

## **DOCKETED**

<b>Docket Number:</b>	16-BSTD-07
<b>Project Title:</b>	Local Ordinance Applications - 2016 Standards
<b>TN #:</b>	212344
<b>Document Title:</b>	Palo Alto Staff Report
<b>Description:</b>	N/A
<b>Filer:</b>	Ingrid Neumann
<b>Organization:</b>	City of Palo Alto
<b>Submitter Role:</b>	Public
<b>Submission Date:</b>	7/18/2016 3:07:35 PM
<b>Docketed Date:</b>	7/18/2016



# **City of Palo Alto**

## **City Council Staff Report**

**(ID # 6796)**

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**Report Type: Action Items**

**Meeting Date: 5/2/2016**

**Summary Title: Updates to the Energy Reach Code Ordinance**

**Title: PUBLIC HEARING: Updates to the Energy Reach Code: an Ordinance Repealing and Restating Chapter 16.17 of the Palo Alto Municipal Code to Adopt the 2016 California Energy Code, Title 24, Chapter 6, of the California Code of Regulations, and Local Amendments**

**From: City Manager**

**Lead Department: Development Services Department**

**Recommended Motion**

Staff recommends that Council conduct a public hearing and then adopt an ordinance repealing and restating Chapter 16.17 of the Palo Alto Municipal Code to adopt and amend the 2016 California Energy Code, Title 24, Chapter 6, of the California Code of Regulations (Attachment 1).

**Executive Summary**

The attached ordinance proposing Local Amendments to the 2016 California Energy Code (Title 24, Chapter 6 of the California Code of Regulations (Energy Reach Code ordinance) would continue Palo Alto's leadership position in promoting energy efficient and high-performance building design and construction. Staff has collaborated with the Green Building Advisory Group and other city departments to develop the proposed ordinance. The criteria proposed in this ordinance were studied to be cost-effective in compliance with the California Energy Commission requirements and the results of the study are in Attachment 2. The Energy Reach Code ordinance differs from the State minimum in the following areas: 1) the ordinance includes an updated energy "reach code" requiring building design to exceed the minimum State energy code requirements by a certain percentage based on project type and scope; 2) the ordinance continues solar-ready infrastructure requirements for new residential buildings; and 3) the ordinance promotes all-electric building design by providing an exemption from "reach code" requirements above the state minimum.

## **Background**

In the face of the global climate challenge, the International Panel on Climate Change (IPCC) has determined that “we risk severe, pervasive and irreversible impacts”<sup>i</sup> from climate change, and need “substantial” greenhouse gas emissions reductions (of 40-70% or more) by mid-century.

The international community of 192 nations met at the COP21 conference in Paris during December of 2015. During the conference, the community agreed to “holding the increase in the global average temperature to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels”<sup>ii</sup>. During the meeting, there was agreement to commit to the “highest possible ambition” to achieve these goals.

Building industry experts have agreed that the loading order to achieve this Green House Gas, (GHG) reduction in buildings starts with energy efficiency. Once energy efficiency has been maximized, the application of renewable energy is appropriate to supplement the energy use within a building.

Every three years, the State of California adopts new building standards that are codified in Title 24 of the California Code of Regulations, referred to as the California Building Standards Code. The 2016 California Energy Code, which resides in Chapter 6 of the California Building Standards Code, contains new mandated energy efficiency measures and has a target effective date of January 1, 2017.

The California Public Utilities Commission and California Energy Commission have set an aggressive policy goal of “Zero Net Energy” (ZNE) for all new residential structures by 2020 and all new commercial buildings by 2030<sup>iii</sup>. The definition of “Zero Net Energy” adopted by the California Energy Commission (CEC) is complex and requires computer modeling software to demonstrate. However, a simple definition of “Zero Net Energy” means that the amount of energy used on-site is equal to the amount of energy produced on-site from a renewable energy system over the course of one year. Some building energy loads, including those that are unregulated by the CEC, will be excluded from the overall ZNE calculation. Statewide regulations are currently being developed to implement these goals for 2020 and 2030, respectively.

Palo Alto has a history of leadership in the area of sustainability and energy efficiency. Over the past three code cycles, Palo Alto has developed an energy efficiency ordinance that is more aggressive than the State of California requirements. The Palo Alto Green Building Advisory Group (GBAG), a group of green building and energy efficiency stakeholders including architects, engineers, energy compliance designers, and contractors have met regularly since 2013 to develop new recommendations for local green building and energy ordinances.

