

ENERGY UPDATE

Campbell Union School District

October 6, 2016

NET ZERO ENERGY/EMISSIONS MULTI-USE Blackford Elementary



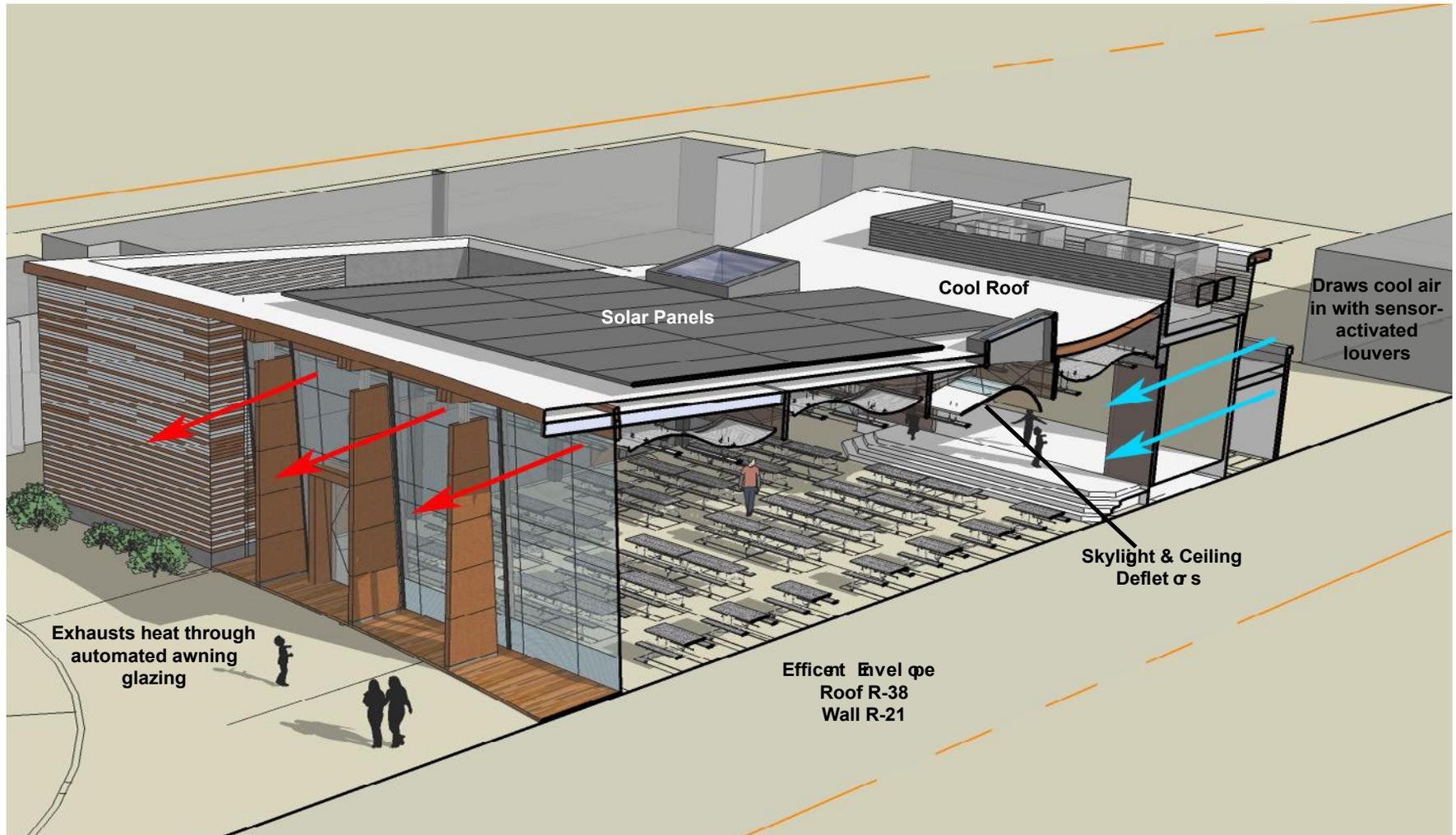
Daylighting



Daylighting



Passive Ventilation and Solar Panels



Passive Ventilation



Central Kitchen



Variable Refrigerant Cooling

- System capacity is adjusted dynamically to meet actual loads
- Independent zone control so areas are not overheated or overcooled
- System can recover heat removed from one zone and use it in another
- Lowest life cycle cost of any system



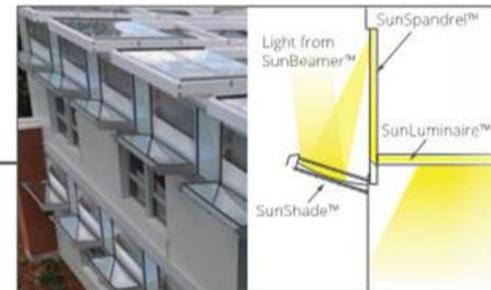
Solar Panels

- High energy loads of refrigeration and ventilation are partially offset by rooftop panels
- Energy not used is fed back into grid to offset future use



