

Energy Performance Overview
Georgina Blach Intermediate School

April 13, 2010

Location and Green Building Certifications

400 Q Street
Sacramento CA 05811 Occupied in 9/2002 Mixed new + renovation

Green Building Certifications

Savings by Design objective	18 – 34%	beyond Title 24
Other programs	CHPS	
LEED New Construction	n/a	
Energy savings points	15	of CHPS max 24
Additional commissioning	yes	
Measurement & verification	-	

Key Energy Efficiency Measures

Increased insulation, reflective roof
Natural ventilation
Operable windows
Daylighting
High efficiency lighting
Light and occupancy sensors

Building Size and Activities

Space type	sq ft	%	hrs/wk	mo/yr		
K-12 school	71,741	100%		10	Number of stories	6
					Window - wall ratio	
					Number of tenants	1
Total non-parking	71,741	100%			Count	Per 1000 sf
enclosed parking	0				Occupants	468 6.5
Total structure	71,741				PCs	

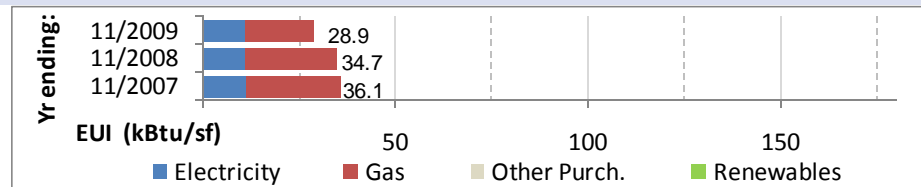
Summary Narrative

This school consists of a campus of several small buildings, with about half the square footage new construction and half renovation of existing space. In the design phase, particular emphasis was placed on daylighting, natural ventilation, and right-sizing the HVAC equipment.

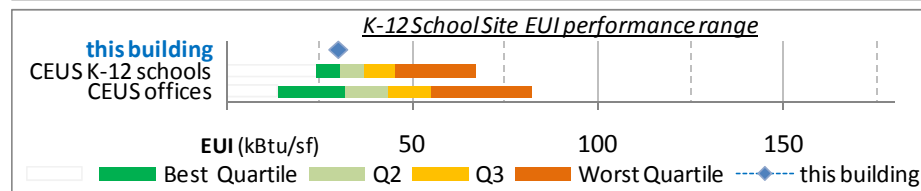
The measured energy use benchmarks well when compared to other California K-12 schools and in the national Energy Star ratings. The Energy Signature (p. 2) shows very low base loads from lighting and equipment. A relatively steep increase in gas use in the cooler months suggests possible further savings from winter HVAC management.

Measured Energy Performance Metrics*

Annual energy by fuel:
Energy use has been stable. Slightly lower gas use in 2009, with no single clear reason.



Compared to other CA buildings the energy use is good, as shown in the comparison to the range of K-12 school results



Energy Star rating: 98 (on a scale of 1-100) suggesting energy use better than 98% of national K-12 schools, when adjusted for climate and other key characteristics.

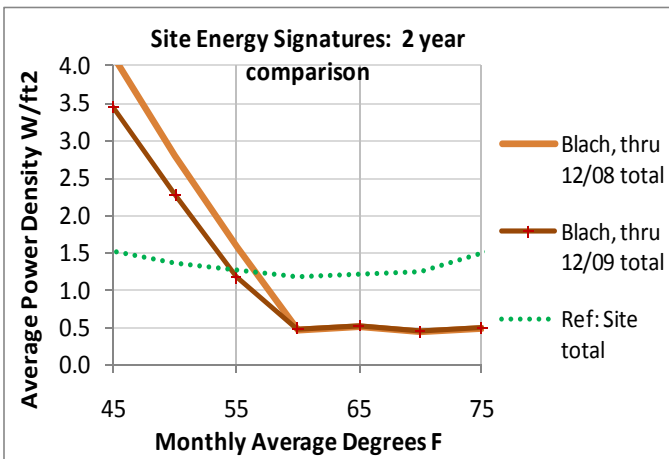
LEED EB: O&M EAc1 points: 18 (on a scale of 1-18)

* See last page for definitions of terms used throughout this report

Comparison to Design Expectations

Whole building energy use modeling from design stage not available

Energy Signature*	Climate Characteristics		
The energy signature displays monthly energy use as a function of outside temperature, indicating factors such as internal loads, ventilation rates, and heating and cooling efficiency. The results below show: <ul style="list-style-type: none"> • Very low electric base load • Relatively high heating use, possibly resulting from high ventilation rates in cooler weather. 	ASHRAE climate zone	3	
	California climate zone	12	
	Design temperatures (°F)	<u>Winter</u>	<u>Summer</u>
		36	81
	Degree Days (annual)	<u>Heating</u>	<u>Cooling</u>
2,400		600	



Key Signature Metrics (avg W/sf/mo)

	Base load	Gas W/sf @ 55° **	Gas W/sf @ 60° **
This building	0.3	1.17	0.40
Reference***	1.1	0.36	0.24

** DOE medium office reference building
 *** May suggest simultaneous heating and cooling

Approximate End Use Split (kBtu/sf/yr)

