

SACRAMENTO CITY UNIFIED SCHOOL DISTRICT BOARD OF EDUCATION

Agenda Item# 10.1

Meeting Date : May 18, 2023

Subject : Carbon Neutral Goals and Guidelines for SCUSD Buildings

- Information Item Only
- Approval on Consent Agenda
- Conference (for discussion only)
- Conference/First Reading (Action Anticipated: _____)
- Conference/Action
- Action
- Public Hearing

Division : Facility Support Services

process to design, construct, and modernize school buildings and facilities to achieve carbon neutrality by 2045, which is set by California Executive Order B-55-18, 2018. As part of the ongoing work outlined by the Facilities Master Plan that was Board approved in October 21, 2021, the District partnered with the New Buildings Institute (NBI) and the Sacramento Municipal Utilities District (SMUD) to develop District guidelines for prioritizing efforts to achieve building portfolio carbon neutrality by 2045, if not sooner. This includes portfolio and project level energy targets and timelines, as well as project requirements for new construction, major modernizations, and facility upgrades. This was a major component of the Facilities Master Plan.

Financial Considerations : These targets and guidelines will be incorporated in capital project design moving forward, which will positively impact the District's General Fund over time.

LCAP Goal(s) : College, Career and Life Ready Graduates; Safe, Emotionally Healthy and Engaged Students; Family and Community Engagement; Operational Excellence

Documents Attached : _____

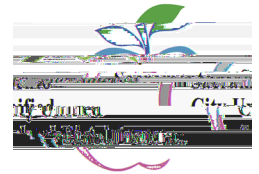
Estimated Time of Presentation : 10 minutes

Board of Education Executive Summary

Facilities Support Services

Carbon Neutral Goals and Guidelines for SCUSD Buildings

April 27, 2023



VI. Results:

To develop Energy Use Intensity (EUI) targets and guidelines for District

EXISTING DISTRICT ENERGY STATS FOR SCHOOL DISTRICT:

Average District Site EUI: 35.1 kBtu/sf/year

Number of Building Sites: 85 are included in this dataset. Two schools (Chavez and Kemble Elementaries are combined because they are on the same site and share a gas meter.)

School Name	Type	Site EUI <i>(kBtu/sf/year)</i>	Source EUI
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With the low average EUI across the district, the lower end of this scale should be achievable by these future projects.

1. All new construction/addition projects will:

- achieve a site energy use intensity of **19-24 kBtu/square foot/year** before photovoltaic (PV), depending on building type,
- be all-electric and have no on-site gas combustion,
- PV-ready for all projects (wherever on site appropriate),
- incorporate renewable energy sources to offset annual electricity use,
- reduce life cycle impacts associated with high embodied carbon materials,
- prioritize local products, manufacturers, and contractors to reduce carbon impacts in the supply chain,
- utilize low global warming refrigerants,
- consider the integration of electric vehicles and fleet infrastructure.
- *Consider threshold goal for PV and storage for resiliency*

2. All major modernization projects will:

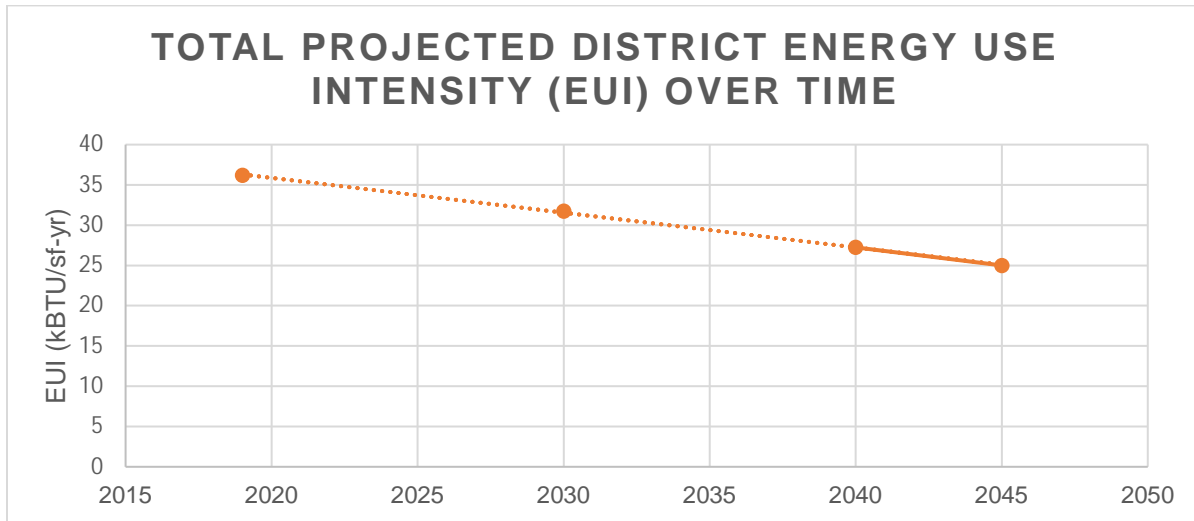
- achieve a site energy use intensity of **25-35 kBtu/square foot/year** before PV, depending on building type,
- either eliminate on-site gas combustion or have a plan to eliminate gas by 2045 (in a resolution or signed by the department director/superintendent)

