



Your Partner for Green Facilities, Sustainability and Clean Technologies

ENERGY EXPENDITURE PLAN



John Muir Elementary School

2526 6th Street

Santa Monica, CA 90405

P: (310) 399-7721

PREPARED FOR:

California Energy Commission
Energy Division
Local Assistance and Financing Office, MS-23
1516 Ninth Street
Sacramento, Ca 95814



PREPARED ON:
5/17/2017

Table of Contents

Section 1: Facility Background.....	3
John Muir Elementary School.....	3
Utility Costs and Rate Schedules	4
Benchmarking.....	5
Section 2: Energy Efficiency Measures (EEM) Summary.....	6
Lighting Systems Retrofit.....	7
Appendix – A.....	8
School Schedules and Maps	8
Daily Bell Schedule and Academic Calendar	9
John Muir Elementary School Map	11
Appendix – B.....	12
Energy Utilization Analysis	12
Appendix – C	15
Lighting Systems Audit.....	15

Section 1: Facility Background

John Muir Elementary School

John Muir Elementary School is located at 2526 6th Street in Santa Monica, CA 90405. It is an elementary school serving approximately 265 students ranging from grades K-5 and provides instruction using 5 permanent buildings and 6 portable buildings. The total amount of occupied space is 50,995 SF. For a complete map of the campus, see Appendix A.

The campus operates on an academic calendar that begins in late August and ends in late June. Winter Break is a two week break that begins at the end of December and goes to the first week of January. Spring Break is a one week break that begins in early-April. School is in session beginning at 8:15 a.m. and continuing until 2:35 p.m., Monday through Friday. For a complete academic calendar and bell schedule, refer to Appendix A.



Utility Costs and Rate Schedules

The John Muir Elementary School facilities receive electricity services from Southern California Edison (SCE) and gas services from SoCalGas (SCG). Monthly utility data is considered separately for each utility meter and each energy type (electricity, natural gas, propane, diesel, and water).

The following is a list of the meters associated with each energy type utilized at John Muir Elementary School:

Table 1: Electric Meter Numbers and Rate Schedules

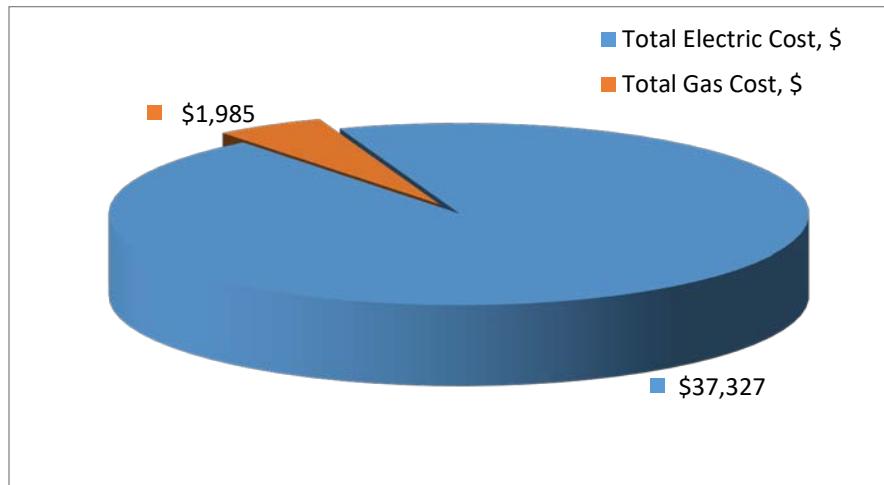
Account Number	Meter Number	Rate Schedule
3-012-2247-21	259000-023800	TOU-GS-2-B

Table 2: Gas or Propane Meter Numbers and Rate Schedules

Account Number	Meter Number	Rate Schedule
1532983611	13265315	GN-10

Also located on site is a 9 kW photovoltaic array, installed in 2013, that produced 12,734 kWh from July, 2015 to June, 2016.

