

Solar Photovoltaic Ordinance Staff Report Template

RECOMMENDATION

That Council adopt the first reading of an Ordinance amending the building code to require solar photovoltaic (PV) systems in newly constructed single-family and low-rise multifamily buildings.

BACKGROUND

The State has set ambitious renewable energy targets for new construction: by 2020, it aims to have solar energy systems installed on fifty percent of new homes and achieve zero-net-energy (ZNE) in all new residential buildings. However, although the State energy code has strict requirements for energy efficiency it does not yet require solar. It is expected that the energy code will require solar in new residential construction beginning in 2020.

Most homebuilders and developers continue to build the majority of projects without solar—in the first quarter of 2016, fewer than ten percent of new homes in California included a solar installation.

Local governments have the authority to adopt amendments to the State code that exceed State energy standards. Several California cities have already established such “reach codes” requiring onsite renewable energy, including San Francisco, San Mateo, Palo Alto, Fremont, Brisbane and Santa Monica.

Adoption of the proposed ordinance will capture opportunities for installations in new construction prior to 2020 that would otherwise be lost and help prepare staff and the development community for the transition to ZNE in 2020.

The ordinance is adapted from a model developed by the California Energy Commission and the Bay Area Regional Collaborative. It preserves the energy efficiency required in the current statewide building code, but also requires that a reasonable amount of self-generation be included.

The scope of the proposed ordinance was based on a cost-effectiveness study commissioned by PG&E with ratepayer funds and recognized by the California Energy Commission that demonstrates that the requirements are cost-effective from the owners’ perspective. Cost-effectiveness is a State requirement for any local reach codes. While there may be opportunities to expand the proposed ordinance to include other

building types and technologies, this would require a new cost-effectiveness study, lessening the opportunity for a streamlined approval process at the state level.

REQUIREMENTS

The proposed requirements apply to solar PV in single-family and low-rise (three stories or fewer) multifamily new construction. Applicants have the option of using either a prescriptive or performance compliance pathway. The prescriptive method applies only to smaller buildings and simply requires that the design meets the State’s minimum efficiency standards and includes a minimum amount of solar PV based on a building’s conditioned floor space. The performance approach provides more flexibility by allowing applicants to use a combination of energy efficiency and renewable energy to achieve a specified energy performance level.

The prescriptive approach requires a minimum amount of solar PV based on the floor area, as specified in the table below. *[MODIFY FOR LOCAL CLIMATE ZONE(S)]*

Conditioned Space (ft ²)	Minimum kW (DC) Required
Less than 1000	1.5
1000 – 1499	1.9
1500 – 1999	2.3
2000 – 2499	2.7
2500 – 2999	3.1
3000 – 3499	3.4
3500 – 3999	3.8
4000 – 4499	4.2

The performance approach specifies that the building be designed such that 45%/55% *[SELECT VALUE BASED ON CLIMATE ZONE]* of the total building energy (including natural gas loads) be provided by solar.

The system sizing is designed for optimal economic effect. Solar PV systems are subject to net metering tariffs and are able to reap near retail rates for electricity exported to the grid. While this allows occupants to net out their energy bills, generation that exceeds the consumption of a building receives much lower compensation. The requirements are designed such that a PV system is expected to meet 80% of a mixed-fuel (natural gas

and electric) home’s electricity use. This approach provides a positive economic outcome with a minimal risk of overproduction of electricity.

The ordinance requires builders to comply with the 2016 Title 24 building energy codes without using a solar credit, which would otherwise allow builders to tradeoff a portion of the required efficiency for solar. By not allowing this tradeoff the ordinance ensures that homes will be as efficient as required by Title 24 Part 6 and have solar power.

DISCUSSION/ANALYSIS

PG&E and its Codes & Standards Program consultant teams prepared the attached 2016 “Local PV Ordinance Cost Effectiveness Study” to help local jurisdictions easily implement solar PV reach codes. The study is designed specifically to provide for PV solar energy systems that would not be oversized for building occupant energy needs and that would be aligned with the statewide goal that all new residential construction be zero net energy (ZNE) by 2020. A cost-effectiveness analysis is provided for all sixteen California climate zones, establishing reach code requirements for on-site renewable energy generation systems in new residential and multifamily buildings sized according to prescriptive and performance models.

