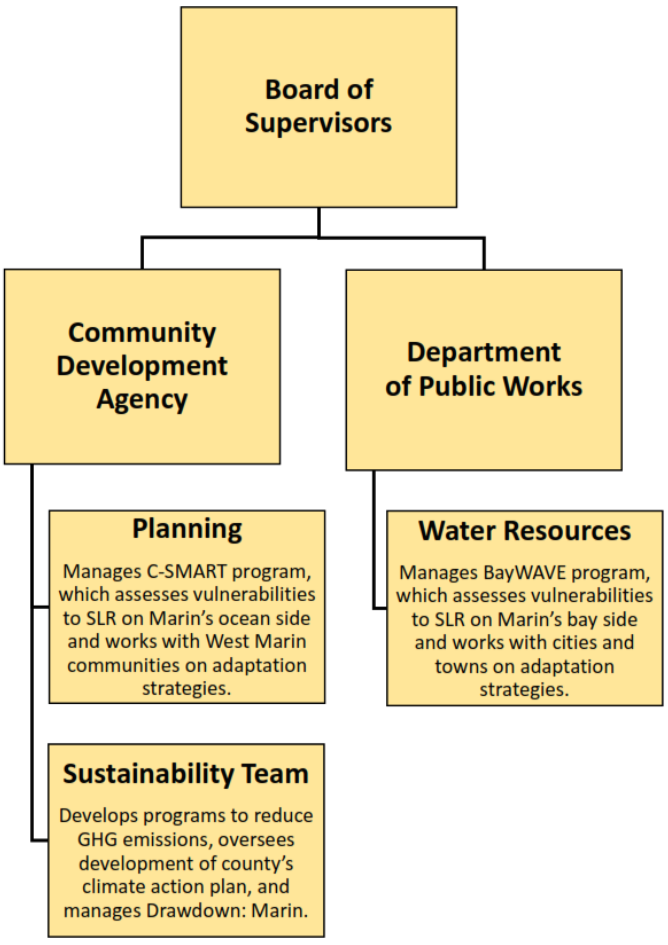
A planning process that is inclusive, deliberate, and goal-oriented will surely give Marin a greater chance of success. By committing to a more collaborative approach, Marin will be better prepared for the difficult climate change challenges that lie ahead. The cost of addressing climate change could be enormous. The cost of doing it haphazardly could be even greater.

The County Government's Organization of Climate Change Efforts Is Too Decentralized

Whether or not Marin's leaders agree on the benefits of a comprehensive, countywide plan and task force for addressing climate change, they should assess whether their current efforts could be made more efficient and effective.

The caliber of people throughout the county who are working on the climate problem is impressive, but their efforts may be hindered by organizational shortcomings. At the county level, the most active programs for addressing climate change reside in two departments: the Community Development Agency and the Department of Public Works, both of which report to the board of supervisors. As Figure 6 shows, the Community Development Agency's Sustainability Team is responsible for mitigation planning, including development of the county's climate action plan, but adaptation efforts are split between the two departments.

Figure 6. County Government Departments with Major Climate Change Roles



County Mitigation Programs

The Community Development Agency's Sustainability Team works on the county's climate action plan and programs to promote renewable energy, encourage green building, recognize green businesses, and implement energy efficiency projects. It also supports the Drawdown: Marin program, a

[35] California Governor's Office of Emergency Services, *California Adaptation Planning Guide,* final public review draft, March 2020, p. 49.

collaborative effort in the county to develop policies and incentives that will help to further reduce, or "draw down," countywide greenhouse gas emissions. (The county's mitigation efforts are described in more detail in Appendix A.)

The Grand Jury identified several areas of concern in the current arrangement of the Sustainability Team:

- **Limited Authority.** Although the Sustainability Team coordinates with other county departments, it has no authority to direct their mitigation efforts.
- **Fragile Institutional Structure.** Members of the Sustainability Team have significant one-on-one contact with individual members of the board of supervisors, who may direct the team to address certain priorities over others. Climate change initiatives appear to have limited institutional durability.
- **Budgetary Uncertainty**. Of the seven people currently on the Sustainability Team, five are completely or partially dependent on grants for their paychecks; and four have limited-term employment, with their current terms expiring between September 2020 and August 2021. As a consequence of the COVID-19 pandemic, funding for these positions may have become even more precarious.

County Adaptation Efforts

The Community Development Agency's planning division leads the C-SMART initiative, which is focused on the potential impacts of sea level rise on West Marin. Staff from the Department of Public Works' water resources division, with support from Community Development Agency planners, lead BayWAVE, the project focused on Marin's San Francisco Bay shoreline.

