

ENERGY UPDATE

Campbell Union School District

October 6, 2016

NET ZERO ENERGY/EMISSIONS MULTI-USE Blackford Elementary



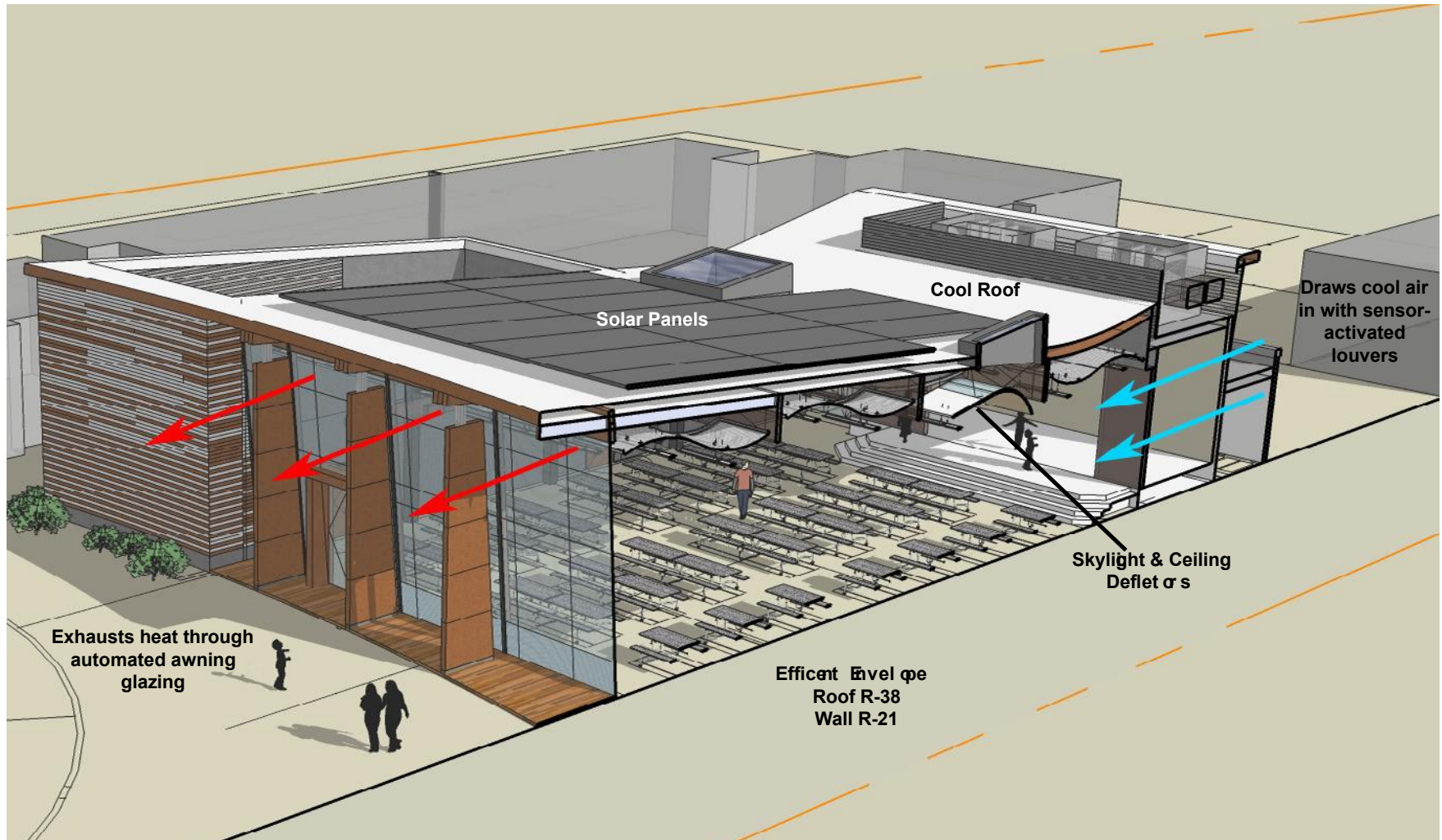
Daylighting



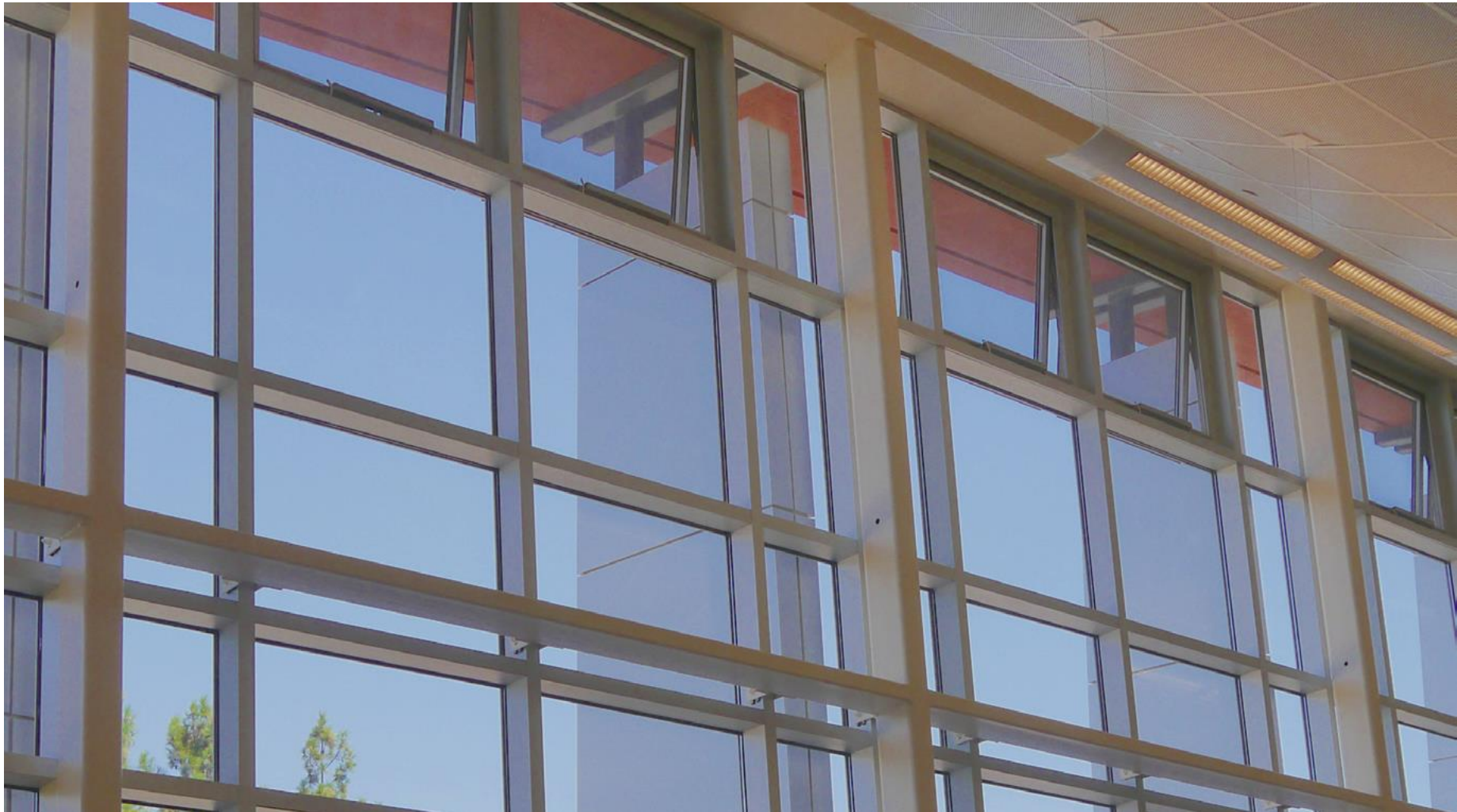
Daylighting



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



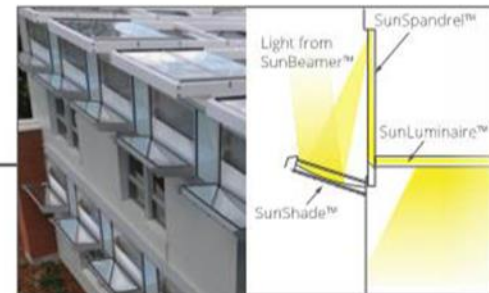
Solar Panels

- 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



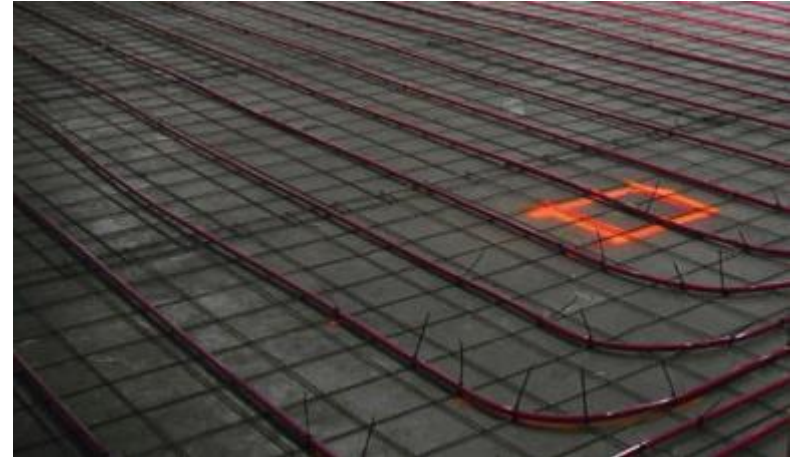
Exhaust Fan Control

- 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



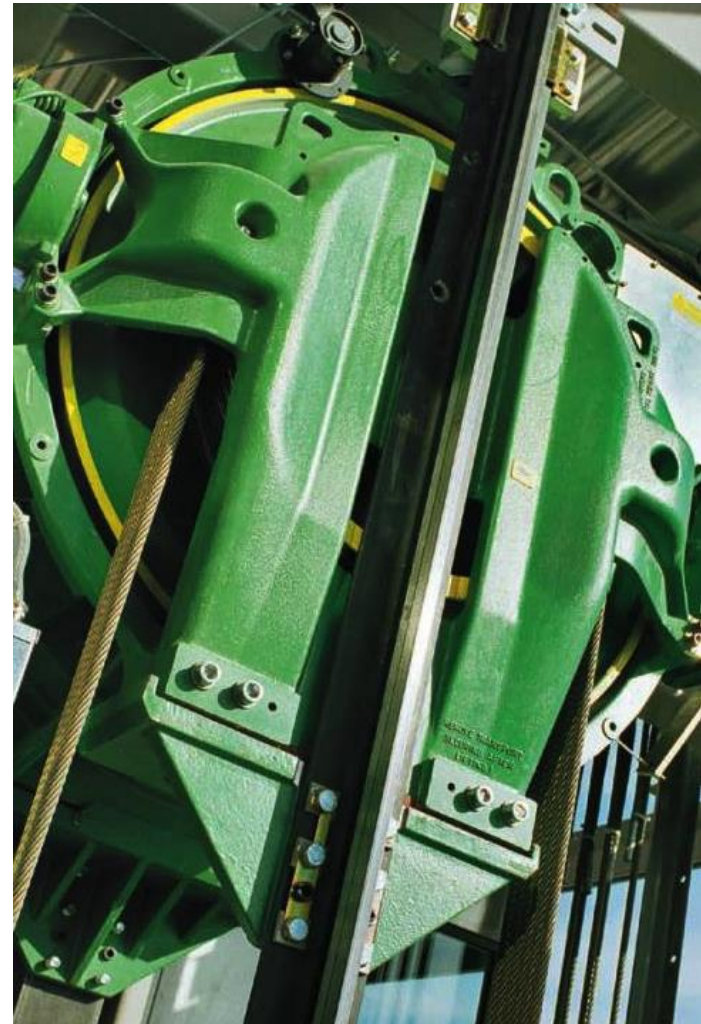
Saving energy through heat exchange

- 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



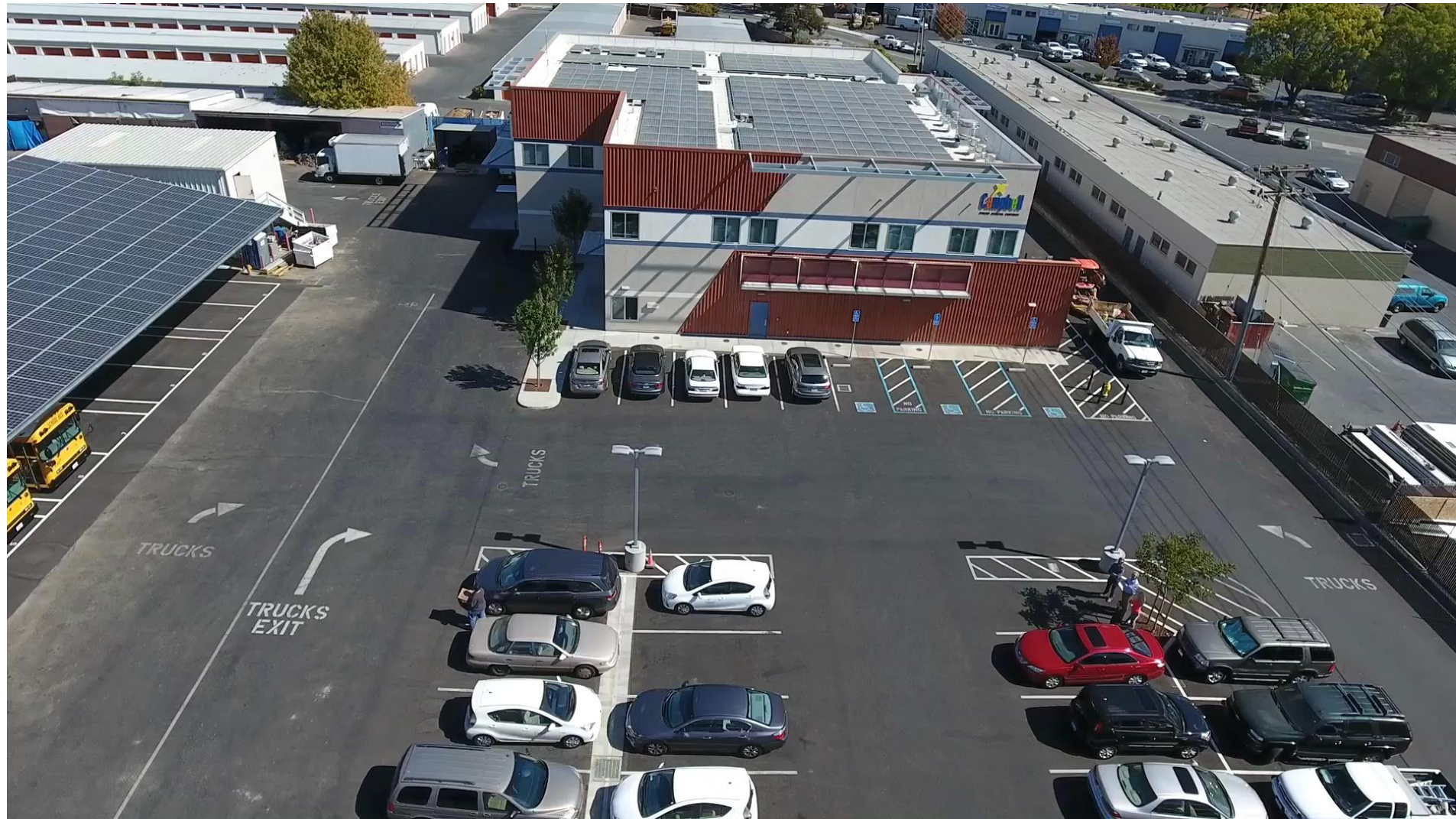