The utility data provided uses the data recovered from each of these meters during the period of July, 2015 to June, 2016. The cost comparison of John Muir Elementary School's gas and electricity costs can be seen in the table below:



Benchmarking

As part of the site evaluation we determined the Energy Utilization Analysis (EUA) to provide important information about the energy usage of the school. Listed in the table below is the Benchmarking Report for John Muir Elementary School:

Energy Use Intensity Calculator					
Electricity		Natural Gas		Other Fuels	
1.39	W/SF	0.04	Therms/SF	0.00	Gals/SF
4.64	kWh/SF	\$ 0.04	Cost/SF	\$ 0.00	Cost/SF
\$ 0.73	Cost/SF				
Energy Costs/SF/Year		\$ 0.77	Energy Use(Kbtu)/SF/Year		53.38

The main purpose of this report is to assess the current energy usage of John Muir Elementary School. Energy consumption is analyzed compared to the site's actual weather data expressed in Cooling Degree Days (CDD) & Heating Degree Days (HDD). Graphs comparing the energy consumption to the CDD and HDD can be found in Appendix B.

The Baseline Energy Utilization Analysis (EUA) report compiles the monthly energy data from all meters on site. The EUA is useful in identifying critical energy consuming benchmarks like kWh/SF, kBtu/SF, and Cost/SF for each fuel type and individual school site. This report is a great resource to have for identifying the lowest energy performing schools. The report ranking will present the schools that consume the most energy when compared to others within the district or other comparable districts. The considered school is rated at 4.64 kWh/SF/yr.

The baseline EUA summary of all the meters for John Muir Elementary School can be found in Appendix B.

Section 2: Energy Efficiency Measures (EEM) Summary

Energy savings are based on the difference between annual energy use under existing conditions and annual energy use under proposed conditions. These annual energy savings, and the corresponding annual energy cost savings, are used to determine the cost-effectiveness of the projects. Demand savings are calculated as the difference between the electricity demand of the existing equipment and electricity demand of proposed equipment. The table below shows the Energy Efficiency Measures proposed and the corresponding savings associated with them.

EEM Number	Energy Efficiency Measure	Demand Savings (kW)	Electricity Savings (kWH/yr)	Natural Gas or Fuel Savings (therms or gal/yr)	Annual Cost Savings (\$)	Rebates and Grants (\$)	Installed Measure Cost (\$)
Lighting	Lighting – Interior Fixture Retrofit	24	43,889		\$7,329.00	\$65,000.00	\$127,331.00
Lighting	Lighting – Exterior Fixture Retrofit	4	15,279		\$2,552.00	\$10,000.00	\$41,360.00
	Totals	28	59,168		\$9,881.00	\$75,000.00	\$168,691.00

Lighting Systems Retrofit

A significant portion of a facilities electrical costs comes from lighting, making lighting retrofits one of the quickest and simplest methods for reducing utility costs. In most cases the retrofits will result in improved light quality and reduced maintenance costs in addition to the estimated energy savings.

The method used for calculating energy savings is outlined below:

$$\text{Annual Saving, } \$ = (\text{Existing Watts} - \text{New Watts}) / 1000 \times \text{Hours/Year} \times \text{Utility Rate} \times N$$

Where,

Existing Watts – Wattage rating for the existing (Baseline) light fixture

New Watts – New wattage rating for the existing light fixture

Hours/Year – Annual number of “burn-hours” (run hours for different areas; see detailed audit in Appendix C)

Utility Rate – Actual weighted composite utility rate, \$/kWh

N – Number of light fixtures of the particular type (see below & in Appendix C for the actual quantities).

The current interior lighting systems in the John Muir Elementary School buildings consist of a combination of 1st generation T-8, metal halide and compact fluorescent lamps and fixtures. Following examination of the data collected, a full retrofit of the lighting system with LED lamps and fixtures is recommended.

The current exterior lighting systems in the John Muir Elementary School buildings consist of compact fluorescent, 1st generation T-8, metal halide, and high pressure sodium lamps and fixtures. Following examination of the data collected, a full retrofit of the lighting system with LED lamps and fixtures is recommended.

This retrofit will generate more saving, electrical demand reduction and better payback than other Energy Conservation Measures such as HVAC replacements. Upon installment of the new system, the campus will conserve 28.2405 kW and 59,168 kWh per year. The cost savings per year will be approximately \$9,881.03. A full detailed audit of the current lighting system implemented in the entire campus can be found in Appendix C.

Appendix – A

School Schedules and Maps

Daily Bell Schedule and Academic Calendar

The John Muir office is open from 8:00 a.m. to 4:00 p.m., Monday – Friday. Please be on time for the morning bell!

