

## DOCKETED

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**MEMO****DAVIS  
ENERGY  
GROUP**  
INCORPORATED

Date: December 6, 2016  
To: Marshall Hunt,  
Codes & Standards Program, PG&E  
From: Davis Energy Group, Inc.  
Misti Bruceri & Associates, LLC  
Enercomp, Inc.  
Subject: 2016 Energy Efficiency Ordinance for Healdsburg, CA

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## **1 Introduction**

This report presents the results from analysis of the feasibility and cost-effectiveness of requiring new low-rise single family and multifamily residential construction located within the City of Healdsburg to exceed the 2016 Building Energy Efficiency Standards, which become effective January 1, 2017. The report includes compliance package options and cost effectiveness analysis within California Climate Zone 2 using Healdsburg Electric Department electricity rates. All proposed package options include a combination of efficiency measures and on-site renewable energy. This analysis builds upon the results of the CALGreen Cost Effectiveness Study conducted for the California Statewide Codes and Standards Program and last modified November 16, 2016, which evaluated compliance package options across all sixteen California climate zones (DEG, 2016).

## **2 Methodology and Assumptions**

The same methodology used to develop the statewide compliance package options was applied to this analysis with two exceptions, as described below. Refer to the CALGreen Cost Effectiveness Study report (DEG, 2016) for further details.

1. Healdsburg Electric Department electricity tariffs were applied in place of PG&E electricity tariffs. The D-1 tariff was used for all scenarios, even those with PV. The analysis team also evaluated the E-7 time of use tariff for the PV performance packages; however, utility costs were higher and savings relative to the basecase lower as compared to the D-1 tariff. Any annual electricity production in excess of annual electricity consumption is credited to the utility account at the net surplus compensation rate of \$0.084/kWh. PG&E gas rates continue to be applied.
2. The optional solar ready provisions were removed. Including these additional requirements resulted in efficiency-only packages that were not cost effective.

## **3 Results**

### ***3.1 Single Family Results***

#### ***3.1.1 Single Family Cost Effectiveness Analysis***

A comparison of cost effectiveness for the three efficiency and two PV performance packages (PV-Plus and TDV-Zero) in each climate zone is presented in Figure 1. Table 1 provides the results in tabular form

along with energy and greenhouse gas (GHG) savings. All five packages are cost effective under the methodology employed in this analysis. The lifecycle benefit-to-cost ratio threshold of one is roughly equivalent to a simple payback of 18 years.

