NORESCO
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Davis Joint Unified School District

Davis, California

ASHRAE Level 2 Audit

Prepared by:
NORESCO, LLC
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Project Developer:
Jeff Schaller

Account Executive:
Rob Reading

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1.1 Brief Background and Summary of Scope

Brief Background

Davis Joint Unified School District's (District) schools consistently achieve academic High Performing Schools status through achievement of scores over 800 on the California Department of Education's Academic Performance Index. The District and the community of Davis mirror this academic success with similar successes in energy efficiency through investments in energy conservation and renewable energy generation. Past third-party energy management programs and the ongoing efforts of the District's Energy Manager have provided cuts in energy use through both the education of staff and careful control of energy-consuming equipment. Tools including computer network power management software and the District-wide Energy Management System (EMS) are being operated to effectively curtail after-hours energy consumption. Recent photovoltaic generation installations at several District schools have provided offsets to utility-provided power.

This ASHRAE Level 2 Energy Audit provides the District with a list of practical measures including preliminary cost and savings estimates that should be refined, designed, financed and implemented with the selected Implementation Contractor. The next steps in the process for project implementation are:

1. District selects an Implementation Contractor
2. District and Implementation Contractor work together to refine list of practical ECMs into an implementation project scope of work
3. Final implementation scope of work, guaranteed savings and implementation costs are incorporated into an Energy Savings Performance Contract (ESPC)
4. Proposition 39 Energy Expenditure Plan is written by selected Implementation Contractor and submitted to the CEC
5. ECMs are Implemented
6. M&V is performed as agreed upon between District and selected Implementation Contractor

Summary of Scope

The District includes 20 schools and 2 administrative and support facilities serving 8,947 students throughout the city of Davis. There are 9 elementary schools, 4 junior high schools, 2 high schools and 5 alternative schools.

ASHRAE's publication: Procedures for Commercial Building Energy Audits, Second Addition, 2011 outlines the steps taken in the development of this report. In advance of the start of the ASHRAE Level 2 Energy Audit, a Preliminary Energy Audit (PEA) was provided to the District that outlined estimated utility consumption and potential ECMs. To develop the ASHRAE Level 2 Audit, audit team members, with support from District staff, conducted a walkthrough survey of the District's facilities, and

reviewed mechanical, electrical, plumbing and irrigation design and condition, and operation and maintenance practices. During the walkthrough, key parameters were measured and meetings were held with District staff to review potential recommendations. As a result of the survey, both low cost and capital improvement ECMs were identified. Summary descriptions and preliminary cost and savings estimates have been provided for these ECMs. Additionally, this report provides general building descriptions and a detailed look at energy use throughout the District's facilities including Energy Use Intensity (EUI) and end-use energy analysis.

The first step to developing the list of recommended ECMs was to list all possible modifications to equipment and operations that will save energy. This list is provided in Section 4.1 Typical School District ECM List. Next, ECMs that might be considered practical were identified and preliminary cost and savings analyses were performed. The step by step description of this process is provided in Section 4.2 Cost and Savings for Practical ECMs. The summary results of the cost and savings analysis for the set of practical measures is shown in the following table. These measures will provide energy and utility cost savings to the District. In some cases the ECMs will improve the control staff has over the equipment and provide greater detail in operating information to more effectively manage the schools and equipment. In other instances, the ECMs address deferred maintenance items or repair existing equipment. The District should work with the selected Implementation Contractor to refine, design, finance and implement the final project set of ECMs from the following table. This final project set of ECMs would be the scope in the Energy Services Agreement.

1.2 ECM Summary Table

ECM #	Measure Description	Annual Energy and Cost Savings					Payback	
		Electricity (kWh)	Annual Peak (kW)	Nat. Gas (therms)	Water (kgal)	Utility Cost Savings	Measure Cost (Note 1)	Simple Payback
1	Lighting - Internal LED and Controls	1,347,876	7,169	-1861		$283,316	$4,606,218	16
2	Lighting - External LED	410,428				$56,974	$589,175	10
3	Plumbing Fixtures	7,669		7	3,872	$26,160	$451,839	17
4	HVAC - RTUs	78,977	2,018	760		$46,313	$8,160,638	176
5	HVAC - 2-Pipe to Split-Systems	27,402	-43	3,214		$4,927	$102,510	21
6	EMS						$2,488,086	-

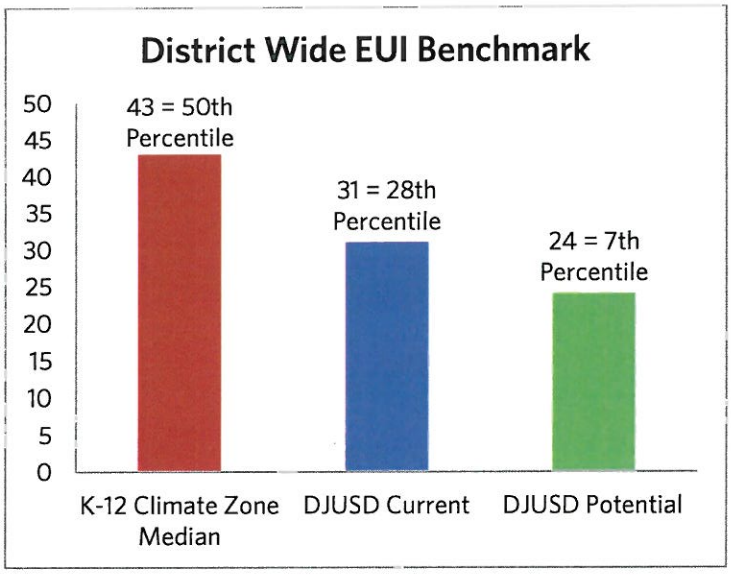
Note 1: According to the United States Department of Energy Office of Energy Efficiency and Renewable Energy, the General Contractor Multiplier for Energy Equipment Replacement projects is 1.53. This multiplier has been applied to estimated labor and materials costs for each ECM.

1.3 Summary of Benchmarking Results

Energy Use Intensity (EUI) is a summary of facility energy consumption normalized by facility size. This value takes into account both electrical and fuel usage by totalizing facility kBtu consumption and then dividing by square footage. The resulting kBtu/square foot value is the EUI of the facility, and can be used to benchmark energy consumption across different facilities independently of building size.

The current EUI for the District was calculated to be 31 kbtu/square foot. Note that this value is based on total energy used in the schools and includes energy provided by both the utilities and the solar generation. This value was compared to EUIs for other schools in the same climate zone as Davis throughout California using CALARCH California Building Energy Reference Tool. This software was developed by Lawrence Berkeley Nation Labs and funded by the California Energy Commission's (CEC) Public Interest Energy Research Program. The median value for K-12 facilities in the same climate zone as Davis is 43 kBtu/square foot. A value of 31 kBtu/square foot puts the District in the 28th percentile, meaning the District use less energy per square foot than 72% of K-12 facilities in the same climate throughout the State. This value highlights the Districts existing commitment to energy conservation.

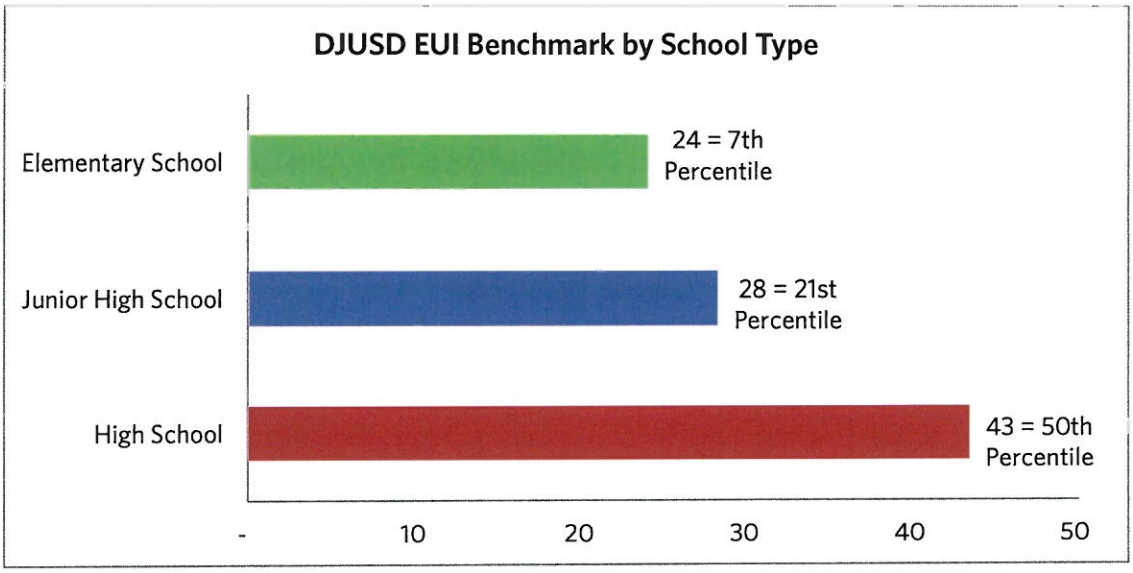
If the District were to implement the recommended ECMs, the District-wide EUI would drop to 24. An EUI of 24 would put the District in the 7th percentile, meaning that the District's schools would be more efficient than 93% of California K-12 schools in the same climate zone.



District-wide EUI benchmarking analysis shows that the District is already using less energy than K-12 facilities in the same climate zone as Davis, but opportunities for additional improvements remain.

A more detailed analysis performed at the individual school level revealed that the District's EUIs vary greatly by school. As expected, the District's high schools have the highest EUI due to operating hours, types of support facilities, activities, and number of students and staff. Additionally, the junior high schools have the next highest EUIs followed by the elementary schools. While savings opportunities

are generally greater at facilities with higher existing EUIs, District elementary schools also have the potential for further energy conservation. A more detailed analysis of the benchmarking results by individual school are shown in Section 2.4 Benchmarking Results.



Average EUIs by school type demonstrate a typical trend – higher EUIs at high schools and lower at elementary schools.

2.0 BACKGROUND INFORMATION

2.1 Audit Scope and Methodology

The energy audit scope and methodology were completed according to the guidelines outlined in Procedures for Commercial Building Energy Audits, Second Addition, 2011 published by ASHRAE, pages 9-12, Level 2 – Energy Survey and Engineering Analysis.

The District participated in the audit kickoff meeting to review the audit plan and procedures, discuss any access issues, and go over the schedule and deliverables. The audit team used careful coordination to minimize disruptions while efficiently collecting data on all 22 sites in less than 8 work days. After collecting utility data from Pacific Gas & Electric (PG&E) as well as the City of Davis for the District's electric, gas, water and trash usage, the audit team performed a utility tariff analysis.

Upon completion of the site audits and utility tariff analysis, the audit team completed a comprehensive energy analysis of each facility. The results of the energy analysis determine the potential annual energy savings by each utility service for each facility. Finally, the team completed a cost benefit analysis to estimate the budget for the District to implement the proposed solutions.

2.2 Description of the Site and Buildings

The District's facilities consist of 9 elementary schools, 4 junior high schools, 2 high schools, 5 elementary schools, a Central Kitchen, and a District Office. The following table briefly describes each site.

Facility	Address	Square Footage	Students	Year Constructed
Elementary Schools				
Birch Lane ES	1600 Birch Ln.	47,391	600	1962
Cesar Chavez ES	1221 Anderson Rd.	40,718	628	1954
Fairfield ES	26960 Co. Rd. 96	3,099	51	1958
Fred T. Korematsu ES	3100 Loyola Dr.	45,196	525	2004
Marguerite Montgomery ES	1441 Danbury St.	45,196	402	2004
North Davis ES	555 E. 14th St.	44,779	602	
Patwin ES	2222 Shasta Dr.	44,076	427	
Pioneer ES	5215 Hamel St.	52,630	520	1965
Willett ES	1207 Sycamore Ln.	46,651	530	1967
Junior High Schools				
Da Vinci Academy JHS	2121 Calaveras Ave.	(Shared w/ Emerson)	253	
Emerson JHS	2121 Calaveras Ave.	105,260	465	1977

Facility	Address	Square Footage	Students	Year Constructed
Harper JHS	4000 E. Covell Blvd.	116,243	659	2002
Holmes JHS	1220 Drexel Dr.	103,983	723	1965
High Schools				
Da Vinci Charter Academy	1400 E. 8th St.	47,282	315	2004
Davis Senior HS	315 W. 14th St.	222,425	1747	
Alternative Schools				
Children's Center State Preschool	1400 E. 8th St.	(Shared w/ Da Vinci Charter)	100	2004
Special Education Preschool	526 B St.	(Shared w/ District Office	100	1991
Davis Adult and Community Education	315 W. 14th St.	(Shared w/ Davis HS)	200	
Davis School for Independent Study	526 B St.	(Shared w/ District Office)	50	1991
Martin Luther King (Jr.) HS	635 B St.	8,000	50	2008
Support Facilities				
District Office	526 B St.	32,797		1991
Operations Center / Central Kitchen	1919 5th St.	17,434		

2.3 Historical Energy Consumption and Costs

Energy savings realism is a primary objective when exploring energy opportunities. The savings estimates must be responsible and accountable to ensure that long-term sustainability of savings is achieved for the District. Any energy savings used as justification for bonds or lease payment should be maintained for at least the lifetime of those payments. Energy savings realism starts with the baseline determination. A detailed baseline analysis based on the data provided by the District utilities is presented here.

Historical utility consumption for the past three fiscal years was collected and evaluated based on billing information provided by PG&E and the City of Davis. This analysis can be found in Section 5.1 Utility Bill Analysis. The following table summarizes the baseline data from 2012 – 2013, the most recent fiscal year of utility data provided. This most recent period of available data was selected as it best represents current facility usage.

Baseline Utility Summary

	Electricity Usage (kWh/yr)	Gas Usage (therms/yr)	Water Usage (ccf/yr)	Trash Usage (loads/yr)	Total Utility Costs ($)
District-wide Baseline	6,025,891	110,385	135,726	608	$1,579,077

Utility baseline analysis was also performed by school to compare similar schools within the District. The most recent baseline data provided was from 2012-2013.

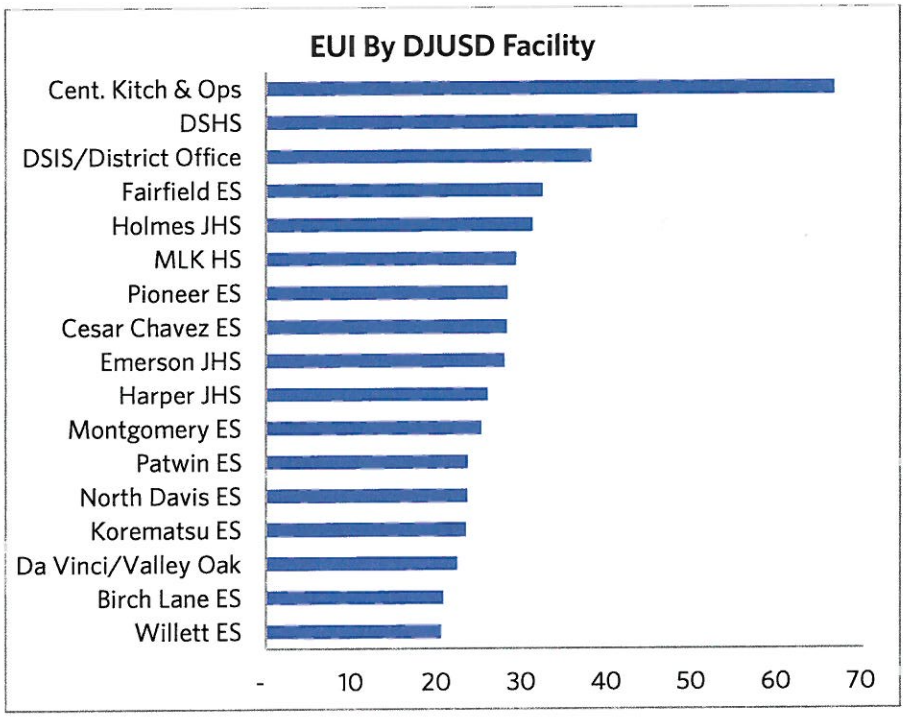
Baseline Period FY12-13 Facility	Gross Area Ft2	Existing Energy Use: Electrical Usage kWh	Annual Demand kW	Peak Demand kW	Natural Gas Therm	Water CCF	Trash Load
Birch Lane ES	47,371	211,318	981	154	2,625	6,044	48
Cesar Chavez ES	40,718	209,956	1,062	154	4,299	1,164	25
Fairfield ES	3,099	29,361	-	-	-	-	-
Korematsu ES	45,196	257,167	-	-	1,289	4,031	37
Montgomery ES	45,196	291,718	-	-	1,439	3,996	34
North Davis ES	44,779	217,071	1,084	171	3,140	2,877	36
Patwin ES	44,076	241,284	975	156	2,162	3,653	34
Pioneer ES	52,630	271,921	1,002	164	5,580	4,770	37
Willett ES	46,651	231,592	1,049	178	1,666	5,586	34
Da Vinci/Valley Oak	47,272	208,405	932	143	3,463	5,182	48
Emerson JHS	105,260	526,907	2,518	327	11,384	23,676	72
Harper JHS SB 116,243	16,243	737,955	1,474	183	4,947	26,200	65
Holmes JHS	103,983	492,275	2,502	273	16,947	13,826	72
DSHS	222,425	1,604,569	5,057	643	41,910	33,143	12
MLK HS	8,000	52,542	-	-	546	-	6
Cent. Kitch & Ops	17,434	202,905	703	76	4,673	371	24
DSIS/District Office	32,797	238,944	1,195	76	4,315	1,207	24
Total	**1,023,130**	**6,025,891**	**20,534**	**2,698**	**110,385**	**135,726**	**608**

2.4 Benchmarking Results

Facility Benchmarking

The energy use intensity (EUI) of a school district, calculated as the total electrical and gas consumption divided by the total building square footage, varies by how the schools are operated as well as the efficiency of the systems at each school. In addition to the EUIs provided for the District and by school type in Section 1.3 Summary of Benchmarking Results, EUIs were further broken out by each individual school and facility. The overall EUI for the District is 31, which is lower than most districts and a testament to the District's energy conservation management to date. With the District as aggressive towards energy conservation and efficiency at its facilities, the opportunity for further ECMs is more difficult to find.

While the District's overall EUI is very low, throughout the District EUIs vary greatly by school. It is to be expected that elementary schools will have lower EUIs than junior highs and high schools due to factors like hours of operation and types of buildings on site. However, this is not always the case, as can be seen in the graph below, Fairfield Elementary School has an EUI of 32 which is higher than or equal to all District junior highs and one of the high schools due to the use of electric heat and smaller less centralized HVAC systems. Additionally, the Central Kitchen and Operations facility has the highest EUI by far throughout the District. This is understandable as the facility is used to prepare meals for the entire District and as a result has substantial energy use related to food preparation. Breaking out the EUIs by individual school highlights these types of anomalies and helps direct efforts towards identifying potential energy savings opportunities.



While the overall District EUI is 31, each individual facility ranges from 21 to 67.

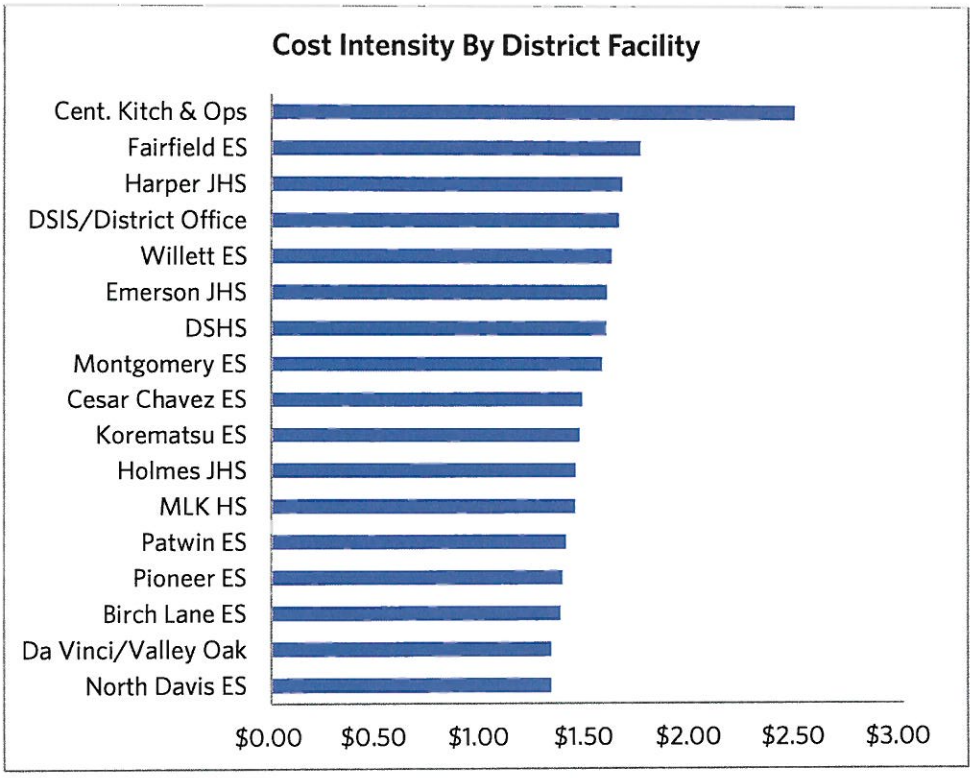
Similarly to the totalized data provided in Section 1.3 Summary of Benchmarking Results, the school by school data was analyzed using the CALARCH program to develop comparisons to other K-12 facilities in the same climate zone in California as shown in the following table.

Facility	EUI	Percentile
Birch Lane ES	21	7%
Cesar Chavez ES	29	21%
Fairfield ES	32	28%
Korematsu ES	24	7%
Montgomery ES	25	7%
North Davis ES	24	7%
Patwin ES	24	7%
Pioneer ES	29	21%
Willett ES	21	7%
Da Vinci/Valley Oak	22	7%
Emerson JHS	28	21%
Harper JHS	26	7%
Holmes JHS	31	28%
DSHS	43	64%
MLK HS	29	21%
Cent. Kitch & Ops	67	64%
DSIS/District Office	38	21%

While the overall District fell into the 28th percentile, the individual schools fall between the 7th and 64th percentiles. This is another helpful tool that provides insight into existing building condition and operation and provides insight into areas and schools of greatest energy conservation potential.

Cost Intensity

Another helpful metric to determine cost effectiveness of ECMs is the existing cost intensity for each site. The cost intensity normalizes utility costs by site square footage. This metric differs from EUI facility benchmarking because it is dependent on the utility rates. Instead of looking purely at energy consumption it provides a picture of the most costly facilities to operate.



Utility Costs Range from $1.33 / sf at North Davis Elementary School to $2.48 / sf at the Central Kitchen.

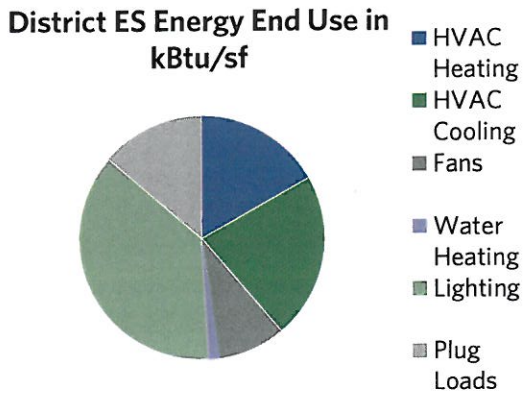
Unlike the EUI, the cost intensity is affected by the solar generation as the effective rates for the solar portion of energy use are different than the traditional utility rates seen by other District schools. The three schools with solar generation (Korematsu ES, Harper JHS and Davis Senior HS) are all above the District average in terms of cost per square foot. The analysis shows that individual building characteristics and usage have a greater effect on utility costs per square foot.