	Plugs, lights	Heating	Cooling	DHW
This	3.9	27.1	4.0	0.3
%	11%	77%	11%	1%

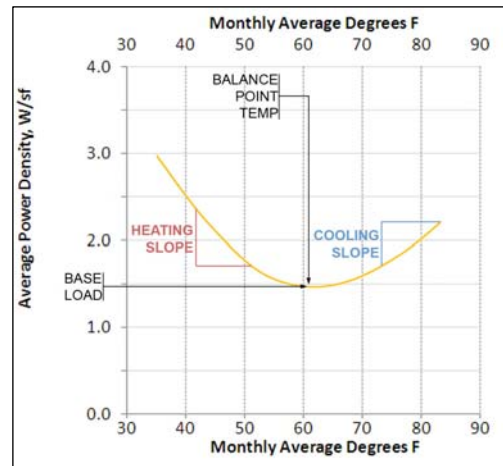
HVAC Basics:

Package roof-top units, rated 13 EER. Premium efficiency fan motors. Natural ventilation.

This report is part of a pilot project under the California Energy Commissions' Public Interest Energy Research (PIER) program. The review of measured energy performance of a set of buildings designed to high performance standards will be used to determine better feedback communication tools and methods for designers, owners, and tenants.

** See last page for definitions of terms used throughout this report*

Definitions	
CEUS	<p>California Commercial End-Use Survey. A study of commercial building energy use, built from a sample of nearly 2800 facilities. The page one performance ranges depicted for California buildings are based on this survey, as summarized in the Energy IQ tool from Lawrence Berkeley National Laboratory. (http://energyiq.lbl.gov/).</p> <p>Activity categories used for reference in this report include, as appropriate for the building:</p> <ul style="list-style-type: none"> Offices – offices of all sizes Large offices – offices of 150,000 or more square feet. K-12 schools – all primary and secondary schools All medium energy types – all buildings <i>except</i> very high plug/process load types (labs, supermarkets, etc) and very low load types (self-storage, vacant).
CHPS	<p>Collaborative for High Performance Schools. A green building rating system designed specifically for K-12 schools.</p>
Energy Signature	<p>A display of monthly energy use in relation to outside temperature for the same period. The resulting pattern readily indicates factors such as:</p> <p>Baseload: the lowest energy use level reached during the year, when minimal heating or cooling is needed.</p> <p>Heating and cooling slopes: the steepness of the increase in energy use for heating (as temperatures get colder) or cooling (as temperatures rise).</p> <p>Characteristics of the energy signature can help suggest specific performance areas they may investigate for possible savings. For example, page 2 displays the level of gas use average temperatures of 55 and 60°. High numbers suggest the possibility of simultaneous heating and cooling.</p> <p>A building’s established energy signature also provides a useful baseline for temperature-normalized identification of the impact of new measures taken or simply monitoring drift in performance levels. Page 2 displays a generic reference line, derived from the DOE’s benchmark medium-sized office model.</p>
Energy Star	<p>A program of the U.S. EPA to certify products and buildings that meet energy efficiency standards. The Energy Star program for commercial buildings gives buildings a 1 – 100 score based on actual energy use. The score indicates the approximate percentage of similar buildings that use more energy per square foot than the rated building.</p> <p>The Energy Star scores provided in this report are preliminary estimates based on information submitted for the study. Scores of 75 or higher may qualify for an official Energy Star certification. More information about Energy Star for buildings can be found at the Energy Star website: https://www.energystar.gov/index.cfm?c=business.bus_bldgs</p>



NBI PIER Project: Evidence-Based Design and Operations in High Performance Buildings

Definitions	
EUI	<p>Energy Use Intensity. Annual building energy use per square foot, expressed here in units of kBtu/sq ft/year, where kBtu = 1000 British thermal units.</p> <p style="padding-left: 40px;">1000 Btu = 1 kBtu = 0.293 kWh (kilo-Watt hours) = 0.01 therms</p>
LEED	<p>Leadership in Energy and Environmental Design. A green building rating system in the U.S, maintained by the US Green Building Council.</p> <p>LEED NC (New Construction) ratings are awarded on the basis of new building design.</p> <p>LEED EB: O&M (Existing Buildings: Operation & Maintenance) are awarded on the basis of actual resource use and operating practices of existing buildings.</p>
Modeling	<p>Energy modeling done during design as the basis for selecting the most effective energy efficiency measures. The comparison to initial modeling on page two shows, where available:</p> <p>Design EUI = the modeled whole building EUI including all planned efficiency measures. Baseline EUI = a modeled reference comparison of a similar “just to code” building, without optional efficiency measures.</p> <p>Differences between actual and modeled energy performance may arise from factors unknown at the design stage such as occupancy levels, activities and plug loads. Thus measured energy above or below the design level doesn’t necessarily indicate success or failure of the efficiency measures. When design projections are available at the monthly level, comparing the measured and modeled energy signatures can help identify the source of any difference.</p>
Savings By Design	<p>A new construction energy efficiency program for nonresidential buildings funded through California utilities, providing incentives for efficiency measures reducing energy use beyond the code requirements of Title 24.</p>