Blue Sky CONSULTING GROUP

GREEN AFFORDABLE HOUSING STUDY

AN ANALYSIS OF GREEN AFFORDABLE HOUSING POLICIES IN SAN DIEGO COUNTY

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Prepared by

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For

County of San Diego

Contents

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1 EXECUTIVE SUMMARY

The County of San Diego (County) engaged the Blue Sky Consulting Group to conduct a "Green Affordable Housing Study" (Study) to identify and analyze specific policy options the County can adopt to advance building electrification, promote decarbonization, and reduce overall energy consumption. This Study presents an analysis of policies with the potential to accomplish these goals, including mandates and reach codes, land use and zoning incentives, financial incentives, financial disincentives, and education programs and technical assistance. This report also provides a summary of existing efforts already underway in the County and includes potential options to expand existing efforts or create new efforts (which would require Board direction to staff and future funding sources).

A list of potential policies the County could consider, along with a description of the pros and cons of each and an assessment of the potential impact, is provided in Appendix A on page 21.

This Study provides an overview of the existing policy landscape, including recent federal and state policy changes, a description of the County's existing efforts to accelerate the adoption of green building measures (GBMs) and achieve its climate change goals, and an assessment of the various types of policy options that the County may wish to consider to further its climate action goals.

1.1 County Climate Action Landscape

Throughout the country, governments at all levels have adopted policies to promote energy efficiency, encourage or require building electrification, and reduce greenhouse gas emissions. In 2021, the Board commissioned the County's Regional Decarbonization Framework (RDF), which identifies regional needs and potential pathways for the County to support regionwide emissions reductions. Subsequently in 2021, the Board also directed the establishment of the Office of Sustainability and Environmental Justice to support decarbonization, community health, and climate justice efforts across the region. Further, the County's *Climate Action Plan* (CAP) sets forth a range of specific measures and actions for County implementation to reduce greenhouse gas (GHG) emissions in the County's unincorporated areas and from County operations. In addition, the County administers the Homeowner and Business Owner Relief Act and the Renewable Energy Fee Waiver programs, which offer fee waivers that remove permitting costs and a streamlined approval process for certain green building projects.

In addition to these County policies and programs, two important policy changes at the state and federal levels have recently been adopted with the potential to accelerate the move toward building electrification. The State of California (State) Energy Code now requires that new residential buildings be "electric ready." This means that, regardless of whether these buildings use gas for some of a home's appliances, electric circuits for space heating, water heating, clothes drying, and cooking must be installed. The federal Inflation Reduction Act (IRA) includes a series of incentives for residential energy efficiency and electrification projects for existing dwellings, as well as available credits for builders of new homes. These programs provide financial incentives for energy efficiency upgrades and rebates on qualified appliances, including electric heat pump water heaters, electric heat pumps for space heating and cooling, and electric ranges and cooktops, among other items. In addition, homeowners can receive rebates for electric panel upgrades and building weatherization improvements.[1]

[1] California Energy Commission, "Inflation Reduction Act Residential Energy Rebate Programs in California." Available at: https://www.energy.ca.gov/programs-and-topics/programs/inflation-reduction-act-residential-energy-rebate-programs-california.

1.2 The County's Energy Measures: Building Electrification and Efficiency

The CAP identifies several areas, including the built environment and transportation, where County policy can meaningfully reduce GHG emissions. This Study focuses on measures aimed at reducing emissions from the County's residential buildings. In this context, the County's key initiatives include new building electrification; electric appliance replacements and electric-ready retrofits of existing homes; investments in on-site renewable energy and energy storage systems (ESS); and upgrades to building envelopes to reduce energy consumption. Previous studies commissioned at both the State and County level have considered the cost-effectiveness of building-related measures.[2]

1.3 Policy Options to Drive Adoption of Climate Measures

To advance energy efficiency, local governments can utilize multiple avenues, including building reach codes, land use and zoning incentives, financial incentives and disincentives, education programs, and technical assistance.

1.3.1 Reach Codes, Mandates, and Prescriptive Compliance Pathways

Mandates can be highly effective in achieving desired goals since, unlike an incentive, they simply require a specific action, such as installation of electric heating and cooling equipment, rather than seeking to change behavior through incentives, education programs, or other means. The primary disadvantage of mandates, correspondingly, is that they are less flexible than other policies, such as incentives, and may result in unintended consequences, such as reductions in new construction activity or large cost increases. In addition, federal law may limit the ability of state and local governments to mandate certain actions, such as requirements to use electric appliances.

Numerous mandate-based policies are possible. For new construction, examples could include a requirement for a minimum energy efficiency standard that could encourage all-electric construction. For existing structures, a mandate could include policies requiring electrical upgrades (such as a panel upgrade designed to facilitate installation of electric appliances) at the time a property is sold or when significant renovations are undertaken.

Research suggests that mandates can be effective in achieving building electrification or energy efficiency goals. However, mandates impose costs, whether on builders or homeowners who are forced to pay more for electrification or energy efficiency upgrades, as well as on residents who may forego benefits such as the experience of cooking with gas. Mandates are also more likely to face legal challenges and may be prevented in many cases by federal law.[3]

1.3.2 Land Use and Zoning Incentives

Land use, zoning, or permitting incentives include policies, such as allowing greater building density or waiving or altering certain policies, like parking requirements, which can add to construction costs. Such incentives can also include expedited permit approvals. These incentives can be offered to builders in exchange for meeting certain climate goals, such as constructing all-electric buildings or installing

[2] "Energy, Resiliency, and Equity Technical Report," County of San Diego; "2022 Cost-Effectiveness Study: Single Family New Construction," Pacific Gas and Electric Company (last revised September 12, 2022).

[3] Local jurisdictions must demonstrate that reach codes save energy and are cost effective.

additional rooftop solar panels or batteries. Incentives like these can be economically meaningful for builders, and they come at little financial cost for the implementing entity.

Land use or zoning incentives have the potential to motivate desired behavior on the part of builders or building owners. However, these incentives have limited applicability, primarily helping to incentivize changes to multifamily buildings. In addition, the incentive with the greatest potential to further the County's housing and climate goals – increased housing density – may not be popular with County residents in some communities.

1.3.3 Financial Incentives

Potential financial incentives can include permit fee waivers or reductions; rebates or grants; tax incentives; and subsidized loans. The primary objective of incentive programs is to address the up-front cost barriers faced by consumers or building owners. Financial incentives are voluntary and are often popular with consumers. They also preserve consumer choice in building construction, renovation, and appliance upgrade options.

While financial incentives have many advantages, they are also subject to two important disadvantages: (1) high cost and (2) limited effectiveness in changing consumer behavior. Specifically, because financial incentives seek to change consumer behavior, they must be large enough to be meaningful to consumers or building owners or they will be ineffective. In other words, small incentives are not likely to change behavior.[4] However, larger incentives can be costly for the implementing entity. In addition, some portion of most financial incentives end up being paid to consumers or building owners who receive the financial incentive for an action they would have undertaken regardless.[5]

Research on the effectiveness of incentives in changing consumer behavior shows that, the size of the incentive must be large enough to motivate behavior change. Specifically, while research suggests that the effectiveness of incentives increases as the size of the incentive increases, however, many financial incentives are not effective at changing consumer behavior, with most of the financial benefits flowing to individuals who would have taken the desired action even in the absence of the incentive. As a result, financial incentives can be costly to implement, and because smaller incentives may not be effective, the larger incentives needed to achieve the desired behavior changes require substantial resources from the implementing entity.[6]

As noted throughout this Study, various incentives exist for "green" building efforts: locally, within the State, and at the federal level. While the size of incentives varies and can have an impact on changing consumer behaviors, additional research is needed to identify the effect of single incentive policies and stacking incentives to see if the combination of various incentives could help to change behavior, particularly for still emerging technologies and associated adoption rates.

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[4] See, for example, Walls, Margaret, "Comparing Subsidies, Loans, and Standards for Improving Home Energy Efficiency." Resources for the Future Discussion Paper. December 2012, p. 11.

