

2021–2022 MARIN COUNTY CIVIL GRAND JURY

ELECTRIFYING MARIN'S BUILDINGS: A COUNTYWIDE APPROACH

June 6, 2022

SUMMARY

Marin County's electricity supplies are becoming cleaner due to the expanding role played by solar and other renewable sources. As this trend continues, local governments have become increasingly engaged in reducing greenhouse gas emissions by electrifying the county's transportation and building sectors. "Building electrification" refers to the elimination of natural gas-fueled appliances in households and businesses. It aims for adoption of four electric appliances: heat pump space heaters, heat pump water heaters, induction cooktops/ranges, and upgraded service panels. Because the life cycles of appliances are long—often 10 to 20 years or more—decisions made today can have long-term impacts. By one estimate, in order to fully electrify U.S. households before 2050, more than 80 million of these appliances in more than 50 million households would have to be replaced over the next decade.¹ While policy-makers in Washington and Sacramento have an important role to play, change on this scale will be very difficult without robust engagement at the local level. The timely pursuit of building electrification will depend in no small measure on local regulations and consumer decisions that are shaped and supported by local communities.

Initial steps are currently being taken by the county and its cities to pave the way toward building electrification. But as the stakes grow higher with each passing year, the time has come for Marin to pursue an integrated and comprehensive countywide building electrification planning process that will strengthen and accelerate decision-making by public officials throughout the county.

In the discussion that follows, the Grand Jury addresses:

- The critical role building electrification plays in advancing Marin County's greenhouse gas reduction targets and in improving the health and safety of its residents
- Proposed "reach" codes for adoption by local jurisdictions that would bring an end to natural gas connections in newly constructed buildings and enhance energy efficiency in homes undergoing renovation

¹ Trevor Higgens, Bianca Majumder, Debbie Lai, Ari Matusiak, and Sam Calisch, *To Decarbonize Households, electrifying all of Marin County's buildings within a specified time period* *America Needs Incentives for Electric Appliances*, June 3, 2021, <https://www.americanprogress.org/article/decarbonize-households-america-needs-incentives-electric-appliances/>.

- A comprehensive countywide building electrification planning process aimed at potential building electrification strategies that should be addressed as part of a countywide planning process.
- The importance of equity as a guiding principle in planning.

APPROACH

The Marin County Civil Grand Jury investigated the actions taken by Marin's county, city, and town governments to reduce greenhouse gas emissions, including their identification of the sources of these emissions and their strategies to meet emission reduction goals established by state law and otherwise. The Grand Jury focused on the building sector as a primary contributor of greenhouse gas emissions and assessed existing and proposed programs and strategies to bring about the effective and equitable electrification of buildings in Marin.

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; interviewed agency officials and non-profit advocacy groups engaged in climate change mitigation; and reviewed reports, studies, plans, and state and local laws dealing directly or indirectly with climate change mitigation.

In the course of its investigation, the Grand Jury repeatedly encountered individuals throughout county and local government who are passionate about their work and extremely well-informed about climate change impacts and mitigation measures. The findings and recommendations presented here are intended to offer a unique perspective afforded by the investigation and help promote an ongoing dialog among county staff, local jurisdictions, and the public on an important component of greenhouse gas reduction efforts.

BACKGROUND: WHY BUILDING ELECTRIFICATION MATTERS

The Increasing Urgency of Marin's Efforts to Mitigate Climate Change

This past year our nation has seen a variety of extreme weather-related impacts including off-season tornados, dramatic flooding, and wildfires at times and locations previously thought immune from such disasters. The hottest annual temperatures ever recorded worldwide have all occurred between 2016 and 2021.² More intense and frequent heat waves, droughts, wildfires, and severe weather events are all results of climate change which are now manifesting throughout the country and the world. Marin County has recently experienced severe drought, ongoing heightened wildfire risk, and the slow creep of sea level rise along our shorelines. Given these developments, scientists and government leaders across the globe agree there is an increasing urgency to reduce greenhouse gas emissions if the worst impacts of climate change are to be avoided.

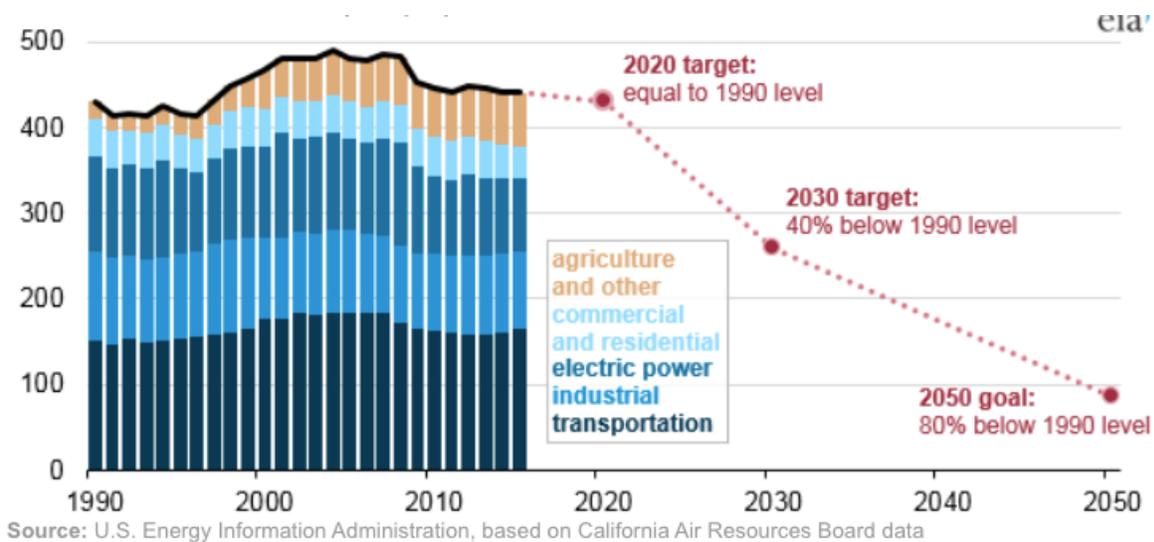
California has helped lead the way in framing the urgent need for prompt action. Legislation passed in 2016 requires state agencies to enact regulations and implement programs that will result in a statewide reduction in greenhouse gas emissions to 40 percent below 1990 levels by

² United Nations, UN News Global Perspective Human Stories, *2021 joins top 7 warmest years on record: WMO*, January 19, 2022, <https://news.un.org/en/story/2022/01/1110022#:~:text=The%20warmest%20seven%20years%20have,to%20record%20global%20average%20warming.>

2030. Unfortunately, a recent report has found that while the state's greenhouse gas emissions dropped 1.6 percent between 2018 and 2019—the second largest percentage decrease since 2010— this is far short of what is needed to reach the mandated reduction by 2030.³ California must now sustain a 4.3 percent annual decrease through 2030—a reduction that is more than 2.5 times greater than was achieved in 2019.⁴