Although the C-SMART and BayWAVE projects reside in different departments and thus do not report to the same director, staff on both projects maintain that there is ongoing collaboration between the two groups. Indeed, they worked together to develop a guide that details the land-use planning tools available to adapt to rising sea levels. The county government published this guide in early 2020.[36] Nonetheless, the current arrangement has its drawbacks:

- **Reliance on Informal Collaboration.** Will C-SMART and BayWAVE complement each other or compete for resources? The collaboration that has occurred to date has been largely on an informal, peer-to-peer basis among staff members with common interests and goals. It is unclear how the adaptation efforts going forward will be coordinated or prioritized, if at all. For example, how will the relative priority of coastal and bayside needs be determined if these programs are not managed jointly? It is hard to see a benefit from keeping these efforts separate.
- **Different Analytical Approaches.** The scenarios of potential sea level rise and storm surges used in BayWAVE's vulnerability assessment do not match the ones used in the C-SMART assessment. It is therefore quite difficult to determine the impact of any single

[36] Marin County, *Adaptation Land Use Planning*, February 2020.

Wetland Restoration Projects

The Marin County Parks project to restore subtidal and intertidal habitat at wetlands within McInnis Park aims to protect the park from sea level rise and maintain the San Francisco Bay Trail connection to Las Gallinas Valley Sanitary District. (Marin County Parks photo)

The county is currently exploring nature-based adaptation options, also called living shorelines, for protecting low-lying areas along the bay and ocean from sea level rise. These nature-based measures can not only reduce the vulnerability of communities to flood hazards but also provide fish and wildlife habitat, recreational opportunities, and carbon sequestration. In collaboration with the Golden Gate National Parks Conservancy, Marin County Parks is developing conceptual plans for a nature-based sea level rise adaptation project at the Bothin Marsh Open Space Preserve in Mill Valley.[37] And in partnership with Las Gallinas Sanitary District and the Marin County Flood Control and Water Conservation District, the parks department is working on solutions to restore tidal wetlands in McInnis Park at the edge of San Pablo Bay in San Rafael.[38]

scenario on the entire county. In the future, will the planning tools and frameworks adopted by C-SMART be compatible with those used by BayWAVE?

- **Limited Staffing**. The staff working on the C-SMART and BayWAVE adaptation programs—four or five employees—are not dedicated full time to keeping up with this dynamic field. They have many other responsibilities and limited time to get their jobs done.
- **Insufficient Attention to Health and Other Risks.** With the county's focus being on sea level rise, other climate change risks, such as health risks caused by extreme weather events and rising temperatures, have received less attention in the county. The Health and Human Services department does not yet have a position focused full time on the health risks of climate change but the need for this will surely grow.

At least one other county department, Marin County Parks, is also involved with adaptation issues. Two of that department's projects are described in the box above.

[37] Marin County Parks, "Creating a Shared Vision for Preservation and Recreation at Bothin Marsh," accessed April 23, 2020, https://www.marincountyparks.org/projectsplans/land-and-habitat-restoration/bothin-marsh-community-vision.
[38] Marin County Parks, "Reclaiming Historic Tidelands and Protecting against Sea Level Rise at McInnis Park," accessed April 23, 2020, https://www.marincountyparks.org/projectsplans/land-and-habitat-restoration/marsh-restoration-mcinnis-park.

A Model for Better Coordination

The Grand Jury is concerned that there is no single body in the county government, other than the board of supervisors, empowered to lead and coordinate the county's overall approach to climate change. In 2020, Marin's county administrator formed a climate change budget working group, but it is unclear how it might help climate change efforts to coalesce around a unified strategy.

What the Marin County government needs is an overarching leadership structure that would coordinate the climate-related efforts not only in the Department of Public Works and the Community Development Agency, but also in Health and Human Services, Parks, Agriculture, and all other departments affected by climate change.

This need could be met in various ways, but the Grand Jury urges the county government to take a close look at the approach taken by San Mateo County. In 2014, San Mateo formed an Office of Sustainability that focuses on climate change mitigation and adaptation, as well as energy and water, transportation and housing, and waste reduction. Reporting directly to the county manager, this office is well positioned to secure collaboration and cooperation from other county departments. San Mateo's effort started with a small full-time staff about the size of Marin's existing seven-person Sustainability Team and has since grown to more than 35. (San Mateo has about three times as many residents as Marin.)