[5] Financial incentives should also be designed to as to ensure that the intended recipient (e.g. the homeowner) receives the benefit, rather than having an incentive absorbed by an intermediary such as a contractor.

[6] Financial disincentives, such as charges imposed on building owners for activities such as installing inefficient space or water heating equipment, can be effective in changing consumer behavior and avoid the costs to the implementing agency associated with financial incentives. However, under the California constitution most such charges would be considered taxes and require a vote of the people to implement.

1.3.4 Education and Technical Assistance

Public education and technical assistance comprise other potential policy tools for local governments seeking to advance climate goals. Such measures can include advertising and public education campaigns or energy audits that provide consumers with information about their energy consumption. Education and technical assistance programs can also be targeted to appliance installers and contractors, who may lack knowledge of new technologies or equipment types.

Third-party green certifications and rating systems, including Energy Star, Leadership in Energy and Environmental Design (LEED), Home Energy Rating System (HERS), Living Building, Nearly zero-emission building (NZEB), National Green Building Standard (NGBS) provide information to consumers about the energy efficiency benefits and characteristics of buildings; these certifications and ratings can also be used as a benchmark for granting incentives, such as expedited permitting or fee waivers, or could be the basis for locally-granted awards that can be used as a marketing benefit for new communities.

Available research suggests that lack of familiarity with new technologies may be an important factor in the slow adoption of electrification measures.[7] Research also suggests that information and technical assistance programs must be carefully designed if they are to be effective.[8]

Consumer education, workforce training, and other public education and promotion activities have potential to increase consumer awareness, and research indicates that some such programs can be effective. In addition, the effectiveness of other policies, such as financial incentives and permit streamlining efforts, can potentially be enhanced if paired with an effective education or technical assistance program. However, the reach and effectiveness of such programs is necessarily limited.

[7] See for example Cohn, C., and N. W. Esram. 2022. Building Electrification: Programs and Best Practices. Washington, DC: American Council for an Energy-Efficient Economy. aceee.org/researchreport/b2201, Page 53.

[8] See for example, Walls, Margaret, "Comparing Subsidies, Loans, and Standards for Improving Home Energy Efficiency." Cityscape, Volume 16, Number 1 (2014).

2 INTRODUCTION & BACKGROUND

On August 31, 2021, the County of San Diego's Board of Supervisors (Board) directed County staff to conduct a "Green Affordable Housing Study" (Study).[9] In December 2022, the County engaged the Blue Sky Consulting Group to conduct this Study, which presents policy options the County could consider to further the deployment of measures intended to reduce GHG emissions from new and existing residential buildings. In general, the County's climate goals in this sector center on building electrification (for both new construction and through existing building retrofits) and investments in energy efficiency, including rooftop solar and on-site battery storage.

2.1 Existing Policies to Promote Energy Efficiency, Electrification, and GHG Reductions

Throughout the country, local governments, state agencies, and the federal government have all adopted policies intended to promote energy efficiency, encourage or require building electrification, and reduce greenhouse gas emissions. The County has pursued numerous efforts in this regard, including the weatherization program, home repair program, and energy savings program; most recently, the County updated its Climate Action Plan (CAP). The CAP lists a series of policies and programs to achieve greenhouse gas emissions reductions.[10]

Beyond the Climate Action Plan, the County has several regional efforts to promote energy efficiency, electrification, and GHG reductions. These efforts include the Regional Decarbonization Framework which identifies various policy options and areas for County investment designed to help it reach its emissions reduction targets. Additionally, the Office of Sustainability and Environmental Justice leads regional efforts to reduce community exposure to health hazards.

In addition to the incentive programs offered at the federal level (see Federal Inflation Reduction Act), the County's Green Building Incentive and Weatherization programs further encourage the adoption of green building measures:

- *Green Building Incentive Program*: Projects that promote natural resource or water conservation, or enhance a building's energy efficiency, are eligible for reduced plan check turnaround times, a 7.5% reduction in plan check and building permit fees, and a total waiver of fees for residential solar installations.
- *Homeowner's & Business Owner's Relief Act (HRA)*: Established in 1995, the HRA eliminated permit review fees for a wide range of home improvements, including solar panel installations, electric water heaters, heat pump space heaters, and air conditioners. This program allows streamlined permitting and fee waivers for weatherization projects including windows, exterior finishings, re-roofs, insulation, stucco, and whole house fans.
- *Expanded Renewable Energy Fee Waiver Pilot*: Under a pilot program that ran from January 2021 to November 2021, the County waived permit fees for electric vehicle (EV) charging stations

[9] "Transformative Housing Solutions That Advance Equity, Sustainability, and Affordability for All," County of San Diego Board of Supervisors (August 31, 2021).

[10] County of San Diego, "2024 Climate Action Plan." Available at: https://www.sandiegocounty.gov/content/sdc/sustainability/cap.html.

($98), battery storage systems ($285), and residential panel upgrades ($285). Across roughly 2,500 eligible permit applications submitted during the pilot, the County awarded a total of $620,733, for an average benefit of roughly $245 per project. The County also expanded its existing streamlined online permitting processes which include online application submissions and approval for these renewable energy projects.

- *Weatherization Program*: The County is currently developing a program to incentivize residential weatherization upgrades for households making 80% or less of the area median income (AMI). Measures will include window, roof, door, and insulation upgrades, as well as electrification of appliances and rooftop solar.[11]

Additional information about these programs is provided in the section "Effectiveness of Existing County Policies" on page 3.

2.1.1 Recent Changes to State Energy Code

The state Energy Code was recently updated with new requirements taking effect on January 1, 2023, to support the transition from natural gas to electrical use. Among many other changes, the state Energy Code now supports the transition from natural gas to electrical use with new mandates for new residential buildings be "electric-ready." This means that, regardless of whether these buildings use gas for some of a home's appliances, electric circuits for space heating, water heating, clothes drying and cooking must be installed. The Energy Code includes requirements for energy storage systems (ESS) and electric vehicle (EV) charging readiness. New single-family homes (SFH) must be "EV capable"—i.e., able to support "Level 2" EV charging infrastructure. For new multi-family developments, 25% of parking spaces must be EV Ready—i.e., come with Level 2 charging infrastructure already installed. Finally, the Energy Code update expanded rooftop solar requirements to all new residential buildings.[12] These requirements are in addition to previously adopted measures, including requirements for rooftop solar installations on new homes and significant measures to ensure new buildings are well insulated. Due to "electric-ready" State mandates when using natural gas, new construction homebuilders will likely experience savings associated with voluntary all-electric construction which eliminates the need for natural gas plumbing, meters and other equipment and eliminates utility infrastructure extensions needed to support gas (estimated savings of approximately $3,400 per unit).[13]

2.1.2 Federal Inflation Reduction Act

The federal Inflation Reduction Act (IRA) includes a series of incentives for residential energy efficiency and electrification projects for existing dwellings as well as available credits for builders of new homes meeting specific energy efficiency or electrification requirements. These programs provide incentives for energy efficiency upgrades and rebates on qualified appliances, including electric heat pump water heaters, electric heat pumps for space heating and cooling, and electric ranges and cook tops, among

[11] *Weatherization Program*, County of San Diego, accessed 12/15/2023. Available at: https://www.sandiegocounty.gov/content/sdc/pds/longrangeplanning/weatherization.html.

[12] Under the updated Code, the minimum rooftop solar capacity depends on whether the new residential building is low-rise (i.e., three stories or fewer) or high-rise (i.e., four stories or higher). In addition, some limited exceptions apply to the requirement for shade or very small roofs.

