EA CREDIT 1: OPTIMIZE ENERGY PERFORMANCE

Project # 1000025262 West Berkeley Public Library

All fields and uploads are required unless otherwise noted.

THRESHOLD ATTEMPTED

Points Attempted: 19 Option 1 > Path: 48% new/44% existing

ALL OPTIONS

TIP: The majority of requirements for EA Credit 1 are contained within documentation for EA Prerequisite 2. Summary data has been linked here for convenience and clarity.

Select a compliance path:

- (●) **Option 1. Whole Building Energy Simulation.** The project team will document improvement in the proposed building performance rating as compared to the baseline building performance rating per ASHRAE/IESNA Standard 90.1-2007 or California Title 24-2005 Part 6.
- ( ) **Option 2. Prescriptive Compliance Path: ASHRAE Advanced Energy Design Guide.** The project team will document compliance with the ASHRAE Advanced Energy Design Guide.
- ( ) **Option 3. Prescriptive Compliance Path: Advanced Buildings Core Performance Guide.** The project team will document compliance with the Advanced Buildings™ Core Performance™ Guide.

OPTION 1. WHOLE BUILDING ENERGY SIMULATION

New construction percent:	100 %

EA Prerequisite 2 Energy Cost Summary: Total Building Energy Cost Performance (Table EAp2-12 or EAp2-13):

Percent energy cost savings:	99.48 %
EA Credit 1 Points Documented:	19

ADDITIONAL DETAILS

☐ Special circumstances preclude documentation of credit compliance with the submittal requirements outlined in this form.

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☐ The project team is using an alternative compliance approach in lieu of standard submittal paths.

SUMMARY

EA Credit 1: Optimize Energy Performance Points Documented:	19
EA Credit 1: Optimize Energy Performance Exemplary Performance Points Documented:	Y

☐ The project team reserves one point in the Innovation in Design credit category for exemplary performance in EAc1.

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Energy Efficiency Report
West Berkeley Branch Library

Pacific Gas and Electric Company®

14 November 2013

1.0 INTRODUCTION AND SUMMARY

This *Energy Efficiency Report* is submitted as part of the requirements of the PG&E Savings by Design program. Attached to this report as appendices are the summary of incremental cost for energy-saving measures that go beyond Title-24 requirements, and the UTIL-1 report with input files for the energy savings and incentive calculations.

The West Berkeley Branch Library Project was designed from 2010 through 2011 and was successfully bid on budget in March, 2012. Construction is scheduled for completion in December, 2013.

The building occupies a 12,000 sq. ft. lot on University Avenue near San Pablo Avenue in Berkeley, CA, a relatively tight urban site. There is a three-story hotel to the east and a five-story apartment building across the street to the south. The building itself is 9,300 sq. ft. and one-story, although it has a two-story main roof height to avoid shadows cast by the neighboring buildings on any solar photovoltaic panels located on the roof.

The design of the building incorporates many energy-efficiency features and systems. These are shown in the diagram of Fig. 1 and are described in detail in this report:

- Extra Insulation: R-25 walls (including effect of thermal bridging), R-55 roof, R-9 floor slab;
- Radiant floor slab heating with hot water from a solar thermal panel system, with an air source heat pump as backup, in lieu of standard rooftop VAV package air-handling unit.
- Passive natural ventilation using motor-driven openable windows and a “wind chimney” feature combined with openable rooftop skylight arrays, in lieu of a fan-driven fresh air delivery system;
- Skylight arrays for daylighting in addition to the natural ventilation function;
- LED stack lighting, in lieu of standard fluorescent stack lighting.

The building’s energy performance was modeled through the design phases and is predicted to achieve *zero net energy (ZNE)* performance under the conditions and operation assumed in the input parameters of the model. The computer analysis for daylighting, computational fluid dynamics (CFD) for modeling natural ventilation air flow, and the whole building energy analysis were all carried out with the support of a grant from Pacific Gas & Electric Company.