SunBeamers, Occupancy Sensors, and Automatic Dimming

- Sunlight is collected by mirrors on perimeter of roof
- Sunlight is beamed into interior light fixtures and LED lamps are automatically dimmed



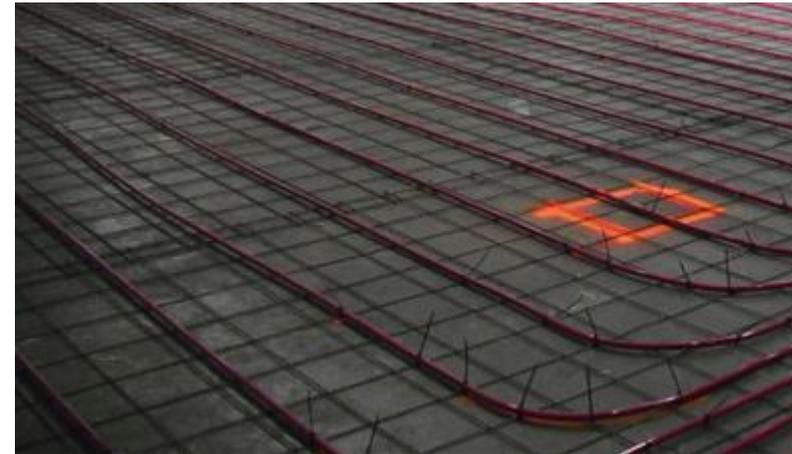
Exhaust Fan Control

- Kitchen hoods typically all run during all occupied hours
- Our fans are individually controlled by infra-red sensors
- Fans only run when cooking equipment is being used
- Save 80% of energy over standard systems



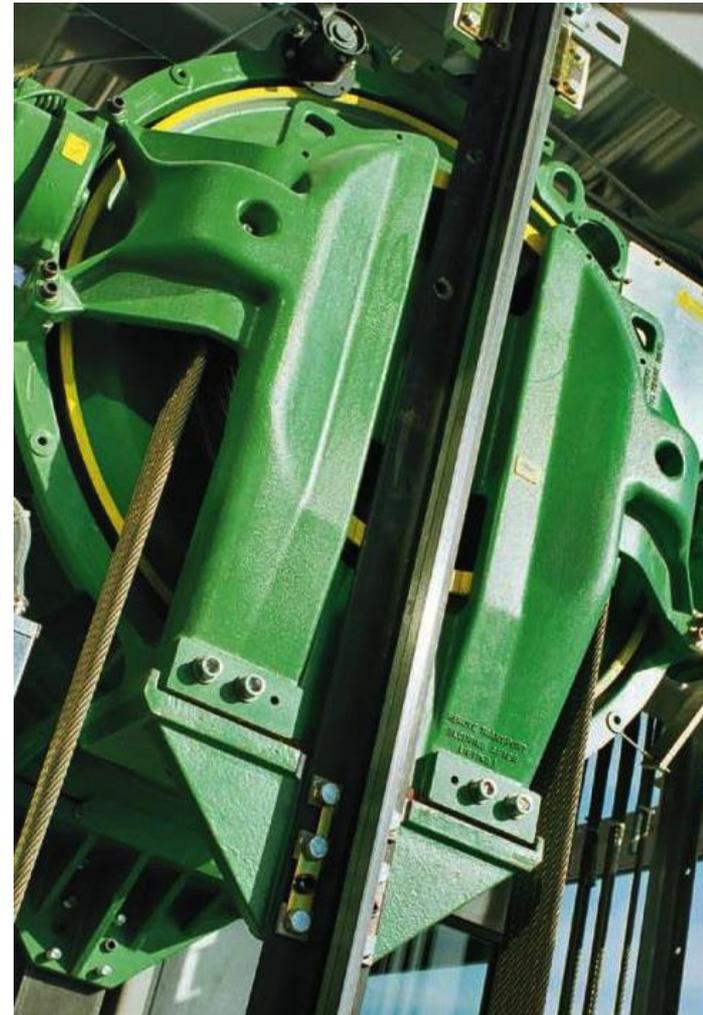
Saving energy through heat exchange

- When refrigeration equipment is used to cool the freezer, waste heat is normally transferred to the outdoor air
- In our freezer, the waste heat is captured and used to heat the coils in the floor
- This prevents freezing of the water in the soil which could cause building damage



Ecospace Elevator

- Compact hoisting machine is located on the side of the hoistway eliminating the need for elevator tower
- Compact machine is 70% more efficient than traditional hydraulic compressor
- Elevator also recovers excess energy when empty car travels up or full car travels down
- This recovers another 25% of the total energy used by elevator



Window Replacement



Gen7 Buildings



Solar Photovoltaic Project, 10 Sites



Solar Photovoltaic Project, 10 Sites

- Blackford
- Campbell Middle
- Capri
- Corporation Yard
- Forest Hill
- Marshall Lane
- Monroe
- Rolling Hills
- Rosemary
- Sherman Oaks