[13] Frontier Energy, Inc., "2022 Cost Effectiveness Study: Single Family New Construction." (2022). See page 18.

other items. In addition, homeowners can receive rebates for electric panel upgrades and building weatherization improvements.[14]

- *High-Efficiency Electric Home Rebate Act (HEEHRA)*: For low-income households, HEEHRA covers 100% of the cost of a home electrification project; moderate-income households are eligible for 50% reimbursement. Eligible projects include electric appliance replacements, weatherization, and electric service panel upgrades and home rewiring. Participating households may receive up to $14,000.
- *Home Energy Performance-Based, Whole House Rebate program (HOMES)*: Housing units that achieve a 35% reduction in energy consumption through various efficiency upgrades are eligible for $4,000. For low- and moderate-income households, the subsidy increases to $8,000.
- *Tax credit programs:* The IRA also offers a variety of tax credits to incentivize home energy efficiency upgrades. The Energy Efficient Home Improvement Credit (25C) offers a 30% credit, typically up to $600, for each appliance or efficiency upgrade. For heat pump space heaters and water heaters, the maximum increases to $2,000. The IRA also extended the tax credit for solar installations.

The federal IRA programs have only recently been implemented. As a result, no data is available currently with which to gauge their effectiveness. However, these policies are designed to advance many of the same climate goals identified by the County in the Climate Action Plan and can help the County in achieving its climate goals.[15] Once more data is available, future research is needed on new federal grant programs and potential funding opportunities for County programs. This future analysis can evaluate the level of impact on County programs to help shape policy options and design effective incentives to motivate consumer behavior. New state and federal funding opportunities could supplement existing or new County programs and may help offset implementation costs associated with County programs to achieve regional climate goals.

2.1.3 State-Level Policies

The California Public Utilities Commissions (CPUC) offers two rebate programs related to energy efficiency upgrades, though these programs are only available to low-income communities.

- *CPUC – Self-Generation Incentive Program (SGIP)*: For low-income housing residents, the CPUC offers battery storage rebates of $850 per installed kilowatt-hour, or "approximately 85 percent of the cost of an average energy storage system."[16]
- *Disadvantaged Communities – Single-family Solar Homes (DAC-SASH)*: For residents of eligible disadvantaged communities (i.e., those among the top 25 percent of census tracts burdened by

[14] California Energy Commission, "Inflation Reduction Act Residential Energy Rebate Programs in California." Available at: https://www.energy.ca.gov/programs-and-topics/programs/inflation-reduction-act-residential-energy-rebate-programs-california.

[15] County of San Diego, 2024 Climate Action Plan. Available at: https://www.sandiegocounty.gov/content/sdc/sustainability/climateactionplan/seir.html.

[16] *Self-Generation Incentive Program*, CPUC, accessed 12/15/2023. Available at: https://www.cpuc.ca.gov/industries-and-topics/electrical-energy/demand-side-management/self-generation-incentive-program

pollution[17]), the CPUC offers rebates of $3 per installed watt of solar capacity, up to a maximum system size of 5 kW. This rebate covers roughly 60% of the total cost for installations of 4 – 5 kW.

2.2 Considering Tradeoffs

Adopting policies that can reduce energy use and GHG emissions can bring important benefits, whether for builders in the form of lower construction costs, residents in the form of lower utility bills, or society generally in the form of lower greenhouse gas emissions and reduced climate impacts. However, policies that can accelerate building decarbonization can also involve important tradeoffs. These tradeoffs generally occur along two dimensions. First, some policies may reduce consumers' utility bills, but come at a cost in the form of higher upfront costs for building construction or appliance upgrades. For example, building weatherization can significantly reduce energy bills for consumers with long-term net benefits identified by statewide studies when measured over the lifetime of the home. However, some weatherization upgrades can cost thousands of dollars which must be paid for up-front or financed. Considering and evaluating these tradeoffs will be important in developing and implementing any policies designed to accelerate the County's decarbonization efforts.

[17] As identified by the California Communities Environmental Health Screening Tool (Cal EnviroScreen 4.0). See: https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-40. It does not appear that any unincorporated communities in the County belong in this cohort.

3 POLICY OPTIONS – ANALYSIS

For local governments seeking to reduce energy consumption and GHG emissions associated with residential structures, many options exist. This section presents an analysis of the impact and feasibility of each of these types of policy actions.

3.1 Reach Codes, Mandates, and Prescriptive Performance Pathways

Mandates are simply requirements for builders or property owners to construct or renovate buildings according to specifications developed by a local government. Typically, these are part of a local building code or otherwise required to obtain approval for a building permit. When mandates seek to improve energy efficiency or reduce greenhouse gas emissions, they are sometimes embodied in a "reach code," or a locally adopted addition to the building code that goes beyond the basic requirements in the State building code.[18]

Mandates have several important advantages as a policy lever for local governments. Most importantly, as a specific requirement, they can be highly effective in achieving desired goals. That is, unlike an incentive, mandates simply require a specific action, such as installation of electric heating and cooling equipment, rather than seeking to change behavior through incentives, education programs, or other means.

The primary disadvantage of mandates, correspondingly, is that they are less flexible than other policies such as incentives, and may result in unintended consequences, such as reductions in new construction activity or cost increases. In addition, federal law limits the ability of state and local governments to mandate certain policies, such as requirements for installation of electric appliances.[19]

Numerous mandate-based policies are possible. For new construction, examples could include requirements for a minimum energy efficiency standard (CalGreen Voluntary Options). For existing structures, a mandate could include policies requiring electrical upgrades (such as a panel upgrade designed to facilitate installation of electric appliances) at the time a property is sold or when significant renovations are undertaken (e.g., renovations over a threshold such as $30,000). Building retrofit policies could also require a switch to energy-efficient appliances at the time of appliance replacement or remodel of specific rooms, such as laundry rooms or kitchens; some retrofit policies include specific exemptions, such as for economic hardship or where an electric panel upgrade would be required. Any such "reach code" would be required to demonstrate cost-effectiveness and energy efficiency over the baseline State building codes and be approved by the California Energy Commission and Building Standards Commission before local enforcement by the County.[20]

[18] Local jurisdictions must demonstrate that reach codes save energy and are cost effective.

[19] Under the EPCA, local governments cannot preempt federal energy efficiency standards.

[20] Cost effectiveness generally means that the money saved from the reduced energy use is enough to cover the initial cost of the energy efficiency measure within a reasonable period of time.

In California, many communities have passed requirements for all electric appliances in existing buildings when appliances are replaced.[21] Many of these policies have been suspended as a result of a lawsuit filed against the City of Berkeley's all electric mandate. Given the status of the Berkeley case, "reach code" policies should be carefully evaluated for legal risk exposure.

3.1.1 Mandates Costs and Effectiveness

Numerous academic studies have examined the impact of mandates, including research specific to electrification mandates. Because mandates are not seeking to change behavior through incentives or consumer education, they are not typically evaluated in terms of their effectiveness (i.e., how many consumers changed their behavior in response to the mandate). Instead, mandates are evaluated based on the costs they impose on building owners in terms of higher installation costs, or loss of perceived consumer benefits (e.g., preference for gas stoves). A recent (2023) study estimated the "cost" of electrification mandates as the amount consumers would be willing to pay to avoid the mandate.[22] Overall, in warm states, such as California, the "cost" of such a mandate was estimated to be $350 per year, although this value depends on the price consumers pay for electricity (with a higher willingness to pay to avoid the mandate as electricity prices rise). Specific impacts depend of course on the mandate in question. For a mandate that imposed relatively minor costs, for example an electrification mandate that lowered new construction costs by about $5,000 and increased consumer energy bills by a few hundred dollars per year, the expected impact on new construction activity would likely be modest. In addition, some mandates, while they come with up-front costs can also produce a long-term benefit for the resident or building owner in the form of lower energy bills over time.

3.2 Land Use and Zoning Incentives

Land use and zoning incentives include policies, such as allowing greater building density or waiving or altering certain policies like minimum setbacks, floor area ratios (FAR), or parking requirements that can impose higher construction costs or reduce the allowable number of units that can be built at a particular site. The County could offer these types of incentives to builders in exchange for their adherence to various possible GBMs, such as all-electric construction, the installation of additional rooftop solar panels, battery storage, and/or other weatherization or envelope measures.