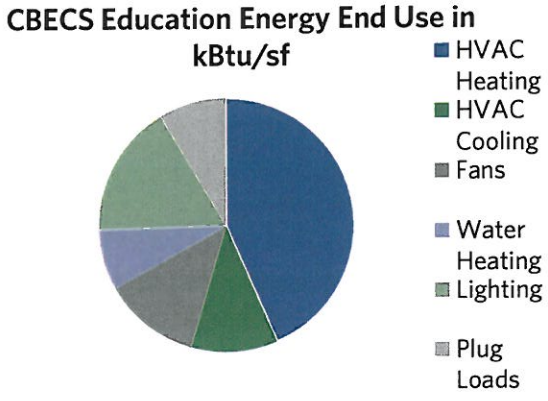
2.5 End-Use Analysis

Energy end-use analysis provides further insight into building energy use by breaking down the usage into specific end-use categories. The breakdown can be compared to typical building usage to determine how factors such as climate and individual building characteristics may effect energy consumption for specific purposes. The District's end-use analysis was developed by facility type using building simulation models that were built using actual District facility characteristics and simulated using actual Davis weather data. The results of this end-use analysis were compared with average end-use data provide by The U.S. Energy Information Administration's Commercial Building Energy Consumption Survey (CBECS). The following section summarizes the comparisons.

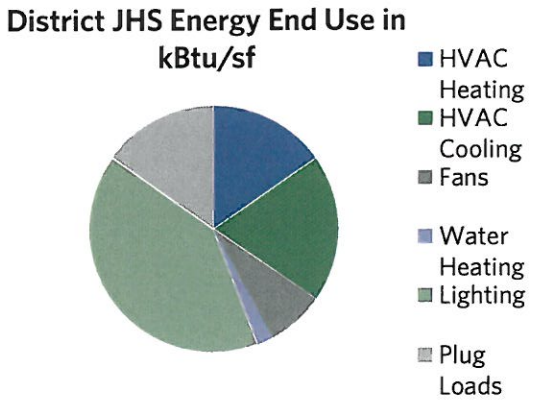
In general, District facilities use far less heating energy as a portion of total energy use compared with typical education facilities. This is due to the relatively mild climate of the region. With a similar mindset, cooling energy percentages are much higher at District facilities. Lighting also makes up a

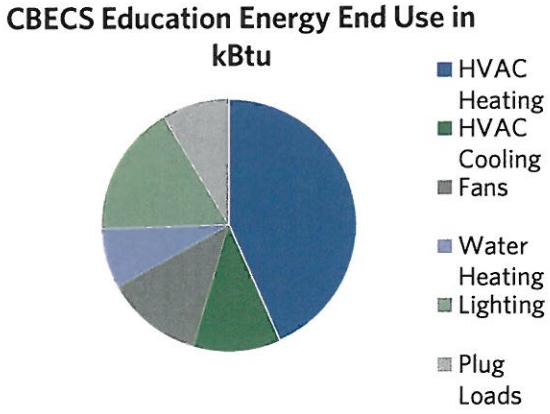
higher percentage of energy consumption at the District, which is somewhat skewed by the low overall energy use for the District's facilities. It does however indicate lighting as a potential primary energy conservation end-use to focus on. To dive further into the District's end-uses, these charts compare the District to the CBECS data by school type.





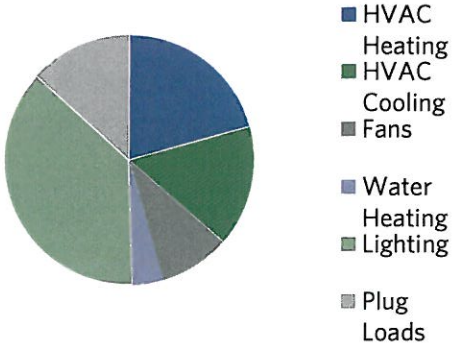
District elementary schools have the smallest domestic hot water load relative to the rest of the District, due to the lack of any showers. Additionally, plug load energy consumption also makes up a smaller percentage of overall usage due to reduced classroom technologies at these schools.



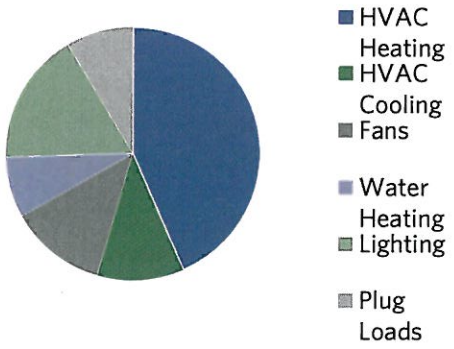


Lighting's contribution to overall energy use is slightly higher at District junior high schools. With similar building construction and mechanical systems, HVAC heating and cooling consumption is similar to those of District elementary schools, still well below average heating usage, and above overall cooling.

District HS Energy End Use in kBtu/sf



CBECS Education Energy End Use in kBtu/sf



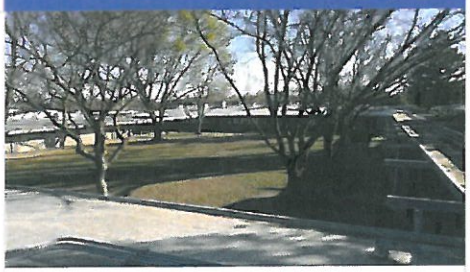
HVAC energy use, including increased fan usage, is slightly higher at District high schools, due to the presence of a few larger central HVAC systems. Plug loads are slightly lower at the high school, due to the presence of more athletic facilities and the auditorium, which both have a very low plug load density. Domestic hot water use is slightly higher, due to the fact that there is more food preparation on-site and showering activity.

Overall, while the energy consumption at the District's schools vary from the national data due to the climate differences, the end uses between building types are fairly similar with no apparent gross differences or outliers. The result of the end use analysis highlight potential savings opportunities in lighting and cooling end uses as these are the two highest categories of energy consumption.

3.0 DESCRIPTION OF THE EXISTING BUILDING SYSTEMS

3.1 Existing Buildings by Site

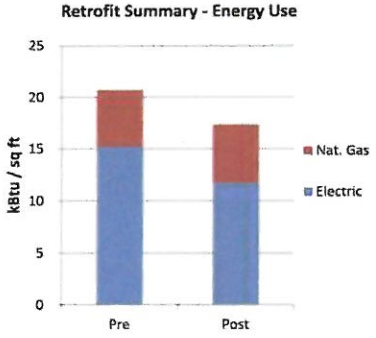
Birch Lane Elementary

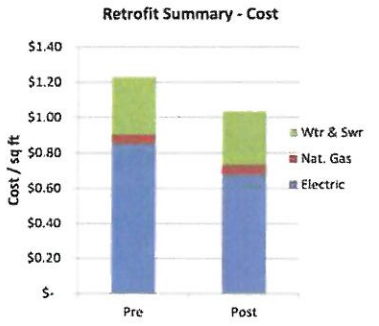


1600 Birch Lane
Year Built: 1962
Square Footage: 47,371
Students: 600
CBECS Use: Education
Site EUI: 20.7 MBtu/sqft
Site $/sqft: $1.23sqft

Projected Savings:

Energy Reduction: 16%
Cost Reduction: $9,200
GHG Reduction: 29 MTCO2e





Building Overview

Birch Lane Elementary School was originally constructed in 1962, with additions constructed over the following years. The school is comprised of three main classroom buildings, an office building, a multi-purpose room (MPR) building, a kindergarten building, and a number of portable classrooms. All buildings are single-story, with exterior entrances to the individual classrooms.

Heating System

The permanent buildings are heated with Carrier gas-fired packaged rooftop units. In general there is one rooftop unit per classroom, with multiple units serving larger spaces, such as the library and MPR. With the exception of a few units that have been replaced more recently, these units are over 20 years old. The portable classrooms are heated with Bard wallpack units. Some of these are gas-fired, while others are electric heat pumps.

Cooling System

Cooling is provided by the same units as provide heating (described above). All of these units use electric direct-exchange cooling. The original Carrier rooftop units have air-side economizers, while the Bard units, and newer rooftop units, do not.

Controls System

All of the heating and cooling equipment is connected to the District's Novar Energy Management System. Programming and scheduling of equipment is done via the Novar front-end, at the District Operations Center.

Lighting System

The interior lighting systems consist of 4ft, 34-watt T12, 3ft, 30-watt T12, 4ft, 32-watt T8, and 3ft, 25-watt T8 lamps, as well as 2ft 34-watt T12 or 32-watt T8 U-lamps. Exterior lighting includes 250-watt HPS flood fixtures, 100-watt metal halide flood fixtures and recessed square fixtures containing 70-watt high pressure sodium or 23-watt screw-in compact fluorescent lamps.

Plumbing System

There are twenty toilets, nine urinals and fourteen faucets at Birch Lane recommended for replacement or retrofit with high efficiency fixtures. While they existing fixtures may be low flow, they use more water than high efficiency alternatives.

Building Envelope

Permanent building walls are constructed with concrete. Ceilings in the permanent buildings are predominantly hard ceiling below attic spaces. Portable classroom buildings are wood-frame with wood siding finish. Ceilings in the portable classroom buildings are predominantly suspended with white 2' x 4' lift-out tiles.

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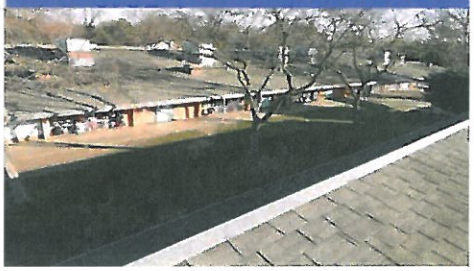
Cesar Chavez Elementary



1221 Anderson Road
Year Built: 1954
Square Footage: 40,718
Students: 628
CBECS Use: Education
Site EUI: 28.2 MBtu/sqft
Site $/sqft: $1.38/sqft

Projected Savings:

Energy Reduction: 11%
Cost Reduction: $8,900
GHG Reduction: 22 MTCO2e

Building Overview

Cesar Chavez Elementary School was originally constructed in 1954, with additions constructed over the years. The school is comprised of four main classroom buildings, an office building, a MPR building, a kindergarten building, and a number of portable classrooms. All buildings are single-story, with exterior entrances to the individual classrooms.

Heating System

The permanent buildings are heated with Carrier gas-fired packaged rooftop units. In general there is one rooftop unit per classroom, with multiple units serving larger spaces, such as the library and MPR. These units are over 20 years old. The portable classrooms are heated with Bard wallpack electric heat pump units.

Cooling System

Cooling is provided by the same units as provide heating (described above). All of these units use electric direct-exchange cooling. The Carrier rooftop units have air-side economizers, while the Bard units do not.

Controls System

All of the heating and cooling equipment described above is connected to the District's Novar Energy Management System. Programming and scheduling of equipment is done via the Novar front-end, at the District Operations Center.

Lighting System

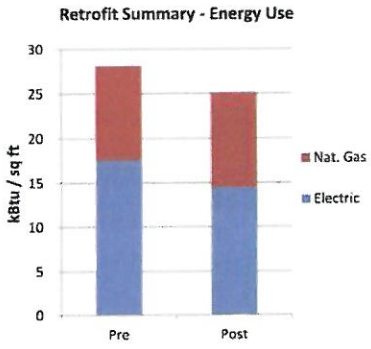
The interior lighting systems consist of 4ft, 34-watt T12, 3ft, 30-watt T12, 4ft, 32-watt T8, and 3ft, 25-watt T8 lamps, as well as 2ft 34-watt T12 or 32-watt T8 U-lamps. Exterior lighting is provided by 100-watt metal halide flood fixtures, 70 and 100-watt HPS wallpacks and recessed square fixtures containing 70-watt high pressure sodium or 23-watt screw-in compact fluorescent lamps in the exterior overhangs of the buildings.

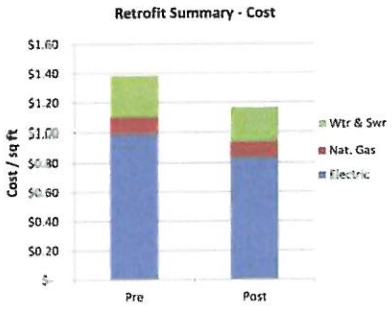
Plumbing System

There are twenty seven toilets, twelve urinals and eighteen faucets at Cesar Chavez recommended for replacement or retrofit with high efficiency fixtures. While they existing fixtures may be low flow, they use more water than high efficiency alternatives.

Building Envelope

Permanent building walls are constructed with wood frame with mix of redwood and brick veneer. In general these buildings have high ceilings with exposed beams and ductwork. Portable classroom buildings are wood-frame with wood siding finish. Ceilings in the portable classroom buildings are predominantly suspended to the desired height with white 2' x 4' lift-out tiles.





NORESCO
United Technologies

Fairfield Elementary

26960 Co. Road 96
Year Built: 1958
Square Footage: 3,099
Students: 51
CBECS Use: Education
Site EUI: 32.3 MBtu/sqft
Site $/sqft: $1.75/sqft

Projected Savings:

Energy Reduction: 8%
Cost Reduction: $400
GHG Reduction: 1 MTCO2e

Building Overview

Fairfield Elementary School was originally constructed in 1958, It is a small, rural school, and consists of a single building that houses both classroom and office space.

Heating System

Heating is provided by three packaged electric heat pumps. One of these units sits on the south roof, while the other two are located on grade, on the north side of the building.

Cooling System

Cooling is provided by the same units as provide heat (described above). The three units use electric direct-exchange cooling, and do not have air-side economizers.

Controls System

All of the heating and cooling equipment described above is connected to the District's Novar Energy Management System. Programming and scheduling of equipment is done via the Novar front-end, at the District Operations Center.

Lighting System

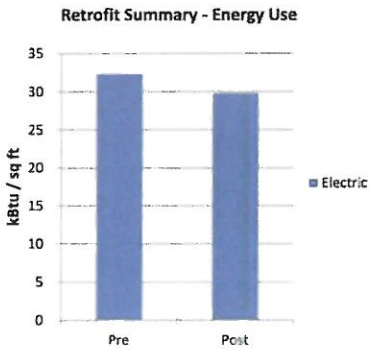
The interior lighting systems consist of 4ft, 34-watt T12, 3ft, 30-watt T12, 4ft, 32-watt T8, and 3ft, 25-watt T8 lamps, as well as 2ft 34-watt T12 or 32-watt T8 U-lamps. Exterior lighting is provided by 70-watt HPS wallpacks.

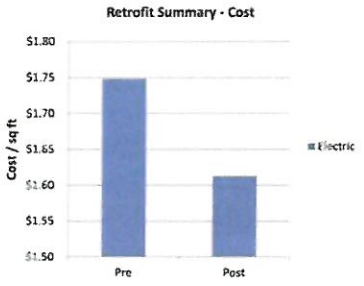
Plumbing System

There are three toilets, one urinal and two faucets at Fairfield recommended for replacement or retrofit with high efficiency fixtures. While they existing fixtures may be low flow, they use more water than high efficiency alternatives.

Building Envelope

Walls are constructed with concrete block. Ceilings are predominantly suspended to the desired height with white 2' x 4' lift out tiles.





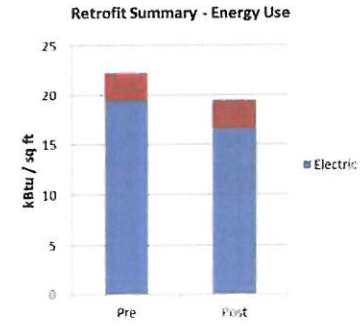
NORESCO
United Technologies

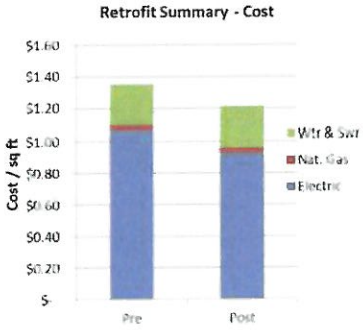
Fred T. Korematsu Elementary

3100 Loyola Drive
Year Built: 2004
Square Footage: 45,196
Students: 525
CBECS Use: Education
Site EUI: 8.1 MBtu/sqft
Site $/sqft: $0.45/sqft

Projected Savings:

Energy Reduction: 35%
Cost Reduction: $6,200
GHG Reduction: 22 MTCO2e





Building Overview

Fred T. Korematsu Elementary School was constructed in 2004. The school consists of an administration building, a kindergarten building, an MPR building, a library building, and four classroom buildings.

Heating System

The administration, kindergarten, library, and multi-purpose buildings are heated with Lennox gas-fired packaged rooftop units. Each of these buildings has multiple units, each one serving a single zone. Each classroom is heated by an individual Bard wallpack electric heat pump.

Cooling System

Cooling is provided by the same units as provide heating (described above). All of these units use electric direct-exchange cooling. The Lennox rooftop units have air-side economizers with power exhaust, while the Bard units provide only a small, constant amount of outside air.

Controls System

All of the heating and cooling equipment described above is connected to the District's Novar Energy Management System. Programming and scheduling of equipment is done via the Novar front-end, at the District Operations Center.

Lighting System

The interior lighting systems consist of 4ft, 34-watt T12, 3ft, 30-watt T12, 4ft, 32-watt T8, and 3ft, 25-watt T8 lamps, as well as 2ft 34-watt T12 or 32-watt T8 U-lamps. Exterior lighting is provided by 250-watt HPS pole-mounted area fixtures in the parking lot, 70-watt HPS wall-mounted round fixtures, and 50-watt HPS wallpacks.

Plumbing System

There are twenty nine toilets, four urinals and twenty six faucets at Korematsu recommended for replacement or retrofit with high efficiency fixtures. While they existing fixtures may be low flow, they use more water than high efficiency alternatives.

Building Envelope

Both CMU and wood-frame with batt insulation walls are present in the administration, kindergarten, library, and multi-purpose buildings. Ceilings in these buildings are a mix of high, hard-ceiling, and suspended ceiling with 2' x 4' lift-out tiles. Each classroom building is essentially comprised of four to five portable classroom buildings, arranged in a "U" shape and finished with stucco to give an appearance of a single building. These buildings have wood-frame with batt insulation walls, and suspended ceilings with white 2' x 4' lift-out tiles.

PV System

A solar photovoltaic system was installed in 2012 through a power purchase agreement and provides approximately 69% of the electricity used by the school.

NORESCO
United Technologies

Marguerite Montgomery Elementary

1441 Danbury Street
Year Built: 2004
Square Footage: 45,196
Students: 402
CBECS Use: Education
Site EUI: 25.2 MBtu/sqft
Site $/sqft: $1.46/sqft

Projected Savings:

Energy Reduction: 9%
Cost Reduction: $6,100
GHG Reduction: 18 MTCO2e

Building Overview

Marguerite Montgomery Elementary School was constructed in 2004, and uses many of the same building plans as Korematsu Elementary School. The school consists of an administration building, a kindergarten building, a MPR building, a library building, and four classroom buildings.

Heating System

The administration, kindergarten, library, and multi-purpose buildings are heated with Carrier gas-fired packaged rooftop units. Each of these buildings has multiple units, each one serving a single zone. Each classroom is heated by an individual Bard or Airxcel wallpack electric heat pump.

Cooling System

Cooling is provided by the same units as provide heating (described above). All of these units use electric direct-exchange cooling. The Carrier rooftop units have air-side economizers, while the wallpack units do not.

Controls System

All of the heating and cooling equipment described above is connected to the District's Novar Energy Management System. Programming and scheduling of equipment is done via the Novar front-end, at the District Operations Center.

Lighting System

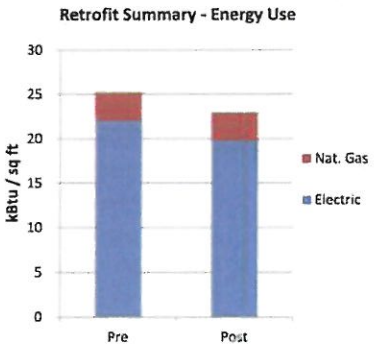
The interior lighting systems consist of 4ft, 34-watt T12, 3ft, 30-watt T12, 4ft, 32-watt T8, and 3ft, 25-watt T8 lamps, as well as 2ft 34-watt T12 or 32-watt T8 U-lamps. Exterior lighting is provided by 250-watt HPS pole-mounted area fixtures in the parking lot, 150-watt HPS flood fixtures, 50-watt HPS wallpacks, and recessed square fixtures containing23-watt screw-in compact fluorescent lamps located in the exterior overhangs.

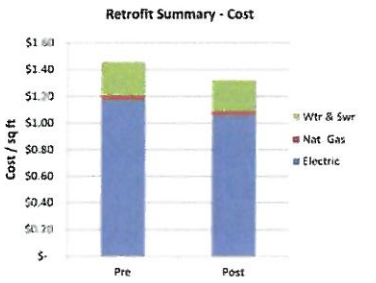
Plumbing System

There are twenty toilets, four urinals and fourteen faucets at Marguerite Montgomery recommended for replacement or retrofit with high efficiency fixtures. While they existing fixtures may be low flow, they use more water than high efficiency alternatives.

Building Envelope

Both CMU and wood-frame with batt insulation walls are present in the administration, kindergarten, library, and multi-purpose buildings. Ceilings in these buildings are a mix of high, hard-ceiling, and suspended ceiling with white 2' x 4' lift-out tiles. Each classroom building is essentially comprised of four to five portable classroom buildings, arranged in a "U" shape and finished with stucco to give the appearance of a single building. These buildings have wood-frame with batt insulation walls, and suspended ceilings with 2' x 4' lift-out tiles.





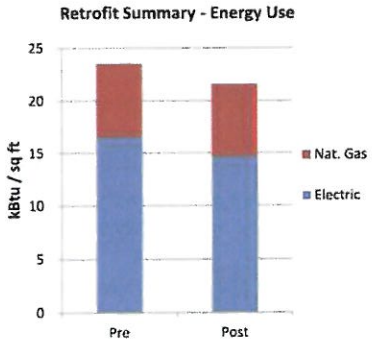
NORESCO
United Technologies

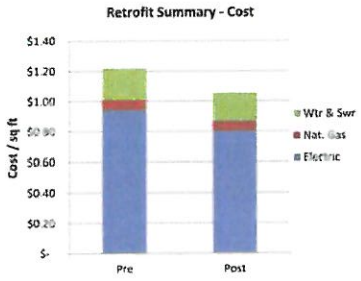
North Davis Elementary

555 E. 14th Street
Square Footage: 44,779
Students: 602
CBECS Use: Education
Site EUI: 23.6 MBtu/sqft
Site $/sqft: $1.2/sqft

Projected Savings:

Energy Reduction: 8%
Cost Reduction: $7,400
GHG Reduction: 15 MTCO2e





Building Overview

North Davis Elementary School consists of three main classroom buildings, an office and MPR building, a kindergarten building, and a number of portable classrooms. All buildings are single-story, with exterior entrances to the individual classrooms.

Heating System

The permanent buildings are heated with Carrier gas-fired packaged rooftop units. In general there is one rooftop unit per classroom, with multiple units serving the library. With the exception of a few units that have been replaced more recently, the units are over 20 years old. The portable classrooms and the kindergarten building are heated with Bard wallpack units. A few of these are gas-fired, while most are electric heat pumps. A few of the wallpack units are over 20 years old.

Cooling System

Cooling is provided by the same units as provide heating (described above). All of these units use electric direct-exchange cooling. The original Carrier rooftop units have air-side economizers, while the Bard units, and newer rooftop units, do not.