Marin's county government should reorganize its climate change efforts to achieve greater focus by creating an office similar to San Mateo's. This new office should report either to the county administrator or directly to the board of supervisors. It should have a full-time senior leader and be staffed primarily, if not exclusively, by current county government personnel. The existing Sustainability Team, including Drawdown: Marin support, should be moved into (or be accountable to) the new office. Community development and public works employees engaged in climate change activities should either work full time in the new office or should have direct accountability to the new office's leadership for their climate change work. This new entity, which in this report will be referred to as the Office of Sustainability and Resilience, would be charged with the following responsibilities with respect to climate change:

- Managing and coordinating climate change mitigation and adaptation planning and programs across county departments
- Identifying and cultivating sources of funding for climate adaptation and mitigation efforts

This last point deserves elaboration. Funding is needed now for staffing, planning, policy development, and implementation of pilot projects. The county does not have a centralized grant application office, so grant applications are prepared by the department seeking the funding. The county should explore the creation of a dedicated resource within the new Office of Sustainability and Resilience where all grant applications related to climate change would be coordinated. Ideally, this position could be self-funded. Expertise in the grant application process, coupled with the expertise of the functional area requesting the grant, should result in more grants being obtained. In addition, this position could serve as a clearinghouse of grant-related information for Marin's municipalities and other agencies. Collaborative countywide climate proposals have a better chance of being funded.

It is critical to acknowledge that efforts to combat climate change—especially adaptation efforts—will require much more focus, investment, and coordination moving forward if we are to protect our communities and our standard of living. A dire need for funding has not confronted the county yet because Marin has yet to complete its adaptation planning or develop any timeline for implementation; but as it tackles the large public works projects that will be needed in the future, adequate staff resources and funding expertise will become critical.

Marin Needs Stronger Collaboration among the County, Cities, Towns, and Agencies

Collaboration does not come naturally to Marin's 152 independent cities, towns, schools, special districts, and other governing entities. But the need to collaborate on climate change is recognized by many. For example, San Rafael's *Climate Action Plan 2030* calls for the following action: "Work with local, county, state, regional, and federal agencies with bay and shoreline oversight and with owners of critical infrastructure and facilities in the preparation of a plan for responding to rising sea levels."[39] The county's 2015 climate action plan states that "effective adaptation requires coordination across many different stakeholders within a county"[40] and "cooperation with Marin County cities could help maximize efficiencies in implementing emissions reduction strategies."[41] San Anselmo's plan states, "San Anselmo doesn't exist in a vacuum. While we are leveraging or trying to combat regional, state-wide, national and even international actions and trends, we also have the ability and responsibility to collaborate with other efforts and campaigns."[42]

Planning and Policy Development

Although Marin's municipalities often resist yielding local control, two countywide efforts could serve as building blocks for a more comprehensive approach to adaptation policy development and planning. The first is the working group of Marin's county and municipal planners that helped develop the countywide, multi-jurisdictional local hazard mitigation plan recently adopted by the county's board of supervisors and all the cities and towns.[43] The success of that effort is an encouraging sign that the planners could expand their collaboration to include a consistent, coordinated approach to adaptation planning for all of Marin.

The second model for collaboration, this one currently focused on mitigation, is the Marin Climate & Energy Partnership, which is funded by contributions by each of its members. Marin's 11 municipalities and the county government formed this partnership in 2007 to help them work together on achieving their greenhouse gas emissions targets. The Transportation Authority of Marin, the Marin Municipal Water District, and MCE (formerly known as Marin Clean Energy) are also members. Almost all of the members are represented by staff-level planners, and a part-

[39] City of San Rafael, *Climate Action Plan 2030*, April 23, 2019, p. 31, https://www.cityofsanrafael.org/documents/climate-change-action-plan-2030/.
[40] ICF International, *Marin County Climate Action Plan (2015 Update)*, ICF 00464.13 (San Francisco, July 2015), p. ES-17, https://www.marincounty.org/-/media/files/departments/cd/planning/sustainability/climate-and-adaptation/execsummarymarincapupdate_final_20150731.pdf?la=en.
[41] ICF International, *Marin County Climate Action Plan (2015 Update)*, pp. 7–9.
[42] Town of San Anselmo, *Climate Action Plan 2030*, June 11, 2019, p. 47, https://www.townofsananselmo.org/DocumentCenter/View/24823/San-Anselmo-Climate-Action-Plan-2030-pdf?bidId=.
[43] Marin County, *Multi-Jurisdiction Local Hazard Mitigation Plan*, 2018.

time consultant coordinates their work. The partnership has developed greenhouse gas inventories for all of the cities, towns, and unincorporated areas in Marin, and it publishes this data on its website.[44] Because only two of Marin's cities and towns have full-time employees devoted to climate change, the partnership fills a gap by assisting municipalities with their climate action plans.

Given the climate partnership's success to date, the Grand Jury recommends that its mission be expanded to include comprehensive support for cities and towns on both mitigation and adaptation planning. It could also become the formal "home" for the less formal meetings currently held by the county and municipal planners. If the county forms the proposed Marin Climate Adaptation Task Force as recommended in this report, the partnership could play an important staff-level role supporting the work of the task force in developing a countywide adaptation plan. If the task force is not formed, the partnership could continue its role of supporting climate change policy efforts in the cities, towns, and other member agencies—but with an expanded scope that includes support for adaptation planning.