Marin County's leaders and residents are well aware that climate change is poised to impact future life in the county. The county and its eleven municipalities have each developed climate action plans to address how local governments and residents can contribute to greenhouse gas emission reductions.⁵ These plans identify the major sources of emissions throughout the county, quantify those emissions, and recommend actions to be taken by individual jurisdictions to curb emissions and reach statewide emissions targets as well as targets enumerated in the individual plans. Although all jurisdictions reached their 2020 goals of reducing greenhouse gas emissions below 2005 levels by at least 15 percent, there is much more to be done if they are to reach the 2030 reduction targets mandated by state law.⁶

Figure 1 - California Greenhouse Gas Emissions by Sector (1990-2015) and Targets Through 2050 (million tons CO₂ equivalent)



Credit: California Air Resources Control Board

Figure 1 shows the dramatic reduction in GHG emissions required for the state to reach its goal of reducing emissions to at least 40% below 1990 levels by 2030.

³ California Green Innovation Index, 13th Edition, 2021, <https://greeninnovationindex.org/2021-edition/>.

⁴ California Green Innovation Index.

⁵ County of Marin, Community Development Agency and Sustainability Team, *Marin County Unincorporated Climate Action Plan*, December 2020, https://www.marincounty.org/-/media/files/departments/cd/planning/sustainability/climate-and-adaptation/cap-2030_12082020final.pdf. The Climate Action Plans for each of the municipalities in Marin are <https://marinclimate.org/climate-action-plans/>.

⁶ See Marin Climate and Energy Partnership (MCEP) website, Marin Sustainability Tracker, <http://www.marintracker.org/>. This is an interactive mapping tool that provides statistics on the greenhouse gas emissions in various jurisdictions.

Buildings Are a Significant Source of Greenhouse Gas Emissions

Building electrification will be a critical component for the county to reach future emissions goals. Natural gas, a major source of greenhouse gas emissions, provides an estimated 70 percent of the energy used in the average California home.⁷ Building emissions are generated in the production and use of electricity and natural gas for heating, cooling, lighting, and running appliances in residential, commercial, municipal, and industrial buildings.⁸ In Marin the largest source of greenhouse gas emissions is the transportation sector (51 percent). The county's next largest greenhouse gas source is the building sector, which is responsible for 34 percent of total emissions.⁹ Of the 34 percent greenhouse gas emissions associated with Marin's building sector, natural gas uses comprise 27 percent of the total, with the remaining 7 percent attributed to the use of electricity generated by coal or gas-fired power plants.¹⁰

Marin County's building sector primarily consists of residential buildings, with single-family homes comprising the majority of building types in the county. Among the housing stock, 69 percent are single-family homes, followed by multi-unit dwellings at 29.5 percent, and mobile homes at 1.5 percent.¹¹ Most of the county's natural gas usage results from the residential sector.¹² Thus, removing natural gas usage from the building sector will have a major impact in reducing overall greenhouse gas emissions in the county.

⁷ New Buildings Institute, *Building Electrification Technology Roadmap*, January 12, 2021, p. 3, <https://newbuildings.org/resource/building-electrification-technology-roadmap/#:~:text=The%20Building%20Electrification%20Technology%20Roadmap,emissions%2C%20and%20improve%20public%20health.>

⁸ The different plans have slightly different categories names to identify this sector, i.e., some refer to it as Residential Energy, Built Environment – Electricity/Natural Gas, Energy Efficiency Buildings, etc. and may or may not include the source of the energy used (County Plan says 72% decrease in Build Env- Electricity from 2005 to 2018 due to cleaner sources of energy used).

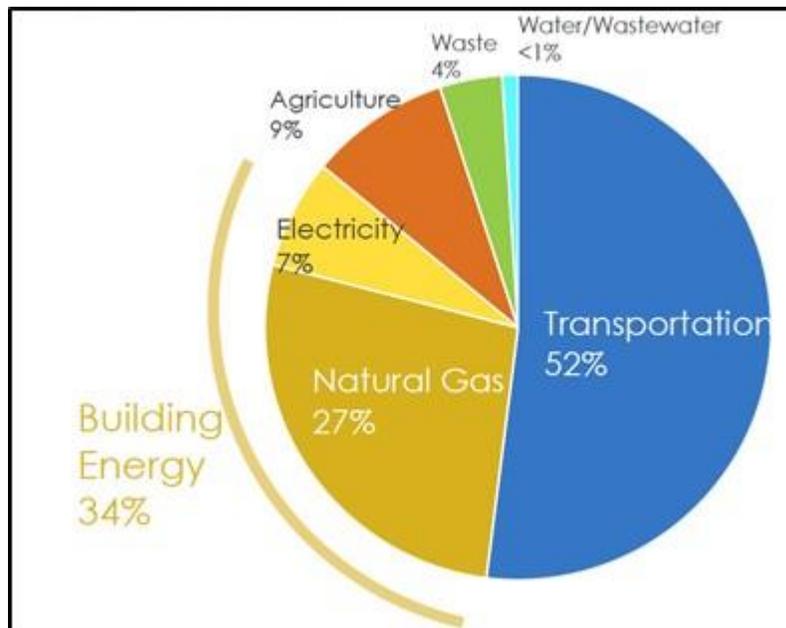
⁹ See MCEP website, *Marin County Emissions by Sector, 2019*, <https://marinclimate.org/greenhouse-gas-inventories/>.

¹⁰ MCEP website, *Marin County Emissions by Sector*.

¹¹ Marin County Housing Element 2015 – 2023 Adopted by the Marin County Board of Supervisors December 9, 2014; See also CountyOffice.org, *Building Departments in Marin County, California*, <https://www.countyoffice.org/ca-marin-county-building-departments/>

¹² In 2005, 72% of natural gas usage was in the residential sector, Marin Community Development Agency's 2007 Marin Countywide Plan at 3.6-4.

Figure 2 - Marin County's 2019 Greenhouse Gas Emission by Sector



Credit: Marin County, Community Development Agency and City of San Rafael, Marin County Green Building Code 2022 Code Cycle Update, February 18, 2022.

