

**VALLEY CLEAN ENERGY ALLIANCE  
COMMUNITY ADVISORY COMMITTEE**

**Staff Report – Item 11**

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**TO:** Community Advisory Committee

**FROM:** Gordon Samuel, Assistant General Manager & Director of Power Services

**SUBJECT:** New Building Electrification Discussion and Potential Strategies

**DATE:** January 28, 2021

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**PURPOSE**

The purpose of this report is to provide background, solicit feedback and discuss options to take to the VCE Board regarding the electrification of new homes and businesses in order to lower greenhouse gas (GHG) emissions. Staff plans to take this feedback and make a recommendation to the VCE Board in the first quarter of 2021.

**STRATEGIC PLAN**

One of the key factors driving the formation of VCE was to address climate change. In addition to providing carbon-free electricity, VCE is reinvesting in our region and expanding our toolset for furthering emissions reductions by launching decarbonization programs. These programs represent the next stage in VCE's maturity and are a mechanism by which VCE will further engage our communities to achieve our mission. In order to bend the carbon curve downwards and improve the lives of our community members, VCE has made it a priority by including a strategic goal of decarbonization. New building electrification is one tool to help achieve that goal.

**BACKGROUND**

Over the past year, the Programs Task Group of the Community Advisory Committee (CAC) has been researching programs for the VCE territory that would encourage electrification of homes and businesses. In doing so, the group discovered that converting appliances (retrofitting homes) from gas to electric can be a costly and complicated project for homeowners and businesses, unless they are going through an extensive remodel. Managing retrofit programs can be costly and time consuming as well. In addition, research has been published recently on the negative impact burning natural gas indoors has on air quality and human health. As a more forward looking way to encourage electrification and lower GHG emissions, the task group also discussed new building electrification policies and actions that can be taken by cities and counties.

At the CAC meeting on December 19, 2020, CAC members Christine Shewmaker and David Springer briefly summarized the issue and suggested that the CAC hear a presentation on new building electrification polices that various cities and counties have undertaken at its January CAC meeting. This report and related materials follow up on that request.

## ANALYSIS

The electrification of new buildings is becoming more commonplace in California cities and counties. Forty local jurisdictions have adopted varying levels of new building electrification requirements over the past several years. The benefits and challenges section below provides an overview of some of the main benefits and issues that have been identified as jurisdictions have consider this step. While not intended to be an exhaustive list of pros/cons, when considering the independence of the source material, on balance staff believes new building electrification is supported in the research and analysis conducted by the State (CEC) and local jurisdictions that have adopted these types of new building requirements. With regard to two key considerations, staff agrees that the source generation for electricity consumed in the new buildings and cost effectiveness are important factors. On the first issue, VCE is in direct control of the electricity source and on the second, cost effectiveness has been addressed in dozens of cities and counties in various regions of the state. A sample of key issues and background materials related to staff's general conclusions are offered below.

### BENEFITS OF NEW BUILDING ELECTRIFICATION

- **Reduce CO2 emissions.** According to the California Air Resources Board ([CARB](#)), [residential and commercial buildings](#) are responsible for 25% of the GHG emissions in CA. These emissions come directly from fossil fuel combustion as well as electricity production for the buildings. Transitioning away from fossil fuel combustion in buildings lowers CO2 emissions.
- **Lower construction cost** – All-electric buildings cost less to build due mainly to eliminating requirements for natural gas infrastructure. In their [staff report supporting building electrification, Menlo Park](#) estimated savings of \$2k to \$5k for residential buildings and from \$20K to over a million dollars for office, retail, hotels, etc.

Reports generally favorable to the economics of electrification include a 2016 TRC report completed by TRC for Palo Alto, an EPRI report completed for SMUD, a 2018 Energy Commission funded report by Energy and Environmental Economics (E3)<sup>1</sup>, a 2018 [report by Rocky Mountain Institute](#), a 2018 [report by Synapse for by NRDC](#), and a 2019 [report by E3](#) sponsored by SMUD, LADWP, and Southern California Edison.