At this time, the climate partnership is staffed by just the one part-time consultant. The partnership should add the resources needed to support the cities, towns, and other members in developing their detailed adaptation measures, including formulating land use and zoning regulations. It is far more efficient to provide coordinated support for these efforts than having each city, town, or other agency find its own way. These expanded efforts could be funded through grants and a modest increase in the member contributions.

If formed, the new Office of Sustainability and Resilience recommended above should be the primary county liaison with the expanded climate partnership. The new office should work through the partnership to assist cities, towns, and other Marin agencies in building skills related to adaptation planning and in sourcing funding for planning and pilot projects.

Collective Action and Implementation

Beyond planning and policy development, there is currently no Marin organization on the horizon that will bring together the cities, towns, and other Marin agencies to collaborate on *implementing* climate change adaptation measures or, in the future, to finance and build the large multi-jurisdictional public works projects that will grow out of adaptation plans. There needs to be such an organization or forum.

Just as San Mateo County provides a model for coordinating climate-related functions within the county government, it also offers a possible model for countywide collaboration on implementation measures related to sea level rise. As described in the box on the next page, the new San Mateo County Flood and Sea Level Rise Resiliency District is a multi-jurisdictional agency designed to consolidate the work of the county's Flood Control District and Flood Resilience Program and to initiate new countywide efforts to address and protect against the impacts of sea level rise.[45] With representation from all 20 San Mateo cities, it is a truly collaborative countywide body that will plan for and implement the public works projects

[44] Marin Climate & Energy Partnership, accessed April 21, 2020, https://marinclimate.org/.
[45] Flood and Sea Level Rise Resiliency District, accessed February 4, 2020, https://resilientsanmateo.org/.

The San Mateo Flood and Sea Level Rise Resiliency District: A Potential Model for Implementing Marin's Adaptation Program

Beginning in 1959, San Mateo County had a flood control district similar to Marin's Flood Control and Water Conservation District. The San Mateo district's board was the county's board of supervisors. The district had separate flood control zones for each flood-susceptible area, with residents in each zone paying extra property taxes to fund the flood control projects in that zone. San Mateo's cities had no representation on the district's board. This is how Marin's current flood control district is organized.

In 2018, San Mateo County completed a vulnerability assessment regarding sea level rise under a project similar to Marin's BayWAVE effort. It projected that in the event of a mid-level 2100 sea level rise scenario, property with an assessed value of $34 billion would be flooded on the bay and coastal sides of the county.[46]

Several cities in San Mateo had pursued independent planning efforts related to sea level rise. In addition, the San Mateo City/County Association of Governments (C/CAG) had a program to assist the cities with stormwater management. However, according to a 2019 City of Menlo Park staff report, "since 2013, San Mateo County and the 20 cities and towns have increasingly recognized their competitive disadvantage in pursuing grant funding to respond to flooding and sea level rise in comparison with neighboring counties that have countywide agencies working on those issues."[47]

In 2017, C/CAG established a committee to study the best way to create a countywide effort to address flooding, regional stormwater, and sea level rise issues in the county. The committee recommended reorganizing the county's existing flood control district, and that proposal was approved by the county in early 2019. The reorganization required the passage of special legislation at the state level, which was approved by the governor on September 12, 2019, and became effective on January 1, 2020.[48] There will be a three-year startup period, during which the district will seek permanent sources of funding for its sea level rise initiatives. The following are key attributes of the new organization:

- The old flood control zones and funding mechanism will continue.
- Countywide sea level rise and resiliency will be added to the organization's mission, including both the coastal and the bayside shoreline.
- The district will now represent the county and all 20 of its cities, with a representative governing board of seven, two of whom are county supervisors.
- Each city will contribute between $25,000 and $55,000 per year, depending on its size, to fund startup operations.
- The district will have a small staff of its own, including a chief executive officer, although it will continue to rely on services provided by the county's Department of Public Works for engineering and other project support.

[46] County of San Mateo, *Sea Level Rise Vulnerability Assessment*, March 2018, p. 181,https://seachangesmc.org /wp-content/uploads/2018/03/2018-03-12_sea level rise_VA_Report_2.2018_WEB_FINAL.pdf.
[47] City of Menlo Park Department of Public Works, staff report, May 7, 2019, p. 1, https://www.menlopark.org/DocumentCenter/View/20709/I2---Flood-and-sea level-Rise---SR?bidId=.
[48] California Assembly Bill 825, https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201920200AB825.

needed to protect San Mateo from the effects of sea level rise. This new agency, which commenced operations January 1, 2020, has three primary objectives:

- To create a collaborative forum bringing all the cities in the county together in their efforts to adapt to sea level rise
- To build expertise, and help San Mateo's cities build expertise, in planning for and executing public works projects for sea level rise adaptation
- To better position San Mateo to compete for funding by creating a cross-jurisdictional entity serving the entire county.

