CEA leadership has solicited its members for ideas regarding 2022 revisions to California’s Building Energy Efficiency Standards (Title 24 or Energy Standards). The material below includes all the input we have received to date, edited only for clarity. These items are not a complete collection of ideas that CEA members are, or will be, developing, nor are they in any priority order. Most importantly, these proposals do not represent a consensus of the Alliance, but a sample of ideas from our members.

The list was submitted to the Energy Commission for initial review. Their response was received and is included below in blue font.

During the next several months, while working on ensuring that the 2019 revisions of Title 24 meet our members’ needs, CEA members will continue the process of refining and clarifying proposals for the California Energy Commission to consider in its 2022 revisions of Title 24.

1. **Commercial Building Outcome Path**
   Outcome based compliance path (use a lighting control system that can monitor and report its connected load and when turned on if lighting is less than X watts building complies). Must keep all control requirements. The light fixtures must be tunable to set high-end trim to ensure compliance.
   
   **CEC response:** A post-occupancy approach to compliance is not possible to legally implement or enforce, nor is it possible to separate energy use attributable to building design from that attributable to occupant behavior once the building is in operation, thus we would not be able to pursue an “outcome-based” compliance path.
   
   That said, if you mean determining compliance with LPDs *during installation or acceptance testing* by firing up the system and recording the system’s self-reported power consumption, we could consider this type of compliance demonstration.

2. **No backsliding**
   No backsliding on existing control provisions
   
   **CEC response:** We are not intending to move backwards on existing Standards, though note that we are subject to statutory requirements for cost effectiveness. If a given requirement is shown to no longer be cost effective, we are required by law to remove the requirement.

3. **Receptacle Controls**
   Receptacle control for alterations (probably coming in T24 2019?)
   
   **CEC response:** A complete code change proposal demonstrating cost-effective energy savings in alterations is required for this proposal.

4. **Maintain Present LPDs**
   Fight further LPD decreases as we are at a point where it impacts health of people. IES illuminance levels should still be met.
   
   **CEC response:** LPD values are technology driven; IES illuminance levels are able to be met under 2019 LPDs using middle-performing LED light sources. We are not currently aware
of a technology improvement that would cause us to revisit LPDs, but we must stay abreast of technological developments.

5. Commercial Building Lighting “Oasis”

Lighting “oasis”? Add a space type that has higher LPD with a limited size (sf) based on percent of whole building; to ensure occupants get enough light (daylight or electric). Controls would be required for this space type.

CEC response: LPD levels are based on the intended use of the space, per IES and ASHRAE guidelines. We would need to better understand how this space would be used, and how it relates to the other defined spaces in relevant codes, in order to respond to this proposal. Also, note that the tailored method to prescriptive compliance (as well as taking the performance approach) allows creation of spaces with unusual lighting levels.

6. Improved DR for lighting

Improved DR for lighting (lighting changes from current level; no override higher).

CEC response: For a space where lighting is already dimmed to its lowest usable level, the purpose of DR is not to further lower lighting to a less-than-useable level. That said, note that the precise behavior of the building during a DR event is not what we are intending to prescribe: the purpose of the regulations is to ensure the building is capable of participating in DR programs, with the precise behavior up to the arrangement reached between the building operator and the utility or aggregator. A building operator would not be prohibited from deciding to reduce all lighting by an amount, to reduce all lighting except in some areas, or to reduce lighting only in fully lit areas (and not in dimmed areas).

7. Power Adjustment Factor for Daylighting Equipment

Power Adjustment Factor for using automated window shades (i.e. shades that automatically adjust based on sky conditions or sun position; not simply motorized shades)

CEC response: We would need a short proposal with a detailed description of estimated energy savings to know the appropriate PAF value for installation of the equipment. (We would not need cost effectiveness as this is an option, not a requirement.)

8. Required Automated Shading

Require automated shades in certain conditions (>40% WWR) and for certain spaces

CEC response: A complete code change proposal demonstrating cost-effective energy savings is required for this proposal, and would need to include the effect of increased shading on the performance of internal lighting with daylighting controls in addition to the direct energy use of the shades themselves. Note, also, that we pursue technology-agnostic standards where possible; if there are other ways to automate shading, such as electrochromic glass, or if the effect of fixed shading is nearly comparable to automated shading, then we would prefer for any proposed standard to be inclusive of all common approaches to shading.

9. Automated Shade ASE Simulations

Automated shades help with performance simulations for daylighting (sDA and ASE). Automated shades can be used as an alternative to ASE simulations.
CEC response: We would need to know which specific Part 6 requirement this is referring to, to provide feedback.