The Green Building Advisory Group held its first annual retreat in August of 2014 to identify priorities and future policy recommendations. During this first retreat, the committee set a goal to develop a “Zero Net Energy” requirement for new single-family homes for the 2016 code cycle. At the March 10, 2015 Policy and Services Committee meeting and the April 20, 2015 City

Council meeting, staff presented a rough timeline for goals toward a Zero New Energy Ordinance for both commercial and multi-family construction.

In October 2015, the GBAG held its second annual retreat to define and prioritize the green building and energy efficiency requirements that are most important to the stakeholders for the upcoming code cycle. During that retreat, the attendees revisited the “Zero Net Energy” goal for new single-family construction in-depth and with the assistance of expert ZNE consultants. Due to technical challenges associated with the definition of “Zero Net Energy” at the time of the retreat, the recommendation resulting from the retreat was to not pursue a full ZNE requirement for new single-family residential, as initially established in the 2014 goals. Instead, the committee recommended pursuing an incremental policy step towards the proposed Zero Net Energy regulation. These incremental policy steps are reflected in the proposed Energy Reach Code ordinance for new single-family, new multi-family, and new commercial construction.

During the 2015 retreat, the Green Building Technical Advisory Committee (GBTAC) was formed with some members of the Green Building Advisory Group. All members of the GBAG were invited to participate. After the retreat, the (GBTAC) held six (6) meetings to implement the policy set by the GBAG by developing technical recommendations.

The two policy action items that resulted from the 2015 retreat include: 1) The development of a new Energy Reach Code, which is based on the 2016 California Energy Code. The energy reach code ordinance creates an incremental step towards Zero Net Energy for new single-family residential, new multi-family residential, and new commercial “non-residential” construction; and 2) The development of the new green building ordinance, based on the 2016 California Green Building Standards Code, which staff will be presenting to the City Council later in the year along with the remainder of the 2016 Building Standards Code updates. Staff is presenting the Energy Reach Code to the City Council ahead of the typical code adoption schedule due a required 60-day public comment period and approval process required by the California Energy Commission.

Once staff files the adopted ordinance with the California Energy Commission, a 60-day public comment period administered by the CEC will begin. City staff will be asked to respond to public comments on an as-needed basis. After the close of the 60-day public comment period, it is normal for the Energy Commission to request revisions to the energy ordinance. In the case of necessary revisions, staff will plan to come back to the City Council to present the revisions in the fall of 2016 in preparation for a target effective date of January 1, 2017.

In addition to the 60-day public comment period, the California Energy Commission requires that a cost-effectiveness study be conducted and filed in the case of a local amendment to the California Energy Code. It is required that the City demonstrate to the California Energy Commission, using the cost-effectiveness study, that the local amendments to the code are financially responsible to the applicants.

To meet the California Energy Commission requirements for the cost-effectiveness study, staff conducted an informal bid process to select a consultant. Staff selected TRC Solutions based on

their ability to provide both residential and non-residential services within the same study and their ability to meet the project timeline. TRC Solutions attended the 2015 GBAG retreat and participated as an expert consultant on the Green Building Technical Advisory Committee (GBTAC). In coordination with direction from the GBAG Retreat and GBTAC meetings, TRC performed the study using CEC-approved energy modeling software. The results of this study are located in Attachment 2 of this report.

## **Discussion**

With the updated Energy Reach Code ordinance, the City of Palo Alto will increase the minimum requirements for building energy performance compared to the 2016 California Energy Code. The proposed energy ordinance adopts specific cost-effective compliance options and would be triggered on permit application for the following project types: 1) new single-family residential, 2) new multi-family residential and 3) new commercial “non-residential” construction.

There are two methods for demonstrating compliance with the statewide 2016 California Energy Code. The first type of compliance is called the “performance approach”. This approach is typically used for new construction projects and is the methodology selected for the proposed local Energy Reach Code, as explained later in this report. The secondary type of compliance approach, called the “prescriptive approach”, is not typically used as a compliance pathway for new construction and is more conservative. Therefore, no local amendments are proposed for this approach.