Window Replacement



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

Unlabeled

Device Folder Group Configuration Account System Logout

System Summary Administration

Columns Refresh Interval

Status Frame

PROLIPHIX

	Zone	RH %	Local	RS #1	RS #2	Cool	Heat	HVAC Mode	Cool	Heat	Day Class	Period	HVAC	Fan	Aux Relay	Button Lockout
Devices																
District-Wide																
Blackford																
Campbell Middle																
Caper																
Castlement																
District Office																
Blen. Office	75.7	36%	75.7			75.5	72.5	Auto	75.5	72.5	Occup	Day	Off	Off	Inactive	
Board Room	71.6	38%	71.6			65.5	55.5	Auto	65.5	55.5	Other	Day	Off	Off	Inactive	
BTS/Alma	72.7	41%	72.7			75.5	68.5	Auto	75.5	68.5	Occup	Day	Off	Off	Inactive	
Cypress Room	73.6	42%	73.6			75.5	68.5	Auto	75.5	68.5	Occup	Day	Off	Off	Inactive	
Extensions	..	..	..			..	..	..	..	..	..	..	..	..	..	..
H.R.	75.7	36%	75.7			75.5	68.5	Auto	75.5	68.5	Occup	Day	Off	Off	Inactive	
Hamilton Room	68.3	41%	68.3			73.5	68.5	Auto	73.5	68.5	Occup	Day	Off	Off	Inactive	
Instrct. 1	72.5	45%	72.5			74.5	70.5	Auto	74.5	70.5	Occup	Day	Off	Off	Inactive	
Instrct. 2	74.2	39%	74.2			75.5	70.5	Auto	75.5	70.5	Occup	Day	Off	Off	Inactive	
Lobby	73.5	41%	73.5			75.5	68.5	Auto	75.5	68.5	Occup	Day	Off	Off	Inactive	
Lounge	73.8	42%	73.8			75.5	68.5	Auto	75.5	68.5	Occup	Day	Off	Off	Inactive	
Super Lobby	73.9	38%	73.9			75.5	68.5	Auto	75.5	68.5	Occup	Day	Off	Off	Inactive	
NDP																
Phone Room	75.7	36%	75.7			75.5	48.5	Auto	75.5	48.5	Occup	Day	Off	Off	Inactive	
Server Room	65.6	51%	65.6			70.5	48.5	Off	70.5	48.5	Occup	Day	Off	Off	Inactive	
Family Center																
Forest Hill																
Lynhaven																
Marshall Lane																
Memroe																
Rolling Hills																
Rosemary																
Sherman Oaks																
Village																
Unassigned Devices																
Configurations																

Function Frame

Status & Control

Thermostat Status

Cool Setting: ...

Heat Setting: ...

Hold: ...

HVAC Settings

HVAC Mode: ...

Fan Mode: ...

