



CITY OF GLENDALE, CALIFORNIA REPORT TO THE SPECIAL CITY COUNCIL

AGENDA ITEM

Report: Requiring Commercial Development in Glendale to Provide Rooftop Solar Photovoltaic Systems

1. Motion Providing Direction to Staff

COUNCIL ACTION

Item Type: Action Item

Approved for September 22, 2020 **calendar**

ADMINISTRATIVE ACTION

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RECOMMENDATION

Staff recommends the City Council provide direction regarding requiring commercial development projects in Glendale to provide rooftop solar photovoltaic systems.

BACKGROUND/ANALYSIS

This report provides information regarding the implications of requiring new commercial development projects in Glendale to provide rooftop solar photovoltaic systems (“PV” or “solar panels”). A PV system is composed of one or more solar panels combined with an inverter and other electrical and mechanical hardware that use energy from the sun to generate electricity. City Council requested this information during its June 9, 2020 Special Meeting. In summary, requiring commercial development projects to provide PV would require California Energy Commission approval to adopt local standards beyond that required by the current California Energy Code. Proposed standards are required to be supported by analysis and findings demonstrating energy savings and cost effectiveness. At least 16 cities in California have successfully adopted a commercial PV requirement. If Glendale were to pursue this, additional study would be required, including a cost effectiveness analysis.

Local Standards

The California Building Energy Efficiency Standards Title 24, Part 6 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. 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.

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.

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.

California Cities with Commercial PV Requirement

At least 16 California cities successfully adopted Reach Codes that require commercial projects to provide PV, as summarized in the below chart.¹ Each city provided a supporting cost effectiveness analysis. A wide range of building prototypes are used in the analyses, as numerous variables are at play: mechanical equipment system configuration, whether building is powered by 100 percent electricity or mixed-fuel (gas plus electricity), percent of roof area available for PV, PV system design, financing, local labor/material costs, utility rates, etc. The studies evaluated life cycle costs over a 15 to 30-year period.

K = thousand, M = million, W = watt, kW = kilowatt, SF = square feet

California City	Adoption Date	Applicability (Non-Residential)	Requirement
Berkeley	Dec 2019	<ul style="list-style-type: none"> • New construction 	<ul style="list-style-type: none"> • PV system to fill solar zone (>15% of roof area)
Brisbane	Dec 2019	<ul style="list-style-type: none"> • New construction 	<ul style="list-style-type: none"> • 3 kW system for <10K SF • 5 kW system for >10K SF • OR solar thermal
Carlsbad	Mar 2019	<ul style="list-style-type: none"> • New construction • Additions where roof area increased by 2K SF • Alterations \$1M+ value affecting 75%+ existing floor area 	<ul style="list-style-type: none"> • 15 kW/10K SF gross floor area, 5 kW for <10K SF, or • PV system that offsets 80% of building's electrical demand
Hayward	Mar 2020	New construction using mixed-fuel	<ul style="list-style-type: none"> • PV system to fill solar zone (>15% of roof area)
Menlo Park	Sep 2019	New construction three stories or less	<ul style="list-style-type: none"> • 3 kW system if <10K SF • 5 kW system if >10K SF
Milpitas	Dec 2019	New construction	<ul style="list-style-type: none"> • 3 kW system if <10K SF • 5 kW system if >10K SF

¹ California Energy Codes & Standards, “2019 Code Cycle – Locally Adopted Energy Ordinances,” https://localenergycodes.com/download/1/file_path/fieldList/2019%20Adopted%20Reach%20Codes.pdf

