APPROVED

SACRAMENTO CITY UNIFIED SCHOOL DISTRICT
BOARD OF EDUCATION

Agenda Item# 9.4

Meeting Date: October 5, 2023

Subject: **Approve Resolution No. 3348: Adopting 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

Recommendation: Approve Resolution No. 3348: Adopting Carbon Neutral Goals and Guidelines for SCUSD buildings.

Background/Rationale: Resolution No. 3348 would adopt the Carbon Neutral Goals and Guidelines for SCUSD Buildings that was presented to the Board at the September 21, 2023 Board Meeting.

Sacramento City Unified School District (SCUSD) is embarking on a 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:

1. Resolution No. 3348

2. Energy & Carbon Goals
3. Energy & Carbon Project Guidelines

Estimated Time of Presentation: 5 minutes

Submitted by: Nathaniel Browning, Director I of Facilities
Chamberlain Segrest, Environmental Sustainability Manager

Approved by: Lisa Allen, Interim Superintendent

Sacramento City Unified School District
Resolution # 3348

RESOLUTION TO ADOPT CARBON NEUTRAL GOALS AND GUIDELINES

WHEREAS, the Intergovernmental Panel on Climate Change (IPCC), the world's most authoritative scientific body on climate change, states in their Sixth Assessment Report that human activities, principally through emissions of greenhouse gases, have unequivocally caused global warming and calls on the world to rapidly decarbonize, at least halving emissions by 2023; and

WHEREAS, global warming and other impacts of climate change is a serious threat to humans, affects vulnerable communities the most; and

WHEREAS, the Sacramento community is experiencing the detrimental effects of climate change through extreme heat, catastrophic storms, increased wildfires, poor air quality, and historic droughts; and

WHEREAS, Sacramento City Unified School District (SCUSD) students and staff are entitled to safe and healthy working and learning environments that reflect recommendations of reliable scientific studies indicating that student achievement and attendance and teacher and staff retention are improved when their environment incorporates natural light, improved indoor air quality and acoustics, and is free of toxins, thermally comfortable, and well maintained; and

WHEREAS, SCUSD embraces the tremendous opportunity to teach students about sustainability, climate change, and environmental health and nutrition; to meet math, science, and social studies standards by integrating climate education; and to support students in becoming leaders as they make their own schools healthier and more ecologically friendly; and

WHEREAS, the SCUSD Board is committed to prioritizing the health and wellness of staff and students while making positive, tangible changes to mitigate climate change, and to ensure that every effort is made to conserve energy and natural resources while exercising sound financial management; and

WHEREAS, the City of Sacramento Action Item Environmental Resources 6.1.6 of the 2035 General Plan establishes a goal to reduce municipal greenhouse gas emissions by 83% below 2005 levels by 2050, with an interim reduction goal of 49% below 2005 levels by 2035; and

WHEREAS, the California Global Warming Solutions Act of 2006 (AB 32) requires the State to reduce greenhouse gas emissions to 1990 levels by 2020 and beyond, and the energy used in buildings accounts for the second largest contribution to California's greenhouse gas emissions; and

WHEREAS, the California Energy Efficiency Strategic Plan of 2008 requires all new commercial construction to be Zero Net Energy by 2030 and 50% of existing buildings to be Zero Net Energy by 2030; and California requires all buildings – new and existing will be Zero Net Energy with clean renewable energy by 2050; and

WHEREAS, an Executive Order to achieve Carbon Neutrality of 2018 (B-55-18) requires the California to achieve statewide carbon neutrality by 2045 and maintain net negative emissions thereafter; and

WHEREAS, the Sacramento Municipal Utility District (SMUD) is committed to carbon emission reductions, the implementation of renewables and beneficial all-electric technologies when and where possible, and has a goal to reach zero carbon emissions in their power supply by 2030; and

WHEREAS, research has shown that prioritizing energy efficiency and carbon neutral construction with clean and renewable energy improvements in school district facilities and operations save school districts money, improve learning environments and the health and wellness of school district student and staff; and

WHEREAS, SCUSD recognizes that achieving environmental sustainability will require a commitment from all sectors of society, and that school districts are in a unique position to make substantial contributions toward the goal of a sustainable world for future generations; and

WHEREAS, the SCUSD Board of Education also believes that responsible stewardship of public funds requires that new schools and district buildings be designed to provide the district with cost-saving, environmentally sustainable systems, flexible configurations that will enable future improvements, and efficient use of its land and resources; and

WHEREAS, the SCUSD Board of Education finds that it has a considerable opportunity through the District's purchasing power to improve the environment and to lower financial outlay by providing guidance for district expenditures on energy, mechanical equipment, construction materials, and other building construction and energy efficiency needs; and

WHEREAS, the SCUSD Board of Education intends for the Carbon Neutral Goals and Guidelines to create a long-term, inspiring vision that integrates and strengthens many efforts in our district, and further recognizes that fully implementing this resolution will take time and must be achieved in stages that are to be measured each year.

NOW, THEREFORE, BE IT RESOLVED, that the Board of Education of the Sacramento City School District recognizes the deliberate progress already made by the district to reduce the district's energy consumption and lessen its carbon footprint.

