**Energy & Carbon Project Requirements**

****

*School District logo – click to place*

School District Name

Date Written or Updated

**Executive Summary**

*Instructions: Fill in any of the sections underlined in green. Feel free to customize this language to be more specific to your district. Add in language about the resolutions, initiatives, and/or board directives that guide this process. Also add in any other language about energy and carbon as a priority for your district.*

Guided by the resolution, carbon plan, energy plan, etc., our district is embarking on a process to design, construct, and modernize school buildings and facilities in order to achieve carbon neutrality by 2045. Occupant health, resource efficiency and sustainability are important to our district and these Project Requirements explain how we aim to achieve our goals in construction activities. Incorporating energy and carbon 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 best practice strategies listed below 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 list of board policies, resolutions, Facility Master Plans, design standards (technical specifications), Request for Proposals, sustainability checklists, and/or education specifications. *(Ensure this list of aligned board documents and policies is correct. Double check they are correctly named – i.e., technical specifications vs. design standards - and that these are current and utilized by your district. There may be other relevant type of documents that are not on this list).* Together, they outline the guidelines and requirements for capital projects (new construction and modernizations), facilities projects, and maintenance and facilities operations.

**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. Energy and carbon emissions reduction opportunities should be considered any time the building envelope or energy using systems are addressed. This entire blue section should be customized to reflect the district’s goals.

**Portfolio Level Goals:**

* reduce consumption by 50% below year baseline by 2030
* eliminate on-site fossil gas combustion before 2045
* achieve an average portfolio site EUI of 25 kBtu/square foot-year by 2045
* generate 100% of portfolio energy use from renewable energy sources
* reduce embodied emissions from construction by 50% below year baseline by 2030, with zero emission construction sites by 2045

**Project Level Goals:**

**(1) All new construction projects will: (choose all or some that apply to your district)**

* achieve a site energy use intensity (EUI) of20 kBtu/square foot/year
* be all-electric and have no on-site gas combustion
* incorporate renewable energy sources to offset annual electricity use
* reduce life cycle impacts associated with high embodied carbon materials (like steel and concrete)
* utilize low global warming potential refrigerants
* integrate electric vehicles (EV) and fleet infrastructure

**(2) All major modernization projects will:**

* achieve LEED, CHPS, or other sustainability goal
* achieve a site energy use intensity of 25-30 kBtu/square foot/year
* 5 total air changes per hour (ACH) for high indoor air quality
* eliminate on-site gas combustion or have a plan to eliminate gas by a target year signed off by the department director
* utilize low global warming potential refrigerants

**(3) All school facility retrofits will:**

* + achieve LEED, CHPS, or other sustainability goal
* improve the site energy use intensity by a minimum of 20% from a baseline year *(2018 or 2019 suggested)* baseline
* consider opportunities to remove gas-combusting equipment,
* specify low global warming potential equipment and low embodied carbon materials

**PROJECT TYPES**

|  |  |
| --- | --- |
|  | *[This section is written for those districts that separate out their capital construction, facilities or maintenance and operations projects.  For your district, it may be a combination of these. For your template, ensure the project departments align with your district process.]* |

**Capital Projects**

Capital projects include new construction, additions, rebuilds and major modernizations, often funded by voter-approved bonds and implemented by the name of department that implements capital construction programs.

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 name of facilities department that manages these projects. These projects are often funded by the school district operations budget. 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 name will inform the design and selection of materials and equipment.

**PROCESS**

**New Construction and Major Modernization**

School District Name requires the design team to incorporate the following elements into the construction process.

**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.

**INTEGRATED DESIGN:**  Integrated design starts early. In the bond process, energy efficiency and carbon emission reduction strategies are considered starting when costing new construction and major modernizations, often even before the bond is passed.  All projects will commence with a design charrette specifically focused on identifying the strategies and systems necessary for meeting the Energy Use Intensity (EUI) target. In addition, design teams should optimize the interrelationships between the building orientation and its systems, surroundings, and occupants to make efficient and effective use of resources such as free daylighting and other passive strategies.

Diagram

Description automatically generated

**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. 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.

**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*](https://www.ashrae.org/about/news/2018/new-advanced-energy-design-guide-available-to-help-k-12-schools-achieve-zero-energy)*: Achieving Zero Energy* (AEDG) to ensure the most efficient building approaches are utilized. These technical requirements are generally described in the technical approaches section below.

**ENERGY MODELING:** Unless the prescriptive measures in the [ASHRAE Advanced Energy Design Guide for Zero Energy Schools](https://www.ashrae.org/about/news/2018/new-advanced-energy-design-guide-available-to-help-k-12-schools-achieve-zero-energy), 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.

**MOCKUPS:** A 3D mockup is a small sample of constructed wall or assembly that is used to demonstrate the process and product that will be constructed on a much larger scale. Mockups are constructed early in the construction process by the contractor, and inspected by the Commissioning Agent, Architect, and any other design team members deemed appropriate for air and water infiltration so that any issues can be resolved before the construction of the actual assembly. Contractors shall build a 3D mockup of wall construction to ensure airtight construction and address sequencing of subcontractors and how wall penetrations will be addressed.