The Grand Jury's investigation found that there is a strong consensus among Bay Area government leaders that funding sources for climate change adaptation favor regional or multi-jurisdictional efforts compared to projects by individual cities, towns, and agencies. Marin currently lacks a multi-jurisdictional climate change initiative like this, leaving it disadvantaged in funding efforts.

Marin's current flood control district is similar to San Mateo's old one. While Marin's district covers the entire county, it operates only in eight designated "zones" where there are flooding risks. Each zone has funding from property taxes paid by homeowners in the zone, and those funds are used to pay for flood control projects in the zone.

Although Marin's district is not charged explicitly with combating sea level rise or other climate change effects, increased flooding is certainly one result of extreme rainfall and weather events. In that sense, the district is already aligned with climate change adaptation.

Indeed, much of the infrastructure of the district—stormwater pump stations, detention basins, bypass drains, levees—is situated in the low-lying areas that constitute the front lines of sea level rise adaptation, so it makes sense for the district to play a key role in climate change adaptation.

The Grand Jury recommends that the county explore the feasibility of reorganizing the Marin County Flood Control and Water Conservation District in a manner similar to San Mateo's, to achieve similar goals of creating a collaborative forum; building the expertise of Marin's cities, towns, and agencies; and creating a multi-jurisdictional agency that will be highly competitive in the fundraising arena. The Grand Jury believes that the purview of the reorganized agency should be countywide and should include climate change adaptation efforts on both the coastal and bay side.

If the Marin Climate Adaptation Task Force is formed as recommended in this report, the task force could commission the feasibility study at the appropriate stage of its planning process. If the task force is not formed, the Grand Jury recommends that the board of supervisors commission the study as soon as it is financially able to do so.

Marin needs to create institutions enabling climate change collaboration among the jurisdictions within the county. With the reorganized flood control district as the collaborative agency responsible for planning and implementing public works projects across the county, Marin would be well positioned to lead on climate change adaptation efforts and compete for funding with other regions. This effort would be even stronger if supported by a newly created Office of Sustainability and Resilience in the county government and backed by a countywide climate change adaptation plan.

CONCLUSION

Over the lifetime of a child born in 2020, Marin County will be profoundly affected by climate change. Today's heavily populated shoreline areas will either be inundated by rising sea levels or be shielded by large sea walls. Highways will be rerouted or reengineered. The vegetation on Mt. Tamalpais will be altered. Health systems will be stressed. Socioeconomic inequities will worsen. We can lessen the severity of those impacts through concerted efforts to reduce greenhouse gas emissions and to sequester carbon. But we cannot reverse the trend.

Property owners and government officials will be facing hard choices. What losses are we willing to accept? How much are we willing to pay? What options do we really have? Nobody has all the answers, but we as a community need to aggressively, deliberatively, and cooperatively organize and plan to meet the climate threat.

As first steps, this report calls for several related but independent changes in Marin's approach to climate change. Our elected officials should establish a Marin Climate Adaptation Task Force to develop a comprehensive adaptation strategy for all of Marin. The county government should consolidate its climate efforts under a new Office of Sustainability and Resilience. The existing Marin Climate & Energy Partnership should expand its mission to support countywide adaptation planning. The county government should explore the feasibility of reorganizing Marin's Flood Control and Water Conservation District board into a countywide body with representatives from the county and all municipalities and the added responsibility of executing public works projects required to defend against sea level rise.

Each of these recommended measures would be a step in the right direction. Taken together, they would take Marin much closer to more effective management of the adaptation challenges that lie ahead. It's the least we can do for our children.

FINDINGS

F1. Climate change mitigation efforts by Marin governments have been notably effective in meeting their goals to reduce greenhouse gas emissions.

F2. Adaptation planning is essential to protect local public utility and transportation infrastructure as well as private property interests, and to enable Marin's citizens to maintain their current standards of living.

F3. With the BayWAVE and C-SMART initial vulnerability assessments completed, the county is now well-positioned to focus on adaptation planning and policies related to sea level rise.

F4. The existing adaptation efforts across the county pay insufficient attention to the other potential effects of climate change, including impacts on public health, ecosystems, and social equity.

F5. There are insufficient staff and financial resources devoted to climate change adaptation efforts across county government as well as in the cities, towns, and other agencies, and many of the existing efforts are highly dependent on grant funding.

F6. Within the county government, there is no single coordinating body focused on climate change, which could impede the ability to unify county efforts around a common strategy and plan.

