



CITY OF GLENDALE, CALIFORNIA REPORT TO THE SUSTAINABILITY COMMISSION

AGENDA ITEM

Report: Developing Building Electrification, Photovoltaic Infrastructure and EV Charging Reach Codes for the City of Glendale

1. Motion recommending the City Council hire a consultant to assist the City in the preparation of a reach code(s) that include building electrification, photovoltaics systems, EV charging, battery storage and cool roof requirements.

COMMISSION/COMMITTEE ACTION

Item Type: Action Item

Approved for November 4, 2021 **calendar**

ADMINISTRATIVE ACTION

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RECOMMENDATION

The Sustainability Commission approve a motion recommending the City Council hire a consultant to assist the City in the preparation of a reach code(s) that include building electrification, photovoltaics systems, EV charging, battery storage and cool roof requirements.

BACKGROUND/ANALYSIS

In September 2020 staff presented a report to City Council asking for direction with respect to requiring commercial development in Glendale to provide rooftop solar photovoltaic systems. In the 2020 report, staff concluded, in part; *“Should City Council decide to pursue adoption of a Reach Code requirement for commercial photovoltaic, further study would need to be conducted 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.”*

City Council directed staff to explore hiring a consultant team to determine the feasibility of adopting a commercial photovoltaic requirement. In addition, City Council also asked that any reach code study include information on building electrification, EV charging, battery storage and cool roof requirements.

City Council also suggested that staff connect with the Building De-carbonization (BDC) Coalition to obtain assistance regarding the process of developing reach codes and to provide staff guidance on navigating the California Energy Commission approval process for the adoption of a reach code.

The BDC assisted staff in connecting with the local Energy Codes team. Their experts develop robust toolkits as well as provide specific technical assistance to local jurisdictions (cities and counties) who are considering adopting energy reach codes. These include cost-effectiveness research and analysis, model ordinance language and other code development and implementation tools, and specific technical assistance throughout the code adoption process.

Staff researched Reach Codes adopted by other jurisdictions. This research indicated that, in general, jurisdictions are adopting building reach codes that require all new construction to be all electric or electric preferred with additional energy efficiency requirements.

As part of the research staff invited the BDC and Local Energy Codes team to provide the Sustainability Commission an updates on reach codes adopted in the state and to review the results of a cost effectiveness study completed for the City of Glendale.

All reach codes must be shown to be cost effective. To be cost effective, the money saved from the reduced energy costs needs to be enough to cover the initial cost within a reasonable period of time.

Analysis

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.

Throughout this report references are made to all electric buildings and mixed fuel buildings. These are defined as:

- **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.
- **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.

The State has set ambitious renewable energy targets for new construction. It aimed 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.

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).

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 de-carbonization by improving energy efficiency and renewable standards.

To date, some 40+ Cities and Counties have adopted some form of ordinance to adopt a reach code covering photovoltaics, energy efficiency measures, all electric in new construction and electric vehicle ordinances.

Likewise, all-electric buildings are one of the key strategies to decarbonizing the state's building stock. The state's electric system is rapidly becoming cleaner, driven by escalating renewable portfolio standards and cleaner product offerings by the utilities and community choice aggregators (CCAs) *and by GWP*. 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.

Cities and Counties consider adopting reach codes to further their sustainability goals. Higher energy standards are critical to de-carbonization. High-efficiency equipment and design will lower energy requirements and reduce demand for fossil fuels and on-site renewables. The City of Glendale will be developing a Climate Action Plan, with de-carbonization being a central tenet of the CAP. The transition to all electric buildings will be a key strategy of de-carbonization.

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.

If a local jurisdiction is to adopt a reach code, it 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.

Ordinance Options

In April 2021, SCE, a City-commissioned consultant, completed cost-effectiveness studies of the proposed approaches. 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.

There are a number of approaches available to adopt a reach code to further the sustainability goals of the City, which may include a mix of the following:

- All new newly constructed residential, and non-residential buildings shall be all electric buildings, and or
- Newly constructed buildings are to comply with stricter energy standards through a combination of energy efficiency, renewable energy and energy storage, and
- Ensure buildings are “Electric Ready” so they include the necessary infrastructure to convert to all-electric in the future, with exceptions for industrial processes yet to be determined.

Option A: Building Electrification– All Electric Building Pathway

A proposed all-electric pathway, where cost effective, would require, with some limited exemptions all new construction low rise residential, high rise residential (including mid-rise) hotels, and non-residential motels, office and retail to be all electric. All other nonresidential would require energy efficiency measures and solar, where:

- i. All newly constructed residential, office, retail, hotel and motel buildings shall be all-electric.

- ii. Newly constructed nonresidential that are designed to utilize mixed-fuel (natural gas or propane in addition to electricity) shall comply with either the prescriptive requirements or meet stricter compliance margins as specified.
- iii. All newly constructed nonresidential buildings, hotels and motels and high-rise (including mid-rise) residential buildings shall be required to install a solar PV system.

There would be guaranteed exemptions to this requirement for hospitals. It will still be necessary to determine if any other operations, such as commercial kitchens would be exempt from such a requirement, and to determine the scope and scale of any exemptions to quantify the impact of exemptions upon the effectiveness of any reach code.