**PROJECT CHECK POINTS:** During the design and construction process, each project team will revisit and report progress on project EUI goals 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 begin in design and follow through to post occupancy. Commissioning agents hired by the District will be brought into the design following each project through design, construction, and post-occupancy 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, development of a maintenance manual, and systems training.  Fundamental commissioning services (as defined by the [US Green Building Council LEED](https://www.usgbc.org/credits/commercial-interiors/v20/eap1) 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 on building and building envelope commissioning.

**TRAINING & STEWARDSHIP:** In addition to the thorough training of department responsible for maintenance and operations, i.e., buildings and grounds staff, it is critical that building occupants such as staff and students are properly engaged in order to operate a building efficiently and obtain feedback about building operation. Activities for engagement are to include conducting occupant training to instill a culture of sustainability and working with the Commissioning Agent to undergo post-occupancy commissioning*.* Any requirements or plans for specific occupant training activities such as training manuals or school signage.

**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.

**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 and checking steam traps
* Checking valves for leakage/failure
* Record keeping of systems and equipment to determine which systems either need maintenance or need replacement
* Add additional M&O tasks of special note
* Add additional M&O tasks of special note
* Add additional M&O tasks of special note

**MODERNIZATIONS AND RETROFITS**

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.

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](https://www.ashrae.org/technical-resources/aedgs/zero-energy-aedg-free-download) 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.

|  |  |
| --- | --- |
|  | *Add in any additional scope items that you would like attended to in capital modernization projects. Make sure to note if these are mandatory or case-by-case. Also be sure to check the mandatory and case-by-case distinctions here are accurate for your district.* |

|  |  |  |
| --- | --- | --- |
|  | **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 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.

In order for Facilities projects to align with the District’s goals and project processes, Facilities shall follow the *District Energy and Carbon Guidelines* in this document below.

This means that Facilities projects shall adhere to the following overarching decision-making 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. 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 District Technical Specifications Document Name or the [*Advanced Energy Design Guide for K-12 School Buildings*](https://www.ashrae.org/about/news/2018/new-advanced-energy-design-guide-available-to-help-k-12-schools-achieve-zero-energy) 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 CARBON NEUTRAL GUIDELINES**

|  |  |
| --- | --- |
|  | *For each section below, review the design techniques proposed and make any additions or remove any sections that are not applicable to your district. We have provided some additional suggestions in some of the sections that you may choose to include.* |

|  |  |
| --- | --- |
|  | *Note: The factors such as R-factors noted in each section below are for ASHRAE Climate Zone 3. Consult Figure 3-2 in the* [*Advanced Energy Design Guide for K-12 School Buildings*](https://www.ashrae.org/about/news/2018/new-advanced-energy-design-guide-available-to-help-k-12-schools-achieve-zero-energy) *to find the Climate Zone Map for your climate zone.* |

In order to achieve adequate levels of efficiency to adhere to the goals set forth by the District, design teams will consult the [Advanced Energy Design Guide for K-12 School Buildings: Achieving Zero Energy (ASHRAE)](https://www.ashrae.org/about/news/2018/new-advanced-energy-design-guide-available-to-help-k-12-schools-achieve-zero-energy) 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.

**ENERGY**

New buildings should be designed to achieve a modeled Site Energy Use Intensity (EUI) of 20 kBTU/square foot-year in new construction 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.

**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.

|  |  |
| --- | --- |
|  | *Note: The R-factors noted below are for ASHRAE Climate Zone 3. Consult the Climate Zone Map for your climate zone and Table 5-3: Envelope Construction Factors in the* [*Advanced Energy Design Guide for K-12 School Buildings*](https://www.ashrae.org/about/news/2018/new-advanced-energy-design-guide-available-to-help-k-12-schools-achieve-zero-energy) *to input the appropriate R-factor for your climate zone.* |

**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 R20 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.

**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 as noted in section EN2 of the [Advanced Energy Design Guide for K-12 School Buildings](https://www.ashrae.org/about/news/2018/new-advanced-energy-design-guide-available-to-help-k-12-schools-achieve-zero-energy)).

*Additional considerations for this section:*

* *Thermoplastic polyolefin (TPO) as the preferred roofing material*
* *Rain screens are encouraged where feasible and cost effective*

|  |  |
| --- | --- |
|  | *Note: The R-factors noted below are for ASHRAE Climate Zone 3. Consult the Climate Zone Map for your climate zone and Table 5-3: Envelope Construction Factors in the* [*Advanced Energy Design Guide for K-12 School Buildings*](https://www.ashrae.org/about/news/2018/new-advanced-energy-design-guide-available-to-help-k-12-schools-achieve-zero-energy) *to input the appropriate R-factor for your climate zone.* |