Unfortunately, the consumption of natural gas in homes and buildings in California is on the rise—up 15.3 percent in the commercial sector and 17.8 percent in housing since 2014, and up 19.8 percent in the industrial sector since 2009.¹³ Statewide, natural gas usage by buildings is significant, with buildings using more gas overall than the state's power plants.¹⁴

These building-related uses of natural gas not only result in greenhouse gas emissions as the fuel is burned, but they are also responsible for additional emissions from the extraction and transportation of gas to end users. Emissions from the drilling of natural gas include methane, nitrogen oxides, and sulfur oxides.¹⁵ Methane is among the most worrisome greenhouse gasses as it traps heat more efficiently than carbon dioxide. It is estimated that 13 million tons of methane leak each year during gas extraction, processing, and transportation.¹⁶ About 90 percent of the gas consumed in California is drilled out of state, which creates significant opportunities for greenhouse gas emissions to occur through leaking and venting in pipeline transmission in addition to those created during combustion.¹⁷

Converting from natural gas to electricity is an effective way to significantly reduce greenhouse gas emissions. It should be noted, however, that some emissions also occur in the generation of

¹³ California Green Innovation Index, <https://greeninnovationindex.org/2021-edition/>

¹⁴ Sierra Club, *Building Electrification Action Plan for Climate Leaders*, December 2019, p. ES-1, <https://www.sierraclub.org/sites/www.sierraclub.org/files/Building%20Electrification%20Action%20Plan%20for%20Climate%20Leaders.pdf>

¹⁵ New Buildings Institute, *Building Electrification Technology Roadmap*, p.4.

¹⁶ Jeff Turrentine, *The Natural Gas Industry Has a Methane Problem*, Natural Resources Defense Council website, June 7, 2019, <https://www.nrdc.org/onearth/natural-gas-industry-has-methane-problem>.

¹⁷ Sierra Club, *Building Electrification Action Plan for Leaders*, p. ES-1. See also City of Berkeley, *Existing Buildings Electrification Strategy*, Administrative Draft, April 2021, pp. 13-14, https://www.cityofberkeley.info/uploadedFiles/Planning_and_Development/Level_3_-_Energy_and_Sustainable_Development/Draft_Berkeley_Existing_Bldg_Electrification_Strategy_20210415.pdf and New Buildings Institute, *Building Electrification Technology Roadmap*, p. 3.

electricity, though at much reduced levels. Pacific Gas and Electric (PG&E) and the community choice aggregator, Marin Clean Energy (MCE), are Marin County's two utility providers.¹⁸ PG&E's electricity is generated from a blend of power sources that is presently 85 percent greenhouse gas emission free. That percentage should increase in the coming decade due to state mandates.¹⁹ MCE customers can currently opt for an arrangement furnishing electricity that is 100 percent generated by wind and solar.²⁰

Reducing the Health and Safety Risks Posed by Gas Appliances

In addition to adding greenhouse gas emissions to the atmosphere, natural gas appliances create a significant amount of indoor air pollution.²¹ Most residential gas appliances lack any pollution controls and can produce very high nitrogen oxide emissions.²² In particular, gas stoves emit nitrogen oxides, carbon monoxide, and formaldehyde as well as fine particulate matter in amounts greater than electric stoves.²³ The peak levels of air pollution, particularly nitrogen dioxide, generated by natural gas cooktop usage can exceed outdoor air quality standards.²⁴ Other natural gas appliances such as heating systems and water heaters also contribute to indoor air pollution and can present significant indoor air quality impacts. Like stoves, natural gas-powered furnaces and hot water tanks also emit nitrogen dioxide, nitric oxide, sulfur oxides, particulate matter, carbon monoxide, and formaldehyde.²⁵

The U.S. Environmental Protection Agency has determined that long-term exposure to nitrogen dioxide is linked to the development of asthma in children, and short term exposure can trigger or exacerbate asthma attacks.²⁶ Children are particularly sensitive to the pollutants generated by gas appliances. Studies have indicated that children in homes with gas appliances are 42 percent more likely to develop asthma symptoms and 32 percent more likely to be diagnosed with asthma during their lifetime.²⁷ Lower-income households bear greater health risks since many of the factors associated with poor indoor air quality – smaller square footage, older appliances, poorer ventilation, high density of household members – create conditions that contribute to poor indoor air quality.²⁸

The use of natural gas as a fuel in buildings also brings safety risks posed by pipeline leaks and ruptures. The potential for earthquakes, aging gas lines, and the volatile nature of natural gas are

¹⁸ Community Choice Aggregation (CCA) is an alternative to the investor owned utility in which local entities aggregate the buying power of individual customers within a defined jurisdiction in order to secure alternative energy supply contracts.

¹⁹ See California Public Utilities Code §454.53, which mandates that by 2045 all retail electricity sold in the state be generated from renewable and zero-carbon resources .https://leginfo.ca.gov/faces/billTextClient.xhtml?bill_id=201720180SB100

²⁰ Marin Clean Energy website, <https://www.mcecleanenergy.org/100-renewable/>.

²¹ Sierra Club, *Building Electrification Action Plan for Leaders*, at p. ES-1.

²² Sierra Club, *Building Electrification Action Plan for Leaders*, at p. ES-1.

²³ Brady Seals and Andee Krasner, *Health Effects from Gas Stove Pollution*, Rocky Mountain Institute, Physicians for Social Responsibility, Mothers Out Front, and Sierra Club, 2020, p.8 <https://rmi.org/insight/gas-stoves-pollution-health>

²⁴ Seals and Krasner, *Health Effects from Gas Stove Pollution* at p. 9.

²⁵ City of Berkeley, *Existing Buildings Electrification Strategy* Administrative Draft April 2021, p. 6, https://www.cityofberkeley.info/uploadedFiles/Planning_and_Development/Level_3_-_Energy_and_Sustainable_Development/Draft_Berkeley_Existing_Bldg_Electrification_Strategy_20210415.pdf.

²⁶ Seals and Krasner, *Health Effects from Gas Stove Pollution* at pp. 12-13; See also City of Berkeley, *Existing Buildings Electrification Strategy* at p. 7.

²⁷ Seals and Krasner, *Health Effects from Gas Stove Pollution* at p. 13.

²⁸ Seals and Krasner, *Health Effects from Gas Stove Pollution* at p. 13.

all risk factors. The catastrophic 2010 San Bruno and 2019 San Francisco gas pipeline explosions exemplify the risks of natural gas lines in buildings.²⁹