BE IT FURTHER RESOLVED, that as the SCUSD Board seeks to expand upon those efforts and to create healthier, more environmentally sustainable schools, the Board hereby adopts the Carbon Neutral Goals and Guidelines, attached to this Resolution at Exhibit A, and summarized below:

Portfolio Level Goals:

1. Achieve carbon neutrality by at least 2045 as a starting point.
2. Achieve an average portfolio site energy use intensity of **25 kBtu/sf/yr** (without photovoltaic systems).
3. Reduce energy consumption by 40% by 2030 and 80% by 2040.
    1. **EUI in 2030: 31.72 kBtu/sf/yr**
    2. **EUI in 2040: 27.24 kBtu/sf/yr**
4. Eliminate onsite gas combustion by 2045.

Project Level Goals:

1. **All new construction/addition projects will:**
   - Achieve a site energy use intensity of 19-24 kBtu/square foot/year before PV, depending on building type,
   - Be all-electric and have no on-site gas combustion,
   - Be 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 potential (GWP) refrigerants that are non-toxic to the environment,
   - Consider the integration of electric vehicles (including protected electric bicycle parking) and fleet infrastructure.

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 2019 baseline weighted by the amount of work slated.**
   - Retrofitted systems should prioritize a shift to beneficial all-electric.
   - All retrofitted systems must be the most efficient equipment available whether gas or electric.

BE IT FURTHER RESOLVED, the SCUSD Board of Education will revisit the Goals and Guidelines of this resolution for any possible improvement and/or refinement within one year of the initial adoption.

BE IT FURTHER RESOLVED, SCUSD will create a roadmap to carbon neutrality to help guide and prioritize projects, and to provide data that may outline the need for future improvements and/or refinements to the Carbon Neutral Goals and Guidelines.

BE IT FURTHER RESOLVED, that staff will report annually to the Sacramento City Unified School District Board of Education, as an appearance item at a regular board meeting, on the status of these goals in terms of EUI (kBtu/square foot-year) on new construction and retrofit projects, total percent reduction as compared to baseline year of 2019, total annual emissions and percent reduction as compared to 2019 baseline, and number of mechanical systems (such as HVAC) converted to from natural gas to electric at the end of their useful life.

BE IT FURTHER RESOLVED, that the SCUSD Board directs staff to regularly monitor opportunities, including partnerships with other governmental or private entities, for achieving carbon neutrality earlier than 2045, and to present such opportunities to the Board in its annual status report.

BE IT FURTHER RESOLVED, that the Sacramento City Unified School District Board directs staff to limit the purchase or repair, where the cost of the repair exceeds 50% of the current value of the equipment,

of carbon-emitting equipment such as vehicles, heating or cooling elements, and maintenance tools when possible.

PASSED AND ADOPTED by the Sacramento City Unified School District Board of Education on this 5th day of October 2023, by the following vote:

AYES: 6
NOES: 0
ABSENT: 1
ABSTAIN: 0

ATESTED TO:

Chinua Rhodes
President of the Board of Education

Lisa Allen
Superintendent

Sacramento City Unified School District
Energy & Carbon Project Requirements

Final: September 2024

Supported by New Buildings Institute

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INTRODUCTION

Guided by the *Sacramento Unified School District Resolution Number 3348* the Sacramento City Unified School District (SCUSD) is embarking on a process to design, construct, and modernize school buildings and facilities to achieve carbon neutrality by 2045. Occupant health, student experiences, resource efficiency, and sustainability are important to our District and this Project Manual explains how the District aims to achieve the stated goals in all construction activities. Incorporating energy and carbon requirements into school design standards can make an immediate impact on health, attendance, academic performance, and teacher retention while decreasing operational costs.

The District has outlined the goals, processes, and guidelines found in this document to help protect students, staff, school visitors, and community members from the detrimental impacts brought on by climate change and to prepare our District for the transition away from on-site fossil gas use.

The District will strive to ensure all buildings are designed with occupant health, indoor environmental quality, and resource efficiency at the forefront. These buildings will prepare students for the future by providing a high-quality education that supports concepts and practices of sustainability. They will preserve current and future resources by adopting practices in design and operations that balance environmental, social, and fiscal responsibility to protect and enhance the quality of life.

This document dovetails with other District policies and documents, including the SCUSD Technical Specifications, Education Specifications, Board Policy 3511, and Administrative Regulation 3511. Together, they outline the guidelines and requirements for capital projects (new construction and modernizations) and facilities projects, which are defined below. This document will be revisited every 3 years to ensure goals and processes are still relevant and up to date.

Capital Projects: Capital projects include new construction, additions, rebuilds and major modernizations, often funded by voter-approved bonds and implemented by the Facilities Services Department.

Both new construction and modernization projects under the capital construction program will prioritize building envelope, HVAC, lighting, and removal of fossil fuel infrastructure to ensure all projects are designed to be as energy and carbon efficient as possible. Where opportunities arise modernizations will prioritize replacement of end-of-life roofs, windows, or heating systems, wherever possible.

Facilities Projects: Facilities projects are the building repairs and deferred maintenance projects managed by our Facilities Services Department. These projects are often funded by the school District maintenance and operations budgets. Examples of these types of projects include system and equipment replacement, lighting, lighting controls, and HVAC system improvements, end-of-life equipment replacement, and school program changes.

These projects generally have limited scope and will support energy and carbon goals by upgrading building elements as they reach their end of useful life. In each case, the District Energy and Carbon Guidelines below and Technical Specifications Document will inform the design and selection of materials and equipment.

