

ALUM ROCK UNION SCHOOL DISTRICT

STRATEGIC ENERGY PLAN

Prepared by:
ARC Alternatives
April 22, 2024

Introduction - ARC Alternatives

- Independent energy consulting and engineering firm
- We specialize in supporting school districts and other local governments with the development, procurement, and implementation of their energy programs
- Our role is an independent advisor to the District on energy-related initiatives

Russell Driver
Principal
Renewables Lead

Curtis Schmitt
Principal
Energy Efficiency Lead

Introduction - Agenda

1. Project background
    - Study scope
    - Regulatory factors
2. Solar projects
    - Methodology
    - Study results
    - Implementation options
3. Energy efficiency and decarbonization projects
    - Benchmarking
    - Project identification
    - Costs and savings
    - Implementation options
4. Recommendations and Board feedback

We will pause periodically during the presentation for questions

Project Background

- ARC Alternatives was hired by the District in January 2020 to:
  - Develop a plan for future energy improvements
  - The plan needs to account for planned improvements identified in the District's Facilities Master Plan
  - The scope includes renewable energy, energy efficiency, and decarbonization
- Regulatory considerations – Net Energy Metering (NEM)
  - The CPUC adopted new NEM rules on 12/15/22 (i.e., "NEM 3.0") that greatly reduced the amount of money a solar system will save the District
  - The CPUC decision established a deadline of April 15, 2023 to secure existing, more beneficial NEM rules
  - ARC, on behalf of the District submitted interconnection applications to PG&E before the deadline and secured NEM 2.0 grandfathering

SOLAR PROJECTS

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ALTERNATIVES

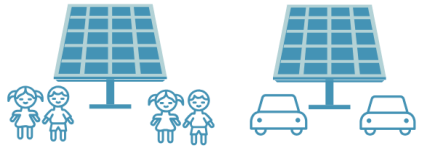
Solar Projects – Study Methodology

- System sizing
    - Determine how much solar is needed to offset utility use at each site
    - Evaluate how much solar will physically fit on the site (desktop and site audits)
    - Use the smaller of the two numbers
- Use system sizes and layouts to…
    - Submit interconnection applications to PG&E
    - Simulate solar production as the key input to the economic analysis
- Develop economic models that estimate
    - Costs
    - Utility savings
    - Full lifecycle cash flow
- Perform scenario analysis to determine model sensitivities and financial performance baselines

Site Evaluation Process and Considerations

Calculate ideal capacity (Utility Analysis) → Identify all possible locations → Review with Staff → Finalize Allowable Locations

Solar Array Placement Considerations



Playground Shade vs Parking Lot Shade



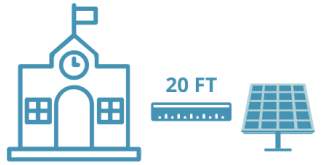
Minimize Distance to Meter



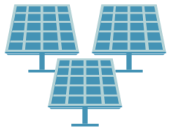
Roof System Limitations *Capacity, DSA*



ADA Requirements



20 Feet Clearance From Existing Building Per DSA



Group Arrays Together



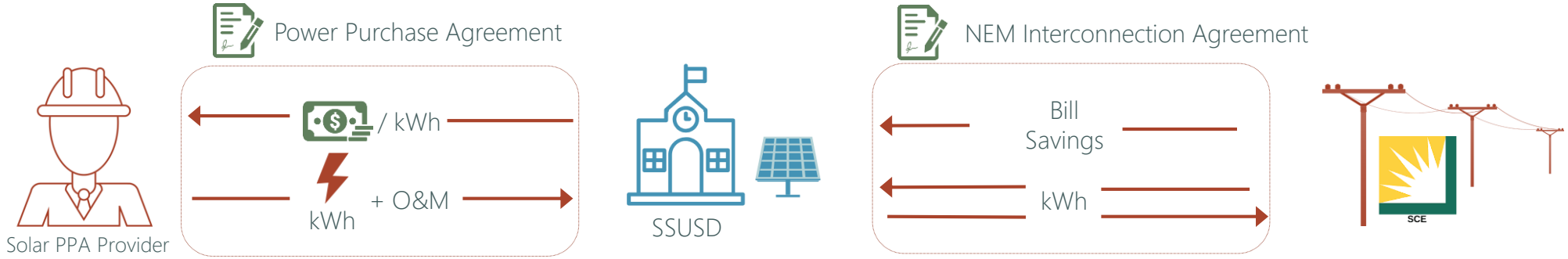
Prioritize "T" Structures



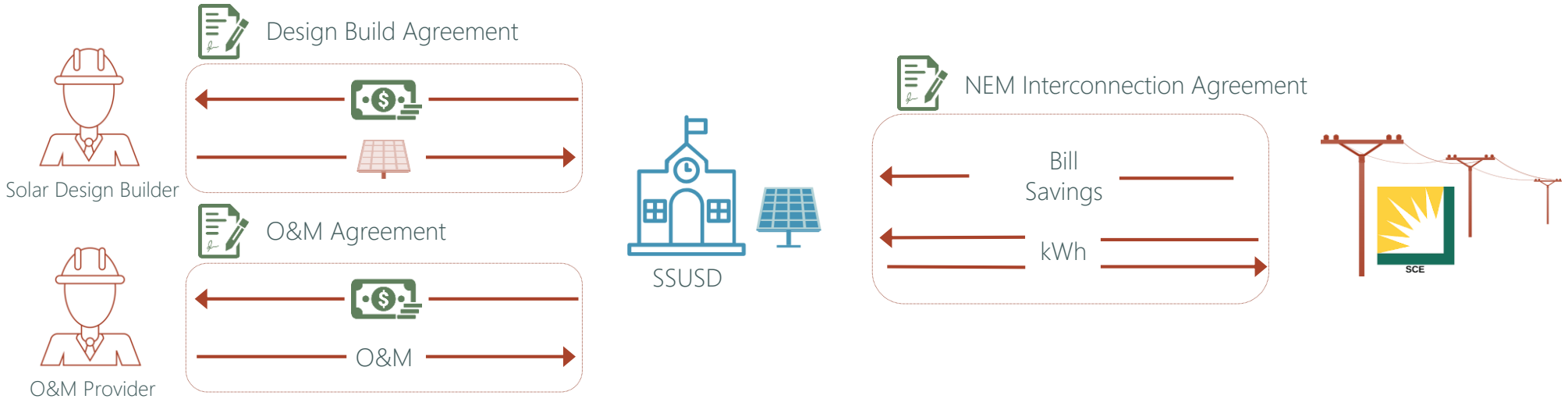
Minimize Tree Removal

Procurement and Financing Options (PPA vs Direct Purchase)

Power Purchase Agreement (PPA): An arrangement where a third-party finances, builds, and maintains a solar system on a customer's property. The customer agrees to purchase all the power produced from the system for the lifetime of the agreement typically at a rate lower than the local utility. For public agencies, a PPA is the only way to directly take advantage of the Federal tax credit, as the financier will pass through a portion of the tax credit in the form of lower pricing.



Direct Purchase: Under the Direct Purchase option, the District contracts with a solar provider for the design and installation of the solar systems and purchases the system directly, owing the assets. The District also contracts separately for the operation and maintenance (O&M) of the systems. The O&M agreement would be procured along with the purchase of the system and would likely be with the Design Builder for a minimum of 5 years. However, after the initial O&M term, the District could choose a different O&M provider if they choose to.



Procurement and Financing Options (Cont.)

	Modeled Assumption	Potential Benefits	Potential Drawbacks
Power Purchase Agreement	• Modeled possible PPA pricing based on recent procurements • Rates vary according to system capacity • All rates are fixed over the project life cycle (0% escalation)	• Does not require capital financing. Remains off balance sheet • Monetizes Federal Investment Tax Credit (ITC) • Provider responsible for performance and maintenance • Long term partnership	• Potential for lower cumulative net benefit if cheaper financing available • Early termination fees if need to exit agreement • Required to purchase all electricity generated • Long term partnership
Purchase Financing	• Purchasing pricing based on size of total portfolio • Includes financing costs • Analysis includes O&M for the lifetime of the systems	• District owns the asset • Potential for higher cumulative net benefit depending on financing • Monetizes Federal Investment Tax Credit (ITC) • Flexibility in operations and direct oversight of performance	• Requires District to obtain financing • Balance sheet debt • District responsible for performance and maintenance