Mountain View	Nov 2019	New construction 10K+ SF	PV installed on 50% of roof area
Pacifica	Nov 2019	New construction three stories or less	<ul style="list-style-type: none"> • 3 kW system if <10K SF • 5 kW system if >10K SF • OR solar thermal
Palo Alto	Dec 2019	New construction	<ul style="list-style-type: none"> • PV system to fill solar zone (>15% of roof area)
Richmond	Mar 2020	New construction	<ul style="list-style-type: none"> • 3 kW system if <10K SF • 5 kW system if >10K SF • OR solar thermal
San Francisco	Feb 2020	New construction 2K+ SF and 10 or fewer occupied floors (separate, flexible approach for taller buildings)	Applicant can choose between PV, solar water heating, or green roof. If PV, 10W/SF of PV roof area.
San Luis Obispo	Sep 2019	New construction	PV system to fill solar zone (>15% of roof area)
San Mateo	Sep 2019	New construction	<ul style="list-style-type: none"> • 3 kW system if <10K SF • 5 kW system if >10K SF • OR solar thermal
Santa Monica	Sep 2019	<ul style="list-style-type: none"> • New construction • Major additions (adding a story or 50% floor area) 	2W/SF of building or addition footprint
Sebastopol	Dec 2019	<ul style="list-style-type: none"> • New construction including 50% demolition • 1,800+ SF additions 	2W/SF conditioned building area or 75% offset of electrical load on annual basis
West Hollywood	Aug 2019	<ul style="list-style-type: none"> • New construction > 10K SF • Alterations causing >10K SF 	PV to offset 15% of usage OR solar thermal with min. .5 solar fraction OR vegetative roof covering min. 30%

The City of Sebastopol's ordinance includes incentives for exceeding requirements (incentives are not specified in the ordinance but are called out as "to be determined by the Building Official," presumably at a later date or perhaps on a case-by-case basis), accounting for using other forms of renewable energy, exceptions and alternative conditions that can be used when encountering practical difficulties in implementation (e.g. site location, shading), the ability for Council to adopt in-lieu fees, and the ability for property owners to meet the requirement across multiple properties (i.e., less on one property and more on another). Several cities included analysis of how the standards would help achieve their Climate Action Plan greenhouse gas emissions reduction

targets. These are examples of the flexibility that can be used to ensure an ordinance is well-suited to local conditions and goals.

Small Buildings

Council requested data regarding the effectiveness of PV on smaller commercial buildings, however, a paucity of data is available to answer this question. A statewide reach code cost effectiveness study² was prepared and many cities have relied on it; however, it does not include analysis of small buildings. Neither was research able to be obtained regarding a counter-argument to using PV on small commercial buildings, nor is there an obvious correlation to cost-effectiveness and building size within the various studies reviewed for this report. Studies generally indicate that cost-effectiveness may be achieved for all commercial building types, depending on the numerous variables discussed within the prior section of this report.

Staff was able to find two mentions of small buildings within other cities' cost effectiveness studies, as described below. As mentioned earlier, many variables are at play in accurately analyzing cost-effectiveness of building types, so caution should be used in extrapolating from these modest findings.

A technical study performed for the City of Carlsbad in 2019 analyzed the cost-effectiveness of a 5 kW PV system for a small office (one-story, 5.5K SF) and 9.4K SF retail strip mall (see further details in Exhibit 1). For both new construction and alterations, the PV systems were found to be cost effective over a 15-year period.

A cost effectiveness study performed for the City of San Francisco in 2014 found that a 14 kW PV system for a small office (one-story, 5.5K SF) and a 6.4 kW PV system for a small restaurant (one-story, 2.5K SF) (see further details in Exhibit 2), covering just 15 percent of roof area, could achieve an annual electric energy offset up to 34 percent and 15 percent, respectively. Again, results are highly variable based on inputs and modeling. The study found that the systems were cost effective in 2015 (over a 25-year period), when federal tax credits for commercial PV were 30 percent. It anticipated a reduction in tax credits in 2017 to 10 percent, resulting in those PV systems no longer being cost effective for small office buildings, but still being cost effective for small restaurants.

² Southern California Edison Company, "2019 Nonresidential New Construction Reach Code Cost Effectiveness Study" (July 2019), <https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=19-BSTD-06>

Current federal tax credits are 26 percent for construction beginning in 2020, with 22 percent in 2021 and 10 percent after that.³ It is possible small commercial PV systems may not continue to be cost effective after 2021 if the tax credit declines.