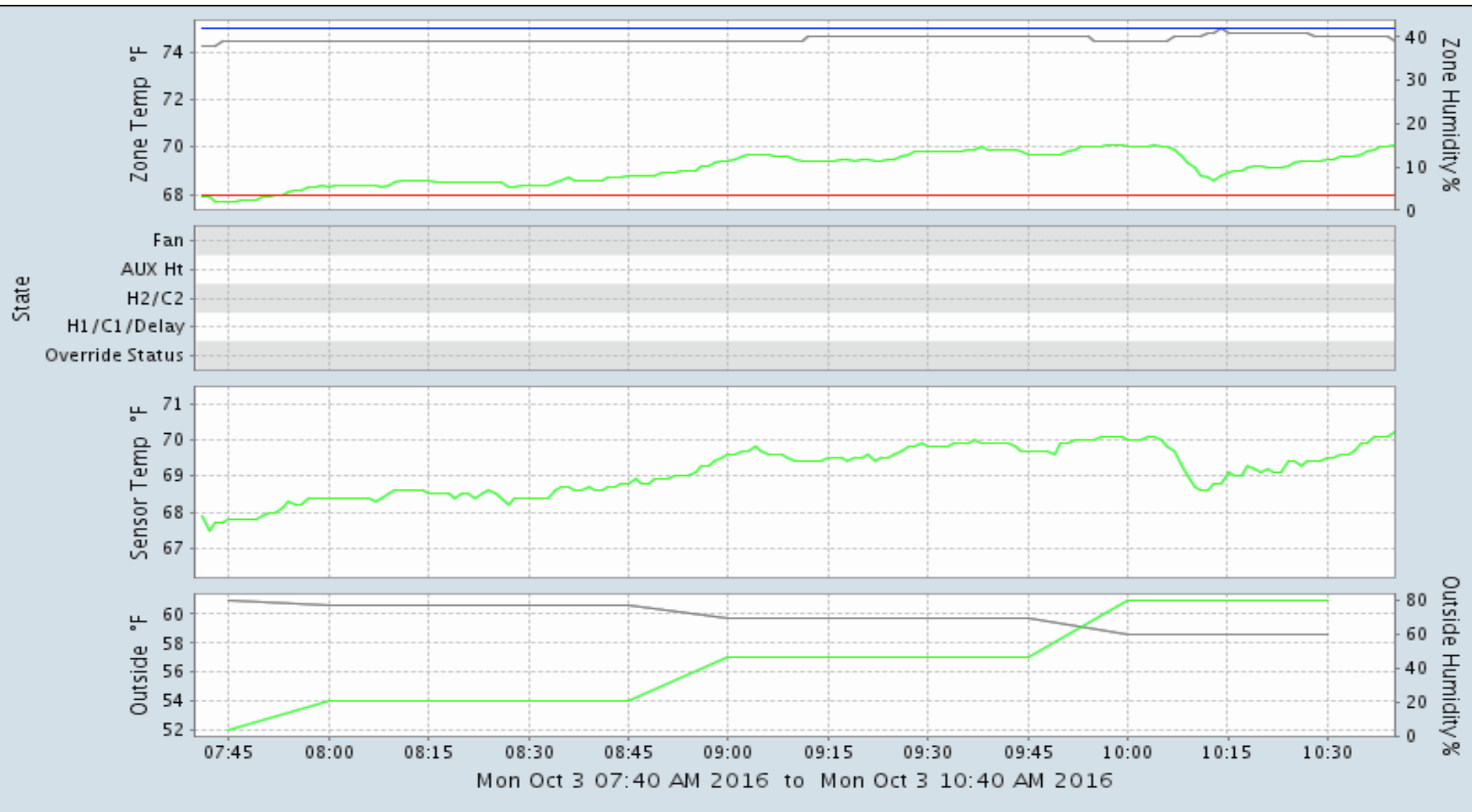
Action Logs Alarm Logs

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

Account: admin Group: Marshall Lane

Refresh Submit

10:30 AM 10/3/2016

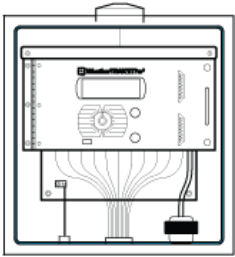


Water Management

Smart Irrigation Controllers

- 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

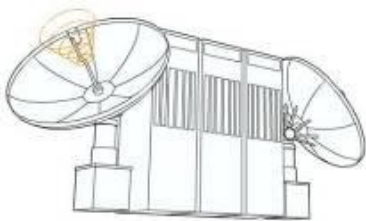
Smart Controller



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