3. All school facility retrofits will improve the site energy use intensity by 20-50% from a 2018-2019 baseline weighted by the amount of work slated.

- Retrofitted systems should prioritize a shift to all-electric.
-

PROPOSED POLICY OR PORTFOLIO LEVEL GOALS

1. In line with [California Executive Order B-55-18](#), SCUSD's building portfolio will achieve carbon neutrality by 2045⁴.
2. This district will have an average portfolio site energy use intensity of **25 kBtu/square foot/year** (without PV).
3. Reduce energy consumption by 40% by 2030 and 80% by 2040.
 - **EUI in 2030: 31.10 kBtu/sf/yr**
 - **EUI in 2040: 27.10 kBtu/sf/yr**
4. Onsite gas combustion of zero by 2045.



⁴ State of California Executive Order B-55-18 To Achieve Carbon Neutrality:
<https://www.ca.gov/archive/gov39/wp-content/uploads/2018/09/9.10.18-Executive-Order.pdf>

Sacramento City Unified School District Energy & Carbon Project Requirements



Developed in partnership with
New Buildings Institute



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Sacramento City Unified Energy and Carbon Requirements

DISTRICT ENERGY AND CARBON EMISSIONS GOALS

The district is committed to leveraging each opportunity to further progress toward achieving these goals. This includes bond-funded new construction and modernization projects, facilities retrofit projects funded with non-bond funds, as well as routine maintenance and operations practices. Ene pr-6.6(u-8 (t)

(3) All school facility retrofits will improve the site Energy Use Intensity (EUI) by 20-50% from a 2018-2019 baseline:

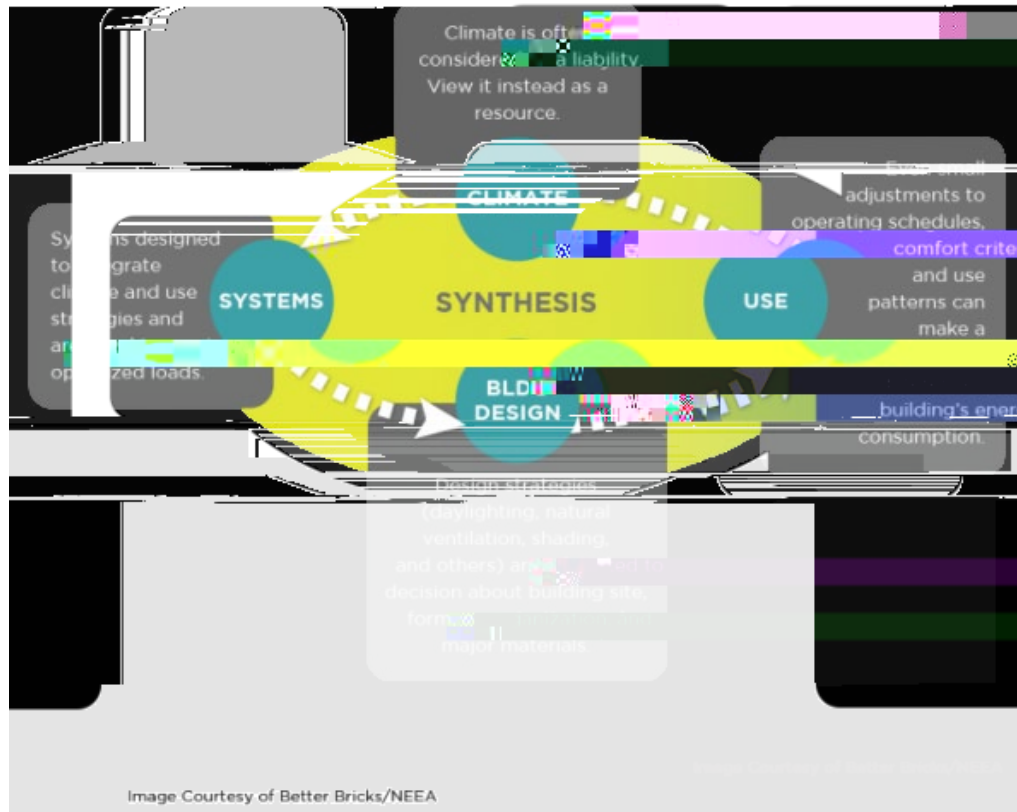
- Retrofitted systems should prioritize a shift to all-electric.
- All retrofitted systems must be the most efficient equipment available whether gas or electric.

