



## CITY OF GLENDALE, CALIFORNIA REPORT TO THE SUSTAINABILITY COMMISSION

### AGENDA ITEM

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Report: Reach Code - Information Report

### COMMISSION/COMMITTEE ACTION

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**Item Type:** Report Only

**Approved for** August 5, 2021 **calendar**

### ADMINISTRATIVE ACTION

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## RECOMMENDATION

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### BACKGROUND/ANALYSIS

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#### Reach Code Reach Codes – Information Report

The following informational report is for the Sustainability Commission to review actions required to potentially recommend that City Council discuss adopting an Ordinance amending the building code to require all newly constructed residential, office, retail and hotel buildings shall be designed, constructed, and equipped as all-electric buildings. Also all newly-constructed mixed-fuel buildings to meet stricter energy efficiency requirements and to require that such buildings as well as additions which are served by natural gas or propane be constructed so that they are ready for conversion to all-electric service.

Recommendations may include any of the following actions:

- 1. Adopt a resolution establishing a policy framework in support of an of local amendment to the California Energy Code*
- 2. Introduce an ordinance that adopts the 2019 California Energy Code, 2019 California Green Building Standards Code*

At a Council meeting in September, 2020 staff provided a report recommending the City Council provide direction regarding requiring commercial development projects in Glendale to provide rooftop solar photovoltaic (PV) systems. The report concluded, should City Council decide to pursue adoption of a Reach Code requirement for commercial PV, further study would be needed toward that aim. In addition to a Glendale-specific cost-effectiveness study for commercial photovoltaics, City Council may desire to include other provisions within the Reach Code, which would require further study.

At that meeting, City Council directed staff to explore hiring a consultant to determine the feasibility of adopting a commercial photovoltaic requirement and to look at a range of reach codes to include building electrification and additional energy efficiency measures including cool roofs and battery storage.

This report describes potential options that City Council may wish to pursue with regard to adopting a resolution promoting or requiring all new residential, office, retail and hotel buildings must be all-electric, with exceptions for hospitals, industrial processes and commercial kitchens. The resolution would propose amendments to the 2019 California Energy Code and 2109 California Green Building Standards Code to reach beyond state requirements, where:

1. All new residential, office, retail and hotel buildings must be all-electric, with exceptions for hospitals, industrial processers and commercial kitchens.
2. All other new mixed-fuel buildings must comply with higher performance standards or prescriptive requirements.
3. Requiring new buildings with natural gas to include the necessary infrastructure to convert to all-electric in the future, with exceptions for industrial processes and commercial kitchens, known as “retrofit ready” requirements.
4. All new buildings must install a PV system as a mandatory measure.

## Definitions

- **ALL-ELECTRIC BUILDING** is a building that uses electricity as the source of energy for all of its space heating, water heating, cooking and clothes drying appliances and has no gas plumbing in the building for these end uses. An All-Electric Building may include solar thermal collectors. *OPTION – may be plumbed for natural gas for commercial kitchens.*
- **MIXED-FUEL BUILDING** is a building that is plumbed for the use of natural gas or propane as fuel for space heating, water heating, cooking or clothes drying appliances.

This report uses information from the Statewide Reach Codes Program. The California Codes and Standards Reach Codes program provides technical support to local governments considering adopting a local ordinance (reach code) intended to support meeting local and/or statewide energy and greenhouse gas (GHG) reduction goals. The program facilitates adoption and implementation of the code when requested by local jurisdictions by providing resources such as cost-effectiveness studies, model language, sample findings, and other supporting documentation. Local jurisdictions that are considering adopting ordinances may contact the program for support through its website, [LocalEnergyCodes.com](http://LocalEnergyCodes.com).

The report outlines options to encourage all electric new construction, establish City solar requirements for all residential and non-residential new construction. The report presents a summary of the findings of cost effectiveness studies to support the options of all electric construction.

## Background

The State has set ambitious renewable energy targets for new construction -- it aims to achieve zero-net-energy (ZNE) for all new residential buildings by 2020 and for all nonresidential buildings (including high-rise residential) by 2030. One of the State’s policy mechanisms is to include energy efficiency and renewable energy requirements in the

energy code, which is part of the State Building Code and must be adopted and enforced by local agencies.

While the requirements of the 2019 version of the code (effective on January 1, 2020) move in the direction of ZNE performance, there are opportunities to achieve greater energy savings and accelerate decarbonization by improving energy efficiency and renewable standards. Such opportunities can be incorporated into the building code as local amendments, known as reach codes.