F7. Cross-jurisdictional collaboration and coordination will be required for successful adaptation efforts, but Marin lacks any overarching organizational or governance structure to facilitate this.

RECOMMENDATIONS

R1. The board of supervisors, in collaboration with the municipalities and other agencies affected by climate change, should convene a multi-jurisdictional task force (referred to in this report as the Marin Climate Adaptation Task Force) charged with developing a single, comprehensive, multi-jurisdictional adaptation strategy for all of Marin.

R2. The board of supervisors should form a new office within county government (referred to in this report as the Office of Sustainability and Resilience) devoted to climate change mitigation and adaptation and reporting to the county administrator's office or the board of supervisors.

R3. The board of supervisors should direct the formation and staffing, preferably in the new Office of Sustainability and Resilience, of a centralized grant-seeking function related to climate change mitigation and adaptation efforts for county government.

R4. Each member of the Marin Climate & Energy Partnership, should declare its support for broadening the partnership's mission and increasing its funding as necessary to enable it to support overall climate change planning efforts, including both mitigation and adaptation in cities, towns, and other member agencies throughout the county.

R5. The board of supervisors should commission a feasibility study concerning the reorganization of Marin's Flood Control and Water Conservation District. This multi-jurisdictional study should analyze broadening the district's mission to include coastal and bayside sea level rise adaptation across the county as well as revising its governing membership to include representatives of the county and all Marin cities and towns. If the board of supervisors supports the formation of the Marin Climate Adaptation Task Force as recommended in this report, the responsibility for this study could be referred to the task force for consideration at the appropriate time.

R6. Each city and town, if it does not have a full-time sustainability coordinator (or similar position), should appoint a committee or commission charged with monitoring and reporting on its climate change mitigation and adaptation efforts.

REQUEST FOR RESPONSES

According to the California Penal Code, agencies required to respond to Grand Jury reports generally have no more than 90 days to issue a response. It is not within the Grand Jury's power to waive or extend these deadlines, and to the Grand Jury's knowledge, the Judicial Council of California has not done so. But we recognize that the deadlines may be burdensome given current conditions caused by the COVID-19 pandemic.

Whether the deadlines are extended or not, it is our expectation that Marin's public agencies will eventually be able to return to normal operations and will respond to this report. In the meantime, however, public health and safety issues are of paramount importance and other matters might need to wait.

Pursuant to Penal Code Section 933.05, the Grand Jury requests responses as shown below. Where a recommendation is addressed to multiple respondents, each respondent should respond solely on its own behalf without regard to how other respondents may respond.

From the following governing bodies:

- County of Marin (F1–F7, R1–R5)
- City of Belvedere (F1–F5, F7, R1, R4, R6)
- City of Larkspur (F1–F5, F7, R1, R4, R6)
- City of Mill Valley (F1–F5, F7, R1, R4, R6)
- City of Novato (F1–F5, F7, R1, R4, R6)
- City of San Rafael (F1–F5, F7, R1, R4, R6)
- City of Sausalito (F1–F5, F7, R1, R4, R6)
- Town of Corte Madera (F1–F5, F7, R1, R4, R6)
- Town of Fairfax (F1–F5, F7, R1, R4, R6)
- Town of Ross (F1–F5, F7, R1, R4, R6)
- Town of San Anselmo (F1–F5, F7, R1, R4, R6)
- Town of Tiburon (F1–F5, F7, R1, R4, R6)
- Marin Clean Energy (MCE) (F1–F4, F7, F8, R1, R4)
- Marin General Services Authority (R4)
- Marin Municipal Water District (F1–F5, F7, R1, R4)
- Transportation Authority of Marin (F1–F5, F7, R1, R4)

The governing bodies indicated above should be aware that the comment or response of the governing body must be conducted in accordance with Penal Code Section 933 (c) and subject to the notice, agenda and open meeting requirements of the Brown Act.

Note: At the time this report was prepared information was available at the websites listed.

Reports issued by the Civil Grand Jury do not identify individuals interviewed. Penal Code Section 929 requires that reports of the Grand Jury not contain the name of any person or facts leading to the identity of any person who provides information to the Civil Grand Jury. The California State Legislature has stated that it intends the provisions of Penal Code Section 929 prohibiting disclosure of witness identities to encourage full candor in testimony in Grand Jury investigations by protecting the privacy and confidentiality of those who participate in any Civil Grand Jury investigation.

APPENDIX A. MITIGATION EFFORTS IN MARIN

Marin County's institutional response to climate change began in 2002, and the focus for most of the years since then has been on mitigation measures—on actions to reduce greenhouse gases and other causes of climate change.