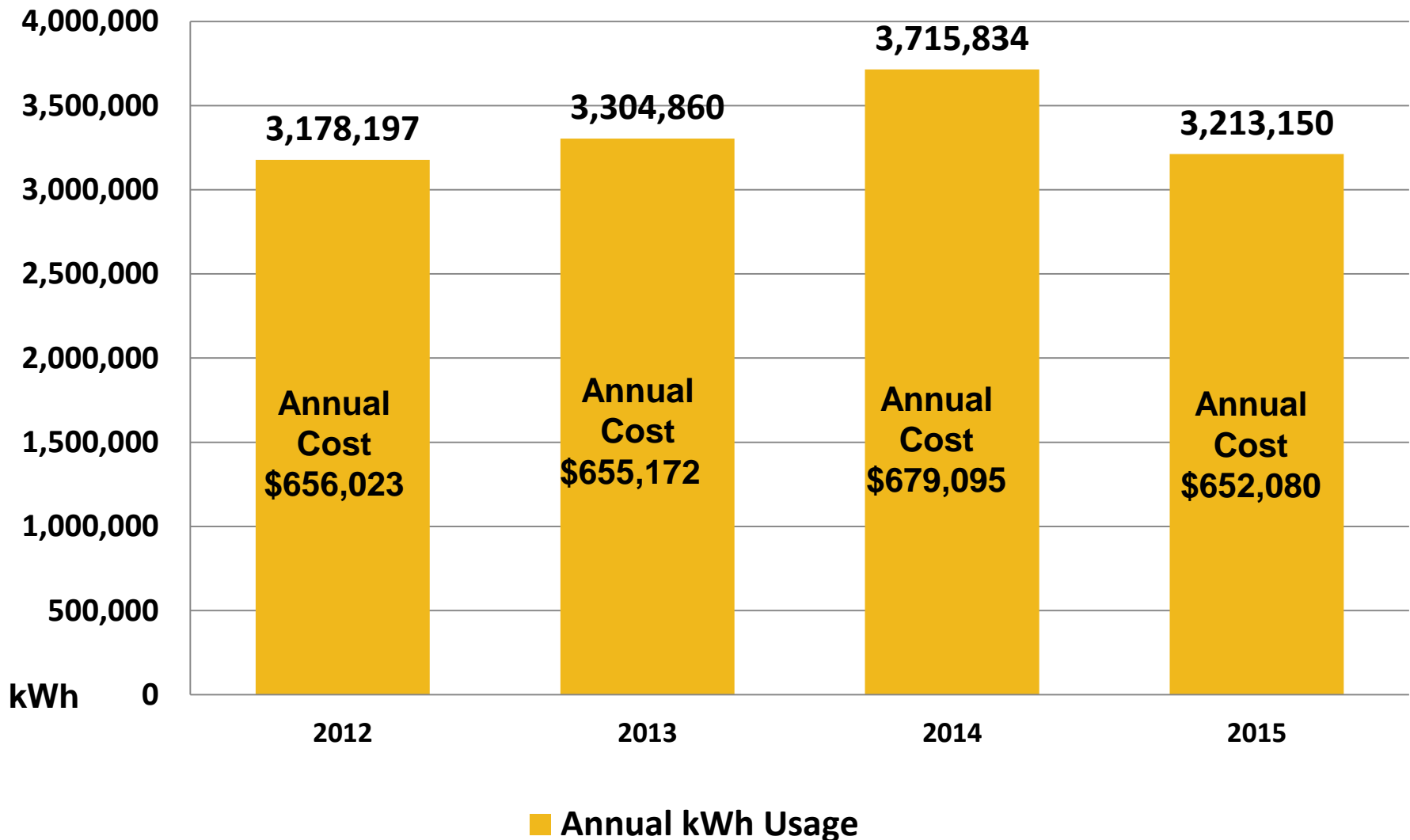
- Proposition 39 Contributions
 - Grant designed to improve energy efficiency at public school districts
- LED lighting
 - Emergency and exit LED retrofits
 - Exterior lighting upgrades
 - 33% less energy used
 - Dimming controlled by occupancy sensors = additional savings
 - Photo sensors for autonomous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