Arrival

8:15 a.m.	School Begins
-----------	---------------

Recess

9:45 - 10:00 a.m.	Primary Recess (K-2)
10:00 - 10:15 a.m.	Upper Grade Recess (3-5)

Lunchtime

11:35 a.m. - 12:20 p.m.	1st and 2nd grades Recess followed by Lunch at 11:55 a.m.
11:50 a.m. - 12:35 p.m.	Kindergarten; Lunch followed by Recess
12:00 p.m. - 12:45 p.m.	3rd - 5th Recess/Lunch (12:17 bell)

Dismissal

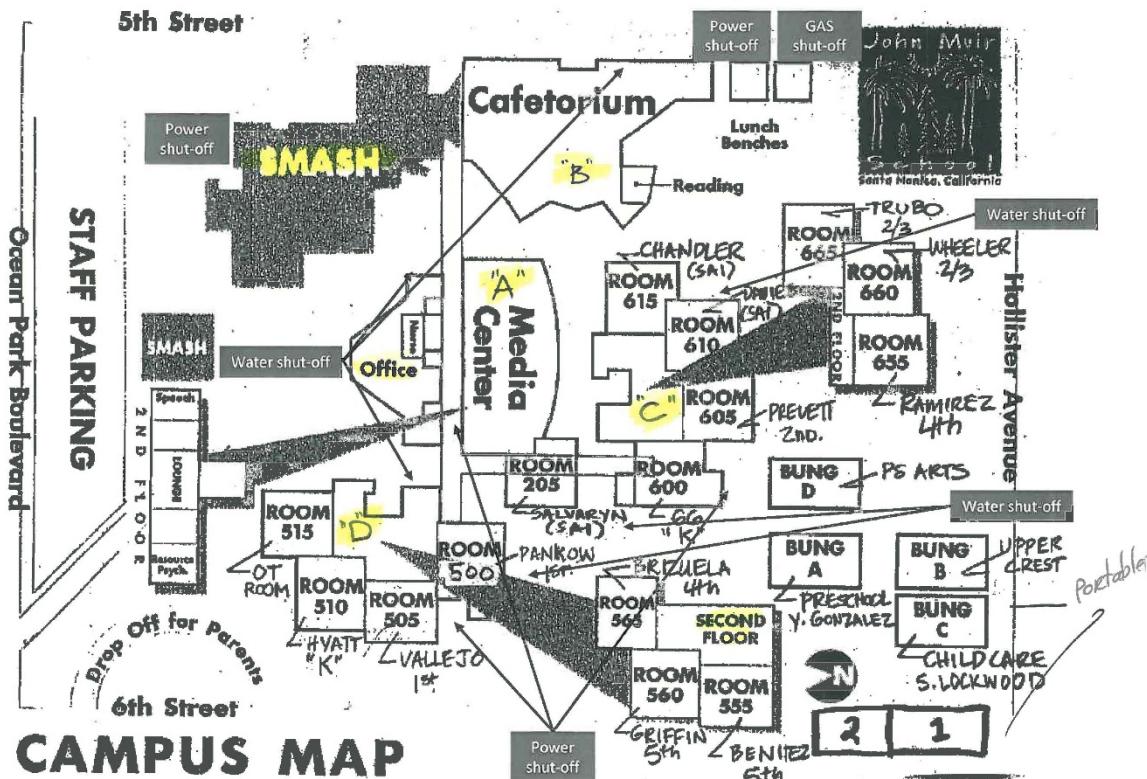
Kindergarten	(Early dismissal on Fridays for grades 1-5) Mon-Fri 1:25 p.m.
1st - 3rd grades	Mon. - Thur. 2:35 p.m. Friday 1:30 p.m.
4th & 5th grade	Mon. - Thur. 2:50 p.m. Friday 1:30 p.m.

Minimum Days Dismissal

Kindergarten	12:25 p.m.
Grades 1 - 5	1:10 p.m.
8/22 - First day of classes	
8/23 - K only	
8/30 - Back to School	
9/6 - Back to School	
11/7 to 10 - Conferences	
11/23 - Thanksgiving Early Dismissal	
5/25 - Open House	
6/9 - End of School	



John Muir Elementary School Map



Appendix – B

Energy Utilization Analysis

Customer Name: **Santa Monica-Malibu USD**

Facility Name: John Muir Elementary and Alternate
 Facility Location: 2526 Sixth Street, Santa Monica, CA
 Sq. Ft. (conditioned space): 50,995
 Billing Period
FROM: Jul-15
TO: Jun-16