Other local governments have begun pursuing energy efficiency goals through land use incentives. Recently, Arlington County, Virginia, increased the allowable FAR for buildings that are certified LEED silver or higher.[23] The city of Bothell, Washington reduced the number of required parking stalls for LEED

[21] Sierra Club database of natural gas reduction policies, available at https://www.sierraclub.org/articles/2021/07/californias-cities-lead-way-pollution-free-homes-and-buildings. See also Nikolewski, Rob, "Encinitas just banned natural gas in new buildings, including homes." San Diego Union Tribune, SEPT. 22, 202 available at https://www.sandiegouniontribune.com/business/story/2021-09-22/encinitas-electric-ordinance. For a map of jurisdictions with reach codes: https://localenergycodes.com/content/map.

[22] Davis, Lucas W. "What matters for electrification? Evidence from 70 years of US home heating choices." Review of Economics and Statistics (2023): 1-46.

[23] See https://betterbuiltnw.com/assets/uploads/resources/BBNW_PolicyExamples_DensityAndVariances_2020-10.pdf

Certified buildings, as well as reducing building permit fees for green buildings.[24] In Portland Oregon, developers receive a density bonus for projects that meet specified energy efficiency requirements.[25]

3.2.1 Key benefits of land use and zoning incentives

Land use and zoning incentives offer a few significant benefits.

Voluntary – In contrast to mandates and financial penalties, land use and zoning incentives do not impose costs on builders or homeowners who choose not to participate.

Likely to motivate GBM adoption - Incentives can be economically meaningful for builders and therefore incentivize desired behaviors.

Low financial costs - Unlike the financial incentives directly paid to homeowners or builders, land use and zoning incentives impose very minor financial costs on the implementing entity. The County would incur costs in setting up and administering a new program but would not need to pay the cost of financial subsidies to builders or homeowners.

Increases housing supply; reduces housing costs – To the extent that these incentives spur new development that would not have otherwise been feasible, they have the additional benefit of reducing home prices by increasing the supply of housing in the unincorporated areas. Moreover, the units created under this approach—whether multi-family units or ADUs—are likely to be less expensive than much of the existing County housing stock.

Increasing residential density reduces per capita GHG emissions – The increase in residential density that typically results from offering land use and zoning incentives is itself an outcome that helps the County achieve its climate goals to the extent that more dense housing is built in place of less dense housing that would otherwise be constructed. Expected emissions from multi-family development are lower than those from single family housing due to two factors. First, to the extent greater densities allow residents easier access to public transit or shorter commute times, per-capita transportation-related emissions are lower for residents living in denser areas.

Second, per-capita home energy use is significantly lower, on average, relative to single-family homes. As shown in Figure 1, below, according to modeling published by the Berkeley National Renewable Energy Laboratory (NREL), on a per-unit basis, townhouses and multi-family units generate 0.2 – 0.7 fewer metric tons of CO2 emissions annually relative to single family homes.[26]

[24] Ibid.

[25] See Portland requirements here: https://www.portland.gov/bps/documents/energy-efficient-building-requirements-planned-development-bonuses/download

[26] *NREL Building Stock Analysis*, National Renewable Energy Laboratory, last updated October 26, 2023. Available at: https://public.tableau.com/app/profile/nrel.buildingstock/viz/USBuildingTypologyResidential/Segments.

Figure 1 – Estimated Annual Per-Unit CO2 Emissions – Single-Family vs. Townhouse vs. Multi-Family, San Diego County[27]

	Avg Square Feet	Mbtu Equiv per year	Electric Share	Natural Gas Share	Annual MT CO2	CO2 Difference
Single-Family Detached	2,663	28.0	27%	73%	1.1	
Townhouse	1,291	22.4	28%	72%	0.9	**-0.2**
Multi-Family	826	13.3	45%	55%	0.4	**-0.7**

3.2.2 Drawbacks of land use and zoning incentives

Land use and zoning incentives also carry some costs.

Potentially unpopular. Zoning changes that increase density can be unpopular with residents who prefer less dense neighborhoods, or who are concerned about road congestion or parking impacts. In addition, such incentives are sometimes offered to builders in exchange for meeting local affordable housing goals, and so require balancing affordable housing and environmental goals.

3.3 Financial Incentives

Potential financial incentives include a variety of tools, including permit fee waivers or reductions; rebates or grants; tax incentives; and subsidized loans. According to a recent review of incentive programs, "the most common type of incentive is a direct rebate to utility customers for purchasing qualifying equipment."[28] More recently, the federal IRA includes multiple incentive programs for energy efficiency and building electrification (see Federal Inflation Reduction Act on page 9). Incentive programs are in general popular with consumers because they are voluntary and reduce out-of-pocket costs.

Financial incentives for new residential construction typically encourage builders to build more energy-efficient homes or to use all electric appliances for space and water heating, cooking and clothes drying. In existing homes, financial incentives, such as rebates, are commonly used to encourage households to invest in energy saving improvements, including home weatherization or to purchase more energy-efficient appliances. Some local governments offer waivers of permit or other fees or expedited permit approval as a means of incentivizing specific environmentally beneficial actions. In San Diego, the County's Green Building Incentive Program offers reduced plan check turnaround times and a reduction in plan check and building permit fees for qualifying projects. The City of Chula Vista offers expedited permit review for projects that are at least 30% more energy efficient than the current state energy efficiency standards.[29] The City of Jacksonville, Florida relies on external verification of energy efficiency by offering expedited building plan review for buildings that achieve LEED certification.[30]

Low interest or subsidized loan program incentives can be useful alternatives (or supplements) to rebates or fee waivers, especially for low-income consumers who may lack available savings or access to credit

[27] Blue Sky Consulting Group analysis of NREL.

[28] Cohn, C., and N. W. Esram, "Building Electrification: Programs and Best Practices." Washington, DC: American Council for an Energy-Efficient Economy. aceee.org/researchreport/b2201 (2022).

[29] ACEEE database of local energy efficiency policies available at https://database.aceee.org/policies-targeting-existing-buildings.

[30] ibid.

necessary to make or finance energy efficient improvements to their homes. In many respects these programs function like other financial incentives, lowering the cost of making desired investments. In addition, however, loan programs provide access to credit to finance energy efficient upgrades at a reduced cost and allow consumers to make purchases that might not otherwise be possible due to lack of credit or savings. Many local governments across the state have such programs in place. For example, the City of Oakland offers zero percent loans through its Weatherization and Energy Retrofit Revolving Loan Program for eligible homeowners.[31]

The primary objective of incentive programs is to address the up-front cost barriers faced by consumers or building owners, as the efficient technologies often require a greater initial investment than conventional technologies. And while there are numerous types of financial incentives, they in general work the same way from an economic standpoint: by lowering costs of a desired action, incentives increase the "uptake" of that activity. While details of individual programs can vary, sometimes in significant ways, the most important aspect of the incentive is the reduction in costs for builders or building owners, whether from a rebate on the purchase price of new appliances or a permit fee waiver with a similar value. In addition, research has shown that incentives can motivate behavior by acting as "cue-to-action" for those considering adoption of the energy efficiency action even beyond the financial effects of the incentive.[32] And, incentives can help to accelerate adoption of new technologies or practices, which can in turn encourage additional consumer adoption through "normalization" of these actions.

1. Disadvantages of Financial Incentives

While financial incentives have many advantages, they are also subject to two important disadvantages: high cost and ineffectiveness in changing consumer behavior. Specifically, because financial incentives seek to change consumer behavior, they must be large enough to be meaningful to consumers or building owners or they will be ineffective. In other words, very small incentives are not likely to change behavior. [33] However, larger incentives can be costly to implement.

