BAYREN

Local Governments Empowering Our Communities

Energy Roadmap

Prepared for the City of Cupertino
December 8, 2025

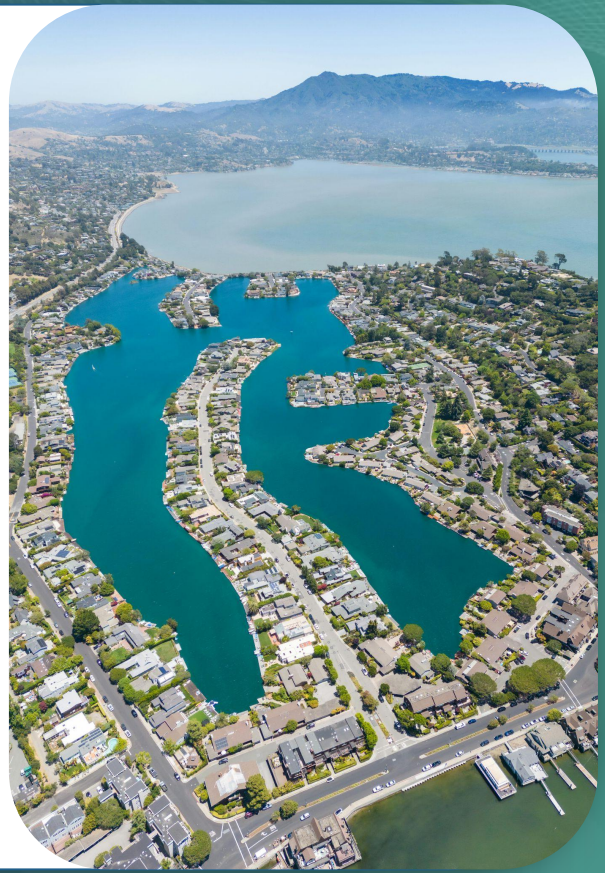


Table of Contents

Executive Summary

The **Bay Area Regional Energy Network** (BayREN) is pleased to provide this comprehensive Energy Roadmap to the **City of Cupertino**.

BayREN assessed the **Library, Quinlan Community Center, Sports Center, Senior Center, and Blackberry Farm Recreation + Pool** for energy and resilience upgrades and developed this report to provide tailored recommendations for enhancing resilience, reducing emissions, and saving on energy costs. BayREN looks forward to supporting the City of Cupertino as it advances these energy initiatives.

BayREN's Energy Roadmapping service helps local governments and special districts (“agencies”) identify, plan, and prioritize integrated energy and resilience projects. Roadmaps help agencies overcome challenges and navigate the evolving landscape of energy resilience and sustainability planning. Administered by the Association of Bay Area Governments (ABAG) and established under the guidance of the California Public Utilities Commission, BayREN supports eligible agencies across the Bay Area in saving energy, reducing operating costs, and advancing sustainability goals.

BAYREN

Community Profile

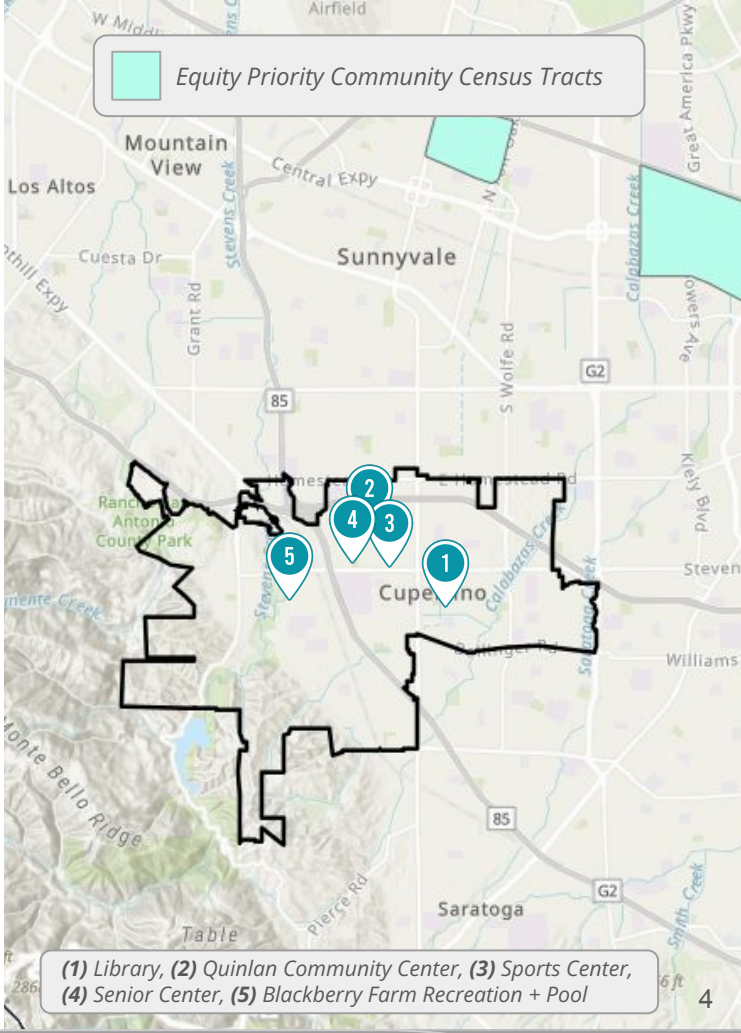
City of Cupertino

Incorporated in 1955, the City of Cupertino experienced significant population growth during the late 1940s after World War II. Now, the City of Cupertino is home to one of the largest technology companies in the world, Apple, Inc. The City has become the heart of Silicon Valley, attracting numerous high-tech companies whose highly skilled employees both work and live in the area.

Population	*Population Growth since 2010*	*Under 18 and 65+*
57,700	**3%**	**37%**

While the five buildings included in Cupertino's roadmap are not physically located in Equity Priority Communities, 19% of Santa Clara County's population reside in Equity Priority Community census tracts.

**Equity Priority Communities include California's most disadvantaged communities and low-income communities and households*



***(1)** Library, **(2)** Quinlan Community Center, **(3)** Sports Center, **(4)** Senior Center, **(5)** Blackberry Farm Recreation + Pool*

Climate & Energy Goals

City of Cupertino

City of Cupertino's Climate Action Plan (CAP) was adopted in 2022 and outlines strategies for building community climate resilience. Energy-related goals from the CAP include:

Increase electrification for both residential and commercial buildings by retrofitting existing buildings and requiring new construction to be electric

Engage with Bay Area Air District (BAAD) to coordinate a plan for emergency and baseload power generation systems

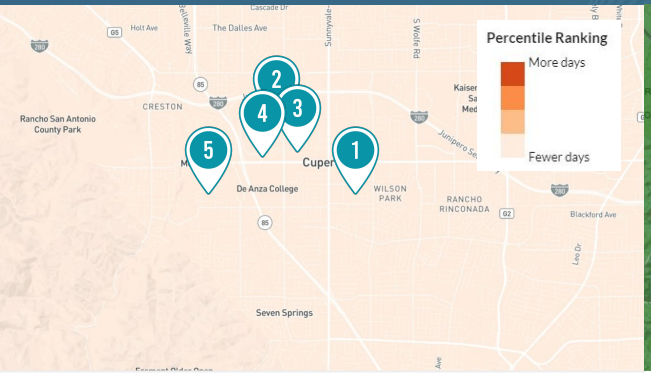
Increase Zero Emissions Vehicles (ZEV) adoption to 100% for all vehicles by 2040

Greenhouse Gas (GHG) Emissions Reduction Goal:

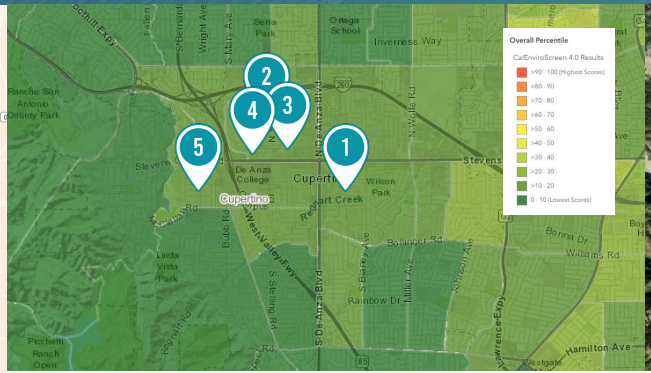
Net Zero by 2040

Climate Vulnerabilities

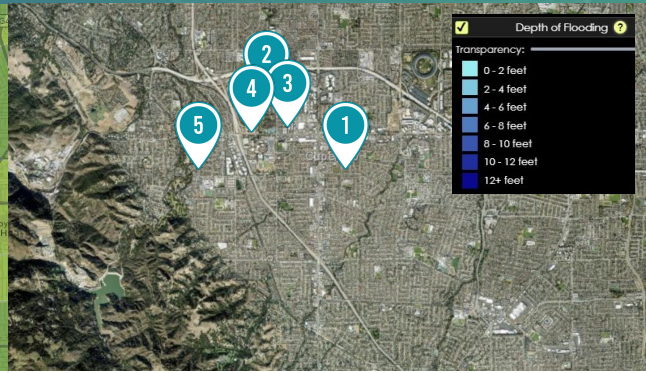
City of Cupertino



California Healthy Places Index: Extreme Heat Edition (2022)



CalEnviroScreen 4.0 (2021)



Adapting to Rising Tides (ART) Sea Level Rise and Shoreline Analysis (2019)

Extreme Heat Days: 29

- Compared to County score: 16

Projected number of days above 90°F by 2035 (CalAdapt)

Heat Vulnerability: 23

- Compared to County score: 40

Heat Health Action Index is a weighted average of indicators that represents heat vulnerability (California Heat Assessment Tool)

Pollution Burden: 10

- Compared to County score: 17
- 14th Percentile compared to other cities in California
- Highest sources of pollution: traffic, cleanup sites, groundwater

Average of the potential exposures to pollutants and the adverse environmental conditions caused by pollution (CalEnviroScreen)

Flooding Risks:

- Coastal: No Rating
- Riverine: Very Low

Wildfire Risk: Very Low

Baseline risk measurements (FEMA National Risk Index)

The map above represents the impact of 36" sea-level rise with no additional storm surge (Adapting to Rising Tides, ART)

Local jurisdiction scores are calculated using City of Cupertino. County scores are calculated using the average of all census tracts within the county where the local jurisdiction is located.

Grid Reliability

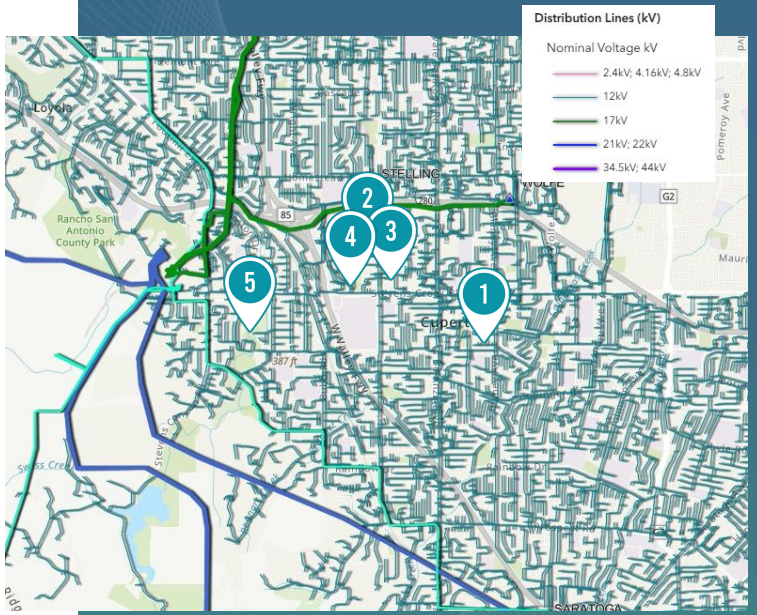
City of Cupertino

Power outages directly impact the reliability and availability of a building's energy and cooling capability. Electric grid system reliability is routinely measured and reported by electric utilities and typically falls into two categories:

Duration = amount of time (in minutes) the avg. customer experienced power outages or interruptions in a given year

Frequency = number of times the avg. customer experienced a "sustained outage" (longer than 5 minutes) in a given year

PG&E Region 3: Mission Division		
Year	**Outage Duration**	**Outage Frequency**
2021	121	0.8
2022	121	1.0
2023	173	1.0
2024	211	1.6
4-year Avg.	**157 minutes**	**1.1**



Electricity distribution lines from PG&E's Grid Resource Integration Portal

PG&E Circuits Serving Your Buildings:
Stelling 1104, 1107, 1110
Wolfe 1109

7
Number of Outages Recorded^ (2021 - 2024)
^Circuit: Stelling 1110

2064
*Average Load Hosting Capacity (kW)**

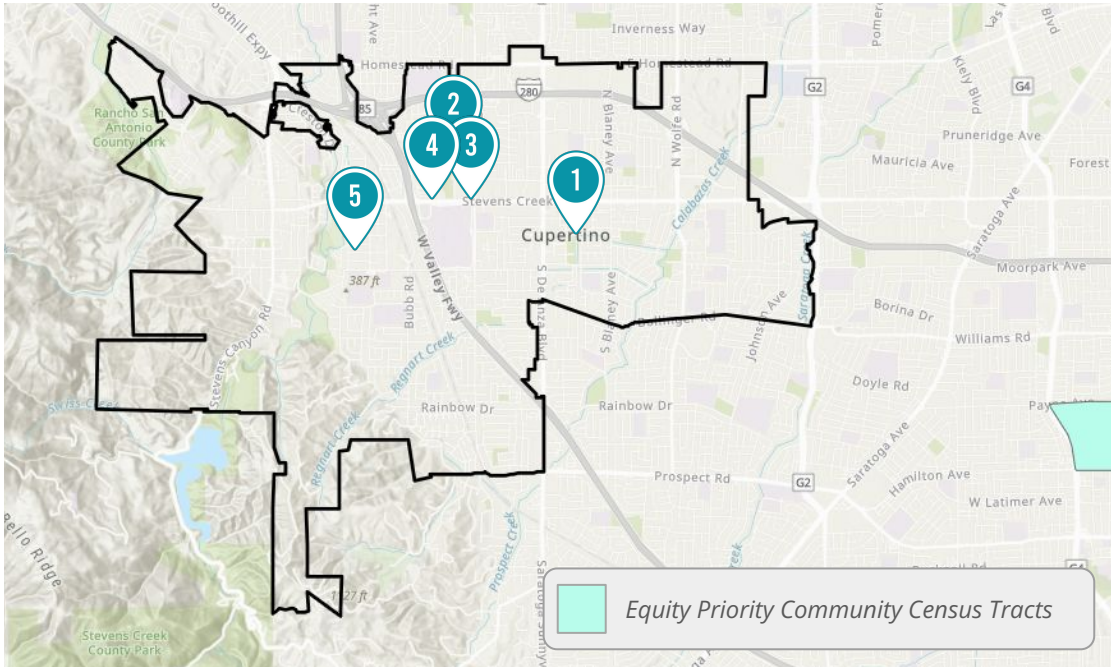
1518
*Average Generation Hosting Capacity (kW)***

**Load Hosting Capacity: Maximum additional electrical load (kW) that can be connected to a circuit without triggering grid upgrades or reliability issues.*
***Generation Hosting Capacity: Maximum generation (kW) from sources like solar & batteries that can be added without exceeding the grid's operational limits.*

Featured Buildings

City of Cupertino

The Library, Quinlan Community Center, Sports Center, Senior Center, and Blackberry Farm Recreation + Pool are included in City of Cupertino's Energy Roadmap.