Using the performance approach, projects throughout the State are required to develop an energy budget that assigns a maximum amount of energy that a building can use within the design. Each budget is unique to the project based on many factors. Examples of the components that contribute to an energy budget include location, size, orientation, building geometry, exterior wall design, roof design, and heating and cooling system design. The allowable energy budget for a building is referred to as the “standard” design. The actual energy budget for the design of a building is referred to as the “proposed” design.

Energy budgets are developed within energy modeling software approved by the California Energy Commission. The primary metric associated with measuring the energy budget in California is called Time-Dependent Valuation (TDV). TDV is a California-specific measurement system, used within the energy modeling software, and assigns a cost value to energy use associated with each hour during the year. “TDV Energy” is the term used to describe an amount of energy when expressed in TDV.

Design and construction teams throughout California are required to demonstrate, using a computer simulation energy model, that the TDV Energy use of the “proposed” design does not use more energy than the TDV Energy in the “standard” design. The proposed local Energy Reach Code incorporates the “performance approach” compliance methodology for new construction described earlier in this report. Under the local code, the requirements for the “proposed” design are defined as using a percentage less TDV Energy than the “standard” design. This concept is referred to as “percent-savings” when compared to the standard design.

While developing the criteria for the ordinance, the Green Building Advisory Group recommended providing design teams with compliance options rather than one specific requirement. As a result, the proposed policy outlines two compliance options for each of the following project types: 1) new single-family residential, 2) new multi-family residential and 3) new commercial “non-residential” construction. The applicable compliance path for each project type is dependent on the presence or absence of solar photovoltaic power in the design. Of the compliance options outlined, the first option is intended for projects that are not pursuing solar photovoltaic (PV) power. The second option is intended for those projects that are pursuing solar photovoltaic (PV) power. The requirements are outlined in Figures 1a and 1b. In the case of commercial construction, the requirement structure is modified due to the lack of “PV Credit,” as explained later in this report.

Previously, under the 2013 California Energy Code, installation of a photovoltaic system did not contribute towards meeting the State minimum code. However, under the 2016 California Energy Code, if a residential applicant chooses to install a photovoltaic system, the project can use a portion of the solar power as a “PV credit” to offset the efficiency requirements for minimum state compliance. There is no “PV credit” available for commercial projects.

The “PV credit” is a fixed value equal to approximately 20% of the total compliance margin for single-family and approximately 12% for multi-family projects. PV system size is measured in the direct current of power rating of the photovoltaic array in kilowatts (kWdc). The PV credits may be applied towards demonstrating energy compliance once a PV system is equal to 2 kWdc in a single family building or 8 kWdc in a multifamily building. Since the PV credit is a fixed percentage, the value will not increase with size of the PV system installed over 2 or 8 kWdc.

To comply with the statewide 2016 California Energy Code, a project can use energy efficiency measures plus the PV credit, to meet minimum compliance. To comply with the Reach Code, a project with PV must be able to comply with the state requirements (have a 0% or greater compliance margin) through energy efficiency alone. The two compliance paths for percent-savings are different for projects either installing or not installing a photovoltaic system. This strategy balances the compliance options.

#### **Figure 1a: New Residential Energy Reach Code Compliance Options**

This figure presents the proposed Energy Reach Code Compliance Options for new single-family and new multi-family residential construction outlined in section 16.17.050 of Attachment 1.

	<b>New Single-Family Residential</b>	<b>New Multi-family Residential</b>
<b>Reach Code Option 1:</b> <i>The project does not include a photovoltaic system</i>	Minimum T24 Energy Code plus the TDV Energy of proposed project is at least 10% less than the TDV Energy of the Standard Design (16.17.050.a.1)	Minimum T24 Energy Code plus the TDV Energy of proposed project is at least 10% less than the TDV Energy of the Standard Design (16.17.050.b.1)
<b>Reach Code Option 2:</b> <i>The project includes a photovoltaic system</i>	Minimum T24 Energy Code plus the TDV Energy of proposed project is at least 20% less than the TDV Energy of the Standard Design <sup>1</sup>	Minimum T24 Energy Code plus the TDV Energy of proposed project is at least 12% less than the TDV Energy of the Standard Design <sup>1</sup>

	(16.17.050.a.2)	(16.17.050.b.2)
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<sup>1</sup> “PV credit” may be applied to meeting the minimum T24 Energy Code. Therefore, a higher percentage savings is required for single-family and multi-family Option 2 to balance the requirements compared to single-family and multi-family Option 1.