Option B: Electric Preferred- Energy Efficiency Pathway

A proposed electric preferred pathway is aimed at encouraging all-electric new buildings 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 energy performance that exceeds California Building Energy Efficiency standards. The program may include the following components:

- All new mixed-fuel buildings must comply with higher performance standards or prescriptive requirements.
- All Electric Buildings would have to comply with the 2019, or later edition of the California Energy Code
- Requiring new buildings with natural gas to include the necessary infrastructure to convert to all-electric in the future, known as “retrofit ready” requirements.
- All new buildings must install a PV system as a mandatory measure.

As with option A, it will be necessary to determine the scope and scale of any exemptions from the reach code to quantify the impact of exemptions upon the effectiveness of any reach code.

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 - all electric design and mixed fuel design - for compliance with the program. As an incentive to design all electric buildings, a higher level of energy efficiency would be required for mixed fuel buildings.

Potential compliance pathway options include the following:

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

Nonresidential 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. The performance requirements listed below are based on the cost effectiveness studies performed for the City of Glendale.

Examples of Improved Energy Performance Standards for Mixed Fuel Buildings include the following:

Building Type	Performance Requirement	Justification
Single family	Exceed (Energy Design Rating (EDR) by 8.5 points	Maximum cost effective Total EDR (TDER)
Detached Accessory Dwelling Units (ADUs	Exceed EDR by 12.90 points	Maximum cost effective TEDR
Low-rise multifamily (1 to 3 habitable stories),	Exceed EDR by 9.5 points	Maximum cost effective TEDR
Mid-rise multifamily (4 to 7 habitable stories),	6.5% Compliance Margin	Maximum cost effective compliance margin
High-rise multifamily (8 and above habitable stories	7.6% Compliance Margin	Maximum cost effective compliance margin

Medium Office	16% Compliance Margin	Maximum cost effective compliance margin
Medium Retail	10% Compliance Margin	Maximum cost effective compliance margin
Small Hotel	5% Compliance Margin	Maximum cost effective compliance margin

Energy Design Rating score is based on total estimated energy use. One-hundred represents a home built to 2006 building code. Zero represents a zero net energy home, an EDR score around 20 points meets compliance of the 2019 code.

“Compliance margin” represents improvements relative to the energy budget calculated for the Standard Design Building. This standard was developed by the Investor Owned Utilities (IOU) local energy code teams.

Solar Requirements

Starting January 1, 2020, the California Energy Code began requiring 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% 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. City Council directed staff to explore hiring a consultant team to determine the feasibility of adopting a commercial photovoltaic requirement and this report recommends such hiring. This report does not determine the specifications of a solar ordinance to meet the demands of various building types.

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. The requirements may not apply to industrial processes and commercial kitchens. The specific requirements for low-rise residential buildings are to be determined.

Cost Effective Studies

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

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 these packages 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. It is important to note that 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, which is an analysis tool to value energy costs and savings.
- **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.
- **Single Family and Low-Rise Multifamily New Construction:** The 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

Due to the complexity of this issue, staff recommend that a consultant be hired to provide technical assistance and support to City staff to assist City staff in the development of a potential reach code and associated ordinances for the City of Glendale. Consultant work may be focused on assisting staff in developing draft ordinances for building electrification, photovoltaics and EV infrastructure in new construction, assist with the outreach and engagement process and support staff and City Council in the reach code adoption process.

The consultant can bring expertise to address a number of items that staff have not addressed in this report, including but not limited to:

1. Community Outreach: At this time staff have not undertaken community outreach activities to obtain input to any of the proposed ordinance options. Community outreach is a critical step especially when determining when exemptions to any proposed ordinance may apply and what those exemptions may be. Outreach will also assist in preparing builders, architects, property owners to prepare for the proposed local amendments to the energy code.
2. Analyze Reach Codes: Determine which of the many reach code options are appropriate for the City of Glendale. Including the determination of any exemptions from any proposed reach code.
3. Building Code Updates: The 2019 Building Energy Efficiency Standards, became effective January 1, 2020. The next update of the Building Energy Efficiency Standards is due in 2022 and will take effect January 1, 2023. It will be necessary to determine how the 2023 standards will influence and proposed reach code ordinance and the impact it will have on the affected community.
4. Reach Code Preparation: Assist staff in the preparation of building electrification, solar photovoltaic, EV charging and battery storage ordinances for adoption by City Council.
5. CEC and BSC Submissions: Assist staff in preparing required documentation for submission to the California Energy Commission and Building Standards Commission.

FISCAL IMPACT

There is no fiscal impact associated with this report

ALTERNATIVES

Alternative 1: The Sustainability Commission recommends that City Council take no action until the 2022 Building Efficiency Standards are published.

Alternative 2: The Sustainability Commission may recommend that City Council direct staff investigate amending the zoning, health and safety, or other municipal code to require all-electric new construction projects with no gas appliances or gas plumbing.

Alternative 3: The Sustainability Commission may recommend any other alternative not proposed by staff.

EXHIBITS

1. 2020 Analysis of Detached Accessory Dwelling Unit, Medium Office, Medium Retail and Small Hotel
2. 2020 Analysis of Residential Construction Cost