DISCUSSION

Near-term Measures to Accelerate Building Electrification

Banning Natural Gas Connections in New Construction

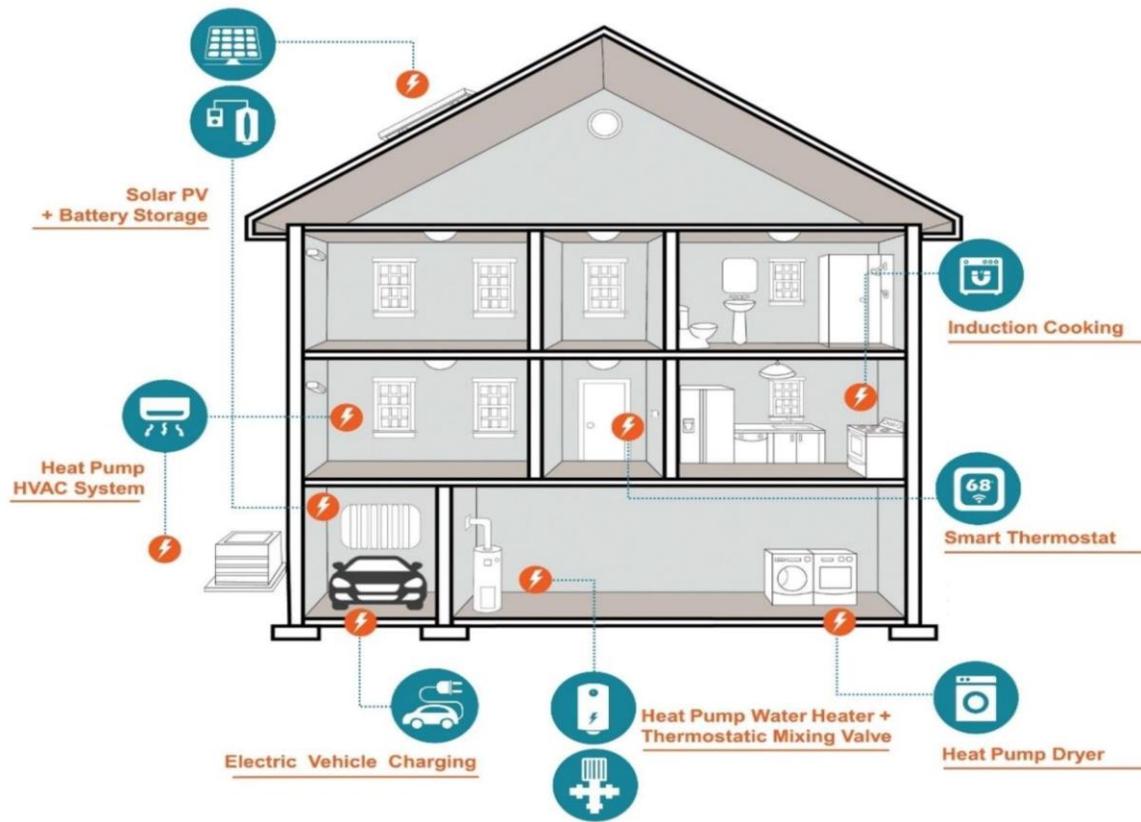
One of the most direct means of accomplishing electrification in the building sector is to ensure that newly constructed buildings are fully electric, with no natural gas connections. A shift to all-electric new construction helps accelerate greenhouse gas emission reductions in the building sector and avoids the health hazards posed by the ongoing use of natural gas in the indoor environment. All-electric buildings are also, with rare exception, cheaper to build than “dual fuel” buildings that incorporate both natural gas and electricity.³⁰ Construction of new dual fuel buildings not only costs more, but it also creates potential inefficiencies as the use of natural gas infrastructure in these buildings is limited in coming years, leaving it underutilized or unused.

California has taken steps toward electrifying the building sector through the most recent update of its state-wide building code. Every three years, the California Energy Commission is charged with updating the state building code which, among other things, creates energy standards for new construction. The latest building code update went into effect in January 2022. It sets the stage for electrification by requiring newly constructed homes to be “electric-ready,” with dedicated 240-volt outlets and space (with plumbing for water heaters) so electric appliances can eventually replace installed gas appliances. It also requires new homes to have either electric heating or electric water heating, depending on which is the larger energy user. While these and other requirements will have a meaningful impact in paving the way for home electrification in the future, many observers had hoped for more decisive action from the state including, potentially, a statewide ban on natural gas connections in a range of newly constructed buildings.

²⁹ City of Berkeley, *Existing Buildings Electrification Strategy* at p. 14; See also Michael Cabanatuan, “PG&E software issue allowed massive 2019 S.F. gas fire to burn longer, feds say,” *San Francisco Chronicle*, Aug. 10, 2021, <https://www.sfchronicle.com/sf/article/PG-E-software-issue-allowed-massive-2019-S-F-gas-16378054.php> which explains the initial blast was caused by a negligent contractor accidentally excavating the line, but the lack of PG&E’s proper software to isolate valve led to a long wait time for the gas line to be shut off.

³⁰ A recent study found incremental costs for new home construction ranged from \$30,000 less to \$3,000 more for an all-electric compared to a dual fuel home. See Frontier Energy, Inc. and Misti Bruceri & Associates, LLC, *2019 Energy Efficiency Ordinance Cost-Effectiveness Study: Low-Rise Residential*, prepared for Pacific Gas and Electric, August 2019, pp. 15-16, <https://efiling.energy.ca.gov/GetDocument.aspx?tn=234020-6&DocumentContentId=66846>

Figure 3 - Common Components of All-Electric Homes



Credit: Building Decarbonization Coalition

The state’s next building code update will not occur until 2025. In the near term, it will be up to local jurisdictions to decide whether to adopt more restrictive “reach codes” or take other measures banning or limiting the use of natural gas in newly constructed buildings. A reach code is a local building energy code that “reaches” beyond the state minimum requirements for energy use in building design and construction. To date, more than 50 local jurisdictions throughout California have adopted reach codes banning or limiting new natural gas infrastructure in new construction.³¹ Within Santa Clara and San Mateo counties, 20 cities have adopted their own building electrification reach codes, a majority of which require new buildings to be all-electric unless limited exceptions are met.³²

Within Marin County, Fairfax is currently the only city to have adopted an all-electric requirement for new buildings.³³ This may soon change, however, as a result of current efforts within the county to develop and disseminate a model reach code addressing electrification in

³¹ Matt Gough, *California's Cities Lead the Way to a Gas-Free Future*, July 22, 2021, <https://www.sierraclub.org/articles/2021/01/californias-cities-lead-way-gas-free-future>.

³² County of Santa Clara, California, Ordinance 108511 http://sccgov.iqm2.com/Citizens/Detail_LegiFile.aspx?Frame=&MeetingID=13238&MediaPosition=&ID=108511&CssClass=

³³ Town of Fairfax, *Staff Report*, August 4, 2021, <https://storage.googleapis.com/proudcity/fairfaxca/uploads/2021/07/Item-18-Ord-Electric.pdf>. San Anselmo is currently considering adoption of a ban on natural gas connections for newly constructed buildings. See Adrian Rodriguez, “San Anselmo considers gas ban for new buildings,” *Marin Independent Journal*, March 18, 2022.

new construction and in certain types of building renovations. It would then be up to the county and each of its municipalities to consider the proposed model code for adoption. Data collected by the county shows that only 16 percent of new building projects in unincorporated Marin voluntarily elected all-electric construction.³⁴ The proposed reach code would require all new residential, multifamily, and commercial construction to be “all-electric.” If widely adopted, this reach code would have an immediate and pronounced impact in electrifying new building construction throughout Marin.