The analysis during the design phase indicated that the building would achieve an *energy use intensity (EUI)* of 20 (kBtu/sq. ft. per year), well within the range of energy efficiency generally required for a building to be able to achieve a ZNE performance with an on-site renewable energy system.

The energy use modeling carried out for this Savings by Design submittal confirmed this level of performance. The site EUI as calculated by the required software, *Energy Pro*, is 25 and the building design was found to perform 35.9% better than the comparable building meeting the minimum Title-24 requirements. This performance level would qualify the project owner to a Savings by Design incentive award of $13,420.

The incremental cost for these five specific energy efficiency features was determined to be $478,486. 75% of this amount comes to $358,864, which is well above the incentive award amount determined as part of the *Energy Pro* analysis.

UTILITY INCENTIVE WORKSHEET — UTIL-1

Project Name: *City of Berkeley West Branch Library*

Date: *11/13/2013*

Step 1 — ANNUAL TDV ENERGY USE (kBtu/sqft-yr)

ENERGY COMPONENT	Standard	Proposed	Margin
Space Heating	25.23	2.97	22.26
Space Cooling	46.82	24.04	22.78
Indoor Fans	0.36	2.02	-1.66
Heat Rejection	0.00	0.00	0.00
Pumps	0.00	0.00	0.00
Domestic Hot Water	15.63	15.63	0.00
Lighting	78.80	34.73	44.07
Receptacle	77.08	77.08	0.00
Process	0.00	0.00	0.00
Process Lighting	0.00	0.00	0.00
TOTALS:	243.92	156.47	87.45

Step 2 — PERCENT BELOW TITLE 24

Adjusted TDV Energy Use
(Excludes Process Energy)

Standard Design		Proposed Design		Margin
243.92	-	156.47	=	87.45

Margin		Standard Design		% Below Title 24*
87.45	/	243.92	=	35.9 %

Incentive Eligibility

	Yes	No
Owner Incentive (>=10%)	☑	☐

Conditioned Floor Area = 9,165.0 ft² **sq. ft.**

Step 3 — ANNUAL SITE ENERGY USE

Average 2pm - 5pm Peak Demand (kW)	Standard	Proposed	Margin
	33.0	25.2	7.9

The values shown here are based upon the results of an EnergyPro Compliance energy analysis that uses Title 24 profiles as specified in the Alternative Calculation Method manual.

ENERGY COMPONENT	Standard		Proposed		Margin	
	Electricity (kWh)	Natural Gas (therms)	Electricity (kWh)	Natural Gas (therms)	Electricity (kWh)	Natural Gas (therms)
Space Heating	14,826	0	1,725	0	13,101	0
Space Cooling	16,876	0	7,111	0	9,765	0
Indoor Fans	167	0	936	0	-768	0
Heat Rejection	0	0	0	0	0	0
Pumps	0	0	0	0	0	0
Domestic Hot Water	7,067	0	7,067	0	0	0
Lighting	36,107	0	16,104	0	20,004	0
Receptacle	36,563	0	36,563	0	0	0
Process	0	0	0	0	0	0
Process Lighting	0	0	0	0	0	0
TOTALS:	111,607	0	69,505	0	42,101	0

Step 4 — POTENTIAL OWNER INCENTIVE CALCULATION

	% Below Title-24* (from step 2)	Incentive Rate		Savings (from Step 3)		Subtotal
Electricity (kWh)	30.0 % →	30.0 ¢/kWh	x	42,101 kWh	=	$12,630
Electricity (kW)		= 100.00 $/kW	x	7.9 kW	=	$790
Natural Gas		= 100.0 ¢/therm	x	0 therm	=	$0
Owner Incentive →				**($150,000 max) =**		$13,420

Pacific Gas and Electric Company

Potential incentives indicated on this report are available only through the Whole Building Approach Element of the Savings By Design Program for new construction and are NOT GUARANTEED. Projects MUST receive prior, written approval from The Utility during conceptual or early design development and must meet all other program requirements to qualify. Potential incentives are subject to program limitations based upon the incremental cost of the measures.

*% Below in this equation is limited to 30%.