The informational report reviews the potential for the City of Glendale to develop reach codes to include building electrification and energy efficiency packages which might lead to the passing of a resolution to adopt a proposed ordinance to amend the building code to require the following:

1. All new residential, office, retail and hotel buildings must be all-electric, with exceptions for hospitals, industrial processes and commercial kitchens.
2. All other new mixed-fuel buildings must comply with higher performance standards or prescriptive requirements.
3. Requiring new buildings with natural gas to include the necessary infrastructure to convert to all-electric in the future, with exceptions for industrial processes and commercial kitchens, known as “retrofit ready” requirements.
4. All new buildings must install a PV system as a mandatory measure.

Higher energy standards are critical to decarbonization. High-efficiency equipment and design will lower energy requirements and reduce demand for fossil fuels and on-site renewables.

Likewise, all-electric buildings are one of the key strategies to decarbonizing the state’s building stock. Glendale Water and Power electric system is rapidly becoming cleaner, driven by escalating renewable portfolio standards and cleaner product offerings. And while it is theoretically possible to power buildings with renewable natural gas, there currently is no plan for large-scale conversion to renewable natural gas.

In addition, advances in electric heat pumps and other electrical equipment are yielding much higher overall efficiencies than their natural gas counterparts. Electric heat pumps, unlike traditional electric resistance heaters, do not generate heat, but concentrate and transfer it for end uses such as space conditioning and water heating. This process uses less primary energy and emits much less carbon, particularly when it is powered by renewable energy.

Many forms of renewable energy are not dispatchable, that is, they cannot be ramped up to match demand on a real-time basis. However, energy storage and load shifting

technologies, combined with dynamic electricity pricing structures are helping overcome these limitations. Batteries, smart buildings and financial incentives enable alignment of the consumer demand and supply from intermittent renewable sources such as solar and wind.

The all-electric readiness requirements are designed to enable buildings initially equipped with natural gas appliances to replace them with electric appliances at a later time without having to make electrical capacity upgrades or make other changes to the building. The all-electric readiness requirements are based on findings that all-electric buildings cause fewer GHG emissions. There are no cost-effectiveness findings for these provisions since, by themselves, they do not reduce energy. Including these is prudent as they are relatively inexpensive at the time of initial construction while enabling buildings to avoid much higher conversion costs in the future.

## **Local Standards**

The California Building Energy Efficiency Standards or Title 24, Part 6 (Title 24) (California Energy Commission, 2018a) is maintained and updated every three years by two state agencies: the California Energy Commission (Energy Commission) and the Building Standards Commission (BSC). In addition to enforcing the code, local jurisdictions have the authority to adopt local energy efficiency ordinances—or reach codes—that exceed the minimum standards defined by Title 24 (as established by Public Resources Code Section 25402.1(h)2 and Section 10-106 of the Building Energy Efficiency Standards). Local jurisdictions must demonstrate that the requirements of the proposed ordinance are cost-effective and result in buildings consuming less energy than is permitted by Title 24. In addition, the jurisdiction must obtain approval from the Energy Commission and file the ordinance with the BSC for the ordinance to be legally enforceable. This process involves submitting an application to the Energy Commission Executive Director with the proposed energy standards, findings and supporting analysis on the energy savings and cost effectiveness of those standards including complying with Title 24, and any required environmental review documents. The process includes a 60-day public comment period and final review and approval by the Energy Commission.

Local jurisdictions must demonstrate that the requirements of the proposed ordinance are:

- Based on local climatic, geological, and topographical, conditions (for purposes of the Green Building Standards Code, such conditions include local environmental conditions);
- Cost-effective;
- Not less restrictive than the State requirements; and
- Do not pre-empt federal appliance efficiency standards.

The new 2019 Building Code, including Title 24, Part 6, went into effect on January 1, 2020. It requires nonresidential buildings to reserve at least 15 percent of the roof area as a “solar zone,” but does not include any requirements or compliance credits for the installation of PV. The City of Glendale adopted these standards on November 19, 2019 by Ordinance 5937.