Renovations of Existing Residential Buildings

New building construction accounts for only a small fraction of Marin’s building stock. The bigger opportunities in electrifying Marin’s building sector lie in electrification of existing buildings. Marin’s proposed reach code would not require that existing dual fuel buildings be electrified, nor would it require replacement of natural gas appliances with electric appliances in existing homes. Rather, the code would be limited to certain residential building renovations. Under the “flexible path” approach that is contemplated, homeowners and contractors applying for building renovation permits would be required to select from a menu of electrification and energy efficiency measures to incorporate into the renovation plan.³⁵ Applicants could select any combination of specified measures, including the addition of electric heat pump space or water heaters, that meet or exceed a target energy score.

To date, at least one California city has enacted a reach code adopting a version of this flexible path approach. In 2021, the City of Piedmont enacted an ordinance that uses a menu of energy efficiency and heating system electrification improvements, and requires renovations on residential buildings to incorporate one item from the menu for projects over \$25,000, and two items for projects over \$100,000.³⁶ In Marin, planning staffs from the county and San Rafael are in the process of drafting and refining the proposed model reach code, including determining what kinds of renovations will trigger its requirements. There are plans to engage the public through community workshops, finalize the draft model reach code, and submit it for legislative review by the fall of 2022.

With respect to new construction, the proposed reach code presents a needed, near-term end to the perpetuation of natural gas infrastructure in Marin’s building sector. With regard to renovations, the proposed code is an effective and practical, if incremental, step towards accelerating building electrification in Marin.

While the proposed model reach code presents a promising start, there are numerous important issues that remain to be addressed. What is the best way to extend electrification initiatives to homes that are not undergoing renovations and to large multi-unit residential buildings? Can enough consumers be incentivized to voluntarily replace gas-fueled appliances with electric ones? Are additional mandates needed? How can electrification programs be structured so as to consider the needs of Marin’s underserved communities and low-income residents? Is there a

³⁴ Brian Reyes, *Policy Brief: 2022 Code Cycle Green Building Ordinance Update – Strategy and Options for Requirements*, prepared for the County of Marin, undated.

³⁵ A program funded by the state’s largest utilities and conducted under the auspices of the California Public Utilities Commission (CPUC) provides guidance and resources to local jurisdictions interested in adopting this kind of approach. See CPUC Codes and Standards. website, <https://explorer.localenergycodes.com/>.

³⁶ Sara Lillevand, *City of Piedmont, Council Agenda Report*, February 1, 2021, <https://www.piedmont.ca.gov/common/pages/DisplayFile.aspx?itemId=17376920>.

means for addressing these questions in a coordinated, comprehensive way that will reach all of Marin's communities?

A Countywide Planning Process Focused on Equity

The Need for Coordinated, Comprehensive, and Strategic Planning to Effectively Address Building Electrification

As shown by the ongoing effort to develop Marin's model reach code, coordination between and among the county and its cities and towns increases the potential for achieving widespread, meaningful results in the short term. All of Marin's local jurisdictions are facing similar challenges in electrifying their building sectors and in reaching greenhouse gas reduction targets. Building departments will play an important role in implementing changes in building codes and permitting requirements. Uniformity will ease the burden on builders and contractors, and thus help to accelerate adoption.

Even more importantly, a countywide approach to planning will help to ensure the timely, sustained, and in depth focus that is required. Time is of the essence. As new gas infrastructure continues to be added to Marin's buildings, and as new gas appliances are installed in Marin's homes, electrification in these buildings is deferred for possibly a decade or more, making greenhouse gas reduction targets correspondingly more difficult to achieve.

There is also a human cost to delay. As low-income residents remain challenged by the up-front costs of electrification, the risk increases of a further divide between those who can afford to electrify and those who cannot. This results in greater exposure to potential displacement, adverse health effects, and other negative impacts to Marin's underserved communities. A countywide planning process would help to ensure that all of Marin's jurisdictions are actively engaged in solving these problems in the near term.

A countywide planning process will also help to ensure that adequate resources are devoted to the complex, multi-layered challenges posed by building electrification. A prior Grand Jury has described the county's approach to climate change mitigation, which relies heavily on the respective climate action plans adopted in each individual jurisdiction.³⁷ With few exceptions, these plans deal with broad recommendations that address a wide variety of areas. Given their breadth, and the limited resources available for developing them, climate action plans rarely take a "deep dive" into a specific issue or topic, and sometimes lack context or specificity, particularly in the area of building electrification.

A coordinated countywide planning process can provide a framework for collaboration that will maximize existing resources by leveraging research, data collection, and policy analysis. A timely example of this kind of collaboration is provided by the Marin Countywide Electric Vehicle Acceleration Plan (Countywide EV Plan). This plan was coordinated by the Marin Climate and Energy Partnership (MCEP).³⁸ Through the coordinated efforts of staff from its

³⁷ Marin County Civil Grand Jury, 2019-2020 *Climate Change: How Will Marin Adapt?*, September 11, 2020, <https://www.marincounty.org/-/media/files/departments/gj/reports-responses/2019-20/climate-change--how-will-marin-adapt.pdf?la=en#>.

³⁸ MCEP is composed of representatives from all eleven cities and towns in Marin, the county, the Transportation Authority of Marin (TAM), Marin Clean Energy, the Marin General Services Authority, and the Marin Municipal Water District. MCEP's mission is to promote collaboration between its members, share resources, and obtain funding to analyze and implement the strategies contained in each jurisdiction's climate action plan.

respective members and its own part-time sustainability coordinator, MCEP has produced a draft Countywide EV Plan that identifies guiding principles, describes relevant data and local conditions, enumerates barriers to EV adoption, and proposes specific strategies and recommended actions for overcoming those barriers. This plan can serve as a model for a similar effort aimed at producing a countywide plan for electrifying Marin's building sector.

There are unique challenges posed by the building sector, to be sure. The scope and complexity of building electrification planning will likely require more time and greater resources than a plan focused on EV adoption. These challenges, however, have not prevented other jurisdictions from producing building electrification plans suited to their specific needs. Planners in San Jose, Berkeley, and elsewhere have recently released comprehensive building electrification plans that provide needed focus and depth, laying the groundwork for implementation of short and long-term electrification strategies within established timeframes.³⁹ Marin County should do the same.

An in-depth planning process will require funding to ensure that sufficient staff is allocated for the project, and that any necessary outside consultants are retained. Development of the Countywide EV Plan was supported by a grant from the Transportation Authority of Marin. As an initial step, staff from the county and its municipalities should identify and pursue potential sources of grant funding from local, regional, and state entities.

At a minimum, a Marin Countywide Building Electrification Plan could identify current programs and policies, remaining challenges, and concrete actions the county and its cities and towns can take to accelerate the electrification of residential and commercial buildings throughout Marin. This plan could set a date for accomplishing the complete electrification of all buildings in Marin and establish a timeline for reaching that goal. And it could establish the necessary "guardrails" to avoid unintended adverse impacts on Marin's underserved communities.