Controls System

All of the heating and cooling equipment described above has Novar DDC controls. However, at the time of the audit, the main site controller had failed. While most programming for the individual units is contained within each unit, the school must essentially be "turned on and off" manually at the main control panel. The District's Facilities, Maintenance, and Operations staff appeared to be very diligent about this, and the school was in fact being shut down each evening; and was running efficiently.

Lighting System

The interior lighting systems consist of 4ft, 34-watt T12, 3ft, 30-watt T12, 4ft, 32-watt T8, and 3ft, 25-watt T8 lamps, as well as 2ft 34-watt T12 or 32-watt T8 U-lamps.

Plumbing System

There are twenty three toilets, eight urinals and nineteen faucets at North Davis Elementary recommended for replacement or retrofit with high efficiency fixtures. While they existing fixtures may be low flow, they use more water than high efficiency alternatives

Building Envelope

Permanent building walls are constructed with concrete while the portable classroom buildings are wood-frame with wood siding. Ceilings throughout are predominantly suspended with white 2' x 4' lift-out tiles.

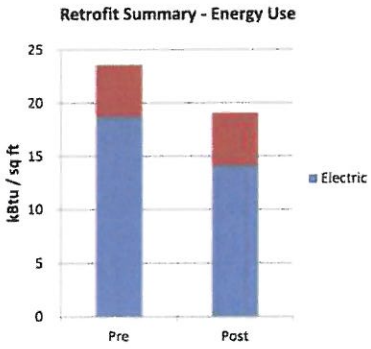
NORESCO
United Technologies

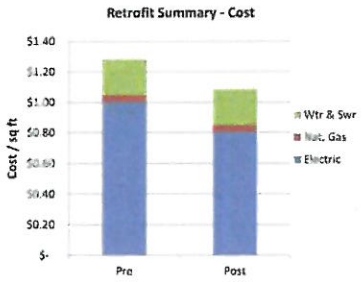
Patwin Elementary

2222 Shasta Drive
Square Footage: 44,076
Students: 427
CBECS Use: Education
Site EUI: 23.6 MBtu/sqft
Site $/sqft: $1.28/sqft

Projected Savings:

Energy Reduction: 19%
Cost Reduction: $8,700
GHG Reduction: 35 MTCO2e





Building Overview

Patwin Elementary School consists of four main classroom buildings, an office building, a MPR building, a kindergarten building, a library building, and a number of portable classrooms. All buildings are single-story, with exterior entrances to the individual classrooms.

Heating System

Heating is provided to the MPR building and the library by Carrier gas-fired package rooftop units. The MPR building has three rooftop units, and the library has two. Each rooftop unit serves a single zone. These units are over 20 years old. Each permanent classroom is heated by an individual ducted gas furnace, located in a closet in each classroom. The portable classroom buildings are heated by individual wallpack electric heat pumps. Most of these units are Bard, though a few other brands are present.

Cooling System

For the most part, cooling is provided by the same units as provide heating (described above). All of these units use electric direct-exchange cooling. In the case of the permanent classrooms, a split DX system is installed in-line with each gas furnace, each with a condensing unit on the roof. While some have been replaced, most of these condensing units are roughly 20 years old. The Carrier rooftop units have air-side economizers, as do most of the split systems. A few split systems, as well as the wallpack heat pump units, provide only a small, constant supply of outside air.

Controls System

All of the heating and cooling equipment described above is connected to the District's Novar Energy Management System. Programming and scheduling of equipment is done via the Novar front-end, at the District Operations Center.

Lighting System

The interior lighting systems consist of 4ft, 34-watt T12, 3ft, 30-watt T12, 4ft, 32-watt T8, and 3ft, 25-watt T8 lamps, as well as 2ft 34-watt T12 or 32-watt T8 U-lamps. Exterior lighting is provided by 250-watt metal halide pole-top area fixtures in the parking lot, 175-watt metal halide pole-mounted wallpacks, 70-watt HPS wall-mounted round fixtures, and 70-watt HPS lamps.

Plumbing System

There are twenty nine toilets, six urinals and twenty four faucets at Patwin recommended for replacement or retrofit with high efficiency fixtures. While they existing fixtures may be low flow, they use more water than high efficiency alternatives.

Building Envelope

Permanent building walls are constructed with wood frame with batt insulation and plaster siding. Ceilings in these buildings are a mix of high, hard-ceiling, high ceiling with splined tiles, and suspended ceiling with white 2' x 4' lift-out tiles. Portable classroom buildings are wood-frame with wood siding. Ceilings in the portable classroom buildings are suspended with white 2' x 4' lift-out tiles.

NORESCO
United Technologies

Pioneer Elementary

5215 Hamel Street

Year Built: 1965, 2004
Square Footage: 52,630
Students: 520
CBECS Use: Education
Site EUI: 28.2 MBtu/sqft
Site $/sqft: $1.28/sqft

Projected Savings:

Energy Reduction: 3%
Cost Reduction: $2,200
GHG Reduction: 9 MTCO2e

Building Overview

Pioneer Elementary School was originally constructed in 1965, with additions over the following years. The new MPR building was constructed in 2004. The school consists of three main classroom buildings, an office and kindergarten building, an MPR building, and a number of portable classroom buildings. All buildings are single-story.

Heating System

Heating is provided to the main classroom buildings and the MPR building by Carrier gas-fired packaged rooftop units. An individual unit serves each classroom with multiple units serving larger spaces such as the MPR and library. These units are roughly 15 years old, with the exception of the units serving the MPR building, which were installed when the building was constructed, 10 years ago. The portable classroom buildings are heated by individual Bard wallpack electric heat pumps. Each of the two kindergarten classrooms is heated by an individual ducted gas furnace. The office areas are heated by 3 gas furnaces ducted together, with five zone dampers which vary the airflow to the various office zones.

Cooling System

For the most part, cooling is provided by the same units as provide heating (described above). All of these units use electric direct-exchange cooling. In the case of the kindergarten classrooms, a split DX system is installed in-line with each gas furnace, each with a condensing unit on-grade. In the case of the office system, there is a DX coil installed in-line with each furnace. These three coils are served by a single, large condensing unit located on-grade. The Carrier rooftop units and the split systems have air-side economizers.

Controls System

All of the heating and cooling equipment described above is connected to the District's Novar Energy Management System. Programming and scheduling of equipment is done via the Novar front-end, at the District Operations Center.

Lighting System

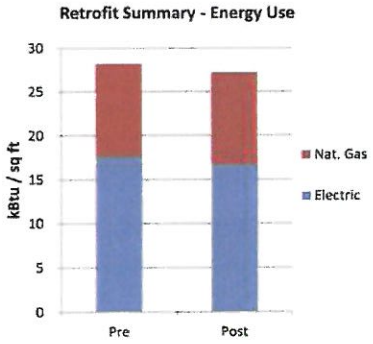
The interior lighting systems consist of 4ft, 34-watt T12, 3ft, 30-watt T12, 4ft, 32-watt T8, and 3ft, 25-watt T8 lamps, as well as 2ft 34-watt T12 or 32-watt T8 U-lamps. Exterior lighting is provided by 70-watt HPS wallpacks, recessed square fixtures containing 70-watt HPS or 23-watt screw-in compact fluorescent lamps, and 70-watt recessed down lights.

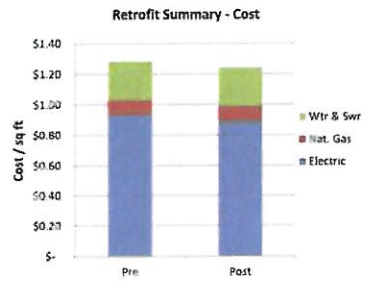
Plumbing System

There are thirty five toilets, seven urinals and twenty five faucets at Pioneer recommended for replacement or retrofit with high efficiency fixtures. While they existing fixtures may be low flow, they use more water than high efficiency alternatives.

Building Envelope

The main classroom buildings and the office and kindergarten building walls are constructed with concrete block, and have suspended ceilings with white 2' x 4' lift-out tiles. The MPR building walls are wood-frame with batt insulation and plaster finish. Portable classroom buildings are wood-frame with wood siding. Ceilings in the portable classroom buildings are with white 2' x 4' lift-out tiles.





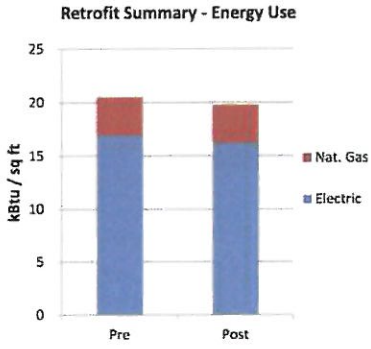
NORESCO
United Technologies

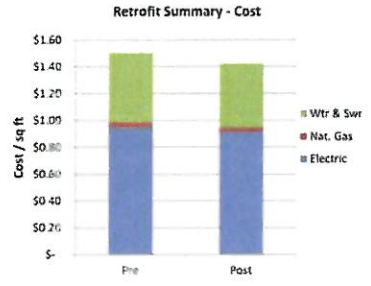
Willett Elementary

1207 Sycamore Lane
Year Built: 1967
Square Footage: 46,651
Students: 530
CBECS Use: Education
Site EUI: 20.5 MBtu/sqft
Site $/sqft: $1.51/sqft

Projected Savings:

Energy Reduction: 4%
Cost Reduction: $3,900
GHG Reduction: 6 MTCO2e





Building Overview

Willet Elementary School was originally constructed in 1967. The school consists of three main classroom buildings, an office and MPR building, and a number of portable classroom buildings. Each building is a single-story.

Heating System

The main classroom buildings, and the office and MPR building, are each heated by two furnace systems, one system serving the east half of each building, and one serving the west. Each furnace system consists of two gas furnaces ducted together, located in the attic. In the case of the classrooms, each system serves three zones, each with an individual thermostat. The temperatures in the three zones are averaged. Most of the furnaces have been replaced with high-efficiency condensing furnaces, while a few standard efficiency furnaces remain. Each portable classroom building is heated by an individual Bard wallpack electric heat pump.

Cooling System

For the most part, cooling is provided by the same units as provide heating (described above). All of these units use electric direct-exchange cooling. In the case of the main buildings, a split DX coil is installed in-line with each pair of gas furnaces. Each DX coil is served by an individual condensing unit, located on-grade.

Controls System

All of the heating and cooling equipment described above is connected to the District's Novar Energy Management System. Programming and scheduling of equipment is done via the Novar front-end, at the District Operations Center.

Lighting System

The interior lighting systems consist of 4ft, 34-watt T12, 3ft, 30-watt T12, 4ft, 32-watt T8, and 3ft, 25-watt T8 lamps, as well as 2ft 34-watt T12 or 32-watt T8 U-lamps. Exterior lighting is provided by 150-watt HPS flood fixtures, 100-watt HPS wallpacks, and recessed square fixtures containing 23-watt screw-in compact fluorescent lamps.

Plumbing System

There are fourteen toilets, five urinals and sixteen faucets at Willett recommended for replacement or retrofit with high efficiency fixtures. While they existing fixtures may be low flow, they use more water than high efficiency alternatives.

Building Envelope

Permanent and portable classroom building walls are wood-frame with wood siding. Main building ceilings are a mix of hard-ceiling and splined ceiling tiles. Ceilings in the portable classroom buildings are suspended with white 2' x 4' lift-out tiles.

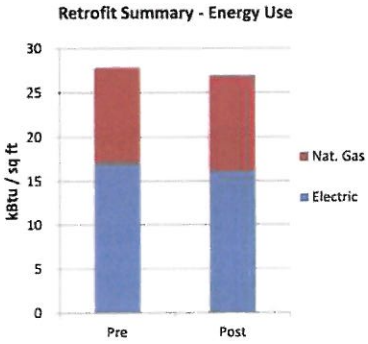
NORESCO
United Technologies

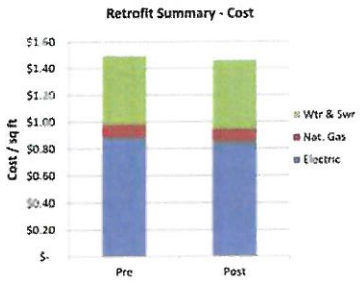
Emerson Junior High

2121 Calaveras Avenue
Year Built: 1977
Square Footage: 105,260
Students: 465
CBECS Use: Education
Site EUI: 27.9 MBtu/sqft
Site $/sqft: $1.49/sqft

Projected Savings:

Energy Reduction: 3%
Cost Reduction: $3,600
GHG Reduction: 17 MTCO2e





Building Overview

Emerson Junior high School was originally built in 1977. The school consists of a number of single-story buildings connected by unconditioned hallways. These buildings contain classroom and office space, library, gymnasium, and an "indoor commons" which serves as a lunch room and assembly space. Additionally, there are five portable classroom buildings.

Heating System

The school was originally designed with a unique heating and air-conditioning system which has since been abandoned. The permanent buildings are now heated primarily by Lennox gas-fired package units. For the most part, these are individual rooftop units, each serving a single classroom, or other space. Larger units, located on-grade, serve the library, indoor commons, gymnasium, and office. The boy's locker room is heated by a ducted gas furnace, located in the old pool-water boiler room. The portable classroom buildings are heated by Bard wallpack electric heat pumps. Some units have been installed recently, but for the most part the package units are roughly 15 years-old.

Cooling System

In general, cooling is provided by the same units as provide heating (described above). All of these units use electric direct-exchange cooling. In the case of the boy's locker room, a split DX coil is installed in-line with the gas furnace, served by a condensing unit on the roof. Most of the smaller units, such as those serving classrooms, do not have air-side economizers. Most of the larger package units are equipped with airside economizers.

Controls System

All of the heating and cooling equipment described above, with the exception of one portable classroom building, is connected to the District's Novar Energy Management System. Programming and scheduling of equipment is done via the Novar front-end, at the District Operations Center. The stand-alone portable has a programmable thermostat with an integrated occupancy sensor. If a room is left unoccupied for 30 minutes, the Bard heat pump unit goes into setback mode, employing the same setpoints and operation as units connected to the Novar system. The system returns to occupied mode as soon as people re-enter the space.

Lighting System

The interior lighting systems consist of 4ft, 34-watt T12, 3ft, 30-watt T12, 4ft, 32-watt T8, and 3ft, 25-watt T8 lamps, as well as 2ft 34-watt T12 or 32-watt T8 U-lamps. Exterior lighting is provided by 250-watt HPS pole-mounted area fixtures in the parking lot, 250-watt HPS flood fixtures, 150-watt HPS wallpacks, 70-watt HPS wallpacks, and recessed square fixtures containing 60-watt incandescent lamps.

Plumbing System

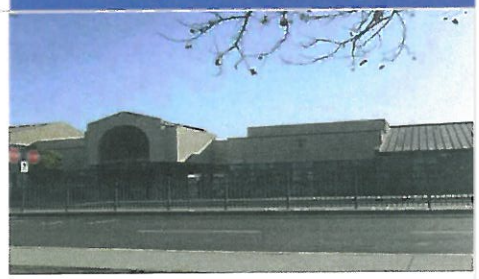
There are thirty six toilets, nineteen urinals and thirty two faucets at Emerson recommended for replacement or retrofit with high efficiency fixtures. While they existing fixtures may be low flow, they use more water than high efficiency alternatives.

Building Envelope

The main school buildings are wood-frame with a mix of stucco and wood finish. Most spaces have high ceilings with exposed beams. Portable classroom buildings are wood-frame with wood siding. Ceilings in the portable classroom buildings are suspended with white 2' x 4' lift-out tiles.

NORESCO
United Technologies

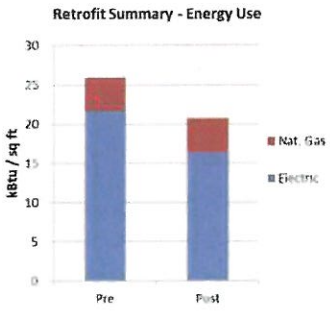
Harper Junior High

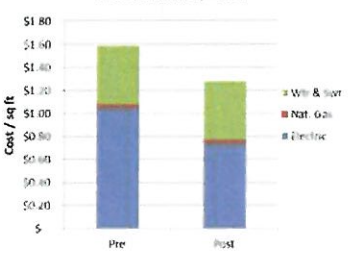


4000 E. Covell Boulevard
Year Built: 2002
Square Footage: 116,243
Students: 659
CBECS Use: Education
Site EUI: 13.4 MBtu/sqft
Site $/sqft: $1.00/sqft

Projected Savings:

Energy Reduction: 38%
Cost Reduction: $36,100
GHG Reduction: 106 MTCO2e





Building Overview

Harper Junior High School was constructed in 2002. The school consists of ten main buildings, containing classrooms, offices, an MPR, and a gymnasium. Additionally there are four portable classroom buildings.

Heating System

The main buildings are heated with Carrier gas-fired packaged rooftop units. In general there is one rooftop unit per classroom, with multiple units serving larger spaces, such as the gym and MPR. These units are original to the building(s). The portable classrooms are heated with Bard wallpack electric heat pumps.

Cooling System

Cooling is provided by the same units as provide heating (described above). All of these units use electric direct-exchange cooling. The Carrier rooftop units have air-side economizers and power exhaust, while the Bard units do not.

Controls System

All of the heating and cooling equipment described above is connected to the District's Novar Energy Management System. Programming and scheduling of equipment is done via the Novar front-end, at the District Operations Center.

Lighting System

The interior lighting systems consist of 4ft, 34-watt T12, 3ft, 30-watt T12, 4ft, 32-watt T8, and 3ft, 25-watt T8 lamps, as well as 2ft 34-watt T12 or 32-watt T8 U-lamps. Exterior lighting is provided by400-watt HPS pole-mounted area fixtures in the parking lots, 250-watt HPS pole-mounted area fixtures, and 50-watt HPS wallpacks.

Plumbing System

There are thirty one toilets, ten urinals and twenty six faucets at Harper recommended for replacement or retrofit with high efficiency fixtures. While they existing fixtures may be low flow, they use more water than high efficiency alternatives.

Building Envelope

The main buildings walls are a mix of CMU, and wood-frame with batt insulation and plaster finish. Portable classroom buildings are wood-frame with wood siding. Ceilings throughout are predominantly suspended with white 2' x 4' lift-out tiles.

PV System

A solar photovoltaic system was installed in 2012 through a power purchase agreement and provides approximately 58% of the electricity used by the school.

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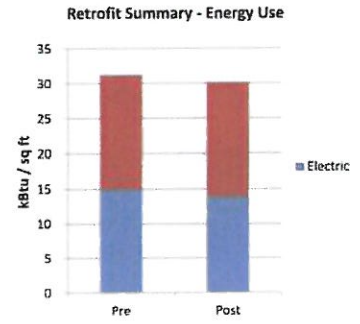
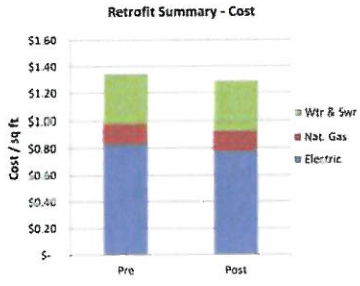
Holmes Junior High

1220 Drexel Drive
Year Built: 1965
Square Footage: 103,983
Students: 723
CBECS Use: Education
Site EUI: 31.4 MBtu/sqft
Site $/sqft: $1.34/sqft

Projected Savings:

Energy Reduction: 3%
Cost Reduction: $5,500
GHG Reduction: 19 MTCO2e





Building Overview

Holmes Junior High School was originally constructed in 1965, and has seen various additions over the years. There are ten main buildings that contain classrooms, office space, a gymnasium, and an MPR. Additionally there are a number of portable classroom buildings.

Heating System

The permanent buildings are heated with gas-fired packaged rooftop units. Most of these units are Carrier brand, though a few units are from other manufacturers. In general there is one rooftop unit per classroom, with multiple units serving larger spaces, such as the gym and MPR. With the exception of a few units that have been replaced more recently, the units are roughly 15 years old. The portable classrooms are heated with Bard gas-fired wallpack units.

Cooling System

Cooling is provided by the same units as provide heating (described above). All of these units use electric direct-exchange cooling. Most of the rooftop units have air-side economizers, while the Bard units, and a few newer rooftop units, do not.

Controls System

All of the heating and cooling equipment described above, with the exception of the two units serving the boy's and girl's locker rooms, is connected to the District's Novar Energy Management System. Programming and scheduling of equipment is done via the Novar front-end, at the District Operations Center. The units serving the locker rooms are turned on and off with a manual wall-switch, and heating and cooling setpoints are controlled with a manual thermostat.

Lighting System

The interior lighting systems consist of 4ft, 34-watt T12, 3ft, 30-watt T12, 4ft, 32-watt T8, and 3ft, 25-watt T8 lamps, as well as 2ft 34-watt T12 or 32-watt T8 U-lamps. Exterior lighting is provided by 175-watt metal halide pole-mounted carriage style fixtures, 150-watt HPS pole-top area fixtures, 70-watt HPS wallpacks, and recessed square fixtures containing 70-watt HPS or 23-watt screw-in compact fluorescent lamps.

Plumbing System

There are thirty three toilets, fifteen urinals and thirty one faucets at Holmes recommended for replacement or retrofit with high efficiency fixtures. While they existing fixtures may be low flow, they use more water than high efficiency alternatives.

Building Envelope

Walls are constructed with a mix of CMU and wood frame, with mix of stucco finish and brick veneer. Portable classroom buildings are wood-frame with wood siding. Ceilings throughout are predominantly suspended with white 2' x 4' lift-out tiles.

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Valley Oak Campus

1400 E. 8th Street
Square Footage: 47,272
Students: 453
CBECS Use: Education
Site EUI: 22.4 MBtu/sqft
Site $/sqft: $1.19/sqft

Projected Savings:

Energy Reduction: 4%
Cost Reduction: $3,300
GHG Reduction: 8 MTCO2e

Building Overview

The Valley Oak Campus, which consists of Da Vinci Charter Academy, special education preschool, state preschool, and child-care, has had several additions made over the years since it was originally built. The campus consists of four main classroom buildings, an office building, an MPR building, and a number of portable classroom buildings. All buildings are single-story, with exterior classroom entrances.

Heating System

Most of the permanent buildings are heated with Carrier gas-fired packaged rooftop units. In general there is one rooftop unit per classroom, with multiple units serving larger spaces, such as the MPR. These units are over 20 years old. One of the permanent buildings (Building D) is heated with ducted gas-fired furnaces, located in a closet in each classroom. The portable classrooms are predominantly heated with wallpack units, most of them manufactured by Bard. Some of these are gas-fired, while some are electric heat pumps.

Cooling System

For the most part, cooling is provided by the same units as provide heating (described above). All of these units use electric direct-exchange cooling. In the case of Building D, a split DX coil is installed in-line with each gas furnace. Each DX coil is served by an individual condensing unit, located on the roof. The rooftop units and split systems have airside economizers, while the wallpack units do not.

Controls System

All of the heating and cooling equipment described above, with the exception of the two units serving the science classroom/lab portables, is connected to the District's Novar Energy Management System. Programming and scheduling of equipment is done via the Novar front-end, at the District Operations Center. The units serving the science class are turned on and off manually, and heating and cooling setpoints are controlled with a manual thermostat.

Lighting System

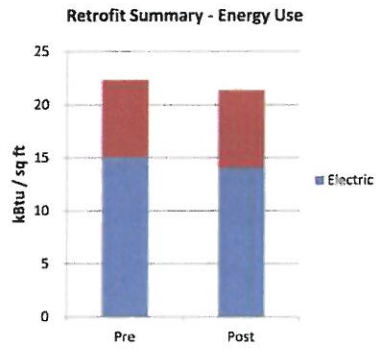
The interior lighting systems consist of 4ft, 34-watt T12, 3ft, 30-watt T12, 4ft, 32-watt T8, and 3ft, 25-watt T8 lamps, as well as 2ft 34-watt T12 or 32-watt T8 U-lamps. Exterior lighting is provided by 250-watt HPS pole-mounted area fixtures in the parking lot, 250-watt HPS flood fixtures, recessed square fixtures containing 70-watt HPS lamps.