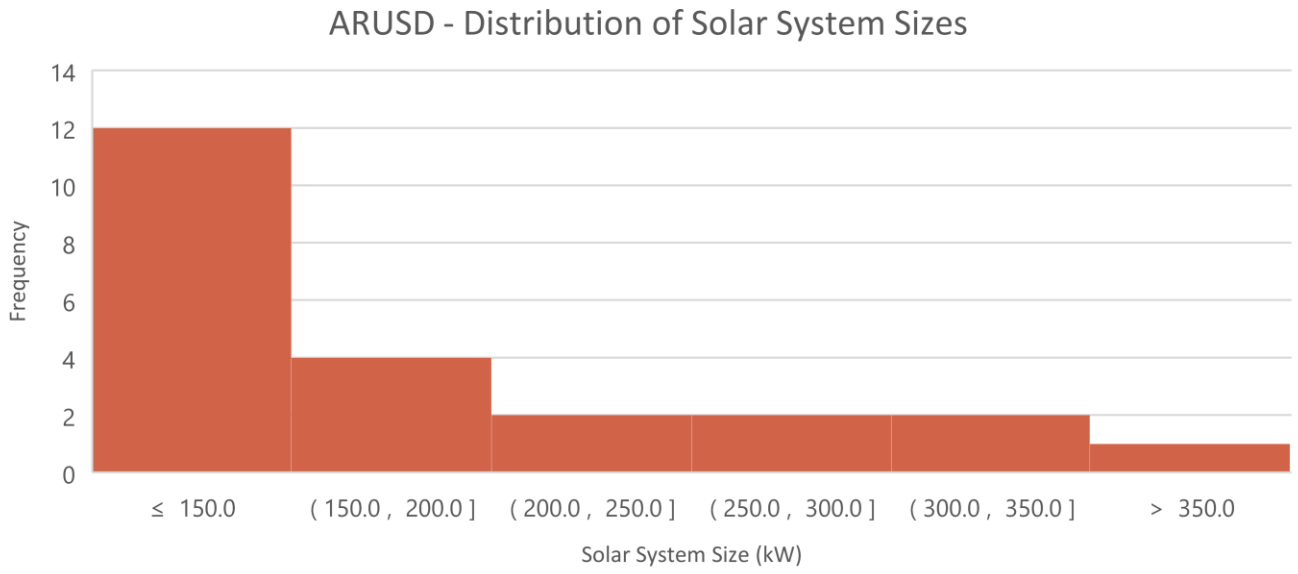
Solar Analysis Overview

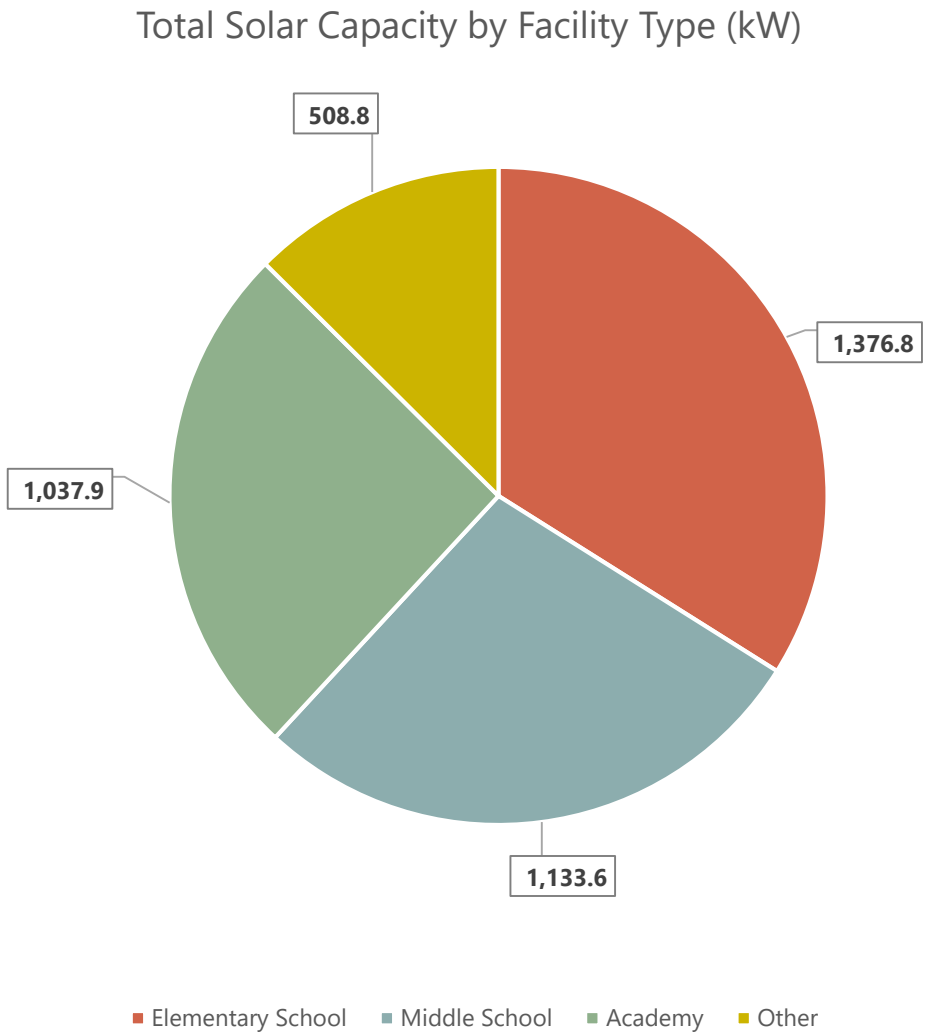
- ARC evaluated 23 District sites for potential solar projects
  - It was found to be advantageous to use the NEM Aggregation program at four schools with multiple meters.
- For the sites and meters evaluated, the District currently consumes roughly 6.8 million kilowatt-hours (kWh) per year at a cost of roughly $2.3 million, resulting in a blended utility rate of $0.3433 per kWh.
- Our analysis identified roughly 4.0 MW-DC of solar PV, consistent with Interconnection Applications submitted to PG&E in April 2023. This capacity would offset about 90-95% of the annual consumption of 6.8 million kWh.

Summary of Solar Sites

The breakdown of all 23 solar sites is shown in the figures below:

Parameter	Value
Total number of sites	23
Total portfolio capacity (kW)	4,057.1
Annual solar production (kWh)	6,470,303
Total baseline site load (kWh)	6,863,774
Energy offset	94%





Layouts for all sites are included in Attachment 2 of this presentation

Financial Benefits of Solar

Utility Bill Savings	–	Cost of Solar	=	Net Benefit to District

- Calculated first
- Independent of system costs and how the solar system is financed
- Dependent on system production and utility rate schedules
- Life cycle savings are dependent on utility rate escalation and solar production degradation assumptions
- Savings value of exports for a particular day depends highly on whether the systems are on Net Energy Metering (NEM 2.0) or Net Billing (NEM 3.0).

- Independent of the utility bill savings from a particular system
- Two primary financing methods:

Power Purchase Agreement (PPA)

  - Buying energy produced from the solar system
  - District does not own the system
  - Third party financed and maintained

Direct Purchase

  - District purchases the systems and owns and operates them for their useful life
  - Total lifecycle cost depends on District financing terms
  - On balance sheet as debt/asset

- Combination of Utility Bill Savings and the Cost of Solar
- Multiple solar financing and procurement scenarios can be evaluated using the same utility bill savings

Utility Bill Savings from Solar

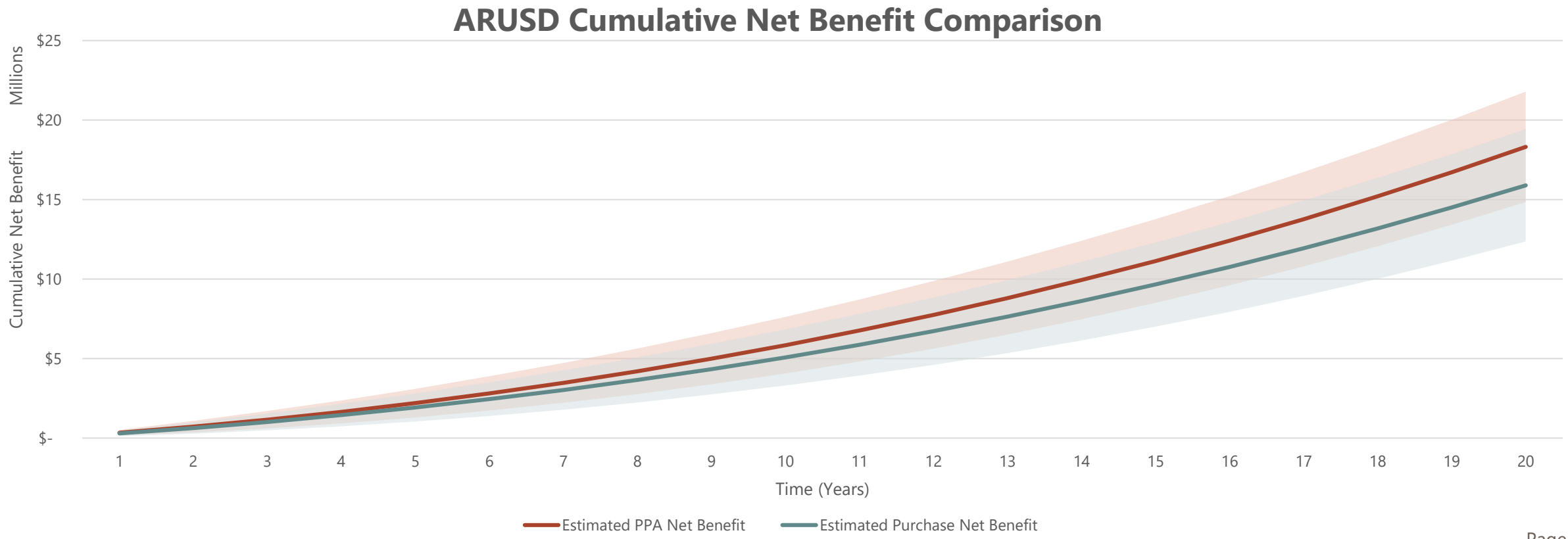
- Current rate structures for each meter were used to project baseline utility costs. Residual utility costs after the addition of solar were modeled with Option R rates when appropriate.
- Utility rates are escalated at 3.5% annually and solar production is degraded at 0.5% annually.
- The savings analysis period is 20 years to account for limits on NEM grandfathering.
- Demand cost savings are limited to 40% of the baseline for NEM projects to constrain overstating potential savings due to demand reduction from solar. For benefitting meters under NEMA, demand savings are limited to 0%, consistent with the utility tariff.
- The analysis shows the District could reduce utility electricity expenditures by roughly $1.5 million in the first year of operations and approximately $41.3 million over the 20-years of the analysis.

Costs of Solar

- Using data from other solar procurements, PPA and cash purchase pricing estimates were developed for all sites.
- In total, the estimated blended PPA rate for all sites within the portfolio is $0.1875 (measured in the dollar cost per kWh of solar generated, to be paid to the solar vendor). Costs incurred through a solar PPA would be approximately $1.2 million in the first year and $23.1 million over the 20-year analysis period.
- In addition, we developed an estimate for an up-front purchase of the solar systems of about $21 million, with an average price per site of $910k. When applying an assumed 30% Federal Investment Tax Credit (ITC) for the solar systems, the purchase cost is reduced to $14.7 million for the whole portfolio, with an average price per site of $640k. In the following pages of the model, the purchase option cash flow assumes the project takes advantage of the 30% Federal ITC.

Project Portfolio Net Benefit

- The projected net benefit of the project ranges from $14.8 million for cash purchase to $21.8 million for a PPA over 20 years. The graph below provides a range of cumulative net benefit amounts based on high and low estimates of project costs, with the center line representing an average between the two.
- While the PPA financing option yields the highest modeled cumulative net benefit, the assumptions ARC uses in its modeling could be updated based on input from the District's Financial Advisor.



Solar Cash Flows

This table is showing the PPA cash flow of all sites combined.

ARC Site ID	Site Name	Year	Site Usage (kWh)	System Size (kW dc)	Solar Generation	kWh Offset	Yield	Utility Bill Before Solar	Utility Bill After Solar	Utility Savings	Blended Utility Rate	PPA Rate	Avoided Cost (Value of Solar)	PPA Cost	Net Benefit
	Portfolio Summary Total	1	6,863,774	4,057	6,470,313	94.3%	1,595	$ 2,356,043	$ 810,588	$ 1,545,455	$ 0.3433	$ 0.1875	$ 0.2389	$ 1,213,184	$ 332,271
	Portfolio Summary Total	2	6,863,774	4,057	6,437,961	93.8%	1,587	$ 2,438,504	$ 846,956	$ 1,591,548	$ 0.3553	$ 0.1875	$ 0.2472	$ 1,207,118	$ 384,430
	Portfolio Summary Total	3	6,863,774	4,057	6,405,772	93.3%	1,579	$ 2,523,852	$ 884,836	$ 1,639,016	$ 0.3677	$ 0.1875	$ 0.2559	$ 1,201,082	$ 437,933
	Portfolio Summary Total	4	6,863,774	4,057	6,373,743	92.9%	1,571	$ 2,612,187	$ 924,287	$ 1,687,899	$ 0.3806	$ 0.1875	$ 0.2648	$ 1,195,077	$ 492,823
	Portfolio Summary Total	5	6,863,774	4,057	6,341,874	92.4%	1,563	$ 2,703,613	$ 965,372	$ 1,738,241	$ 0.3939	$ 0.1875	$ 0.2741	$ 1,189,101	$ 549,140
	Portfolio Summary Total	6	6,863,774	4,057	6,310,165	91.9%	1,555	$ 2,798,240	$ 1,008,156	$ 1,790,084	$ 0.4077	$ 0.1875	$ 0.2837	$ 1,183,156	$ 606,928
	Portfolio Summary Total	7	6,863,774	4,057	6,278,614	91.5%	1,548	$ 2,896,178	$ 1,052,705	$ 1,843,473	$ 0.4220	$ 0.1875	$ 0.2936	$ 1,177,240	$ 666,233
	Portfolio Summary Total	8	6,863,774	4,057	6,247,221	91.0%	1,540	$ 2,997,544	$ 1,099,089	$ 1,898,455	$ 0.4367	$ 0.1875	$ 0.3039	$ 1,171,354	$ 727,101
	Portfolio Summary Total	9	6,863,774	4,057	6,215,985	90.6%	1,532	$ 3,102,458	$ 1,147,382	$ 1,955,076	$ 0.4520	$ 0.1875	$ 0.3145	$ 1,165,497	$ 789,579
	Portfolio Summary Total	10	6,863,774	4,057	6,184,905	90.1%	1,524	$ 3,211,044	$ 1,197,658	$ 2,013,386	$ 0.4678	$ 0.1875	$ 0.3255	$ 1,159,670	$ 853,717
	Portfolio Summary Total	11	6,863,774	4,057	6,153,980	89.7%	1,517	$ 3,323,431	$ 1,249,995	$ 2,073,436	$ 0.4842	$ 0.1875	$ 0.3369	$ 1,153,871	$ 919,564
	Portfolio Summary Total	12	6,863,774	4,057	6,123,210	89.2%	1,509	$ 3,439,751	$ 1,304,475	$ 2,135,276	$ 0.5011	$ 0.1875	$ 0.3487	$ 1,148,102	$ 987,174
	Portfolio Summary Total	13	6,863,774	4,057	6,092,594	88.8%	1,502	$ 3,560,142	$ 1,361,182	$ 2,198,960	$ 0.5187	$ 0.1875	$ 0.3609	$ 1,142,361	$ 1,056,599
	Portfolio Summary Total	14	6,863,774	4,057	6,062,131	88.3%	1,494	$ 3,684,747	$ 1,420,203	$ 2,264,544	$ 0.5368	$ 0.1875	$ 0.3736	$ 1,136,650	$ 1,127,895
	Portfolio Summary Total	15	6,863,774	4,057	6,031,821	87.9%	1,487	$ 3,813,713	$ 1,481,629	$ 2,332,084	$ 0.5556	$ 0.1875	$ 0.3866	$ 1,130,966	$ 1,201,118
	Portfolio Summary Total	16	6,863,774	4,057	6,001,662	87.4%	1,479	$ 3,947,193	$ 1,545,555	$ 2,401,639	$ 0.5751	$ 0.1875	$ 0.4002	$ 1,125,312	$ 1,276,327
	Portfolio Summary Total	17	6,863,774	4,057	5,971,653	87.0%	1,472	$ 4,085,345	$ 1,612,077	$ 2,473,268	$ 0.5952	$ 0.1875	$ 0.4142	$ 1,119,685	$ 1,353,583
	Portfolio Summary Total	18	6,863,774	4,057	5,941,795	86.6%	1,465	$ 4,228,332	$ 1,681,299	$ 2,547,033	$ 0.6160	$ 0.1875	$ 0.4287	$ 1,114,087	$ 1,432,946
	Portfolio Summary Total	19	6,863,774	4,057	5,912,086	86.1%	1,457	$ 4,376,324	$ 1,753,326	$ 2,622,998	$ 0.6376	$ 0.1875	$ 0.4437	$ 1,108,516	$ 1,514,482
	Portfolio Summary Total	20	6,863,774	4,057	5,882,526	85.7%	1,450	$ 4,529,495	$ 1,828,266	$ 2,701,229	$ 0.6599	$ 0.1875	$ 0.4592	$ 1,102,974	$ 1,598,256
	Total	**T**	**137,275,480**	**4,057**	**123,440,010**	**89.9%**	**1,521**	**$ 66,628,138**	**$ 25,175,038**	**$ 41,453,100**	**$ 0.4854**	**$ 0.1875**	**$ 0.3358**	**$ 23,145,002**	**$ 18,308,099**