DISTRICT ENERGY AND CARBON EMISSIONS GOALS

Portfolio Level Goals:

- Achieve building portfolio carbon neutrality by 2045, as required by California Executive Order B-55-18.
- Have an average portfolio site Energy Use Intensity (EUI) of **25 kBtu/sq ft/yr** (without Photovoltaic (PV) systems). For comparison, the District's current average EUI is 35.1 kBtu/sq ft/yr without PV.
- Reduce energy consumption by 40% by 2030 and 80% by 2040. These goals are expressed as follows:
    - EUI in 2030: 31.10 kBtu/sf/yr
    - EUI in 2040: 27.10 kBtu/sf/yr
- Reduce onsite gas combustion to zero by 2045, as required by California Executive Order B-55-18.
- Continue to participate with SMUD's PowerDirect® Auto Demand Response program.
- Engage SMUD early for programs and support offered, for all projects connected to the electrical grid.

Project Level Goals:

(1) All new construction projects:

- Will achieve a site EUI of **19-24 kBtu/sqft/yr** without photovoltaic (PV), depending on building type (see table 1: Energy Use below for building specific EUI),
- Will have no on-site gas combustion (and will be all electric),
- Will be PV-ready (where site appropriate),
- Will incorporate renewable energy sources to offset annual electricity use, including, but not limited to, solar and geothermal,
- Will reduce life cycle impacts associated with high embodied carbon materials wherever possible,
- Will prioritize local products, manufacturers, and contractors to reduce carbon impacts in the supply chain,
- Will utilize low Global Warming Potential (GWP) refrigerants that minimize (if not eliminate) global warming impacts that are non-toxic to the environment,
- Will consider the addition of charging infrastructure for staff electric vehicles (including protected electric bicycle parking) and the District fleet (including buses and other heavy duty service vehicles),
- Will consider battery storage (including parked school buses at the campus) and/or microgrid solutions supporting the PV system, for District and school resiliency, where practicable.
- Deploy carbon dioxide monitors or sensors in all classrooms[1].
- Select local, sustainable, and renewable materials wherever possible and prioritize materials that are manufactured using low embodied energy[2].
- Install onsite renewable energy sources, with the District standard being 80% of project load to offset annual electricity.[3]
- Seek to reduce the embodied carbon emissions associated with construction by aligning with the CALGreen requirements around Environmental Product Declarations (EPDs) for construction materials, and compliance with Global Warming Potential (GWP) values outlined by CALGreen and the Buy Clean California Act (BCCA). *(See the Materials section detailed in the Carbon Neutral Guidelines for specifics on sections and requirements. In CALGreen these requirements apply only to projects with a square footage greater than ≥50,000 sq ft)*
- Align with CALGreen EV Charging mandatory measures for non-residential buildings[4].
- Procure ENERGY STAR (or more efficient) appliances and equipment, where ratings exist

[1] See section 5.506.3 of CALGreen for monitor/sensor specifications
[2] See section A5.405 of CALGreen for alternative language
[3] Sections 110.10(b) through 110.10(d) from 2022 Title 24, Part 6 give specific details about California's mandatory solar readiness measures.
[4] Refer to section 5.106.5.6 of CALGreen

(2) All major modernization projects:

- Will achieve a site energy use intensity of **25-35 kBtu/sf/yr** before PV, depending on the building type (see table 1: Energy Use below for building specific EUI),
- Will eliminate on-site gas combustion completely or include a designed plan to eliminate gas by 2045. The plan will come in the form of a board approved resolution and/or document signed by the Department Director, Project Sponsor, or Superintendent)
- Select all-electric building systems and equipment wherever possible.
- Deploy carbon dioxide monitors or sensors in all modernized classrooms.
- Prepare for 'electric readiness' and have a plan to eliminate gas by a target year signed off by the department director
- Upgrade the electrical system to include demand-responsive controls and equipment in accordance with Title 24 requirements.
- Evaluate the potential to install onsite renewable energy sources and energy storage to offset annual electricity use, and pursue "solar-ready" infrastructure.
- Seek to reduce the embodied carbon emissions associated with construction by aligning with the CALGreen requirements around Environmental Product Declarations (EPDs) for construction materials, and compliance with Global Warming Potential (GWP) values outlined by CALGreen and the Buy Clean California Act (BCCA). *(See the Materials section detailed in the Carbon Neutral Guidelines for specifics on sections and requirements. In CALGreen these requirements apply only to projects with a square footage greater than ≥50,000 sq ft)*
- Align with CALGreen EV Charging mandatory measures for non-residential buildings.
- Procure ENERGY STAR (or more efficient) appliances and equipment, where ratings exist.

(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.
- Installations of HVAC, refrigeration, and fire suppression equipment should comply with CALGreen refrigerant requirements listed in the HVAC section below.
- Procure Energy Star (or more efficient) appliances and equipment, where ratings exist

Table 1. Energy Use Intensity Targets by Building Type

Building Type	New Construction Site EUI[5]	Major Modernization Site EUI[6]	Retrofit EUI
Administrative Admin building EUI includes a data room which accounts for the higher EUI. Other unique loads such as maintenance & operation shops, kitchens, evaluated on a case by case basis.	21 *kBtu/sf/yr*	26 *kBtu/sf/yr*	Retrofit projects will improve the site energy use intensity by 20-50% from a 2019 baseline weighted by the amount of work slated.
Primary School (K-5 and Middle)	19 *kBtu/sf/yr*	25 *kBtu/sf/yr*	
Secondary School (High School)	20 *kBtu/sf/yr*	25 *kBtu/sf/yr*	

Note: Sacramento is ASHRAE Climate Zone 3B[7].

