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From: Sachi A. Hamai
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REPORT BACK ON NATIONAL TRENDS IN REDUCING EMISSIONS THROUGH BUILDING DECARBONIZATION PROGRAMS (ITEM NO. 12, AGENDA OF AUGUST 13, 2019)

On August 13, 2019, the Board approved the *National Trends in Reducing Emissions Through Building Decarbonization Programs* motion which directed the Chief Sustainability Office (CSO), in consultation with the Department of Public Works (DPW), to report back within 60 days on jurisdictions that have either implemented policies or practices instituting building decarbonization or that have the stated purpose of moving towards net zero carbon buildings. This report outlines ongoing efforts toward decarbonization and includes recommendations for Los Angeles County.

Federal, state, and local regulation of building energy use has historically focused on energy efficiency and conservation, which indirectly results in decreases of greenhouse gas emissions but does not directly phase out fossil fuel consumption. As the electrical grid increasingly transforms to zero-emission and renewable energy sources, switching from natural gas to electric power is an increasingly impactful strategy to reduce emissions and decarbonize the building stock.

Summary of Approaches to Building Decarbonization

Staff identified dozens of cities in California and throughout the U.S. that have adopted or are considering adopting building decarbonization policies. Attachment I lists these efforts and compares key features. Among these, there are four main approaches described below.

Require Mixed-Fuel Construction to Meet Higher Efficiency Standards

The California Energy Commission (CEC) sets a baseline building code for new construction, known as CalGreen, which has standards for energy efficiency, water efficiency, and other elements that all jurisdictions must adopt. The state building code also outlines higher standards within a tiered, voluntary framework that developers are encouraged but not required to follow. The voluntary standards, known as CalGreen Tier 1 and Tier 2, are more energy- and water-efficient than the CalGreen baseline, thereby reducing emissions associated with buildings.

Local jurisdictions may amend local building codes, pending proof of cost-effectiveness and approval from the CEC, to adopt "reach codes" that mandate higher standards than the state baseline code. For example, Palo Alto and the County of Marin have adopted reach codes requiring buildings with natural gas infrastructure to meet standards like those outlined in CalGreen Tier 1. All-electric construction is exempt from the higher local standards but will achieve greenhouse gas emission reductions over time due to changes in the electrical grid.

Many other local jurisdictions, including San Jose and Santa Monica, have recently developed or adopted reach codes to incentivize the all-electric approach by requiring mixed-fuel construction to meet higher standards than are required for all-electric construction. The efficacy of this approach is dependent on the degree to which the all-electric option is taken up by building developers. This approach may also be complex to communicate and implement because of the need for detailed energy modeling and documentation along multiple implementation pathways.

Require Electric Technology for Specified Equipment

It is also possible to adopt building code changes that require certain equipment, such as space and water heaters (the largest sources of greenhouse gas emissions in buildings) to be electric. Cost-effective and energy-efficient alternatives to gas equipment, such as ground-source heat pumps and water heaters, are widely available. This approach has been adopted by the cities of Carlsbad and Menlo Park.

Require New Construction to be All-Electric

Multiple local jurisdictions in California are exploring legal pathways to eliminate natural gas infrastructure from new construction. The Sonoma County cities of Santa Rosa, Petaluma, and Windsor are implementing reach codes that require low-rise residential construction to be all-electric. This is an approach based on the legal argument that because the CEC has developed an all-electric model for building compliance with state code, there is at least one known cost-effective pathway for meeting both state and local code. In July 2019, the city of Berkeley used local authority over issues of community safety to approve a prohibition on natural gas infrastructure in new low-rise residential buildings. Jurisdictions may also consider applying these requirements to existing buildings through retrofit ordinances.

Impose an Emissions or Energy Use Limit and Decrease the Limit Over Time

Under this approach, all buildings over a certain threshold size (e.g., 10,000 square feet) are given a greenhouse gas emissions limit based on the building type and use, and that limit decreases each year. Building owners are required to report annually on the emissions associated with the building's energy usage. If those emissions are higher than the limit, they pay a fee for each metric ton of emissions above the limit. Funds collected through this type of program can be used to implement emission reduction projects at selected categories of buildings, such as affordable housing, to ease compliance. Additionally, buildings whose emissions are below the limit may be able to sell their excess credits to buildings above the limit in a cap-and-trade style program.

This type of program has the largest potential impact as it applies to all buildings, not just new construction. New York City is the primary example of a jurisdiction taking this type of approach, having adopted the program in April 2019. Washington, D.C. has also adopted a similar program, though focused on energy performance rather than on emissions.