Implementation Options

- District-wide solar program
  - PPA
  - District ownership
- More limited deployment
  - PPA options limited with smaller portfolio size
  - Could be combined with modernization projects and new construction
- Financial savings driven by NEM deadlines



ENERGY EFFICIENCY AND DECARBONIZATION PROJECTS

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ALTERNATIVES

Energy Efficiency and Decarbonization Projects: Benchmarking

- First step in energy assessment
- Useful to compare sites, focus on opportunities
- "Heat Map" results

Site Name	Square Feet	Annual Energy Use (kWh)	Annual Gas Usage (Therms)	Electricity EUI (kWh/ft^2)	Gas EUI (Therms/ft^2)
Adelante Academy - Ridgemont	25,796	324,807	154	12.59	0.01
Alum Rock School District Office	66,500	717,064	6,553	10.78	0.10
A. J. Dorsa Elementary	48,427	270,842	607	5.59	0.01
Aptitud Academy	34,237	196,496	923	5.74	0.03
Cesar Chavez Early Learning Center	53,218	202,078	4,289	3.80	0.08
Adelante II Academy - Cinderella	40,469	211,979	1,515	5.24	0.04
Clyde L. Fischer Middle	70,776	552,023	14,722	7.80	0.21
Donald Meyer Elementary	44,492	170,034	274	3.82	0.01
Horace Cureton Elementary	25,660	185,009	2,539	7.21	0.10
Joseph George Middle	57,287	384,810	3,188	6.72	0.06
Lee Mathson Middle	52,811	497,127	3,159	9.41	0.06
Linda Vista Elementary	44,687	302,865	1,689	6.78	0.04
Lyndale Elementary	44,301	311,334	1,801	7.03	0.04
Millard McCollam Elementary	36,394	161,755	7,693	4.44	0.21
Hubbard Media Arts Academy	40,605	371,155	1,572	9.14	0.04
Ocala STEAM Academy	55,901	443,598	2,951	7.94	0.05
Russo / McEntee Academy	48,859	179,304	3,460	3.67	0.07
Ryan STEAM Academy	35,862	179,873	4,472	5.02	0.12
San Antonio Elementary	39,153	303,006	9,179	7.74	0.23
LUCHA Elementary	23,252	171,296	-	7.37	-
Sylvia Cassell Elementary	41,380	259,784	-	6.28	-
Ben Painter Elementary	56,180	220,163	1,323	3.92	0.02
William Sheppard Middle	63,358	413,686	1,550	6.53	0.02
Total	**1,049,605**	**7,030,087**	**73,613**	**6.70**	**0.07**

Energy Efficiency and Decarbonization Projects: Benchmarking (continued)

- Provides Context
- Informs field work and recommendations

Site	Observation	Audit Result
District Office	High EUI for both gas and electricity, opportunities likely both for electricity and gas savings	Savings on lighting upgrades and a variety of HVAC measures. Higher than average gas usage for boilers and water heaters, electrification possible
Lee Mathson, Middle, Hubbard Media Arts Academy	Higher than average electric EUIs, considering Buildings & Climate	Savings on lighting upgrades and a variety of HVAC measures
Adelante Academy (Ridgemont)	Extremely high electric EUI, opportunity likely	Savings on lighting upgrades and a variety of HVAC measures
Cesar Chavez ELC, Horace Cureton Elementary, Ryan STEAM Academy	Higher than average gas EUIs, electrification projects likely	Gas usage found from boilers and water heaters. Electrification projects possible
Clyde L. Fischer Middle, Millard McCollam Elementary, and San Antonio Elementary	Extremely high gas EUI, warrants investigation	Heavy gas boiler, package unit and water heater usage; carbon savings possible with electrification
Remainder	EUIs below average, limited opportunities likely	Confirmed, fewer project opportunities available

Energy Efficiency and Decarbonization Projects: Project Identification

- Data gathering & Benchmarking
- Site Visits to confirm details/findings
- Engineering & Analysis
    - Engineering calculations; existing/proposed equipment & conservative assumptions
    - Database for Energy Efficient Resources (DEER) measures
    - Balanced to historical site consumption (Benchmark data)
    - Current utility rates – tariff analysis by site
    - Cost estimates based on standard project costs & recent history
- With some measures, there was more than one approach evaluated
    - Primary measure usually the simplest and most cost-effective approach to conduct now
    - Alternate measure usually involves electrification, best done with modernization

Energy Efficiency and Decarbonization Projects: Project Identification (continued)

- Economic Calculations
  - Calculate simple payback by measure
  - Primary measures – full cost, intended to install now
  - Alternate measures – incremental cost considered (i.e. cost beyond investment that will otherwise already occur)
- All project savings are stand alone estimates
  - Primary and alternate measures on same equipment are mutually exclusive
  - Interactive and cascading effects not considered at this stage

Energy Efficiency and Decarbonization Projects: Project Identification (continued)

- Resulting measures Identified
- Recommended measures underlined
- Details available for measures of interest (backup slides)
- Summary by site available in SEP Report

Category	Identified Project
Lighting	Campuswide LED Lighting Upgrades Targeted Lighting Retrofit
HVAC	Package/Cabinet Heat Pump Replacement Wall Mount Heat Pump Replacement Package Unit Replacement Replace PTAC with ductless mini split Replace Furnace with Condensing Furnace Replace Unit Heater (Reznor) with Gas Replace Unit Heater (Reznor) with Electric Replace ductless mini split Split System Replacement Package/Split System Electrification PTAC/Furnace System Electrification Furnace Electrification
Boiler Replacements	Condensing Boiler replacement Air to Water Heat Pump (electrification)
Water Heaters	Heat pump water heaters (electrification)
Controls and EMS	Install New EMS Upgrade IBEX Upgrade BACtalk Upgrade EMS at modernization Install Smart/Programmable Thermostat
Kitchen Equipment	Dishwasher Replacements Gas Oven Replacement (electrification)

Energy Efficiency and Decarbonization Projects: Recommended Measures

- All lighting upgrades identified (both LED1 and LED2)
- Upgrading to Tier 2 commercial dishwashers (FS2)
- HVAC: Like-for-like measures, not requiring major infrastructure changes and would be more cost effective to be done in conjunction with modernization
    - Replacing existing heat pumps to high-efficiency heat pumps (HVAC1, HVAC2)
    - Upgrading existing package terminal AC (PTAC) units to high-efficiency split systems (HVAC 4)
    - Replacing existing mini split systems with high-efficiency mini split systems (HVAC10)
- Installing District-wide programmable thermostats (Ptstat)

Measure ID	Measure	Electric Savings (kWh/yr)	Gas Savings (th/yr)	Cost Savings ($/yr)	Project Cost ($)	SPB (yrs)	Carbon Savings (lbs CO2e)
FS2	Tier 2 Dishwasher (Full Cost)	1,488	2,096	$ 3,629	$ 13,942	3.8	25,485
HVAC1	Package/Cabinet Heat Pump Replacement	635,615	-	$ 222,227	$ 4,510,000	20.3	420,269
HVAC10	Replace ductless mini split	58,421	-	$ 18,882	$ 190,500	10.1	38,628
HVAC2	Wall Mount Heat Pump Replacement	264,403	-	$ 94,113	$ 2,074,000	22.0	174,823
HVAC4	Replace PTAC with ductless mini split	117,975	-	$ 41,931	$ 612,500	14.6	78,005
LED1	Campuswide LED Retrofit	1,310,646	-	$ 446,638	$ 4,109,616	9.2	866,600
LED2	Targeted LED Retrofit	6,713	-	$ 2,477	$ 10,130	4.1	4,439
Ptstat	Install programmable Thermostat	4,813	-	$ 1,681	$ 6,600	3.9	3,182
	Total, Recommended Primary Measures	**2,400,074**	**2,096**	**$ 831,578**	**$ 11,527,288**	**13.9**	**1,611,432**

Energy Efficiency and Decarbonization Projects: Measures investigated – not recommended

- Upgrading to 96% efficient boilers (B2) due to long payback periods
- All EMS upgrades (EMS1-4) due to high project costs
- Replacing package units, furnaces to condensing furnaces, and split systems (HVAC3, HVAC6, HVAC11) due to the payback period exceeding the equipment lifespan—only recommended for carbon savings
- Replacing Reznor gas heaters with gas unit heaters (HVAC8), due to the long payback period—only recommended if the equipment fails

Measure ID	Measure	Electric Savings (kWh/yr)	Gas Savings (th/yr)	Cost Savings ($/yr)	Project Cost ($)	SPB (yrs)	Carbon Savings (lbs CO2e)
B2	Replace with 96% Efficient Boiler	-	4,311	$ 5,197	$ 179,242	34.5	50,398
EMS1	Install New EMS	25,085	1,394	$ 9,406	$ 312,000	33.2	32,881
EMS2	Upgrade IBEX	74,913	1,156	$ 28,031	$ 1,332,000	47.5	63,045
EMS3	Upgrade BACtalk	46,443	818	$ 16,799	$ 477,000	28.4	40,270
EMS4	Upgrade EMS at modernization	10,150	288	$ 3,924	$ 1,140,000	>50 yr SPB	10,078
HVAC11	Split System Replacement	44,024	245	$ 15,453	$ 573,000	37.1	31,972
HVAC3	Package Unit Replacement	117,400	1,066	$ 41,128	$ 1,362,000	33.1	90,089
HVAC6	Replace Furnace with Condensing Furnace	-	1,078	$ 1,371	$ 252,000	>50 yr SPB	12,606
HVAC8	Replace Unit Heater (Reznor) with Gas UH	-	365	$ 466	$ 40,000	>50 yr SPB	4,270
	Total, Not Recommended Measures	**318,015**	**10,722**	**$ 121,775**	**$ 5,667,242**	**46.5**	**335,610**

Energy Efficiency and Decarbonization Projects: Electrification Measures investigated

- Substantial carbon savings but have poor economic returns; most have higher overall energy cost
- With negative savings, there is not a payback period, consider for environmental attributes only
    - Electrifying boilers with an Air-to-Water Heat Pump (B3)
    - Replacing existing ovens with electric convection ovens (Oven)
    - Electrifying HVAC systems for furnaces, heaters, and package units (HVAC5, HVAC7, HVAC9, HVAC11)
    - All water heater replacement measures to heat pump (electric) water heaters (WH1-5)