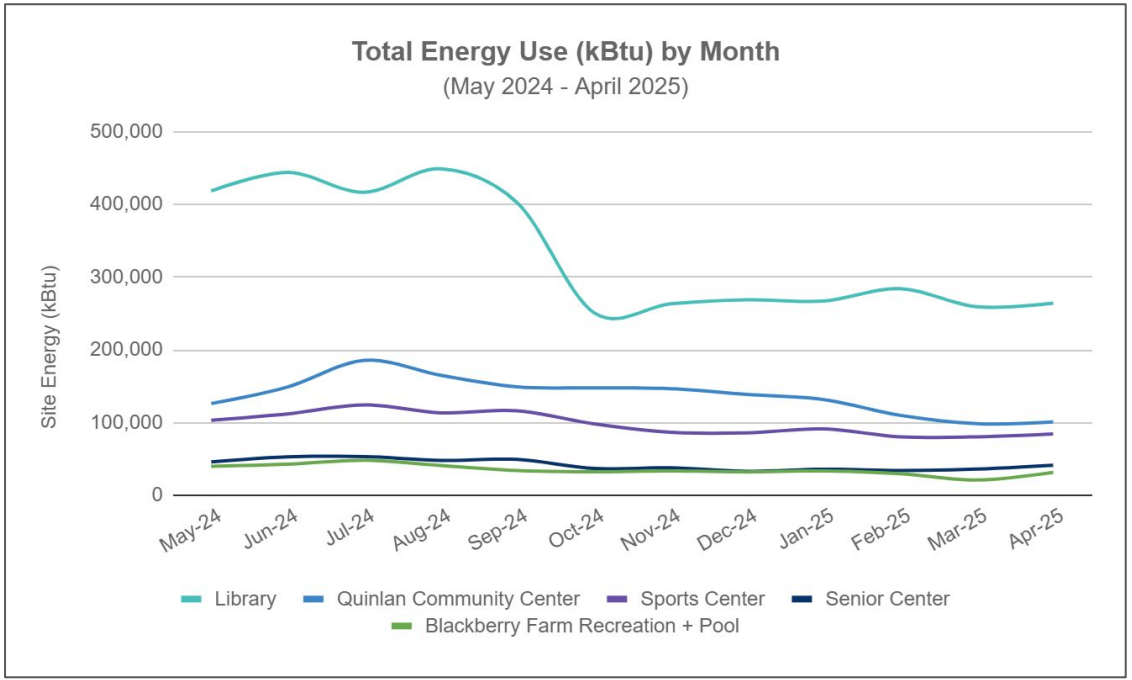
City of Cupertino building locations

The City of Cupertino selected the following buildings for inclusion in the Roadmap:

1. The **Library** is an existing cooling and resilience center for public use, located at 10800 Torre Ave.
2. The **Quinlan Community Center** is an existing cooling center for public use, and Emergency Operations Center (EOC) for staff, located at 10185 N Stelling Rd.
3. The **Sports Center** is a public building located at 21111 Stevens Creek Blvd.
4. The **Senior Center** is a public building located at 21251 Stevens Creek Blvd.
5. The **Blackberry Farm Recreation + Pool** are public facilities located at 21979 San Fernando Ave.

Featured Buildings - Energy Use Comparison

City of Cupertino



Note: The chart on this page converts electricity and gas usage into common energy units of kBtu.

Energy Details

PG&E Meter Properties	
• Library: 1 electric and 1 gas meter • Quinlan: 1 electric and 1 gas meter • Sports Center: 1 electric and 1 gas meter • Senior Center: 1 electric and 1 gas meter • BBF Recreation + Pool: 1 electric and 1 gas meter	
Electricity	
Highest-Consuming Site	Library
Lowest-Consuming Site	BBF Recreation + Pool
Natural Gas	
Highest-Consuming Site	Quinlan Comm. Ctr.
Lowest-Consuming Site	Sports Center
Overall Energy Use (kBtu)	
Highest-Consuming Site	Library
Lowest-Consuming Site	BBF Recreation + Pool

Featured Building: Library

Building Characteristics

Library

The Cupertino Library is a member of the Santa Clara County Library District.

Building Characteristics	
Building Size	54,300 sq ft (98% air-conditioned area)
Year Built	2004
Roof Age	21 years old
Number of Floors	2
Max. Occupancy	1,029
Hours of Operation	M-F: 10 AM - 9 PM; S-S: 10 AM - 6 PM
Accessibility	ADA Accessible
Walkability	86 (out of 100)
Current Resilience Designation	Cooling Center

Existing Equipment Inventory:

E = electricity, NG = natural gas

- **1** *Forced Air Boiler (NG)*
- **1** *Main Air Handler (E)*
- **4** *Light Fixture Types* *[95% fixtures currently LEDs]*
- **2** *Hot Water Pumps (E)*
- **1** *Electric Water Heater (E)* *[janitorial closet]*
- **4** *Heat Pumps (E)*

Building Envelope

Dual-pane windows, Metal stud wall, R-19 batt insulation, Built-up roof

Energy Characteristics

Library

Building Energy Details	
PG&E Meter Number(s)	1009484301 (Electric); 54051338 (Gas)
PG&E Rate Details	B10S
Demand Response	No
CCA Participation	Silicon Valley Clean Energy
Building Electrical Panel Capacity	AC-1: 1200A; LP-L2C: 400A; LP-L2A: 400A; LP-L1A: 400A; LP-L1C: 400A; LM: 400A; ELEV. A: 125A; ELEV. B: 125A; L1E: 225A, SPARE: 100A; CAFÉ: 100A; TEMP PWR PANEL: 200A
PG&E Service Capacity	2500 A
PG&E Load Hosting Capacity	460 kW
Solar & Battery Storage	Lead-acid Battery Backup for Egress Lighting (100A on 1st Floor and 100A on 2nd Floor)
Backup Generator Sizing	N/A
Average Outage Duration (2024)	
Name of Circuit Serving Building	Wolfe 1109
Circuit Outage Duration Avg.	0 minutes (0 outages recorded)
Division Outage Duration Avg.	211 minutes
Outage Experience: City staff reports having about 6-7 outages/year, lasting about 5-6 hours each.	

94
kBtu/ft²
Current Energy Use Intensity

+2.6%
*Variance from National Median Energy Use Intensity**

89.8
MTCO2e
Baseline GHG Emissions

**National Median Site Energy Use Intensity of a library is 92 (kBtu/ft²)*

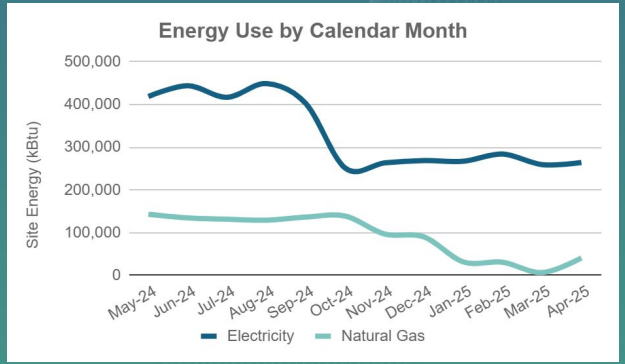
Total Annual Energy Cost: $426,000

Electricity

- **Annual Usage:** 1,170,000 kWh
- **Annual Cost:** $410,000
- **Peak Demand:** 332 kW
- **Solar Production:** None

Natural Gas

- **Annual Usage:** 11,000 Therms
- **Annual Cost:** $16,000



Community Resilience Center (CRC) Profile

Library

CRC Characteristics

Resilience Designation	Primary Heating/Cooling Center
Hours of Operation *(during activation)*	Varies depending on the reason for activation
Reasons for Activation	Extreme heat
Critical Loads	All loads considered critical; there are many sensitive books that need to stay at a consistent temperature
Nearest Transit	0.5 miles to nearest bus stop
ADA Accessibility	The Library was built with physical accessibility in mind to meet the needs of those with limited mobility or who rely on mobility aids

CRC Type	Resilience Services	Provided Year-Round	Provided During Activation
Level 1: Relief Station	Provides daytime shelter, safe space, cooling, heating, clean air	-	✓

Community Resilience Center (CRC) Profile

Library

Community Engagement + Resilience Planning

The City of Cupertino has directed residents to use the Library as a heating/cooling center as guided by the County of Santa Clara. The Library is open to all members of the public and provides information and service in multiple languages to suit the needs of the local population. The Library was built with physical accessibility in mind to meet the needs of those with limited mobility or who rely on mobility aids.

The Library hosts community workshops and provides a space for the community to gather as needed for public or private events. The Library currently serves as a heating/cooling location during regular business hours. If necessary, the Library will extend its hours to accommodate the needs of the community.

Critical energy loads for the Library are anticipated to include HVAC, lighting, EV charging, and more. The Library needs higher than average energy loads because of the sensitive books that need to stay in a consistent temperature. Additionally, the Library has 6 EV charger ports. Conversations about installing new solar and battery storage are ongoing.

Critical Needs

- Cooling center activation anticipated at 29 days/year based on CalAdapt's extreme heat projections *(see page 6)*
- Additional staffing may be needed for increased hours during resilience center activation
- Consistent temperature for sensitive books in the library's collection
- Continued support needed from community partners and facility staff to run regularly scheduled community programming
- Educational resources to be made available to community members in multiple languages
- First aid kits needed for basic medical care and treatment during resilience center activation

Recent and Planned Building Upgrades & Renovations

Library

Building upgrades and renovations recently completed or planned.

Upgrade/Renovation	Date Completed or Planned	Notes
Library opens new meeting room	Completed 2021	The Library opened the new Torre Meeting Room on the first floor
Library building expansion is completed	Completed 2022	The Library added two large, flexible meeting rooms: Community Room 101 on the first floor and Community Room 201 on the second floor
Replace all batteries on Battery Energy Storage System	Planned 2026	Currently seeking funding for FY 2025-26

Energy Efficiency Opportunities

Library

High-level estimates of project savings, costs, and financial details for the energy efficiency measures (EEMs) identified during the site audit.

#	Measure	Effective Useful Life (yrs)	Electric Energy Savings (kWh/yr)	Gas Energy Savings (therm/yr)	Total Energy Savings (kBtu/yr)	Energy Cost Savings ($/yr)	Gross Project Cost* ($)	Simple Payback Period (yrs)	Net Present Value ($)	GHG Savings ($MTCO_2e$ /yr)
EEM-1	Retro-commission (RCx) HVAC System	5	50,000	1,100	280,000	$19,000	$40,000	2	$42,000	7.3
EEM-2	Repair or Replace VFDs on Supply and Return Fans for Main AHU	15	50,000	N/A	170,000	$18,000	$80,000	4	$110,000	1.4
Totals		**N/A**	**100,000**	**1,000**	**450,000**	**$37,000**	**$120,000**	**3**	**$152,000**	**8.7**

**Gross Project Cost is inclusive of estimated equipment and installation costs as well as design, engineering, and construction.*

Energy Fuel Substitution Opportunities

Library

High-level estimates of project savings, costs, and financial details for the energy fuel substitution measures (EFSs) identified during the site audit.

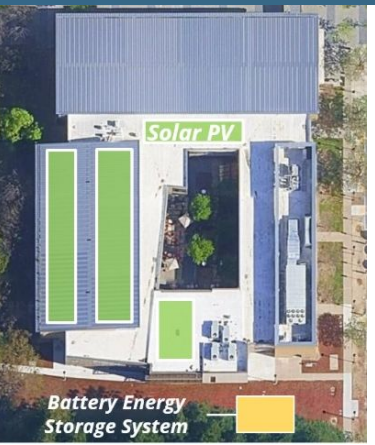
#	Measure	Effective Useful Life (yrs)	Electric Energy Savings (kWh/yr)	Gas Energy Savings (therm/yr)	Total Energy Savings (kBtu/yr)	Energy Cost Savings* ($/yr)	Gross Project Cost** ($)	Simple Payback Period (yrs)	Net Present Value ($)	GHG Savings ($MTCO_2e$ /yr)
EFS-1	Replace Existing Heating Hot Water Boiler with Air-to-Water Heat Pump	20	- 90,000	11,000	780,000	-$11,000	$1,000,000	N/A	-$1,100,000	54

**Energy cost savings calculations assume installation of the recommended solar PV system.*

***Gross Project Cost is inclusive of estimated equipment and installation costs as well as design, engineering, and construction.*

Solar PV + Battery Storage Opportunities

Library



On-site Solar PV System Opportunities	
System Size (kW)	100-kW DC
System Siting	Library Roof
Year-1 Solar Production (kWh/yr)	170,000 kWh
Annual Energy Offset from Solar (%)	15%
Area Available (Sq. ft.)	7,200

Battery Storage System Opportunities	
System Size (kW / kWh)	400 kW / 2,200 kWh
Critical Load Supported (%)	100%
System Autonomy Supporting Critical Load (Hours)	Recommended System: 6 hours Jurisdiction Preference: N/A
Battery System Footprint (Sq. ft.)	400

High-level estimates of project savings, costs, and financial details for the energy resilience measures (ERMs) identified during the site audit.