- **Eliminate the need to electrify and decarbonize later.** VCE has the creation of a decarbonization road map in its strategic plan. The most efficient building decarbonization retrofit is one that does not need to happen.
- **Better indoor air quality.** [Studies by medical professionals](#) have correlated exposure to NO<sub>2</sub> with [respiratory illness such as asthma](#), particularly in children. [Lawrence Berkeley National Lab](#) has studied exposure to NO<sub>2</sub>, micro-particulates (PM2.5), and other pollutants produced by inadequately vented ranges. In response, the Statewide Codes and Standards Team is proposing [Title 24 requirements](#) for 2022 that will apply a new American Society of Testing and Materials (ASTM) standard and require minimum capture efficiencies for residential range

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<sup>1</sup> California Energy Commission Docket Number 18-IEPR-09, TN #223785

hoods, with higher capture efficiencies (or exhaust airflows) required for gas ranges than electric ranges (cooking on an electric range still produces PM2.5 and harmful gases).

**Safer buildings** –The presence of gas appliances in homes and businesses increases the risk of methane leaks, inadequate venting of combustion gases, fires and explosions. The California Mechanical Code still allows gas appliances to be located indoors and to use indoor air to support combustion. High volume exhaust fans, for example whole house fans and kitchen range hoods can cause backdrafting of flues with the risk of carbon monoxide poisoning or even fire. While this practice is uncommon in new homes the risk is prevented outright in all-electric residences.

### CHALLENGES OF NEW BUILDING ELECTRIFICATION

There have been multiple reports on the costs and impacts of electrification, some favorable and some not. Here are several reports completed between 2016 and 2019 by different firms and with different sponsoring organizations.

- A 2018 [American Gas Association study](#) by ICF concluded that reduction in emissions from the residential sector would be offset by increased emissions from the power generation sector, “even in a case where all incremental generating capacity is renewable.” This report projected policy-driven electrification would increase average residential costs, including amortized costs for upgrades and utility bills, by 38 to 46 percent, and that the cost of GHG reduction would range from \$572 to \$806 per metric ton, significantly higher than the cost of other GHG reduction options.
- The California Building Industry Association sponsored a 2018 study by Navigant<sup>2</sup> focused on existing homes and stated that appliance electrification in 2020 may increase homeowner bills from \$50 to \$387 per year. If spread over a 15-year period, existing single-family homeowners would experience a combined annual cost increase of \$236 to \$1,302 if infrastructure upgrades are required, and -\$119 to \$922 if they are not required.

### LOCAL JURISDICTION ACTIONS

Forty different California municipalities and counties have [taken action on building electrification](#). These actions vary and are described below. These local jurisdictions represent 13 counties – Alameda (5), Contra Costa (1), Los Angeles (1), Marin (3), San Diego (1), San Francisco (1), San Luis Obispo (1), San Mateo (9), Santa Clara (12), Santa Cruz (1), Sonoma (3), Ventura (1), Yolo (1) - and at least 10% of the population of California (10% was calculated prior to Oakland taking action). Of the 40, 36 are served by CCAs or will be and four are served by city run utilities. Population size in these 40 jurisdictions varies: two have populations from 900K to one million, two range from 5K to 7k and there are many in-between.

The actions taken by these 40 jurisdictions fall into three basic sub types. These are:

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<sup>2</sup> California Energy Commission Docket Number 18-IEPR-09, TN #224761

- **Electric Preferred.** The most common approach is to adopt an Energy Commission approved “Reach Code” that allows mixed fuel buildings to be constructed under certain conditions. For example, they may be required to meet a higher efficiency standard, and/or may be required to provide adequate electrical capacity and pre-wiring to facilitate future conversion to electricity for water heating, space conditioning, cooking, and clothes drying, and/or to provide wiring for EV chargers. Higher permit fees may also be required. Energy efficiency improvements for mixed fuel buildings are typically implemented by requiring buildings to meet some marginal improvement in the Energy Design Rating (EDR), thus exceeding the minimum efficiency required by Title 24 Energy Standards. The higher the EDR margin, the greater the increase in energy efficiency. This rating is calculated using CEC approved software that is used to demonstrate compliance with energy standards by builders.
- **All Electric Required.** Adopted Reach Codes may require buildings to be constructed that meet all energy needs using electricity, and include exceptions that allow mixed fuel in some limited cases.
- **Natural Gas Ban.** Rather than require electricity, some are taking the approach to ban natural gas hook ups in new construction. This approach uses local ordinances rather than reach codes.