For New Construction, ASHRAE dictates that an EUI of 21.1 for office, an EUI of 19 for primary and an EUI of 19.4 for secondary is feasible for new construction in Climate Zone 3B – but we have provided a range for design teams.

For Modernization, ASHRAE sets the standard that an EUI of 33 is achievable for office, an EUI of 30 for primary school, and an EUI of 33 for high school. Based on the NBI Getting to Zero database and past. work in schools, we have amended the ranges above to be slightly more aggressive except for secondary schools which may have unique loads in some cases.

With the low average EUI across the district, the lower end of this scale should be achievable by these future projects.

[5] New construction targets come from the ASHRAE Advanced Energy Design Guide for K-12 Zero Energy Schools and ASHRAE Advanced Energy Design Guide for Small to Medium Office for Administrative buildings: https://www.ashrae.org/technical-resources/aedgs/zero-energy-aedg-free-download

[6] Modernization targets come from ASHRAE Standard 100 targets for existing buildings which identifies that offices can achieve an EUI of 33, primary can achieve an EUI of 30, and secondary an EUI of 33.

[7] https://openei.org/wiki/Climate_Zone_3B

CAPITAL PROJECTS - NEW CONSTRUCTION

The design team will incorporate the following elements into the construction process. New construction projects under the capital construction program will prioritize building envelope, HVAC, lighting, and removal of fossil fuel infrastructure to ensure all projects are designed to meet minimum ventilation standards and be as energy and carbon efficient as possible.

Processes

ENGAGE THE LOCAL COMMUNITY: The design team must seek authentic input and feedback from the local school community during the design phase.

DESIGNATE AN ENERGY CHAMPION: All projects must nominate an energy champion who will ensure energy and carbon are considered at energy opportunity in the design process. This person should be district staff but may also be a consultant that will participate in the eco-charrette, stakeholder meetings, and shall check in with the progress of the design team at least once at the end of each phase of construction (conceptual design, schematic design, design development and construction documents). The energy champion shall also participate in the value engineering process so that long term costs are considered in decision-making.

EMPLOY INTEGRATED DESIGN: Carbon neutral schools require highly structured collaboration among those who plan, design, construct, use, operate and maintain them. Integrated Design requires that team members from a variety of disciplines work together to consider the intersection of local climate conditions, building use patterns, building design and layout, building systems, and cost. Integrated design starts early. Engage the local electric utility (SMUD) early (ideally pre-conceptual design) for potential incentives and technical support through their SMUD Integrated Design Solutions incentive program. In the large bond programs, energy efficiency and carbon emission reduction strategies begin when estimating the cost of new construction and major modernizations.

Major construction and modernization projects will include an “eco-charrette” early in the design process. The eco-charrette will specifically focus on identifying the strategies and systems necessary for meeting the EUI targets. In addition, design teams will be expected to optimize the interrelationships between the building orientation and building systems, surroundings, and occupants. The District’s goal is to include as many passive energy design strategies as possible, such as natural daylighting and beneficial electrification that includes heat recovery.