#	Measure	Effective Useful Life (years)	Energy Cost Savings ($/year)	Gross Project Cost*($)	Simple Payback Period (yrs)	Net Present Value ($)	GHG Savings ($MTCO_2e$/yr)
ERM-1	Install a Solar PV System	25	$60,000	$760,000	13	$90,000	4.5
ERM-2	Install a Battery Energy Storage System	25	$25,000	$1,200,000	48	-$230,000	N/A
TOTALS		**N/A**	**$85,000**	**$1,960,000**	**23**	**-$140,000**	**4.5**

**Gross Project Cost is inclusive of estimated equipment and installation costs as well as design, engineering, and construction.*

Featured Building: Quinlan Community Center

Building Characteristics

Quinlan Community Center

The Quinlan Community Center offers a variety of indoor spaces that are suitable for occasions such as weddings, receptions, corporate seminars, and meetings.

Building Characteristics	
Building Size	28,695 sq ft (100% air-conditioned area)
Year Built	1988
Roof Age	Unknown
Number of Floors	1
Max. Occupancy	Unknown
Hours of Operation	M-F: 8 AM - 6 PM; S-S: Closed
Accessibility	ADA Accessible
Walkability	73 (out of 100)
Current Resilience Designation	Community Resilience Center

Existing Equipment Inventory:

E = electricity, NG = natural gas

- **2** *Chillers (E)*
- **5** *Air Handlers (E)*
- **4** *Light Fixture Types* *[95% fixtures currently LEDs]*
- **2** *Chilled Water Pumps (E)*
- **1** *Hot Water Boiler (NG)*
- **1** *Hot Water Pump (E)*
- **1** *Domestic Water Heater (NG)*
- **1** *Kitchen Area (NG)* *[1 stovetop, 1 griddle, 1 oven]*

Building Envelope

Dual-pane windows, Wood stud wall, Unknown wall insulation, Clay barrel tile roof

Energy Characteristics

Quinlan Community Center

Building Energy Details	
PG&E Meter Number(s)	1009512069 (Electric); 37897288 (Gas)
PG&E Rate Details	B10S
Demand Response	No
CCA Participation	Silicon Valley Clean Energy
Building Electrical Panel Capacity	MCC-2: 250A; MCC-1: 300A; TRANS. T-1: 100A; TRANS. T-2: 100A; TRANS. T-3: 60A; PANEL LF: 60A; PANEL L1: 200A
PG&E Service Capacity	800 A
PG&E Load Hosting Capacity	2,480 kW
Solar & Battery Storage	Solar: 311 kW / 453,795 kWh *(in design)*
Backup Generator Sizing	240 kW
Average Outage Duration (2024)	
Name of Circuit Serving Building	Stelling 1104
Circuit Outage Duration Avg.	0 minutes (0 outages recorded)
Division Outage Duration Avg.	211 minutes
Outage Experience: City staff reports having about 1-2 outages/year, lasting about 1-2 hours each.	

**National Median Site Energy Use Intensity of a Mixed Use Property is 79 (kBtu/ft²)*

126
kBtu/ft²
Current Energy Use Intensity

+59.9%
*Variance from National Median Energy Use Intensity**

116.9
MTCO2e
Baseline GHG Emissions

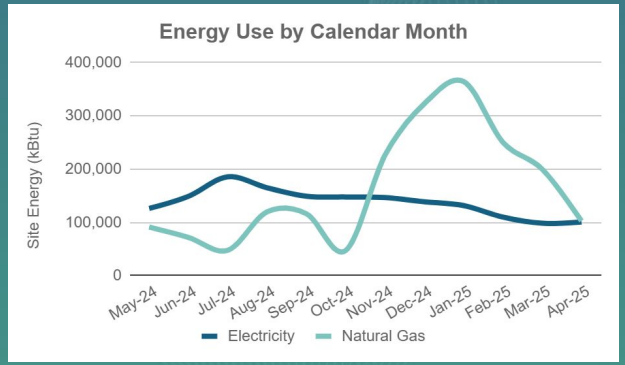
Total Annual Energy Cost: $215,000

Electricity

- **Annual Usage:** 483,000 kWh
- **Annual Cost:** $170,000
- **Peak Demand:** 126 kW
- **Solar Production:** None

Natural Gas

- **Annual Usage:** 19,000 Therms
- **Annual Cost:** $45,000



Community Resilience Center (CRC) Profile

Quinlan Community Center

CRC Characteristics

Resilience Designation	Emergency Operations Center (EOC), Mass Care and Shelter Facility, & Secondary Heating/Cooling Center
Hours of Operation *(during activation)*	As needed beyond normal operating hours
Reasons for Activation	Extreme Heat, Poor Air Quality, Emergency Evacuation
Critical Loads	Minimum required to support sheltering capabilities
Nearest Transit	0.7 miles to nearest bus stop
ADA Accessibility	Quinlan Community Center was built with physical accessibility in mind to meet the needs of those with limited mobility or who rely on mobility aids

CRC Type	Resilience Services	Provided Year-Round	Provided During Activation
Level 3: Emergency Shelter	Provides overnight shelter and associated resources (e.g. showers)	-	✓

Community Resilience Center (CRC) Profile

Quinlan Community Center

Community Engagement + Resilience Planning

The City of Cupertino has directed residents to use the Quinlan Community Center as a heating/cooling center as guided by the County of Santa Clara. This site is secondary to the library and used when the library does not have power.

The Quinlan Community Center is open to all members of the public and provides information and service in multiple languages to suit the needs of the local population. The Quinlan Community Center was built with physical accessibility in mind to meet the needs of those with limited mobility or who rely on mobility aids.

Quinlan Community Center has previously been used as a charging station for phones and other personal devices during widespread power outages. If needed, Quinlan will be used as an overnight shelter location.

The City is currently working to determine the critical energy loads for the Quinlan Community Center.

Critical Needs

- Cooling center activation anticipated at 29 days/year based on CalAdapt's extreme heat projections *(see page 6)*
- Additional staffing may be needed for increased hours during resilience center activation
- Charging stations for community members to power phones and other devices to help stay connected during power outages
- Continued support needed from community partners and facility staff to run regularly scheduled community programming
- Educational resources to be made available to community members in multiple languages
- First aid kits needed for basic medical care and treatment, along with refrigeration for formula, food, and medical supplies

Recent and Planned Building Upgrades & Renovations

Quinlan Community Center

Building upgrades and renovations recently completed or planned.

Upgrade/Renovation	Date Completed or Planned	Notes
Replace roofing on flat roofs	Planned Q1 2026	Roof replacement in anticipation of adding new solar PV
Install new solar PV	Planned April 2026	City Council approved the Photovoltaic Systems Design and Installation (PV) project as part of the Fiscal Year (FY) 24-25 budget
Install EV chargers	Planned 2026	Possibly add EV Chargers, as required by the scope of the PV project

Energy Efficiency Opportunities

Quinlan Community Center

High-level estimates of project savings, costs, and financial details for the energy efficiency measures (EEMs) identified during the site audit.

#	Measure	Effective Useful Life (yrs)	Electric Energy Savings (kWh/yr)	Gas Energy Savings (therm/yr)	Total Energy Savings (kBtu/yr)	Energy Cost Savings ($/yr)	Gross Project Cost* ($)	Simple Payback Period (yrs)	Net Present Value ($)	GHG Savings ($MTCO_2e$ /yr)
EEM-3	Convert Pneumatic Controls to Direct Digital Control (DDC)	15	50,000	3,400	510,000	$25,500	$500,000	20	-$235,000	20

**Gross Project Cost is inclusive of estimated equipment and installation costs as well as design, engineering, and construction.*

Energy Fuel Substitution Opportunities

Quinlan Community Center

High-level estimates of project savings, costs, and financial details for the energy fuel substitution measures (EFSs) identified during the site audit.

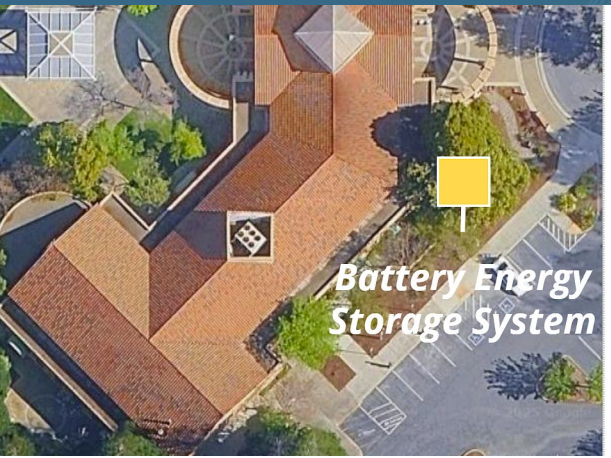
#	Measure	Effective Useful Life (yrs)	Electric Energy Savings (kWh/yr)	Gas Energy Savings (therm/yr)	Total Energy Savings (kBtu/yr)	Energy Cost Savings* ($/yr)	Gross Project Cost** ($)	Simple Payback Period (yrs)	Net Present Value ($)	GHG Savings ($MTCO_2e$ /yr)
EFS-2	Replace Existing Domestic Water Heater with Heat Pump Domestic Water Heater	20	- 14,000	2,600	210,000	$6,000	$110,000	N/A	-$35,000	14
EFS-3	Replace Existing HHW Boiler with Air-to-Water Heat Pump and Control HHW Pump with Variable Frequency Drive	15	-130,000	17,000	1,300,000	$36,000	$800,000	N/A	-$430,000	86
EFS-4	Replace Existing Gas Range with Electric Range	15	-10,000	400	7,000	$700	$40,000	N/A	-$30,000	1.8
TOTALS		**N/A**	**-154,000**	**20,000**	**1,517,000**	**$42,700**	**$950,000**	**N/A**	**-$495,000**	**101.8**

**Energy cost savings calculations assume installation of the solar PV system currently in design.*

***Gross Project Cost is inclusive of estimated equipment and installation costs as well as design, engineering, and construction.*

Solar PV + Battery Storage Opportunities

Quinlan Community Center



On-site Solar PV System Opportunities	
System Size (kW)	310 kW (in design phase)
System Siting	Rooftop + Carport
Year-1 Solar Production (kWh/yr)	450,000 kWh (potential)
Annual Energy Offset from Solar (%)	93%
Area Available (Sq. ft.)	N/A

Battery Storage System Opportunities	
System Size (kW / kWh)	90 kW / 750 kWh
Critical Load Supported (%)	100%
System Autonomy Supporting Critical Load (Hours)	Recommended System: 2 hours Jurisdiction Preference: N/A
Battery System Footprint (Sq. ft.)	200

High-level estimates of project savings, costs, and financial details for the energy resilience measures (ERMs) identified during the site audit.

#	Measure	Effective Useful Life (years)	Energy Cost Savings ($/year)	Gross Project Cost*($)	Simple Payback Period (yrs)	Net Present Value ($)	GHG Savings ($MTCO_2e$/yr)
ERM-3	Install Battery Energy Storage System (BESS)	25	N/A	$500,000	6	$700,000	N/A

**Gross Project Cost is inclusive of estimated equipment and installation costs as well as design, engineering, and construction.*

Featured Building: Sports Center

Building Characteristics

Sports Center

The Sports Center is a multipurpose facility with 17 tennis courts, eight pickleball courts, a fitness center, two racquetball courts, indoor and outdoor sport courts, and a locker room.

Building Characteristics	
Building Size	20,808 sq ft (100% air-conditioned area)
Year Built	1978
Roof Age	Unknown
Number of Floors	2
Max. Occupancy	653
Hours of Operation	M-F: 8 AM - 10 PM; S-S: 8 AM - 8 PM
Accessibility	Yes
Walkability	82 (out of 100)
Current Resilience Designation	N/A

Existing Equipment Inventory:

E = electricity, NG = natural gas

1 *Heat Pump (E)*

1 *Packaged Rooftop Makeup Air Unit (NG)*

2 *Domestic Water Heaters (NG)*

5 *Light Fixture Types*
[99% fixtures currently LEDs]

5 *Packaged Rooftop Gas Pack Unit (E/NG)*

Building Envelope

Dual-pane windows, Wood & metal studs wall, Unknown wall insulation, Built-up roof

Energy Characteristics

Sports Center

Building Energy Details	
PG&E Meter Number(s)	1010260937 (Electric); 001590A (Gas)
PG&E Rate Details	B6
Demand Response	No
CCA Participation	Silicon Valley Clean Energy
Building Electrical Panel Capacity	PANEL HP2: 150A; ELEVATOR SHUNT TRIP: 50A; UNKNOWN: 70A; UNKNOWN: UNKNOWN^; DB-1: 300A
PG&E Service Capacity	400 A
PG&E Load Hosting Capacity	3,690 kW
Solar & Battery Storage	Solar: 214 kW / 322,104 kWh *(in design)*
Backup Generator Sizing	N/A
Average Outage Duration (2024)	
Name of Circuit Serving Building	Stelling 1107
Circuit Outage Duration Avg.	0 minutes (0 outages recorded)
Division Outage Duration Avg.	211 minutes
Outage Experience: N/A	

73
kBtu/ft²
Current Energy Use Intensity

+77.2%
*Variance from National Median Energy Use Intensity**

27.2
MTCO2e
Baseline GHG Emissions

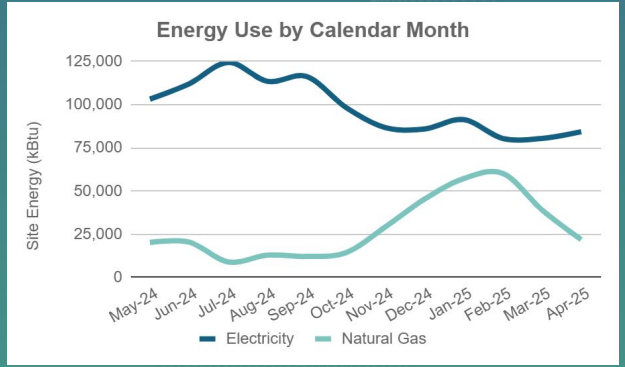
Total Annual Energy Cost: $145,100

Electricity

- **Annual Usage:** 345,000 kWh
- **Annual Cost:** $137,000
- **Peak Demand:** 225 kW
- **Solar Production:** None

Natural Gas

- **Annual Usage:** 3,400 Therms
- **Annual Cost:** $8,100



*National Median Site Energy Use Intensity of a Fitness Center/Health Club/Gym is 41 (kBtu/ft²)

^Breaker did not have a legible rating and single line diagrams were unavailable

Recent and Planned Building Upgrades & Renovations

Sports Center

Building upgrades and renovations recently completed or planned.