Measure ID	Electrification Measures	Electric Savings (kWh/yr)	Gas Savings (th/yr)	Cost Savings ($/yr)	Project Cost ($)	SPB (yrs)	Carbon Savings (lbs CO2e)
B3	Electrify Boiler with AWHP	(308,111)	26,289	$ (73,080)	$ 216,825	n/a	103,582
HVAC12	Package Unit/Split System Electrification	18,807	27,810	$ 41,484	$ 504,500	12.2	337,516
HVAC5	PTAC/Furnace System Electrification	(34,447)	21,792	$ 14,734	$ 317,500	21.5	231,955
HVAC7	Furnace Electrification	(7,411)	1,304	$ (1,070)	$ 32,000	n/a	10,341
HVAC9	Replace Unit Heater (Reznor) with Electric UH	(9,860)	336	$ (2,779)	$ 28,500	n/a	(2,587)
Oven	Replace Gas Convection Oven with Electric	(6,630)	601	$ (1,547)	$ 8,339	n/a	2,642
WH1	Replace with 30 Gal Heat Pump Water Heater	(12,960)	1,430	$ (404)	$ 5,515	n/a	8,147
WH2	Replace with 40 Gal Heat Pump Water Heater	(25,920)	2,828	$ (1,017)	$ 11,238	n/a	15,919
WH3	Replace with 50 Gal Heat Pump Water Heater	(38,880)	4,254	$ (2,307)	$ 17,639	n/a	24,019
WH4	Replace with 60 Gal Heat Pump Water Heater	(14,300)	1,482	$ (553)	$ 6,774	n/a	7,868
WH5	Replace with 75 Gal Heat Pump Water Heater	(112,980)	13,538	$ (6,936)	$ 58,544	n/a	83,548
	Total, Electrification Measures	**(552,691)**	**101,664**	**$ (33,476)**	**$ 1,207,375**	**n/a**	**822,950**

Recommendations and Board Feedback

- Provide direction on whether District wants to move forward with solar, energy efficiency projects, or both
- If the District wants to pursue solar…
  - Provide direction on the preferred ownership and financing approach
  - We need to develop and release an RFP as soon as possible, given NEM deadlines?
- If the District wants to pursue energy efficiency projects…
  - ARC recommends we work with staff to determine a financing and procurement approach
  - Consider bundling with solar projects, if it can be done in a way that doesn't impact schedule

ATTACHMENT 1 – SOLAR LAYOUTS

arc ALTERNATIVES

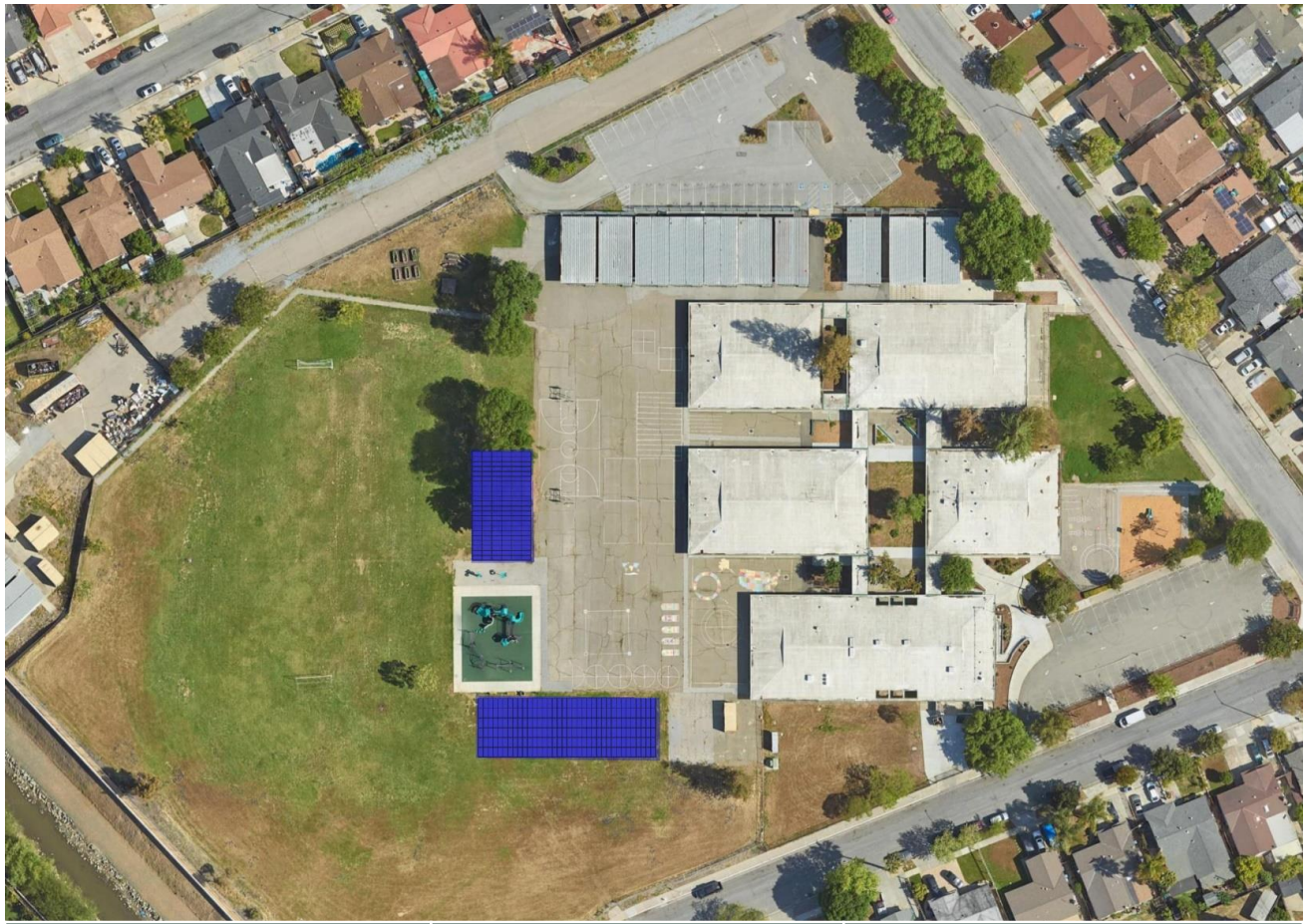
Site List

#	Site Name	Address	Production Target (kWh)
1	Adelante Academy – Ridgemont Dr	2999 Ridgemont Dr., San Jose CA	325,000
2	District Office	2930 Gay Ave., San Jose CA	716,000
3	A. J. Dorsa Elementary	1290 Bal Harbor Way, San Jose CA	270,000
4	Aptitud Academy	2475 Van Winlke Ln., San Jose CA	197,000
5	Cesar Chavez Early Learning Center	2000 Kammerer Ave., San Jose CA	202,000
6	Adelante Academy – Cinderella Ln	1970 Cinderella Ln., San Jose CA	212,000
7	Clyde L. Fischer Middle	1720 Hopkins Dr., San Jose CA	552,000
8	Donald Meyer Elementary	1824 Daytona Dr., San Jose CA	170,000
9	Horace Cureton Elementary	3720 E Hills Dr., San Jose CA	185,000
10	Joseph George Middle	277 Mahoney Dr., San Jose CA	385,000
11	Lee Mathson Middle	2050 Kammerer Ave., San Jose CA	497,000

#	Site Name	Address	Production Target (kWh)
12	Linda Vista Elementary	100 Kirk Ave., San Jose CA	304,000
13	Lyndale Elementary	13901 Nordyke Dr., San Jose CA	311,000
14	Millard McCollam Elementary	3311 Lucian Ave., San Jose CA	162,000
15	Hubbard Media Arts Academy	1680 Foley Ave., San Jose CA	371,000
16	Ocala STEAM Academy	2800 Ocala Ave., San Jose CA	444,000
17	Russo / McEntee Academy	2851 Gay Ave., San Jose CA	179,000
18	Ryan STEAM Academy	1241 McGuinness Ave., San Jose CA	180,000
19	San Antonio Elementary / LUCHA	1855 E San Antonio St., San Jose CA	474,000
20	Sylvia Cassell Elementary	1300 Tallahassee Dr., San Jose CA	260,000
21	William Sheppard MS / Ben Painter ES - NEMA	480 Rough and Ready Rd., San Jose CA	634,000
	Total		**7,030,000**

Adelante Academy – Ridgemont Dr.