Solar Installation Monitoring/Maintenance

- Tigo Monitoring and Management System
 - Overview
 - Site Installations
 - Environmental Comparisons
 - Dashboard
 - Site layout
 - Solar system current condition and production levels- overall and per panel
 - Historical data
 - Charts
 - Summarize production at various intervals- day/week/month
 - Entire system or granular production
 - Alerts/Reports
 - Daily, weekly, monthly production reports
 - System alerts- inverter, strings, panels

<https://installations.tigoenergy.com/base/login/logout>

Facility Energy Management Systems

- The Big 3
 - Electricity - Lighting and H.V.A.C.
 - Natural Gas - H.V.A.C.
 - Water - Irrigation systems

Lighting Controls

- Wattstopper Lighting Control Systems
 - Astronomical programming
 - Network control of exterior/interior lighting systems
 - Real time activity display



H.V.A.C. System Control

- Proliphix Energy Management Software
 - Browser based interface
 - Oversee current classroom conditions
 - Proactively respond to malfunctions
 - Central schedule programming
 - Conserves staff time, ensures schedule uniformity
 - Address special events efficiently
 - Back to school night
 - Winter vacation, legal holidays
 - Conservation
 - Conserves electricity and natural gas = dollar savings
 - Cuts emissions
 - Reduces energy

H.V.A.C. System Control

The screenshot displays the ProLiphix HVAC System Control interface. The main window is titled 'Devices' and shows a tree view of various rooms and zones. A table below the tree lists sensor data for each device. The table has columns for Zone, RH %, Local, RS #1, RS #2, Cool, Heat, HVAC Mode, Cool, Heat, Day Class, Period, HVAC, Fan, Aux Relay, and Button Lockout. The 'Instr. 1' row is highlighted in red, indicating a high temperature reading of 74.8.

Zone	RH %	Local	RS #1	RS #2	Cool	Heat	HVAC Mode	Cool	Heat	Day Class	Period	HVAC	Fan	Aux Relay	Button Lockout
75.7	36%	75.7			75.0	72.0	Auto	75.0	72.0	Occup	Day	Off	Off	Inactive	
71.6	38%	71.6			65.0	55.0	Auto	65.0	55.0	Other	Day	Off	Off	Inactive	
72.7	41%	72.7			75.0	68.0	Auto	75.0	68.0	Occup	Day	Off	Off	Inactive	
73.6	42%	73.6			75.0	68.0	Auto	75.0	68.0	Occup	Day	Off	Off	Inactive	
..
75.7	36%	75.7			75.0	68.0	Auto	75.0	68.0	Occup	Day	Off	Off	Inactive	
68.3	41%	68.3			73.0	68.0	Auto	73.0	68.0	Occup	Day	Off	Off	Inactive	
72.5	45%	72.5			74.8	70.0	Auto	74.8	70.0	Occup	Day	Off	Off	Inactive	
74.2	39%	74.2			75.0	70.0	Auto	75.0	70.0	Occup	Day	Off	Off	Inactive	
73.5	41%	73.5			75.0	68.0	Auto	75.0	68.0	Occup	Day	Off	Off	Inactive	
73.8	42%	73.8			75.0	68.0	Auto	75.0	68.0	Occup	Day	Off	Off	Inactive	
73.9	38%	73.9			75.0	68.0	Auto	75.0	68.0	Occup	Day	Off	Off	Inactive	
75.7	36%	75.7			75.0	40.0	Auto	75.0	40.0	Occup	Day	Off	Off	Inactive	
65.4	51%	65.4			70.0	40.0	Off	70.0	40.0	Occup	Day	Off	Off	Inactive	