Upgrade/Renovation	Date Completed or Planned	Notes
Upgrade racquetball court lighting fixtures	Completed 2025	N/A
EMS/HVAC controls upgrade	Planned 2026	Project anticipated to take 1-3 months, once the contract is approved
Lighting controls upgrade	Planned 2026	Project anticipated to take 1-3 months, once the contract is approved
Replace roofing and access hatch	Planned Q1 2026	Roof replacement in anticipation of adding new solar PV
Install new solar PV	Planned April 2026	City Council approved the Photovoltaic Systems Design and Installation (PV) project as part of the Fiscal Year (FY) 24-25 budget

Energy Efficiency Opportunities

Sports Center

High-level estimates of project savings, costs, and financial details for the energy efficiency measures (EEMs) identified during the site audit.

#	Measure	Effective Useful Life (yrs)	Electric Energy Savings (kWh/yr)	Gas Energy Savings (therm/yr)	Total Energy Savings (kBtu/yr)	Energy Cost Savings ($/yr)	Gross Project Cost* ($)	Simple Payback Period (yrs)	Net Present Value ($)	GHG Savings ($MTCO_2e$ /yr)
EEM-4	Tighten AC Unit Schedule Around Occupancy Hours	5	9,000	400	70,000	$5,000	$10,000	2	$12,000	2.4

**Gross Project Cost is inclusive of estimated equipment and installation costs as well as design, engineering, and construction.*

Energy Fuel Substitution Opportunities

Sports Center

High-level estimates of project savings, costs, and financial details for the energy fuel substitution measures (EFSs) identified during the site audit.

#	Measure	Effective Useful Life (yrs)	Electric Energy Savings (kWh/yr)	Gas Energy Savings (therm/yr)	Total Energy Savings (kBtu/yr)	Energy Cost Savings* ($/yr)	Gross Project Cost** ($)	Simple Payback Period (yrs)	Net Present Value ($)	GHG Savings ($MTCO_2e$/yr)
EFS-5	Replace Existing Domestic Water Heaters with Heat Pump Domestic Water Heaters	20	- 5,000	1,000	80,000	$2,000	$125,000	N/A	-$100,000	5
EFS-6	Replace Existing Gas Fired Packaged Units with Ultra-High Efficiency Heat Pumps	15	-14,000	2,400	190,000	$5,000	$500,000	N/A	-$440,000	12
TOTALS		**N/A**	**-19,000**	**3,400**	**270,000**	**$7,000**	**$625,000**	**N/A**	**-$540,000**	**17**

**Energy cost savings calculations assume installation of the solar PV system currently in design.*

***Gross Project Cost is inclusive of estimated equipment and installation costs as well as design, engineering, and construction.*

Featured Building: Senior Center

Building Characteristics

Senior Center

The Senior Center has a variety of indoor spaces offering diverse programs and services, including educational classes, recreational activities, and volunteer opportunities.

Building Characteristics	
Building Size	15,900 sq ft (96% air-conditioned area)
Year Built	2001
Roof Age	26 years
Number of Floors	1
Max. Occupancy	337
Hours of Operation	M-F: 8 AM - 5 PM; S-S: Closed
Accessibility	No
Walkability	82 (out of 100)
Current Resilience Designation	N/A

Existing Equipment Inventory:

E = electricity, NG = natural gas

6 *Rooftop Gas Packs (E/NG)*

1 *Packaged Rooftop Makeup Air Unit (NG)*

3 *Light Fixture Types*
[95% fixtures currently LEDs]

1 *Kitchen Area (NG)*
[1 stovetop, 2 ovens]

1 *Domestic Water Heater (NG)*

Building Envelope

Dual-pane windows, Wood stud wall (stucco/plaster finish), R-19 batt insulation, Clay barrel tile roof

Energy Characteristics

Senior Center

Building Energy Details	
PG&E Meter Number(s)	1009514262 (Electric); 52533338 (Gas)
PG&E Rate Details	B10S
Demand Response	No
CCA Participation	Silicon Valley Clean Energy
Building Electrical Panel Capacity	REF-1: 20A; REF-3, 4, 6: 20A; A/C 5: 60A; REF-5: 20A; REF-2: 20A; UNKNOWN: 20A; A/C 4: 100A; A/C 3: 150A; A/C 1: 225A; PANEL A: 225A; PANEL K: 225A; PANEL B1: 225A; A/C 6: 125A; A/C 2: 80A
PG&E Service Capacity	1000 A
PG&E Load Hosting Capacity	3,690 kW
Solar & Battery Storage	None
Backup Generator Sizing	N/A
Average Outage Duration (2024)	
Name of Circuit Serving Building	Stelling 1107
Circuit Outage Duration Avg.	0 minutes (0 outages recorded)
Division Outage Duration Avg.	211 minutes
Outage Experience: N/A	

**National Median Site Energy Use Intensity of a Mixed Use Property is 79 (kBtu/ft²)*

57
kBtu/ft²
Current Energy Use Intensity

-27.7%
*Variance from National Median Energy Use Intensity**

25.1
MTCO2e
Baseline GHG Emissions

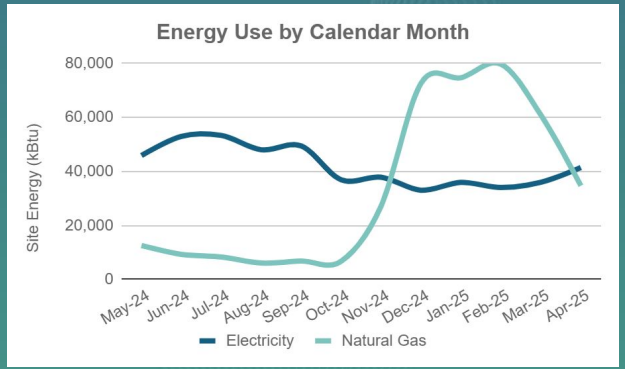
Total Annual Energy Cost: $77,000

Electricity

- **Annual Usage:** 150,000 kWh
- **Annual Cost:** $67,000
- **Peak Demand:** 129 kW
- **Solar Production:** None

Natural Gas

- **Annual Usage:** 4,000 Therms
- **Annual Cost:** $10,000



Recent and Planned Building Upgrades & Renovations

Senior Center

Building upgrades and renovations recently completed or planned.

Upgrade/Renovation	Date Completed or Planned	Notes
Gutter replacement on Mary Ave. side of building	Planned 2026	Project anticipated to take 1 week, once the contract is approved

Energy Efficiency Opportunities

Senior Center

High-level estimates of project savings, costs, and financial details for the energy efficiency measures (EEMs) identified during the site audit.

#	Measure	Effective Useful Life (yrs)	Electric Energy Savings (kWh/yr)	Gas Energy Savings (therm/yr)	Total Energy Savings (kBtu/yr)	Energy Cost Savings ($/yr)	Gross Project Cost* ($)	Simple Payback Period (yrs)	Net Present Value ($)	GHG Savings ($MTCO_2e$ /yr)
EEM-5	Tighten AC Unit Schedule Around Occupancy Hours & Tune Economizer Operations	5	14,000	N/A	48,000	$6,000	$12,000	2	$14,000	0.4

**Gross Project Cost is inclusive of estimated equipment and installation costs as well as design, engineering, and construction.*

Energy Fuel Substitution Opportunities

Senior Center

High-level estimates of project savings, costs, and financial details for the energy fuel substitution measures (EFSs) identified during the site audit.

#	Measure	Effective Useful Life (yrs)	Electric Energy Savings (kWh/yr)	Gas Energy Savings (therm/yr)	Total Energy Savings (kBtu/yr)	Energy Cost Savings ($/yr)	Gross Project Cost* ($)	Simple Payback Period (yrs)	Net Present Value ($)	GHG Savings ($MTCO_2e$/yr)
EFS-7	Replace Existing Domestic Water Heater with Heat Pump Domestic Water Heater	20	- 4,000	800	60,000	$100	$50,000	N/A	-$49,000	4
EFS-8	Replace Gas Pack RTUs with Air-to-Air Heat Pumps	15	-11,000	2,200	180,000	$400	$750,000	N/A	-$746,000	11
EFS-9	Replace Existing Gas Range with Electric Range	15	-20,000	1,000	30,000	-$7,000	$40,000	N/A	-$110,000	5
TOTALS		**N/A**	**-35,000**	**4,000**	**270,000**	**-$6,500**	**$840,000**	**N/A**	**-$905,000**	**20**

**Gross Project Cost is inclusive of estimated equipment and installation costs as well as design, engineering, and construction.*

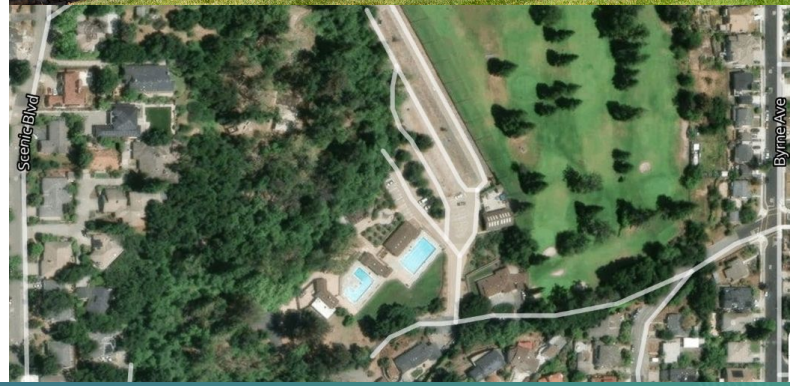
Featured Building: Blackberry Farm Recreation + Pool

Building Characteristics

Blackberry Farm Recreation + Pool

The Blackberry Farm Recreation area features two pools, pool locker rooms, picnic areas, a playground, cafe, sand volleyball courts, a 1-mile ADA accessible walking trail, and restrooms.

Building Characteristics	
Building Size	Slide Pool 65,000 gal; Recreation Pool 95,000 gal
Year Built	Various
Roof Age	28 years
Number of Floors	1
Max. Occupancy	Unknown
Hours of Operation	M-F: 12 PM - 6 PM; S-S: 10 AM - 6 PM
Accessibility	N/A
Walkability	39 (out of 100)
Current Resilience Designation	N/A



Existing Equipment Inventory:

E = electricity, NG = natural gas

2 *Pool Heaters (NG)*
[1 wading pool, 1 main pool]

4 *Filter Pumps (E)*
[2 wading pool, 2 main pool]

2 *Light Fixture Types (E)*
[95% fixtures currently LEDs]

1 *Kitchen Area (NG)*
[1 stovetop, 1 oven, 1 charbroiler]

2 *Domestic Water Heaters (NG)*
[1 kitchen, 1 electric/ mechanical room]

1 *Shower Water Heater (E)*

Building Envelope

Single-pane windows, Wood stud frame (board & batten sliding), unknown wall insulation, Built-up roof (Asphalt composite shingles)

Energy Characteristics

Blackberry Farm Recreation + Pool

Building Energy Details	
PG&E Meter Number(s)	1009514262 (Electric); 61270689 (Gas)
PG&E Rate Details	B19S
Demand Response	No
CCA Participation	Silicon Valley Clean Energy
Building Electrical Panel Capacity	1:UNKNOWN; 3: 200A; 5: 100A; 7: 100A; 9: 30A; 11: 20A; 13: 20A; UNKNOWN: 20A; 4 LIFEGUARD SHACK: 100A; 6: 125A; 8: 50A; 10 FREEZ: 20A; 12 REFRIG: 20A
PG&E Service Capacity	800 A
PG&E Load Hosting Capacity	0 kW
Solar & Battery Storage	None
Backup Generator SIzing	N/A
Average Outage Duration (2024)	
Name of Circuit Serving Building	Stelling 1110
Circuit Outage Duration Avg.	486 minutes (3 outages recorded)
Division Outage Duration Avg.	211 minutes
Outage Experience: N/A	

Note: There is no site EUI for Blackberry Farm Recreation + Pool because the aggregated building area is unknown.

35.5
MTCO2e
Baseline GHG Emissions

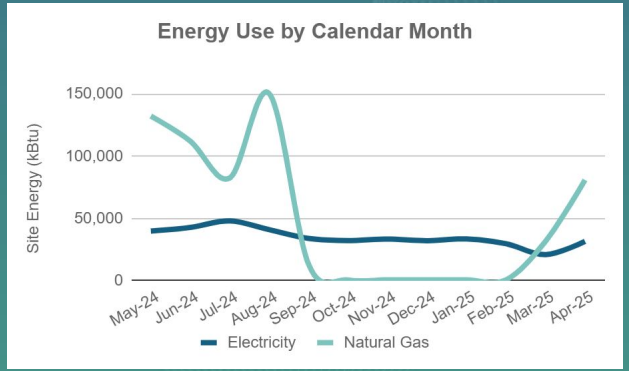
Total Annual Energy Cost: $54,000

Electricity

- **Annual Usage:** 120,000 kWh
- **Annual Cost:** $41,000
- **Peak Demand:** 48kW
- **Solar Production:** None

Natural Gas

- **Annual Usage:** 6,000 Therms
- **Annual Cost:** $13,000



Recent and Planned Building Upgrades & Renovations

Blackberry Farm Recreation + Pool

There are no building upgrades and renovations that have been recently completed or that are planned.

Upgrade/Renovation	Date Completed or Planned	Notes
N/A	N/A	N/A

Energy Fuel Substitution Opportunities

Blackberry Farm Recreation + Pool

High-level estimates of project savings, costs, and financial details for the energy fuel substitution measures (EFSs) identified during the site audit.

#	Measure	Effective Useful Life (yrs)	Electric Energy Savings (kWh/yr)	Gas Energy Savings (therm/yr)	Total Energy Savings (kBtu/yr)	Energy Cost Savings ($/yr)	Gross Project Cost* ($)	Simple Payback Period (yrs)	Net Present Value ($)	GHG Savings ($MTCO_2e$/yr)
EFS-10	Replace Existing Domestic Water Heaters with Heat Pump Domestic Water Heaters	20	-5,000	1,000	80,000	$500	$150,000	N/A	-$140,000	4.5
EFS-11	Replace Existing Pool Heaters with Air-to-Water Heat Pumps	20	-39,000	5,000	370,000	-$2,400	$1,500,000	N/A	-$1,530,000	27.2
EFS-12	Replace Existing Gas Range with Electric Range	15	-10,000	500	20,000	-$2,300	$60,000	N/A	-$80,000	4.5
TOTALS		**N/A**	**-54,000**	**6,500**	**470,000**	**-$4,200**	**$1,710,000**	**N/A**	**-$1,750,000**	**36.2**

**Gross Project Cost is inclusive of estimated equipment and installation costs as well as design, engineering, and construction.*

Project Phasing Plan

Project Phasing Plan *(Page 1 of 2)*

City of Cupertino

Projects are being proposed in phases to deliver meaningful energy efficiency and resilience benefits while ensuring optimal financial outcomes.