2999 RIDGEMONT DR., SAN JOSE CA





152 kW	248,000 kWh	98%
System Size	Annual Energy Production	Energy Offset

District Office

2930 GAY AVE., SAN JOSE CA





396 kW	646,000 kWh	98%
System Size	Annual Energy Production	Energy Offset

A. J. Dorsa Elementary

1290 BAL HARBOR WAY, SAN JOSE CA





157 kW	256,000 kWh	109%
System Size	Annual Energy Production	Energy Offset

Aptitud Academy

2475 VAN WINLKE LN., SAN JOSE CA



117 kW	191,000 kWh	98%
System Size	Annual Energy Production	Energy Offset



Cesar Chavez Early Learning Center

2000 KAMMERER AVE., SAN JOSE CA





112 kW	202,000 kWh	98%
System Size	Annual Energy Production	Energy Offset

Adelante Academy – Cinderella Ln

1970 CINDERELLA LN., SAN JOSE CA





92 kW	151,000 kWh	98%
System Size	Annual Energy Production	Energy Offset

Clyde L. Fisher Middle

1720 HOPKINS DR., SAN JOSE CA





339 kW	552,000 kWh	98%
System Size	Annual Energy Production	Energy Offset

Donald Meyer Middle School

1824 DAYTONA DR., SAN JOSE CA





104 kW	170,000 kWh	98%
System Size	Annual Energy Production	Energy Offset

Horace Cureton Elementary

3720 E HILLS DR., SAN JOSE CA





109 kW	178,000 kWh	98%
System Size	Annual Energy Production	Energy Offset

Joseph George Middle

277 MAHONEY DR., SAN JOSE CA





236 kW	385,000 kWh	98%
System Size	Annual Energy Production	Energy Offset

Lee Mathson Middle

2050 KAMMERER AVE, SAN JOSE, CA 95116

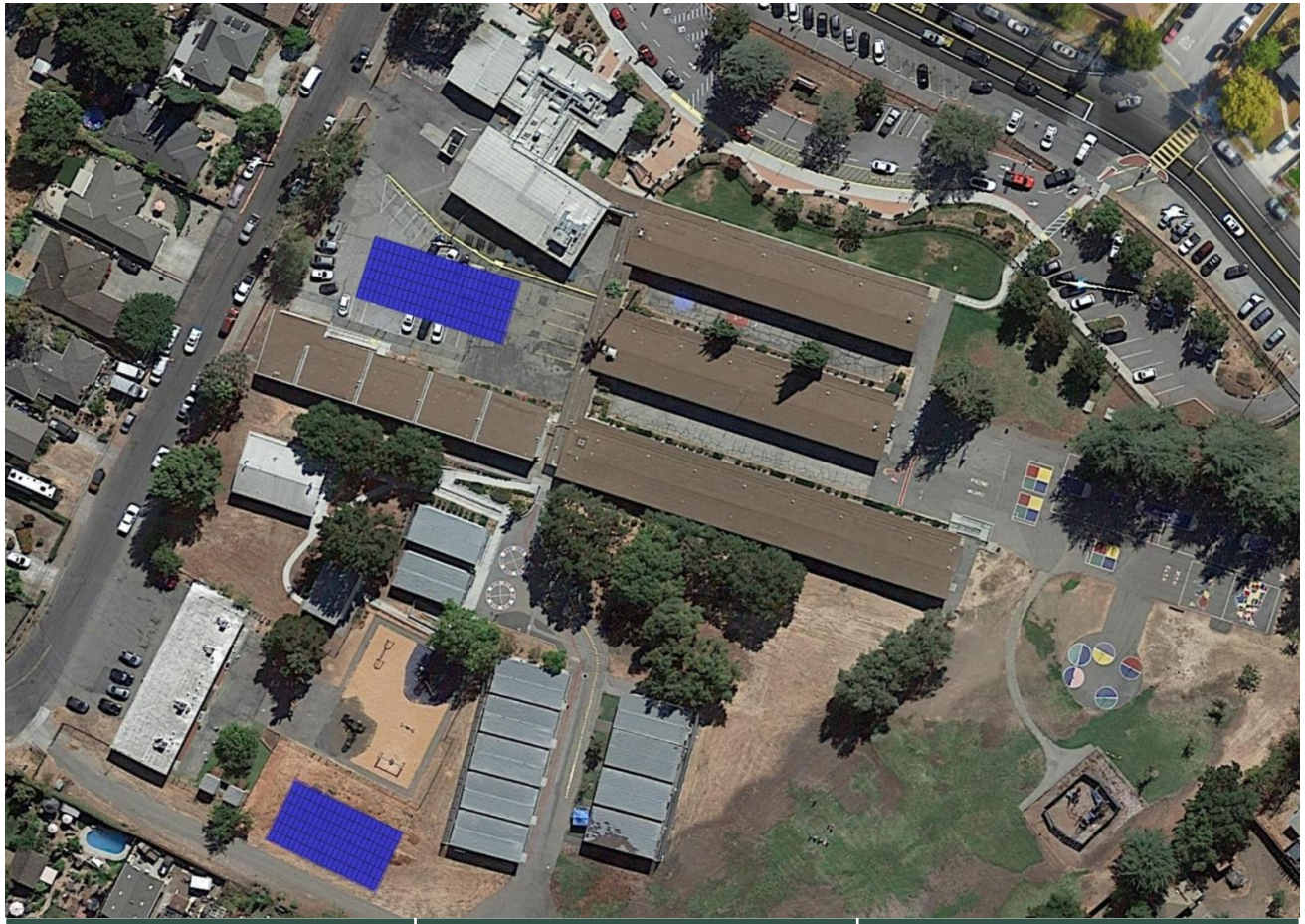




305 kW	497,000 kWh	97%
System Size	Annual Energy Production	Energy Offset

Linda Vista Elementary

100 KIRK AVE., SAN JOSE CA





129 kW	211,000 kWh	98%
System Size	Annual Energy Production	Energy Offset

Lyndale Elementary

13901 NORDYKE DR., SAN JOSE CA





191 kW	311,000 kWh	98%
System Size	Annual Energy Production	Energy Offset

Millard McCollam Elementary

3311 LUCIAN AVE., SAN JOSE CA





99 kW	162,000 kWh	98%
System Size	Annual Energy Production	Energy Offset

Hubbard Media Arts Academy

1680 FOLEY AVE., SAN JOSE CA





228 kW	371,000 kWh	98%
System Size	Annual Energy Production	Energy Offset

Ocala STEAM Academy

2800 OCALA AVE., SAN JOSE CA





252 kW	412,000 kWh	98%
System Size	Annual Energy Production	Energy Offset

Russo / McEntee Academy

2851 GAY AVE., SAN JOSE CA





104 kW	169,000 kWh	99%
System Size	Annual Energy Production	Energy Offset

Ryan STEAM Academy

1241 MCGUINNESS AVE., SAN JOSE CA





92 kW	150,000 kWh	98%
System Size	Annual Energy Production	Energy Offset

San Antonio Elementary

1855 E SAN ANTONIO ST., SAN JOSE CA



186 kW	303,000 kWh	97%
System Size	Annual Energy Production	Energy Offset



LUCHA Elementary

1711 E SAN ANTONIO ST, SAN JOSE CA





105 kW	171,000 kWh	97%
System Size	Annual Energy Production	Energy Offset

Sylvia Cassell Elementary

1300 TALLAHASSEE DR., SAN JOSE CA



143 kW	233,000 kWh	98%
System Size	Annual Energy Production	Energy Offset



Ben Painter Elementary

500 ROUGH AND READY RD., SAN JOSE CA





135 kW	220,000 kWh	97%
System Size	Annual Energy Production	Energy Offset

William Sheppard Middle School

480 ROUGH AND READY RD., SAN JOSE CA





254 kW	414,000 kWh	97%
System Size	Annual Energy Production	Energy Offset

ATTACHMENT 2 – ENERGY EFFICIENCY MEASURE DETAILS

arc ALTERNATIVES

LED Lighting Upgrades

LED1: CAMPUSWIDE LED RETROFIT

Exterior: Retrofit high pressure sodium, metal halide, incandescent and CFL fixtures exterior with LED fixtures:

1. Pole lights retrofit with similar style fixtures
2. Wallpack fixtures replaced with new LED wallpack fixtures.
3. Floodlight & canopy fixtures replaced with like style LED fixtures

Interior: Majority of scope is linear fluorescents. Several variations of project types:

1. Retrofit troffer fixtures with LED 'door kits'
2. Replace existing T8 lamps with LED tube lights (wrap & strip fixtures)
3. Retrofit recessed fixtures with LED kits
4. Replace lamps with LED lamps
5. Incorporate Occupancy sensors

LED2: TARGETED LED RETROFIT

- Same scope as campuswide, only PAC/SEL:
  - Primarily TLED retrofit of pendant fixtures
  - Strip & wrap fixtures
  - CFL Floodlights

ASSUMPTIONS AND CONSIDERATIONS

- DesignLights Consortium (DLC) approved fixtures recommended
- Fixture life >50,000 hrs, great added maintenance benefit
- CFLs could be removed from scope to improve economics



LED Lighting Upgrades - Results

Site Name	Measure ID	Measure	Electric Savings (kWh/yr)	Gas Savings (th/yr)	Cost Savings ($/yr)	Project Cost ($)	SPB (yrs)	Carbon Savings (lbs CO2e)
Adelante Academy - Ridgemont	LED1	Campuswide LED Retrofit	68,491	-	$ 23,885	$ 294,124	12.3	45,286
Alum Rock School District Office	LED1	Campuswide LED Retrofit	117,895	-	$ 38,683	$ 368,130	9.5	77,952
A. J. Dorsa Elementary	LED1	Campuswide LED Retrofit	86,802	-	$ 28,984	$ 132,245	4.6	57,394
Aptitud Academy	LED1	Campuswide LED Retrofit	72,984	-	$ 26,772	$ 215,802	8.1	48,257
Cesar Chavez Early Learning Center	LED2	Targeted LED Retrofit	6,713	-	$ 2,477	$ 10,130	4.1	4,439
Horace Cureton Elementary	LED1	Campuswide LED Retrofit	58,932	-	$ 20,254	$ 258,305	12.8	38,966
Joseph George Middle	LED1	Campuswide LED Retrofit	106,088	-	$ 36,107	$ 447,360	12.4	70,145
Lee Mathson Middle	LED1	Campuswide LED Retrofit	138,972	-	$ 43,395	$ 432,052	10.0	91,888
Lyndale Elementary	LED1	Campuswide LED Retrofit	89,178	-	$ 31,987	$ 327,477	10.2	58,965
Hubbard Media Arts Academy	LED1	Campuswide LED Retrofit	87,406	-	$ 29,295	$ 277,205	9.5	57,793
Russo / McEntee Academy	LED1	Campuswide LED Retrofit	96,100	-	$ 32,803	$ 243,082	7.4	63,541
Ryan STEAM Academy	LED1	Campuswide LED Retrofit	66,740	-	$ 24,342	$ 224,505	9.2	44,129
San Antonio Elementary	LED1	Campuswide LED Retrofit	92,794	-	$ 29,994	$ 254,680	8.5	61,355
LUCHA Elementary	LED1	Campuswide LED Retrofit	53,477	-	$ 18,757	$ 98,676	5.3	35,359
Ben Painter Elementary	LED1	Campuswide LED Retrofit	59,960	-	$ 21,102	$ 197,547	9.4	39,646
William Sheppard Middle	LED1	Campuswide LED Retrofit	114,827	-	$ 40,275	$ 338,426	8.4	75,924
Total			**1,317,359**		**$ 449,115**	**$ 4,119,746**		**871,039**

HVAC1 - PACKAGE/CABINET HEAT PUMP REPLACEMENT

- Replace older heat pump with high efficiency heat pump
- Basis of Design Bard I-TEC series; IPLV up to 16.5
- Applies primarily to cabinet style classroom units (Airedale)
- Payback generally equal to equipment life
- Recommend implement only in areas not being affected by bond program



HVAC2 - WALL MOUNT HEAT PUMP REPLACEMENT



- Replace older wall mount heat pumps with high efficiency heat pump
- Basis of Design Bard Quiet Climate series; IPLV up to 15
- Applies primarily to Bard style units, primarily classrooms
- Measure intended now
- Payback generally equal to equipment life
- Recommend implement only in areas not being affected by bond program

HVAC3 - PACKAGE UNIT REPLACEMENT

- Replace older package unit with high efficiency units
- Like for like option; Gas heating, electric cooling
- Efficiencies of 14 SEER / 82% AFUE used as basis of design
- Measure is mutually exclusive with HVAC12 (electrification option)
- Measure intended now
- Payback generally exceeds equipment life; only recommended for carbon savings



HVAC4 - REPLACE PTAC WITH DUCTLESS MINI SPLIT

- Replace Package Terminal Air Conditioner with high efficiency ductless mini split systems
- 16 SEER utilized as basis of design (conservative)
- Single zone Mitsubishi split system can be up to 30 SEER
- Payback generally less than equipment life
- Measure intended now
- Recommended where major renovation is not scheduled
- Measure is mutually exclusive with HVAC5 in classrooms (electrification)



HVAC5 - PTAC/FURNACE SYSTEM ELECTRIFICATION

- Generally applies to schools where separate heating and cooling systems serve same space, target older systems
- Measure requires wholistic approach and replacement of gas heating sources with electric and integration with cooling systems
- Variable Refrigerant Flow (VRF) basis of design to provide integrated, all electric heating and cooling
- 16 SEER utilized for calculations (conservative)
- Multi zone systems Mitsubishi City Multi® can be up to 26 IEER
- Due to extensive retrofit needs, intended at normal replacement
- Incremental cost considered
- Similar design to Dorsa (photo); recommend as District Standard design approach
- Overlaps with HVAC4 PTAC Replacement Measure



HVAC6 - REPLACE FURNACE WITH CONDENSING FURNACE

- Replace older existing furnaces with condensing furnace
- 90% AFUE utilized as basis of design
- Payback generally longer than equipment life
- Measure intended now (full cost)
- But due to long payback, recommended only if equipment
- Consider all electric approach at modernization
- Mutually exclusive with HVAC 7



HVAC7 - FURNACE ELECTRIFICATION

- Applies to heating only locker room systems at Sheppard Middle
- Measure requires wholistic approach and replacement of gas heating sources with electric and integration with cooling systems (if added)
- Variable Refrigerant Flow (VRF) basis of design to provide integrated, all electric heating and cooling (if added)
- 4.7 COP utilized for calculations (conservative)
- Multi zone systems Mitsubishi City Multi® can be up to 5.5 COP
- Alternative would be air to water heat pump (AWHP)
- Due to extensive retrofit needs, intended at normal replacement
- Incremental cost considered
- Project does not generate economic savings; only recommended for carbon savings (or in conjunction with adding cooling)
- Overlaps with HVAC6 Furnace Replacement Measure



HVAC8 - REPLACE UNIT HEATER (REZNOR) WITH GAS UNIT HEATER

- Only applies to large unit heaters (>50 MBH)
- Reznor UEZ basis of design (up to 93% AFUE)
- Payback generally longer than equipment life
- Measure intended now (full cost)
- But due to long payback, recommended only if equipment fa
- Consider all electric approach at modernization



HVAC9 - REPLACE UNIT HEATER (REZNOR) WITH ELECTRIC UNIT HEATER

- Intended for small units (<50 MBH) based on market availability
- Measure intended now (full cost)
- Project does not generate economic savings; only recommended for carbon savings



HVAC10 - REPLACE DUCTLESS MINI SPLIT

- Replace older existing ductless mini split system with high efficiency min split
- 16 SEER utilized as basis of design (conservative)
- Single zone Mitsubishi split system can be up to 30 SEER
- Payback generally less than equipment life
- Measure intended now (full cost)
- Recommended where major renovation is not scheduled