Elec Utility Name:		SCE	Natural Gas Utility Name:		SCG
Account #	Meter #	Rate Schedule	Account #	Meter #	Rate Schedule
2-35-584-5629	259000-023800	TOU-GS-2-B	6307342052	13265315	GN-10-NON-RESIDENTIAL
0	0	0	0	0	0
0	0	0	0	0	0
0	0	0	0	0	0

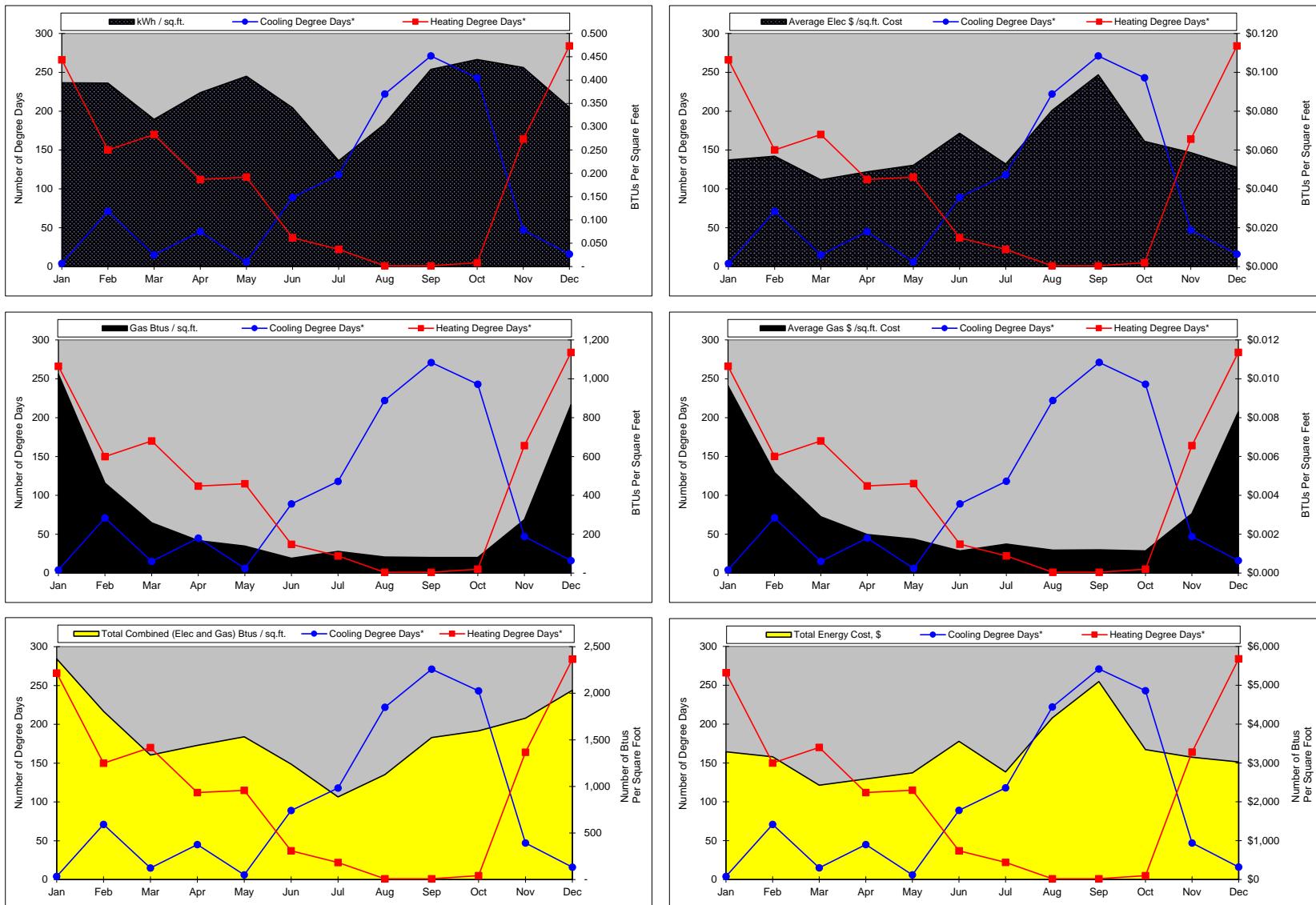
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL ANNUAL (Purchased from SCE)	TOTAL ANNUAL (Purchased from SCE and Solar Production)
Cooling Degree Days*	4	71	15	45	6	89	118	222	271	243	47	16	1,147	
Heating Degree Days*	266	150	170	112	115	37	22	1	1	5	164	284	1,327	
Days in Billing Period														
electric	32	30	30	31	30	29	30	31	30	30	33	29	365	
natural gas	31	32	29	29	31	30	30	29	32	28	30	34	365	
Electric Usage														
kWh per Billing Cycle	20,102	20,066	16,104	19,029	20,813	17,367	11,575	15,610	21,565	22,646	21,770	17,405	224,052	
\$ for kWh Billed	\$2,798	\$2,896	\$2,279	\$2,486	\$2,657	\$3,500	\$2,692	\$4,100	\$5,034	\$3,288	\$2,992	\$2,605	\$37,327	
Max kW Billed	80	86	64	64	67	70	42	70	80	83	74	74	71	
\$ for kW Billed	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
Total Electric Cost, \$	\$2,798	\$2,896	\$2,279	\$2,486	\$2,657	\$3,500	\$2,692	\$4,100	\$5,034	\$3,288	\$2,992	\$2,605	\$37,327	
Ave. Daily Electric Cost, \$	\$87	\$97	\$76	\$80	\$89	\$121	\$90	\$132	\$168	\$110	\$91	\$90	\$102	
Average \$/kWh Cost	\$0.139	\$0.144	\$0.142	\$0.131	\$0.128	\$0.202	\$0.233	\$0.263	\$0.233	\$0.145	\$0.137	\$0.150	\$0.167	
Average Elec \$ /sq.ft. Cost	\$0.055	\$0.057	\$0.045	\$0.049	\$0.052	\$0.069	\$0.053	\$0.080	\$0.099	\$0.064	\$0.059	\$0.051	\$0.051	
