Santa Monica-Malibu Unified School District

2828 4th Street

Santa Monica, CA 90405

Energy Management Report

Prepared for:
Santa Monica-Malibu USD

Prepared by:
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Prepared on:
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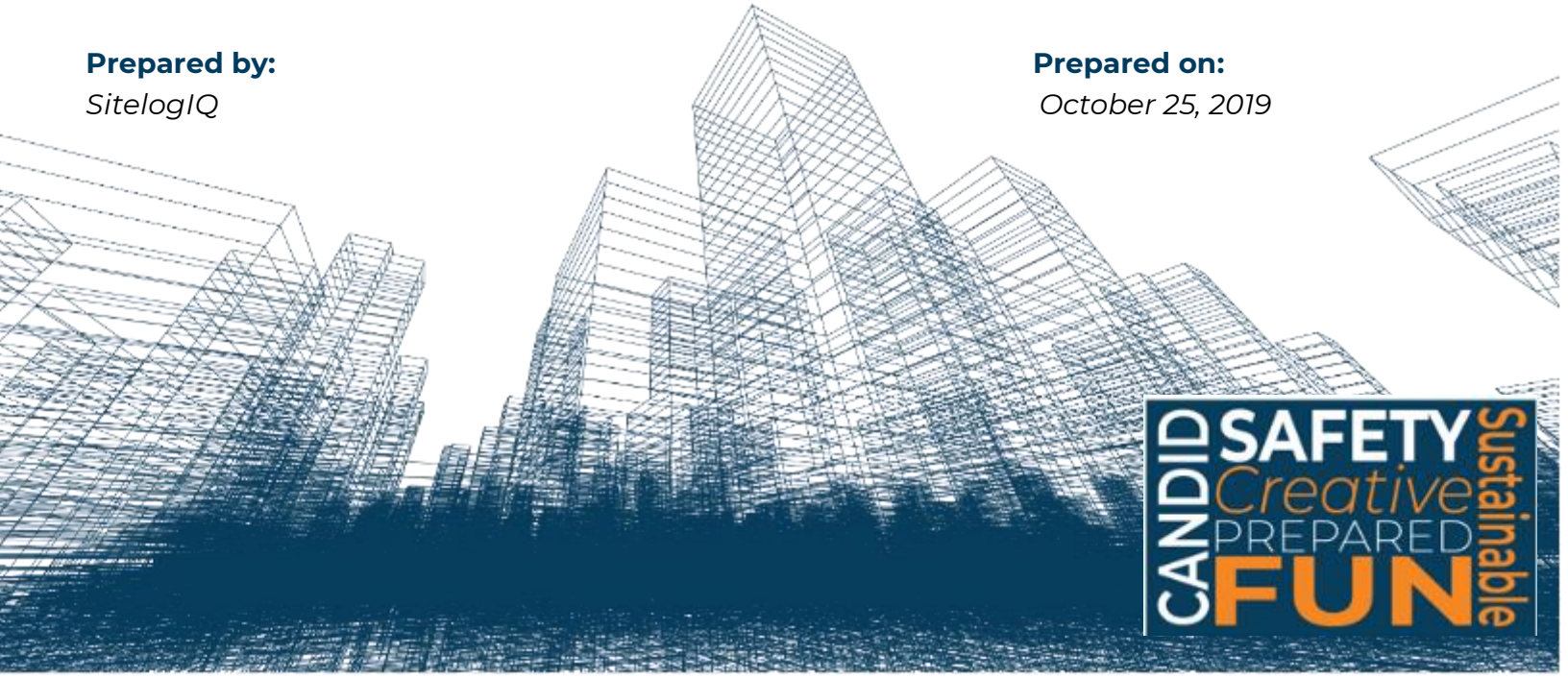


Purpose of this Report

This report is an opportunity to evaluate the current status of energy consumption and costs for the School District and will track the District's performance long term. The report will be provided semi-annually and will serve as a tool to discuss and evaluate performance, review and implement policies, and identify opportunities for making further improvements.