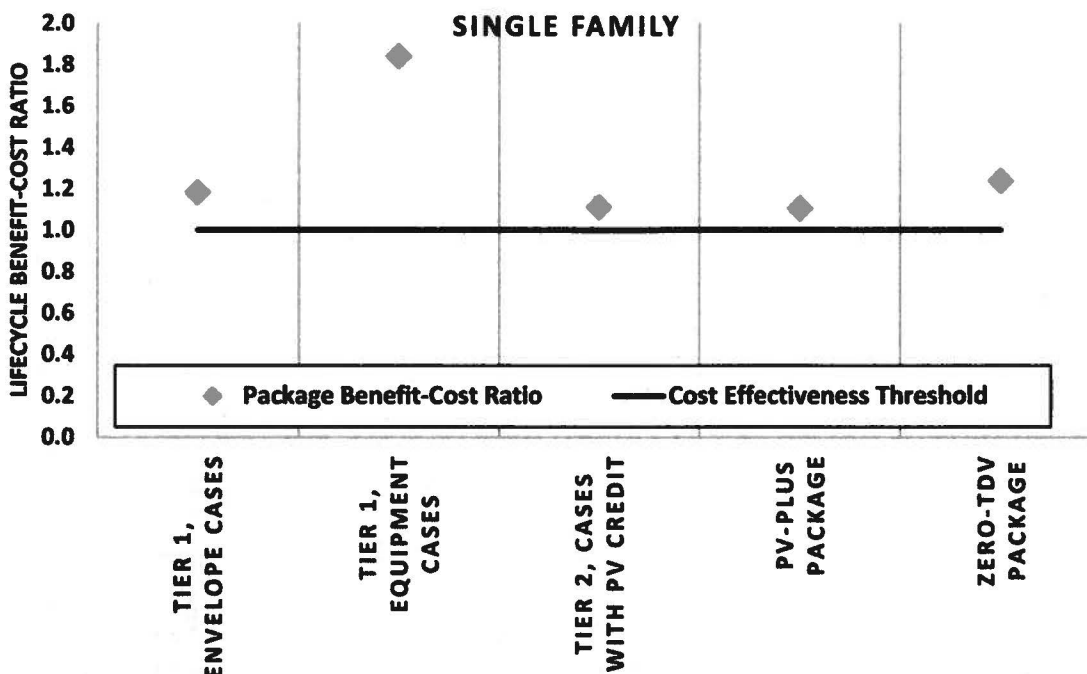


Figure 1: Single family cost effectiveness comparison

Table 1: Single Family Package Cost Effectiveness Results

T-24 Comp. Margin	PV Capacity (kW)	Elec Savings (kWh)	Gas Savings (therms)	% GHG Savings <sup>1</sup>	Package Cost <sup>2</sup>	Utility Cost Savings	Simple Payback	Lifecycle Benefit-Cost Ratio
<b>Tier 1, Envelope Cases</b>								
15.8%	N/A	146	49.1	8.2%	\$1,430	\$92	15.5	1.18
<b>Tier 1, Equipment Cases</b>								
16.8%	N/A	34	67.0	9.7%	\$999	\$100	10.0	1.84
<b>Tier 2, Cases with PV Credit</b>								
31.4%	2.1	3,227	132.7	46.9%	\$10,079	\$610	16.5	1.11
<b>PV-Plus Package</b>								
31.4%	2.5	3,798	132.7	51.9%	\$11,514	\$692	16.6	1.10
<b>Zero-TDV Package</b>								
31.4%	4.0	6,200	132.7	72.9%	\$17,550	\$1,183	14.8	1.24

<sup>1</sup> Based on CA electricity production and equivalent CO<sub>2</sub> emission rates of 0.724 lbCO<sub>2</sub>e / kWh & 11.7 lb-CO<sub>2</sub>e / therm.

<sup>2</sup> Includes 10% markup for builder profit and overhead.

3.1.2 Single Family Package Recommendations

Table 2 summarizes the efficiency measures and PV system sizing used to cost effectively meet the recommended targets. In addition to the PV-Plus package, the Zero-TDV package is also presented. The net surplus compensation rate of \$0.084/kWh is double that currently paid by the investor owned utilities, which results in a cost effective Zero-TDV package for these gas/electric home scenarios.

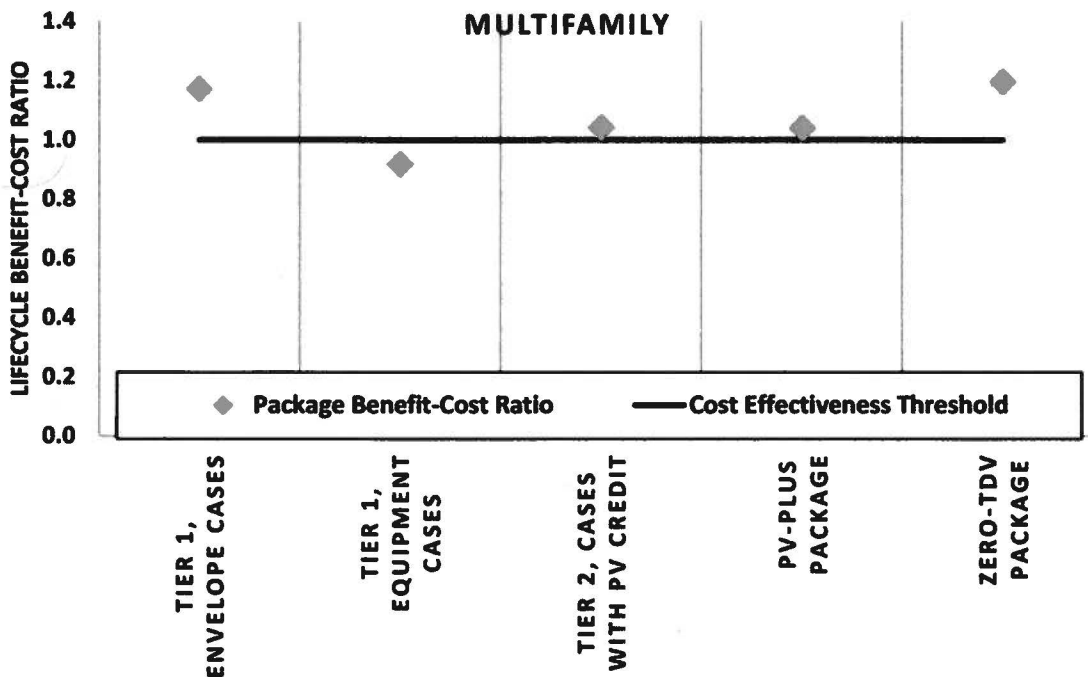
**Table 2: Single Family: Cost Effective Measures Summary**