One reason the Carlsbad and San Francisco studies have different outcomes is their respective modeling uses different inputs. For example, some of those differences include the solar irradiance factor, tax credit assumptions, variations in the types of costs included, and cost of construction. The solar irradiance factors used result in the San Francisco system producing about 5.5 percent less energy annually than the system used in Carlsbad's study (Glendale's solar irradiance is close to Carlsbad's). The San Francisco study used a 10 percent federal tax credit for 2017 while Carlsbad used 19 percent. The San Francisco study accounted for additional costs including debt interest, depreciation, and insurance. Furthermore, the cost of construction may be higher in San Francisco.

As a note, most new commercial buildings in Glendale would not qualify as "small buildings," as defined in the studies, since most of them are more than one story and over 5,000 SF.

Large Buildings

As discussed in the prior section of this staff report, sufficient data was not able to be obtained to draw a conclusive determination regarding the correlation between building size and PV cost effectiveness. Only one of the studies reviewed for this report provided data for building size and energy offset (see below chart). The chart indicates that for the parameters used in the study, building use is a more significant factor than building size.

San Francisco Study (Exhibit 2)				
Building Type	Floor Area (SF)	# Floors	% Roof	% Energy Offset
Small restaurant	2,501	1	15	15
Small office	5,502	1	15	34
Medium retail	24,563	1	15	48
Small hotel	42,554	3	15	31
Warehouse	49,495	1	11.2	100
Medium office	53,628	3	15	15
Large retail	240,000	1	15	47
Large office	498,589	12	15	4

³ United States Department of Energy, Office of Energy Efficiency & Renewable Energy: Guide to the Federal Investment Tax Credit for Commercial Solar Photovoltaics (January 2020), <https://www.energy.gov/sites/prod/files/2020/01/f70/Guide%20to%20the%20Federal%20Investment%20Tax%20Credit%20for%20Commercial%20Solar%20PV.pdf>

It should be noted that overall square footage does not translate to increased efficiency in solar production or usage. As an example, a tall building with a smaller roof area would not produce a large percentage of energy offset. Staff recommends the City perform its own study to better understand the correlation between overall building size, roof area, and energy offset opportunities.

Next Steps

Should City Council decide to pursue adoption of a Reach Code requirement for commercial PV, further study would need to be conducted toward that goal. More specifically, unanswered questions remain regarding the impact of a commercial PV requirement on different types of buildings and/or businesses. Staff was unable to obtain conclusive findings with online research; therefore, it is recommended that City of Glendale conduct its own study to answer those questions.

In addition to a Glendale-specific cost-effectiveness study for commercial PVs, City Council may desire to include other provisions within the Reach Code, which would also require further study.

Based on similar projects, contracting with a consultant to conduct the studies may cost in excess of \$40,000, and potentially more depending on the scope of work. No funding is currently appropriated in the City's current budget for this work.

Council may desire to consider waiting to take action on this item until staff presents its findings regarding LEED (Leadership in Energy and Environmental Design) Neighborhood Design (ND)/Cities and EcoDistricts in connection with the Downtown Specific Plan. The requirements of a potential sustainability program may include elements related to commercial PV. Staff anticipates returning to Council in early 2021 with findings regarding a sustainability overlay.

FISCAL IMPACT

Not applicable as no funding, budget, or contract implications are associated with this agenda item.

ALTERNATIVES

The City Council has the following alternatives to consider with respect to this agenda item:

Alternative 1: Direct staff to explore hiring a consultant team to determine the feasibility of adopting a commercial PV requirement.

Alternative 2: Provide direction to staff to return with this item following Council discussion regarding LEED ND/Cities and EcoDistricts.

Alternative 3: Direct staff not to pursue a commercial PV requirement at this time.

Alternative 4: Council may consider any other alternative not presented by staff.

CAMPAIGN DISCLOSURE

Not applicable as no contract is being considered with this agenda item.

EXHIBITS

1. City of Carlsbad "Energy Conservation Ordinance Cost Effectiveness Analysis" Excerpt
2. City of San Francisco "Report on Cost-Effectiveness and Other Analyses for Proposed Solar Ordinance" Excerpt