CAPITAL PROJECTS - NEW CONSTRUCTION

The design team is to incorporate the following elements into the construction process:

ENGAGE THE LOCAL COMMUNITY: The design team must (s) (b) (5) - (D) 02T05 (his15a.6eill6.6-37 33MC013 Tc 0r2

THE FOUR MAJOR COMPONENTS OF INTEGRATED DESIGN



REDUCE ENERGY LOAD FIRST: A key strategy in integrated design is a “strategic implementation hierarchy” to optimize energy and carbon emission reductions. This strategy is particularly applicable to modernization project. The goal is to reduce energy loads first. By doing so, HVAC systems may be sized to accommodate the new (lowered) load, rather than designed to the former (larger) load. This saves energy and long term costs for the District. Though efficiency in the building envelope is an important part of energy reduction, the hierarchy may be different for each project.

Technical Approaches

Design teams will refer to the technical guidance contained in the design guide of the American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE), [Advanced Energy Design Guide for K-12 School Buildings: Achieving Zero Energy](#) (AEDG) to ensure the most efficient building approaches are utilized. These technical approaches are generally described below.

ENERGY MODELING: Unless the prescriptive measures in the [ASHRAE Advanced Energy Design Guide for Zero Energy Schools](#) are followed, the design team will conduct energy modeling. This model will be refined as details of the design come into focus. Modeling inputs should be clearly documented so any variances from modeled numbers during occupancy can

be identified quickly. All plug loads (including security cameras, emergency lighting, IT equipment, fire alarms, and kitchen equipment) should be captured.

- An early energy model should be developed no later than the schematic design phase. Modeling will investigate building massing, orientation, and system type selection. This early model will analyze the relative energy impacts of various design decisions and will inform the system type selection. For example, a better insulated building envelope can reduce the size of the HVAC system, thus saving first costs.
- Later in the design process, energy models will investigate and estimate EUI to allow for comparison to goals and cost savings potential of energy conservation measures. These same energy model's estimates can also be used to size on-site renewables needed to achieve zero net carbon.
- Finally, an as-built model will be created to reflect the actual conditions in the new or modernized building. This model should be available to calibrate post-occupancy to verify assumptions and provide feedback to the District.

LIFECYCLE COSTING: To limit the adverse long-term impacts, the District requires that all value engineering decisions include consideration of life cycle costs. Interactive impacts of decisions will be considered before making first cost reduction decisions.

PROJECT CHECK POINTS: During the design and construction process, each project team will revisit and r

The chart below summarizes which elements will be incorporated into each modernization and retrofit project and which will only be included on a case-by-case basis. Design teams will consider the synergies with planned scope of work, available funding, and site-specific design parameters.

FACILITIES PROJECTS

The Facilities Department is an integral part of the district’s efforts to care for and improve its building stock, tackle deferred maintenance, and achieve energy and carbon goals. Typical work includes lighting retrofits, control upgrades, window retrofits, roofing replacement, installation of information technology, security or fire alarm systems, and replacement of boilers or other aging equipment.