Targets and Plans

In April 2002, the Marin County Board of Supervisors adopted a resolution to join the Cities for Climate Protection Campaign. The resolution pledged the county to take a leadership role in promoting public awareness of climate change and to undertake efforts to reduce greenhouse gas and other air pollution emissions.[49] In June 2003, as part of that commitment, the county government completed its first analysis of greenhouse gas emissions levels.[50] Three years later, the board adopted the *Marin County Greenhouse Gas Reduction Plan,* setting a greenhouse gas reduction target of 15 percent below 1990 levels by 2020 for both community and municipal emissions in unincorporated Marin. Crediting government and private sector investments in energy efficiency, renewable energy, alternative fuel vehicles, water conservation, and waste minimization, the county reported that it met its community emissions target in 2012—eight years ahead of schedule.[51]

The *Marin County Climate Action Plan (2015 Update)* built on the 2006 plan, doubled the 2020 reduction target for community emissions, and listed actions the county would take to achieve the reductions.[52] Another update is scheduled to be completed before the end of 2020 and is expected to include forecasts, targets, and strategies to 2030.

Starting in 2009, all of Marin's incorporated cities and towns also developed their own climate action plans. Almost all of these local plans were developed with assistance from the Marin Climate & Energy Partnership (MCEP), a group that includes staff-level planners from Marin's county and municipal governments. MCEP has been instrumental in creating the greenhouse gas inventories needed for the climate action plans. Like the county's climate action plan, the municipal plans focus primarily on efforts the local governments and communities can take to reduce greenhouse gas emissions. Collectively, the patchwork of county and municipal plans covers all of Marin County. From 2005 to 2018, according to the MCEP, countywide greenhouse gas emissions dropped by 25 percent.[53]

A collaborative effort in the county to confront the challenge of climate change began in October 2017 when the board of supervisors adopted a resolution stating that "the County of Marin will work with County staff and community leaders to develop and implement policies and create incentives that will achieve dramatic greenhouse gas reductions, align climate action policies

[49] Marin County Board of Supervisors, Meeting Minutes, April 23, 2002, https://pav.marincounty.org/publicaccessbosarchive/.
[50] Marin County Community Development Agency, *Greenhouse Gas Emissions Analysis Report,* County of Marin Cities for Climate Protection Campaign (June 2003), https://www.marincounty.org/depts/cd/divisions/planning/sustainability/~/media/Files/Departments/CD/Planning/Sustainability/Initiatives/CCP_FinalReport.pdf.
[51] ICF International, *Marin County Climate Action Plan (2015 Update),* p. ES-1.
[52] ICF International, *Marin County Climate Action Plan (2015 Update),* pp. ES-1–ES-2.
[53] Marin Climate & Energy Partnership, "Marin Tracker," accessed June 29, 2020, http://www.marintracker.org/.

with the California Climate Adaptation Strategy, and adopt integrated strategies to achieve one "carbon free" goal."[54]

The initiative that sprouted from this resolution was named Drawdown: Marin, and it is managed by the county government's Community Development Agency. Its current goals are to reduce, or "draw down," net countywide greenhouse gas emissions by 60 percent by 2030, relative to 2005 levels, and to achieve net-zero emissions by 2045. To help meet these goals, it has formed working groups to develop solutions in six focus areas: renewable energy, transportation, buildings and infrastructure, carbon sequestration, local food and food waste, and climate resilient communities. These groups, called stakeholder collaboratives, consist of technical experts, community members, county and city staff, and others, many of whom are unpaid volunteers.

The original aim was for Drawdown: Marin's steering committee to endorse 12 to 18 solutions that, once approved by the board of supervisors, would be integrated into the 2020 update of the *Marin County Climate Action Plan*. [55] In July 2020, Drawdown: Marin issued a draft strategic plan that summarized 29 climate change solutions proposed by the stakeholder collaboratives, including 7 solutions that were endorsed by the steering committee for immediate implementation.[56] Drawdown: Marin also has a Community Partnership Council to engage people throughout the county in its efforts.

Implementation of Mitigation Programs

A major step in moving beyond planning and actually implementing mitigation measures was the 2010 launch of Marin Clean Energy, a joint powers authority that was California's first community choice aggregation (CCA) program. Authorized by the California legislature in 2002 under Assembly Bill 117, CCA programs allow communities to choose their electricity sources. Marin Clean Energy's initial participants were unincorporated Marin County and seven Marin cities and towns. It was explicitly created to help reduce greenhouse gas emissions:

> The purposes for the Initial Participants . . . entering into this Agreement include addressing climate change by reducing energy related greenhouse gas emissions and securing energy supply and price stability, energy efficiencies and local economic benefits. It is the intent of this Agreement to promote the development and use of a wide range of renewable energy sources and energy efficiency programs, including but not limited to solar and wind energy production.[57]