**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 R20 wall insulation should be specified.

*Additional considerations for this section:*

* *Exterior insulation, affixed with low-thermal bridging techniques, is preferred over cavity insulation*
* *Fiberglass batts should be limited in certain circumstances for exterior walls due to poor thermal performance in the field*

|  |  |
| --- | --- |
|  | *Note: The U-values noted below are for ASHRAE Climate Zone 3. Consult the Climate Zone Map for your climate zone and Table 5-5: Fenestration Criteria in the* [*Advanced Energy Design Guide for K-12 School Buildings*](https://www.ashrae.org/about/news/2018/new-advanced-energy-design-guide-available-to-help-k-12-schools-achieve-zero-energy) *to input the appropriate U-value for your climate zone.* |

**WINDOWS**

Windows and skylights will have U-values < 0.30 and thermally-broken frames. Windows size and Solar Heat Gain Coefficients (SHGC) will be tuned to building orientation, with north 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 E/S/W elevations) should be determined through daylight modeling and provided via exterior shading devices. Interior shades will always be provided in classrooms and offices.

*Additional considerations for this section:*

* *Thermochromic glass might be considered as an approach for glare and heat control if appropriate and cost effective*

**DAY****LIGHTING**

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.

*Additional considerations for this section:*

* *Zoned lighting should be considered where appropriate to utilize lighting systems only when needed*

**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*](https://www.ashrae.org/about/news/2018/new-advanced-energy-design-guide-available-to-help-k-12-schools-achieve-zero-energy) 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. Often electrical equipment is already oversized and with energy efficiency measures in place the increase in size may not be needed. This should be carefully evaluated for each project. Electrical rooms should provide a spare breaker for future PV panels and space for a solar inverter. Plug loads (controlled and uncontrolled), electrical systems (cameras, fire alarm, IT), lighting, heating/cooling, ventilation, kitchen equipment, and DHW 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. Electric vehicle and bus infrastructure should be considered where appropriate.

*Additional considerations for this section:*

* *An energy monitor and dashboard are to be installed in all new and modernized buildings*

**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 [design guides](https://caenergywise.com/design-guides/) and [equipment recommendations](https://caenergywise.com/rebates/) for kitchen appliances, walk-ins, and cooking hoods. The [Food Service Technology Center](https://fishnick.com/) provides best practices on all-electric kitchens.

**HEATING & COOLING**

Space conditioning should be limited to permanently occupied areas; no conditioning is needed in foyers, hallways, restrooms, mechanical rooms, or custodial closets. *(Confirm this is appropriate for your climate zone, some climates like 6B may need conditioning in other areas if permanently occupied rooms are found in perimeter zones).* Heating and cooling shall be provided by HFC-free (when available), centralized, all-electric systems that meet [CEE Tier 2](https://library.cee1.org/content/consortium-energy-efficiency-cee-high-efficiency-commercial-air-conditioning-and-heat-pump-0/) 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](https://caenergywise.com/design-guides/). Ventilation in single-occupancy restrooms should be tied into the local occupancy sensor.

Design teams should additionally consult the [CDC recommendations](https://www.cdc.gov/coronavirus/2019-ncov/community/ventilation.html) 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-6pm ; 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 78 +/- 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.*)

**HOT WATER**

Refer to the [Advanced Energy Design Guide for K-12 School Buildings](https://www.ashrae.org/about/news/2018/new-advanced-energy-design-guide-available-to-help-k-12-schools-achieve-zero-energy) 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.)*

**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. Projects will use the [PV Watts Calculator](https://pvwatts.nrel.gov/) to calculate the solar capacity for your project location and compare against the modeled energy use to correctly size the PV array.

**ADDITIONAL CONSIDERATIONS:**

*Incorporate any of the additional items below as they align with your district goals.*

**WATER & IRRIGATION**

Urinals shall use no more than one pint per flush and be installed with partitions in all male restrooms. Other fixtures shall meet the latest CalGreen requirements. Remodeled restrooms shall contain shut-off valves to aid in the identification and repair of plumbing leaks. Multi-fixture restrooms should be pre-plumbed to receive rainwater for toilet flushing. Drought-tolerant plants should be used (outside of food gardens), hose bibbs provided around the perimeter of buildings, and natural grass replaced with turf on athletic fields.

**STORM & RAINWATER**

Playground matting shall be permeable, and schoolyards should be graded to allow perimeter infiltration.

It shall be the goal of all new projects to capture and retain all stormwater runoff on site. To that end, all roofs shall be rainwater-harvesting friendly (TPO, metal) and incorporate external downspouts. Backflow devices are required at the point of collection and at the street. Finally, toilets at frequently used multi-stall restrooms should be pre-plumbed as follows (or retrofitted during gut modernizations):

* Toilets should be served by a dedicated water line that is labeled as a rainwater line (inside walls only).
* That water line should be connected to the local domestic water system.
* Design teams should create an accessible tie-in point where future rainwater can be routed into the toilet water line and a three-way valve added.

**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.

**EV and FLEET**

EV charging capability shall be incorporated for a minimum of Level 2 Charging Infrastructure for 10% of the current parking spaces for staff and visitors. 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.

**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.