## **New Program Description**

The proposed program is aimed at encouraging all electric new buildings. Encouragement to develop all electric buildings will be done through incentives and amendments to Building Code. The program is designed to prioritize the construction of all electric buildings. Incentives to adopt this approach will be in the form of requiring all other new mixed fuel building to achieve higher energy performance over the 2019 California Building Energy Efficiency standards. The program shall include the following components:

- All new residential, office, retail and hotel buildings must be all-electric, with exceptions for hospitals, industrial processes and commercial kitchens.
- All other new mixed-fuel buildings must comply with higher performance standards or prescriptive requirements.
- Requiring new buildings with natural gas to include the necessary infrastructure to convert to all-electric in the future, with exceptions for industrial processes and commercial kitchens, known as “retrofit ready” requirements.
- All new buildings must install a PV system as a mandatory measure

The City of Glendale will be developing a Climate Action Plan, with decarbonization being a central tenant of the CAP. The transition to all electric buildings may be a key strategy of CAP to reduce greenhouse gas emissions and help the City of Glendale to continue this positive trend.

Information contained within this report relies in information provided by the Local Energy Codes Cost Effective Studies. That report is an addendum to the *2019 Nonresidential New Construction Reach Code Cost Effectiveness Study* and *2020 New Construction Cost Effectiveness Analysis: Detached Accessory Dwelling Units* modified to accurately represent the City of Glendale, California. The study analyzes cost-effectiveness of measure packages that exceed the minimum state requirements, the 2019 Building Energy Efficiency Standards, effective January 1, 2020, for design in newly constructed buildings. This report was developed in coordination with the California Statewide Investor Owned Utilities (IOUs) Codes and Standards Program, key consultants, and engaged cities - collectively known as the Reach Code Team.

The prototypes analyzed in these studies are:

- Detached Accessory Dwelling Units (ADUs)
- Single family homes
- Low-rise multifamily
- Mid-rise multifamily
- High-rise multifamily
- Medium Office
- Medium Retail
- Small Hotel

## Proposed Requirements

Similar to the energy standards that are consistent with the structure of the State code, which offers two pathways for compliance the City of Glendale may offer two pathways for compliance with the program, all electric design and mixed fuel design. As an incentive to design all electric buildings, a higher level of energy efficiency would be required for mixed fuel buildings.

### Residential options

All Electric 1. Comply with 2019 California Energy Code

Mixed Fuel 1. Comply with 2019 California Energy Code including City requirements for enhanced building energy performance

2. Pre-wire to be electric ready

### Non residential options

All Electric 1. Comply with 2019 California Energy Code

2. Comply with City Solar Requirements

Mixed Fuel 1. Comply with 2019 California Energy Code including City requirements for enhanced building energy performance

2. Comply with City Solar requirements

3. Pre-wire to be electric ready

Proposed Energy Performance Standards vary by building type as follows. The performance requirements listed below are based on the cost effectiveness studies performed for the City of Glendale.

Building Type	Performance Requirement	Justification
<b>Single family</b>	Exceed EDR by 8.5 points	Maximum cost effective TEDR
<b>Detached Accessory Dwelling Units (ADUs)</b>	Exceed EDR by 12.90 points	Maximum cost effective TEDR
<b>low-rise multifamily (1 to 3 habitable stories),</b>	Exceed EDR by 9.5 points	Maximum cost effective TEDR
<b>mid-rise multifamily (4 to 7 habitable stories),</b>	6.5% Compliance Margin	Maximum cost effective compliance margin
<b>high-rise multifamily (8 and above habitable stories)</b>	7.6% Compliance margin	Maximum cost effective compliance margin
<b>Medium Office</b>	16% Compliance Margin	Maximum cost effective compliance margin
<b>Medium Retail</b>	10% Compliance Margin	Maximum cost effective compliance margin
<b>Small Hotel</b>	5% Compliance margin	Maximum cost effective compliance margin

Energy Design Rating (EDR) score based on total estimated energy use. 100 represents a home built to 2006 building code. 0 represents a zero net energy home, an EDR score around 20 points meets compliance of the 2019 code.

### Solar Requirements

Starting January 1, 2020, the California Energy Code will require solar photovoltaic systems on all new single-family and low-rise multifamily buildings (three stories or less). The new 2019 Building Code, including Title 24, Part 6, went into effect on January 1, 2020. It requires nonresidential buildings to reserve at least 15 percent of the roof area as a “solar zone”. The proposed amendment to the energy code may require the installation of solar panels on the solar zone. Other Cities propose alternate options. City Council has directed staff to explore hiring a consultant team to determine the feasibility of adopting a commercial photovoltaic requirement.

### Electric Ready

The all-electric readiness requirements apply only to buildings and additions that are plumbed for gas. The requirements include circuits and/or conduit for water and space heating equipment, cooking equipment and clothes dryers, as well as space requirements for water heaters (accessory dwelling units are exempt from the space requirements). The requirements do not apply to industrial processes and commercial kitchens. The



specific requirements for low-rise residential buildings are at Section 150.0 and nonresidential requirements are at Section 140.0(b)2.