In addition, some portion of financial incentives may go to a consumer or building owner who receives the financial incentive for an action they would have undertaken regardless, further diminishing the cost-effectiveness of financial incentives. For example, a homeowner who has already decided to replace a gas furnace with a more efficient electric heat pump does not need a financial incentive since they were already planning to take an environmentally beneficial action. However, because there is generally no way to distinguish between consumers who would take an action on their own and those who would only take the desired action in response to an incentive, individuals that would have taken the action regardless will receive the financial incentive on the same terms as individuals who are only taking the action in response to the incentive. As a result, policies that rely on incentives can be expensive to implement, since they need to pay for those individuals who would have taken the desired action regardless of the incentive in addition to those who are responsive to the incentive.

[31] ibid.

[32] Simpson, Genevieve and Julian Clifton, "Testing Diffusion of Innovations Theory with data: Financial incentives, early adopters, and distributed solar energy in Australia." Energy Research & Social Science, Volume 29, July 2017, Pages 12-22.

[33] See, for example, Walls, Margaret, "Comparing Subsidies, Loans, and Standards for Improving Home Energy Efficiency." Resources for the Future Discussion Paper. December 2012, p. 11.

2. Effectiveness of Financial Incentives

Research on the effectiveness of incentives shows that incentives can be effective in changing consumer behavior. To be effective, however, the size of the incentive must be large enough to motivate this behavior change. Furthermore, many reports that claim to show program effectiveness instead report program participation, without accounting for the extent to which programs changed behavior or were merely benefitting those who would have taken the desired action regardless of the incentive. Finally, research also shows that some energy efficiency programs do not reduce overall energy consumption, as consumers respond to increased efficiency in one area with higher energy use in another such that total consumption is relatively unchanged (e.g., a homeowner installs a more efficient space heating system but then increases the thermostat setting in the winter because the lower operating costs enables them to do so without increasing the monthly utility bill).

One study that relied on a national energy use simulation model found that subsidies for the purchase of energy efficient space heating equipment increased the uptake of such equipment; specifically, the research found that a subsidy of 50% of the purchase price increased uptake of such equipment by about 9 percentage points over 25 years (from a baseline of about 15% of total equipment to about 24% of equipment).[34] While this research did show that incentives can be effective in changing consumer behavior, such a policy could be expensive to implement, with heat pump installations in California costing an average of $17,287. With this average cost, a 50% subsidy would cost the implementing agency $8,644 per installation.[35] And while this study did not directly estimate the fraction of the incentive that went to those who would have elected the option regardless of the incentive, the implied share of such consumers from the results was about 60% (i.e., 15% in the baseline out of the 24% in the subsidy scenario modeled). A separate study in Europe found similar results, indicating that, "at a rebate level that corresponds to half the purchase price of the offered heating system, the estimated share of free riders exceeded 50% for most countries."[36]

Other studies have found subsidies to be somewhat less effective in changing behavior, with an even greater share of consumers that would have elected to select the desired outcome regardless of the incentive. For example, a recent empirical study analyzed the incremental impact of energy efficiency rebates that were part of the State Energy Efficient Appliance Rebate Program (SEEARP) implemented as part of the 2009 American Recovery and Reinvestment Act.[37] Under this program, federal funds totaling $300 million were distributed to the states, which in turn implemented rebate programs that varied in terms of the characteristics of eligible energy-saving appliances and the amount of the rebates offered. The authors used detailed transaction-level purchasing data from a national retailer, matched with demographic data, to analyze the impact of the rebate programs. They also compared the consumer activity in the weeks or months before and after the rebate period to quantify purchases with rebates that were simply intertemporal transfers—that is, purchases of eligible appliances that would have

[34] Walls, Margaret, "Comparing Subsidies, Loans, and Standards for Improving Home Energy Efficiency." Resources for the Future Discussion Paper. December 2012, p. 11.

[35] Heat pump installation costs can vary significantly. However, one recent survey indicated an average of about $8 per square foot or $17,287 across California during the period December 2021 to May 2022. See https://carbonswitch.com/heat-pump-costs/.

[36] Olsthoorn, M., Schleich, J., Gassmann, X., Faure, C. (2017): Free riding and rebates for resi-dential energy efficiency upgrades: A multi-country contingent valuation experiment. Energy Economics

[37] Houde, Sebastian, and Joseph Aldy, "Consumers' Response to State Energy Efficient Appliance Rebate Programs," American Economic Journal: Economic Policy 2017, 9(4): 227–255.

occurred before or after the rebate period if the rebate had not been offered. The authors estimated that 85 to 90 percent of the rebate funding went to consumers who would have switched anyway, even without the rebate or simply shifted the timing of a purchase they would otherwise have made. The authors also found a small "income effect" from the rebate, "where consumers claimed rebates to purchase higher quality, but less energy-efficient models."[38]

Another study compared two policies designed to reduce energy use: one provided free energy audits to consumers while the other offered rebates to upgrade existing heat pump systems to more efficient units. The authors found that these policies were effective in reducing GHG emissions, with both policies resulting in reductions in energy use of about 5%.[39] The authors noted, however, "that people replace heat pumps when their existing equipment is about to die and essentially free ride on the incentives." This result would suggest that information-based programs have the potential to be more cost-effective than incentive programs.

Research regarding the effectiveness of subsidized interest loan programs has shown that these programs may not be very effective in motivating consumers to change behavior. First, these policies are not widely adopted by consumers. According to one researcher, "energy efficiency loan programs have had low participation rates."[40] This factor is potentially explained at least in part by a second related explanation, namely, "the financial incentive to switch to high-efficiency equipment options is simply not that great because the loan has to be repaid."[41] One study directly comparing tax credits to zero interest loans found that study participants "valued tax credits much higher than interest-free loans."[42] Ultimately, though energy-efficiency-financing programs may be cost-effective, they "have not accomplished much thus far…, but it is possible that a large-scale national program could provide some CO2 emissions reductions at relatively low cost."[43]

3. Considerations for Low-Income Residents

Research has consistently shown that low-income homeowners may lack access to credit or needed savings to finance energy efficiency improvements or building electrification investments. In addition, low-income households may not pay enough in income taxes to benefit from tax credit-based programs. According to one recent report, "Low- and moderate-income (LMI) customers and renters face significant obstacles to enjoying the benefits of building electrification."[44] Nevertheless, while research directly analyzing the effectiveness of incentives for those already opting in and responsiveness of low-income populations was not available, the fact that many low-income households do not participate in incentive-

[38] Ibid, p. 253.

[39] Alberini, Anna; Towe, Charles (2015) : Information v. Energy Efficiency Incentives: Evidence from Residential Electricity Consumption in Maryland, Economics Working Paper Series, No. 15/208, ETH Zurich, CER-ETH - Center of Economic Research, Zurich, https://doi.org/10.3929/ethz-a-010352655.

[40] Walls, Margaret, "Comparing Subsidies, Loans, and Standards for Improving Home Energy Efficiency." Resources for the Future Discussion Paper. December 2012, p. 3.

[41] Walls, Margaret, "Comparing Subsidies, Loans, and Standards for Improving Home Energy Efficiency." Resources for the Future Discussion Paper. December 2012, p. 3.

[42] Zhao, Tingting, et al, "Consumer responses towards home energy financial incentives: A survey-based study." Energy Policy Volume 47, August 2012, Pages 291-297.

[43] Walls, Margaret, "Comparing Subsidies, Loans, and Standards for Improving Home Energy Efficiency." Cityscape: A Journal of Policy Development and Research • Volume 16, Number 1 • 2014.

[44] Cohn, C., and N. W. Esram, "Building Electrification: Programs and Best Practices." Washington, DC: American Council for an Energy-Efficient Economy. aceee.org/researchreport/b2201 (2022).

based programs suggests that ineffective incentives for those who would otherwise already opt-in would be more moderate among these populations (i.e. most of the participation would likely be new consumers rather than those electing to opt-in regardless of incentives since current participation is low). As a result, cost-effectiveness of financial incentives for low-income populations likely exceeds that of the population as a whole.

Future County policy development could take into consideration the challenges and opportunities specific to low-income residents. In particular, future studies are needed to help design incentives to best support low-income residents. For example, new state and federal income-based funding sources could provide future program opportunities to focus and offset some of the cost of entry associated with low-income resident's ability to finance energy efficiency improvements or building electrification investments.