For new single-family construction projects, two compliance options are given to project applicants, as shown in Figure 1a. Both options outline requirements using the “performance approach” methodology. The first option requires projects to demonstrate that the TDV Energy of the proposed new home is at least 10% less than Standard Design if the project does not include a photovoltaic system. This first compliance option allows projects to use energy efficiency only as the methodology to meet the Energy Reach Code. The second option requires projects to demonstrate that the TDV Energy of the proposed new home is at least 20% less than the Standard Design if the project does include a photovoltaic system. This second compliance option allows projects to use both energy efficiency and/or a photovoltaic system as the methodology to meet the Energy Reach Code.

For new multi-family construction projects, two very similar compliance options are given to project applicants as with new single-family projects, as outlined in Figure 1a. Both options for multi-family outline requirements using the “performance approach” methodology. The first option requires projects to demonstrate that the TDV Energy of the proposed new home is at least 10% less than the Standard Design if the project does not include a photovoltaic system. This first compliance option allows projects to use energy efficiency only as the methodology to meet the Energy Reach Code. The second option requires projects to demonstrate that the TDV Energy of the proposed new home is at least 12% less than the Standard Design if the project does include a photovoltaic system. This second compliance option allows projects to use both energy efficiency and renewable energy as the methodology to meet the Energy Reach Code.

### **Figure 1b: Commercial Energy Reach Code Compliance Options**

This figure presents the proposed Energy Reach Code Compliance Options for new commercial construction outlined in section 16.17.050 of Attachment 1.

<b>New Commercial</b>	
<b>Reach Code Option 1:</b> <i>The project either 1) does not include a photovoltaic system or 2) includes a photovoltaic system smaller than 5kW</i>	Minimum T24 Energy Code plus The TDV Energy of proposed project is at least 10% less than the TDV Energy of the Standard Design. (16.17.050.c.1)
<b>Reach Code Option 2:</b> <i>The project includes a photovoltaic system equal to or greater than 5kW</i>	Minimum T24 Energy Code plus The proposed building includes a 5kW or greater photovoltaic system <sup>2</sup> (16.17.050.c.2)

<sup>2</sup> There is no “PV credit” available for commercial buildings. Therefore a minimum kilowatt (kW) size is proposed instead of an adjusted percentage margin.

For new commercial construction, “non-residential” projects, two compliance options are given to project applicants, as outlined in figure 1b. The options are modified because no “PV Credit” is allowed for minimum compliance by the State. Both options for commercial construction outline requirements using the “performance approach” methodology. The first option requires projects to demonstrate that the TDV Energy of the proposed new building is at least 10% less than the Standard Design if the project does not include a photovoltaic system or includes a photovoltaic system that is smaller than 5 kilowatts. This first compliance option allows projects to use energy efficiency or energy efficiency combined with a small photovoltaic system as the methodology to meet the Energy Reach Code. The second option requires projects to demonstrate minimum California Energy Code compliance plus install a minimum photovoltaic system of 5 kilowatts or greater. This second compliance option allows projects to use renewable energy only as the methodology to meet the Energy Reach Code. As aforementioned, the reasoning behind this option is that there is no “PV Credit” allowed by the Energy Commission for new commercial construction.

Development Services staff is currently participating in a multi-departmental study on Electrification, also known as “Fuel Switching”, approved by City Council on August 17th, 2015. Development Services is conducting a portion of the electrification work plan with a schedule to return back to City Council in December of 2016 with an update. The study will determine the feasibility, cost effectiveness and other construction and operational challenges that need be addressed both at a policy as well as a construction level. During the early course of said study, staff has received feedback that attempting to design an all-electric building and meet the existing Energy Reach Code poses challenges and inhibits the potential application of an all-electric solution. As a result, the proposed ordinance provides for an exemption to the requirements of the Energy Reach Code if the project is pursuing an all-electric design.

Due to the timing of the Electrification study related to the Building Standards Code adoption cycle, the proposed ordinance does not include an all-electric measure. All-electric compliance options must be studied for cost-effectiveness in compliance with California Energy Commissions requirements.