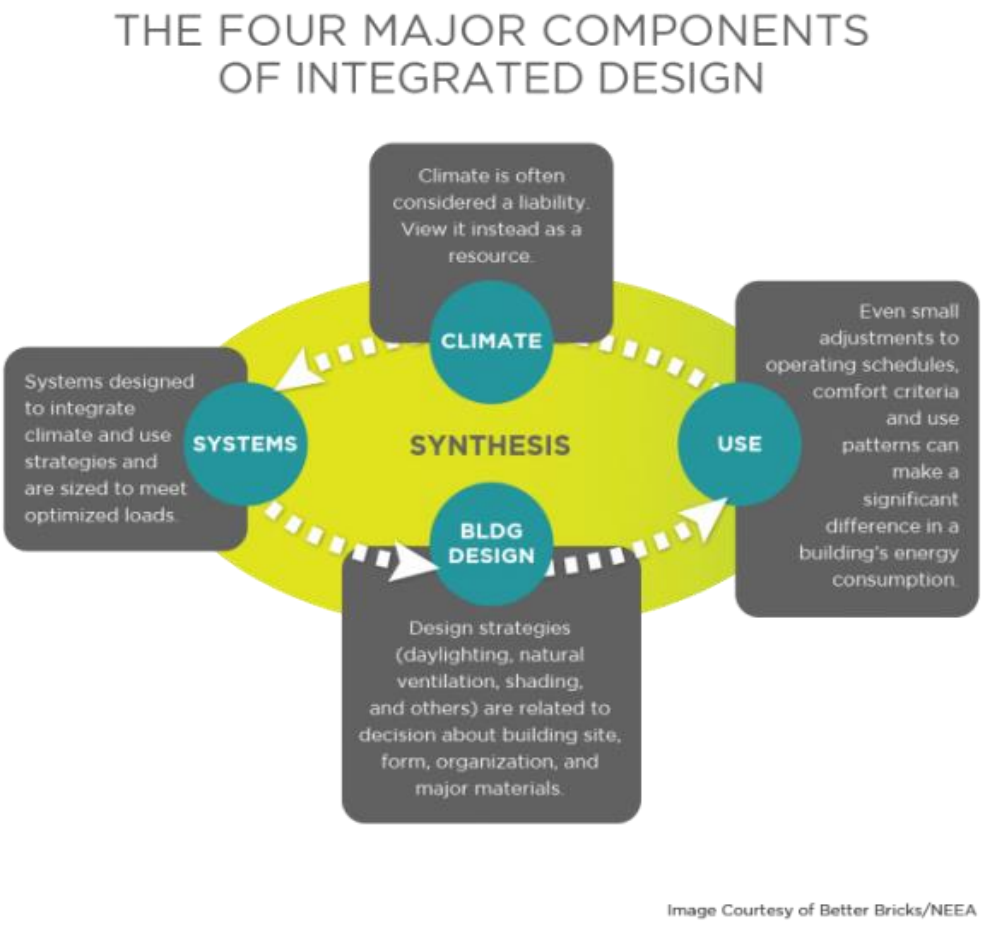

Image Courtesy of Better Bricks/NEEA

PRIORITIZE LOAD REDUCTION: A key strategy in integrated design is a strategic implementation hierarchy to achieve energy and carbon emission reduction goals. This strategy prioritizes energy load reduction, with attention to the building envelope and lighting improvements. This sequencing often allows for a greater rate of return and savings to investment ratio. For example, minimizing heating load before replacing existing HVAC systems avoids oversizing of equipment and allows for replacement with equipment and/or systems that are more efficient and, where feasible, do not have on-site fossil fuel combustion. Every project is unique and although envelope should generally be prioritized, this process may be different, for example, during a major modernization. The key point is that all aspects of building load reduction should be considered and balanced with heating and cooling demand.

PARTICIPATE IN UTILITY AUTO DEMAND RESPONSE PROGRAMS: Continue participation in the local electric utility (SMUD) auto demand response program, PowerDirect®. The financial incentives offered further encourage the District to shed load during critical electrical strain on the grid. These funds can be used to further optimize equipment operation.

Technical Approaches

BUILDING DESIGN GUIDELINES: 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 & VALUE ENGINEERING: 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 report progress on project goals (including energy use intensity estimates) at these key checkpoints:

- Share the results of the energy model with the energy champion and others at the end of each phase of the process (conceptual design, schematic design, design development, construction documents, and an as-built model).
- During construction mockups in the field when different disciplines must work together to ensure that the building envelope is airtight and energy using systems are integrated.
- During value engineering when the life cycle costs must be weighed against the first cost savings.

COMMISSIONING: Commissioning shall align with the requirements set forth in CALGreen section 5.410.2 and will begin in design and follow through to 1 year after post occupancy (ensure 2 year re-commissioning is part of scope). Commissioning agents hired by the District will be brought into the design following each project through design, construction, and post-occupancy (1 year) to ensure that the energy goals and design intent are achieved as outlined in this document and reflected in the Basis of Design (BOD) developed by the project team for each project. Each commissioning plan will include design reviews, construction inspections, functional testing[8], development of a maintenance manual, and systems training. Fundamental commissioning services (as defined by the US Green Building Council LEED process) may be provided by the same organization whose representatives include design team members.

ENVELOPE COMMISSIONING: Envelope commissioning will be prioritized in all capital projects, this process begins with a blower door assessment and thermal imaging of the current building shell, where it will be retained, to identify leakage areas of concern. Existing envelope improvements should be prioritized based on the building testing results to ensure updates are maximizing performance improvement. Design teams should refer to the technical specifications of the AEDG for further details

[8] See section 5.410.4 of CALGreen for guidance on testing, adjusting, and balancing systems.

on building and building envelope commissioning, and adhere to the requirements set forth in Subchapter 3, section 120.8 of Title 24, Part 6.

TRAINING & STEWARDSHIP:

- All Facilities Service staff shall be trained by vendors and contractors, per written agreement, for any given construction project. Local utility service companies should be looped in to provide additional trainings in their area of expertise.
- It is critical that building occupants such as staff and students are properly engaged to operate a building efficiently, maximize savings, and obtain feedback about building operation. Occupants must feel ownership over their buildings carbon neutral performance and understand their individual and collective roles in sustaining carbon neutral performance for the long term. Example training materials include videos, manuals, and captivating signage. Examples of feedback include working with the Commissioning Agent to undergo post-occupancy commissioning.

FINANCIAL INCENTIVES: All projects will seek out local incentives and grants from utilities, Community Choice Aggregators (CCAs), Regional Energy Networks (RENs), and other local entities to help support district energy, carbon, and financial goals. More information and assistance to identify funding options can be found by contacting the Efficient and Healthy Schools Program, or by seeking support from local utilities, current project teams, or other reaching out to schools@newbuildings.org.

VERIFICATION: The measurement and verification (M&V) period typically spans 12 to 24 months after substantial completion of the building. During this time, the commissioning agent, design team, contractor, and energy modeler will work together with the district to review the energy performance of the project. This should be an ongoing and proactive process throughout the entire period so if anomalies are found between the expected site Energy Use Intensity and performance, and the actual site EUI performance, they can be identified and addressed quickly.

MAINTENANCE & OPERATIONS: Maintenance and operations is a key piece in ensuring that resource conservation and efficiency continue through the life of buildings and systems. This includes preventative maintenance, energy & water use monitoring, building automation system (BAS) monitoring, and retro-commissioning (or preferably continuous commissioning) of HVAC and controls.

Every effort should be made to specify maintenance-friendly equipment, facilitate maintenance access to building systems (without ladders/lifts and without disturbing classes) and select materials that are easy to clean and inexpensive to maintain. Standardization of replacement materials, such as HVAC filter types and sizes, shall also be prioritized. The Maintenance and Operations team should be included in these discussions to provide team feedback on system selection.

The M&O team will be a key participant in the retro-commissioning of the completed projects. Additionally, the team will undergo the following practices to ensure buildings are maintained appropriately.