The information presented herein is based on observations made while onsite. Recommendations are made upon analysis, observation, and experience. Any recommendation requiring changes to equipment, set-points, or educational programs will be discussed with the appropriate District representative before implementation. Contact to outside vendors to request changes will not be made until approval from the District.

Additionally, please note that these recommendations were made from the perspective of energy management and conservation. Implementation of these measures should be made at the discretion of the District and should not be disruptive.

Section 1: Observations and Action Items

Spring site visits were conducted on **October 9th, 2019, from 9 am-12 pm**. During this time, temperatures ranged in the mid-60s to the low-70s with clear weather. Santa Monica-Malibu USD was not in session during the day the site walks were conducted, and HVAC units were not running an occupied schedule. Interior lights were off for the most part, except for the restrooms at Will Rogers Elementary. Exterior lights were all off except for areas in which there is limited daylight. Computer charging stations were present in every classroom and were plugged in. Additionally, there were many space heaters found throughout the District, though not plugged in or operating at the time.

During these site walks, power measurements (instantaneous wattage) were taken for several types of plug loads, including space heaters, mini-fridges, computer charging stations, and coffee makers. This energy profile is typical of plug loads like refrigerators, charging carts, most electronics, and coffee makers. For example, an EnergyStar-rated miniature refrigerator does not operate at a constant wattage but turns the compressor on and off to maintain the specified temperature. The figure below depicts the trend of a mini-fridge during a normal day.

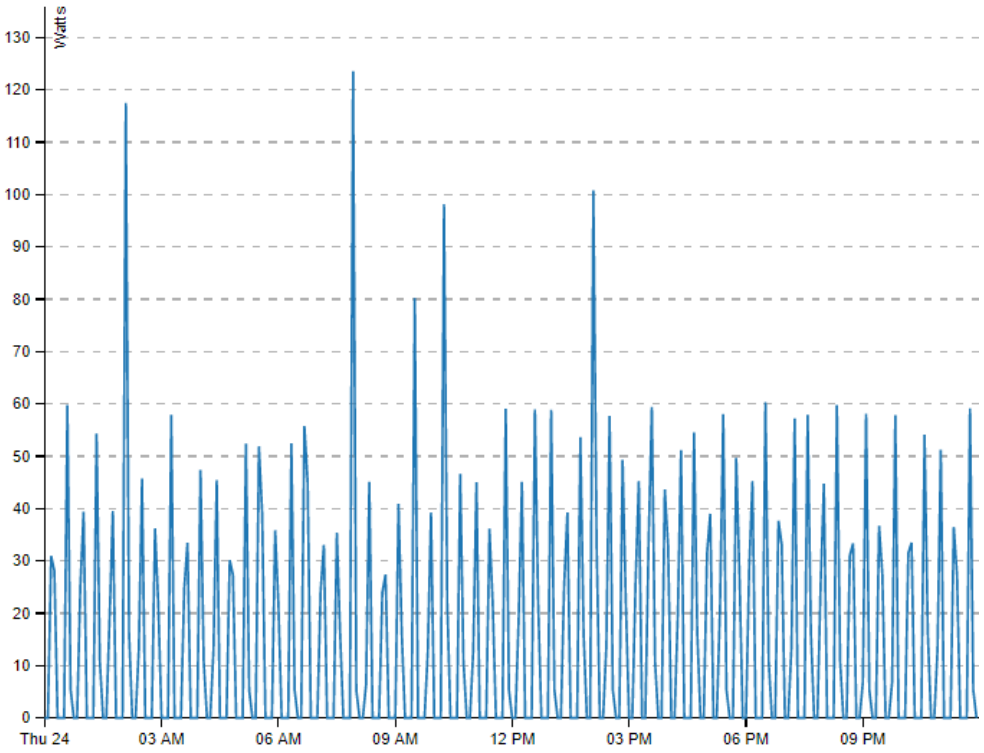


Figure 1. Energy Usage profile of a typical EnergyStar Mini-fridge.

On the other hand, other plug loads tend to have a more constant profile. Therefore, power measurements would be more indicative of the plug load's total energy usage. This energy profile would be indicative of power draw from space heaters, scented plug candles, and lights.