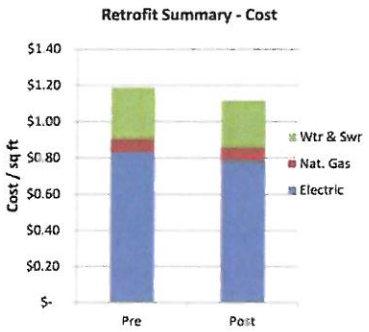
Plumbing System

There are twenty two toilets, seven urinals and twenty two faucets at Valley Oak recommended for replacement or retrofit with high efficiency fixtures. While they existing fixtures may be low flow, they use more water than high efficiency alternatives.

Building Envelope

Permanent building walls are wood frame with stucco finish, with the exception of Building D which has a brick veneer. Ceilings in the permanent buildings are a mix of hard-ceiling, and high ceiling with exposed beams. Portable classroom buildings are wood-frame with wood siding. Ceilings in the portable classroom buildings are predominantly suspended with white 2' x 4' lift-out tiles.





NORESCO
United Technologies

Davis Senior High

315 West 14th Street
Square Footage: 222,425
Students: 1747
CBECS Use: Education
Site EUI: 29.4 MBtu/sqft
Site $/sqft: $1.14/sqft

Projected Savings:

Energy Reduction: 9%
Cost Reduction: $16,300
GHG Reduction: 76 MTCO2e

Building Overview

Davis Senior High School consists of a performing arts center, two gymnasiums, a library, an administration building, and a number of classroom buildings. There is one two-story classroom building, with exterior classroom entrances; and the rest are single-story, with exterior entrances. Additionally there are high-bay style shop spaces, and a number of portable classroom buildings. The campus is also home to the adult school, which is one, single-classroom building.

Heating System

Most of the school is heated by gas-fired packaged rooftop units. These units vary in age, but a number of the oldest units are over 20 years old. The learning center and humanities buildings are served by packaged multi-zone rooftop units. Each of these units serves six zones using a gas-fired furnace for heating, and electric direct-exchange cooling. The kitchen and Building M are heated with hydronic "2-pipe" fan coil units. These fan coil units receive heating hot water from a boiler located in the kitchen building mechanical room. This boiler is over-sized, as it originally provided heating to the old MPR building as well, which was recently demolished. The portable classroom buildings are heated by wallpacks.

Cooling System

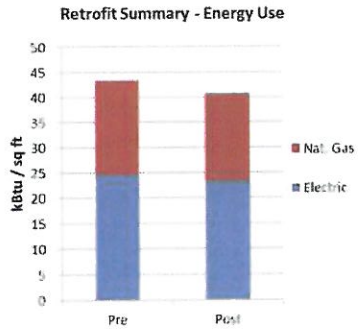
For the most part, cooling is provided by the same units as provide heating (described above). All of the rooftop and wall-pack units use electric direct-exchange cooling. In general the rooftop units have airside economizers, while the wallpacks do not. The hydronic 2-pipe fan coils that serve the kitchen and Building M are served with chilled water in cooling season by an air-cooled chiller, located on-grade behind the kitchen building. The chiller was installed in 1993, and like the boiler, is over-sized.

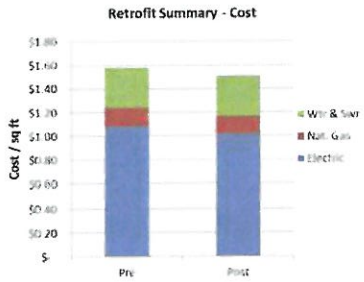
Controls System

Most of the heating and cooling equipment is connected to the District's Novar Energy Management System. Programming and scheduling of equipment is done via the Novar front-end, at the District Operations Center. Some of the portable classroom buildings are not connected to the Novar system, and have programmable thermostats with integrated occupancy sensors. The two multi-zone units serving the learning center have stand-alone Honeywell DDC controls, and are connected to a time-clock. The two-pipe fan coil / boiler and chiller system serving the kitchen and Building M has stand-alone pneumatic controls. Some of the fan-coils are controlled by manual wall-switches, while some must be turned on and off from the electric disconnect. The boiler chiller switchover controls are no longer functioning and the system must be switched from heating to cooling manually as the seasons change.

Lighting System

The interior lighting systems consist of 4ft, 34-watt T12, 3ft, 30-watt T12, 4ft, 32-watt T8, and 3ft, 25-watt T8 lamps, as well as 2ft 34-watt T12 or 32-watt T8 U-lamps.





Davis Senior High (cont'd)

Plumbing System

There are seventy nine toilets, thirty two urinals and fifty eight faucets at Davis Senior High recommended for replacement or retrofit with high efficiency fixtures. While they existing fixtures may be low flow, they use more water than high efficiency alternatives.

Building Envelope

Permanent buildings have a mix of CMU walls, and wood-frame walls with plaster finish. Ceilings are predominantly suspended to the desired height with white 2' x 4' lift out tiles; but hard ceilings, and high ceilings with exposed beams and ductwork exist too. Portable classroom buildings are wood-frame with wood siding. Ceilings in the portable classroom buildings are predominantly suspended with white 2' x 4' lift-out tiles.

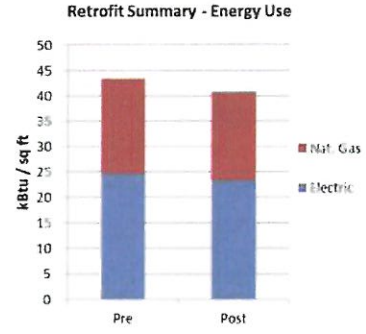
PV System

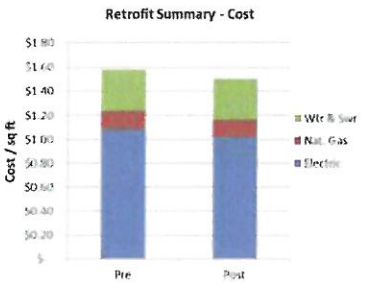
A solar photovoltaic system was installed in 2012 through a power purchase agreement and provides approximately 56% of the electricity used by the school.

315 West 14th Street
Square Footage: 222,425
Students: 1747
CBECS Use: Education
Site EUI: 29.4 MBtu/sqft
Site $/sqft: $1.14/sqft

Projected Savings:

Energy Reduction: 9%
Cost Reduction: $16,300
GHG Reduction: 76 MTCO2e





NORESCO
United Technologies

Martin Luther King (Jr.) High School

635 B Street
Year Built: 2008
Square Footage: 8,000
Students: 50
CBECS Use: Education
Site EUI: 29.2 MBtu/sqft
Site $/sqft: $1.31/sqft

Projected Savings:

Energy Reduction: 6%
Cost Reduction: $700
GHG Reduction: 2 MTCO2e

Building Overview

Martin Luther King (Jr.) High School consists of a single building, constructed in 2008. The building houses classrooms and offices for the continuation high school, and a weight room.

Heating System

Heating is provided by six Carrier gas-fired packaged rooftop units, each serving a single zone in the building. These units are original to the building.

Cooling System

Cooling is provided by the same units as provide heating (described above). All of these units use electric direct-exchange cooling. All of the units are equipped with air-side economizers.

Controls System

All of the heating and cooling equipment described above is connected to the District's Novar Energy Management System. Programming and scheduling of equipment is done via the Novar front-end, at the District Operations Center.

Lighting System

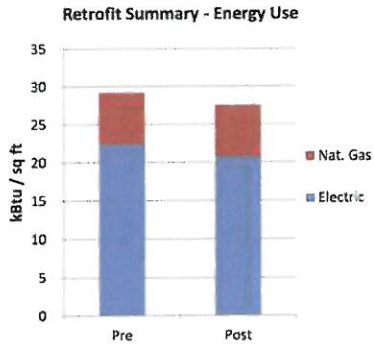
The interior lighting systems consist of 4ft, 34-watt T12, 3ft, 30-watt T12, 4ft, 32-watt T8, and 3ft, 25-watt T8 lamps, as well as 2ft 34-watt T12 or 32-watt T8 U-lamps. Exterior lighting is provided by 150-watt HPS pole-mounted area fixtures in the parking lot.

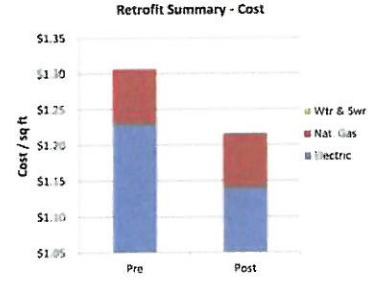
Plumbing System

There are six toilets, one urinal and twenty five faucets at Martine Luther King (Jr.) High School recommended for replacement or retrofit with high efficiency fixtures. While they existing fixtures may be low flow, they use more water than high efficiency alternatives.

Building Envelope

Walls are constructed with wood frame with thin brick veneer over stucco. Ceilings are predominantly suspended with white 2' x 4' lift out tiles.





NORESCO
United Technologies

DSIS / District Office

526 B Street
Square Footage: 32,797
Students: 50
CBECS Use: Education
Site EUI: 38.0 MBtu/sqft
Site $/sqft: $1.55/sqft

Projected Savings:

Energy Reduction: 2%
Cost Reduction: $1,400
GHG Reduction: 3 MTCO2e

Building Overview

The Susan B. Anthony campus was currently houses both the District Offices and the Davis School for Independent Study (DSIS). The campus is essentially a single one-story building, with multiple wings.

Heating System

Heating is provided by a mix of Carrier, Lennox, and Goettl gas-fired packaged rooftop units. Each unit provides heating to a single zone. Most of the units are in the 10 to 15 year age range, but a few of the units were installed as early as 1988.

Cooling System

Cooling is provided by the same units as provide heating (described above). All of these units use electric direct-exchange cooling. A few of the units are equipped with air-side economizers, but most provide only a small, constant amount of outside air.

Controls System

All of the heating and cooling equipment described above is connected to the District's Novar Energy Management System. Programming and scheduling of equipment is done via the Novar front-end, at the District Operations Center.

Lighting System

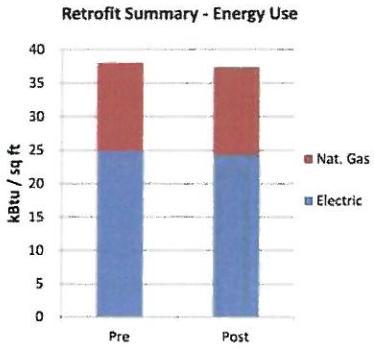
The interior lighting systems consist of 4ft, 34-watt T12, 3ft, 30-watt T12, 4ft, 32-watt T8, and 3ft, 25-watt T8 lamps, as well as 2ft 34-watt T12 or 32-watt T8 U-lamps.

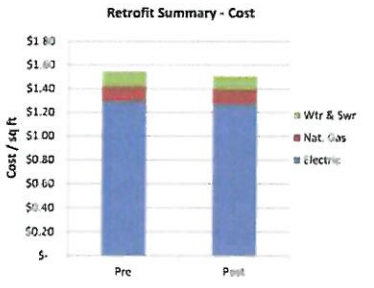
Plumbing System

There are sixteen toilets, three urinals and fourteen faucets at the District Office recommended for replacement or retrofit with high efficiency fixtures. While they existing fixtures may be low flow, they use more water than high efficiency alternatives.

Building Envelope

Walls are constructed with wood frame with plaster finish. Ceilings are a mix of high, hard ceiling, and suspended ceiling with white 2' x 4' lift-out tiles.





NORESCO
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Operations Center / Central Kitchen

1919 5th Street
Square Footage: 17,434
CBECS Use: Education
Site EUI: 66.5 MBtu/sqft
Site $/sqft: $2.32/sqft

Projected Savings:

Energy Reduction: 4%
Cost Reduction: $2,100
GHG Reduction: 9 MTCO2e

Building Overview

The Operations Center and central kitchen building was originally constructed as a maintenance facility with office space and the District's central kitchen added in 2003. Currently all of the food for the District's cafeterias is prepared here. The offices and shop space for the District's Facilities, Maintenance, and Operations staff is also housed in the building.

Heating System

Heating is provided predominantly by Carrier gas-fired package rooftop units. Additionally, two packaged exhaust / make-up air units serving the kitchen hoods have gas-fired furnaces to heat the make-up air.

Cooling System

Cooling is provided by the same units as provide heating (described above), with the exception of the make-up air units, which do not have cooling. All of the packaged rooftop units use electric direct-exchange cooling and are equipped with air-side economizers.

Controls System

All of the heating and cooling equipment described above is connected to the District's Novar Energy Management System. Programming and scheduling of equipment is done via the Novar front-end, within this building.

Lighting System

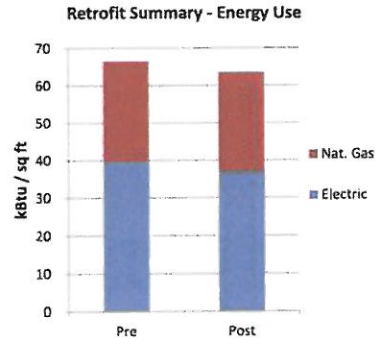
The interior lighting systems consist of 4ft, 34-watt T12, 3ft, 30-watt T12, 4ft, 32-watt T8, and 3ft, 25-watt T8 lamps, as well as 2ft 34-watt T12 or 32-watt T8 U-lamps. The kitchen also has 8-ft strip and hooded industrial fixtures with F59T8 lamps.

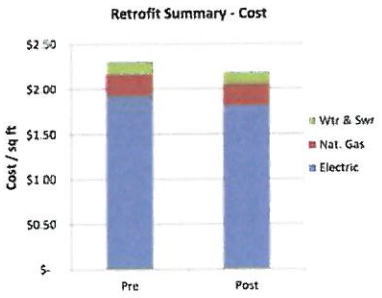
Plumbing System

There are five toilets, one urinal and twenty four faucets at the Operations Center recommended for replacement or retrofit with high efficiency fixtures. While they existing fixtures may be low flow, they use more water than high efficiency alternatives.

Building Envelope

The original high-bay portion of the building is a metal butler building. The 2003 office and kitchen addition has wood-frame walls with batt insulation and plaster finish. Ceilings are predominantly suspended to the desired height with white 2' x 4' lift-out tiles.





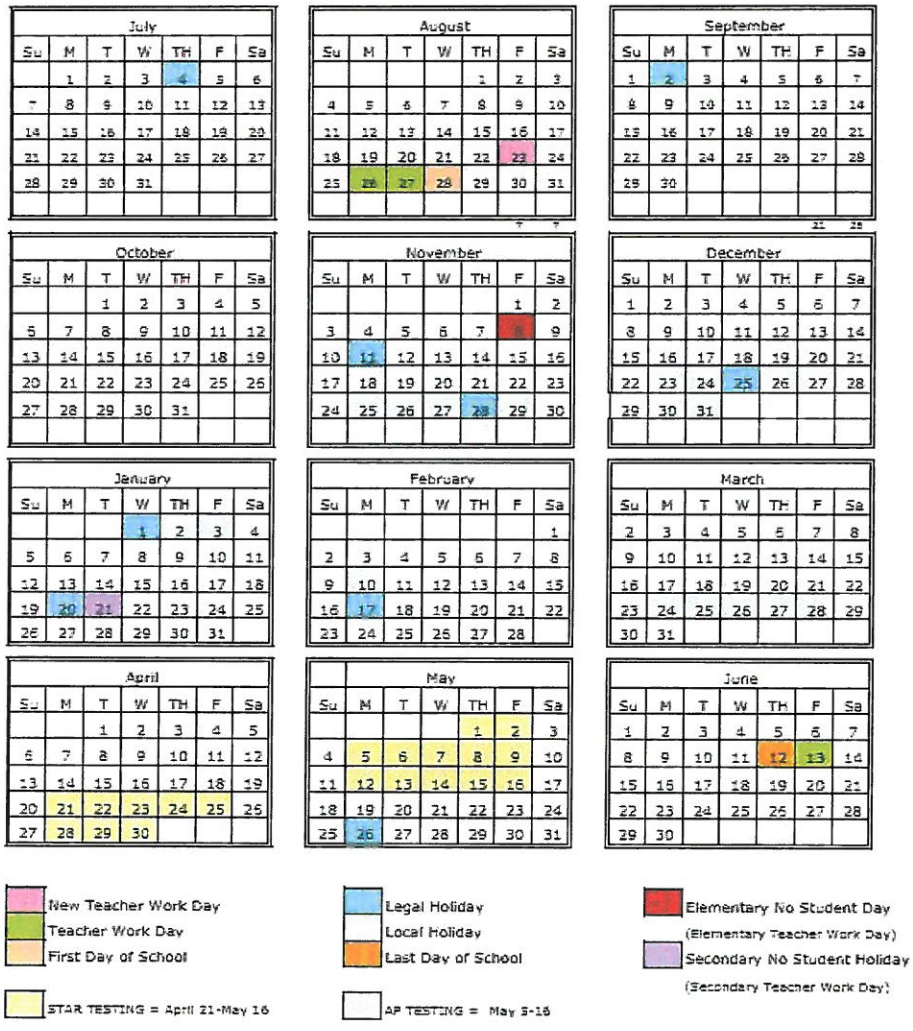
3.2 School Calendar and General Hours of Operation

The District operates on a typical nine month calendar with classes in session from mid-August through mid-June. Hours of operations are fairly consistent with school in session from 8AM to 3PM, Monday through Friday with the exception that elementary schools release at 1:30PM on Wednesdays. HVAC equipment is controlled to match the school calendar through the District-wide EMS. The following table is the District calendar for the 2013-2014 academic year.

Davis Joint Unified School District
School Calendar 2013-2014

Note: First Day of instruction is August 28, 2013
Last Day of instruction is June 12, 2014

Student Days 180
Teacher Days 184



Board Approved:

NORESCO
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4.0 ENERGY CONSERVATION MEASURES

4.1 Typical School District ECM List

The audit team investigated a comprehensive list of possible modifications to equipment and operations that would potentially save energy. This list is comprised of both typical school district ECMs and more uncommon energy solutions. The practicality of these ECMs was evaluated based on the on-site audit, discussions with District Facilities, Maintenance, and Operations staff and energy savings and ECM cost estimates. In accordance with ASHRAE Level 2 Audit guidelines, measures that did not provide energy savings or facility improvement benefits to the District were eliminated from the list. The resulting list of practical measures is shown in Section 4.2 Cost and Savings for Practical ECMs and each practical measure is described in section 4.3 Practical ECM Descriptions. Brief analysis on the excluded measures is included in Section 4.5 Excluded Measures.

Potential Measure
High efficiency florescent lighting
Internal LED lighting
Occupancy-based lighting controls
Day-lighting controls
EMS-based lighting controls
External LED lighting
High efficiency toilets and urinals
Faucet aerators
Low flow showerheads
Ice-maker retrofits
Kitchen pre-rinse sprayers
Cooling tower water re-use and deduct meters
Weather-based irrigation controls
Energy Management System (EMS) upgrades
HVAC system improvements
Heating hot water systems
Building envelope improvements
Trash compaction
Vending machine controls
Premium-Efficiency motors and variable speed pumping
Domestic hot water systems
Information Technology (IT) equipment
Renewable Energy Generation
Utility bill evaluation for anomalies
Tariff evaluation (electric, natural gas, water/sewer)
Time-of-use (TOU) analysis
Meter consolidation
Irrigation deduction metering

4.2 Cost and Savings for Practical ECMs

A detailed cost and savings analysis was performed for remaining ECMs found to be practical for the District. The practicality of these ECMs was evaluated in accordance with ASHRAE Level 2 Audit guidelines based on the on-site audit, discussions with District staff and energy savings and ECM cost estimates. These ECMs will provide valuable energy and cost savings to the District while addressing infrastructure needs and improving maintenance and facility operational efficiency. Detailed descriptions of these measures are found in Section 4.3 Practical ECM Descriptions.

Implementing the resulting mix of ECMs would provide a 21% reduction in total District energy consumption and 25% reduction in total utility costs.

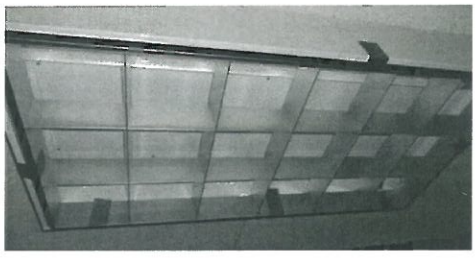
ECM #	Measure Description	Annual Energy and Cost Savings					Payback	
		Electricity (kWh)	Annual Peak (kW)	Nat. Gas (therms)	Water (ccf)	Utility Cost Savings	Measure Cost (Note 1)	Simple Payback
1	Lighting - Internal LED and Controls	1,347,876	7,169	-1861		$283,316	$4,606,218	16
2	Lighting - External LED	410,428				$56,974	$589,175	10
3	Plumbing Fixtures	7,669			3,872	$26,160	$451,821	17
4	HVAC - RTUs	78,977	2,018	760		$46,313	$8,160,638	176
5	HVAC - 2-Pipe to Split-Systems	27,402	-43	3,214		$4,927	$102,510	21
6	EMS						$2,488,086	-

Note 1: According to the United States Department of Energy Office of Energy Efficiency and Renewable Energy, the General Contractor Multiplier for Energy Equipment Replacement Projects is 1.53. This multiplier has been applied to estimated labor and materials costs for each ECM

4.3 Practical ECM Descriptions

ECMs 1,2 - Lighting System Retrofits

The lighting throughout the District is primarily made up of 32 watt T-8 lamp interior fixtures and 70 to 250 watt high pressure sodium (HPS) and metal halide (MH) exterior fixtures. While these fixtures are fairly efficient, advances in florescent and LED technology and lighting controls have resulted in availability of fixtures that use significantly less energy. Revised Title 24 guidelines as defined in the 2013 California Building Energy Efficiency Standards scheduled to go into effect July 1, 2014, provide detailed rules for how lighting retrofits must be designed. The suggested lighting project has been designed in compliance with these guidelines.



11,080 interior fixtures are recommended for replacement or retrofit with LED fixtures and kits, reducing energy consumption and increasing standardization across the District's schools.

Interior Fixture Upgrades:

Two interior lighting retrofit options were considered during the lighting design process. The first option standardizes on new interior LED fixtures and fixture retrofit kits throughout the District. This option provides the most energy savings and standardization, reducing utility costs and simplifying operations and maintenance.

- ECM 1: Interior lighting Option 1: 11,080 interior fixtures would be retrofitted with new LED fixtures or retrofit kits.

A second option was considered that would provide the majority of the energy savings as Option 1 but with reduced costs. This option provides LED fixtures where required to meeting Title 24 guidelines while sticking with linear florescent fixtures where possible. While this option does not provide the same level of energy savings or standardization, the use of linear florescent fixtures in some areas reduces the estimated implementation costs. This option would result in more complicated operations and maintenance procedures as fixtures and lamps would vary from room to room across the District. While this option provides better simple paybacks based on estimated energy savings and implementation costs, it is not recommended due to the maintenance cost associated with lack of standardization.

Interior Lighting Controls Upgrades:

Lighting controls upgrades were recommended based on providing additional energy savings and complying with the new Title 24 guidelines.

Title 24 requires that an occupancy sensor be installed in any room where lighting upgrades are implemented. To meet this requirement, occupancy sensors were included throughout the District with the two exceptions provided for in Title 24:

- If less than 40 fixtures are upgraded in a building, then the Title 24 requirements do not apply at all (This is typical for portable classrooms and other small buildings).
- Occupancy sensors are not required in electrical equipment rooms.