HVAC11 - SPLIT SYSTEM REPLACEMENT

- Replace older split systems with high efficiency units
- Like for like option; most are supplemental cooling only
- Efficiencies of 14 SEER / 90% AFUE used as basis of design
- Measure is mutually exclusive with HVAC12 (electrification option)
- Measure intended now
- Payback generally exceeds equipment life; only recommended for carbon savings or upon failure



HVAC12 - PACKAGE UNIT/SPLIT SYSTEM ELECTRIFICATION

- Similar to HVAC5 but, applies to schools where heating and cooling systems serve same space, target older systems
- Measure requires wholistic approach and replacement of gas/electric units with electric only
- Variable Refrigerant Flow (VRF) basis of design to provide integrated, all electric heating and cooling
- 16 SEER utilized for calculations (conservative)
- Multi zone systems Mitsubishi City Multi® can be up to 26 IEER
- Due to extensive retrofit needs, intended at normal replacement
- Incremental cost considered
- Similar design to Dorsa; recommend as District Standard design approach
- Overlaps with HVAC3 Package Unit and HVAC 11 Split System (S/S) Measures

SUMMARY OF HVAC PROJECTS BY SCHOOL – PRIMARY MEASURES

Site Name	HVAC1	HVAC2	HVAC3	HVAC4	HVAC6	HVAC8	HVAC9	HVAC10	HVAC11	Electric Savings (kWh/yr)	Gas Savings (th/yr)	Cost Savings ($/yr)	Project Cost ($)	SPB (yrs)	Carbon Savings (lbs CO2e)
Adelante Academy - Ridgemont	X	X		X						80,867	-	$ 28,201	$ 481,000	17.1	53,469
Alum Rock School District Office	X	X	X	X			X	X	X	67,847	426	$ 23,047	$ 460,750	20.0	49,841
A. J. Dorsa Elementary		X		X						24,277	-	$ 8,106	$ 169,000	20.8	16,052
Aptitud Academy	X	X	X		X			X	X	50,470	120	$ 18,675	$ 375,940	20.1	34,770
Cesar Chavez Early Learning Center		X	X						X	24,109	166	$ 9,106	$ 332,000	36.5	17,883
Adelante II Academy - Cinderella		X		X						38,740	-	$ 14,541	$ 197,500	13.6	25,615
Clyde L. Fischer Middle		X	X					X	X	31,275	51	$ 9,746	$ 220,000	22.6	21,278
Donald Meyer Elementary	X	X		X	X					46,268	30	$ 18,359	$ 561,720	30.6	30,945
Horace Cureton Elementary		X		X						35,185	-	$ 12,093	$ 307,750	25.4	23,265
Joseph George Middle	X	X		X	X			X	X	76,138	368	$ 26,369	$ 620,160	23.5	54,648
Lee Mathson Middle	X		X					X		118,458	113	$ 37,127	$ 798,750	21.5	79,640
Linda Vista Elementary	X	X	X					X	X	72,692	48	$ 29,854	$ 654,000	21.9	48,625
Lyndale Elementary	X	X	X					X		69,943	47	$ 25,183	$ 551,500	21.9	46,794
Millard McCollam Elementary		X	X	X						33,759	120	$ 13,301	$ 209,000	15.7	23,718
Hubbard Media Arts Academy	X	X	X	X		X		X	X	61,149	108	$ 20,637	$ 445,000	21.6	41,698
Ocala STEAM Academy	X	X		X	X					85,390	373	$ 28,374	$ 562,880	19.8	60,823
Russo / McEntee Academy		X		X	X	X			X	34,491	134	$ 11,937	$ 316,940	26.6	24,373
Ryan STEAM Academy		X	X	X		X	X			31,622	277	$ 11,890	$ 182,500	15.3	24,148
San Antonio Elementary			X					X		48,832	324	$ 16,165	$ 505,750	31.3	36,080
LUCHA Elementary								X	X	7,928	-	$ 2,781	$ 66,250	23.8	5,242
Sylvia Cassell Elementary	X	X								58,582	-	$ 21,196	$ 468,000	22.1	38,734
Ben Painter Elementary		X	X				X	X	X	34,373	232	$ 12,398	$ 444,750	35.9	25,437
William Sheppard Middle	X			X	X			X		95,583	154	$ 33,706	$ 711,360	21.1	64,998
Total, Primary HVAC Measures										**1,227,978**	**3,091**	**$ 432,792**	**$ 9,642,500**	**22.3**	**848,077**

SUMMARY OF HVAC PROJECTS BY SCHOOL – ELECTRIFICATION ALTERNATIVES

- Savings overlap with primary measures

Site Name	HVAC5	HVAC7	HVAC12	Electric Savings (kWh/yr)	Gas Savings (th/yr)	Cost Savings ($/yr)	Project Cost ($)	SPB (yrs)	Carbon Savings (lbs CO2e)
Aptitud Academy			x	2,000	100	$ 868	$ 5,000	5.8	2,491
Ben Painter Elementary			x	10,758	875	$ 4,922	$ 43,000	8.7	17,341
Cesar Chavez Early Learning Center			x	2,333	1,260	$ 2,447	$ 35,000	14.3	16,271
Adelante II Academy - Cinderella	x			19,018	1,364	$ 8,925	$ 76,500	8.6	28,513
Clyde L. Fischer Middle			x	(20,045)	13,250	$ 9,358	$ 166,500	17.8	141,627
Horace Cureton Elementary	x			(4,624)	2,308	$ 1,281	$ 50,250	39.2	23,918
Joseph George Middle	x			(7,610)	2,485	$ 488	$ 55,750	>50 yr SPB	24,012
Lee Mathson Middle			x	(383)	2,308	$ 2,692	$ 39,000	14.5	26,722
Linda Vista Elementary			x	5,090	1,300	$ 3,700	$ 39,000	10.5	18,565
Lyndale Elementary			x	2,293	962	$ 2,779	$ 20,500	7.4	12,756
Millard McCollam Elementary	x			(24,869)	6,924	$ (1,492)	$ 54,000	n/a	64,490
Hubbard Media Arts Academy			x	4,103	1,105	$ 2,827	$ 36,000	12.7	15,631
Ocala STEAM Academy	x			(8,626)	2,378	$ 156	$ 18,000	>50 yr SPB	22,097
Russo / McEntee Academy	x			(9,434)	2,599	$ (50)	$ 19,000	n/a	24,147
Ryan STEAM Academy	x			1,698	3,735	$ 5,426	$ 44,000	8.1	44,778
San Antonio Elementary			x	12,658	6,651	$ 11,892	$ 120,500	10.1	86,111
William Sheppard Middle		x		(7,411)	1,304	$ (1,070)	$ 32,000	n/a	10,341
Total, Electrification Alternatives				**(23,051)**	**50,906**	**$ 55,147**	**$ 854,000**	**15.5**	**579,813**

Boiler Measures

B1 – REPLACE BOILER WITH 90% EFFICIENT BOILER

- Replace existing boiler with condensing (90% efficient) boiler
- Intended now, but all instances >50 year SPB

B2 – REPLACE BOILER WITH 96% EFFICIENT BOILER

- Replace existing boiler with condensing (96% efficient) boiler
- Requires low entering water temperature water to get actual 96% efficiency, often performs lower than nameplate
- Intended now, but a few instances where SPB < EUL, but not likely before modernization.



Therefore, recommend replacement in conjunction with electrification and modernization

B3 – ELECTRIFY BOILER WITH AWHP

- Electrify with an Air to Water Heat Pump (AWHP)
- Produces low temp hot water, requires integration with loads served to run on 120-130°F water
- Intended at normal replacement, incremental cost considered
- Alternatively, remove hydronic systems and use combination of heat pumps, VRF systems and heat pump water heaters
- Project does not generate economic savings; only recommended for carbon savings

Boiler Measures

B1
(90% EFFICIENT BOILER)

Site Name	Measure ID	Measure	Electric Savings (kWh/yr)	Gas Savings (th/yr)	Cost Savings ($/yr)	Project Cost ($)	SPB (yrs)	Carbon Savings (lbs CO2e)
Adelante Academy - Ridgemont	B1	Replace Boiler with 90% Efficient Boiler 300 MBH Boiler, FCA ID 4816808	-	15	27	$ 137,019	> 50 yrs	180
Alum Rock School District Office	B1	Replace Boiler with 90% Efficient Boiler 210 MBH Boiler, FCA ID 4497614	-	66	121	$ 17,213	> 50 yrs	766
Adelante - Cinderella	B1	Replace Boiler with 90% Efficient Boiler 2750 MBH Boiler, FCA ID 4731064	-	152	198	$ 153,508	> 50 yrs	1,771
Clyde L. Fischer Middle	B1	Replace Boiler with 90% Efficient Boiler 315 MBH Boiler, FCA ID 4297570	-	62	73	$ 24,620	> 50 yrs	730
Clyde L. Fischer Middle	B1	Replace Boiler with 90% Efficient Boiler 3050 MBH Boiler, FCA ID 4294726	-	605	710	$ 155,527	> 50 yrs	7,069
Clyde L. Fischer Middle	B1	Replace Boiler with 90% Efficient Boiler 3050 MBH Boiler, FCA ID 4294738	-	605	710	$ 155,527	> 50 yrs	7,069
Clyde L. Fischer Middle	B1	Replace Boiler with 90% Efficient Boiler 1010 MBH Boiler, FCA ID 4297553	-	200	235	$ 57,597	> 50 yrs	2,341
Millard McCollam Elementary	B1	Replace Boiler with 90% Efficient Boiler 1050 MBH Boiler, FCA ID 4734956	-	351	416	$ 57,867	> 50 yrs	4,105
Millard McCollam Elementary	B1	Replace Boiler with 90% Efficient Boiler 1250 MBH Boiler, FCA ID 4734984	-	418	495	$ 59,213	> 50 yrs	4,887
William Sheppard Middle	B1	Replace Boiler with 90% Efficient Boiler 1470 MBH Boiler, FCA ID 4788751	-	155	182	$ 57,393	> 50 yrs	1,812
Subtotal, B1			**-**	**2,629**	**3,169**	**$ 875,482**	**> 50 yrs**	**30,730**

B2
(96% EFFICIENT BOILER)

Site Name	Measure ID	Measure	Electric Savings (kWh/yr)	Gas Savings (th/yr)	Cost Savings ($/yr)	Project Cost ($)	SPB (yrs)	Carbon Savings (lbs CO2e)
Adelante Academy - Ridgemont	B2	Replace with 96% Efficient Boiler 300 MBH Boiler, FCA ID 4816808	-	25	44	$ 3,720	> 50 yrs	295
Alum Rock School District Office	B2	Replace with 96% Efficient Boiler 210 MBH Boiler, FCA ID 4497614	-	107	198	$ 2,604	13	1,256
Adelante - Cinderella	B2	Replace with 96% Efficient Boiler 2750 MBH Boiler, FCA ID 4731064	-	248	326	$ 34,100	> 50 yrs	2,904
Clyde L. Fischer Middle	B2	Replace with 96% Efficient Boiler 315 MBH Boiler, FCA ID 4297570	-	102	120	$ 3,906	32	1,197
Clyde L. Fischer Middle	B2	Replace with 96% Efficient Boiler 3050 MBH Boiler, FCA ID 4294726	-	992	1,165	$ 37,820	32	11,593
Clyde L. Fischer Middle	B2	Replace with 96% Efficient Boiler 3050 MBH Boiler, FCA ID 4294738	-	992	1,165	$ 37,820	32	11,593
Clyde L. Fischer Middle	B2	Replace with 96% Efficient Boiler 1010 MBH Boiler, FCA ID 4297553	-	328	386	$ 12,524	32	3,839
Millard McCollam Elementary	B2	Replace with 96% Efficient Boiler 1050 MBH Boiler, FCA ID 4734956	-	576	682	$ 13,020	19	6,733
Millard McCollam Elementary	B2	Replace with 96% Efficient Boiler 1250 MBH Boiler, FCA ID 4734984	-	686	812	$ 15,500	19	8,015
William Sheppard Middle	B2	Replace with 96% Efficient Boiler 1470 MBH Boiler, FCA ID 4788751	-	254	298	$ 18,228	> 50 yrs	2,971
Subtotal, B2			**-**	**4,311**	**5,197**	**$ 179,242**	**34**	**50,398**