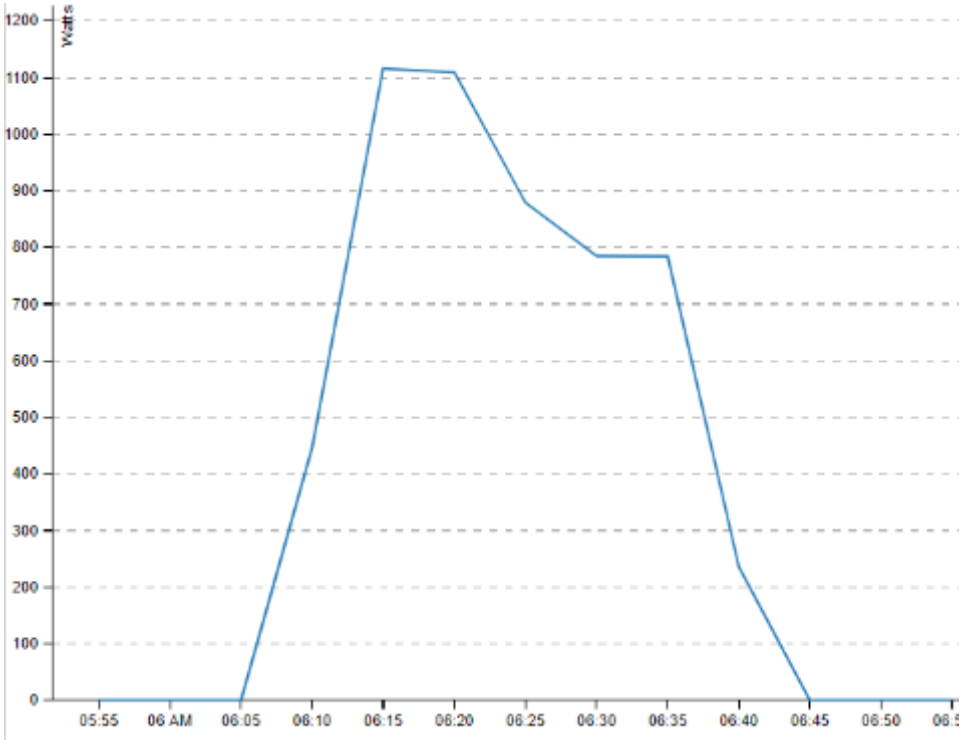


Figure 2. Energy Usage profile of a Space Heater

As can be seen from the figure above, the energy usage of a space heater is more constant than a refrigerator's energy use. As a result, we highly discourage the use of space heaters and instead encourage less intensive forms of heating (e.g., heated pads with timer control).

The following table shows a list of the findings and the power measurements taken during the site walks. Power measurements only show the energy usage at the time of measurement and are not necessarily indicative of total energy use of the plug load.

Table 1. List of Plug Loads with potential for energy savings if replaced or removed.

Plug Load	Site	Location	Average Measured Wattage (while Running)	Estimated Hours of Operation	Estimated Annual Energy (kWh)	Estimated Annual Cost ($)
Mini Refrigerator (~4.0 ft^3)	Will Rogers Elementary	Room 305 Office	300	24 hours/day 40 weeks/year	84	$21
Full-Sized Refrigerator	Will Rogers Elementary	Room 406	460	24 hours/day 52 weeks/year	168	$42
Computer Charging Cart	Will Rogers Elementary	Room 505 (also most classrooms)	80 (while Charging) 3 (while idle)	24 hours/day 52 weeks/year	161	$40
Space Heater	Will Rogers Elementary	Front Office	1,500	4 hours/day Ten weeks/year	300	$75
Scented Plug Candle	Will Rogers Elementary	Portable Room 507	2	24 hours/day 52 weeks/year	18	$4.38
Mini Refrigerator	Will Rogers Elementary	Room 304	300	24 hours/day 40 weeks/year	84	$21
Space Heater	Obama Center	Career Office	712	4 hours/day Ten weeks/year	142	$36
Space Heater	Obama Center	Harmony's Office	750	4 hours/day Ten weeks/year	150	$38
Space Heater	Obama Center	Room 301	1,250	4 hours/day Ten weeks/year	250	$63
Space Heater	Edison Language Academy	Front Office	750	4 hours/day Ten weeks/year	150	$38
Lights	Edison Language Academy	Cafeteria	40	24 hours/day 52 weeks/year	350	$88
Commercial Refrigerator**	Edison Language Academy	Kitchen	Not Measured	24 hours/day 52 weeks/year	3,500	$875