3.4 Education and Technical Assistance

Public education and technical assistance comprise another potential policy for local governments seeking to advance climate goals. Such measures can include advertising and public education campaigns in which the public is educated via advertising, pamphlets, policy briefs, direct engagement, or other means with respect to a local entity's climate goals and policies. Other consumer education programs can include energy audits which provide consumers with information about their energy consumption and the largest energy users in their homes (and frequently provide information about the likely impact and cost of energy efficiency upgrades). Education and technical assistance programs can also be targeted to appliance installers and contractors, who may lack knowledge of new technologies or equipment types.

Third party green certifications and rating systems including Energy Star, Leadership in Energy and Environmental Design (LEED), Home Energy Rating System (HERS), Living Building, Nearly zero-emission building (NZEB), National Green Building Standard (NGBS) and others can also be used as a benchmark for granting incentives, such as expedited permitting or fee waivers or could be the basis for locally-granted awards which can be used as a marketing benefit for new communities. Available research suggests that building with third-party green certifications and ratings could be more attractive to consumers and could allow building owners to demand higher rents when compared to similar buildings without certifications.

Available research suggests that lack of familiarity with new technologies may be an important factor in slowing adoption of electrification measures. A recent study found, for example, that "lack of general knowledge and awareness about heat pump technologies among the public" was one of the important "reasons why heat pumps might not be the first choice for many customers."[45] Other research has found that information campaigns can be as effective as some financial incentives. For example, one study compared two approaches for reducing energy consumption among Maryland consumers, conducting a home energy audit and providing a rebate on the purchase of air-source heat pumps. The research found that offering the audit resulted in roughly the same reduction in energy use – about 5 percent – as the incentive, but came at a lower cost.[46]

[45] Cohn, C., and N. W. Esram. 2022. Building Electrification: Programs and Best Practices. Washington, DC: American Council for an Energy-Efficient Economy. aceee.org/researchreport/b2201, Page 53.

[46] Alberini, Anna and Charles Towe, "Information v. Energy Efficiency Incentives: Evidence from Residential Electricity Consumption in Maryland." EconomicsWorkingPaperSeries (2015). Available at: https://www.research-collection.ethz.ch/handle/20.500.11850/112684.

Research also suggests that information and technical assistance programs must be carefully designed if they are to be effective. One study comparing subsidies, loans, and application of energy efficiency standards, found that adoption of energy efficiency standards was not as effective as other approaches, leading to "purchases of equipment that just reaches the standards" rather than encouraging consumers to adopt even more energy saving strategies.[47] Another study compared the effectiveness of a financial incentive with a "nudge" in the form of goal setting and feedback to consumers. The authors "findings do not show evidence of synergies between traditional and behavioral interventions. On the contrary, the nudge seems to divert participants' attention from the financial incentive."[48]

[47] Walls, Margaret, "Comparing Subsidies, Loans, and Standards for Improving Home Energy Efficiency." Cityscape, Volume 16, Number 1 (2014).

[48] Fanghella, Valeria, et al, "Energy saving in a simulated environment: An online experiment of the interplay between nudges and financial incentives." Journal of Behavioral and Experimental Economics. Volume 93, August 2021.

4 APPENDIX A: POTENTIAL POLICIES TO ACCELERATE ADOPTION OF GREEN BUILDING MEASURES

Measure	Target	Pros	Cons	Potential impact
4.1 Reach Codes, Mandates, and Prescriptive Compliance Pathways				
Establish a reach code limiting the allowable GHG emission from new residential construction. New homes could comply by building with all electric construction or via an alternative compliance pathway (including options contained in CalGreen voluntary options) that resulted in a similar level of GHG emissions.	New Construction	Potential to accelerate transition to all electric new construction. Potential lower initial costs for builders/homeowners who forego a gas connection.	Homeowners may face fewer choices for homes with gas cooking appliances. Potential for higher utility costs due to higher costs of electricity vs natural gas. Potential high implementation costs for County due to need to evaluate alternative compliance pathway applications.	***High.*** Potential to accelerate transition to all electric new construction. Note: Additional legal analysis should be conducted in terms of the feasibility of this option (see Appendix B).
Require electrification upgrades at time of sale for existing residential development. Require building owners to upgrade electric panels, install circuitry for all electric homes or make other upgrades at time of sale.	Existing Homes	Potential to accelerate transition to all electric homes by facilitating subsequent installation of electric appliances such as heat pumps.	Potentially cost for building owners of several thousand dollars to as much as a few tens of thousands of dollars depending on scope of program adopted and condition of specific buildings.	***Medium.*** While this measure would not directly result in building electrification, it has the potential to accelerate transition to all electric existing buildings; existing buildings are a significant source of GHG emissions given that they are often less energy efficient relative to newly constructed homes. Note: Additional legal analysis should be conducted in terms of the feasibility of this option (see Appendix B).

Measure	Target	Pros	Cons	Potential impact
Adopt a Building Energy Performance Standard for commercial and multi-family residential properties. Adopt a reach code limiting the allowable GHG emission from new multifamily and commercial construction (including options contained in CalGreen voluntary options). New buildings could comply by building with all electric construction or via an alternative compliance pathway that resulted in a similar level of GHG emissions.	New Construction (Multifamily, Commercial)	Potential to accelerate transition to all electric new construction. Potential lower initial costs for builders who forego a gas connection.	Residents and businesses may face fewer choices for buildings with gas appliances. Potential for higher utility costs due to higher costs of electricity vs natural gas. Potential high implementation costs for County due to need to evaluate alternative compliance pathway applications.	***Medium.*** Potential to accelerate transition to all electric new construction. Note: Additional legal analysis should be conducted in terms of the feasibility of this option (see Appendix B).
Mandate battery storage for new residential construction. Adopt a local building code to require battery storage for all new homes.	New Construction	Potential to reduce GHG emissions by reducing reliance on grid electricity. Likely to result in on-bill savings to utility customers. Increases attractiveness of all electric new construction.	Upfront costs to builders/homeowners.	***Medium.*** New homes are already very energy efficient and all electric ready. Impact of added battery storage would reduce emissions by reducing demand for grid electricity during certain times. Note: Additional legal analysis should be conducted in terms of the feasibility of this option (see Appendix B).

Measure	Target	Pros	Cons	Potential impact
Mandate solar and battery storage for renovations. Adopt a local building code to require rooftop solar and battery storage for home renovations projects involving a new roof and costing more than $50,000.	Existing Homes	Potential to reduce GHG emissions by reducing reliance on grid electricity. Likely to result in on-bill savings to utility customers.	Upfront costs to builders/homeowners.	***Medium.*** New homes are already very energy efficient and all electric ready. Impact of added battery storage would reduce emissions by reducing demand for grid electricity during certain times. Note: Additional legal analysis should be conducted in terms of the feasibility of this option (see Appendix B).
4.2 **Land Use and Zoning Incentives**				
Increase allowable housing density. Amend Zoning Code to allow for development incentives (e.g., density bonus, reduce parking requirements) when development includes building electrification features beyond code requirements.	New Construction	Higher density housing reduces energy consumption on a per housing unit basis and has the potential to lower emissions associated with VMTs when compared to less dense construction. Potential to accelerate transition to all electric buildings. Relatively low cost to county to implement; permit costs could be recouped from applicants. Potential to lower home prices to the extent incentive increases new construction activity and supply of housing in County.	Some residents may oppose higher density housing in their neighborhoods. Costs for county to process and approve applications.	***High.*** Potentially significant impact depending on extent of added density. Research indicates that denser development results in less consumption of energy relative to a typical single family home.