Within each sub type above there can be variations on types of buildings covered, residential or non-residential, low-rise or high-rise, etc. Over half of the 40 jurisdictions have chosen the all-electric approach.

As noted, the first two approaches involve Reach Codes. Reach Codes go beyond the state mandated Title 24 energy codes for building performance, must be shown to be cost-effective, and after passage by cities or counties require approval by the Energy Commission. Many of the REACH codes adopted to date have been approved by the CEC.

The “all electric required” or “natural gas ban” approaches also result in electrification of new buildings. A primary administrative difference is that a gas hookup ban does not require Energy Commission approval and is triggered on project approval, for example in entitlements and development agreements. All-electric reach codes are subject to CEC approval and are triggered by the building permit. Some municipalities, for example Berkeley and San Francisco, enacted gas bans but also adopted electric-preferred reach codes to address different building types.

The table below shows some examples of these 3 approaches by a sampling of the 40 jurisdictions (Note - three categories above are also those listed by the [PVE/SVCE/San Mateo OOS website](#) mentioned below).

**THREE BASIC APPROACHES TO ELECTRIFICATION OF NEW BUILDINGS**

Type	Municipality	Approach Details
Electric Preferred	Davis	New residential buildings that use mixed fuel need to have a Total EDR compliance margin of 9.5 for single family 10.0 for low-rise multifamily dwellings and provide pre-wiring for heat pump heating/cooling,

		water heating and electric ranges & ovens. All electric dwellings are exempt.
	San Luis Obispo	Similar to Davis except mixed fuel buildings must have an EDR margin of 9.0 for single family and 9.5 for multifamily. Mixed fuel non-residential buildings must also meet a higher performance standard with some exceptions such as commercial kitchens and public health uses. Offer technical support to builders who opt for all-electric construction.
All-Electric	Palo Alto	Residential buildings are required to be all-electric. Non-residential buildings may be mixed fuel but must meet a higher performance standard and be electrification ready. This is step towards stated goal of all electric in new construction by 2022. Will revisit in 2022.
	Oakland	All New Buildings to be all-electric. Also prohibits going from all electric to mixed fuel. Exemptions for ADUs and projects under prior development agreements.
	Menlo Park	Single family and low-rise multi-family residential to be all electric, with exceptions for stoves & fireplaces but prewiring must be provided. Nonresidential and high-rise to be all electric. Exceptions may be granted on appeal with third party verification.
	Redwood City	Requires all electric new buildings with exceptions for OSHPD regulated facilities, laboratories, and commercial kitchens. Residential buildings that are 100% affordable and ADUs are exempted.
Natural Gas Ban	Berkeley	No buildings built after January 2020 may be served by natural gas. Exceptions allowed where this is not physically feasible, or energy code compliance cannot be achieved, but these buildings must be provided with sufficient electrical capacity and wiring to be all-electric.
	San Jose	In November 2020 updated a previous ordinance (10/19) that banned natural gas hook ups in new single family and low-rise multi-family units to cover all new buildings. Exceptions for hospitals, ADUs, and facilities with a distributed energy resource,
	Morgan Hill	Buildings permitted after March 1, 2020 must be all-electric. Bans natural gas hook ups in new buildings with some exemptions for feasibility and public interest.

A full list of all 40 actions taken can be found at the [buildingdecarb.org](https://www.buildingdecarb.org) website:

<https://www.buildingdecarb.org/uploads/3/0/7/3/30734489/activecodematrix12-22.pdf> - and is attached. Some measures also include solar and EV charging.