Overall, the District is doing well in continuing to practice good energy conservation behaviors. Based on the observations made during the site walk, the following actions can be taken to improve the District's carbon footprint at the sites visited:

- Avoid having mini-fridges in classrooms or non-designated break areas. A **mini-fridge uses about half the energy a full-sized fridge does** but **at a quarter of the size**.
- Unplug mini-fridges when not being used
- If extra heating is necessary, do not use space heaters and instead opt for less energy-intensive forms of heating like heat pads or thick socks.
- Do not use scented plug candles, as they continuously draw energy and can be distracting to occupants
- Ensure that full-sized refrigerators are emptied during extended breaks (summer, spring, and winter), cleaned, and unplugged.
- Confine food from commercial refrigerators in the kitchens to a single fridge and unplug empty, unused units.
- Ensure that interior lights are off while areas are left unoccupied.
- Close shades in rooms with large window area while unoccupied. Closing shades prevent radiant heat from entering the room and reduces the amount of electricity used for cooling during unoccupied periods.

Section 2: Site Pictures and Energy Estimates

The following recommendations were made based on the observations at the three sites visited. The depictions below also show the locations these observations and the energy use estimates based on stated projected energy use. Please note that because there is a lot of variability in plug load controls, this summary provides a generic estimate in the opportunity for energy savings.

Will Rogers Elementary

Plug Load: Empty Mini-fridge (~3.6 ft^3)
Location: Will Rogers Elementary, Room 305
Measured Average Wattage: 300 W (intermittent)
Estimated Annual Usage: 84 kWh
Estimated Annual Cost: $21
Recommended Action: Unplug if not being used and confine all refrigeration to a common break room.

Plug Load: Full Refrigerator
Location: Will Rogers Elementary, Room 406
Measured Average Wattage: 460 W (intermittent)
Estimated Annual Usage: 168 kWh
Estimated Annual Cost: $42
Recommended Action: Unplug if not being used and confine all refrigeration to a common break room. Otherwise, ensure that it is cleaned out and unplugged during extended breaks (winter, spring, and summer break)

Plug Load: Computer Charging Station
Location: Will Rogers Elementary, Room 505 (also in most classrooms
Measured Average Wattage: 80 W (Charging)/3 W (Idle)
Estimated Annual Usage: 94 kWh
Estimated Annual Cost: $23
Recommended Action: Unplug during weekends and during extended breaks (winter, spring, and summer break)

Plug Load: Space Heater (Old)
Location: Will Rogers Elementary, Front Office
Measured Average Wattage: 1500 W
Estimated Time Used per year: 200 hours (4 hours/day, 10 weeks/year)
Estimated Annual Usage: 300 kWh (1.5 kWh/hour of use)
Estimated Annual Cost: $75
Recommended Action: Replace with more efficient form of individual warming (e.g. heat pad)

Plug Load: Scent Plug Candle
Location: Will Rogers Elementary, Room 507 (portable unit)
Measured Average Wattage: 2 W
Estimated Annual Usage: 18 kWh
Estimated Annual Cost: $4
Recommended Action: Do not use in classrooms, scent was particularly strong in classroom indicating an overconcentration.

Plug Load: Empty Mini-fridge (~3.6 ft^3)
Location: Will Rogers Elementary, Room 304
Measured Average Wattage: 300 W (intermittent)
Estimated Annual Usage: 84 kWh
Estimated Annual Cost: $21
Recommended Action: Unplug if not being used and confine all refrigeration to a common break room.