While local policies and programs are critical to the success of building electrification, they cannot succeed without broader efforts to increase the capacity and reliability of the electric grid. Power outages pose an ongoing challenge, especially for underserved communities that may lack the resources to buy generators and otherwise mitigate the cost and inconvenience of short-term power loss. With increasing electrification of homes and the growth of electric vehicles, the state's utilities will need to expand clean power generation and distribution infrastructure. These utilities, in conjunction with state regulatory agencies, must ensure that electricity is available to meet increased demand, especially during peak usage periods.

The Importance of Equity

An initial challenge for planners will be to ensure that equity issues are considered from the outset and are adequately reflected in resulting policies and programs. Underserved communities, often largely composed of renters, have in many cases been left out of California's

³⁹ City of Berkeley, *Existing Building Electrification Strategy*, https://www.cityofberkeley.info/uploadedFiles/Planning_and_Development/Level_3_-_Energy_and_Sustainable_Development/Draft_Berkeley_Existing_Bldg_Electrification_Strategy_20210415.pdf
See also City of San José Department of Environmental Services, *Healthy Homes, Healthy Air - A Framework for Existing Building Electrification Centered on Community Priorities*, February 22, 2022, <https://www.sanjoseca.gov/home/showpublisheddocument/82395/637811379809170000>.

push toward electrification.⁴⁰ Low-income households often have a high energy burden – meaning a disproportionate amount of household income goes toward energy expenses. In Marin County, about 50 percent of renters are housing cost burdened, meaning they spend more than 30 percent of their income on rent. Contributing to this burden is the fact that low-income housing tends to be older and less energy efficient. Research has shown that African-American, Latino, and low-income households tend to pay more for electricity and natural gas service per square foot of building space.⁴¹ These households have greater vulnerability to rising energy costs and are less able to mitigate the impact of rising costs through measures that require significant up-front investment, such as installing solar panels and batteries or replacing outdated gas appliances with cleaner, more efficient electric appliances. Beyond these financial burdens, underserved communities must also contend with the added health risks posed by poor indoor air quality.

If building electrification strategies are to succeed, they must not increase the burden on Marin's underserved communities. Rather, they must ensure that these communities have full access to building electrification's principal benefits: cleaner air, healthier homes, affordable clean energy, and energy efficiency resulting in reduced monthly energy bills. This can be accomplished in part by promoting and advocating for expansion of such programs as MCE's pilot program for Low-Income Families and Tenants which offers subsidies of \$1,200 per unit to fund acquisition of appliances and energy efficiency improvements for up to 1,400 affordable multifamily units.⁴²

Countywide planners should identify and prioritize the critical needs of underserved communities and identify priority solutions that can be addressed through building electrification. They can design a broad community engagement strategy to ensure the countywide plan reflects a diverse set of community voices and concerns. Through such an approach, the countywide plan can more effectively address communities who in the past may have been excluded from the full benefits of clean energy.

Electrification Strategies for Existing Buildings

A ban on natural gas infrastructure in newly constructed buildings is important. But in order to reach its greenhouse gas emission reduction targets, Marin must develop effective strategies for the electrification of existing dual fuel buildings, which comprise the overwhelming majority of Marin's building stock. Marin's proposed reach code addressing certain residential renovations presents a meaningful step forward. But it is not enough. As a next step, Marin's planners should evaluate a full range of potential electrification initiatives for existing buildings, a number of which are being considered and implemented by other local jurisdictions. In the sections below,

⁴⁰ We use the term "underserved communities" to refer to communities where residents are: predominantly people of color; living on low incomes; underrepresented in the policy setting or decision-making process; subject to disproportionate impact from one or more environmental hazards; and likely to experience disparate implementation of environmental regulations and socioeconomic investments.

⁴¹ Ariel Drehobl and Lauren Ross, *Lifting the High Energy Burden in America's Largest Cities: How Energy Efficiency Can Improve Low Income and Underserved Communities*, April 2016, https://assets.ctfassets.net/ntcn17sslow9/1UEmqh5159cFaHMqVwHqMy/1ee1833cbf370839dbbdf6989ef8b8b4/Lifting_the_High_Energy_Burden_0.pdf.

⁴² MCE press release (Nov 3, 2017), *MCE Launches Pilot Program for Low-Income Families and Tenants* <https://www.mcecleanenergy.org/press-releases/lift-2/#:~:text=The%20LIFT%20program%20will%20build,in%20rebates%20for%20affordable%20properties>.

the Grand Jury identifies some of the issues, initiatives, and programs that should be considered as part of a countywide planning process.

Consumer Choice, Incentives, and Rebates

Ideally, the transition needed to electrify Marin's households can be accomplished in the near term, as consumers make the choice to replace old gas-fueled appliances that have reached the end of their useful lives with clean, efficient electric appliances. Local governments can play a critical role in supporting this shift through programs educating consumers about the advantages of electrification, and by providing financial incentives and subsidies as added inducements.

A countywide building electrification plan could be used to develop coordinated strategies aimed at public outreach and education. These strategies could go beyond past and current efforts by the county, and more fully engage each of Marin's cities and towns in coordinated outreach and marketing campaigns. Among other things, these outreach efforts would seek to educate consumers about the importance of household electrification in reducing greenhouse gas emissions and reducing the health and safety risks of indoor natural gas use. They would acquaint consumers with the electric appliances needed to electrify their household and the advantages offered by each of them, and provide information about the upfront costs of acquiring and installing these electric appliances, as well as the potential ongoing cost savings resulting from more efficient electric appliances. They would also direct consumers to available incentives offered by local utilities and by local and state government agencies, including enhanced subsidies and rebates available to lower income households. Importantly, they would also inform consumers about additional financing assistance available to lower income households in the form of low interest loans and other financing options.

Through its "Electrify Marin" program, the county currently offers rebates to single family property owners for the replacement of natural gas appliances with electric ones, including water heaters, furnaces, cooktops, as well as upgrading electric service panels, where needed.⁴³ This program, launched in January 2019 and funded by a grant from the Bay Area Air Quality Management District, achieved modest success in its initial two year phase, paying out \$152,750 in rebates for 129 appliance upgrades.⁴⁴ In recent months, there has been an uptick in activity, possibly associated with easing of pandemic restrictions, bringing the total to over 400 appliance upgrades. Earlier this year, the county's board of supervisors approved the decision to infuse the program with \$447,000 in additional funds received through the American Rescue Plan Act.⁴⁵ While Electrify Marin remains a vital program, its scope is limited. It remains unclear that these incentives will suffice in prompting the participation required to advance widespread electrification throughout the county.

In addition to the county's Electrify Marin rebate program, other subsidies are available to homeowners as well as owners of multi-unit residential buildings. These include:

⁴³ County of Marin, Electrify Marin - Natural Gas Appliance Replacement Rebate Program website, <https://www.marincounty.org/depts/cd/divisions/sustainability/electrify>.