- Defining and maintaining operational setpoints
- Equipment scheduling and periodic review to ensure match with occupancy schedules
- Checking sensor operation
- Filter changes, fan operation check, coil cleaning and other preventative maintenance tasks
- System flushing
- Checking valves for leakage/failure
- Record keeping of systems and equipment to determine which systems either need maintenance or need replacement

EQUIPMENT SELECTION: Every effort shall be made to 1) Select maintenance-friendly, less complicated equipment, 2) Select equipment that is tested and proven (ideally in a K-12 setting); 3) Facilitate easy access to building systems (without ladders/lifts and without disturbing classes), and 4) Select materials that are easy to clean and inexpensive to maintain. Standardization of replacement materials, such as HVAC filter types and sizes, shall also be prioritized. The Maintenance and Operations team should be included in these discussions to provide team feedback on system selection.

CAPITAL PROJECTS - MAJOR MODERNIZATIONS

While new construction can be designed and built to meet the District's ambitious energy and While new construction can be designed and built to meet the District's ambitious energy and carbon goals relatively straightforwardly and with minimal additional cost, retrofitting existing buildings to reach similar levels of efficiency may present a bigger hurdle. The District recognizes that parts of the building may be difficult to update to current standards, for example, meeting prescriptive envelope insulation levels within existing walls.

Despite these challenges, modernizations and retrofit projects are key opportunities to continually improve energy performance and reduce carbon emissions over time. As mentioned in the process section above, design teams will be guided by a strategic implementation hierarchy that calls for consideration of balancing energy load reduction, with attention to features such as the building envelope and lighting improvements, which should be balanced before HVAC upgrades. Minimizing heating load before replacing existing systems avoids oversizing of equipment and allows for replacement with equipment and/or systems that are more efficient and, where feasible, do not have on-site fossil fuel combustion.

Electrification of equipment and systems that burn fossil fuels onsite is a key decarbonization step and is central to many modernizations and retrofit projects. When electrifying equipment, teams should predict the peak kW load of the new system and determine whether the project will require or trigger related investments in electrical systems. Design teams should assess if current electrical panel(s) have enough capacity and physical space, whether current electrical service(s) may need to be upgraded, and whether additional infrastructure such as wiring, subpanels, or transformers may be needed. Consider projects that combine efficiency and electrification: in many cases, efficiency strategies that reduce the need for system capacity save money both by reducing equipment capacity/size and by avoiding electrical upgrades.

Envelope commissioning will be prioritized in modernization projects, as with all capital projects. This process begins with a blower door assessment and thermal imaging of the current building shell (where it will be retained) to identify leakage areas of concern. Existing envelope improvements should be prioritized based on the building testing results to ensure updates are maximizing performance improvement. Design teams should refer to the technical specifications of the Advanced Energy Design Guide for K-12 School Buildings for further details on building and building envelope commissioning.

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.

	MODERNIZATION	
SCOPE See further details below	Mandatory	Case-by-case
Envelope *air sealing and insulating walls and openings*	✓	
Roofs *insulation, rainwater collection*		✓
Glazing & Shading *heat minimization, high performance windows*		✓
Lighting *LED lighting & controls*	✓	
Electrical *energy monitoring*	✓	
Metering *submetering*		✓
Kitchen *electrification & Energy Star energy-efficient equipment*	✓	
Heating *electrification & maintainability*		✓
Ventilation *heat recovery & filtration*		✓
Controls *set points & operating hours*	✓	
Domestic Hot Water *recirculation pumps & pipe insulation*	✓	
Plug Loads *are measured & controlled*	✓	
Water *backflow device & high-efficiency fixtures*	✓	
Schoolyard *green schoolyards, stormwater mgmt. & rainwater collection*		✓
Materials *CalGreen, CA Section 01350 & CA Buy Clean*	✓	
Renewables *Onsite solar PV, storage*		✓
Zero Energy Ready *roof solar readiness*	✓	

FACILITIES (RETROFIT) 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 for those projects to align with the District's goals and project processes:

- The energy champion shall be consulted and provide guidance on incorporating energy efficiency and carbon emission reduction into the design of retrofits and replacements.
- Specifications for new equipment will match those for new construction unless prohibited by Division of State Architect's Interpretation of Regulations (IR) A-22 or this change requires significant and costly expansion of electricity infrastructure. This will avoid like for like replacements and ensure that replacement equipment will be more energy efficient.
- New fossil fuel burning equipment will not be installed.

The add in link/name of District Technical specifications doc when available or the *Advanced Energy Design Guide for K-12 School Buildings* are to be consulted for all Facilities projects so architects working on these projects continue to work to achieve the District's energy and carbon goals.

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 **20 kBtu/sf/year for secondary schools** including plug loads, security cameras, IT & fire alarm systems, and kitchen equipment. Building systems should be "designed for off", meaning that they will shut down without user intervention. Energy modeling during design should confirm that site EUI targets are achieved.
Reference: Table 3-1 of the Advanced Energy Design Guide for K-12 School Buildings

FORM & SITING

Buildings should be simple and compact, integrated into the landscape, oriented to allow for daylighting while managing solar gain, minimizing glare and maximizing renewable energy production. Building form should consider exterior circulation to minimize the need for conditioned common areas and stacking functions to promote energy efficiency.