Title 24 also requires that multi-level control be provided on any fixtures that are upgraded, and that it must be at the fixture level (i.e., controlling every other fixture in a row or through a "checkerboard" or other pattern is not allowed). Title 24 allows for a minimum of one additional control step between on/off if the post-retrofit W/sf is less than 85% of the allowed W/sf. Full dimming control is required if the post-retrofit W/sf is greater than 85% of the allowed W/sf. The recommended strategy is to upgrade with low enough wattage retrofits to beat the 85% threshold so that dimming would not be required. This allows for the use of the existing dual circuits for inboard/outboard switching that exist in many District rooms. Where dual circuits did not exist, dimming upgrades and dimming controls to meet the multi-level control requirements were provided regardless of the W/sf achieved.

There are two exceptions to the multi-level controls requirement where these controls are not recommended:

- If less than 40 fixtures are upgraded in a building, then the Title 24 requirements do not apply at all (This is typical for portable classrooms and other small buildings).
- Not required in rooms less than 100 sf and with only one fixture with two or fewer lamps.

Title 24 requires daylight control in rooms with at least 24 sf of glazing. Applying daylight controls to existing lighting systems is difficult (and/or expensive) because the wiring layouts are unknown and Title 24 requires separate zones of control depending on the distance of the fixtures from the windows. Daylight control is not required however if the post-retrofit watts per square foot is less than 85% of the allowed watts per square foot. The recommended lighting upgrade strategy is beat the 85% threshold, eliminating the daylight control requirement. Although it may be beneficial to install daylight controls where there is abundant natural light, the difficult installation and lack of verifiable savings result in potentially long paybacks.

Exterior Fixture Upgrades:

Similarly, two options for exterior lighting retrofits were also considered. Both options rely heavily on new exterior LED fixtures and retrofit kits. The first option, which is recommended, is made up entirely of LEDs while the second option substituted florescent lamps in a few locations. Again, while the second option reduced the estimated implementation costs, the savings are also reduced while operations and maintenance are complicated due to reduction in standardization.

- ECM 2: Exterior lighting Option 1: 937 exterior fixtures would be retrofitted with new LED fixtures or retrofit kits.

ECM 3 – Plumbing Fixtures

The majority of the plumbing systems throughout the District already utilize low flow fixtures. There are some opportunities for improvement in water consumption through fixture replacement and sink flow restrictors. The following is a description of the plumbing upgrades recommended throughout the District.

432 flush valve toilets are recommended for replacement with high efficiency units to reduce water usage and limit the impact of anticipated water rate increases.

- 432 existing floor mount and wall mount flush valve toilets be replaced with new high efficiency 1.28 gpf china and piston flush valves.
- 18 existing floor mount and wall mount gravity-fed tank toilets be replaced with new 1.0 gpf pressure-assist tank toilets.
- 139 existing wall mount flush valve urinals be replaced with new high efficiency 0.125 gpf urinal china and piston flush valves.
- 10 existing floor mount flush valve urinals be retrofitted with new low flow 0.5 gpf piston flush valves.
- 344 existing staff and student restroom faucets be retrofitted with 0.5 gpm spray-type flow restrictors.

- 6 existing restroom faucets in nurse's offices be retrofitted with 1.0 gpm laminar type flow restrictors.

The current water and sewer rates in Davis are fairly low and therefore the paybacks associated with these projects are over 20 years. California is currently experiencing a drought, with much of Northern California feeling the brunt of its effects. Many smaller providers of water and sewer service throughout the region are beginning to implement voluntary, and in some cases mandatory, reductions in water usage by their customers. Several, including some providers within the greater Sacramento area, are looking to implement rate hikes to further encourage water conservation. Additionally, the City of Davis is set to increase water rates substantially over the next five years to pay for infrastructure improvements. Reduction in water usage will help reduce the impact of these factors on the future water utility costs to the District.

ECM 4 – HVAC Upgrades: Rooftop Unit Replacement

There are over 400 existing packaged roof top units located throughout the District that range in age from less than 10 years to over 30. Typical lifespan for these units is rated at 15 years by the CEC. While the units over 15 years old are still operating, it is recommended that they be replaced to curb rising operations and maintenance costs. Additionally, older units are less efficient than new designs.

Rooftop units at Patwin ES are the oldest in the District, averaging 23 years old.

The roof top replacement ECM includes estimated costs and savings for replacing all 409 existing units throughout the District. These numbers provide the maximum potential savings and cost associated with this project. If it is not feasible to replace all the units at the same time, it is recommended the oldest units are replaced first and newer units are replaced as resources become available. The following table lists the unit quantities and total capacities for each school and has been organized by average unit age to demonstrate the recommended prioritization of replacements.

Facility	Unit Count	Total Tons	Weighted Avg. Age
Patwin ES	23	67	23
Birch Lane ES	22	101	22
North Davis ES	20	102	22
Cesar Chavez ES	23	100	22
Da Vinci/Valley Oak	19	81	21
Fairfield ES	3	11	17
Willett ES	8	72.5	17

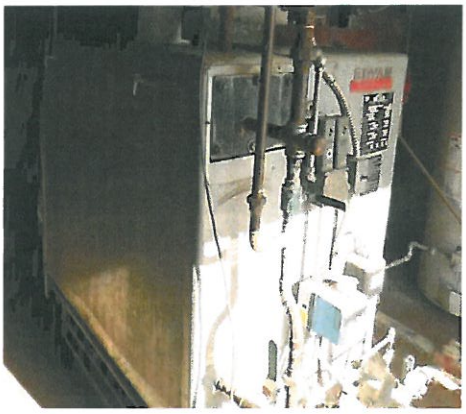
Facility	Unit Count	Total Tons	Weighted Avg. Age
Emerson JHS	32	197	16
Pioneer ES	26	129	15
DSIS/District Office	24	114	15
Holmes JHS	48	284	14
DSHS	99	573	14
Montgomery ES	14	74	12
Harper JHS	23	290	11
Central Kitchen & Ops	5	34	11
Korematsu ES	14	77	9
MLK HS	6	34	7

While the District's Facilities, Maintenance, and Operations staff has done a commendable job keeping the older units running, there is potential for energy savings and better unit reliability through the replacement of these units with new high efficiency units. The new units will heating and cooling efficiencies over the existing units, reducing the amount of energy required to condition these facilities.

In addition to the energy savings associate with new units, they will require less maintenance than existing units; new units should use "environmentally-sound" R-410a refrigerant, as opposed to the old units which use R-22 refrigerant. R-22 is being phased out due to its harmful effects on the ozone, and is becoming increasingly expensive and hard to acquire.

ECM 5 – HVAC Upgrades: DSHS 2-Pipe to Split-System Conversion

The 2-pipe heating and cooling system at Davis Senior High School, currently used to condition the Kitchen building and Building M, is over 40 years old. While the existing system provides adequate heating and cooling, the reliability and efficiency of the system is costing the District money in maintenance and excess energy consumption. There is an opportunity to improve the conditioning to these areas through the removal of this system and replacement with new packaged equipment. The existing hydronic fan-coils associated with the 2-pipe system should be replaced with split-system heat-pumps, which use electric direct-exchange (DX) heating and cooling.



The boiler serving the 2-Pipe system is over 40 years old and oversized for its use.

The existing system utilizes 2-pipe fan-coil units to provide heating and cooling. These coils are connected to an air-cooled chiller during cooling season, and a hot-water boiler during heating season.

This system, originally designed in 1960, has a number of issues from an operational, maintenance, and energy-consumption standpoint. These issues will be eliminated by this ECM:

- Only heating or cooling is available to all the rooms served by this system at any given time. Additionally, the original controls designed to switch between heating and cooling have failed, and the system must be manually switched from heating to cooling by District Facilities, Maintenance, and Operations staff. This can pose a significant challenge during the shoulder seasons, when large swings in weather can be experienced.
- The existing boiler and chiller are grossly oversized, as they were originally sized to condition the multi-purpose room, which has since been demolished. Boilers and chillers that are oversized to this degree will constantly operate at much lower than optimum efficiency.
- The system has exceeded its useful life.
- The existing system uses pneumatic controls, requiring the use of an air-compressor, which requires significant maintenance.
- Due to the age and condition of the system, the circulation pump must run 24/7 to ensure that sediment in the loop doesn't settle-out and plug control valves. This consumes a significant amount of power over the course of the year.

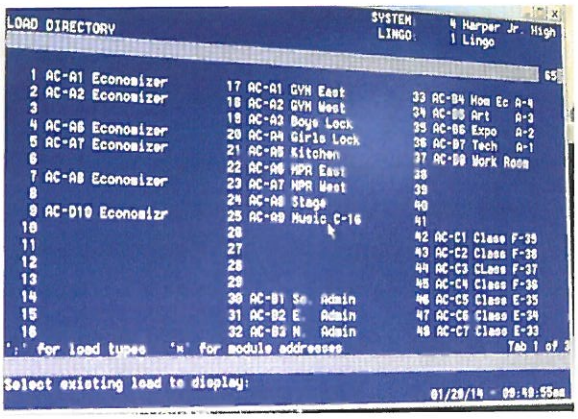
In addition to the five (5) fan-coil units recommended for replacement, there is a small hydronic convector in the Building M office, also served by the 2-pipe system. It is recommended that this convector be replaced with an electric baseboard heater, ensuring that there is adequate heating available in the office.

In order to ensure proper air-balance in the kitchen, and further decrease energy consumption, it is recommended that a small type-II exhaust hood with dedicated make-up air unit be installed to serve the existing gas convection oven. This will allow the large existing exhaust hood to remain off.

The end result of this project will be efficient, controllable, and properly sized HVAC equipment for the Kitchen building and Building M at Davis Senior High School.

ECM 6 - Upgrade Building Automation System

The existing District-wide Novar EMS is becoming a burden on the District as replacement parts and trained technicians are becoming harder to find. While the District does a commendable job operating this system to minimize HVAC energy consumption, maintaining the system is going to become more and more expensive, time-consuming and difficult as it gets older and older. Additionally, the system is proprietary, limiting flexibility in selecting new parts or additions to the system. It is recommended that the system be replaced with a new open protocol system that will reduce



The existing EMS is labor intensive and proprietary. Replacement are getting harder to find and more expensive as the system gets older.

operations and maintenance load and provide flexibility for new additions and upgrades going forward. While energy savings for a new EMS are severely limited by the District's current tight controls of building operation in the existing system, the new system will provide operational, maintenance and comfort benefits.

The new network will enable the District to more easily monitor, schedule, and adjust HVAC equipment operation to optimize energy efficiency and occupant comfort. The web-based design of a new system will enable authorized District staff to log in to the network via a password protected gateway and utilize all of the new EMS functionality from any location in the world with internet access. The web-based system would be hosted on a new server/workstation and contain graphics and a database that continuously monitor and respond to each school's conditions and hardware. Similarly, alarming capabilities will be included to notify the appropriate District personnel of any problems via email or text message.

The graphical interface of the recommended new EMS will include custom-programmed schematics of building floor plans and animated equipment layouts. The floor plans will contain thermographs assigning different colors to different rooms depending on their temperature. Equipment layouts will depict set point values and measured values for each piece of equipment. The existing control end-devices (valve and damper actuators that are controlled by the system, etc.) will be replaced with new digital end devices supervised by the web-based EMS.

The resulting system would provide significant improvements in operations and maintenance issues going forward and eliminate the issues created by utilizing a proprietary network.

4.4 Impractical Measures

From the original ASHRAE Level 2 comprehensive list of typical ECMs, the following measures were considered but deemed to be impractical.

Potential Measure	
High efficiency florescent lighting	Title 24 regulations require the use of LED lighting in most areas, while florescent lighting could be used in some areas, incorporating florescent into the lighting design would result in a patchwork of various lighting systems across rooms, creating operations and maintenance issues.
EMS-based lighting controls	Potential savings will be captured through occupancy and daylighting controls.
Low flow showerheads	Limited shower use on District campuses.
Ice-maker retrofits	The District does not have ice-makers.
Kitchen pre-rinse sprayers	The kitchen pre-rinse sprayers are low flow.
Cooling tower water re-use and deduct meters	The District does not have cooling towers.

Potential Measure	
Weather-based irrigation controls	Irrigation is already being curtailed drastically.
Building envelope improvements	Building envelopes throughout the District are in good shape. Minimal building usage during night time and middle of summer reduces savings opportunities for building envelope improvements.
Trash compaction	The District has been aggressive about right sizing bins, so there are not cost-saving opportunities as compared to cost of the measure.
Vending machine controls	Vending machines throughout the District are already being controlled to turn off during school hours.
Premium-Efficiency motors and variable speed pumping	No large motors or pumps throughout the District.
Domestic hot water systems	Limited hot water usage throughout the District.
Information Technology (IT) equipment	Desktop power management software is already in use by District.
Renewable Energy Generation	While there is potential for further solar energy generation, the District is not currently interested in expansion of PV generation.
Utility bill evaluation for anomalies	No anomalies identified.
Tariff evaluation (electric, natural gas, water/sewer)	No rate savings opportunities identified.
Time-of-use (TOU) analysis	District has already been switched to time of use rates.
Meter consolidation	No opportunity for meter consolidation savings identified.
Irrigation deduction metering	Irrigation is already being curtailed drastically during metering periods.

4.5 Proposition 39 Process

Once the District and Implementation Contractor agree on the scope of work, the next step is to develop a Proposition 39 Energy Expenditure Plan to submit to the CEC.

The Eight-Step Funding Pathway Example for applying for and receiving Proposition 39 funds is provided in the Program Implementation Guidelines provided by the CEC. This report provides the

information required for Steps 1 through 6 for the District. To complete the final two steps, ECMs that meet the Proposition 39 criteria and roughly match the anticipated Proposition 39 allocation for the District must be selected and included within the District's Energy Expenditure Plan. The following table outlines the steps in the process.

Step	Title	Description
1	Electric Gas Usage/Billing Data	Provide the CEC utility data and billing records.
2	Benchmarking	Provide the EUI for each school site receiving Prop 39 funding.
3	Energy Project Prioritization Considerations	Certify that the District considered the 11 Project Prioritization Factors provided by the CEC.
4	Sequencing of Facility Improvements	Suggests prioritizing energy efficiency projects over renewable solutions.
5	Energy Project Identification	Choose one of 3 options to identify energy projects; the District may use an energy survey completed within the past 3 years.
6	Cost Effectiveness Determination	All projects included in the Plan must meet the bundled minimum savings to investment ration (SIR) of 1.05 to be approved for an award.
7	Complete Energy Expenditure Plan	Include the following: • Energy Planning Funds, including a description of their use and breakdown of expenditures. • Consent for utility release forms (Step 1) • Benchmarking EUI (Step 2) • ECMs, including estimated energy savings and project cost of each (Step 5) • Energy Training request • Energy Manager request • Job Creation Benefits
8	Project Tracking and Reporting	Requires a final report 12-15 months after the completion of the eligible energy projects.

NORESCO
United Technologies

5.0 APPENDIX - SUPPORTING INFORMATION

5.1 Utility Bill Analysis

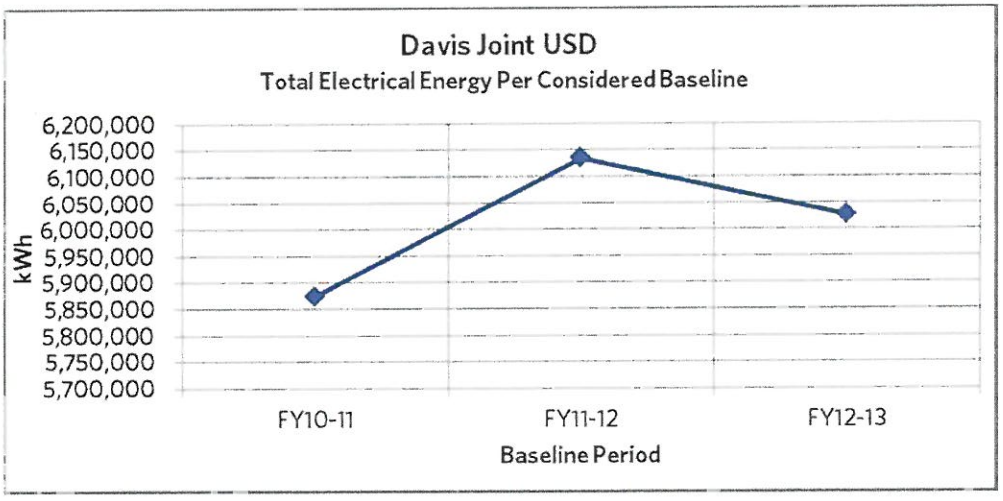
The District's electricity, natural gas, water and trash bills were provided and reviewed for August 2010 through August 2013. The data shows that the District currently spends over $1.5 million dollars annually for utilities. Approximately 66% of this cost is from electricity. Further analysis of the electric usage and costs for Fiscal Year 2012-2013 including individual meter usage, equipment loads and tariffs are described below.

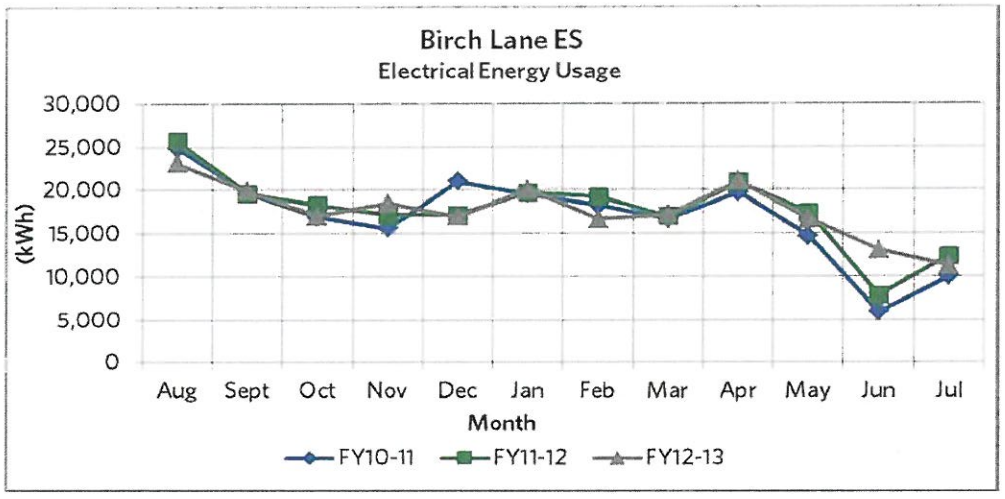
Utility	District Utility Usage (common units)	Site Utility Use (equivalent units)	District Utility Costs ($)	% of Costs
Electricity	6,025,891 kWh	20,560,339 Btu	$1,039,289	66%
Natural Gas	110,385 therms	11,038,500 Btu	$99,313	6%
Water/Sewer	135,726 ccf	N/A	$355,789	23%
Trash	608 loads	N/A	$84,686	5%

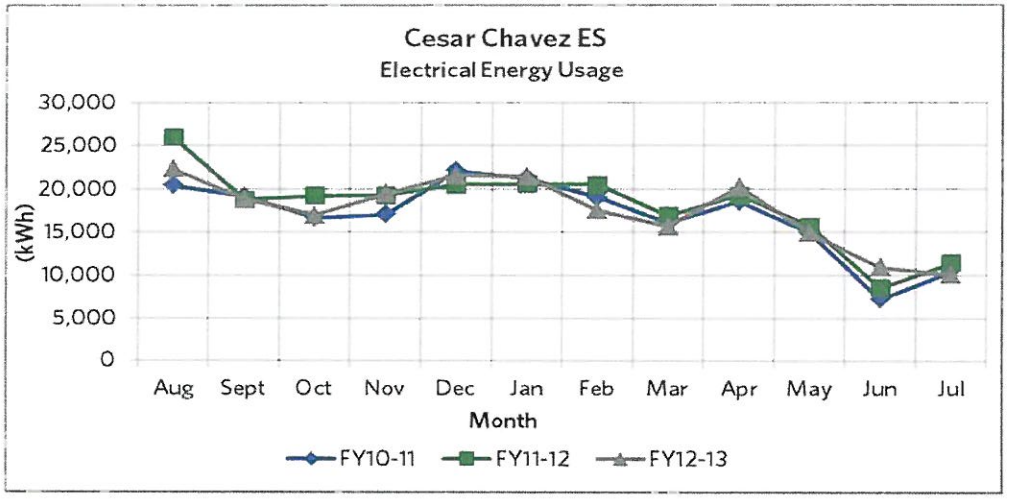
Electricity Usage

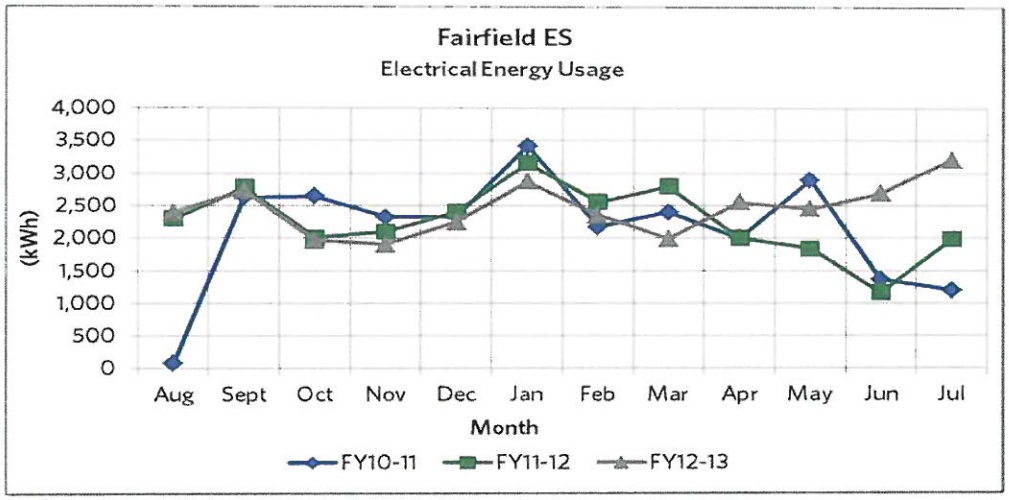
Electricity is provided to the District by both PG&E and three solar photovoltaic installations. The PG&E-purchased electrical energy is delivered through multiple transformers and meters. A total of 25 meters register electrical usage throughout the District's 17 campuses. The electricity produced by the photovoltaic systems is transformed and fed into the system. Separate meters on the PV systems measure the electricity provided by the system. The three schools with PV utilize net metering tariffs that allow the total annual generated energy to be subtracted from the total site use on corresponding PG&E bills. The photovoltaic energy is paid for on a separate bill through a power purchase agreement.

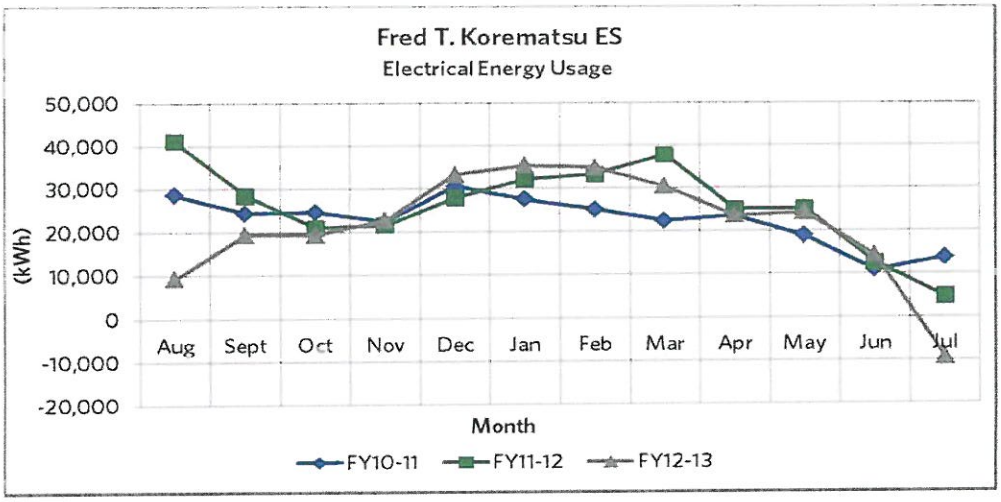
NORESCO analyzed the total monthly energy usage at these meters for the three year period. As the charts show, the consumption varies monthly. However, on an annual basis, consumption increased in 2012 and decreased slightly in 2013. Over the last three years there has been a net increase in electricity consumption.