Emission Reductions and Economic and Development-Related Impacts

The programs outlined above have not been in effect long enough to quantify reductions in emissions or economic- or development-related impacts, though New York City's program is expected to reduce building emissions 40 percent by 2030, putting the city on a path toward net zero emissions by 2050. Many other local and regional Climate Action Plans also identify building decarbonization as a crucial strategy for achieving emission reduction goals.

A 2018 study commissioned by the California Building Industry Association, which estimated the expected level of emissions associated with electrification of specific equipment within new and existing homes, found that requiring electric appliances would result in significant reductions. Climate Zone 8, the only zone within the County that was analyzed for the study, was projected to achieve a 37 to 57 percent reduction.

Additional California-specific studies have found that decarbonization and electrification measures are cost-effective, reducing lifecycle expenses for the consumer. A 2019 study commissioned by Southern California Edison, the Sacramento Municipal Utilities District, and the Los Angeles Department of Water and Power assessed the cost-effectiveness of residential building electrification through a point-by-point comparison of the costs associated with gas versus electric equipment. It found that all-electric new construction delivers lifecycle savings relative to a mixed-fuel home with traditional air conditioning.

There have been no studies to date that have examined the specific impacts on small businesses and ratepayers in disadvantaged communities; however, there are policy tools that can reduce any such impact should they arise. A 2019 study by E3 on the Future of Gas Distribution in California found that demand for gas will decrease in all potential pathways toward a low-carbon future, and that falling demand will lead to increased costs for remaining customers, absent policy intervention. That study recommends the development of a gas transition strategy to protect consumers, which could include targeted retirements of gas pipelines to reduce gas system expenditures, rate changes, and transition assistance for low-income consumers.

The California Energy Codes and Standards Program has published two studies outlining cost-effective combinations of energy-efficiency standards that exceed the minimum state requirements. The studies examine the costs of both mixed-fuel and all-electric construction in every climate zone in California.

Recommendation

Based on the foregoing and consistent with the OurCounty Sustainability Plan, it is recommended that DPW and the CSO work with stakeholders over the next 12 months to identify and recommend changes to building codes or other mechanisms that will significantly reduce emissions associated with buildings in unincorporated Los Angeles County, such that the changes could begin to take effect in 2021. It is also recommended that DPW and the CSO develop a benchmarking ordinance requiring large buildings to report on their energy usage, which will facilitate the future development of targets to reduce energy usage and emissions.

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Attachment

c: Executive Office, Board of Supervisors
County Counsel
Internal Services
Public Works

Building Decarbonization Policies by Jurisdiction and Status

Jurisdiction	Policy	Status	Target Parameters:			Applicable to:		Building Type
			Greenhouse Gas Emissions	Energy Usage	Full or Partial Electrification	New Construction	Existing Buildings	
California Cities and Counties (listed alphabetically)								
Berkeley, CA	Prohibition on natural gas infrastructure in new buildings, leveraging the city's local authority over community safety issues	Adopted 2019			x	x		Low-rise residential construction
Carlsbad, CA	Reach code requiring that water heating systems derive at least 60% of energy from on-site solar energy or recovered energy	Adopted 2019		x	x	x		Low-rise residential construction
Culver City, CA	Reach code requiring new construction to be all-electric	Committed 2019			x	x		
Davis, CA	Reach code to incentivize all-electric construction (which only has to meet baseline state code compliance) by requiring that mixed-fuel construction achieve energy efficiency improvements above state code requirements	Under consideration		x		x		Low-rise residential construction
Marin County, CA	Reach code requiring that mixed-fuel construction achieve energy efficiency improvements above state code requirements	Effective 2018		x		x		Residential and nonresidential construction
	Up-to-date reach code to incentivize all-electric construction (which only has to meet baseline state code compliance) by requiring that mixed-fuel construction achieve energy efficiency improvements above state code requirements	Under consideration		x		x		Residential and nonresidential construction

Menlo Park, CA	Reach code requiring that: • low-rise residential construction use electric equipment for space heating, water heating, and clothes dryers • nonresidential & high-rise residential buildings (with exceptions) be all-electric and have a minimum amount of solar production	Adopted 2019			x	x		Residential and nonresidential construction
Monte Sereno, CA	Reach code to incentivize all-electric construction (which only has to meet baseline state code compliance) by requiring that: • mixed-fuel construction achieve energy efficiency improvements above state code requirements • mixed-fuel buildings be electric-ready	Under consideration		x		x		Residential and nonresidential construction
Pacifica, CA	Reach code to incentivize all-electric construction (which only has to meet baseline state code compliance) by requiring that: • mixed-fuel construction achieve energy efficiency improvements above state code requirements • mixed-fuel buildings be electric-ready	Under consideration		x		x		Residential and nonresidential construction
Palo Alto, CA	Reach code requiring that mixed-fuel construction achieve energy efficiency improvements above state code requirements	Effective 2017		x		x		Residential and nonresidential construction
Petaluma, CA	Reach code requiring that new construction be all-electric	Under consideration			x	x		Residential construction