Measure	Target	Pros	Cons	Potential impact
4.3 Financial Incentives				
Expand the Renewable Energy Fee Waiver Program. The County's Green Building Incentive program waives building permit fees for installation of solar equipment.	New Construction, Existing Homes	Potential to accelerate PV adoption. Voluntary measure likely to be well-received by consumers.	Research indicates that incentives can be relatively ineffective in changing consumer behavior, particularly for low value incentives. Costs to county to replace lost fee revenue.	***Low.*** Likely modest impact given small value of incentive (relative to overall cost of project).
Waive permit fees for building electrification projects. Permit fees would be waived for installation of building electrification equipment such as heat pumps.	Existing Homes	Potential to accelerate building electrification. Voluntary measure likely to be well-received by consumers.	Research indicates that incentives can be relatively ineffective in changing consumer behavior, particularly for low value incentives. Costs to county to replace lost fee revenue.	***Low.*** Likely modest impact given small value of incentive (relative to overall cost of project).
Offer a financial incentive to promote electrification of existing developments and/or installation of EV charging stations. Create program to offer a cash incentive to building owners who installed EV chargers or electric appliances such as heat pumps.[49]	Existing Buildings	Potential to accelerate building electrification. Voluntary measure likely to be well-received by consumers.	Building electrification could result in higher on-bill impacts for some consumers. Research indicates that incentives can be relatively ineffective in changing consumer behavior, although the impact depends on the size of the incentive. Costs to county to fund incentive (would depend on adoption and extent of incentive offered).	***Low.*** Likely modest impact given generally low effectiveness of small incentives to motivate changes in consumer behavior. Larger incentives could have a bigger impact. Existing federal incentives for electrification have been adopted as part of the Inflation Reduction Act.

[49] By 2028, the County plans to install 2,040 Level II or equivalent charging stations at County facilities and in public locations in the unincorporated area.

Measure	Target	Pros	Cons	Potential impact
Offer an incentive to promote the purchase of alternative fuel and/or zero-emission construction and landscaping equipment.	Builders	Voluntary measure likely to be well-received by consumers.	Research indicates that incentives can be relatively ineffective in changing consumer behavior. Response would depend on size of incentive, with higher value incentives producing a larger change in behavior. Costs to county to fund incentive (would depend on adoption and extent of incentive offered).	***Low.*** Likely modest impact given generally low effectiveness of small incentives to motivate changes in consumer behavior. Larger incentives could have a bigger impact.
Subsidize heat pump installation cost. Provide an incentive payment to building owners who install a heat pump to replace a gas furnace.	Existing Homes	Potential to accelerate transition to all electric buildings. Voluntary measure likely to be well-received by consumers.	Research indicates that incentives can be relatively ineffective in changing consumer behavior. A substantial portion of the incentive would likely be paid to individuals who would take the desired action regardless (free riders), thereby reducing the cost effectiveness of the incentive. Potential to increase on-bill costs for consumers.	***Low.*** Likely modest impact given generally low effectiveness of incentives to motivate changes in consumer behavior. Larger incentives could have a bigger impact.
Create a low interest loan program for low-income consumers to install GBMs. Such a program would allow low-income homeowners to apply for loans to make specified home repairs.	Existing Homes	Low-income consumers may lack the resources or access to credit needed to install GBMs; therefore, has the potential to increase adoption of GBMs among low income building owners. Voluntary measure likely to be well-received by consumers.	Relatively small value of low or zero interest incentive likely to result in modest take up rates for program. Potentially high implementation and administration costs for County.	***Low.*** Likely modest impact given generally low effectiveness of incentives to motivate changes in consumer behavior. Low income building owners may still lack ability to repay loans even with zero interest. Cost to County to implement, subsidize loan interest and defaults.

Measure	Target	Pros	Cons	Potential impact
Set time requirements for the processing of building electrification permits. Accelerate building electrification by limiting the permit processing time for electrification applications.	Existing Homes	Potential to accelerate building electrification. Voluntary measure likely to be well-received by consumers.	Research indicates that incentives can be relatively ineffective in changing consumer behavior, particularly for low value incentives.	***Low.*** Likely modest impact given generally low effectiveness of incentives to motivate changes in consumer behavior.
4.4 **Education and Technical Assistance**				
Consumer education campaign. Implement a program to make consumers aware of benefits of various GBMs.	Builders, Homeowners, Consumers	Potential to accelerate adoption of GBMs. Some programs can be implemented at low cost.	Likely modest impact.	***Low.*** Likely modest impact. Would depend on program specifics and effectiveness.
Develop and distribute materials to assist renters with implementing energy efficiency improvements.	Renters	Potential to accelerate adoption of GBMs. Could be implemented at low cost.	Likely modest impact.	***Low.*** Likely modest impact. Would depend on program specifics and effectiveness.
Create a green building award to distinguish building electrification projects/renovations in the unincorporated area.	Builders	Potential to accelerate adoption of GBMs. Could be implemented at low cost.	Likely modest impact.	***Low.*** Likely modest impact. Would depend on program specifics and effectiveness.

Measure	Target	Pros	Cons	Potential impact
Create public-facing website to provide information related to building electrification. Website would provide links to, e.g., the BayREN Policy Calculator[50] and guides for consumers purchasing EVs.[51]	All residents	Potential to accelerate adoption of GBMs. Could be implemented at low cost.	Likely modest impact.	***Low.*** Likely modest impact. Would depend on program specifics and effectiveness.
Create a County program to assist residents and businesses pursuing grants for building electrification projects.	All residents	Potential to accelerate adoption of GBMs. Some programs can be implemented at low cost.	Likely modest impact.	***Low.*** Likely modest impact. Would depend on program specifics and effectiveness.
Create a County program to provide technical/engineering design for building electrification and related projects.	All residents	Potential to accelerate adoption of GBMs. Some programs can be implemented at low cost.	Likely modest impact.	***Low.*** Likely modest impact. Would depend on program specifics and effectiveness.
Create workforce training opportunities for building electrification related careers and activities.	Workers, Builders	Potential to accelerate adoption of GBMs. Some programs can be implemented at low cost.	Likely modest impact.	***Low.*** Likely modest impact. Would depend on program specifics and effectiveness.

[50] https://mcusercontent.com/2eedea12c1cb29c9cc5e929cd/files/9a08bbce-fcaf-0d03-860e-7a1ceeaa8334/BayREN_Policy_Calculator_Info.pdf

[51] https://www.sandiegocounty.gov/content/sdc/sustainability/news/EVConsumerGuideLaunch.html#:~:text=Key%20components%20of%20the%20EV%20Consumer%20Guide%20include%3A,owner%20to%20install%20chargers%3B%20%20and%20More%20items

5 APPENDIX B: ALL-ELECTRIC PRE-EMPTION

Some local governments in California and across the country have adopted mandates for all-electric construction of new housing. Recent legal developments suggest that explicit prohibitions of gas-powered appliances or natural gas infrastructure are likely to be struck down by federal courts. Alternative policy approaches, however, may accomplish similar results in terms of reducing greenhouse gas emissions without running afoul of federal law.

In 2019, the City of Berkeley adopted an all-electric mandate, banning the installation of natural gas infrastructure in all new residential and commercial construction. Subsequently, the California Restaurant Association (CRA) sued the city, arguing that its natural gas ban was preempted by a federal statute, the Energy Policy and Conservation Act (EPCA), which sets federal efficiency standards for various types of home appliances and equipment.

In April 2023, the Ninth Circuit Court of Appeals struck down Berkeley's gas ban, agreeing with CRA that the EPCA preempts state and local governments from interfering, even indirectly, with individuals' "ability to use" products that meet federal efficiency standards. Because a natural gas ban effectively bans the use of federally approved gas ranges, furnaces, water heaters, and other appliances, the court reasoned, such a ban is preempted by the EPCA.[52]

Even if the Berkeley approach to mandating all-electric construction is determined to be prohibited under federal law, there are alternative approaches the County could take to strongly encourage electrification without resorting to incentive or penalty schemes or violating federal law.