The remaining four Marin municipalities joined in 2011. Now calling itself MCE, the program has since added 22 municipalities and unincorporated areas in Contra Costa, Napa, and Solano Counties. PG&E provides electric delivery services, and customers in MCE's service areas are

[54] Marin County Board of Supervisors, Resolution No. 2017-104, October 3, 2017, https://marin.granicus.com/MetaViewer.php?view_id=36&clip_id=8757&meta_id=917217.
[55] "Drawdown: Marin Roadmap," June 2019 update, https://www.marincounty.org/-/media/files/departments/cd/planning/sustainability/climate-and-adaptation/drawdown-marin/drawdown-roadmap_updated-june-2019.pdf?la=en.
[56] County of Marin Sustainability Team, *Drawdown: Marin Strategic Plan*, draft, July 2020, https://www.marincounty.org/-/media/files/departments/cd/planning/sustainability/climate-and-adaptation/drawdown-marin/strategic-plan/draft-drawdown-marin-strategic-plan.pdf?la=en.
[57] Marin Energy Authority, Joint Powers Agreement, as amended through April 21, 2016, https://www.mcecleanenergy.org/wp-content/uploads/2017/03/JPA-Agreement-24-Communities_Updated-3.21.17.pdf.

automatically enrolled in the CCA unless they opt out. According to MCE, 60 percent of the electricity obtained through its default "Light Green" option is generated from renewable sources including solar, wind, bioenergy, geothermal, and small hydro. It says that its "Deep Green" option, which costs residential customers about $5 a month extra, provides "100 percent non-polluting wind and solar power produced in California." Half of the Deep Green premium supports local renewable energy projects such as solar farms and electric vehicle charging installations.[58] Climate action plans frequently promote Deep Green as a greenhouse gas reduction strategy.

The county government has also implemented programs to encourage residents to reduce their carbon footprint. Among them: Electrify Marin, a countywide program that provides financial incentives for residents to replace fossil-fuel appliances with high-efficiency electric appliances; the Marin Solar Project, which helps homeowners and businesses evaluate options for solar systems; and the Marin Energy Watch Partnership, which provides resources and incentive funds to help residents, businesses, and public agencies become more energy efficient. County agencies and many cities and towns have partnered with Resilient Neighborhoods, which conducts workshops to educate and motivate community members to reduce their household greenhouse gas emissions. Other actions taken by the county government and municipalities include installation of charging stations for electric vehicles.

[58] "Residential," MCE, accessed June 2, 2020, https://www.mcecleanenergy.org/residential/#.

APPENDIX B. CURRENT AND RECOMMENDED ENTITIES AND PROGRAMS REFERENCED IN THIS REPORT

The following is a brief description of the primary governmental organizations and programs in Marin involved in climate change mitigation and adaptation, or affected by climate change:

Name	Description
Marin County Community Development Agency	A department within county government responsible for planning, and land use and building regulation. The department also manages the C-SMART program.
Marin County Department of Public Works	A department within county government responsible for county roads and public works projects on county lands. The department also manages the BayWAVE program and provides all staff support to the Marin County Flood Control and Water Conservation District.
Marin County Department of Health and Human Services	A department within county government responsible for public health, behavioral health and recovery, and social services across the county.
Marin County Flood Control and Water Conservation District	The district manages flood control and water conservation efforts within eight geographical districts within the county funded by ad valorem taxes paid by property owners.
Marin County Parks Department	A department within county government responsible for managing public parks on county lands. The department also provides all staff support to the Marin Open Space District.
Drawdown: Marin	A program approved by the county in 2017 to work with community members to develop innovative climate change mitigation programs that can be implemented by Marin's governments.
BayWAVE	A program launched by the county in 2015 to assess the vulnerability of the county's eastern shore to sea level rise. The program is managed by the Marin County Department of Public Works.

Name	Description
C-SMART	A program launched by the county in 2014 to assess the vulnerability of the county's ocean shoreline to sea level rise. The program is managed by the Marin County Community Development Agency.
Marin Climate & Energy Partnership	A collaboration among Marin's cities and towns, MCE, Transportation Authority of Marin, and Marin Municipal Water District to assist members with their climate action plans and associated greenhouse gas inventories. The partnership was also involved in the formation of MCE and the development of associated energy efficiency programs. It is a program managed by the Marin General Services Authority.
Sustainability Team	A seven-person team within the Marin County Community Development Agency to manage climate change mitigation efforts within county government. It also provides support to Drawdown: Marin.

The following are new organizations to be formed as recommended by this report:

Name	Description
Marin Climate Adaptation Task Force	A task force to create a countywide adaptation plan that can be adopted by cities, towns and other agencies throughout the county.
Marin County Office of Sustainability and Resilience	An office reporting either to the County Administrator or the board of supervisors to unify mitigation and adaptation efforts within county government.