Compliance Margin Target	QII	ACH50	Window U-value / SHGC	Door U-value	HPA	AH Fan W/cfm	HW Pipe Insul.	PV-Plus PV Capacity (kW)	Zero-TDV PV Capacity (kW)
<b>Efficiency Only Packages</b>									
15%	Y	3	.30/.23	0.20		0.30	Y		
<b>PV Performance Packages</b>									
30%	Y		.30/.50	0.20	Y		Y	2.5	4.0

3.2 Multifamily Results

3.2.1 Multifamily Cost Effectiveness Analysis

A comparison of cost effectiveness for the multi-family prototype is presented in Figure 2. Table 3 summarizes the cost effectiveness of the packages. Consistent with the original analysis, exceeding code in multifamily occupancies is more challenging than in single family homes. The Tier 1 Envelope and PV system packages meet the minimum cost-effectiveness threshold requirements. The Tier 1 equipment package was not found to be cost effective; however ultimately the economics will depend on the specific project design and efficiency measures implemented.



**Figure 2: Multifamily all-electric cost effectiveness comparison**

**Table 3: Multi Family Efficiency Package Cost Effectiveness Results**

T-24 Comp. Margin	PV Capacity (kW)	Elec Savings (kWh)	Gas Savings (therms)	% GHG Savings <sup>1</sup>	Package Cost <sup>2</sup>	Utility Cost Savings	Simple Payback	Lifecycle Benefit-Cost Ratio
<b>Tier 1, Envelope Cases</b>								
4.8%	N/A	7	7.3	2.2%	\$146	\$9	15.7	1.17
<b>Tier 1, Equipment Cases</b>								
15.0%	N/A	7	27.3	8.0%	\$642	\$32	20.0	0.92
<b>Tier 2, Cases with PV Credit</b>								
20.4%	1.0	1,608	17.2	33.7%	\$4,004	\$227	17.6	1.04
<b>PV-Plus Package</b>								
20.4%	1.4	2,234	17.2	44.9%	\$5,436	\$308	17.6	1.04
<b>Zero-TDV Package</b>								
20.4%	2.3	3,674	17.2	70.7%	\$8,728	\$569	15.4	1.20
<sup>1</sup> Based on CA electricity production and equivalent CO <sub>2</sub> emission rates of 0.724 lbCO <sub>2</sub> e / kWh & 11.7 lb-CO <sub>2</sub> e / therm.								
<sup>2</sup> Includes 10% markup for builder profit and overhead.								

**3.2.2 Multifamily Package Recommendations**

Table 4 summarizes the efficiency measures and PV sizing used in each climate zone to cost effectively meet the recommended targets.

**Table 4: Multifamily: Cost Effective Measures Summary**

Compliance Margin Target	QII	Window U-value / SHGC	Door U-value	AH Fan W/cfm	HW Comp. Dist.	PV-Plus PV Capacity (kW)	Zero-TDV PV Capacity (kW)
<b>Efficiency Only Packages</b>							
QII only	Y						
<b>PV Performance Packages</b>							
20%	Y	.30/.23	0.20	0.3	Y	1.4	2.3

**4 Summary**

Table 5 summarizes recommended cost effective ordinance criteria for single family and multifamily buildings. PV systems shall be sized consistent with the CEC Solar PV Ordinance for the PV-Plus package and sized to achieve an Energy Design Rating equal to zero for the Zero-TDV package.