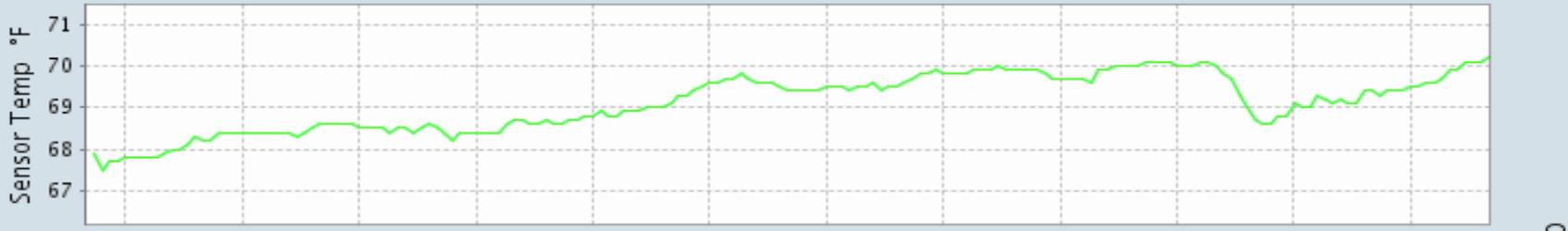
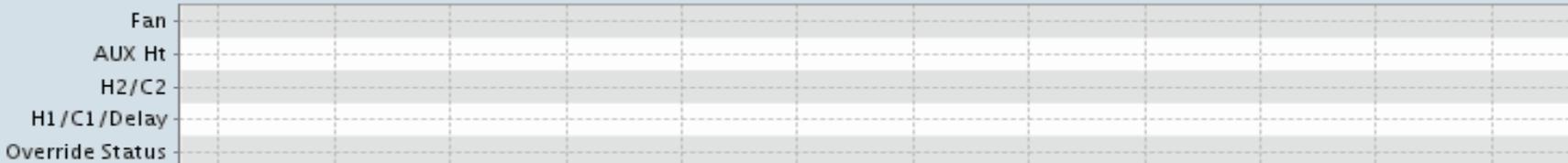
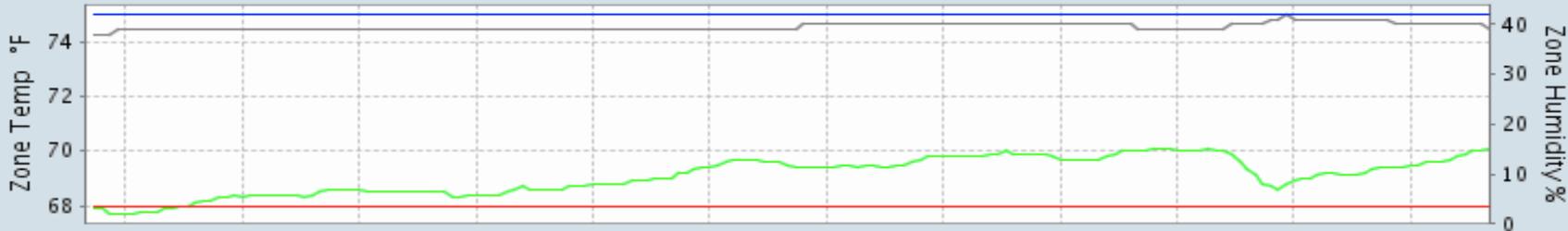
On the right side, the 'Function Frame' contains 'Status & Control' and 'HVAC Settings' sections. The 'Thermostat Status' section shows 'Cool Setting', 'Heat Setting', and 'Hold' with dropdown menus. The 'HVAC Settings' section shows 'HVAC Node' and 'Fan Mode' with dropdown menus. At the bottom right, there are 'Refresh' and 'Submit' buttons.

At the bottom left, the 'Action Logs' section shows a table of recent actions:

Action Status	Target	Account	Time
✓ Login		admin	10:43:41 AM Mon, Oct 03, 2016
✓ Login	3rd Action Log	admin	10:43:36 AM Mon, Oct 03, 2016
✓ Room K2		System	10:24:04 AM Mon, Oct 03, 2016

The bottom status bar shows 'Account: admin Group: Marshall Lane' and the system time '10:50 AM 10/3/2016'.

State



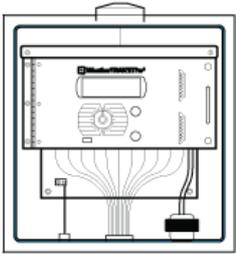
Mon Oct 3 07:40 AM 2016 to Mon Oct 3 10:40 AM 2016

Water Management

Smart Irrigation Contollers

- Irrigation water accounts for 85% of District water usage
- Weathertrak system by Hydropoint
- Remote monitoring and control of sprinkler systems to maximize efficiency and improve maintenance
- Silicon Valley Water Conservation Award winner, 2010
 - Greenscape Management

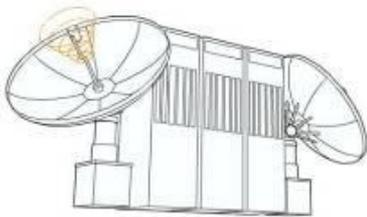
Smart Controller



Flexible and Powerful On-site Management

- More than just a timer
- Automated Scheduling Engine
- Site-specific data inputs (plant, soil, slope, etc.)
- Water use and system monitoring

Hi-Resolution Weather



Reliable Water Use/ Measurement of Water Needs

- Multiple data sources (stations, satellites, Doppler)
- No single point of failure (single sensor)
- Temp, wind, solar, humidity