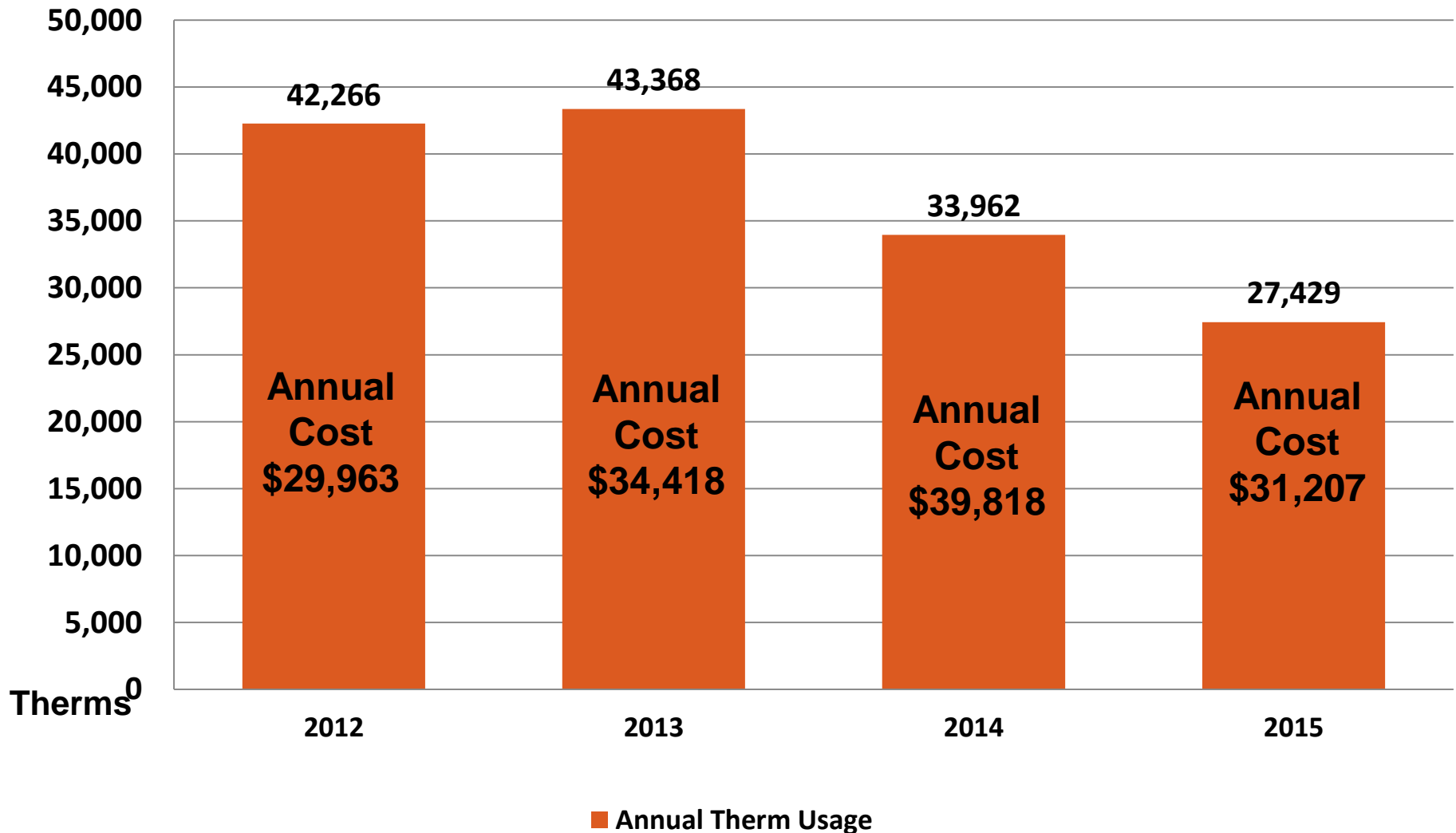
Lighting Advancements- Next Up

- 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

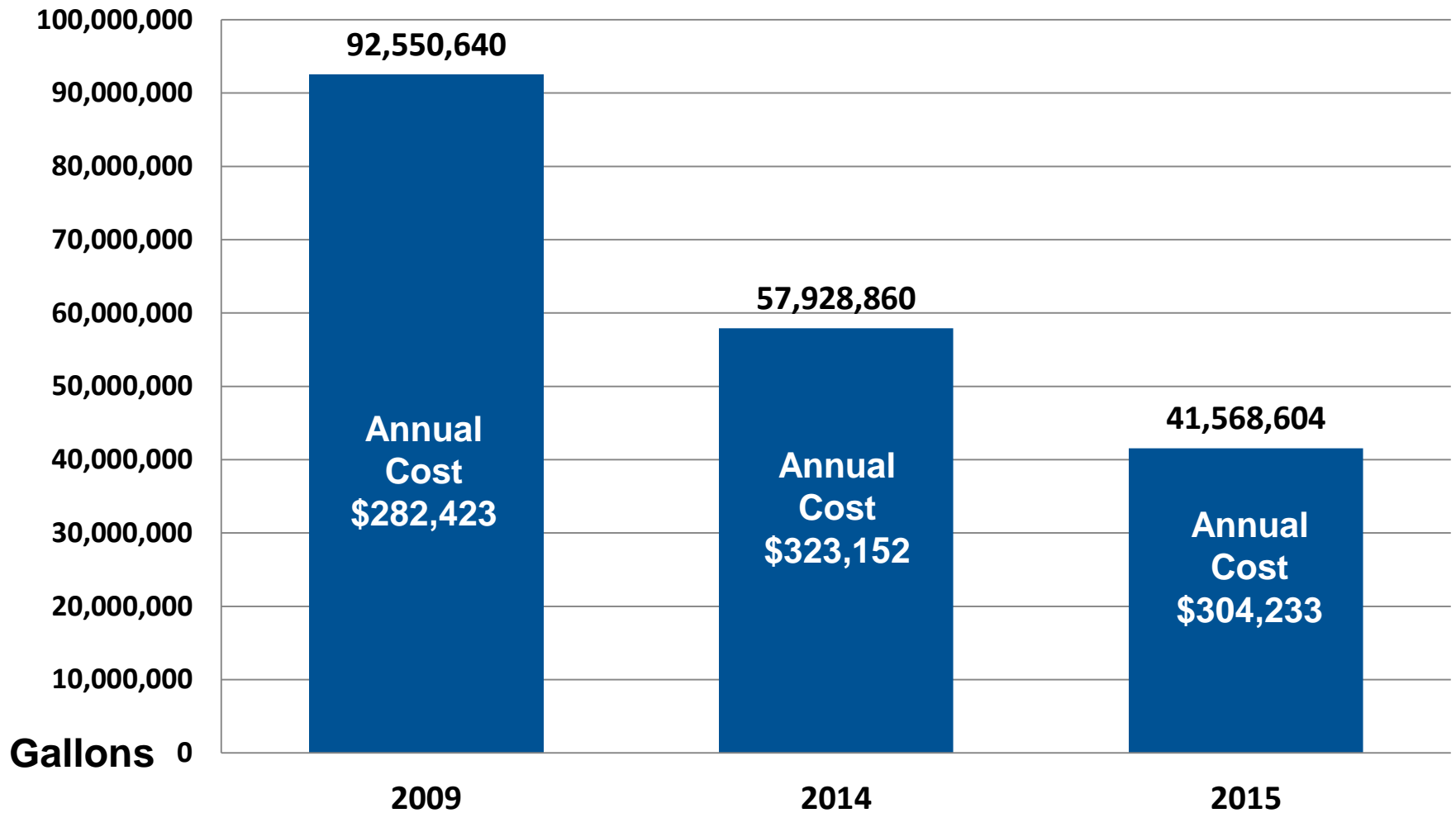