San Francisco, CA	Reach code to incentivize all-electric construction (which only has to meet baseline state code compliance) by requiring that mixed-fuel construction achieve energy efficiency improvements above state code requirements	Under consideration		x		x		Residential and nonresidential construction
San Jose, CA	Reach code to incentivize all-electric construction (which only has to meet baseline state code compliance) by requiring that: • mixed-fuel construction achieve energy efficiency improvements above state code requirements • mixed-fuel development be "electric ready" • nonresidential development include solar panels	Approved 2019		x		x		Residential construction and office buildings
	Prohibition on natural gas infrastructure in low-rise residential construction and new municipal buildings	Committed			x	x		Low-rise residential and municipal construction
San Luis Obispo, CA	Reach code to incentivize all-electric construction (which only has to meet baseline state code compliance) by requiring that: • mixed-fuel construction achieve energy efficiency improvements above state code requirements • mixed-fuel residential development be "electric ready" • nonresidential development include solar panels • mixed-fuel buildings pay a carbon offset fee which will fund the retrofitting of existing buildings	Under consideration		x		x		Residential and nonresidential construction

San Mateo, CA	Reach code to incentivize all-electric construction (which only has to meet baseline state code compliance) by requiring that mixed-fuel construction achieve energy efficiency improvements above state code requirements	Adopted 2019		x		x		Single family, duplex, and office building
Santa Monica, CA	Reach code requiring that new construction achieve energy efficiency improvements above state code requirements	Effective 2017		x		x		Residential and nonresidential construction
	Updated reach code to incentivize all-electric construction (which only has to meet baseline state code compliance) by requiring that mixed-fuel construction achieve energy efficiency improvements above state code requirements	Adopted 2019		x		x		Residential and nonresidential construction
Santa Rosa, CA	Reach code requiring that new construction be all-electric	Under consideration			x	x		Low-rise residential construction
Windsor, CA	Reach code requiring that new construction be all-electric	Adopted 2019			x	x		Low-rise residential construction
Cities Outside of California								
Austin, TX	Benchmarking, energy audit, and disclosure requirements. Multifamily properties with energy use intensity >150% of average must reduce use by 20%	Adopted		x		x	x	Commercial buildings over 10,000 square feet
Denver, CO	<ul style="list-style-type: none"> • Mandated incorporation of cool roofs and other energy efficiency features for new structures • Mandated retrofits for existing buildings 	Adopted		x		x	x	Buildings/additions over 25,000 square feet
New York City	Emission limits per square foot of multiple large building types	Adopted	x			x	x	All buildings over 25,000 square feet

Portland, OR	<ul style="list-style-type: none"> • Energy use reduction targets for existing buildings (25% by 2030) • Zero net-carbon emissions for new buildings by 2030 	Adopted	x	x		x	x	Residential and small commercial buildings
Minneapolis, MN	Benchmarking requirements and disclosure requirements, ASHRAE level 1 evaluation or similar tune-up/recommissioning every 5 years	Adopted		x			x	Commercial and multifamily buildings over 50,000 square feet
Orlando, FL	Benchmarking requirements with Energy Star portfolio manager, buildings below national average must do energy audit or retro-commission every 5 years starting May 2020	Adopted		x			x	Municipal buildings over 10,000 square feet, commercial and multifamily properties over 50,000 square feet
Seattle, WA	<ul style="list-style-type: none"> • Required energy benchmarking • Mandatory 5-year energy and water efficiency building tune-ups 	Adopted		x			x	<ul style="list-style-type: none"> • Nonresidential buildings over 20,000 square feet (benchmarking) • 50,000+ square feet (tune-ups)
Washington, D.C.	<ul style="list-style-type: none"> • Energy performance standards for multiple types of existing large buildings • Net-zero energy requirements for new construction 	Committed		x		x	x	<ul style="list-style-type: none"> • Existing buildings over 10,000 square feet • Residential and commercial construction
States								
Massachusetts	<ul style="list-style-type: none"> • 100% renewable energy, including for buildings and heating • Heat pump adoption targets • Funding programs to boost heat pump market (e.g., installation training, R&D) 	Under consideration	x		x	x	x	Nonspecific
Washington State	Energy intensity and energy use targets for nonresidential buildings	Under consideration		x		x	x	<ul style="list-style-type: none"> • Existing buildings over 50,000 square feet • All nonresidential construction