⁴⁴ County of Marin website, *Local Government Programs and Policies for Existing Building Decarbonization* (January 2021) <https://www.marincounty.org/-/media/files/departments/cd/planning/sustainability/electrify-marin/531-lessons-learned-report.pdf?la=en>.

⁴⁵ Richard Halstead, "Marin to spend \$4M in pandemic aid on climate projects," *Marin Independent Journal*, December 20 2021, <https://www.marinij.com/2021/12/20/marin-to-spend-4m-in-pandemic-aid-on-climate-projects/>.

- Bay Area Regional Energy Network - rebates and incentives for heat pump water heaters and panel upgrades⁴⁶
- TECH Clean California - incentives for heat pump systems, heat pump water heaters⁴⁷
- Marin Clean Energy - rebates for heat pump water heaters, solar, and battery storage⁴⁸
- PG&E - rebates for heat pump water heaters, battery storage.⁴⁹

In addition to rebates and incentives, acquisition and installation of electric appliances may also be supported by a variety of financing options that offer advantages over market-rate financing. Taken together, these incentive and financing programs furnish a critical boost to building electrification by raising consumer awareness and lowering financial barriers to adoption. They also advance equity to the extent that enhanced incentives and adequate financing options are available to low-income residents.

If sufficient resources are directed to rebate and financing programs, they could fulfill a role similar to the incentives and tax credits that have proven so effective in accelerating electric vehicle adoption in Marin and elsewhere. But unless and until those resources become available, the pace of electrification for existing buildings remains uncertain, and may fall well short of the level needed to reach emission reduction goals. Consequently, mandates may be needed as an additional means of ensuring these goals are met.

Mandating The Switch to Electric Appliances at the Time of Replacement

Marin's proposed model reach code would apply to a small subset of existing buildings – residences that are being renovated. In contrast, the county's most recent Climate Action Plan refers to a much more sweeping mandate, potentially reaching all dual fuel single family residences in Marin. The Climate Action Plan states that the county will “[c]onsider adopting an ordinance in 2024, effective January 1, 2025, that requires homeowners to replace natural gas appliances, such as hot water heaters, stoves, cooktops, and clothes dryers, with high-efficiency electric appliances at time of replacement where feasible.”⁵⁰ Larkspur has a similar statement in its Climate Action Plan. Fairfax's Climate Action Plan also states that it will “[a]dopt an ordinance that phases in requirements to replace natural gas appliances and equipment with electric appliances and equipment at time of replacement.”

⁴⁶ Bay Area Regional Energy Network (BayREN) website, which allows users to navigate to appliance specific rebates, <https://www.bayren.org/rebates-financing>.

⁴⁷ TECH Clean California Incentives website, <https://energy-solution.com/tech-incentives/>.

⁴⁸ MCE website, <https://www.mcecleanenergy.org/?s=rebates>, which explains various categories of rebates available.

⁴⁹ Pacific Gas and Electric (PG&E) website, https://www.pge.com/en_US/search/search-results.page?%26query=waterheater, which explains various rebates available for water heaters.

⁵⁰ County of Marin, *Marin County Climate Action Plan 2030*, p. 29 https://www.marincounty.org/-/media/files/departments/cd/planning/sustainability/climate-and-adaptation/cap-2030_12082020final.pdf

HVAC – Heating, Ventilation, and Air Conditioning (HVAC). Heat pump technology, which transfers heat rather than generating it, provide a particularly efficient alternative to gas space heating. Air-source heat pumps are a significant portion of the cost of electrification but can provide two systems in one – both heating and cooling.

Water Heating – Heat pump water heaters transfer heat from the indoor or outdoor air into a storage tank to heat water.

Cooking – Induction stoves use electricity to directly heat pots and pans through a magnetic current rather than a direct heat source.

Dryers – Some clothes dryers are currently fueled by natural gas. Heat pump and electric resistance clothes dryers are an efficient alternative.

Electric Panels – Electric panel upgrades may be necessary in many buildings to support sufficient capacity for all-electric equipment. This can add significant costs to electrification retrofits.

Credit: City of San Jose

By mandating a transition to electric appliances, a time-of-replacement ordinance could be instrumental in advancing the county's greenhouse gas reduction goals. The county's proposed 2024 timetable leaves ample time for a thorough assessment of such an ordinance as part of a broader building electrification planning process.

One potential drawback of the proposed replacement ordinance lies in the financial burden that could result from the up-front costs required to purchase and install electric appliances. Because the ordinance applies only when the household has decided to replace an existing (presumably outdated or nonfunctioning) appliance, the burden would include any difference in cost between a new gas

appliance and its (new) electric counterpart. This burden can be reduced through rebates and incentives, including enhanced rebates aimed at lower-income households. The County's Climate Action Plan acknowledges this by noting the need to "[e]valuate the financial impact on households at different income levels and consider offering rebates or subsidies, in partnership with electricity providers if available, for disproportionately impacted households."⁵¹ Existing rebate programs, including Electrify Marin, could provide greater focus on equity by directing additional dollars to needs-based rebates. If electrification of appliances is mandated by ordinance, rebates would be less important in incentivizing consumer choice, and more important in subsidizing the transition for those with greater financial need.⁵² Rebate programs could be expanded or restructured accordingly.

Other issues that should be addressed in developing a time-of-replacement ordinance include:

- Identification of a pool of qualified contractors who can help guide consumer choice and install electric appliances economically and effectively
- Identifying effective enforcement mechanisms, including ways to minimize permit avoidance
- Creative ways to minimize upfront costs, including bulk buying of electric appliances which could be resold to consumers at discounted prices.

⁵¹ County of Marin, *Marin County Climate Action Plan 2030*, p. 29.

⁵² Incentivizing consumer choice would remain important for those households that are not subject to the proposed ordinance, for example, renters in multi-unit apartment buildings.

Electrifying Multi-Unit Residential Buildings

Approximately 38 percent of current housing in Marin is renter-occupied, mostly in multi-unit buildings.⁵³ This segment of the housing market poses the difficult challenge of “split incentives,” which refers to the differing interests of landlords and tenants in addressing energy upgrades. Tenants, who typically pay utilities, benefit from lower energy costs. But landlords typically shoulder the capital costs of energy-related upgrades. Planners thus face the challenge of incentivizing building owners to make these improvements, even though they are not the primary beneficiaries of lower energy costs.

There are many strategies that would help to encourage landlords to undertake electrification related upgrades. For instance, expanding or increasing rebate programs that address multi-unit residential buildings could increase the number of appliances replaced. While Electrify Marin is available only to owners of single family properties, rebates for electrification of multi-unit buildings are available from other sources, including MCE and the Bay Area Regional Energy Network.⁵⁴ Owners of multi-unit buildings can use these rebates to lower their upfront costs, install new electric appliances, and benefit from the enhanced market appeal of clean, all-electric units with lower health risks and the potential for lower monthly energy bills for tenants. Publicizing and/or increasing the rebates for larger properties would encourage more participation.