		Library						Quinlan Community Center						Blackberry Farm Recreation + Pool					
Phase #	**Implementation Timeframe**	**Measure #**	**Gross Project Cost ($)**	**Net Present Value ($)**	**Total Energy Savings (kBtu)**	**Energy Cost Savings** ($/yr)**	**GHG Savings ($MTCO_2e$ /yr)**	**Measure #**	**Gross Project Cost ($)**	**Net Present Value ($)**	**Total Energy Savings (kBtu)**	**Energy Cost Savings** ($/yr)**	**GHG Savings ($MTCO_2e$ /yr)**	**Measure #**	**Gross Project Cost ($)**	**Net Present Value ($)**	**Total Energy Savings (kBtu)**	**Energy Cost Savings ($/yr)**	**GHG Savings ($MTCO_2e$ /yr)**
1	Now - 6 Months	EEM-1, EEM-2	$120,000	$152,000	450,000	$37,000	8.7	EEM-3	$500,000	-$235,000	510,000	$25,500	20	EFS-10	$150,000	-$140,000	80,000	$500	4.5
2A	Electrical Service Upgrade (Before Phase 2B)							Electrical Service Upgrade of 850A	$250,000^	0	0	0	0						
2B	6 months - 1 Year	EFS-1	$1,000,000	-$1,100,000	780,000	-$11,000	54	EFS-2	$110,000	-$35,000	210,000	$6,000	14	EFS-11	$1,500,000	-$1,530,000	370,000	-$2,400	27.2
3	Varies*	ERM-1, ERM-2	$1,960,000	-$140,000	820,000	$85,000	4.5	EFS-3	$800,000	-$430,000	1,300,000	$36,000	86						
4	2 - 3 Years							EFS-4	$40,000	-$30,000	7,000	$700	1.8						
5	3 - 5 Years							ERM-3	$500,000	$700,000	0	0	0						
6A	Electrical Service Upgrade (Before Phase 6B)													Electrical Service Upgrade of 200A	$10,000,000 ^	0	0	0	0
6B	9 - 10 Years													EFS-12	$60,000	-$80,000	20,000	-$2,300	4.5
TOTALS			**$3,080,000**	**-$1,392,000**	**2,050,000**	**$111,000**	**65.8**		**$2,200,000**	**-$30,000**	**2,027,000**	**$68,200**	**121.8**		**$11,710,000**	**-$1,750,000**	**470,000**	**-$4,200**	**36.2**

EEM = energy efficiency measure, ERM = energy resilience measure, EFS = energy fuel substitution

**Phase 3 implementation timelines include: 2 - 3 Years (ERM-1, ERM-2) and 1 - 2 Years (EFS-3)*

***Energy cost savings calculations assume installation of the solar PV systems for the Library and Quinlan Community Center.*

^This cost comprises of the soft and hard costs for a regional transformer upgrade since there is no longer any load hosting capacity for the regional transformers for the Quinlan Community Center and Blackberry Farm Recreation + Pool. PG&E will not cover the costs for a regional transformer upgrade.

Project Phasing Plan *(Page 2 of 2)*

City of Cupertino

Projects are being proposed in phases to deliver meaningful energy efficiency and resilience benefits while ensuring optimal financial outcomes.

		Sports Center						Senior Center					
Phase #	**Implementation Timeframe**	**Measure #**	**Gross Project Cost ($)**	**Net Present Value ($)**	**Total Energy Savings (kBtu)**	**Energy Cost Savings** ($/yr)**	**GHG Savings ($MTCO_2e$ /yr)**	**Measure #**	**Gross Project Cost ($)**	**Net Present Value ($)**	**Total Energy Savings (kBtu)**	**Energy Cost Savings ($/yr)**	**GHG Savings ($MTCO_2e$ /yr)**
1	Now - 6 Months	EEM-4	$10,000	$12,000	70,000	$5,000	2.4	EEM-5	$12,000	$14,000	48,000	$6,000	0.4
2A	Electrical Service Upgrade (Before Phase 2B)	Electrical Service Upgrade of 250A	$150,000^	0	0	0	0	Electrical Service Upgrade of 100A	$100,000^	0	0	0	0
2B	6 months - 1 Year	EFS-5	$125,000	-$100,000	80,000	$2,000	5	EFS-7	$50,000	-$49,000	60,000	$100	4
3	Varies*	EFS-6	$500,000	-$440,000	190,000	$5,000	12	EFS-8	$750,000	-$746,000	180,000	$400	11
4	2 - 3 Years							EFS-9	$40,000	-$110,000	30,000	-$7,000	5
TOTALS			**$785,000**	**-$528,000**	**340,000**	**$12,000**	**19.4**		**$952,000**	**-$891,000**	**318,000**	**-$500**	**20.4**

EEM = energy efficiency measure, ERM = energy resilience measure, EFS = energy fuel substitution

**Phase 3 implementation timelines include: 1 - 3 Years (EFS-6) and 1 - 2 Years (EFS-8)*

***Energy cost savings calculations assume installation of the solar PV system for the Sports Center.*

^This cost comprises of the soft and hard costs for a regional transformer upgrade since there is no longer any load hosting capacity for the regional transformer for the Sports Center and Senior Center. PG&E will not cover the costs for a regional transformer upgrade.

Project Phasing Plan

City of Cupertino

Projects are being proposed in phases to deliver meaningful energy efficiency and resilience benefits while ensuring optimal financial outcomes.

Phase #	Implementation Timeframe	Measure #	Gross Project Cost ($)	Net Present Value ($)	Total Energy Savings (kBtu)	Energy Cost Savings** ($/yr)	GHG Savings ($MTCO_2e/yr$)
1	Now - 6 Months	EEM-1, EEM-2, EEM-3, EEM-4, EEM-5, EFS-10	$792,000	-$197,000	1,158,000	$74,000	34.6
2A	Before Phase 2B	Electric Service Upgrades (850A, 250A, and 100A)	$500,000^	N/A	N/A	N/A	N/A
2B	6 months - 1 Year	EFS-1, EFS-2, EFS-5, EFS-7, EFS-11	$2,785,000	-$2,814,000	1,500,000	-$5,300	104.2
3	Varies*	ERM-1, ERM-2, EFS-3, EFS-6, EFS-8	$4,010,000	-$1,756,000	2,490,000	$126,400	113.5
4	2 - 3 Years	EFS-4, EFS-9	$80,000	-$140,000	37,000	-$6,300	6.8
5	3 - 5 Years	ERM-3	$500,000	$700,000	N/A	N/A	N/A
6A	Before Phase 6B	Electric Service Upgrade (200A)	$10,000,000^	N/A	N/A	N/A	N/A
6B	9-10 Years	EFS-12	$60,000	-$80,000	20,000	-$2,300	4.5
TOTALS			**$18,727,000**	**-$4,287,000**	**5,205,000**	**$186,500**	**263.6**

EEM = energy efficiency measure, ERM = energy resilience measure, EFS = energy fuel substitution
**Phase 3 implementation timelines include: 1 - 2 Years (EFS-3, EFS-8), 1 - 3 Years (EFS-6), and 2 - 3 Years (ERM-1, ERM-2)*
***Energy cost savings calculations assume installation of the solar PV systems for the Library, Quinlan Community Center, and Sports Center.*

^This cost comprises of the soft and hard costs for a regional transformer upgrade since there is no longer any load hosting capacity for the regional transformers at the Quinlan Community Center, Sports Center, Senior Center, and Blackberry Farm Recreation + Pool. PG&E will not cover the costs for a regional transformer upgrade.

Project Phasing Plan Methodology

City of Cupertino

PHASE 1: Recommended for implementation within the next 6 months to support energy efficiency at the Library, Quinlan Community Center (QCC), Sports Center, and Senior Center. This phase will help reduce electric demand on future solar PV installations.

PHASE 2A: Suggested before Phase 2B, the City of Cupertino is projected to need an additional 850 amps above the existing 800-amp service at the QCC, an additional 250 amps above the existing 400-amp service at the Sports Center, and an additional 100 amps above the existing 1,000-amp service at the Senior Center to accommodate for the the various fuel substitution measures. These facilities still have available load hosting capacity on their regional transformers and will only require a new switchgear upgrade.

PHASE 2B: Suggested after Phase 2A and within the next 6 months - 1 year for the QCC, Sports Center, Senior Center, and Library. These fuel-switching measures will also support the facilities as they prepare for future solar PV installations, ensuring that key loads and equipment can be powered through onsite renewable energy, as driven by the City's goal of reaching Net Zero by 2040.

PHASE 3: Recommended for implementation after Phase 2 and within the next 2–3 years, this phase includes the solar PV and battery energy storage system (BESS) installation for the Library. This will ensure the new resilience measures are properly sized following a baseline period with the more efficient or newly electrified equipment from Phases 1 and 2. Phase 3 also includes additional fuel-switching measures at QCC and the Senior Center within 1-2 years, and at the Sports Center within 1-3 years, to prepare for critical loads to be supported by future solar installations.

PHASE 4: Proposed for implementation in 2–3 years, Phase 4 includes the final fuel-switching measures at QCC and the Senior Center. These remaining measures have the lowest estimated total energy savings for each building, making them an appropriate final step toward full electrification at each site.

PHASE 5: Suggested for implementation in 3–5 years, this phase includes installing a 90 kW / 750 kWh BESS at QCC. Given QCC's designation as a Community Resilience Center, the BESS will support all critical loads for up to two hours during a power outage. This measure is prioritized after the Library's resilience upgrades, as the Library serves as the City's primary heating and cooling center.

PHASE 6A: Suggested before Phase 6B, the City of Cupertino is projected to need an additional 200 amps above the existing 800-amp service to accommodate EFS-12, replacing the gas range with an electric unit at the Blackberry Farm Recreation + Pool (BBF) kitchen. This upgrade is required due to limitations on the circuit's load hosting capacity. While the BBF kitchen is not currently in use, the measure is included if the City chooses to fully electrify the kitchen in the future.

PHASE 6B: Recommended as the final step to fully electrify the BBF kitchen within a 9–10 year timeframe, Phase 6B requires completion of Phase 6A, as sufficient electrical service capacity must be available to accommodate the additional load from the electric range. Upon completion of Phase 6B, all buildings included in the roadmap will be fully electrified and prepared to utilize onsite generation, if not already underway.

Glossary of Terms - Upgrade Opportunities

- **Effective Useful Life (EUL):** The median number of years that installed energy saving measures are considered effective at reducing energy consumption or demand.
- **kBtu (kilo-British thermal unit):** A common energy unit that helps compare electricity (kWh) and natural gas (therms) on the same scale by converting both into kBtu.
- **Gross Project Cost:** The total project cost inclusive of estimated equipment and installation costs as well as design, engineering, and construction.
- **Simple Payback Period (SPP):** The amount of time required to recover the initial costs of a project from its savings. SPP ignores the time value of money and assumes that future savings occur in even amounts each year. For example, a $1,000 investment that saves $500 each year has a two-year SPP.

  SPP = Gross Project Cost ($) / Annual Energy Bill Savings ($/yr)

- **Net Present Value (NPV):** NPV accounts for the time value of money and reflects what a project's total lifetime cash flow is worth in today's dollars. It is calculated by summing the present value of all future cash flows, including both costs (such as purchase, installation, and ongoing maintenance) and savings (including utility and maintenance savings, and any revenues) using an appropriate discount rate. A discount rate can be the minimum acceptable rate of return. A positive NPV indicates the project's benefits exceed its costs, making it financially advantageous.

  $NPV = [(\text{Cash flow}) / (1 + i)^t] - \text{initial investment}$, where i = discount rate and t = number of time periods

- **GHG Savings:** The reduction in Greenhouse Gas (GHG) emissions achieved through installing suggested opportunities.

Thank you

Jake Anderson

Acting Assistant Director, The Energy Coalition
janderson@energycoalition.org

Sean Youra

Public Programs Project Manager, BayREN
syoura@bayareametro.gov

BAYREN

Local Governments Empowering Our Communities

Site Analysis Report

Prepared for the City of Cupertino
December 8, 2025

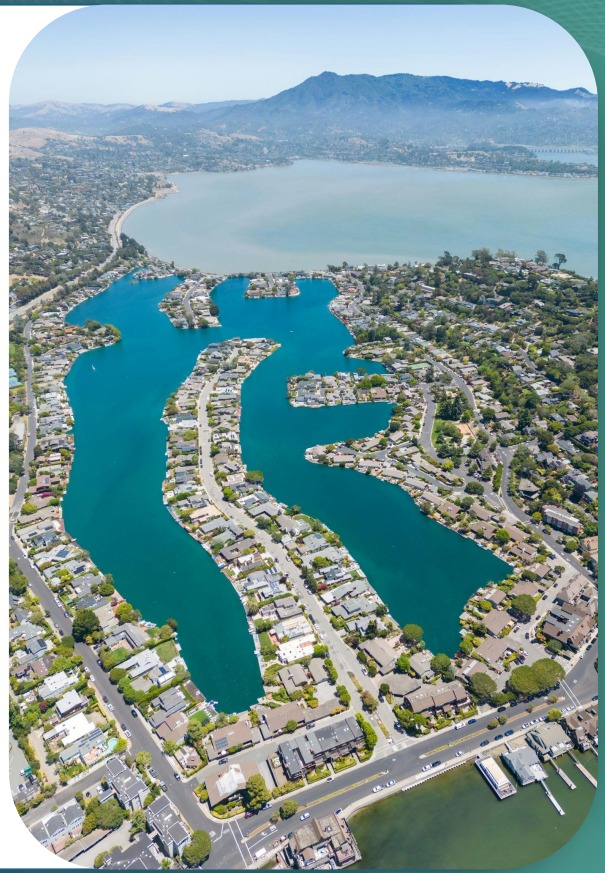


Table of Contents

Table of Contents

Table of Contents

Table of Contents

Appendix - Site Analysis Report

Library HVAC Details

HVAC	Central Plant		Unitary Equipment			
Unit Tag	AC-1	B-1	AC-1	AC-2	AC-3	AC-4
Unit Type	Main AHU	HHW Boiler	Packaged Heat Pump			
Make & Model	Trane SLH6012ECJB	Teledyne Lars PH1200	Trane WHC092H3RA	Trane WHC060H3RBA	Trane WHC092H3RA	Trane WHC060H3RBA
Year of Installation	2004	2004	2004	2004	2004	2004
RUL (years)	0	0	0	0	0	0
Unit Capacity	38,500 CFM 1,366 kBtu/h Cooling	1,200 kBtu/h Heating	3,500 CFM 97 kBtu/h Cooling 98 kBtu/h Heating	2,000 CFM 60 kBtu/h Cooling 56 kBtu/h Heating	2,900 CFM 91 kBtu/h Cooling 85 kBtu/h Heating	1,300 CFM 59 kBtu/h Cooling 54 kBtu/h Heating
Fuel Type	Electric	Natural Gas	Electric	Electric	Electric	Electric
Area Served	Main Library Areas		Program Room A	Program Room B	Program Room C	Program Room D
Terminal Unit	VAV Boxes	Reheat Coils	Area Served	Area Served	Area Served	Area Served
Controls	Trane Tracer Synchrony BMS					