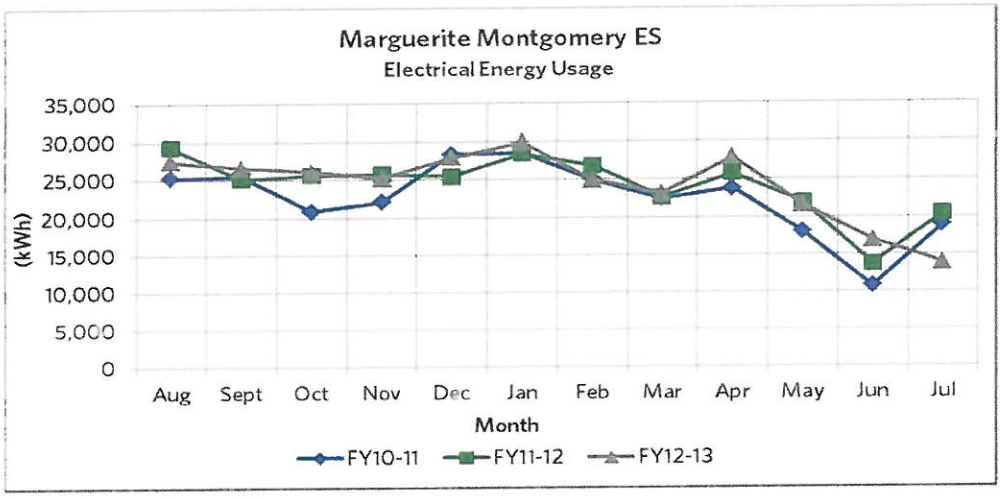

Davis Joint USD
Total Electrical Energy Per Considered Baseline
6,200,000
6,150,000
6,100,000
6,050,000
6,000,000
5,950,000
5,900,000
5,850,000
5,800,000
5,750,000
5,700,000
kWh
FY10-11
FY11-12
FY12-13
Baseline Period

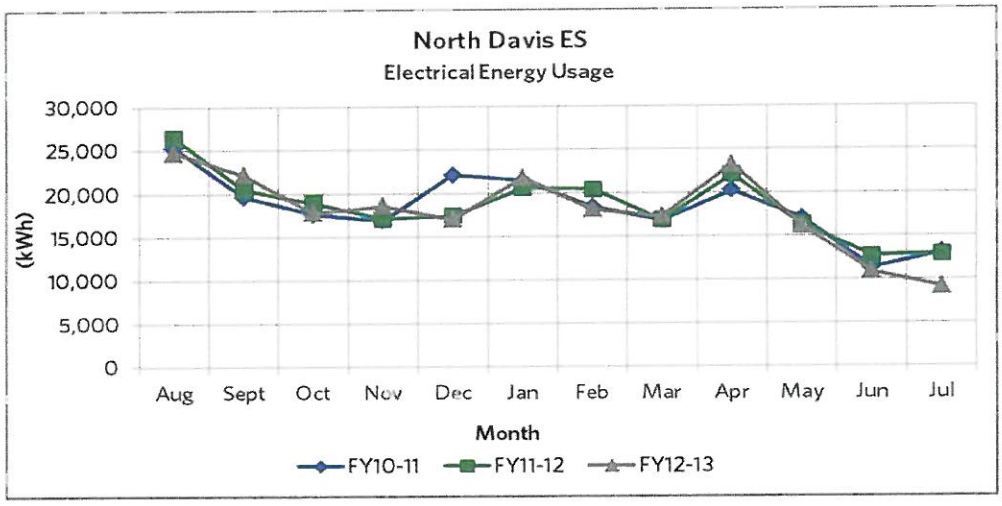

Birch Lane ES
Electrical Energy Usage
30,000
25,000
20,000
15,000
10,000
5,000
0
(kWh)
Aug
Sept
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Month
FY10-11
FY11-12
FY12-13

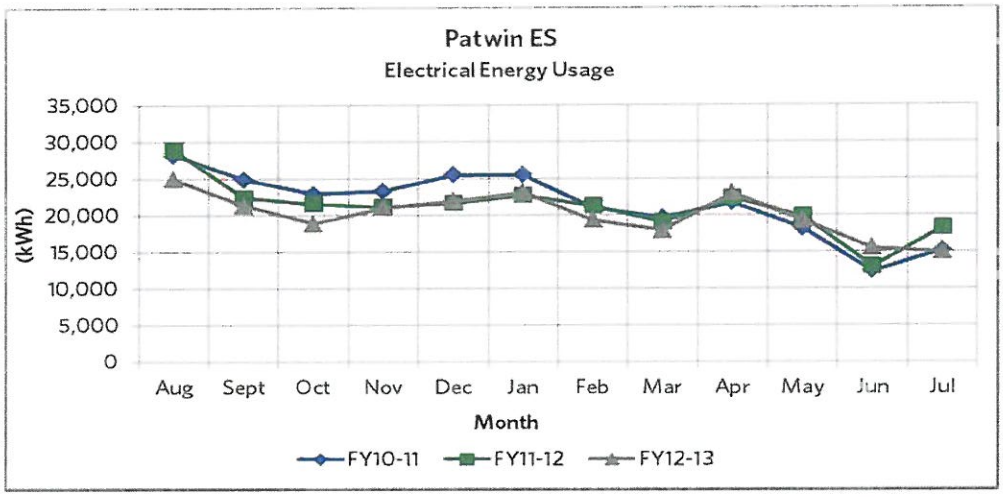

Cesar Chavez ES
Electrical Energy Usage
30,000
25,000
20,000
15,000
10,000
5,000
0
(kWh)
Aug
Sept
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Month
FY10-11
FY11-12
FY12-13

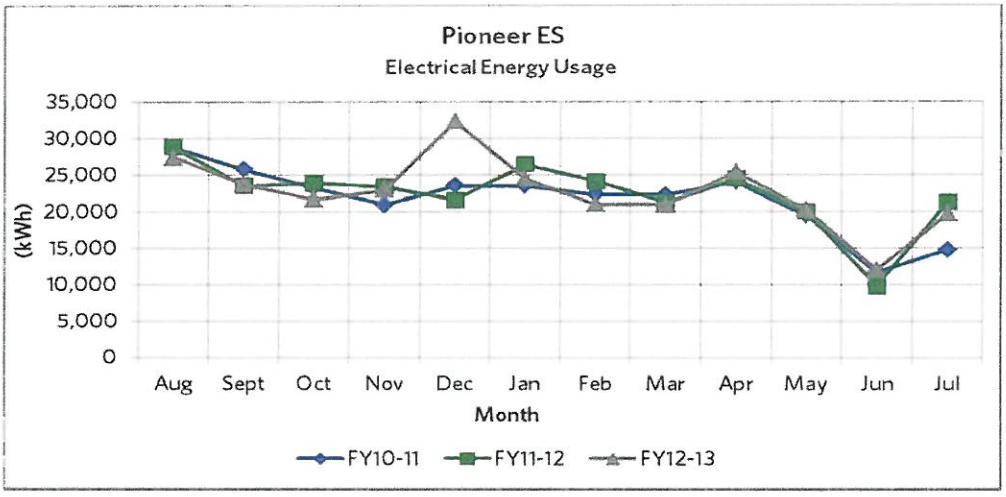

Fairfield ES
Electrical Energy Usage
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
(kWh)
Aug Sept Oct Nov Dec Jan Feb Mar Apr May Jun Jul
Month
FY10-11 FY11-12 FY12-13

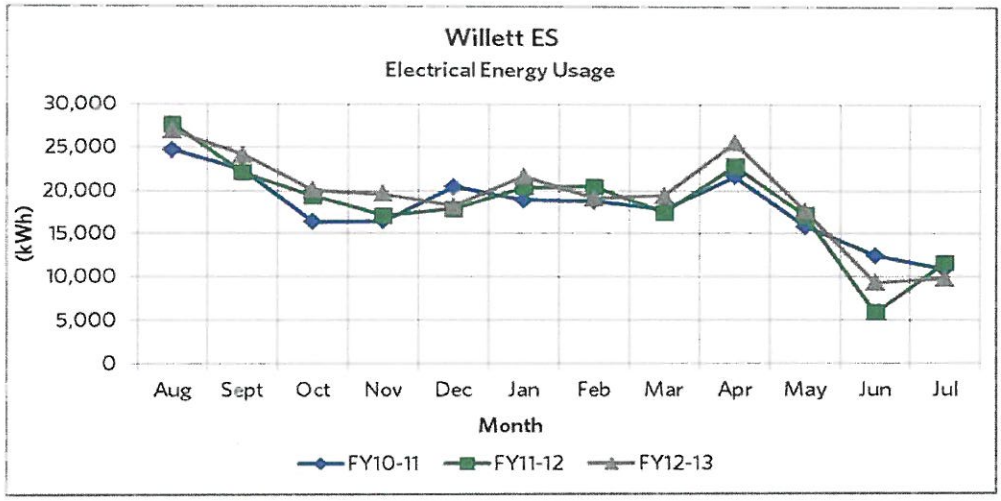

Fred T. Korematsu ES
Electrical Energy Usage
50,000
40,000
30,000
20,000
10,000
0
-10,000
-20,000
(kWh)
Aug Sept Oct Nov Dec Jan Feb Mar Apr May Jun Jul
Month
FY10-11 FY11-12 FY12-13


Marguerite Montgomery ES
Electrical Energy Usage
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
(kWh)
Aug Sept Oct Nov Dec Jan Feb Mar Apr May Jun Jul
Month
FY10-11 FY11-12 FY12-13


North Davis ES
Electrical Energy Usage
30,000
25,000
20,000
15,000
10,000
5,000
0
(kWh)
Aug Sept Oct Nov Dec Jan Feb Mar Apr May Jun Jul
Month
FY10-11 FY11-12 FY12-13


Patwin ES
Electrical Energy Usage
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
(kWh)
Aug Sept Oct Nov Dec Jan Feb Mar Apr May Jun Jul
Month
FY10-11 FY11-12 FY12-13


Pioneer ES
Electrical Energy Usage
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
(kWh)
Aug Sept Oct Nov Dec Jan Feb Mar Apr May Jun Jul
Month
FY10-11 FY11-12 FY12-13


Willett ES
Electrical Energy Usage
30,000
25,000
20,000
15,000
10,000
5,000
0
(kWh)
Aug
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Oct
Nov
Dec
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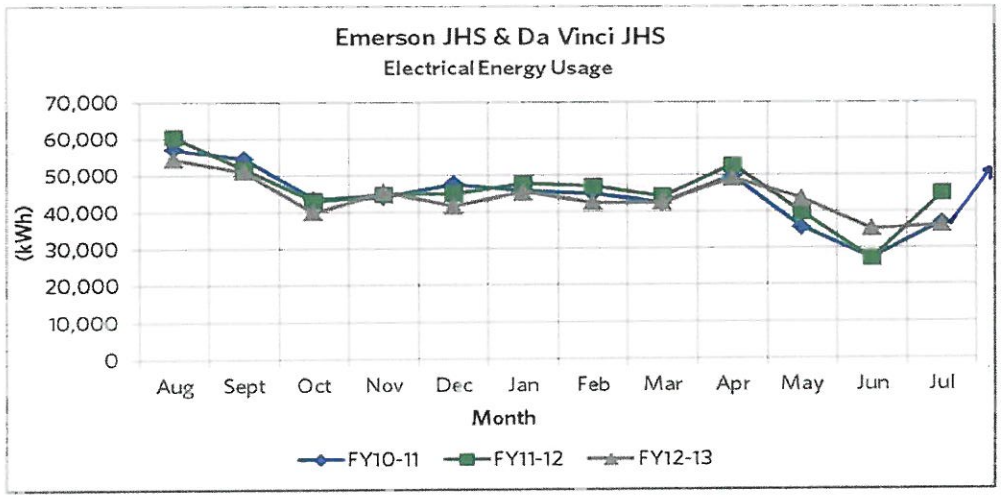
FY11-12
FY12-13


Emerson JHS & Da Vinci JHS
Electrical Energy Usage
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
(kWh)
Aug
Sept
Oct
Nov
Dec
Jan
Feb
Mar
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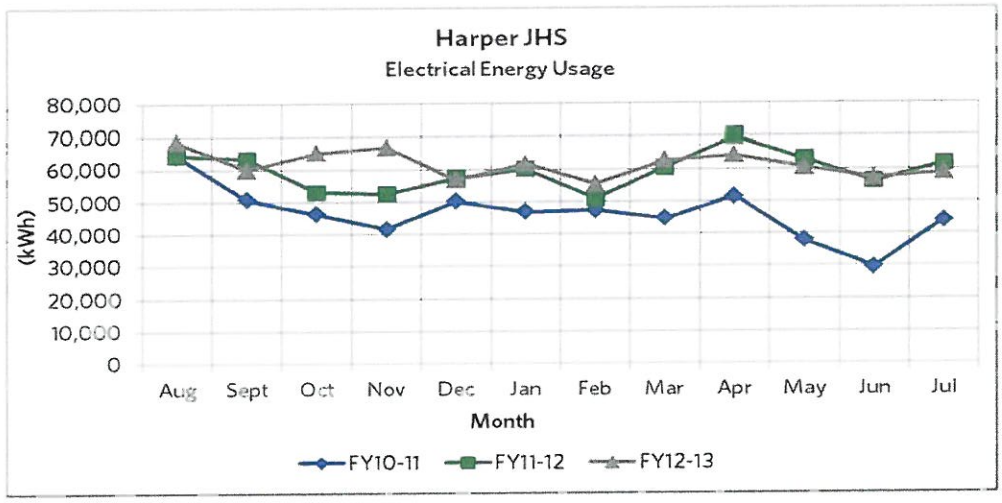
FY11-12
FY12-13


Harper JHS
Electrical Energy Usage
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
(kWh)
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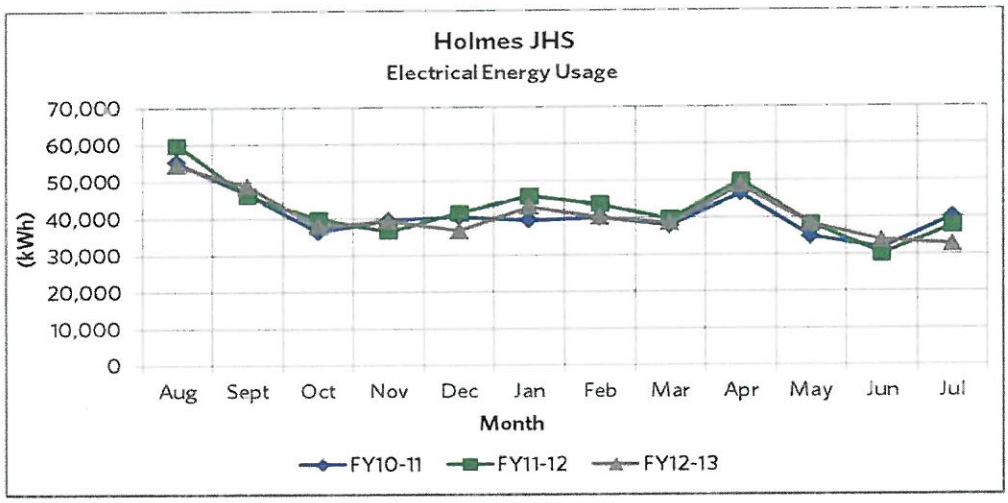
FY12-13


Holmes JHS
Electrical Energy Usage
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
(kWh)
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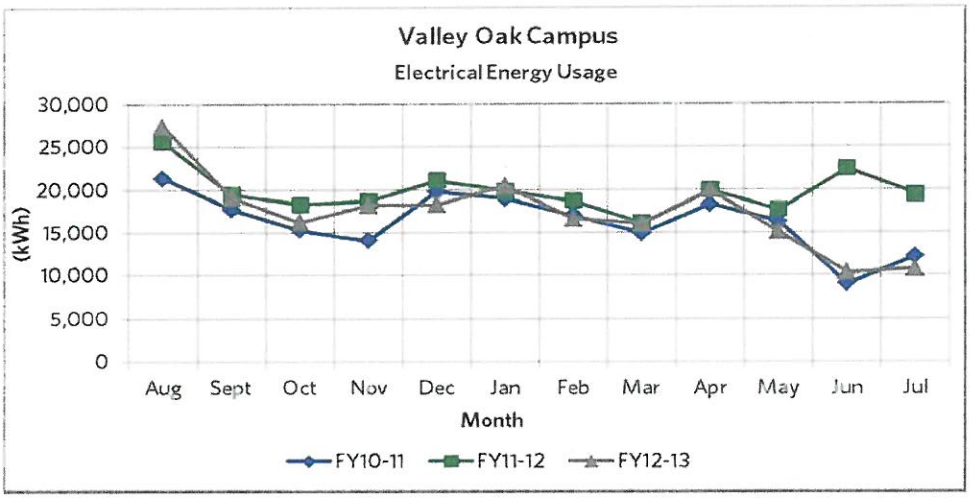
FY12-13


Valley Oak Campus
Electrical Energy Usage
30,000
25,000
20,000
15,000
10,000
5,000
0
(kWh)
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Mar
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Jun
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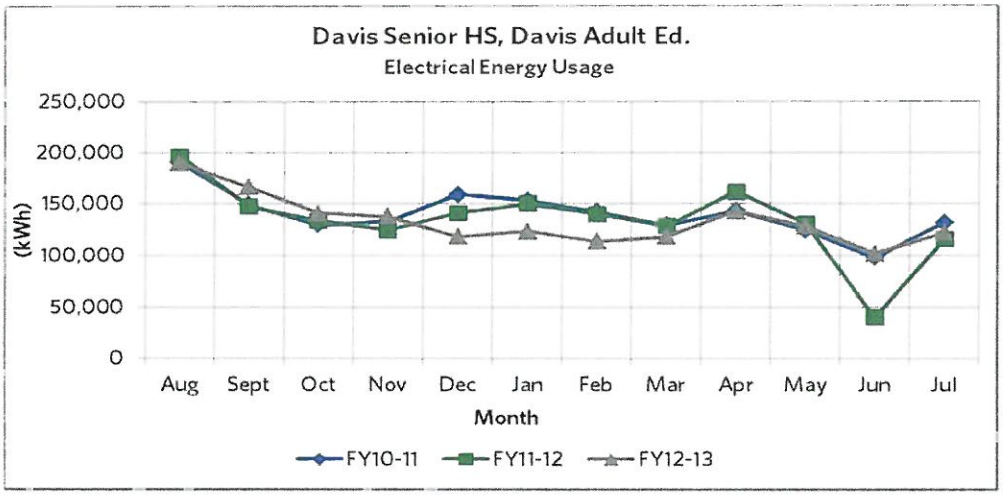
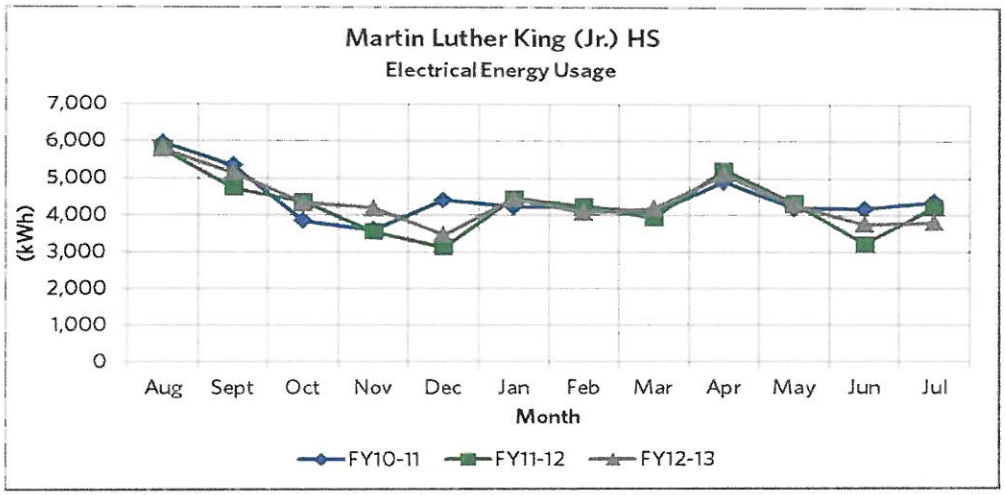
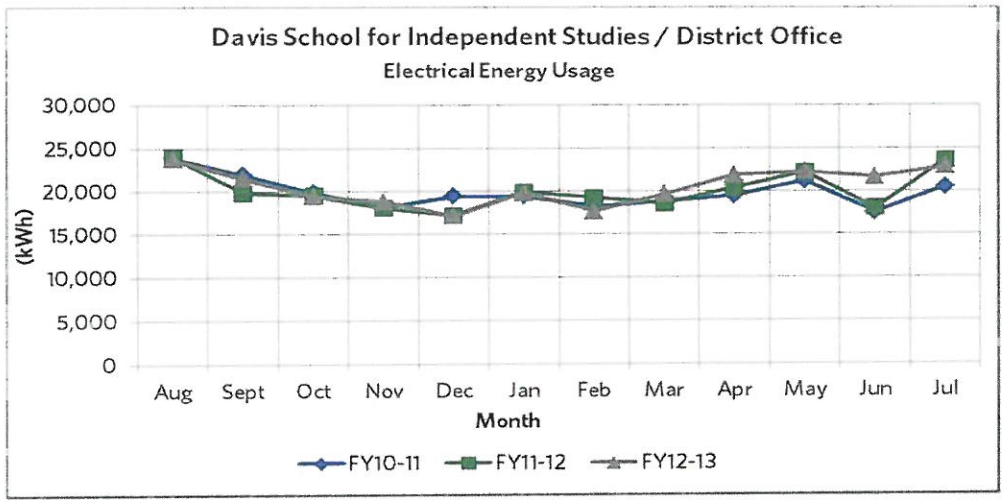
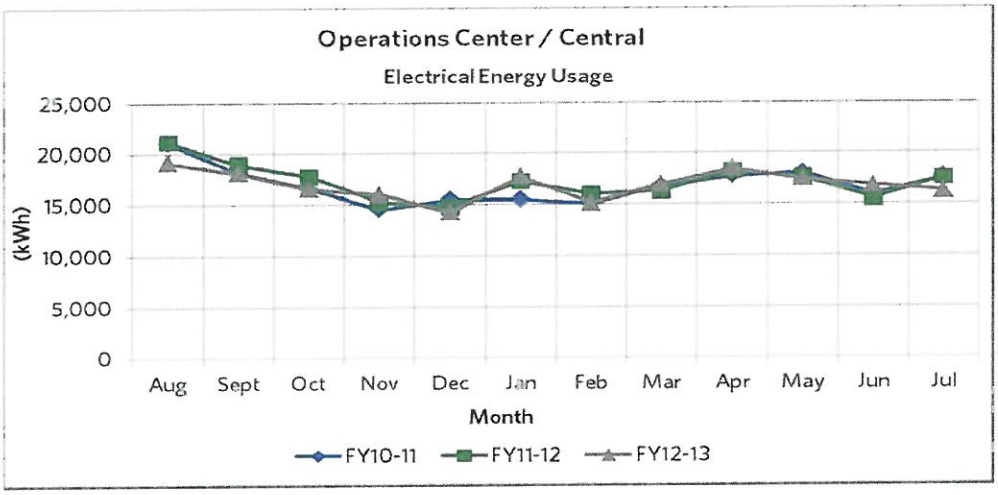
FY10-11
FY11-12
FY12-13


Davis Senior HS, Davis Adult Ed.
Electrical Energy Usage
250,000
200,000
150,000
100,000
50,000
0
(kWh)
Aug
Sept
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Month
FY10-11
FY11-12
FY12-13


Martin Luther King (Jr.) HS
Electrical Energy Usage
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
(kWh)
Aug Sept Oct Nov Dec Jan Feb Mar Apr May Jun Jul
Month
FY10-11 FY11-12 FY12-13


Davis School for Independent Studies / District Office
Electrical Energy Usage
30,000
25,000
20,000
15,000
10,000
5,000
0
(kWh)
Aug Sept Oct Nov Dec Jan Feb Mar Apr May Jun Jul
Month
FY10-11 FY11-12 FY12-13


Operations Center / Central
Electrical Energy Usage
25,000
20,000
15,000
10,000
5,000
0
(kWh)
Aug Sept Oct Nov Dec Jan Feb Mar Apr May Jun Jul
Month
FY10-11 FY11-12 FY12-13

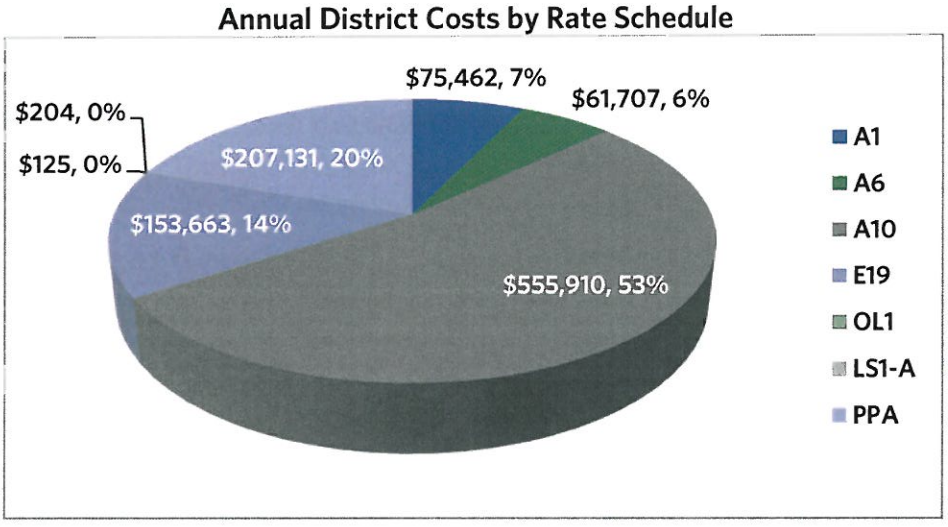
The consumption data is relatively consistent for each school over the past three years of historical electrical energy usage. Consumption remains relatively consistent throughout the year considering the District is not in session several months of the year.