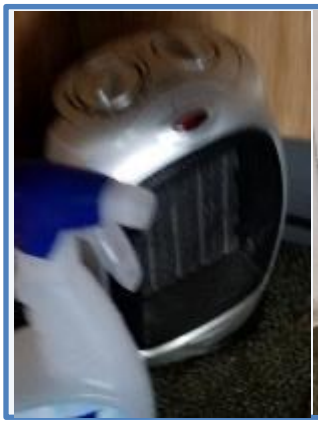
Obama Center for Exploration and Inquiry

Plug Load: Space Heater (Old, Small)
Location: Obama Center, Front Office
Measured Average Wattage: 712 W
Estimated Time Used per year: 200 hours (4 hours/day, 10 weeks/year)
Estimated Annual Usage: 142 kWh (0.71 kWh/hour of use)
Estimated Annual Cost: $36
Recommended Action: Replace with more efficient form of individual warming (e.g. heat pad)

Plug Load: Space Heater (Newer, Small, max output)
Location: Obama Center, Counselor Office
Measured Average Wattage: 750 W
Estimated Time Used per year: 200 hours (4 hours/day, 10 weeks/year)
Estimated Annual Usage: 150 kWh (0.75 kWh/hour of use)
Estimated Annual Cost: $38
Recommended Action: Replace with more efficient form of individual warming (e.g. heat pad)

Plug Load: Space Heater (Newer, Large)
Location: Obama Center, Room 301
Measured Average Wattage: 1250 W
Estimated Time Used per year: 200 hours (4 hours/day, 10 weeks/year)
Estimated Annual Usage: 250 kWh (1.25 kWh/hour of use)
Estimated Annual Cost: $63
Recommended Action: Replace with more efficient form of individual warming (e.g. heat pad). Additionally, do not use near thermostat, as it may cause excessive use of the AC.

Edison Language Academy

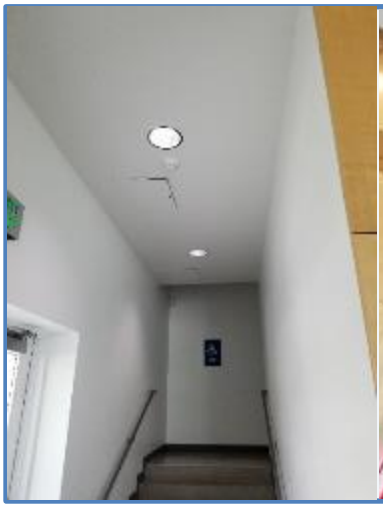


Plug Load: Space Heaters (Old, Small)
Location: Edison LA, Front Office
Measured Average Wattage: 750 W
Estimated Time Used per year: 200 hours (4 hours/day, 10 weeks/year)
Estimated Annual Usage: 150 kWh (0.75 kWh/hour of use)
Estimated Annual Cost: $38
Recommended Action: Replace with more efficient form of individual warming (e.g. heat pad).

Location: Edison LA, Cafeteria

Observation: Cafeteria unoccupied with shades not being used. On hotter days this allows heat to come in, utilizing a greater amount of mechanical cooling.

Recommended Action Item: During extended breaks and weekends, close shades to keep out excess light and heat.



Location: Edison LA, Cafeteria
Observation: Overhead lights on while unoccupied
Estimated Watt per Fixture: 10 W
Estimated # of Fixtures: 10 fixtures
Estimated Time Used per year: 8,760 hours (24 hours/day, 52 weeks/year)
Estimated Annual Usage: 350 kWh
Estimated Annual Cost: $38
Recommended Action: Turn off lights while unoccupied

Plug Load: Commercial Refrigerators
Location: Edison LA, Kitchen
Estimated Annual Usage: 3,500 kWh
Estimated Annual Cost: $875
Recommended Action: Condense left over food during summer breaks to one Commercial Refrigerator and clear out and unplug refrigerators not being used.
Potential Energy Savings: 700 kWh or $175 per unit during summer break.