B3
(ELECTRIFICATION)

Site Name	Measure ID	Measure	Electric Savings (kWh/yr)	Gas Savings (th/yr)	Cost Savings ($/yr)	Project Cost ($)	SPB (yrs)	Carbon Savings (lbs CO2e)
Adelante Academy - Ridgemont	B3	Electrify Boiler with AWHP 300 MBH Boiler, FCA ID 4816808	(1,805)	154	(360)	$ 4,500	n/a	607
Alum Rock School District Office	B3	Electrify Boiler with AWHP 210 MBH Boiler, FCA ID 4497614	(7,680)	655	(1,312)	$ 3,150	n/a	2,582
Adelante - Cinderella	B3	Electrify Boiler with AWHP 2750 MBH Boiler, FCA ID 4731064	(17,756)	1,515	(4,680)	$ 41,250	n/a	5,969
Clyde L. Fischer Middle	B3	Electrify Boiler with AWHP 315 MBH Boiler, FCA ID 4297570	(7,320)	625	(1,533)	$ 4,725	n/a	2,461
Clyde L. Fischer Middle	B3	Electrify Boiler with AWHP 3050 MBH Boiler, FCA ID 4294726	(70,876)	6,047	(14,846)	$ 45,750	n/a	23,827
Clyde L. Fischer Middle	B3	Electrify Boiler with AWHP 3050 MBH Boiler, FCA ID 4294738	(70,876)	6,047	(14,846)	$ 45,750	n/a	23,827
Clyde L. Fischer Middle	B3	Electrify Boiler with AWHP 1010 MBH Boiler, FCA ID 4297553	(23,470)	2,003	(4,916)	$ 15,150	n/a	7,890
Millard McCollam Elementary	B3	Electrify Boiler with AWHP 1050 MBH Boiler, FCA ID 4734956	(41,161)	3,512	(11,885)	$ 15,750	n/a	13,838
Millard McCollam Elementary	B3	Electrify Boiler with AWHP 1250 MBH Boiler, FCA ID 4734984	(49,001)	4,181	(14,149)	$ 18,750	n/a	16,473
William Sheppard Middle	B3	Electrify Boiler with AWHP 1470 MBH Boiler, FCA ID 4788751	(18,166)	1,550	(4,554)	$ 22,050	n/a	6,107
Subtotal, B3			**(308,111)**	**26,289**	**(73,080)**	**$ 216,825**	**n/a**	**103,582**

WH1-5 – REPLACE GAS WATER HEATER WITH HEAT PUMP WA HEATER



- Replace existing gas water heater with heat pump water heater
- COP generally ranges 2.5-3.0
- Compared to electric resistance water heater COP of 1.0
- Intended now, but project does not generate economic savings
- Only recommended for carbon savings
- Measures 1 thru 5 are based on size:

Measure Name	Description
WH1	Replace with 30 Gal Heat Pump Water Heater
WH2	Replace with 40 Gal Heat Pump Water Heater
WH3	Replace with 50 Gal Heat Pump Water Heater
WH4	Replace with 60 Gal Heat Pump Water Heater
WH5	Replace with 75 Gal Heat Pump Water Heater

Water Heater Measures

Site Name	Measure ID	Measure	Electric Savings (kWh/yr)	Gas Savings (th/yr)	Cost Savings ($/yr)	Project Cost ($)	SPB (yrs)	Carbon Savings (lbs CO2e)
Adelante Academy - Ridgemont	WH5	Replace with 75 Gal Heat Pump Water Heater, FCA ID 4816783	(8,070)	967	-$18	$3,704	N/A	5,968
Alum Rock School District Office	WH1	Replace with 30 Gal Heat Pump Water Heater, FCA ID 4497636	(6,480)	715	-$202	$2,757	N/A	4,073
Alum Rock School District Office	WH3	Replace with 50 Gal Heat Pump Water Heater, FCA ID 4498294	(6,480)	709	-$344	$2,900	N/A	4,003
Alum Rock School District Office	WH1	Replace with 30 Gal Heat Pump Water Heater, FCA ID 4525589	(6,480)	715	-$202	$2,757	N/A	4,073
A. J. Dorsa Elementary	WH5	Replace with 75 Gal Heat Pump Water Heater, FCA ID 4576801	(8,070)	967	-$83	$3,769	N/A	5,968
Aptitud Academy	WH4	Replace with 60 Gal Heat Pump Water Heater, FCA ID 4540950	(7,150)	741	-$203	$3,313	N/A	3,934
Cesar Chavez Early Learning Center	WH5	Replace with 75 Gal Heat Pump Water Heater, FCA ID 4737567	(8,070)	967	-$509	$4,196	N/A	5,968
Cesar Chavez Early Learning Center	WH2	Replace with 40 Gal Heat Pump Water Heater, FCA ID 4737589	(6,480)	707	-$317	$2,872	N/A	3,980
Adelante II Academy - Cinderella	WH4	Replace with 60 Gal Heat Pump Water Heater, FCA ID 4731173	(7,150)	741	-$350	$3,461	N/A	3,934
Clyde L. Fischer Middle	WH5	Replace with 75 Gal Heat Pump Water Heater, FCA ID 4294739	(8,070)	967	-$1,363	$5,050	N/A	5,968
Donald Meyer Elementary	WH3	Replace with 50 Gal Heat Pump Water Heater, FCA ID 4661572	(6,480)	709	-$38	$2,593	N/A	4,003
Horace Cureton Elementary	WH5	Replace with 75 Gal Heat Pump Water Heater, FCA ID 4585912	(8,070)	967	-$412	$4,099	N/A	5,968
Joseph George Middle	WH5	Replace with 75 Gal Heat Pump Water Heater, FCA ID 4883721	(8,070)	967	-$333	$4,019	N/A	5,968
Joseph George Middle	WH2	Replace with 40 Gal Heat Pump Water Heater, FCA ID 4870854	(6,480)	707	-$209	$2,764	N/A	3,980
Lee Mathson Middle	WH5	Replace with 75 Gal Heat Pump Water Heater, FCA ID 4589967	(8,070)	967	-$438	$4,125	N/A	5,968
Linda Vista Elementary	WH5	Replace with 75 Gal Heat Pump Water Heater, FCA ID 4540682	(8,070)	967	-$184	$3,870	N/A	5,968
Linda Vista Elementary	WH5	Replace with 75 Gal Heat Pump Water Heater, FCA ID 4540768	(8,070)	967	-$184	$3,870	N/A	5,968
Lyndale Elementary	WH3	Replace with 50 Gal Heat Pump Water Heater, FCA ID 4795513	(6,480)	709	-$224	$2,779	N/A	4,003
Millard McCollam Elementary	WH5	Replace with 75 Gal Heat Pump Water Heater, FCA ID 4735097	(8,070)	967	-$1,591	$5,278	N/A	5,968
Hubbard Media Arts Academy	WH5	Replace with 75 Gal Heat Pump Water Heater, FCA ID 4557749	(8,070)	967	-$233	$3,919	N/A	5,968
Ocala STEAM Academy	WH3	Replace with 50 Gal Heat Pump Water Heater, FCA ID 4733167	(6,480)	709	-$128	$2,683	N/A	4,003
Ocala STEAM Academy	WH5	Replace with 75 Gal Heat Pump Water Heater, FCA ID 4862604	(8,070)	967	-$163	$3,850	N/A	5,968
Ocala STEAM Academy	WH5	Replace with 75 Gal Heat Pump Water Heater, FCA ID 4862603	(8,070)	967	-$163	$3,850	N/A	5,968
Russo / McEntee Academy	WH3	Replace with 50 Gal Heat Pump Water Heater, FCA ID 4744425	(6,480)	709	-$658	$3,213	N/A	4,003
Ryan STEAM Academy	WH3	Replace with 50 Gal Heat Pump Water Heater, FCA ID 4559738	(6,480)	709	-$915	$3,470	N/A	4,003
San Antonio Elementary	WH5	Replace with 75 Gal Heat Pump Water Heater, FCA ID 4581654	(8,070)	967	-$1,260	$4,946	N/A	5,968
LUCHA Elementary	WH2	Replace with 40 Gal Heat Pump Water Heater, FCA ID 4471418	(6,480)	707	-$187	$2,743	N/A	3,980
William Sheppard Middle	WH2	Replace with 40 Gal Heat Pump Water Heater, FCA ID 4788768	(6,480)	707	-$304	$2,860	N/A	3,980
Subtotal, Water Heaters			**(205,040)**	**23,532**	**-$11,218**	**$99,710**	**N/A**	**139,501**

EMS UPGRADES

- There are three baselines for existing EMS at school sites:
  - Alerton IBEX, a modem-based system, which is no longer supported and failing
  - Alterton BACtalk, an internet-based system, which appears to communicate sporadically (was down during site visits) and used for basic temperature and scheduling
  - Local controls only, which are a mix of programmable and non-programmable thermostat



- Four measures were evaluated:
  - EMS1: Install new EMS such as Alerton Compass2, for the case where there are local controls only and HVAC units can be integrated with an EMS. This excludes sites where PTAC units are prevalent.
  - EMS2: Upgrade IBEX to the currently available technology, which will replace the dial-up modem access and add capabilities
  - EMS3: Upgrade BACTalk to currently available technology, which would add capabilities and address the intermittent communications issues experienced.
  - EMS4: Upgrade EMS at modernization, to address the schools where the majority of units (PTACs) will not be easily integrated into an EMS.

EMS UPGRADES (CONTINUED)

- Considerations
  - Unfortunately, due to high project costs and some level of control existing already, no measures are economically viable.
  - Recommend integrating a district standard for control systems into the modernization, when most equipment will be replaced. The incremental cost at that time could be considered and will provide better project economics.

Site Name	Measure ID	Measure	Electric Savings (kWh/yr)	Gas Savings (th/yr)	Cost Savings ($/yr)	Project Cost ($)	SPB (yrs)	Carbon Savings (lbs CO2e)
Adelante Academy - Ridgemont	EMS2	Upgrade IBEX	9,840	10	$ 3,449	$ 144,500	42	6,623
Alum Rock School District Office	EMS4	Upgrade EMS at modernization	4,345	83	$ 1,579	$ 284,000	> 50 yrs	3,843
A. J. Dorsa Elementary	EMS3	Upgrade BACtalk	6,564	31	$ 2,236	$ 136,000	> 50 yrs	4,702
Aptitud Academy	EMS2	Upgrade IBEX	5,953	58	$ 2,262	$ 116,500	> 50 yrs	4,614
Cesar Chavez Early Learning Center	EMS4	Upgrade EMS at modernization	1,224	54	$ 520	$ 152,000	> 50 yrs	1,441
Adelante II Academy - Cinderella	EMS4	Upgrade EMS at modernization	1,284	19	$ 507	$ 164,000	> 50 yrs	1,071
Clyde L. Fischer Middle	EMS1	Install New EMS	25,085	1,394	$ 9,406	$ 312,000	33	32,881
Donald Meyer Elementary	EMS2	Upgrade IBEX	5,151	17	$ 2,074	$ 151,500	> 50 yrs	3,605
Horace Cureton Elementary	EMS4	Upgrade EMS at modernization	1,121	32	$ 425	$ 256,000	> 50 yrs	1,115
Joseph George Middle	EMS2	Upgrade IBEX	11,658	201	$ 4,217	$ 193,500	46	10,058
Lee Mathson Middle	EMS3	Upgrade BACtalk	12,048	160	$ 3,957	$ 89,500	23	9,836
Linda Vista Elementary	EMS3	Upgrade BACtalk	7,340	85	$ 3,114	$ 74,500	24	5,847
Lyndale Elementary	EMS2	Upgrade IBEX	9,432	114	$ 3,615	$ 151,500	42	7,569
Millard McCollam Elementary	EMS2	Upgrade IBEX	4,900	486	$ 2,486	$ 78,000	31	8,921
Hubbard Media Arts Academy	EMS3	Upgrade BACtalk	8,995	79	$ 3,119	$ 80,500	26	6,871
Ocala STEAM Academy	EMS2	Upgrade IBEX	13,439	186	$ 4,625	$ 162,000	35	11,060
Russo / McEntee Academy	EMS4	Upgrade EMS at modernization	1,086	44	$ 424	$ 132,000	> 50 yrs	1,232
Ryan STEAM Academy	EMS4	Upgrade EMS at modernization	1,090	56	$ 470	$ 152,000	> 50 yrs	1,375
San Antonio Elementary	EMS3	Upgrade BACtalk	7,344	417	$ 2,863	$ 64,000	22	9,730
LUCHA Elementary	EMS3	Upgrade BACtalk	4,152	46	$ 1,510	$ 32,500	22	3,283
Sylvia Cassell Elementary	EMS2	Upgrade IBEX	7,870	-	$ 2,848	$ 183,000	> 50 yrs	5,204
Ben Painter Elementary	EMS2	Upgrade IBEX	6,670	84	$ 2,456	$ 151,500	> 50 yrs	5,392
William Sheppard Middle	EMS3	Upgrade BACtalk	10,026	78	$ 3,608	$ 74,500	21	7,541
Total, EMS Upgrades			166,617	3,734	$ 61,769	$3,335,500	> 50 yrs	153,815