The methodology, prototype characteristics, and measure packages are retained from the main studies referenced above except for the energy costs are calculated using local Glendale utility rates and updated modeling software since the 2019 study. Measure packages include combinations of energy efficiency, electrification, solar photovoltaics (PV), and battery storage. The cost effectiveness is evaluated for California Climate Zone 9.

## IMPACTS

The proposed requirements are based on cost-effectiveness studies commissioned by City of Glendale. The studies analyzed several prototypical buildings. For each prototype, the studies simulated operating the buildings with different combinations of energy efficiency, solar and battery measures in order to determine the impacts on energy consumption, greenhouse gas emissions, costs and savings. Costs include incremental capital costs, and, in some cases higher energy costs. In general, the first costs of an all-electric building are lower than a mixed-fuel building due to the lack of gas plumbing.

### Summary of Findings

The Reach Code team developed packages of energy efficiency measures as well as packages combining energy efficiency with PV generation and/or battery storage systems, simulated them in building modeling software, and gathered costs to determine the cost effectiveness of multiple scenarios. The Reach Code team coordinated assumptions with multiple utilities, cities, and building community experts to develop a set of assumptions considered reasonable in the current market. Changing assumptions, such as the period of analysis, measure selection, cost assumptions, energy escalation rates, or utility tariffs are likely to change results.

The Reach Code team provides the following high-level takeaways from results:

- **Detached ADU:** All-electric detached ADUs have near zero or positive 'Total EDR Margins' implying that they comply with the code or exceed the 2019 Title 24 minimum requirements. They are cost effective in Glendale using the On-Bill metric.
- **Medium Office:** Both mixed fuel energy efficiency packages are cost effective and have positive compliance margins with and without solar PV and battery. All-electric packages are cost effective and compliant against the standard mixed fuel baseline model with efficiency measures and/or solar PV and battery. All-electric office is cost effective but requires additional efficiency measures to achieve compliance with federal minimum efficiency equipment and support an

all-electric reach code.

- **Medium Retail:** All mixed fuel and all-electric energy efficiency packages are cost effective with positive compliance margins.
- **Small Hotel:** Mixed fuel efficiency and PV with battery packages are cost effective with positive compliance margin but not On-Bill cost effective with efficiency measures alone. Electrification packages are cost effective but require additional efficiency measures to achieve compliance with federal minimum efficiency equipment. Hence, an all-electric reach code can be required when combined with efficiency measures alone or with efficiency plus solar PV and/or battery.

Reach code policies requiring all-electric buildings with added efficiency and/or solar PV are feasible for detached ADUs, medium office, medium retail and small hotel building types. Electric-preferred policies, where a mixed-fuel prototype must achieve a higher compliance margin than an all-electric building, are supported for all building types. In addition, PV only and PV + Battery reach codes policies are feasible for nonresidential new construction building types. In practice system size must be optimized for the specific building.

### Mid-Rise and High-Rise Multifamily New Construction

This analysis found cost-effective, non-preempted packages for mid-rise multifamily buildings under both mixed-fuel and all-electric cases. The results of this analysis can be used by the City of Glendale to support the adoption of reach codes.

### 3.1 Single Family and Low-Rise Multifamily New Construction

This analysis found cost-effective, non-preempted packages for both single family and low-rise multifamily buildings, under both mixed fuel and all-electric cases.

The Cost Effectiveness studies are included as exhibits 1 & 2 to this report.

### **Next Steps**

The next steps in the process are outlined below.

1. Information Session for Sustainability Commission August 5, 2021
2. Obtain Consultant proposals determining the feasibility of adopting a commercial photovoltaic requirement
3. Conduct internal and external outreach and refine scope

4. Prepare staff report and supporting documents, submit staff report to Sustainability Commission for recommendations
5. Prepare staff report and supporting documents with Sustainability Commission recommendations, submit staff report to City Council

## **FISCAL IMPACT**

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## **ALTERNATIVES**

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## **EXHIBITS**

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1. 2019 Cost-Effectiveness Study: 2020 Analysis of Residential Construction Cost Effectiveness – City of Glendale
2. New Construction Cost-Effectiveness Study Addendum: 2020 Analysis of Detached Accessory Dwelling Unit, Medium Office, Medium Retail and Small Hotel – City of Glendale