In addition to the all-electric exemption, staff is actively working with the California Energy Commission (CEC) to amend the energy modeling compliance software, CBECC, to eliminate the penalties against heat pump water heaters that make it difficult to model the proposed Energy Reach Code. Staff has been working directly with the technical advisory team for the CEC on the software. They are aware of the heat pump water heater modeling penalty and will be addressing it in the final version of the software. Staff is committed to working with applicants that attempt to design heat pumps into their new home designs to ensure they are not adversely affected by this unintended outcome of the CEC software. These efforts will include but are not limited to coordinating with the CEC, finding creative ways to comply with the reach code and at the minimum ensure all projects comply with the minimum title 24 Part 6 energy code requirements.

The proposed Energy Reach Code achieves carbon reduction in addition to energy efficiency in the construction of new buildings. For each newly constructed single-family building, 382 lbs.

of carbon dioxide equivalent (CO<sub>2</sub>e) avoided savings is estimated, representing 5% GHG savings achieved. For each new multifamily building, 747 lbs. of CO<sub>2</sub>e avoided savings is estimated, representing 3% GHG savings achieved. For each new nonresidential building, 6,027 lbs. of CO<sub>2</sub>e avoided savings is estimated, representing 7% GHG savings achieved.<sup>iv</sup>

An estimate of annual city-wide GHG savings is attained by multiplying the CO<sub>2</sub>e savings per building against the number of new buildings permitted in Palo Alto during the 2015 Calendar year. GHG savings are expressed in metric tons of carbon dioxide equivalent (MTCO<sub>2</sub>e). In total, the Energy Reach Code estimates a total of 71 metric tons of carbon dioxide equivalent (MTCO<sub>2</sub>e) avoided annually. The average GHG reductions across the City are estimated to be 6%, weighted by the new construction square footage. These GHG reduction estimates are based on complying with the 10% compliance packages in the Reach Code.. Compliance with the Reach Code may be achieved through a variety of measures, each of which will have varying electric and natural gas usages and GHG savings. Attachment 2 contains additional details on the carbon reduction estimates.

The 2016 version of the California Energy Code provides for aggressive changes and in energy efficiency for existing structures compared to 2013 code. Therefore, the Energy Reach Code does not propose any requirements pertaining to existing buildings.

The existing energy ordinance, passed by the City Council in April of 2015, mandates additional “solar ready” infrastructure for residential projects beyond the state regulation. Single-family residential structures are required to dedicate 500 square feet of clear roof surface for future solar panels. The applicant is also required to provide an electrical conduit for the future PV wiring.

Development Services has coordinated with the Public Works Department, and Urban Forestry Division to address conditions in which shading from protective trees may impact a solar ready zone or photovoltaic system installation. In the event of a conflict between the Energy Reach Code, the Solar Shade Act, and the Palo Alto Tree Ordinance, the requirement most protective of existing tree canopies will prevail.

### **Resource Impact**

Resource Impacts from the adoption of these ordinances will be the additional staff time in plan checking and inspection requirements. These costs will be recovered via plan check and permit fees collected.

## **Policy Implications**

The proposed 2016 Energy Reach Code ordinance is an update to the 2013 Energy Reach Code and corresponds with the proposed 2016 Energy Code. Palo Alto Municipal Code 16.17 will be amended for the proposed requirements..

## **Environmental Review**

This action is exempt from the California Environmental Quality Act under CEQA Guidelines section 15308 as an action by the City for protection of the environment.

### **Attachments:**

- Attachment A: Ordinance Repealing and Restating Chapter 16.17 of the Palo Alto Municipal Code (PDF)
- Attachment B: 2016 Palo Alto Reach Code Cost Effectiveness 20160331 (PDF)

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<sup>i</sup> Climate change threatens irreversible and dangerous impacts, but options exist to limit its effects, IPCC PRESS RELEASE, Nov 2, 2014

<sup>ii</sup> [Durban Platform for Enhanced Action \(decision 1/CP.17\) Adoption of a protocol, another legal instrument, or an agreed outcome with legal force under the Convention applicable to all Parties](#), Nov 30, Dec 11, 2015, UN Framework Convention on Climate Change

<sup>iii</sup> [California Energy Efficiency Strategic Plan](#), New Residential Zero Net Energy Action Plan 2015---2020, June 2015, California Energy Commission – Efficiency Division, Ca Public Utility Commission – Energy Division

<sup>iv</sup> Since the cost effectiveness study was prepared to meet the CEC's cost effectiveness study parameters these figures reflect a statewide energy portfolio.