INSTALL PROGRAMMABLE THERMOSTATS

- Local thermostats are being installed as controls fail
- Many thermostats observed are non-programmable
- Programmable thermostats would remove occupant control, ensuring temperature setpoints and schedules are maintained
- A comprehensive project to replace non-programmable thermostats is not of a scale that will be economically viable, so we recommend installing programmable thermostats as opportunities arise

Site Name	Measure ID	Measure	Electric Savings (kWh/yr)	Gas Savings (th/yr)	Cost Savings ($/yr)	Project Cost ($)	SPB (yrs)	Carbon Savings (lbs CO2e)
Adelante Academy - Ridgemont	Ptstat	Install programmable Thermostat	266	-	$ 93	$ 300	3	176
Alum Rock School District Office	Ptstat	Install programmable Thermostat	329	-	$ 108	$ 300	3	218
A. J. Dorsa Elementary	Ptstat	Install programmable Thermostat	98	-	$ 33	$ 300	9	65
Aptitud Academy	Ptstat	Install programmable Thermostat	205	-	$ 75	$ 300	4	136
Cesar Chavez Early Learning Center	Ptstat	Install programmable Thermostat	186	-	$ 68	$ 300	4	123
Adelante II Academy - Cinderella	Ptstat	Install programmable Thermostat	178	-	$ 67	$ 300	4	118
Clyde L. Fischer Middle	Ptstat	Install programmable Thermostat	229	-	$ 71	$ 300	4	151
Donald Meyer Elementary	Ptstat	Install programmable Thermostat	132	-	$ 52	$ 300	6	87
Horace Cureton Elementary	Ptstat	Install programmable Thermostat	95	-	$ 33	$ 300	9	63
Joseph George Middle	Ptstat	Install programmable Thermostat	229	-	$ 78	$ 300	4	151
Lee Mathson Middle	Ptstat	Install programmable Thermostat	284	-	$ 89	$ 300	3	188
Linda Vista Elementary	Ptstat	Install programmable Thermostat	213	-	$ 87	$ 300	3	141
Lyndale Elementary	Ptstat	Install programmable Thermostat	242	-	$ 87	$ 300	3	160
Millard McCollam Elementary	Ptstat	Install programmable Thermostat	272	-	$ 106	$ 300	3	180
Hubbard Media Arts Academy	Ptstat	Install programmable Thermostat	239	-	$ 80	$ 300	4	158
Ocala STEAM Academy	Ptstat	Install programmable Thermostat	320	-	$ 105	$ 300	3	212
Russo / McEntee Academy	Ptstat	Install programmable Thermostat	194	-	$ 66	$ 300	5	128
Ryan STEAM Academy	Ptstat	Install programmable Thermostat	165	-	$ 60	$ 300	5	109
San Antonio Elementary	Ptstat	Install programmable Thermostat	255	-	$ 82	$ 300	4	169
LUCHA Elementary	Ptstat	Install programmable Thermostat	346	-	$ 121	$ 300	2	229
Sylvia Cassell Elementary	Ptstat	Install programmable Thermostat	164	-	$ 59	$ 300	5	108
Ben Painter Elementary	Ptstat	Install programmable Thermostat	171	-	$ 60	$ 300	5	113
William Sheppard Middle	Ptstat	Install programmable Thermostat	291	-	$ 102	$ 300	3	193

Kitchen Equipment

Most replacements of kitchen equipment exceed EUL of equipment (Food Warmers, Freezers, Refrigerators, Exhaust Hoods etc)

Two types of equipment warrant consideration

FS1/FS2 – REPLACE DISHWASHER WITH TIER 1/TIER 2 COMMERCIAL DISHWASHER

- Energy Star Tier 2 recommended over Tier 1
- Intended now, full cost considered. SPB approximately equal to life of equipment
- Also looked at normal replacement, incremental cost yields very good economics

FS3 – REPLACE GAS CONVECTION OVEN WITH ELECTRIC CONVECTION OVEN

- Indicative savings figures evaluated provided
- Intended now, full cost considered
- Project does not generate economic savings; only recommended for carbon savings
- Could be considered with modernization to eliminate gas from site



Kitchen Equipment – Dishwasher Savings

Site Name	Measure ID	Measure	Electric Savings (kWh/yr)	Gas Savings (th/yr)	Cost Savings ($/yr)	Project Cost ($)	SPB (yrs)	Carbon Savings (lbs CO2e)
A. J. Dorsa Elementary	FS1	Tier 1 Dishwasher (Full Cost)	135	190	$315	$4,578	14.5	2,310
Adelante II Academy - Cinderella	FS1	Tier 1 Dishwasher (Full Cost)	135	190	$300	$4,578	15.3	2,310
Donald Meyer Elementary	FS1	Tier 1 Dishwasher (Full Cost)	135	190	$475	$4,578	9.6	2,310
Joseph George Middle	FS1	Tier 1 Dishwasher (Full Cost)	135	190	$281	$4,578	16.3	2,310
Lyndale Elementary	FS1	Tier 1 Dishwasher (Full Cost)	135	190	$435	$4,578	10.5	2,310
Millard McCollam Elementary	FS1	Tier 1 Dishwasher (Full Cost)	135	190	$278	$4,578	16.5	2,310
Russo / McEntee Academy	FS1	Tier 1 Dishwasher (Full Cost)	135	190	$278	$4,578	16.5	2,310
LUCHA Elementary	FS1	Tier 1 Dishwasher (Full Cost)	135	190	$270	$4,578	16.9	2,310
Subtotal, FS1 - Full Cost			**1,080**	**1,520**	**$2,632**	**$36,625**	**13.9**	**18,482**
A. J. Dorsa Elementary	FS2	Tier 2 Dishwasher (Full Cost)	186	262	$435	$6,054	13.9	3,186
Adelante II Academy - Cinderella	FS2	Tier 2 Dishwasher (Full Cost)	186	262	$413	$6,054	14.7	3,186
Donald Meyer Elementary	FS2	Tier 2 Dishwasher (Full Cost)	186	262	$655	$6,054	9.2	3,186
Joseph George Middle	FS2	Tier 2 Dishwasher (Full Cost)	186	262	$388	$6,054	15.6	3,186
Lyndale Elementary	FS2	Tier 2 Dishwasher (Full Cost)	186	262	$600	$6,054	10.1	3,186
Millard McCollam Elementary	FS2	Tier 2 Dishwasher (Full Cost)	186	262	$383	$6,054	15.8	3,186
Russo / McEntee Academy	FS2	Tier 2 Dishwasher (Full Cost)	186	262	$383	$6,054	15.8	3,186
LUCHA Elementary	FS2	Tier 2 Dishwasher (Full Cost)	186	262	$373	$6,054	16.3	3,186
Subtotal, FS2 - Full Cost			**1,488**	**2,096**	**$3,629**	**$48,429**	**13.3**	**25,485**
A. J. Dorsa Elementary	FS1	Tier 1 Dishwasher (Incremental Cost)	135	190	$315	$267	0.8	2,310
Adelante II Academy - Cinderella	FS1	Tier 1 Dishwasher (Incremental Cost)	135	190	$300	$267	0.9	2,310
Donald Meyer Elementary	FS1	Tier 1 Dishwasher (Incremental Cost)	135	190	$475	$267	0.6	2,310
Joseph George Middle	FS1	Tier 1 Dishwasher (Incremental Cost)	135	190	$281	$267	1.0	2,310
Lyndale Elementary	FS1	Tier 1 Dishwasher (Incremental Cost)	135	190	$435	$267	0.6	2,310
Millard McCollam Elementary	FS1	Tier 1 Dishwasher (Incremental Cost)	135	190	$278	$267	1.0	2,310
Russo / McEntee Academy	FS1	Tier 1 Dishwasher (Incremental Cost)	135	190	$278	$267	1.0	2,310
LUCHA Elementary	FS1	Tier 1 Dishwasher (Incremental Cost)	135	190	$270	$267	1.0	2,310
Subtotal, FS1 - Incremental Cost			**1,080**	**1,520**	**$2,632**	**$2,138**	**0.8**	**18,482**
A. J. Dorsa Elementary	FS2	Tier 2 Dishwasher (Incremental Cost)	186	262	$435	$1,743	4.0	3,186
Adelante II Academy - Cinderella	FS2	Tier 2 Dishwasher (Incremental Cost)	186	262	$413	$1,743	4.2	3,186
Donald Meyer Elementary	FS2	Tier 2 Dishwasher (Incremental Cost)	186	262	$655	$1,743	2.7	3,186
Joseph George Middle	FS2	Tier 2 Dishwasher (Incremental Cost)	186	262	$388	$1,743	4.5	3,186
Lyndale Elementary	FS2	Tier 2 Dishwasher (Incremental Cost)	186	262	$600	$1,743	2.9	3,186
Millard McCollam Elementary	FS2	Tier 2 Dishwasher (Incremental Cost)	186	262	$383	$1,743	4.6	3,186
Russo / McEntee Academy	FS2	Tier 2 Dishwasher (Incremental Cost)	186	262	$383	$1,743	4.6	3,186
LUCHA Elementary	FS2	Tier 2 Dishwasher (Incremental Cost)	186	262	$373	$1,743	4.7	3,186
Subtotal, FS2 - Incremental Cost			**1,488**	**2,096**	**$3,629**	**$13,942**	**3.8**	**25,485**

Kitchen Equipment – Oven Savings

Indicative savings by site shown below

Carbon Savings = 2,642 lbs CO2e/year/oven

Site Name	Ave Elect Cost ($/kWh)*	Ave Gas Cost ($/therm)**	Cost Savings, Per Oven
Adelante Academy - Ridgemont	$0.349	$1.747	($1,262)
Alum Rock School District Office	$0.328	$1.843	($1,068)
A. J. Dorsa Elementary	$0.334	$1.423	($1,359)
Aptitud Academy	$0.367	$1.344	($1,624)
Cesar Chavez Early Learning Center	$0.369	$1.259	($1,690)
Adelante II Academy - Cinderella	$0.375	$1.310	($1,701)
Clyde L. Fischer Middle	$0.310	$1.175	($1,347)
Donald Meyer Elementary	$0.395	$2.220	($1,287)
Horace Cureton Elementary	$0.344	$1.244	($1,531)
Joseph George Middle	$0.340	$1.238	($1,512)
Lee Mathson Middle	$0.312	$1.218	($1,338)
Linda Vista Elementary	$0.410	$1.241	($1,972)
Lyndale Elementary	$0.359	$2.035	($1,155)
Millard McCollam Elementary	$0.390	$1.185	($1,873)
Hubbard Media Arts Academy	$0.335	$1.314	($1,433)
Ocala STEAM Academy	$0.327	$1.251	($1,415)
Russo / McEntee Academy	$0.341	$1.219	($1,530)
Ryan STEAM Academy	$0.365	$1.287	($1,645)
San Antonio Elementary	$0.323	$1.173	($1,438)
LUCHA Elementary	$0.351	$1.173	($1,621)
Sylvia Cassell Elementary	$0.362	$0.000	($2,399)
Ben Painter Elementary	$0.352	$1.298	($1,553)
William Sheppard Middle	$0.351	$1.173	($1,621)
Average	$0.351	$1.301	($1,547)