Electricity Rate Schedules

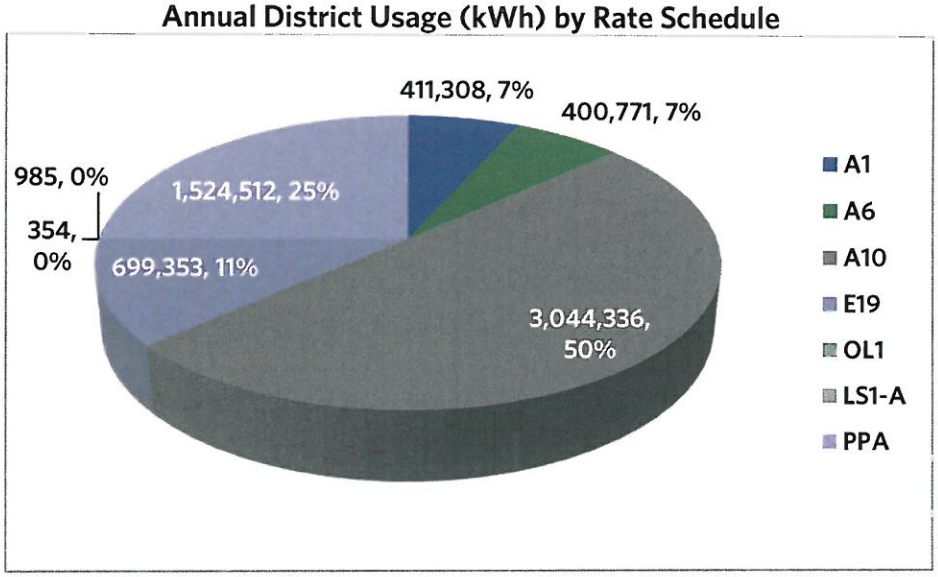
The District is served by a total of 25 electric accounts. All but three of these accounts fall under a specific PG&E rate tariff based on the amount of kWh consumed in a given month and/or the peak kW in a given month. Three schools (Davis Senior HS, Harper JHS, and Korematsu ES) have independent solar PPAs and thus are subject to NEMEXP PG&E schedules. Davis Senior HS is billed at an E19 schedule rate, while Harper JHS and Korematsu ES are billed at the A6 rates for usage that exceeds their solar generation contracts.

About 44% of the electric accounts are billed under Schedule A10, as shown in the table below. Schools under the A1 and A6 schedules represent 14% of the total energy consumed and 13% of the total District electric costs. The 3 schools with PPAs spend 20% of the overall electric utility costs on 25% of the District's usage. The following table includes a breakdown of electric utility accounts.

PG&E Rate Schedule	# of Accounts	Annual kWh	Annual Cost
A1	5	411,308	$75,462
A6	3	400,771	$61,707
A10	11	3,044,336	$555,910
E19	1	699,353	$153,663
OL1	1	354	$125
LS1-A	1	985	$204
PPA	3	1,524,512	$207,131



Electricity purchased on Schedule A10 represents 53% of total District electrical costs; the next highest cost is for electricity purchased through the PPA agreements accounting for another 20%.



Despite having 24% of District electric accounts on Schedules A1X, A6 TOU, LS1-A, and OL1, they account for less than 1% of total electrical usage because of lower usage limits.

A brief description of each rate schedule is provided below.

Schedule A1- Small General Service - As of November 2012, this rate schedule is closed to customers with a maximum demand of 75 kW or greater for three consecutive months or usage that exceeds 150,000 kWh per year.

Schedule A6- Small General Time of Use Service - Customers with a maximum demand of 200kW or greater for three consecutive months must have an interval data meter than can be read remotely. Customers who fail to exceed 199kW for 12 consecutive months may elect a non-time-of use rate schedule.

Schedule A10 - Medium General Demand Metered Service - is a demand metered rate schedule for customers whose maximum demand will be between 200 and 499 kilowatts. If a customer's demand exceeds 499 kW for 3 consecutive months, the account will be transferred to Schedule E-19 or E-20.

Schedule E19 - Medium General Demand Metered TOU Service - is a demand metered rate schedule for customers whose maximum demand is between 500kW and 999kW. There is a 200kW or greater provision of this schedule and customers who fail to exceed 199kW for 12 consecutive months may elect to stay on the TOU of this schedule or elect an applicable non-TOU use rate schedule.

Schedule OL-1 - Outdoor Area Lighting Service - is applicable to outdoor area lighting service for the illumination of areas where street and highway lighting schedules are not applicable and where PG&E installs, owns, operates and maintains the complete lighting installation.

Schedule LS1-A - PG&E Owned Street and Highway Lighting - is applicable to PG&E-owned and maintained lighting installations which illuminate streets, highways and other outdoor ways.

Schedule NEM EXP - Net Energy Metering Service For Small Customers- is applicable to a customer who uses a Renewable Generation Facility with a capacity between 30kW and 1,000 kW that is intended to primarily offset part or all of the customer's own electrical requirements. For the purposes of this analysis, NEMEXP rate schedules have been labeled as the rate schedule at which their usage is charged. (ie. E-19 or A-10)

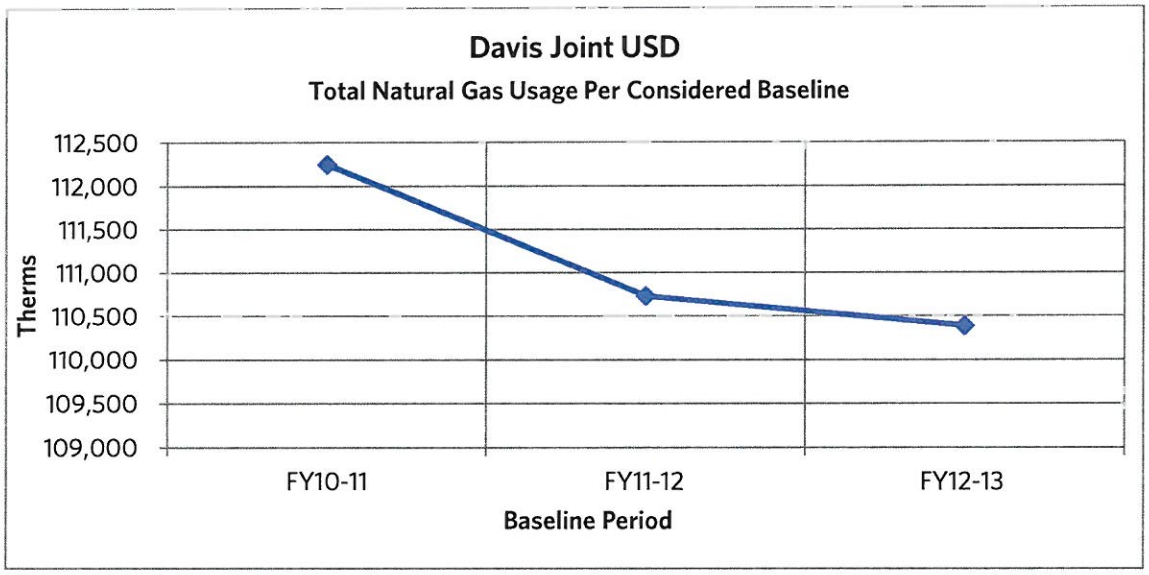
Schedule E-SRG - Small Renewable Generator PPA- This is an optional schedule for customers that have an effective renewable energy resource of less than 1.5 MW.

PPAs- The District purchases power generated by the solar photovoltaic installations through power purchase agreements. The system are owned by a third party who sells the electricity to the District. These agreements have set electrical costs and annual escalation rates going forward 20 years. At the end of the agreement, the District may purchase these solar systems at a contract price.

Natural Gas Usage

PG&E provides natural gas to the District. A total of 17 meters register gas usage throughout the District's 17 campuses.

NORESCO analyzed the total monthly energy usage at these meters for the most recent three year period. As the chart shows below, on an annual basis, consumption has been declining across the District over the last 3 years potentially due to better scheduling of HVAC systems through the central energy management system.



Natural Gas Rate Schedules

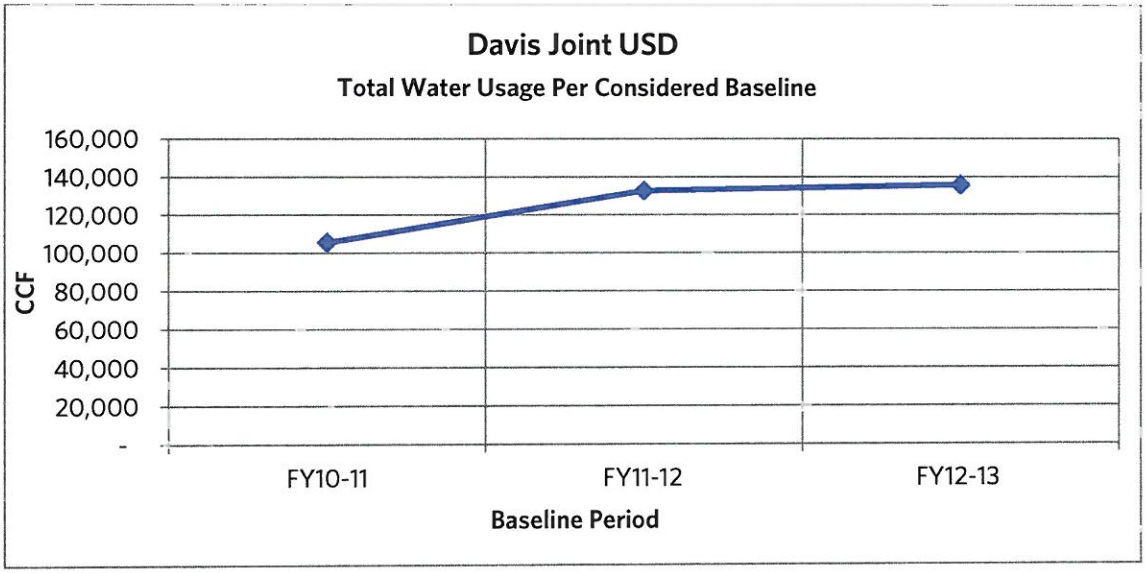
There are a total of 17 gas accounts. All 17 accounts are billed under the GNR1 rate schedule.

Schedule GNR1- Gas Service to Small Commercial Customers- Average monthly use must not exceed 20,800 therms. Customers on this schedule pay a Customer Charge, a Procurement Charge and a Transportation Charge per meter.

Water/Sewer Usage

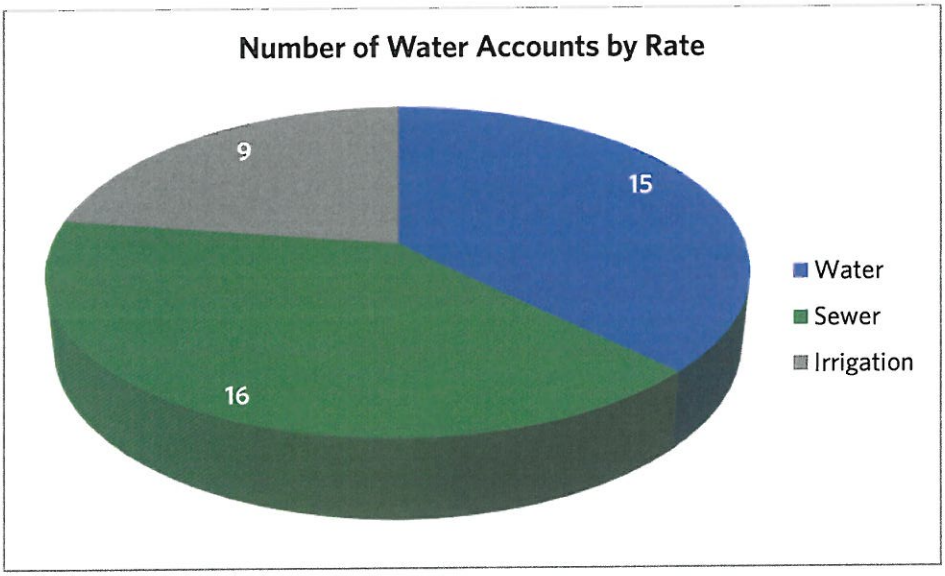
The City of Davis provides water, sewer and irrigation services to the District. A total of 40 meters register water, sewer or irrigation usage throughout the District's 17 campuses.

NORESCO analyzed the total monthly energy usage at these meters for the most recent three year period. As the chart shows below, on an annual basis, consumption has been increasing across the District over the last 3 years.

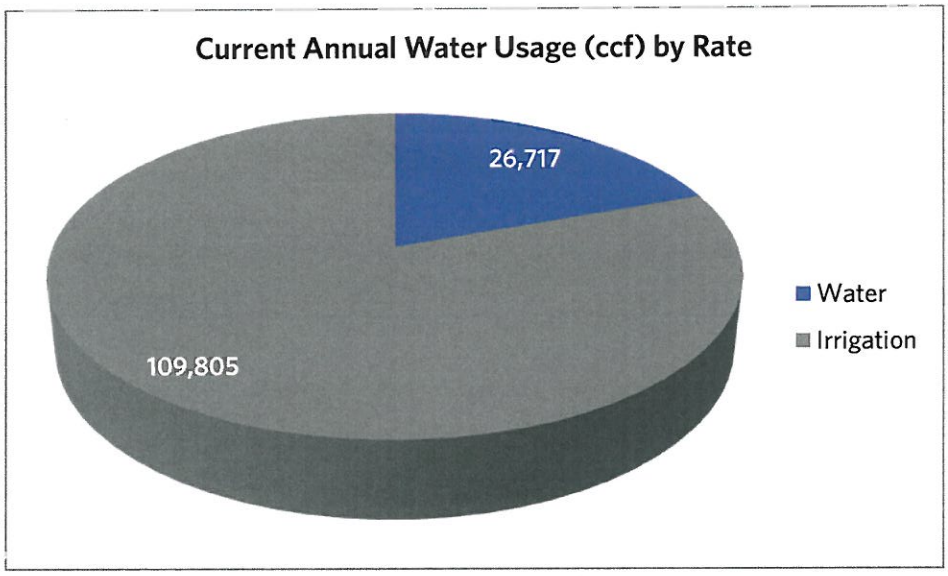


Water/Sewer Rate Schedules

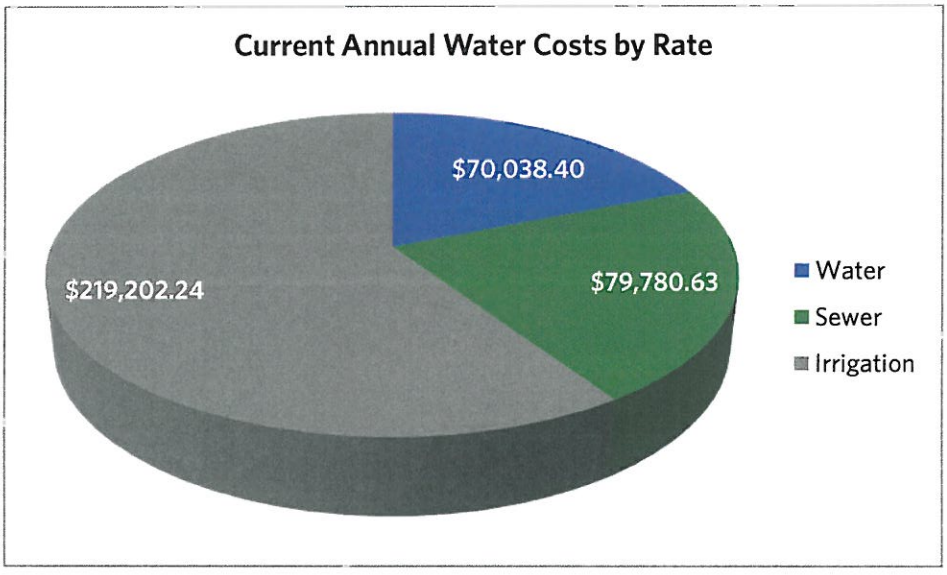
There are a total of 40 water, sewer and irrigation accounts. As can be seen in the following graph, 15 accounts are water, 16 accounts are sewer and 9 accounts are irrigation rate schedules.



Although irrigation represents the least number of accounts and sewer represents the most, irrigation usage is highest. In the graph below sewer is not show,. The water and sewer accounts actually share the same meter and the usage is recorded on the water account. Water is billed by monthly usage, while sewer is billed at the same amount throughout the year, and is calculated depending on what the District's usage was from November through February. During those months, little if any water is dedicated to irrigation purposes, so all water, in effect, is coming back to the City of Davis for treatment. Therefore it is assumed, as an educational facility operating relatively consistently the remainder of the year, that the winter sewer usage of the District remains the sewer usage throughout the rest of the year.



Annual irrigation costs are also much higher than water and sewer costs combined. However, per ccf (100 cubic feet), water and sewer rates are higher.

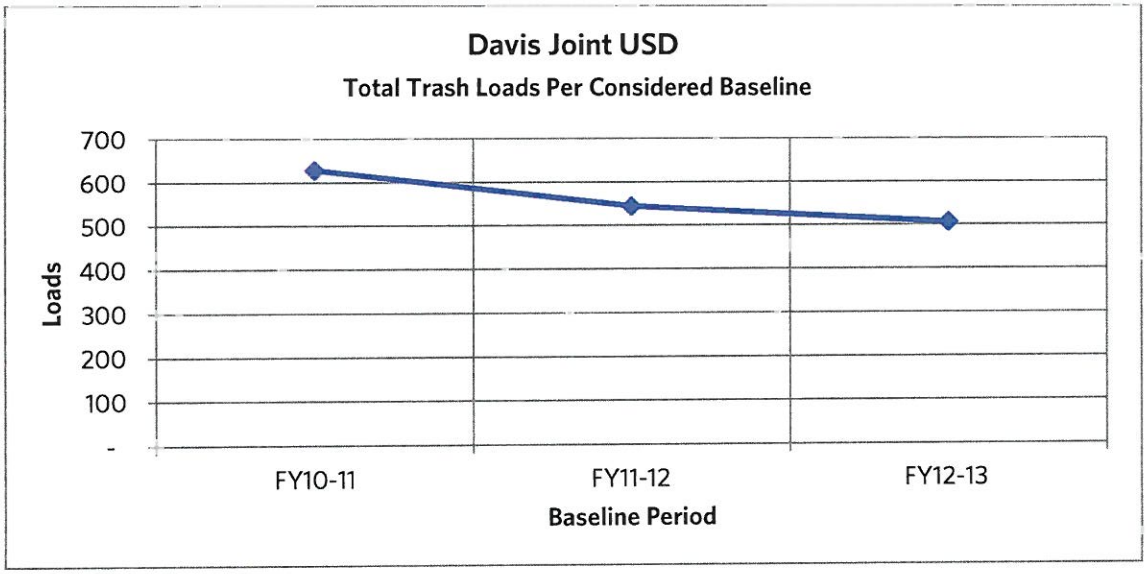


NORESCO
United Technologies

Trash Usage

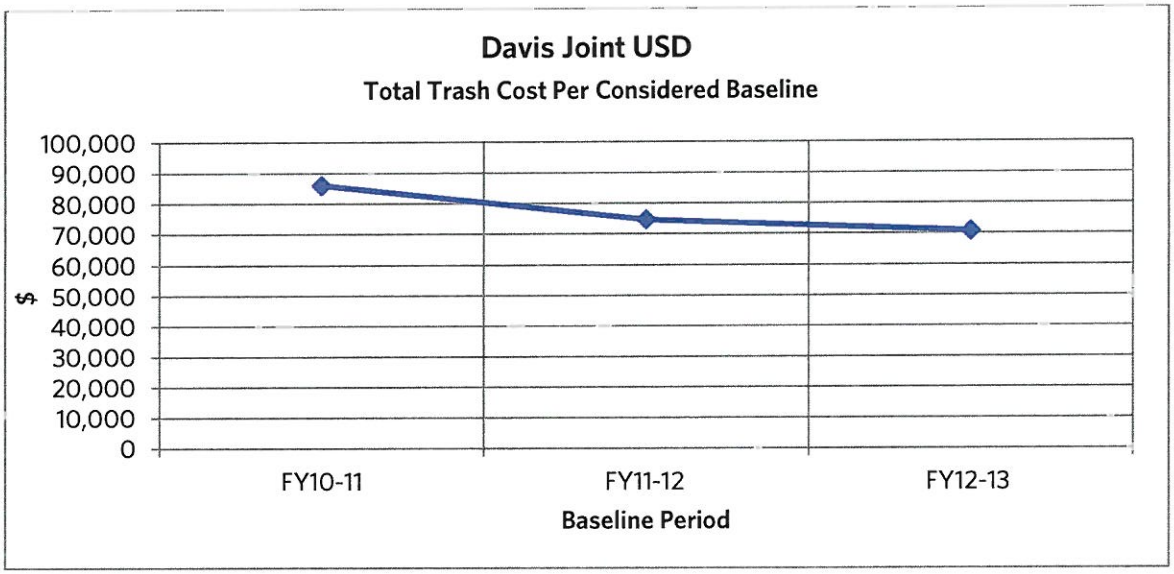
The Davis Waste Removal provides refuse services to the District. Currently, the District has about 500 trash load pickups per year.