Remote Monitoring and Management

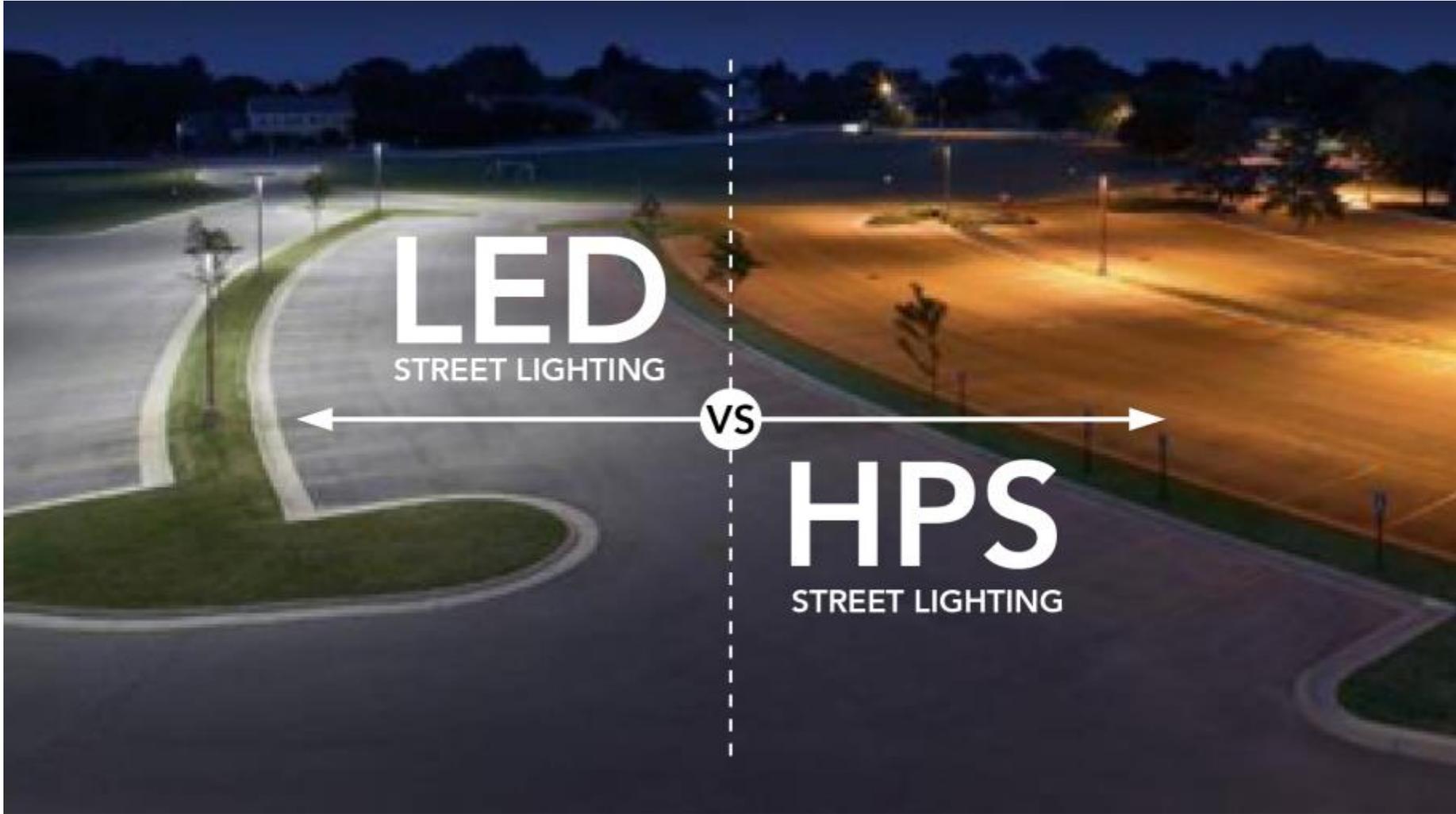


Internet Applications - Management Platform

- Off-site programming and setup
- Instant changes
- Web-based irrigation/landscape asset inventory
- Ongoing measurement and verification
- Real-time monitoring and alert notification
- Operational efficiencies