**Table 5: Healdsburg Reach Code Package Recommendations**

<b>Packages</b>	<b>Building Type</b>	<b>T-24 Compliance Target</b>	<b>QII</b>	<b>PVCC Allowed</b>	<b>PV<sup>1</sup></b>
Tier 1 Efficiency Package	SF	15%	Yes	No	n/a
	MF	QII	Yes	No	n/a
PV-Plus Packages	SF	30%	Yes	Yes	Yes
	MF	20%	Yes	Yes	Yes
Zero-TDV Packages	SF	30%	Yes	Yes	Yes
	MF	20%	Yes	Yes	Yes

<sup>1</sup>Sized consistent with the CEC Solar PV Ordinance for the PV-Plus package and sized to achieve a zero Energy Design Rating for the Zero-TDV package.

## **5 References**

DEG, 2016. California Statewide Codes and Standards Program Title 24, Part 11 Local Energy Efficiency Ordinances CALGreen Cost Effectiveness Study. Davis Energy Group. October 2016.

## 6 Appendix A - Utility Rate Tariffs

Following are the Healdsburg Electric Department electricity tariffs applied in this study.



CITY OF HEALDSBURG  
ELECTRIC RATE SCHEDULES

### CITY OF HEALDSBURG D-1 RESIDENTIAL RATE SCHEDULE

#### GENERAL DESCRIPTION

This rate schedule is applicable to individually metered residential dwellings, taking single-phase service within Healdsburg's service territory. This rate is not applicable to the service(s) of common spaces of multi-family units.

#### RATES AND BASELINE QUANTITIES

The D-1 schedule is based upon a tiered system. Tiers 1 and 2 energy allotment is equivalent to the daily seasonal baseline multiplied by the number of days in the billing cycle; tier 3 is for all usage above the first two tiers. The D-1 rates include a monthly customer charge, applicable state and local taxes will be added to the amounts in the table below.

<b>D-1 Electric Rates</b>	
Tier 1	\$0.1291 / kWh
Tier 2	\$0.1603 / kWh
Tier 3	\$0.2762 / kWh
Monthly Customer Charge	\$4.31 / Month

Daily Baseline quantities applicable to the D-1 Rate Schedule are listed below for both the winter and summer season.

<b>D-1 Daily Baseline Quantities</b>	
Summer (May 1st – October 31st)	10.2 kWh / Billing Day
Winter (November 1st – April 30th)	10.8 kWh / Billing Day



CITY OF HEALDSBURG  
ELECTRIC RATE SCHEDULES

**BILLING SEASONS AND CHANGE OVER DATES**

There are two billing seasons, winter and summer. The winter season begins with the first billing cycle that includes any day in the month of November. The summer season begins with the first billing cycle that includes any day in the month of May. Monthly bills that include May and November seasonal changeover dates will be calculated by multiplying the applicable seasonal daily baseline quantity by the number of days in the billing period.

**D-1 RATE MODIFIERS AND DISCOUNTS**

The following modifiers and discounts are available to electric services provided under the D-1 rate schedule.

**Low Income Discount** – For qualifying customers, a discount is available to offset a portion of the customer's energy bill. Customers receiving this discount are required to annually certify that they qualify for this program. A low-income discount of 20% will only be applied to the first two energy tiers of each billing period. See the City of Healdsburg's CARE program for more information.

**Net-Metering** – For customers with qualifying self-generation, a net-metered rate modifier is available to promote the development of renewable energy. The customer's applicable rate will be applied under the crediting policy of net-metered services. At the end of each billing period, excess kWh will be converted to an equivalent bill credit based upon that billing period's kWh rate. If at the end of the billing period, the customer owes the utility a payment, a debt will be shown. If after 12-months the customer is a net-consumer, a bill will be sent showing the balance owed and due. If after a twelve-month period the customer was a net-generator of energy, each surplus kWhr will be credited according to the customers Net-Surplus credit election.

Customers wishing to take the benefits of net-metering must sign and comply with the City's interconnection agreement before the net-metering modifier will be applied to their account.

**Green Rate** – For customers wishing to promote the development and use of renewable energy, the City of Healdsburg offers a Green Rate. Under the Green Rate, the City will procure, on the customer's behalf, Renewable Energy to match the customer's monthly energy consumption. Customers choosing the Green Rate will incur an additional 1.8 cents per kWh for every kWh consumed during the billing period.