NORESCO analyzed the total monthly usage for the three year period. As the chart shows below, on an annual basis, consumption has been declining across the District over the last 3 years. The Davis RISE (Recycling is Simply Elementary) program, a partnership between Davis Waste Removal, Davis Farm to School, the City of Davis, and the District, has been effectively implementing recycling programs throughout the District to reduce the solid waste stream at all District campuses. Correspondingly, the District's Facilities, Maintenance, and Operations teams have been aggressively right sizing bins over the past several years to continue to lower costs.



Trash Rate Schedule

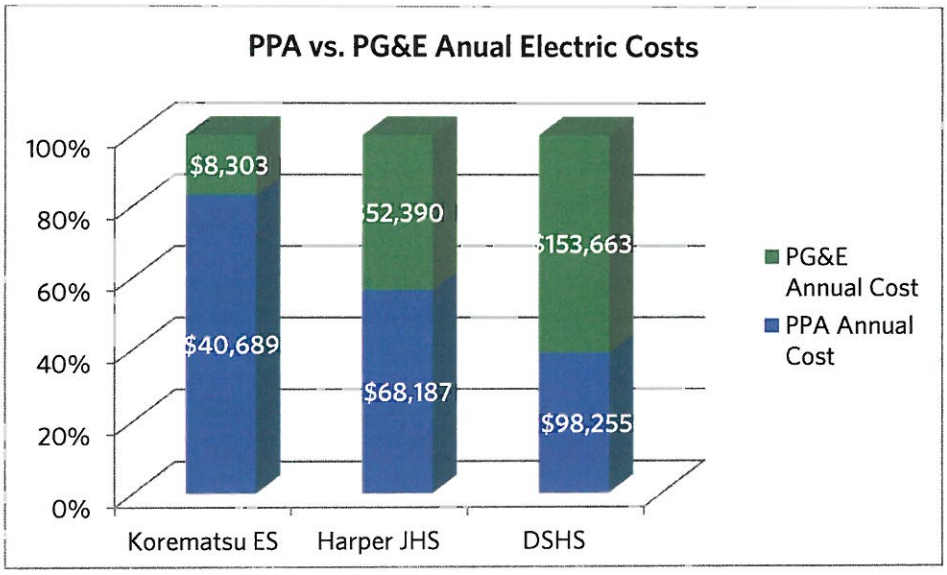
The District is charged for trash based on the size of their bins and the number of loads required per site. As can be seen in the graph below, annual trash costs have been declining with the annual trash usage.



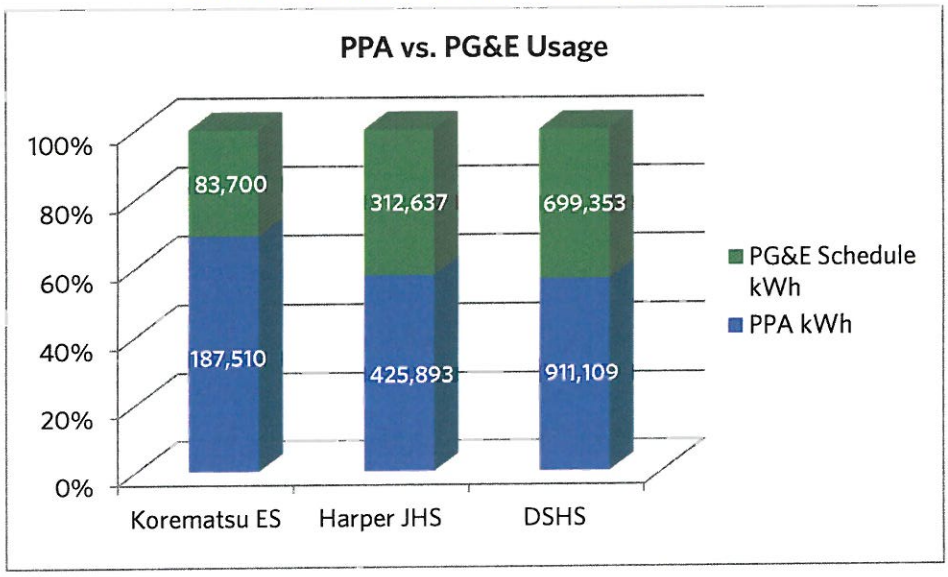
Energy Conservation Limitations at Schools with Power Purchase Agreements

Korematsu Elementary, Harper Junior High, and Davis Senior High School purchase the majority of their electricity through power purchase agreements. Energy that is generated by the on-site photovoltaic systems is sold to the District at an agreed upon rate. Additional energy consumed by these schools is provided by PG&E. The PG&E bill is 'trued-up' annually, and is the difference between the total energy consumed at each school site and the total energy produced by its corresponding PV system. If the solar systems produce more energy at their respective school than is consumed, PG&E typically only pays the District for their over-generation of electricity $0.03-0.04 per kWh. This is well below the purchase rate for these schools. As a result, energy conservation projects are strongly limited in savings to only the energy that is currently purchased from PG&E. The baseline PG&E usage that sets the maximum cost effective savings values for these sites are:

- Korematsu ES – 83,700 kWh or $8,303
- Harper JHS – 312,637 kWh or $52,390
- Davis SHS – 699,353 kWh or $153,663



Despite the minority of electrical energy to Davis Senior HS coming from PG&E, the E-19 PG&E rate schedule still allows for significant savings opportunity.



All 3 schools are provided more than 50% of their electrical energy through their solar PPAs.

When the energy usage at the three schools with PPAs is compared to their respective electric costs, it is apparent that the rate each school is billed at through PG&E will affect the cost-effectiveness of ECMs. Davis Senior HS, for example, has a much greater potential for PG&E electrical savings that can be used towards retrofit projects than Korematsu ES.

Rate Escalation

The future escalation of utility rates plays an important role in planning for ECMs through quantifying the financial benefit of the realized energy savings in coming years. The rate forecast described herein summarizes the methodologies used to forecast future utility rates for the District. The intent is to document recently implemented rate changes as well as pending near-term rate increases for the District's utilities. Assumptions are then made to develop a price projection extending out through a potential long-term savings project, which in this case was estimated at 15 years. As utility prices increase over time, the cost savings resulting from ECMs increases accordingly.

The rate projection is a critical input to the financial cash projection for energy and water savings. In order to establish a fair and balanced rate projection, several sources were researched to document information related to energy price indices. While the California Proposition 39 The Clean Energy Jobs Act of 2012 Program Implementation Guidelines recommend using 4% escalation for all utilities, research performed using , historical electric and natural gas pricing through PG&E, published rate increases through the City of Davis's website, Consumer Price Index publications and information from the District's PPA agreements show that the 4% value may be aggressive, resulting in potential overstatement of savings. The utility rate projections for the District, based on the detailed analysis are summarized in the table below.

Energy Escalation Factors						
Program Year	Fiscal Year	PG&E Electricity (Note 1)	DSHS PPA Electricity (Note 2)	Korematsu ES and Harper JHS PPA Electricity (Note 2)	Natural Gas (Note 3)	Water/Sewer (Note 4,5)
1	2015	2.28%	3.50%	0.00%	4.68%	11.00%
2	2016	2.28%	3.50%	0.00%	4.68%	23.00%
3	2017	2.28%	3.50%	0.00%	4.68%	12.00%
4	2018	2.28%	3.50%	0.00%	4.68%	19.00%
5	2019	2.28%	3.50%	0.00%	4.68%	2.38%
6	2020	2.28%	3.50%	0.00%	4.68%	2.38%
7	2021	2.28%	3.50%	0.00%	4.68%	2.38%
8	2022	2.28%	3.50%	0.00%	4.68%	2.38%
9	2023	2.28%	3.50%	0.00%	4.68%	2.38%

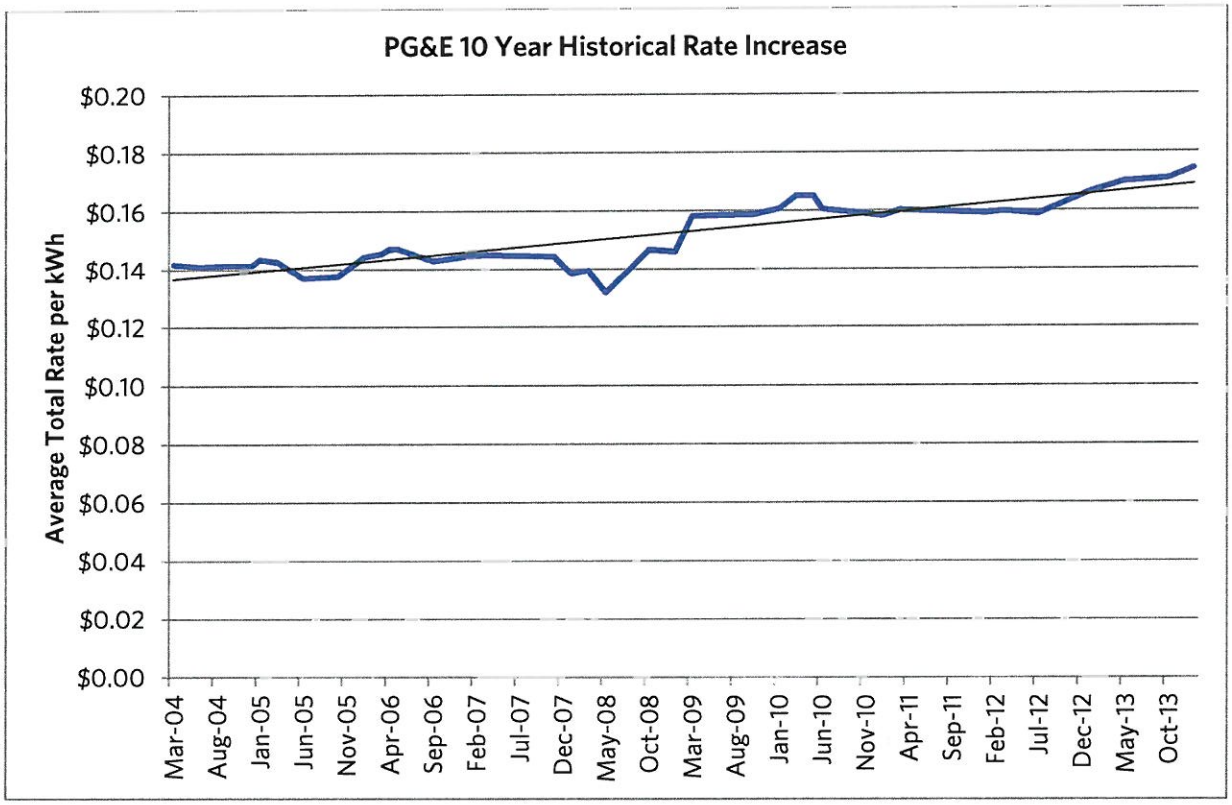
Energy Escalation Factors						
Program Year	Fiscal Year	PG&E Electricity (Note 1)	DSHS PPA Electricity (Note 2)	Korematsu ES and Harper JHS PPA Electricity (Note 2)	Natural Gas (Note 3)	Water/Sewer (Note 4,5)
10	2024	2.28%	3.50%	0.00%	4.68%	2.38%
11	2025	2.28%	3.50%	0.00%	4.68%	2.38%
12	2026	2.28%	3.50%	0.00%	4.68%	2.38%
13	2027	2.28%	3.50%	0.00%	4.68%	2.38%
14	2028	2.28%	3.50%	0.00%	4.68%	2.38%
15	2029	2.28%	3.50%	0.00%	4.68%	2.38%

Note 1: Future rate escalation based on trend of historical PG&E electricity pricing for past 10 years.
Note 2: Future rate escalation set based on existing District power purchase agreements.
Note 3: Future rate escalation based on trend of historical PG&E natural gas pricing for past 15 years.
Note 4: Based on City of Davis Published Rates for the next 5 years.
Note 5: Future water rate escalation based on the Consumer Price Index for the West Region.

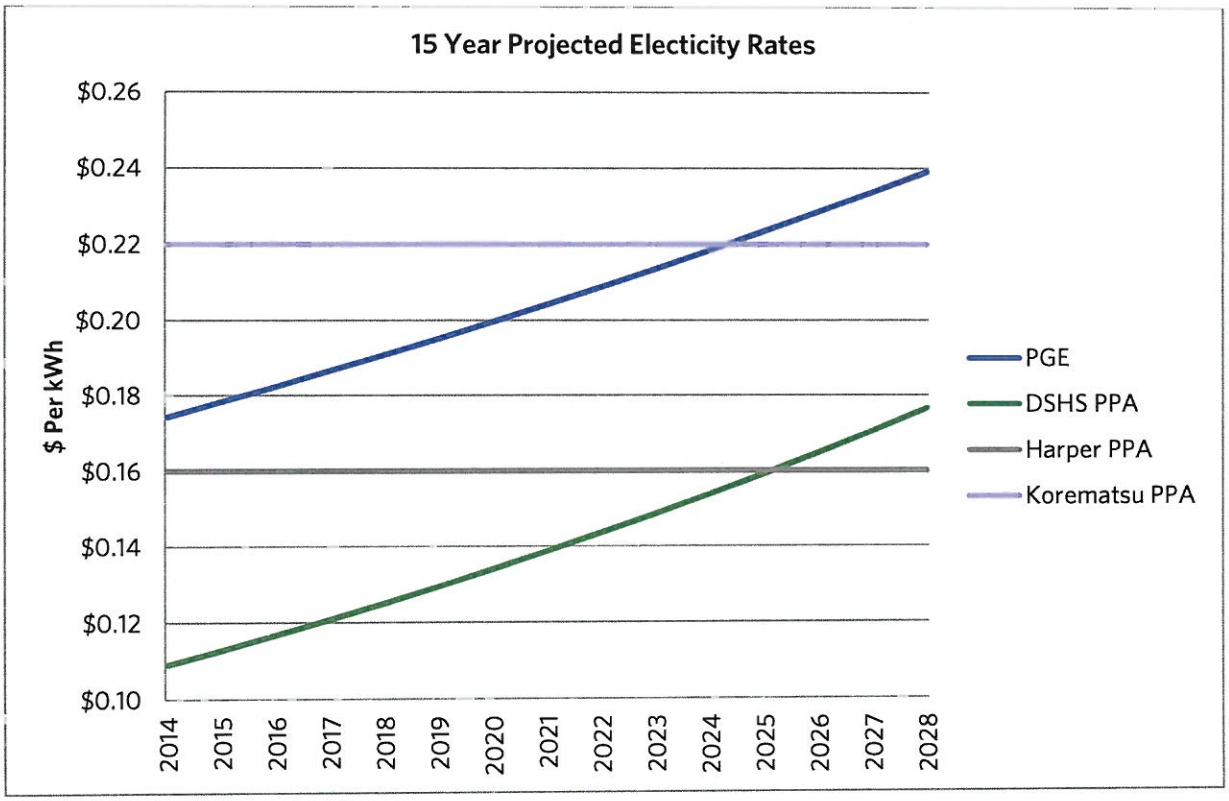
This analysis represents the best effort projection analysis at the time of this writing. As with most financial market projections, actual conditions may vary.

Electric Rate Projections

Electric service projections for future years is based on an analysis of PG&E's 10 year historical rate increase. As shown in the following graph, the average escalation rate over the last 10 years has been 2.28%.

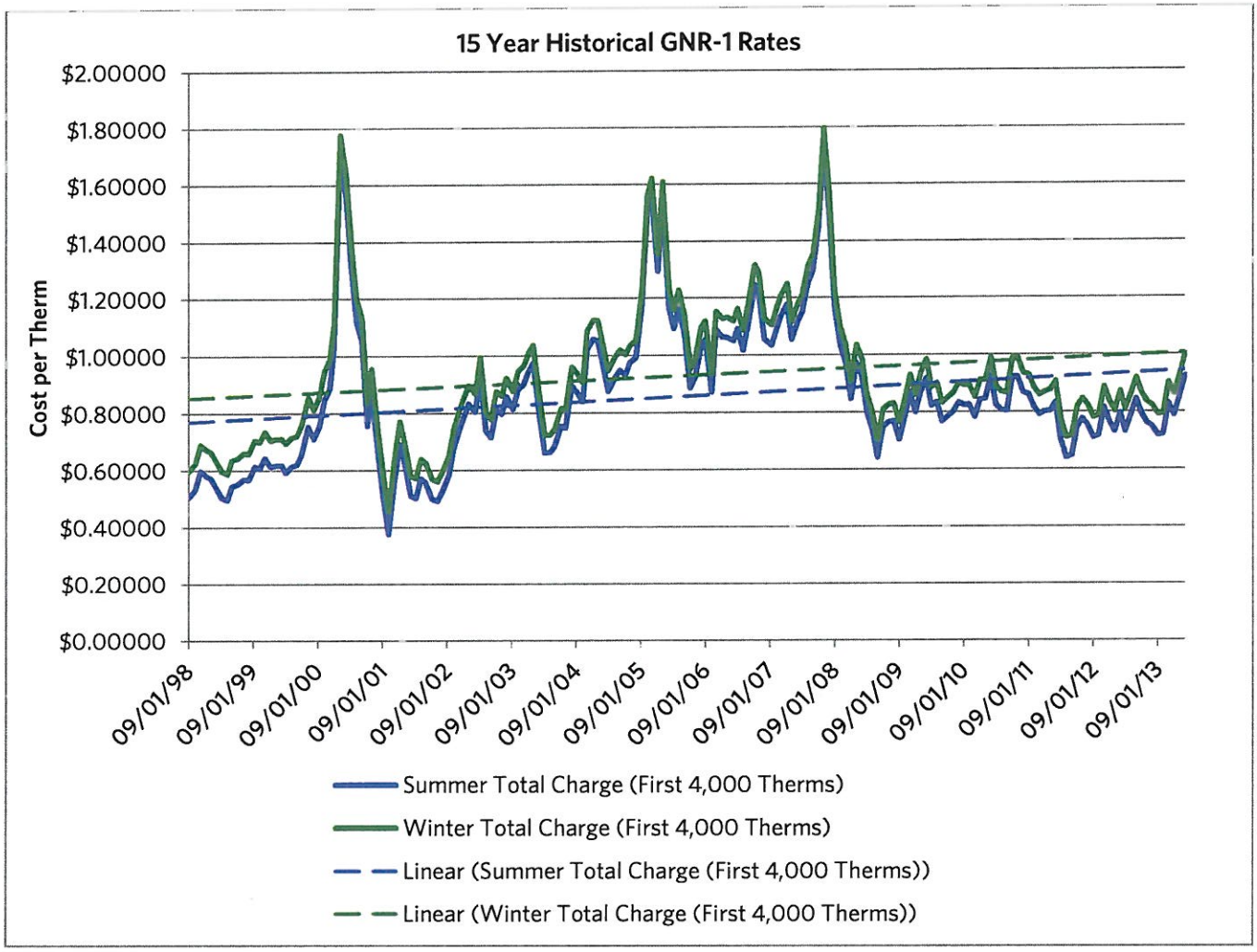


Looking forward, the PG&E rates are calculated to escalate at this approximately 2.3%. In comparison, the PPA at Davis Senior High School has a set escalation rate of 3.5% while the PPAs at the two other schools have escalations of 0%. The following chart shows the calculated electrical costs anticipated for these three rate cases going forward 15 years, starting with their current costs of $0.109/kwh, $0.16/kwh and $0.22/kWh for Davis Senior High School, Harper Junior High School and Korematsu Elementary School.



Natural Gas Rate Projection

The District's facilities are all on PG&E's GNR-1 rate. Therefore, gas service rate projections for future years are based on an analysis of PG&E's 15 year historical GNR-1 rate increase. The following graph shows that while prices fluctuate greatly from month to month, the average escalation, represented by the dashed lines for summer and winter charges, has averaged 4.21%.



Water/Sewer Rate Projection

The City of Davis has approved rate increases for water and sewer through 2015. This information is summarized as follows:

Water and Sewer Rates	
Fiscal Year	% Increase
2015	48%
2016	11%
2017	23%
2018	12%
2019	19%

For the remainder of the 15-year forecast, escalation of water and sewer rates was set at 2.38% based on the Consumer Price Index for the West Region. The Consumer Price Index provides the expected inflation index looking forward for a mix of general consumer products and is considered a conservative and reliable figure for calculating utility escalation.

5.2 Billing Issues and Anomalies

While reviewing the District's utility bills and performing the baseline analysis some billing issues and anomalies were seen. These are shown in bold text in the table below.

Year to Year Variations	Total kWh Change		Therms Change		Water/Sewer Change		Trash Change	
	FY11-12 % over last year	FY12-13 % over last year	FY11-12 % over last year	FY12-13 % over last year	FY11-12 % over last year	FY12-13 % over last year	FY11-12 % over last year	FY12-13 % over last year
Birch Lane ES	5%	0%	-20%	-3%	0%	0%	0%	0%
Cesar Chavez ES	7%	-3%	4%	3%	**37%**	**-42%**	-17%	-17%
Fairfield ES	6%	8%						
Korematsu ES	14%	-17%	**21%**	**-56%**	**33%**	**38%**	**-21%**	-3%
Montgomery ES	8%	0%	-2%	-10%	**29%**	-5%	**-21%**	-11%
North Davis ES	1%	-2%	-6%	-7%	5%	16%	0%	0%
Patwin ES	-2%	-4%	-4%	-18%	9%	**40%**	**-21%**	-11%
Pioneer ES	3%	1%	0%	**23%**	-17%	**82%**	0%	3%
Willett ES	1%	5%	-2%	-7%	**51%**	13%	**-21%**	-11%
Da Vinci & Emerson JHS	4%	-4%	10%	-10%	**36%**	-4%	-12%	-3%
Harper JHS	**28%**	3%	**-23%**	-15%	**59%**	-14%	-13%	-19%
Holmes JHS	4%	-3%	-12%	**29%**	**29%**	-4%	**-21%**	-5%
Valley Oak Campus	**22%**	-12%	16%	**-24%**	**30%**	**28%**	**50%**	0%
Davis Senior HS, Davis Adult Ed.	-4%	0%	2%	3%	5%	12%	**50%**	0%
Martin Luther King (Jr.) HS	-4%	3%	-3%	-7%	0%	0%	**-27%**	**-25%**
Central Kitchen and Operations	2%	-2%	0%	-8%	-11%	**-26%**	0%	0%
DSIS / District Office	0%	0%	0%	0%	0%	0%	0%	0%
Total	4%	-2%	-1%	0%	**26%**	2%	-13%	-7%

While there have been a number of fluctuations year to year at the individual facility level, the overall usage has been fairly constant across the past three years. The identified utility anomalies were

discussed with District to help identify any potential issues or savings opportunities. Some of the higher water usage increases were associated with irrigation leaks that have since been fixed. Other anomalies in electric and natural gas usage were explained through differences in schedules, after school program hours and staff programs year to year.

Throughout the District there has been a significant decrease in the number of trash load pickups over the last three years. A couple commendable efforts throughout the District have led to this decrease. The Davis RISE program, partnering the District with the City of Davis, Davis Waste Removal, and other community programs, has been increasing recycling awareness and opportunities throughout the District, reducing the amount of trash at each campus through creating compost piles and using volunteers to pick out recyclables. Their goal has been to divert trash and reduce the District's solid waste stream. Concurrently, staff at the District's Operations Center constantly adjust trash bin sizes and pickups from each District campus, over time right-sizing trash collection to reduce costs.