Minimum PV system sizes are based on a percentage of total building “time dependent valuation” (TDV) of energy use, an energy metric used by the CEC since 2005 to evaluate compliance with Title 24 standards. TDV values energy use differently depending on the fuel source, time of day, and season, and is designed to reflect the “societal value or cost” of energy, including long-term projected costs of energy. Using TDV, any electricity used (or saved) during peak periods of the summer has a much higher value than electricity used (or saved) during off-peak periods.

The accompanying cost-effectiveness study uses statewide average values for its solar installation cost assumptions, and includes the State New Solar Homes Partnership (NSHP) rebate values of \$0.50/watt and the Federal Tax Credit of 30 percent of the post-rebate installed system cost. Incremental development costs for single family and multifamily residential buildings are calculated as follows:

	Single Family	Multifamily (per unit)
Includes NSHP Incentive	\$3.35/watt (DC)	\$3.03/watt (DC)
Excludes NSHP Incentive	\$3.70/watt (DC)	\$3.38/watt (DC)

Using these values, the study found that in every one of the sixteen climate zones in California, minimum solar PV installations on new residential construction would be both feasible and cost effective in that the benefits provided by the system in terms of utility bill savings during the system lifetime would outweigh the incremental costs of the systems. The analysis of the costs and benefits of the proposed requirements found that a typical system will pay for itself from energy bill savings in about 15 years. First-year savings for single-family residences are projected at about \$720 annually; multifamily savings are projected at about \$370 annually. ***[USE VALUES SPECIFIC TO THE LOCAL CLIMATE ZONE IN TABLE 3 OF THE COST-EFFECTIVENESS STUDY].***

	Single Family	Multifamily (per unit)
System Size	2.6 kW (DC)	1.5 kW (DC)
Annual Electricity Savings	4,049 kWh	2,368 kWh
% Carbon Savings ¹	42.5%	46.6%
Package Cost ²	\$10,448	\$5,579
Annual Utility Cost Savings	\$732	\$361
Simple Payback ³	14.3	15.5
Lifecycle Benefit-Cost Ratio	1.29	1.19

¹ Based on CA electricity production and equivalent CO₂ emission rates of 0.724 lb-CO₂e / kWh & 11.7 lb-CO₂e / therm.

² Includes 10% markup for builder profit and overhead. \$.50/W NSHP incentive not applied to package costs.

³ Assumes no change in annual utility rates. Historically, residential electricity rates have increased an average of 4.5% annually. In early 2017, PG&E increased residential electricity rates by 7% above average 2016 rates.

[EDIT THIS SECTION TO REFLECT WHICH OPTIONS ARE INCLUDED IN THE ORDINANCE.]

The ordinance includes several alternative compliance strategies.

1. Another form of on-site renewable electric energy generation, such as wind, can be substituted for the required solar PV.

2. A portion of the required solar PV can be met with electric storage. At present, this option would need to be assessed on a case-by-case basis since the State compliance software does not generate equivalency values for storage, but this feature is planned for the near future. In the meantime, developers would need to demonstrate equivalency.
3. The system size may be reduced if the applicant can demonstrate that the system will generate more electricity than the building, appliances and plug loads will consume over the course of a year.
4. If on-site solar PV is not practical
 - a. the building can be designed to meet the energy efficiency requirements of CALGreen Tier 1, that is, 15% more efficient than the State standard, or
 - b. the owner can commit to participation in a community solar program that has been specifically approved as an alternative compliance method.

In addition, the local Building Official may reduce the requirements or exempt a building if she/he determines that there are sufficient practical challenges, including, limited rooftop availability or shading from nearby structures, topography or vegetation. The applicant is responsible for demonstrating requirement infeasibility when applying for an exception.

The requirements will become effective upon approval by the California Energy Commission, which is expected within 90 days of local adoption.

[ADD SECTION ON OUTREACH AND/OR COMMISSIONS/SUBCOMMITTEE ACTIONS]

FISCAL IMPACT

The costs associated with the application and administration of the building standards in the *[City of]* are funded by *[LIST FUNDING SOURCE]*. The proposed code adoption would, therefore, not require any additional general fund contribution.

CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

Adoption of the ordinance requires CEQA compliance. The ordinance includes findings that the requirements would have no adverse environmental impact and that it is therefore categorically exempt from CEQA.

ATTACHMENTS:

- PG&E 2016 Local PV Ordinance Cost Effectiveness Study
- Proposed Ordinance