Lighting Advancements

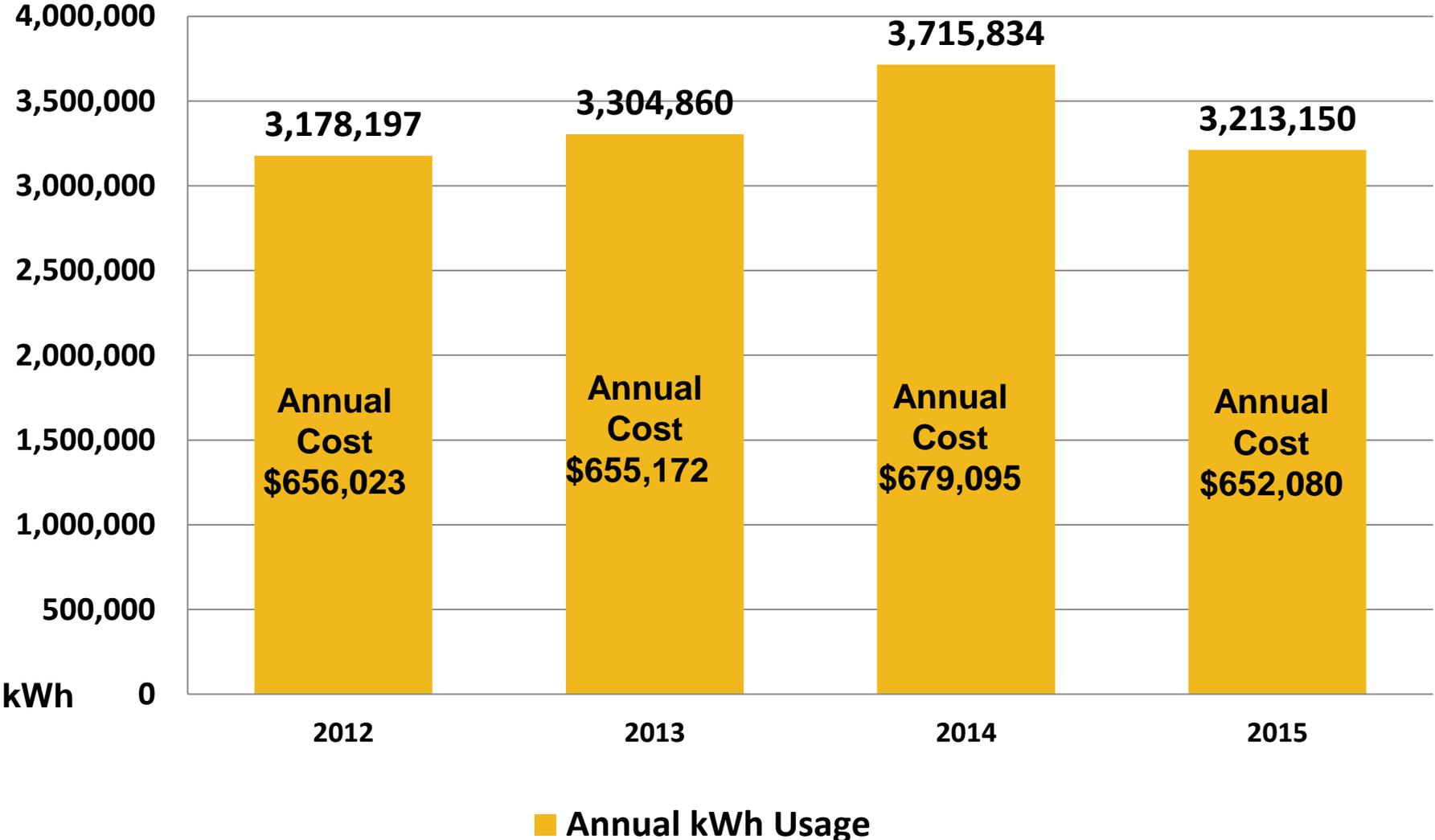
- Proposition 39 Contributions
 - Grant designed to improve energy efficiency at public school districts
- LED lighting
 - Emergency and exit LED retrofits
 - Exterior lighting upgrades
 - 33% less energy used
 - Dimming controlled by occupancy sensors = additional savings
 - Photo sensors for autonomous control if controls are not adequate
 - Focused lighting patterns
 - Improved aesthetics