Another strategy to increase electrification for rental properties would be requiring time of use replacement for multi-unit buildings. The proposed reach code requiring electrification at time of replacement, as currently described in Marin County's Climate Action Plan, would apply only to single-family homes. Expanding it to reach multi-unit residential buildings would significantly broaden its impact. Such an expansion would have to take into account the financial burden on building owners, and should be considered in the context of other measures to ease this burden (such as access to adequate rebates and other incentives)

Finally, as discussed in more detail below, planners should consider implementing benchmarking and performance standards (i.e., a minimum energy efficiency standard) for large residential complexes. This would be an opportunity to incentivize electrification and/or other efficiency measures, possibly using a “flexible path” approach similar to that contemplated by Marin's proposed reach code for residential renovations.

Using Building Performance Standards to Electrify Existing Buildings

For buildings that consume large amounts of energy, such as large multi-unit residential or commercial buildings, the use of building performance standards can be a practical, measurable, and effective means of reducing greenhouse gas emissions. Using this approach, greenhouse gas emissions standards, based on the size and function of the building, are established, and then enforced through audits and fees.

The US Environmental Protection Agency uses the term “benchmarking” to describe the measurement of a building's energy usage as compared with similar-sized buildings to track

⁵³ Caroline Peattie and Lucie Hollingsworth, “Marin Voice: Housing element can advance racial, economic equity,” *Marin Independent Journal*, March 17, 2022, <https://www.marinij.com/2022/03/17/marin-voice-housing-element-can-advance-racial-economic-equity/>.

⁵⁴ BAYREN “Multifamily Property Owners,” <https://www.bayren.org/rebates-financing/multifamily-property-owners>

energy consumption over time, and the agency has developed a widely used tool to track energy usage.⁵⁵ The State, as well as several jurisdictions around the Bay Area, currently require benchmarking for large buildings. In particular, the California Energy Commission has promulgated a statewide regulation that requires owners of all buildings over 50,000 square feet to annually report energy usage, and several jurisdictions in the region have adopted benchmarking ordinances based on size or building classification, though they vary in their requirements.⁵⁶ Elsewhere in the country, a handful of large cities, including New York, Washington, DC, and St. Louis, have developed and begun to implement building performance standards.

Table 1 - Bay Area Jurisdictions Requiring Annual Benchmarking

| Jurisdiction | Square Footage Threshold | Building Use |
|---------------|--------------------------|---|
| San Francisco | 50,000 10,000 | Residential Commercial or Industrial |
| Brisbane | 10,000 | Any class of privately owned building |
| Berkeley | 25,000 | Any class of privately owned building |
| San Jose | 50,000 10,000 | Residential Commercial or Industrial |

Credit: California Energy Commission

Although no jurisdictions in the Bay Area have yet implemented ordinances requiring building owners to meet specific energy consumption targets, the jurisdictions in Table 1 all anticipate using benchmarking data to develop enforceable building performance standards in the future. In the meantime, San Jose and Berkeley have voluntary programs that challenge owners to decrease greenhouse gas emissions each year or complete other energy efficiency related activities. Many of the climate action plans in Marin state they will consider developing building performance standards for existing buildings, though no jurisdiction has set any benchmarking requirements beyond those set by the California Energy Commission. The development of performance standards will require assessment of complex issues such as appropriate building size or usage exemptions, financing support, how compliance will be demonstrated, as well as equity and gentrification concerns among other issues. The collection of energy use data could assist with developing performance standards in the future.

⁵⁵ ENERGY STAR Portfolio Manager Portfolio Manager website, <https://www.energystar.gov/buildings/benchmark>.

⁵⁶ California Energy Commission, Building Energy Benchmarking Program website, <https://www.energy.ca.gov/programs-and-topics/programs/building-energy-benchmarking-program/exempted-local-benchmarking>.

FINDINGS

- F1. With the building sector accounting for approximately 34 percent of greenhouse gas emissions in Marin County, it will be necessary to substantially reduce emissions from that sector if the county and its cities and towns are to meet their 2030 greenhouse gas reduction goals.
- F2. Reducing or eliminating natural gas as a fuel source in buildings will dramatically reduce greenhouse gas emissions from Marin County's building sector.
- F3. The use of natural gas in buildings gives rise to health and safety risks, including adverse health effects attributed to exposure to natural gas, and safety risks posed by pipeline leaks, ruptures, and explosions. These health and safety risks serve as additional reasons to eliminate natural gas as a fuel source in new and existing buildings.
- F4. The timely reduction of greenhouse gas emissions from Marin County's building sector will require in-depth, comprehensive, and coordinated planning. A countywide planning process, coordinated by Marin Climate and Energy Partnership or the county's Sustainability Team, would be an effective and efficient means of sustaining focus and leveraging the resources needed for developing a Countywide Building Electrification Plan.
- F5. Underserved communities and lower income households have greater vulnerability to rising energy costs and will likely require extra financial support to mitigate those costs and reduce household greenhouse gas emissions through measures that require significant up-front investment.
- F6. The timely electrification of existing buildings will likely require one or more mandatory measures, supported where necessary by financial subsidies and rebates.

RECOMMENDATIONS

- R1. On or before January 1, 2023, Marin County and each of its cities and towns that have not already done so should adopt a reach code banning natural gas connections in newly constructed buildings.
- R2. On or before January 1, 2023, Marin County and each of its cities and towns that have not already done so should adopt a reach code requiring energy efficiency measures in connection with renovations of existing residential buildings. The reach code should specify the size of the renovation that will trigger the requirement and provide flexibility by allowing the applicant to choose from a list of energy efficiency measures, including electrification of gas appliances.
- R3. Marin County and each of its cities and towns, collaborating through the Marin Climate and Energy Partnership or otherwise, should develop a comprehensive Countywide Building Electrification Plan to be completed on or before January 1, 2024. The Plan should identify those strategies, programs, and concrete actions necessary to bring about an equitable, prompt, and material acceleration of building electrification throughout the county.

REQUEST FOR RESPONSES

Pursuant to Penal code section 933.05, the grand jury requests responses as follows:

From the following governing bodies:

- City of Belvedere (F1–F6, R1- R3)
- City of Larkspur (F1–F6, R1- R3)
- City of Mill Valley (F1–F6, R1- R3)
- City of Novato (F1–F6, R1- R3)
- City of San Rafael (F1–F6, R1- R3)
- City of Sausalito (F1–F6, R1- R3)
- Marin County Board of Supervisors (F1–F6, R1-R3)
- Town of Corte Madera (F1–F6, R1- R3)
- Town of Fairfax (F1–F6, R2- R3)
- Town of Ross (F1–F6, R1- R3)
- Town of San Anselmo (F1–F6, R1- R3)
- Town of Tiburon (F1–F6, R1- R3)

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.