**Calculation methodology and assumptions are detailed on page 45.*

Appendix - Site Analysis Report

Library HVAC Details (Continued)

HVAC	Transfer Equipment	
Unit Tag	P-1	P-2
Unit Type	Heating Hot Water Pump	Heating Hot Water Pump
Make	Bell & Gosset	Bell & Gosset
Year of Installation	2004	2004
RUL (years)	0	0
Unit Capacity	5-hp 58 gpm 88 ft. head	5-hp 58 gpm 88 ft. head
Controls	Constant Speed	Constant Speed
Equipment Served	B-1	B-1

**Calculation methodology and assumptions are detailed on page 45.*

Appendix - Site Analysis Report

Library Lighting & DHW Details

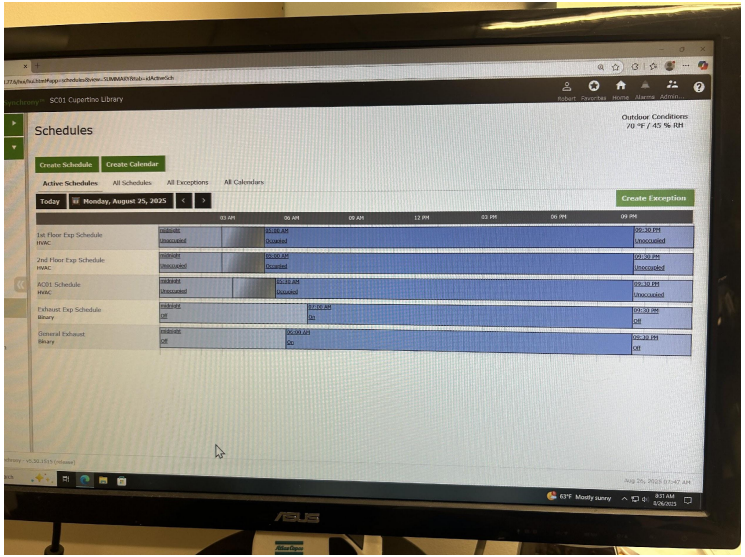
Lighting	Light Fixture			
Type	2' x 4' Ceiling Recessed Linear fixture with LED tubes	Direct/ Indirect Pendant LEDs	Ceiling Recessed Can LEDs	Wall packs and Pole Lights
Controls	Manual Wall Switches Occupancy Sensors	Manual Wall Switches	Manual Wall Switches	Timers
Area Served	Bookshelves/ Reading Area/ Breakrooms	Reading Areas/ Parents' Corner	Hallways	Exterior/ Parking

DHW	Type
Unit Tag	DWH-1
Make & Model	AO Smith DEN-40 110
Year of Installation	2021
RUL (years)	16
Fuel Type	Electricity
Input Rating	40.94 kBtu
Storage	40 gallons

**Calculation methodology and assumptions are detailed on page 45.*

Appendix - Site Analysis Report

Library EEM-1: Retro-commission (RCx) HVAC System



Observations

- Duration of Unreliable BMS Data: Past four months
- Library Operating Hours: 10 AM – 9 PM M-F & 10 AM – 6 PM SS
- Main Air Handling Unit (AHU) Operating Schedule: 5:30 AM – 9:30 PM
- Program Rooms Heat Pumps Operating Schedule: 5 AM – 9:30 PM
- Economizer Operation: Minimum Outside Air (OA)
- Supply Air Temperature (SAT) Reset: Unknown if working properly
- Duct Static Pressure (DSP) Reset: Unknown if working properly

Recommendations

- HVAC Operating Schedule: 8 AM – 9:30 PM M-F & 8 AM – 6:30 PM SS
- Economizer Operation: Minimum OA to 100% OA
- SAT & DSP Resets: Review design sequences of operation for control
- Agile RCx Team Approach: RCx agent, trusted controls contractor, and site staff make changes or repairs on the spot as they are found on the BMS

Rationale

A retro-commissioning effort is like a building tune-up. It involves the investigation and analysis of system operations and controls to determine no-cost and low-cost measures. The goal is to get all systems working as close to the design intent as possible. A retro-commissioning effort will uncover opportunities for significant energy savings, improved systems reliability, and repair opportunities.

Appendix - Site Analysis Report

Library EEM-2: Repair or Replace VFDs on Supply and Return Fans for Main AHU

Existing Equipment
Supply Fan Motor HP: 75
Return Fan Motor HP: 40

Observation
During our investigation of the main air handling unit (AHU), site staff mentioned that the variable frequency drives (VFDs) for the supply and return fans had stopped functioning. Therefore, both fans are currently operating at maximum speed.

Recommendation
We recommend repairing or replacing the existing VFDs of the supply and return fan to return to variable flow control. This may require the re-calibration of the static pressure sensors, controls re-integration and programming.

Rationale
Fan energy drops exponentially with fan flow. Reducing supply and return flow to only what is needed saves energy. VFDs are the most efficient means of controlling the fan speed. VFDs also offer a number of non-energy saving advantages, including rotational speed adjustments over a continuous range of operation, noise reduction during low flow operation, and inclusion of motor soft-start controls.

Appendix - Site Analysis Report

Library EFS-1: Replace Existing Natural Gas Fired Heating Hot Water Heater with Electric Heat Pump Water Heater

Existing Equipment
Quantity: 1
Location: Roof
Fuel Type: Natural Gas
Heating Hot Water Boiler Size: 1,200 kBtu/h
Boiler Efficiency: 82%
Boiler Control Type: Building Management System (BMS)
Boiler Operation: Continuous
Age: 21 Years Old

Recommendation
1. Replace the existing natural gas fired boiler at the site with an air-to-water heat pump.
2. Integrate the new air-to-water heat pump unit into the building's existing BMS.
3. Program the heat pump to operate on a schedule that considers start up time with the library's occupancy schedule.
4. Retrofit the existing pipe fittings with Victaulic pipe fittings to prevent leaks from a scheduled heating hot water (HHW) system.

Rationale
Air-to-water electric heat pumps will be at least three times as efficient as gas-fired boilers in making hot water. They will reduce energy usage and greenhouse gas emissions. However, replacing the existing gas-fired equipment with electric will result in an operating cost penalty.

Appendix - Site Analysis Report

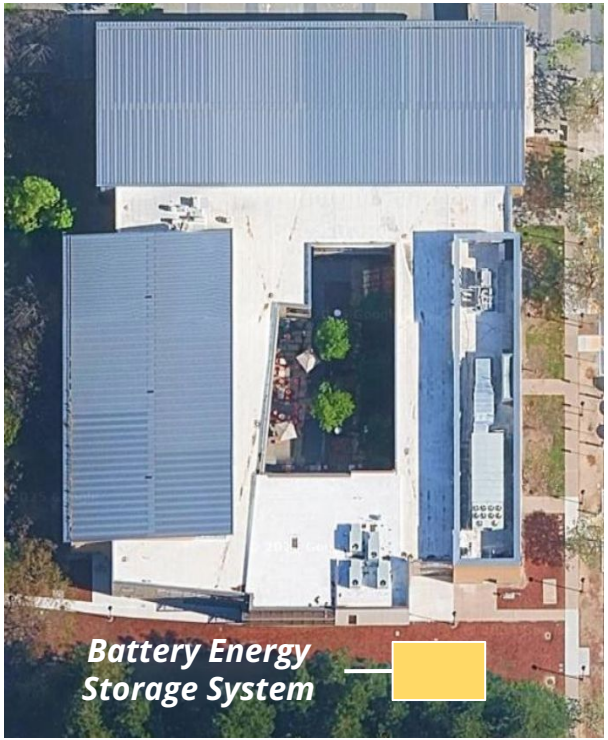
Library ERM-1: Install a Solar PV System

Recommendation
Solar PV System Capacity: 100-kW DC
Install Location: Library Roof
Approximate Roof Space: 7,200 sq.ft.
Generation Capacity: 170,000 kWh
Annual Electricity Consumption Offset: 15%
Estimated EUL: 25 years

Rationale
Installing a solar PV system with a capacity of 170,000 kWh will help cover about 15% of the current electricity use. The new solar PV system would be able to cover the electricity use from the new air-to-water heat pump for the HHW system.

Appendix - Site Analysis Report

Library ERM-2: Install a Battery Energy Storage System



Recommendation
Battery System Size: 400 kW/ 2,200 kWh
Total Load Support: 100%
Operating Duration: 6 hours
Install Location: Outside Near Electrical Room
Approximate Install Area: 400 sq.ft.
Additional Widgets: Energy management system enabling charging during low-demand periods and discharging during peak demand or utility outages.

Rationale
Installing a battery energy storage system with a capacity of 400 kW/ 2,200 kWh will support all the loads at the facility for 6 hours. This capacity is greater than the typical grid outage that the facility experiences.

Appendix - Site Analysis Report

Library Electrical Capacity Analysis

Current Building Peak (A)	1,350
New Electrified Equipment Load (A)	800
New Solar PV (A)	325
Existing Electrical Service (A)	2,500
Electrical Service Upgrade	Not Needed

Appendix - Site Analysis Report

Quinlan HVAC Details

HVAC	Central Plant		
Unit Tag	B-1	CH-1	CH-2
Unit Type	HHW Boiler	Air Cooled Chiller	Air Cooled Chiller
Make & Model	Rite 105	Trane CGAM 060F	Trane CGAM 060F
Year of Installation	Unknown	2025	2025
RUL (years)	0 (Assumed)	20	20
Unit Capacity	1,050 kBtu/h Heating	60 Tons Cooling	60 Tons Cooling
Fuel Type	Natural Gas	Electric	Electric
Terminal Unit	Air Handlers' Hot Decks	Air Handlers' Cold Decks	Air Handlers' Cold Decks
Controls	Pneumatic		

**Calculation methodology and assumptions are detailed on page 45.*

Appendix - Site Analysis Report

Quinlan HVAC Details (Continued)

HVAC	Unitary Equipment				
Unit Tag	AH-1	AH-2	AH-3	AH-4	AH-5
Unit Type	Air Handler				
Make & Model	Trane HDT#21	Trane MZ #21	Trane MZ #21	Trane MZ #21	Trane HDT #6
Year of Installation	1988	1988	1988	1988	1988
RUL (years)	0	0	0	0	0
Unit Capacity	10,000 CFM 438 kBtu/h CHW Coil 216 kBtu/h HHW Coil	10,000 CFM 353 kBtu/h CHW Coil 216 kBtu/h HHW Coil	10,000 CFM 353 kBtu/h CHW Coil 216 kBtu/h HHW Coil	10,000 CFM 353 kBtu/h CHW Coil 379 kBtu/h HHW Coil	2,250 CFM
Fuel Type	Electric	Electric	Electric	Electric	Electric
Area Served	Multipurpose	West Offices	East Offices	Unknown	Kitchen
Controls	Pneumatic				

**Calculation methodology and assumptions are detailed on page 45.*

Appendix - Site Analysis Report

Quinlan HVAC Details (Continued)

HVAC	Transfer Equipment		
Unit Tag	P-1	P-2	P-3
Unit Type	Chilled Water Pump	Chilled Water Pump	Heating Hot Water Pump
Make	Bell & Gosset	Bell & Gosset	Bell & Gosset
Unit Capacity	5-hp 80 gpm 70 ft. head	5-hp 80 gpm 70 ft. head	1.5-hp 45 gpm 55 ft. head
Controls	Constant Speed	Constant Speed	Constant Speed
Equipment Served	CH - 1 & 2	CH - 1 & 2	B-1

**Calculation methodology and assumptions are detailed on page 45.*

Appendix - Site Analysis Report

Quinlan Lighting, DHW, and Kitchen Details

Lighting	Light Fixture			
Type	2' x 4' Ceiling Recessed Linear fixture with LED tubes	Pendant LEDs	Ceiling Recessed Can LEDs	Wall Mounted LEDs, Ballard LEDs
Controls	Manual Wall Switches / Occupancy Sensors	Manual Wall Switches	Manual Wall Switches	Timers, Photocell sensors
Area Served	Conference Room	Hallways	Entrance/ Hallways	Exteriors

Kitchen	Type
Unit Tag	Gas Range 1
Make & Model	Montague Grizzly G2626
Year of Installation	Unknown
RUL (years)	Unknown
# of Pilot Lights	4
Equipment Operation	4 activities per year, 3 days of cooking per activity, 8 hours per day

DHW	Type
Unit Tag	DWH-1
Make & Model	State Industries SBD65305NE
Year of Installation	2006
RUL (years)	1
Fuel Type	Natural Gas
Input Rating	305 kBtu
Storage	65 gallons

**Calculation methodology and assumptions are detailed on page 45.*

Appendix - Site Analysis Report

Quinlan EEM-3: Convert Pneumatic Controls to Direct Digital Control (DDC)

Observation

- HVAC Equipment Control: Pneumatic
- Pneumatic Limitations: Limited visible feedback on HVAC equipment & zones, limiting optimization of systems and energy saving possibilities
- HVAC Equipment Age: All past end of EUL, except for chillers installed in 2025
- Central Plant HHW & CHW Systems Operation: Constant speed and fixed setpoints
- AHU & Exhaust Fan Control: VFD

Recommendation

- HVAC Equipment Control: Direct Digital Control (DDC)
- Data Visibility: All zone and central plant equipment points and trends
- DDC Opportunities: Improved occupant comfort, ease of maintenance, diagnosing of issues, ability to implement energy efficient sequences of operations

Rationale

Pneumatic controls are becoming increasingly difficult to maintain and find spare parts for. Pneumatic components will lose calibration over time and are labor intensive to maintain. Failing pneumatic components will result in inefficient energy operation and comfort issues within the building. It is also hard to find employees who are trained in pneumatic controls.