CUSD Electrical Usage



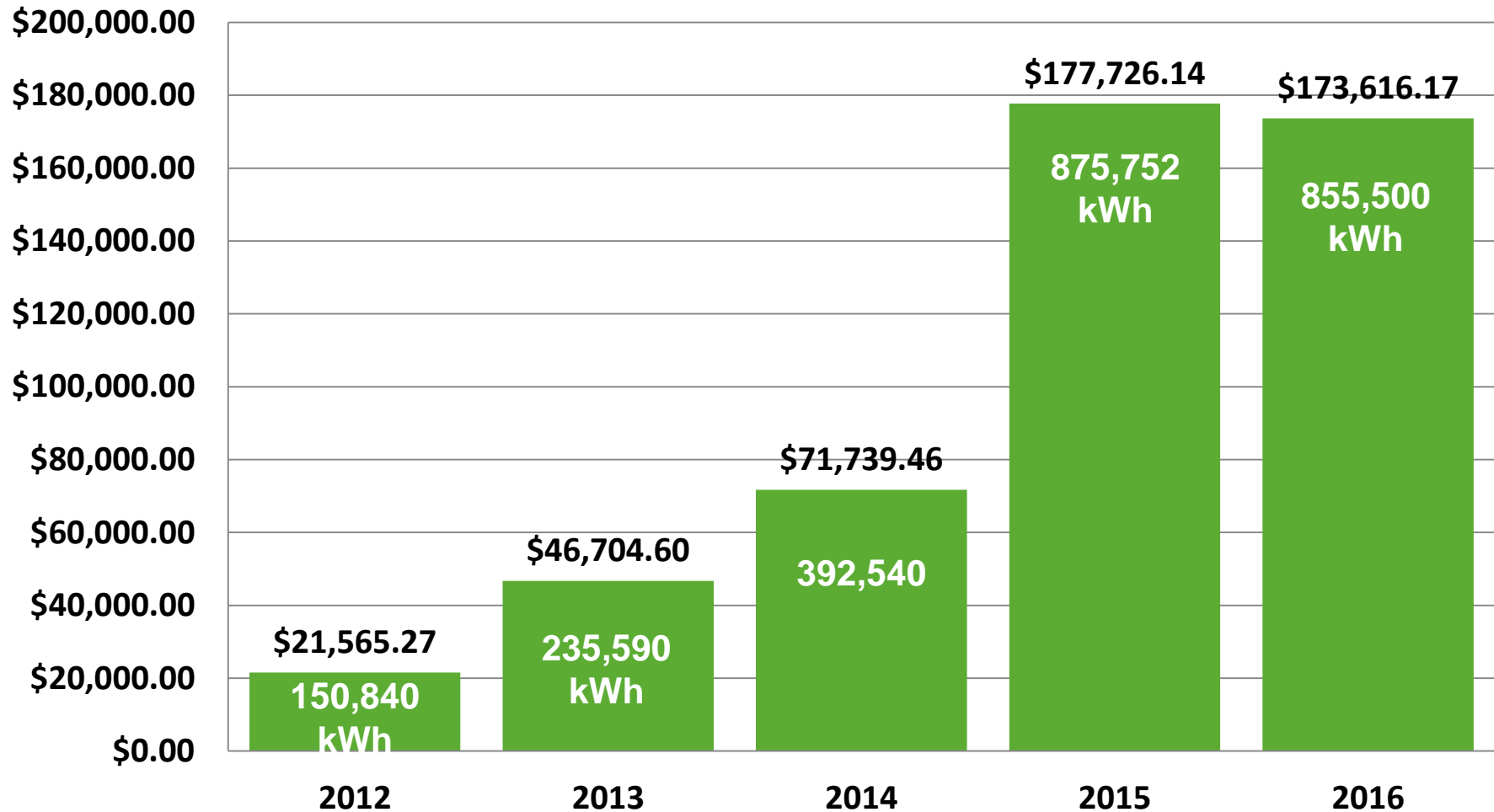
CUSD Gas Usage



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