5.1.1 The EPCA's Building Code Exception: Prescriptive vs Performance Pathways

Under the EPCA's "building code exception," state and local governments may avoid preemption by requiring buildings to meet *overall* energy efficiency standards that, on net, are more stringent than those the building would achieve if following minimum federal standards for individual appliances. There are several conditions that local governments must satisfy under the building code exception, but the key requirement is that the code must offer a compliance option that incorporates all products meeting federal standards.[53]

California's Energy Code itself includes an example of the use of the EPCA building code exception. The Energy Code offers two compliance "pathways" to builders or retrofitters, a "prescriptive" and a "performance" pathway. Under "prescriptive" compliance, the code dictates the measures builders must undertake for each building component.[54] In some cases, such as for water heaters in Climate Zone 10, a builder choosing the prescriptive pathway is required to install an electric appliance even though there are gas water heaters that meet federal efficiency standards. The Energy Code is not preempted by the EPCA, however, since it also offers builders an alternative "performance" pathway, which sets an overall energy efficiency target that the building must reach. Builders opting for performance-based compliance may choose gas-powered alternatives that are disallowed under the prescriptive pathway but must additionally adopt other energy efficiency measures so that the building as a whole is as energy efficient as one constructed according to prescriptive requirements. For example, builders choosing the performance pathway could install additional on-site solar or energy storage, or could undertake

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[52] Thus far, the Ninth Circuit—which covers many western states, including California, Oregon, and Washington—is the only circuit court in the United States to have reached this ruling. In the coming years, Congressional amendments to the EPCA, or a Supreme Court decision overruling the Ninth Circuit, could enable California's local governments to enact these mandates.

[53] 42 U.S. Code § 6297

[54] *2022 Building Energy Efficiency Standards For Residential And Nonresidential Buildings*, California Energy Commission, Section 150.1.

weatherization measures that, together with installed gas appliances, would result in a building that is as energy efficient as a building built to the prescriptive standard.

While the use of the building code exception is thus more complex than directly prohibiting use of natural gas appliances, current interpretations of federal law permit building codes that prescriptively require all-electric construction so long as there are alternative compliance options involving gas appliances. While the prohibition of natural gas through administrative policing powers was addressed through court rulings, no legal challenges or direction has been provided for Energy Code performance-based methods encouraging electrification.

5.1.2 Emissions standards

A separate approach to prohibiting gas appliances comes from New York City, which now prohibits new buildings from "combust[ing] any substance that emits 25 kilograms or more of carbon dioxide per million British thermal units of energy."[55] Because this law regulates emissions—and not energy efficiency—some have argued that, even in the Ninth Circuit, this approach is not preempted by the EPCA.[56]

In California, both the California Air Resources Board (CARB) as well as the Bay Area Air Quality Management District (BAAQMD) have announced their own bans on gas-powered appliances. In March 2023, BAAQMD passed amendments to its building appliances rules. Under the current timeline, beginning in 2027, any new water heater sold or installed in BAAQMD's jurisdiction must emit no nitrous oxide (NOx). In 2029, the same zero NOx rule will apply to newly purchased furnaces.[57] Because gas-powered water heaters and furnaces emit NOx, these appliances are effectively banned under the rule. CARB is considering adopting this rule as well, which would in effect result in a statewide ban on new gas-powered water heaters or furnaces.[58]

Because the County does not have authority over local emissions regulations, this approach would instead require action from the San Diego County Air Pollution Control District (SDCAPC). For example, SDAPCD could follow similar paths as CARB and BAAQMD and encourage or mandate replacing natural appliances with electric alternatives. County staff could also partner with SDAPCD to further evaluate options to create new programs to encourage the transition from natural gas to electrically powered equipment.

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[55] *Local Laws of the City of New York*, No. 154 (2021), available at: https://www.nyc.gov/assets/buildings/local_laws/ll154of2021.pdf

[56] Amy Turner, "Ninth Circuit Holds Berkeley's Gas Ban Preempted by U.S. Energy Policy & Conservation Act," *Columbia Law School, Climate Law* (April 18, 2023). Available at: https://blogs.law.columbia.edu/climatechange/2023/04/18/ninth-circuit-holds-berkeleys-gas-ban-preempted-by-u-s-energy-policy-conservation-act/.

[57] *Rules 9-4 and 9-6 Building Appliances*, Bay Area Air Quality Management District (accessed December 21, 2023). Available at: https://www.baaqmd.gov/rules-and-compliance/rule-development/building-appliances?blm_aid=1275592.

[58] *Zero-Emission Appliance Standards*, California Air Resources Board (accessed December 21, 2023). Available at: https://ww2.arb.ca.gov/our-work/programs/zero-emission-appliance-standards.

5.1.3 State Petitions for Preemption Waivers

Finally, the EPCA allows states and river basin commissions to apply for exemptions to the law's preemption of state and local energy efficiency standards.[59] Because the County cannot itself seek a waiver, this approach would require asking the state to seek a waiver.

[59] "State Petitions for Exemption from Federal Preemption," Dept. of Energy, Office of Energy Efficiency & Renewable Energy (accessed December 21, 2023). Available at: https://www.energy.gov/eere/state-petitions-exemption-federal-preemption.

6 APPENDIX C: EFFECTIVENESS OF EXISTING COUNTY POLICIES

The County currently offers incentives for green building measures in the form of its Green Building Incentive program, Homeowner's & Business Owner's Relief Act, and Expanded Renewable Energy Fee Waiver Pilot (see the section "Existing Policies to Promote Energy Efficiency, Electrification, and GHG Reductions" on page 8). While these programs can reduce costs and shorten project timelines for building owners, and can serve as an important signal with respect to which building upgrades the County sees as beneficial, analysis of available research suggests that these programs may have limited effectiveness in terms of changing consumer behavior. Research shows, for example, that even large incentives worth up to 50% of the total cost of an efficiency upgrade may only increase adoption by 10% (see the section "Financial Incentives" on page 15 for additional information).

Analysis of available data broadly confirms this finding. Figure 8, below, shows the number of applications per month for eligible projects related to battery storage, service panel upgrades, and EV charging stations under the Expanded Renewable Energy Fee Waiver Pilot. Comparing the number of applications during the pilot period to the period immediately after the pilot ended shows that the number of such projects did not decline significantly, as would be expected if the program was driving a significant behavior change. Specifically, data from the post-pilot period (i.e., February 2022 and after), shows that during the post-pilot period, when the fee waiver was no longer available, permit applications fell by less than 2% (i.e., three permits per month). To the extent the pilot was responsible for the increase in permits at the time of implementation, a corresponding drop in permits would be expected when the pilot ended. Data for the period immediately prior to pilot adoption in February 2021 (i.e., when fee waivers were not yet available) shows that the County received 178 applications. During the pilot period that followed, the County received 230 eligible permit applications per month.[60] Although there was an observed increase in applications co-incident with the start of the pilot, there are reasons to doubt the pilot's effectiveness in terms of increasing applications. First, to the extent residents learned of the pilot prior to its start date, many may have delayed their efficiency projects until the pilot began. This dynamic would tend to increase the disparity between pre-pilot and pilot application activity even as much of the difference would be due merely to customer project timing, and not increased rates of adoption. Second the COVID-19 pandemic began in March 2020, immediately prior to the pre-pilot period, and it is likely that the resulting economic downturn further reduced permitting activity during the pre-pilot period.

As noted throughout this report, multiple levels of "green" building-related incentives exist locally, within the state, and at the federal level. While the amount of these incentives varies (the larger the incentive, the more likely it could motivate behavior), additional research is needed to identify and isolate the effect of single incentive policies and evaluate the impact of stacking incentives to see if the combination of various incentives and fee waivers (regardless of size) could help to change behavior, particularly for still emerging technologies and associated adoption rates (early, middle, and late adopters). This future evaluation could identify where the emerging technology adoption is currently (defined within the adoption model) and then design programs and incentives to help motivate consumer behavior towards the intended policy outcome.

[60] Data provided by County for July 2020 – November 2022. These metrics do not imply that the pilot was only responsible for only three additional energy efficiency projects per month, since the popularity of solar, battery storage, and EV charging has grown over time.

Figure 2 – Impact of Renewable Energy Fee Waiver