Appendix - Site Analysis Report

Quinlan EFS-2: Replace Existing Domestic Water Heater with Heat Pump Water Heater

Existing Equipment
Unit Quantity: One
Unit Location: Compressor Room
Unit Type: Natural Gas Domestic Water Heater
Unit Input Capacity: 305 kBtu/h
Unit Efficiency: 80%
Unit Age: 19 years old

Recommendation
1. Replace existing unit with an air-to-water domestic heat pump water heater when the existing unit begins failing.

Rationale
Electric air-to-water heat pump domestic water heaters will be at least four times as efficient as the existing natural gas-fired domestic water heater. They will reduce energy usage and greenhouse gas emissions. Replacing existing gas-fired equipment with electric typically results in an operating cost penalty. However, based on the City's utility rates, this measure will save energy cost as well.

Appendix - Site Analysis Report

Quinlan EFS-3: Replace Existing Natural Gas Fired Heating Hot Water Heater with Electric Heat Pump Water Heater

Existing Equipment
Quantity: 1
Location: Boiler Room
Heating Hot Water Boiler Size: 1,050 kBtu/h
Boiler Efficiency: 80%
Boiler Control Type: Pneumatic
Boiler Operation: Continuous
Age: > 20 Years Old

Recommendation
1. Replace the existing natural gas fired boiler at the site with an air-to-water heat pump.
2. Integrate the new air-to-water heat pump unit into the building's new DDC BMS.
3. Program the heat pump to operate on a schedule that considers start up time with the community center's occupancy schedule.
4. Retrofit the existing pipe fittings with Victaulic pipe fittings to prevent leaks from a scheduled heating hot water (HHW) system.

Rationale
Air-to-water electric heat pumps will be at least three times as efficient as gas-fired boilers in making hot water. They will reduce energy usage and greenhouse gas emissions. However, replacing the existing gas-fired equipment with electric will result in an operating cost penalty.

Appendix - Site Analysis Report

Quinlan EFS-4: Replace Existing Gas Kitchen Equipment with Electric

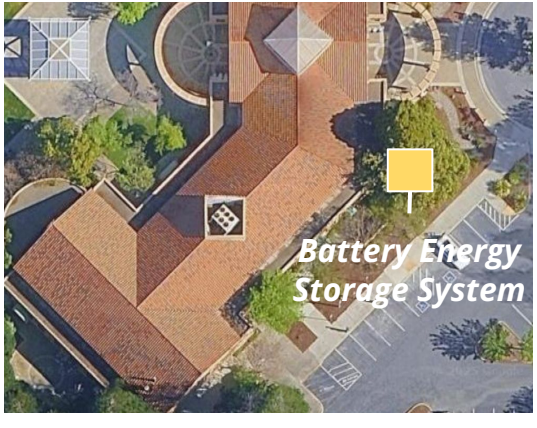
Existing Equipment
Unit Quantity: One
Unit Capacity: Four burners, One Griddle and Two Standard Ovens
Ignition Type: Pilot Light
Typical Use: Up to four activities each year, 3 days per activity, 8 hours per day

Recommendation
1. Replace existing gas range with an electric range, griddle and electric oven.

Rationale
Induction cooking is often considered one of the most efficient cooking technologies. With induction cooking, up to 90% of the energy consumed is transferred to the food, compared to about 74% for traditional electric systems, and 40% for gas. Induction cooking relies on the principle of magnetic induction that excites eddy currents in ferromagnetic cookware when in presence of an electromagnetic field. These induced currents dissipate heat by Joule effect, generating heat for cooking directly in the cooking vessel. This results in superior heat up time and temperature response when compared to both electric resistance and gas stove tops. On average, induction stove tops heat up 50% faster as compared to gas units. In addition, induction ranges use energy only when actively heating or cooking.

Appendix - Site Analysis Report

Quinlan ERM-3: Install a Battery Energy Storage System



New Solar PV System in Design
Size: 310 kW
Potential Generation: 450,000 kWh

Recommendation
Battery System Size: 90 kW/ 750 kWh
Total Load Support: 100%
Operating Duration: 2 hours
Install Location: Outside Near Boiler Room
Approximate Install Area: 200 sq.ft.
Additional Widgets: Energy management system enabling charging during low-demand periods and discharging during peak demand or utility outages.

Rationale
Installing a battery energy storage system with a capacity of 90 kW/ 750 kWh will support all the critical loads at the facility for 2 hours. This capacity is greater than the typical grid outage that the facility experiences.

Appendix - Site Analysis Report

Quinlan Electrical Capacity Analysis

Current Building Peak (A)	250
New Electrified Equipment Load (A)	950
New Solar PV (A)	450
Existing Electrical Service (A)	800
Electrical Service Upgrade Size (A)	850
Estimated Electrical Service Upgrade Cost	$250,000^

^Assuming that there are no additional utility charges based on our review of the existing grid load using the Grid Resource Integration Portal (GRIP) Tool.

Appendix - Site Analysis Report

Sports Center HVAC Details

HVAC	Unitary Equipment						
Unit Tag	AC-1	AC-2	AC-3	AC-4	AC-5	AC-6	MUA-1
Unit Type	Gas Pack	Gas Pack	Gas Pack	Heat Pump	Gas Pack	Gas Pack	Makeup Air Unit
Make & Model	Bryant 582KE06A	Carrier 48HJD012	Carrier 48HJD006	Carrier 50TCQD12A	Carrier 48HJE004	Carrier 48HJD006	No Nameplate
Year of Installation	Unknown	2001	2004	2021	2005	2008	No Nameplate
RUL (years)	Unknown	0	0	16	0	3	0 (Assumed)
Unit Capacity	5 Tons Cooling 67 kBtu/h Heating	10 Tons Cooling 180 kBtu/h Heating	5 Tons Cooling 72 kBtu/h Heating	9.75 Tons Cooling 116 kBtu/h Heating	3 Tons Cooling 72 kBtu/h Heating	5 Tons Cooling 72 kBtu/h Heating	Unknown
Fuel Type	Electric & Natural Gas	Electric & Natural Gas	Electric & Natural Gas	Electric	Electric & Natural Gas	Electric & Natural Gas	No Nameplate
Area Served	Front Lobby	Multipurpose Room	Racquetball Courts	Child Care	Tennis Office	Teen Center	Unknown
Controls	Syserco Envision for Alerton BACtalk BMS						Unknown

**Calculation methodology and assumptions are detailed on page 45.*

Appendix - Site Analysis Report

Sports Center Lighting & DHW Details

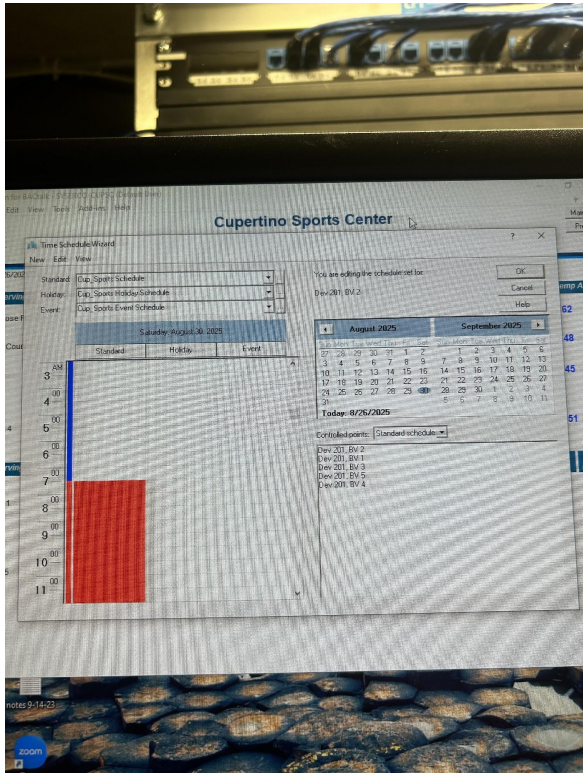
Lighting	Light Fixture				
Type	2' x 4' Ceiling Recessed Linear fixture with LED tubes	Direct/ Indirect Pendant LEDs	Ceiling Recessed Can LEDs	Floodlights	Bulkhead Lights
Controls	Manual Wall Switches	Manual Wall Switches	Manual Wall Switches	Motion Sensors	Manual Wall Switches
Area Served	Yoga Room / Break Room / Offices	Workout Area	Entrance/ Hallways	Tennis/ Basketball Courts	Exteriors

DHW	Type	Type
Unit Tag	DWH-1	DWH-2
Make & Model	AO Smith BTL 180 200	AO Smith BTL 180 104
Year of Installation	2014	2014
RUL (years)	9	9
Fuel Type	Natural Gas	Natural Gas
Input Rating	180 kBtu	180 kBtu
Storage	81 gallons	93 gallons

**Calculation methodology and assumptions are detailed on page 45.*

Appendix - Site Analysis Report

Sports Center EEM-4: Tighten AC Unit Schedule Around Occupancy Hours



Observation

The Sports Center has a central BMS that maintenance staff can use to adjust the schedules of the AC units on the roof. The table below shows the schedule of the AC units in comparison with the building.

Day of Week	Sports Center Hours	AC Unit	AC Unit Schedule
Monday – Friday	8 AM – 10 PM	AC-2, 3, 6	5 AM – 10 PM
		AC-1, 4, 5	24/7
Saturday & Sunday	8 AM – 8 PM	AC-2, 3, 6	7:30 AM – 10 PM
		AC-1, 4, 5	24/7

Recommendation

- Monday – Friday Operation for All Units: 7:30 AM – 10 PM
- Saturday & Sunday Operation for All Units: 7:30 AM – 8 PM
- The schedule above is both fine-tuned but consistent with the existing schedules.

Rationale

Adjusting the AC unit schedules to operate the units only when necessary will reduce equipment runtime and save energy without impacting occupant comfort.

Appendix - Site Analysis Report

Sports Center EFS-5: Replace Existing Domestic Water Heaters with Heat Pump Water Heaters

Existing Equipment
Unit Quantity: Two
Unit Location: Storage
Unit Type: Natural Gas Domestic Water Heater
Unit Input Capacity: 180 kBtu/h
Unit Efficiency: 80%
Unit Age: 11 years old

Recommendation
1. Replace existing unit with an air-to-water domestic heat pump water heater when the existing unit begins failing.

Rationale
Electric air-to-water heat pump domestic water heaters will be at least four times as efficient as the existing natural gas-fired domestic water heater. They will reduce energy usage and greenhouse gas emissions. Replacing existing gas-fired equipment with electric typically results in an operating cost penalty. However, based on the City's utility rates, this measure will save energy cost as well.

Appendix - Site Analysis Report

Sports Center EFS-6: Replace Existing Gas Fired Packaged Units with Ultra-High Efficiency Heat Pumps

Existing Gas HVAC Equipment

Packaged Rooftop Unit	Area Served	Cooling Capacity	Heating Capacity
AC-1	Front Lobby	5 Tons	67 kBtu/h
AC-2	Multipurpose Room	10 Tons	180 kBtu/h
AC-3	Racquetball Courts	5 Tons	72 kBtu/h
AC-5	Tennis Office	3 Tons	72 kBtu/h
AC-6	Teen Center	5 Tons	72 kBtu/h
MUA-1	Could Not Find	Could Not Find	Could Not Find

Recommendation

Install packaged heat pump units with an EER of 11.4 or higher and a COP of 3.6 or higher.

Rationale

Air-to-air electric heat pumps will be at least three times as efficient as existing furnaces. They will reduce energy usage and greenhouse gas emissions. Replacing existing gas-fired equipment with electric typically results in an operating cost penalty. However, based on the City's utility rates, this measure will save energy cost as well.

Appendix - Site Analysis Report

Sports Center Electrical Capacity Analysis

Current Building Peak (A)	400
New Electrified Equipment Load (A)	250
Existing Electrical Service (A)	400
Electrical Service Upgrade Size (A)	250
Estimated Electrical Service Upgrade Cost	$150,000^

^Assuming that there are no additional utility charges based on our review of the existing grid load using the Grid Resource Integration Portal (GRIP) Tool.

Appendix - Site Analysis Report

Senior Center HVAC Details

HVAC	Unitary Equipment						
Unit Tag	AC-1	AC-2	AC-3	AC-4	AC-5	AC-6	KMAU-1
Unit Type	Gas Pack	Gas Pack	Gas Pack	Gas Pack	Gas Pack	Gas Pack	Makeup Air Unit
Make & Model	Trane YCH300B	Trane YCH090D	Trane YCH150C	Trane YCH120C	Trane YCH061C	Trane YCH151C	Trane GRAA20GDB
Year of Installation	2001	2001	2001	2001	2001	2001	2001
RUL (years)	0	0	0	0	0	0	0
Unit Capacity	8,000 CFM 25 Tons Cooling 400 kBtu/h Heating	3,000 CFM 7.5 Tons Cooling 120 kBtu/h Heating	4,000 CFM 12.5 Tons Cooling 150 kBtu/h Heating	3,400 CFM 10 Tons Cooling 135 kBtu/h Heating	2,000 CFM 5 Tons Cooling 90 kBtu/h Heating	5,000 CFM 12.5 Tons Cooling 150 kBtu/h Heating	2,000 CFM 200 kBtu/h Heating
Fuel Type	Electric & Natural Gas	Electric & Natural Gas	Electric & Natural Gas	Electric & Natural Gas	Electric & Natural Gas	Electric & Natural Gas	Natural Gas
Area Served	Reception Hall	Lobby – Exterior Zone	Classroom – North Exterior Zone	Exercise Room	Offices and Kitchen	Office Rooms – Interior Zone	Kitchen
Controls	Trane Tracer Synchrony BMS						Unknown

**Calculation methodology and assumptions are detailed on page 45.*

Appendix - Site Analysis Report

Senior Center Lighting, DHW, and Kitchen Details

Lighting	Light Fixture		
Type	2' x 4' Ceiling Recessed Linear fixture with LED tubes	Ceiling Recessed Can LEDs	Wall Mounted LEDs, Ballard LEDs
Controls	Manual Wall Switches / Occupancy Sensors	Manual Wall Switches	Timers, Photocell sensors
Area Served	Conference Rooms	Entrance/ Hallways	Exteriors

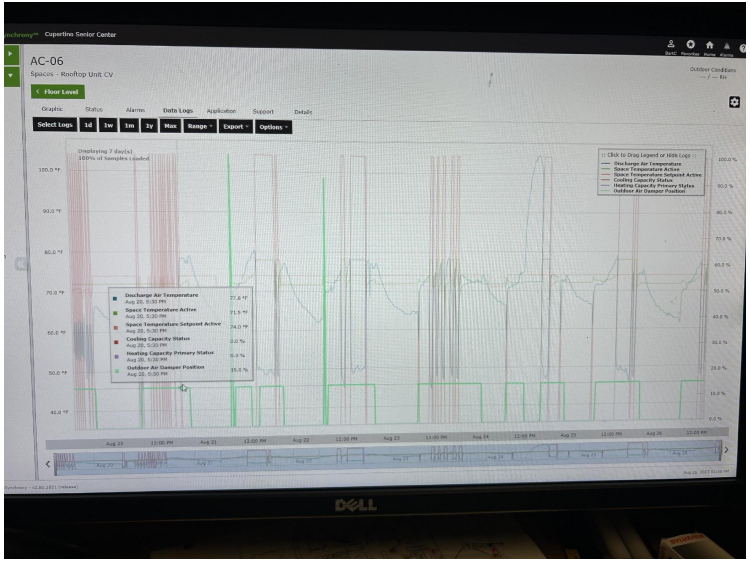
Kitchen	Type
Unit Tag	Gas Range 1
Make & Model	Southbend 4721DD
Year of Installation	2017
RUL (years)	7
# of Pilot Lights	12
Equipment Operation	Twice per week

DHW	Type
Unit Tag	DWH-1
Make & Model	AO Smith BTN 120 108
Year of Installation	2012
RUL (years)	7
Fuel Type	Natural Gas
Input Rating	120 kBtu
Storage	71 gallons

**Calculation methodology and assumptions are detailed on page 45.*

Appendix - Site Analysis Report

Senior Center EEM-5: Tighten AC Unit Schedule Around Occupancy Hours and Tune Economizer Operation



Observation

The Senior Center has a central BMS that maintenance staff can use to adjust the schedules of the AC units on the roof. The table below shows the schedule of the AC units in comparison with the building. On the BMS, we also observed that the economizers are typically only allowing the minimum required outdoor airflow despite optimal free-cooling conditions.