Facilities projects shall adhere to the following overarching decision-making processes in order

DISTRICT ENERGY AND CARBON GUIDELINES

In order to adhere to the goals set forth by the District, design teams will consult the [Advanced Energy Design Guide for K-12 School Buildings \(AEDG\): Achieving Zero Energy \(ASHRAE\)](#) and follow the *Energy and Carbon Guidelines* below. While these guidelines are most easily implemented in new construction, they should also be utilized where applicable in other projects. For reference, Sacramento County is in ASHRAE Climate Zone 3B: Warm Dry. All requirements below reflect the modeled capabilities of this climate zone.

ENERGY

New buildings should be designed to achieve a modeled site energy use intensity (EUI) of **19 kBtu/sf/year** for primary schools and **19.4 kBtu/sf/year for secondary schools** including plug loads, security cameras, IT & fire alarm systems, and kitchen-0.6 (i)2.6 (onT5)2.6 (6 v)8.8 (2p9 (em)-5.9 (en)10

(shaded) south-facing glass being larger and having a higher SHGC than east or west-facing glass. Windows should additionally consider the access to views for building occupants.

Reference: Table 5-5 of the [Advanced Energy Design Guide for K-12 School Buildings](#)

SHADING

The need for glare and heat control (on E/S/W elevations) should be determined through daylight modeling and provided via exterior shading devices.

- **Interior shades** will be provided in all classrooms and offices.
- **Exterior building shades** will be provided, with consideration of solar angled or perforated sunshades.
- **Exterior ground shading:**
 - Shading must cover at least 50% of the parking area. All parking shade structures will have a minimum solar shading coefficient of 0.70.

PLUG LOADS

Staff refrigerators and microwaves should be provided to discourage individual units. Outlets wired for receptacle control (as per Title 24) shall be clearly labeled. Efficient kitchen equipment is required. The CA Energy Wise website provides [equipment recommendations](#) for kitchen appliances, walk-ins, and cooking hoods. The [Food Service Technology Center](#) provides best practices on all-electric kitchens.

HEATING & COOLING

Heating and cooling shall be provided by HFC-free (when available), centralized, all-electric systems that meet [CEE Tier 2](#) levels of efficiency. Projects should prioritize the removal of gas heating systems in existing buildings and NO gas heating systems are allowed in new construction.

VENTILATION

Mechanical ventilation should incorporate dedicated outside air systems (DOAS) with occupancy and/or CO₂-based controls, a 15-minute delay, and MERV-13 final filters throughout. Fresh air should originate from a shaded/cool part of the building exterior and be delivered low in each space. Ceiling fans may be used to expand the comfort range and to allow for an increased cooling set point. Kitchen hoods should incorporate heat recovery and variable flow control and be designed according to CA Energy Wise [Design Guides](#). Ventilation in single-occupancy restrooms should be tied into the local occupancy sensor.

Design teams should additionally consult the [CDC recommendations](#) for ventilation best practices to increase the delivery of clean air and dilute potential contaminants.

CONTROLS

Space conditioning controls should be tied into the District EMS systems and separate controls provided for each zone. Occupied hours vary depending on room (7AM-3PM for classrooms; 7AM-3PM for offices, etc.). The system should be off after hours, on weekends, and over unoccupied holidays (with the possibility of limited duration and zone-specific overrides).

- Set points should be 68 +/- 3 degrees F in heating mode and 78 +/- 3 degrees F in cooling mode for all new/modernized buildings
- Set points should be 68 degrees F in heating mode and 74 degrees F in cooling mode for all non-modernized buildings.

HOT WATER

Refer to the [Advanced Energy Design Guide for K-12 School Buildings](#) for domestic and ser3 (y)8.7P6chorTw 1
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SCHOOLYARD

Incorporate drought tolerant and biophilic landscaping wherever possible. Ensure the design is student and maintenance friendly.

- Shade tree plantings will cover at least 30% of each school property in the areas used by children and youth during the school day.
- Per Title 24, shade tree plantings will be required over at least 20% of the landscape area and 20% of the hardscape area within 15 years, with landscape irrigation necessary to establish and maintain tree health.
- Interactive gardens and outdoor classrooms should be considered at all elementary