kWh / sq.ft.	0.394	0.393	0.316	0.373	0.408	0.341	0.227	0.306	0.423	0.444	0.427	0.341	4.39	4.64
Natural Gas Usage														
Therms per Billing Cycle	522	236	132	85	71	39	57	42	41	41	140	442	1,848	
Total Gas Cost, \$	\$491	\$264	\$148	\$101	\$89	\$58	\$76	\$60	\$61	\$58	\$156	\$423	\$1,985	
Ave. Daily Gas Cost, \$	\$16	\$8	\$5	\$3	\$3	\$2	\$3	\$2	\$2	\$2	\$5	\$12	\$5	
Average \$/therm Cost	\$0.941	\$1.119	\$1.121	\$1.188	\$1.254	\$1.487	\$1.333	\$1.429	\$1.488	\$1.415	\$1.114	\$0.957	\$1.074	
Average Gas \$ /sq.ft. Cost	\$0.010	\$0.005	\$0.003	\$0.002	\$0.002	\$0.001	\$0.001	\$0.001	\$0.001	\$0.001	\$0.003	\$0.008	\$0.039	
Gas Btus / sq.ft.	1,024	463	259	167	139	76	112	82	80	80	275	867	3,624	
Total Energy Usage														
Combined (Elec and Gas) Btus / sq.ft.	2,369	1,806	1,337	1,440	1,532	1,239	886	1,127	1,524	1,596	1,732	2,032	18,619	
Total Energy Cost, \$	\$3,289	\$3,160	\$2,427	\$2,587	\$2,746	\$3,558	\$2,768	\$4,160	\$5,095	\$3,346	\$3,148	\$3,028	\$39,312	
Ave. Energy \$/sq.ft./period	\$0.06	\$0.06	\$0.05	\$0.05	\$0.05	\$0.07	\$0.05	\$0.08	\$0.10	\$0.07	\$0.06	\$0.06	\$0.77	

* Notes:

- 1) Heating degree days and cooling degree days are based on 65 F.
- 2) Heating degree days and cooling degree days are based on Santa Monica weather data.

Customer: Santa Monica-Malibu USD
Building: John Muir Elementary and Alternate

Energy Used from: Jul-15
to: Jun-16



Appendix – C

Lighting Systems Audit

Page | 15



SANTA MONICA-MALIBU
JOHN MUIR ELEMENTARY SCHOOL
ENERGY AUDIT REPORT