#### CCAs ENCOURAGING ELECTRIFICATION

- MBCP (3CE)
  - Offering [reach codes incentives \(15K\) to cities in service area and grants](#) for developers of all electric multi-unit dwellings.
- SVCE

- Has [web page on advantages of all electric buildings](#)
- In their [decarbonization roadmap](#) they list encouraging reach codes for electricity in new buildings by member cities as a major approach (page19)
- PCE
  - Has [award programs for design of all electric](#) commercial and residential buildings
  - Has a [web page to defining REACH](#) codes
- Coalition of [PCE, SVCE and San Mateo Office of sustainability](#) has coalition on all electric new buildings
  - Lists three basic approaches
    - Electric preferred Energy Code Ordinance
    - All- Electric Code Ordinance
    - Natural Gas Ban Ordinance
  - Have grants of 10K to municipalities to help establish REACH codes ( separate form for PCE and SVCE cities)
  - Lots of supporting information and resources such as example ordinances for all three types above. Do note that for the first two types, the example ordinances are climate zone specific.

#### UTILITIES POSITIONS

- Supported [by PGE](#)
- Supported by [SMUD and CalCCA and SoCal Edison](#)
- Opposed by [So Cal Gas](#)

SMUD, LADWP, and Southern California Edison joined forces to support an [economic study](#) of housing electrification costs and benefits.

#### **NEXT STEPS**

After discussing and receiving feedback from the CAC, staff plans to present information and policy options to the Board on new building electrification in the 1<sup>st</sup> quarter of 2021.

#### **Attachment:**

1. List of 40 Actions taken

Jurisdiction	Approach			Systems			Building Types							Add-Ons		
	Natural Gas Infrastructure Moratorium	All-Electric Reach	Electric-Preferred	Whole Building	Water Heating	Space Heating	Low Rise Residential	City-Owned Properties	High Rise Residential	Hotel	Retail	Office	Restaurant	Life Sciences	Additional Solar	Electric Vehicles
Alameda	X			X				X								
Berkeley**	X		X	X			X	X	X	X	X	X	X	X	X	X
Brisbane		X			X	X	X	X	X	X	X	X	X			X
Burlingame		X		X	X	X	X	X	X	X	X	X		X		X
Campbell		X			X	X	X									X
Carlsbad	X	X			X		X								X	X
Cupertino*		X		X			X	X	X	X	X	X				X
Davis			X	X			X									
East Palo Alto		X		X			X	X	X	X	X		X			X
Hayward		X	X	X			X	X	X	X	X	X	X	X	X	X
Healdsburg		X			X	X	X	X	X	X	X	X	X	X		
Los Altos*		X		X	X	X	X	X	X	X	X					X
Los Altos Hills		X			X	X	X	X	X	X	X	X				
Los Gatos		X		X			X									X
Marin County			X	X			X	X	X	X	X	X	X			X
Menlo Park*		X			X	X	X	X	X	X	X	X		X	X	X
Millbrae		X			X	X	X	X	X	X	X	X	X			X
Mill Valley			X	X			X		X							X
Milpitas			X	X			X	X	X	X	X	X	X	X		X
Morgan Hill	X			X			X	X	X	X	X	X	X	X		
Mountain View*		X		X			X	X	X	X	X	X		X	X	X
Oakland		X		X			X	X	X	X	X	X	X			
Ojai		X		X			X	X	X	X	X		X			
Pacifica		X			X	X	X	X	X	X	X	X		X	X	X
Palo Alto*		X	X	X			X	X	X	X	X	X	X	X		X
Piedmont		X		X			X								X	
Redwood City*		X		X			X	X	X	X	X					X
Richmond		X		X	X	X	X	X	X	X	X					X
San Anselmo			X	X			X	X	X	X	X	X	X			
San Francisco**	X		X	X			X	X	X	X	X	X	X	X	X	X
San Jose**	X			X			X	X	X	X	X	X	X	X	X	X
San Luis Obispo			X	X			X	X	X	X	X	X	X	X	X	
San Mateo**		X		X			X		X		X				X	X
San Mateo County		X		X			X	X	X	X	X	X				X
Santa Cruz	X			X			X	X	X	X	X		X			
Santa Monica			X	X			X	X	X	X	X	X	X	X	X	X
Santa Rosa		X		X			X									
Saratoga		X			X	X	X	X	X	X	X	X	X			X
Sunnyvale*		X		X			X	X	X	X	X	X	X			X
Windsor		X		X			X									

\* Council went beyond staff recommendation  
 \*\* Multiple ordinances passed to strengthen/expand scope