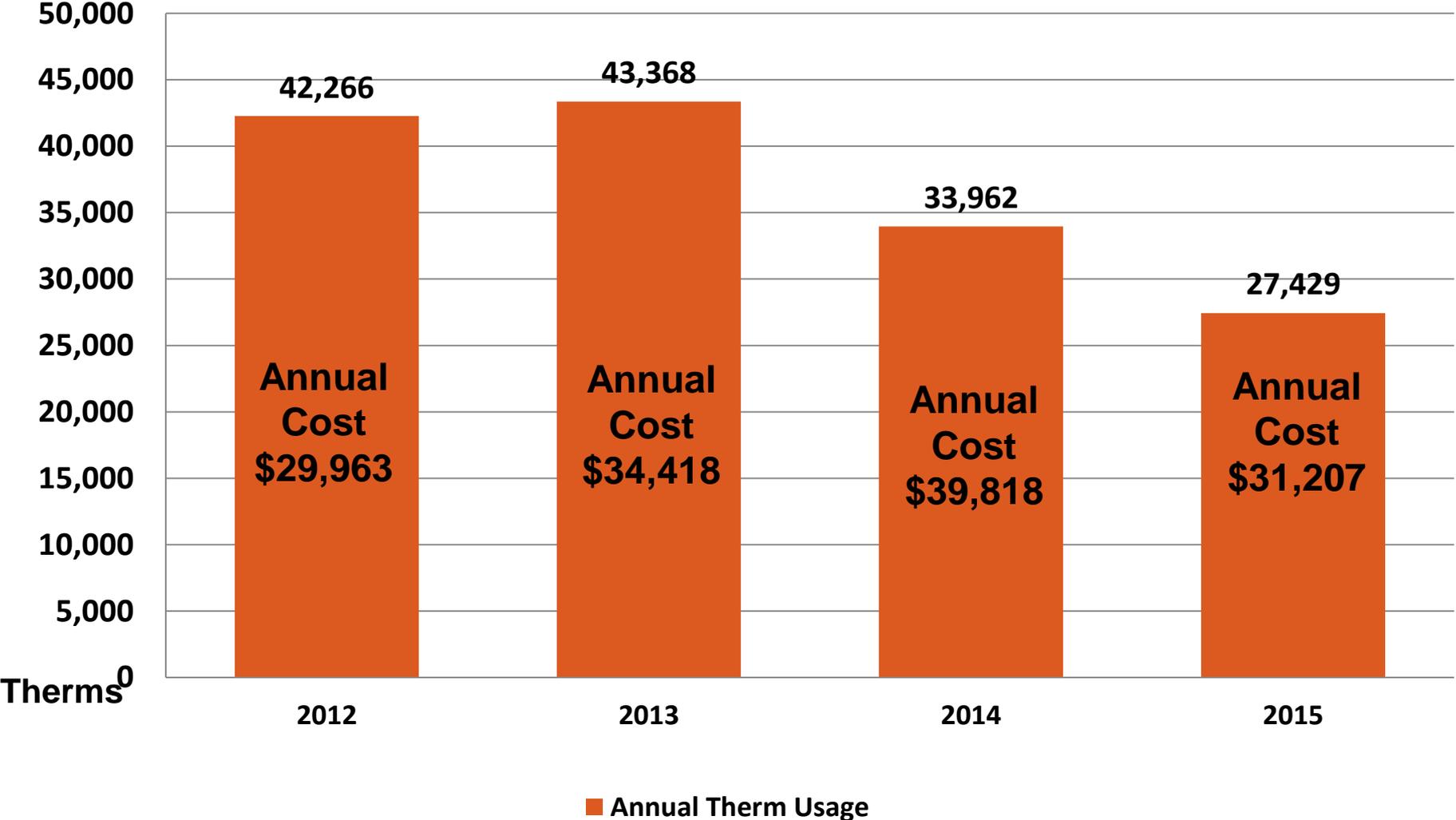
Lighting Advancements- Next Up

- Linear fluorescent bulbs to LED retrofit
- Castlemont/Lynhaven done Winter 2015
 - Phillips 18w bulb replaces 32w fluorescent bulbs
- Monroe, Village, CMS, Blackford
 - Winter 2016
 - Everline LED modules include packaged driver and light bar
 - Less is more- directed lighting throw
 - Improved color
 - No fluorescent flicker
 - Dimmable