ENVELOPE

In order to minimize the heating load, roof, wall, slab edge, and door insulation will be continuous and optimized via building modeling to comply with the EUI target above. In general, R30 roof and R23 wall insulation should be specified. Exterior insulation should be specified over cavity insulation and fiberglass batts should be limited in certain circumstances due to poor thermal performance in the field. Double swinging doors without a center post or rolling overhead doors without insulated panels are discouraged due to poor air sealing properties. Low-slope roofs will have a Solar Reflectance Index (SRI) of 75 or higher[9].

If PV panels will be mounted to the roof, the roofing system must be able to handle uplift from the panels. Attachments for PV panels need to minimize thermal bridging (see section EN35 in the Advanced Energy Design Guide for K-12 School Buildings).

AIR & MOISTURE CONTROL

Moisture and air control layers will be continuous and reside on the warm side of exterior insulation, and architects will design and specify airtight construction practices (.25 CFM/SF @ 75 Pa).
Reference: As noted in section EN2 of the Advanced Energy Design Guide for K-12 School Buildings

INSULATION

In order to minimize the heating or cooling (depending on dominated climate load), roof, wall, slab edge, and door insulation will be continuous and optimized via energy modeling to comply with the EUI target above. In general, R30 roof and R23 wall insulation should be specified.

WINDOWS

Windows and skylights will have U-values < 0.47 and <0.99, respectively, and thermally-broken frames. Windows size and Solar Heat Gain Coefficients (SHGC) will be tuned to building orientation, with north

[9] See section A5.106.11.2 of CALGreen for alternative metrics that support the installation of cool roofs to mitigate Urban Heat Island.

and (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.

SHADING

The need for glare and heat control (on East /Southwest elevations) should be determined through daylight modeling and provided via exterior shading devices. Interior shades will always be provided in classrooms and offices.

DAYLIGHTING

Whenever possible, buildings will utilize natural light to meet lighting needs. Acceptable strategies include sloped ceilings, light louvers, clerestories, reflective interior surfaces, sun tubes, and skylights along interior walls.

LIGHTING

In general, lights should run parallel to windows, with the closest bank controlled via daylight sensors. Lights in daylit stairs or hallways should be similarly controlled. Skylights, sun tubes, or light wells may be considered in permanently occupied spaces without access to natural light provided that rooftop solar requirements can be met.

> **Interior lighting** will be 100% LED, with manual on/auto off in classrooms/offices, occupancy sensors in common areas, and daylighting controls per Title 24. A Lighting Power Density (LPD) of 0.4 watts/sf or less shall be achieved. Architects should refer to the District Technical Specifications or the *Advanced Energy Design Guide for K-12 School Buildings* for appropriate light levels, set points, and design guidance for each space type
>
> **Exterior lighting** will also be LED, incorporate bi-level control, and astronomical time clocks.

ELECTRICAL

Size of new transformers and switchgear should be right-sized. They will be evaluated based on future electric heating and solar loads wherever possible. Electric vehicles and electric school bus electrical needs shall be considered. Often electrical equipment is already oversized and with energy efficiency measures in place an increase in size may not be needed. This should be carefully evaluated for each project. Electrical rooms should provide a spare breaker for future photovoltaic panels and space for a solar inverter. Plug loads (controlled and uncontrolled), electrical systems (cameras, fire alarm, information technology), lighting, heating/cooling, ventilation, kitchen equipment, and domestic hot water should be monitored and may be separately sub-metered if cost effective and appropriate in new buildings and when subpanels are replaced in existing ones. Specific requirements include:

- All buildings should comply with the applicable requirements of Sections 130.5(a) through 130.5(e) of 2022 Title 24, Part 6 – for their electrical distribution system including demand responsive controls and equipment.
- Upgrade the electrical system to include demand-responsive controls and equipment in accordance with Sections 130.5(a) through 130.5(e) of Subchapter 6 Nonresidential and Hotel/Motel Occupancies-Additions, Alterations and Repairs from 2022 Title 24, Part 6.

PLUG LOADS

Plug loads can be best managed by requiring the most efficient, Energy Star equipment. Equipment should also be turned off or powered down when not in use. Devices such as plug strips or controls may be utilized to centralize plug load control. Clearly label outlets wired for receptacle control to save energy.

KITCHENS

Electrification of kitchens should be fully considered, including the kitchen hot water heater. The electric combi-oven with ventless condensation hood should be prioritized.

Efficient, EnergyStar™ kitchen equipment is required. The Energy Wise website provides design guides and equipment recommendations for kitchen appliances, walk-ins, and cooking hoods. The Food Service Technology Center provides best practices on all-electric kitchens. Staff refrigerators and microwaves should be provided to discourage individual units.

STUDENT RESTROOMS

Please consider hand dryers instead of paper towels in all student restrooms.
Please consider metering faucets (push) for all student restrooms.

HEATING & COOLING

Space conditioning should be limited to permanently occupied areas. 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. Installations of HVAC, refrigeration, and fire suppression equipment should comply with Section 5.508 Outdoor Air Quality of CALGreen, which requires the use of refrigerants that do not contain CFCs and Halons. Refrigeration systems must have a GWP of ≤150. HVAC systems should explore low-GWP refrigerant options such as CO_2.

VENTILATION

Mechanical ventilation should incorporate dedicated outside air systems (DOAS) with occupancy and/or CO2-based controls, a 15-minute delay, and at least 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 are generally 7am-3pm ; the system should be off after hours and on weekends (with the possibility of limited duration and zone-specific overrides). Set points should be 68 +/- 3 degrees F in heating mode and 76 +/- 3 degrees F in cooling mode. (*Insert district specific setpoints if they differ from these. However, these are the recommended setpoints for energy efficient buildings.*) Note that all buildings should comply with the applicable requirements of Sections 130.5(a) through 130.5(e) of 2022 Title 24, Part 6 – for their electrical distribution system including demand responsive controls and equipment.