Day of Week	Senior Center Hours	AC Units Schedule
Monday – Friday	8 AM – 5 PM	7 AM – 730 PM
Saturday & Sunday	Closed	Off Unless Event

Recommendation

- Monday – Friday Operation for All Units: 7 AM – 6 PM
- Inspect, repair, or replace economizer dampers and actuators, as needed.
- Ensure that the proper economizer sequence is followed and the associated OAT, MAT, RAT and SAT sensors are calibrated.

Rationale

Economizer systems take advantage of favorable weather conditions to reduce mechanical cooling loads by introducing cool outdoor air into a building. The term “free-cooling” is used to describe savings achieved from a properly working economizer.

Appendix - Site Analysis Report

Senior Center EFS-7: Replace Existing Domestic Water Heater with Heat Pump Water Heater

Existing Equipment
Unit Quantity: One
Unit Location: Storage
Unit Type: Natural Gas Domestic Water Heater
Unit Input Capacity: 120 kBtu/h
Unit Efficiency: 80%
Unit Age: 13 years old

Recommendation
1. Replace existing unit with an air-to-water domestic heat pump water heater when the existing unit begins failing.

Rationale
Electric air-to-water heat pump domestic water heaters will be at least four times as efficient as the existing natural gas-fired domestic water heater. They will reduce energy usage and greenhouse gas emissions. Replacing existing gas-fired equipment with electric typically results in an operating cost penalty. However, based on the City's utility rates, this measure will save energy cost as well.

Appendix - Site Analysis Report

Senior Center EFS-8: Replace Existing Gas Fired Packaged Units with Ultra-High Efficiency Heat Pumps

Rationale

Air-to-air electric heat pumps will be at least three times as efficient as existing furnaces. They will reduce energy usage and greenhouse gas emissions. Replacing existing gas-fired equipment with electric typically results in an operating cost penalty. However, based on the City's utility rates, this measure will save energy cost as well.

Existing Gas HVAC Equipment

Packaged Rooftop Unit	Area Served	Cooling Capacity	Heating Capacity
AC-1	Reception Hall	25 Tons	400 kBtu/h
AC-2	Lobby – Exterior Zone	7.5 Tons	120 kBtu/h
AC-3	Classroom – North Exterior Zone	12.5 Tons	150 kBtu/h
AC-4	Exercise Room	10 Tons	135 kBtu/h
AC-5	Offices and Kitchen	5 Tons	90 kBtu/h
AC-6	Office Rooms – Interior Zone	12.5 Tons	150 kBtu/h
KMAU-1	Kitchen	None	200 kBtu/h

Recommendation

Install packaged heat pump units with the following EER and COP.

Unit	AC-1	AC-2	AC-3	AC-4	AC-5	AC-6	KMAU-1
EER	10.1	11.6	10.9	11.6	11.4	10.9	N/A
COP	3.4	3.6	3.6	3.6	3.6	3.6	3.5

Appendix - Site Analysis Report

Senior Center EFS-9: Replace Existing Gas Range with an Electric Induction Range

Existing Equipment
Unit Quantity: One
Unit Capacity: 12 Burners and Two Standard Ovens
Ignition Type: Pilot Light
Typical Use: Twice per week, 16 hours per week

Recommendation
1. Replace existing gas range with an electric range, griddle and electric oven.

Rationale
Induction cooking is often considered one of the most efficient cooking technologies. With induction cooking, up to 90% of the energy consumed is transferred to the food, compared to about 74% for traditional electric systems, and 40% for gas. Induction cooking relies on the principle of magnetic induction that excites eddy currents in ferromagnetic cookware when in presence of an electromagnetic field. These induced currents dissipate heat by Joule effect, generating heat for cooking directly in the cooking vessel. This results in superior heat up time and temperature response when compared to both electric resistance and gas stove tops. On average, induction stove tops heat up 50% faster as compared to gas units. In addition, induction ranges use energy only when actively heating or cooking.

Appendix - Site Analysis Report

Senior Center Electrical Capacity Analysis

Current Building Peak (A)	550
New Electrified Equipment Load (A)	550
Existing Electrical Service (A)	1,000
Electrical Service Upgrade Size (A)	100
Estimated Electrical Service Upgrade Cost	$100,000^

^Assuming that there are no additional utility charges based on our review of the existing grid load using the Grid Resource Integration Portal (GRIP) Tool.

Appendix - Site Analysis Report

BBF HVAC Details

HVAC	Central Plant		Transfer Equipment	
Unit Type	Pool Heater	Pool Heater	Filter Pumps (2)	Filter Pumps (2)
Area Served	Main Pool	Wading Pool	Main Pool	Wading Pool
Make & Model	Lochinvar KBN701	Lochinvar KBN400	Sulzer 10-30957	Nidec Motor Corp G20812, G20813
Year of Installation	2014	2014	Unknown	Unknown
RUL (years)	9	9	Unknown	Unknown
Unit Specs	700 kBtu/h Heating	399 kBtu/h Heating	10-hp 340 gpm 70 ft. head	Unknown
Fuel Type	Natural Gas	Natural Gas	Electric	Electric
Controls	Manual Control		VFD	VFD
Hours of Operation	24/7 From Memorial Day to Close of Season (Only 100 Days Out of the Year); Off in the Off-Season			

**Calculation methodology and assumptions are detailed on page 45.*

Appendix - Site Analysis Report

BBF Lighting, DHW, and Kitchen Details

Lighting	Light Fixture	
Type	Vapor tight linear LED fixture	Bulkhead light
Controls	Manual Wall Switches	Manual Wall Switches
Area Served	Mechanical Room/ Kitchen	Exteriors

Kitchen	Type	
Unit Tag	Gas Range	Charbroiler
Make & Model	American Range JTRH-6	Star 6136CBF
Year of Installation	Unknown	Unknown
RUL (years)	Unknown	Unknown
# of Pilot Lights	6	N/A
Equipment Operation	2 activities per year	2 activities per year

DHW	Type		
Unit Tag	DWH-0416	DWH-0508	DWH-0416
Make & Model	AO Smith BTH 199 100	Takagi T-H3-DV	American Standard CE-20-AS
Year of Installation	2011	2016	2017
RUL (years)	6	11	12
Fuel Type	Natural Gas	Natural Gas	Electricity
Input Rating	199 kBtu	199 kBtu	6.8 kBtu
Storage	100 gallons	Tankless	19 gallons

**Calculation methodology and assumptions are detailed on page 45.*

Appendix - Site Analysis Report

BBF EFS-10: Replace Existing Domestic Water Heater with Heat Pump Water Heater

Existing Equipment
Unit Quantity: Two
Unit Location: Electrical/Mechanical Room and Kitchen
Unit Type: Natural Gas Domestic Water Heater
Unit Input Capacity: 199 kBtu/h
Unit Efficiency: 80%
Unit Age: 14 and 9 years old

Recommendation
1. Replace existing units with air-to-water domestic heat pump water heaters when the existing units begin failing.

Rationale
Electric air-to-water heat pump domestic water heaters will be at least four times as efficient as the existing natural gas-fired domestic water heater. They will reduce energy usage and greenhouse gas emissions. Replacing existing gas-fired equipment with electric typically results in an operating cost penalty. However, based on the City's utility rates, this measure will save energy cost as well.

Appendix - Site Analysis Report

BBF EFS-11: Replace Existing Pool Heaters with Electric Heat Pump Water Heaters

Existing Equipment
Quantity: 2
Location: Respective Pool Rooms
Fuel Type: Natural Gas
Main Pool Heater Size: 700 kBtu/h
Wading Pool Heater Size: 399 kBtu/h
Main Pool Heater Efficiency: 93%
Wading Pool Heater Efficiency: 90%
Boiler Control Type: Manual Control
Boiler Operation: Continuous During Open Season

Recommendation
1. Replace each existing natural gas fired water heater at the site with an equivalent air-to-water heat pump water heater.

Rationale
Air-to-water electric heat pumps will be at least three times as efficient as gas-fired boilers in making hot water. They will reduce energy usage and greenhouse gas emissions. However, replacing the existing gas-fired equipment with electric will result in an operating cost penalty.

Appendix - Site Analysis Report

BBF EFS-12: Replace Existing Gas Range with an Electric Induction Range

Existing Equipment
Unit Quantity: One
Unit Capacity: Six Burners, Two Charbroilers and a Standard Oven
Ignition Type: Pilot Light
Typical Use: Up to two activities each year in the past, not used currently

Recommendation
Replace the existing gas range with an electric range, two charbroilers, and an electric oven. Although the BBF kitchen is currently not in use, this measure is being documented and calculated should the City choose to fully electrify the kitchen.

Rationale
Induction cooking is often considered one of the most efficient cooking technologies. With induction cooking, up to 90% of the energy consumed is transferred to the food, compared to about 74% for traditional electric systems, and 40% for gas. Induction cooking relies on the principle of magnetic induction that excites eddy currents in ferromagnetic cookware when in presence of an electromagnetic field. These induced currents dissipate heat by Joule effect, generating heat for cooking directly in the cooking vessel. This results in superior heat up time and temperature response when compared to both electric resistance and gas stove tops. On average, induction stove tops heat up 50% faster as compared to gas units. In addition, induction ranges use energy only when actively heating or cooking.

Appendix - Site Analysis Report

BBF Electrical Capacity Analysis (with Electrified Kitchen)

Current Building Peak (A)	175
New Electrified Equipment Load (A)	825
Existing Electrical Service (A)	800
Electrical Service Upgrade Size (A)	200
Estimated Electrical Service Upgrade Cost	$10,000,000^

^There is no longer any available load hosting capacity on the site's regional transformer based on our review using the Grid Resource Integration Portal (GRIP) Tool. A very expensive utility transformer upgrade will be required. Quinlan Community Center, the Sports Center, and the Senior Center still have available load hosting capacity on their regional transformers and will only require a new switchgear upgrade, which is significantly cheaper than a utility transformer upgrade.

Appendix - Site Analysis Report

BBF Electrical Capacity Analysis (without Electrified Kitchen)

Current Building Peak (A)	175
New Electrified Equipment Load (A)	600
Existing Electrical Service (A)	800
Electrical Service Upgrade Size	Not Needed

Methodology - Site Analysis Report

Utility CCA Make-up

- Silicon Valley Clean Power Green Start with 37% renewable component

Utility Rate Calculations

- Used blended rate to calculate per unit electricity and natural gas cost
- Energy cost savings are calculated on an annual basis
- No utility rate escalator was used in calculating energy savings

GHG Emissions

- Electricity = 0.058 lbs of CO_2 per kWh for Silicon Valley Clean Power Green Start
- Natural gas = 11.7 lbs of CO_2 per therm

Energy Cost Savings Assumption

- Assumed a blended electricity cost of $0.35 per kWh and natural gas cost of $1.47 per therm for the Library
- Assumed a blended electricity cost of $0.35 per kWh and natural gas cost of $2.30 per therm for Quinlan
- Assumed a blended electricity cost of $0.40 per kWh and natural gas cost of $2.38 per therm for the Sports Center
- Assumed a blended electricity cost of $0.45 per kWh and natural gas cost of $2.41 per therm for the Senior Center
- Assumed a blended electricity cost of $0.34 per kWh and natural gas cost of $2.15 per therm for Blackberry Farm

Remaining Useful Life (RUL) Years

- RUL of the equipment is estimated based on typical life of the equipment, the manufacture date of the unit, and the existing condition as observed during the site visit.

Project Cost Estimation

- Project costs were estimated on the basis of vendor quotes for equipment, labor costs were estimated using RSMeans Costing Catalog for the region and equipment to be installed at the facility, and appropriate adders were included to account for design, engineering, commissioning, and contingency.

Glossary - Site Analysis Report

Typically Used Acronyms:

- AHU – Air Handling Unit
- BBF – Blackberry Farm
- BMS – Building Management System
- BTU - British Thermal Unit
- CFM – Cubic Feet per Minute
- CHW – Chilled Water
- COP – Coefficient of Performance
- DC – Direct Current
- DDC – Direct Digital Control
- DHW – Domestic Hot Water
- DSP – Duct Static Pressure
- DWH – Domestic Water Heater
- EER - Energy Efficiency Ratio
- EUL - End-of-useful Life
- GPM – Gallons per Minute
- HHW – Heating Hot Water
- HP – Horsepower
- kW - kiloWatt
- kWh - kiloWatt Hour
- LED – Light Emitting Diode
- MAT – Mixed Air Temperature
- OAT – Outside Air Temperature
- PV - Photovoltaic
- RAT – Return Air Temperature
- RCx – Retro-commissioning
- RUL – Remaining Useful Life
- SAT – Supply Air Temperature
- VAV – Variable Air Volume
- VFD – Variable Frequency Drive