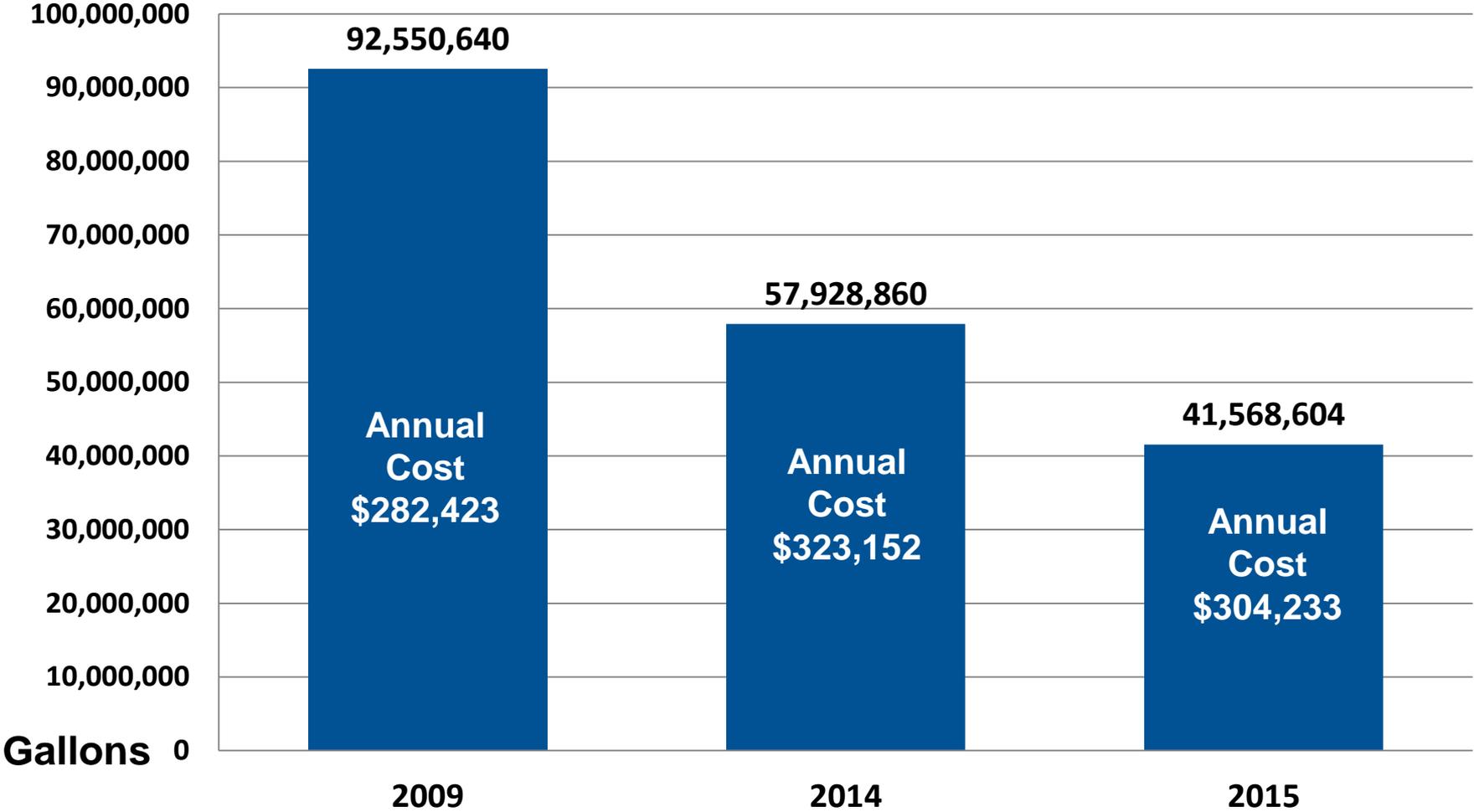
CUSD Electrical Usage



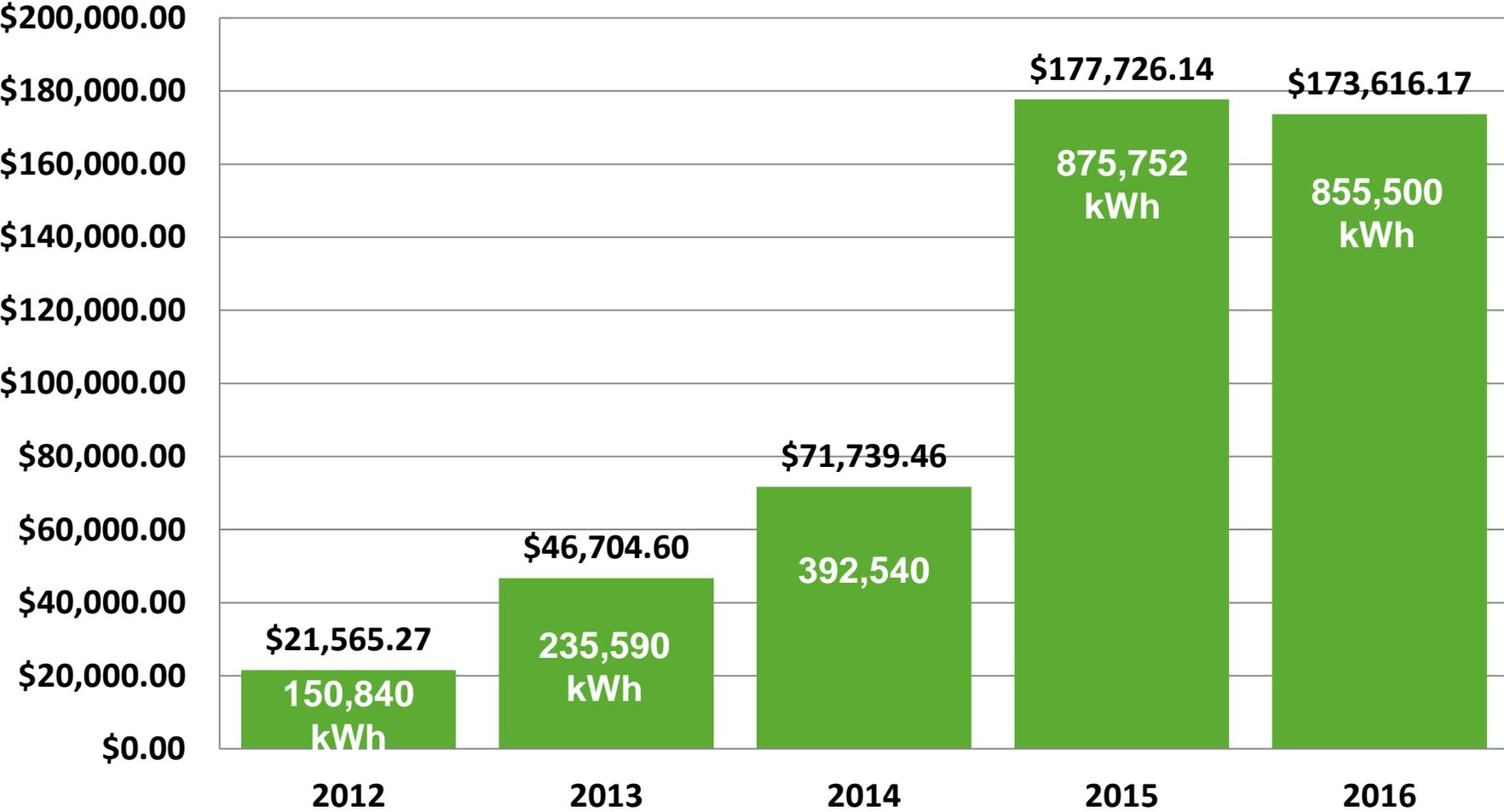
CUSD Gas Usage



CUSD Water Usage



CUSD Solar Production



■ Dollars Saved and kWh Generated

Energy Star Program

- Utility data tracking and benchmarking tool sponsored by EPA
- Energy Star Designation Program
 - Data Review
 - Comparison with other similar facilities
 - Signifies that your building meets or exceeds the national standards for energy consumption compared to similar buildings located across the nation