HOT WATER

Refer to the Advanced Energy Design Guide for K-12 School Buildings for domestic and service hot water. In addition, large kitchens with walk-in coolers/freezers should be outfitted with heat recovery systems that preheat hot water. All pipes shall be insulated, and water temps set at <120 degrees F *(Insert your district hot water temps if they differ. However, this is the recommended temperature.)*

MATERIALS

Finishes and other materials shall be durable, contain recycled/bio-based content, lead and PVC-free, recyclable at end-of-life, and meet low emissions criteria outlined in CalGreen and CA Section 01350.

This applies to paints, coatings, adhesives, sealants, flooring/carpet, composite wood/panels, acoustical ceilings, insulation, and furniture.

Projects will reduce the embodied carbon emissions associated with construction by aligning with the CALGreen requirements around Environmental Product Declarations (EPDs) for construction materials, and compliance with Global Warming Potential (GWP) values outlined by CALGreen and the Buy Clean California Act (BCCA). Effective July 1, 2024, new construction DSA school projects with a combined area of ≥ 50,000 sq ft shall comply with Section 5.409.2 or Section 5.409.3 of CALGreen. Specific requirements include:

- Materials must adhere to maximum allowable values, determined as 175% of the Global Warming Potential (GWP) values outlined in the Buy Clean California Act (BCCA). However, it's important to note that concrete products are not subject to BCCA regulations. Ready-mixed Concrete High Early Strength shall be assessed at 130% of the permissible GWP values set for each respective product category of ready-mixed concrete. So, to exceed these standards, projects are required to use concrete and steel that have a GWP no greater than 120% of the industry-wide average
- Provide EPD for listed materials (steel, glass, mineral wool, concrete) with lower than specified GWP limits in Section 5.409.3 of CALGreen.

RENEWABLES

Appropriately sized breakers, panel and conduit will be included in the base bid. Renewable energy system panels and equipment will be considered as an add alternate in new construction and major modernization construction projects. The District standard is 80% of projected load for all new systems. Projects will use the PV Watts Calculator to calculate the solar capacity for your project location and compare against the modeled energy use to correctly size the PV array.

ADDITIONAL CONSIDERATIONS:

WATER & IRRIGATION

Bathroom fixtures shall meet the latest CalGreen requirements.
Remodeled restrooms shall contain shut-off valves to aid in the identification and repair of plumbing leaks.
Drought-tolerant plants should be used (outside of food gardens), hose bibbs provided around the perimeter of buildings.

STORM & RAINWATER

Playground matting shall be permeable, and schoolyards should be graded to allow perimeter infiltration. Projects should capture and retain stormwater runoff for gardens as appropriate.

EV and FLEET

EV-capable spaces shall be incorporated and shall follow Section 5.106.5.6 - EV Charging mandatory measures for non-residential buildings from CALGreen to determine the number of EV capable spaces required for each project. This section determines the number of EV capable and EV charging stations with EVSE based on the number of actual parking spaces available, along with describing requirements for Automatic Load Management System (ALMS).

Please see spec sheet for networked Level 2 and DC fast charging stations from OpConnect.

Per SB 454, all publicly accessible EV charging stations (those not behind a full-time locked gate) must be installed with a credit card reader. Please see spec sheets.

Additionally, the District plan to transition EV Fleet to Electric Bus should be made available to the design team to be able to appropriately incorporate bus charging infrastructure for future charging, if desired.

ACTIVE COMMUTE

Walking and biking routes on the school campus shall be planned to improve safety and encourage active commutes. Design teams will provide one bike rack (4-loops) for schools on hills and two bike racks or enough to meet demand (whichever is greater) at all other locations. Car parking is strongly discouraged on school sites.

SCHOOLYARDS

- **Landscaping:**
  - Incorporate drought tolerant and biophilic landscaping wherever possible. Ensure the design is student and maintenance friendly.
  - Consider planting trees larger than 24 inch box trees.
  - 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.
  - Shade tree plantings will cover at least 30% of each school property in the areas used by children and youth during the school day.
  - Consider including a child accessible forest in the design, specifically surrounding the play structure.
- **Play Structures:**
  - Consider nature play elements in addition to traditional play structures.
  - Create dynamic and diverse play areas to include areas for imaginative play, quiet reflection, and constructive play (building, shaping, and manipulating things to create something new).
- **Outdoor Classrooms/Gardens:**
  - Consider a shade structure for the outdoor classroom areas in addition to planting trees (which will take time to reach maturity and shade students).
  - Include flexible seating for students, so that teachers can group students in rows, tables, or in a circle.
  - Consider placing smaller, simpler gardens and outdoor learning areas throughout the campus (instead of just one place). That way teachers have closer access and multiple classrooms can be learning outside and gardening at the same time. If a finger school, consider the courtyards that the classroom opens up to.
- **Kinder/Pre-K Yard:**
  - Consider shading, including tree coverage in yards.
  - Consider nature play elements in addition to traditional play elements. Think rolling logs, etc.
  - Diversify play area to include areas for imaginative play, quiet reflection, and constructive play (building, shaping, and manipulating things to create something new). The latter is incredibly important for this age group.