10. Shading and SHGC

Get automated shades to help meet SHGC window requirements. These shades need to be wired, as battery operated units are not permanent.

CEC response: If a code change proposal is drafted for automated shading, we would recommend including this in that proposal. That said, we would be unlikely to reduce the SHGC required for a window or provide an exception for automated shades, given that automated shades can still be overridden, require energy to operate, and the shade would only block a portion of the solar heat entering through the glazing (meaning there are likely to be hours where overall solar heat gain is increased relative to a higher-performing window – note also there are some climate zones where the solar heat is an energy benefit that offsets space heating costs, and that we’ve had to remove some SHGC requirements as a result).

11. Control Receptacles – Remove “copy room” Qualification from Exception

Per Exception 2 to Section 130.5(d)iii, “Receptacles for network copiers, fax machines, A>V and data equipment other than personal computers in copy rooms.” State staff have confirmed that this exception only applies to “copy rooms.” These devices are often found in open offices, alcoves, closets, conference rooms, training rooms, and patient rooms, among many examples. Why is the exemption only limited to copy rooms? Some of the issues arise in patient rooms where the TVs can be mounted at 6ft in each room, which means we are required to have an additional controlled receptacle directly below the TV because that is a vertical distance of 6ft.

IF the code was reworded to, “Receptacles specifically for network copiers, fax machines, A/V and data equipment other than personal computers,” it wouldn’t limit the exception to just one room type and it would clear the confusion. A requirement should also be added that these locations must be clearly marked/specification on the plans, so a plan checker or inspector can easily see which receptacles are exempt.

CEC response: We will examine the Exceptions used in this Section, likely as part of the 2019 Standards: what we are seeing is that current generations of this equipment have energy saving features that include automatically entering a very low power standby/sleep mode after a short period of inactivity. Thus, we agree that requiring a copier, fax machine, or AV/data equipment with these energy saving features to be plugged into a controlled receptacle may not achieve the energy savings originally estimated for these spaces (noting also the recent appliance standards passed for computing equipment).

12. Allow Daylighting Distributed Controls at Individual Fixtures for Warehouses

Section 130.1(d)2Dii daylighting requirements (warehouses included) states that you shall provide the number controls step per table 130.1-A Multi-level Lighting Controls and Uniformity Requirements. This means that all of the warehouse lights that are in same daylit zones (this can be very large) as defined in 130.1(d), must dim at the same time, because the word “uniformity” is used. Since this is the case, control cables must be taken to every fixture in that zone or control circuit.
For parking garages, this can be avoided. Since parking garages have different daylighting requirements and the word “uniform” is not used, it is permissible to have distributed daylighting controls at each fixture. Warehouses like parking structures can have low light levels. Add an exception to 130.1(d)2Di specifically for warehouses below 0.5w/sf. This would allow warehouse lights to have the option to go with individual daylight sensors as well as individual occupancy control, which would avoid running unnecessary control cable and still provide energy savings with daylight control.

CEC response: We will examine the phrasing used in Table 130.1-A as part of the 2019 Standards: the intent of the uniformity requirement is to ensure dimming as opposed to checkerboarding, striping, or other strategies that create a non-uniform environment of full-on and full-off luminaires. The requirement is not intending to prevent dimming individual luminaires to differing levels based on having individual daylight sensors or controls; we agree that individual dimming levels would lead to a more uniformly lit space, not less, and Table 130.1-A is only specifying the general strategy to be used (continuous dimming, stepped dimming, or lamp-based stepped dimming) based on the capabilities of the lighting technology, not the specific manner in which it is implemented.

Regarding the 0.5w/sqft threshold for controls, see item 27.

13. Define ‘Area Controls’

130.1(a), Please clarify or define area controls. Section 130.1(a)1 does state that all lights shall have a manual on/off control in each enclosed space. But does a circuit breaker on a panel or relay panel qualify as an area control for manual on/off? Some inspectors allow a circuit breaker in a warehouse to function as an area control, but others do not. Please clarify in the code.

CEC response: We will examine the phrasing of this Section in the 2019 Standards.

14. Define Area Control Annunciation Level in the Code

Section 130.1(a)2 Exception 1, the question arises on what is the requirement on annunciation level. Is this a simple pilot light on/off or is there some level of annunciation required for dimming areas like 50% indication or 10% indication? Different light control manufactures have different takes on the requirement. Please clarify in code.

CEC response: We will examine the phrasing of this Section in the 2019 Standards.

15. Allow for an Option to Increase Daylight Zones

There are several projects that have daylight zones that cut off at undesired locations, even in the middle of linear lighting runs. If we are allowed to increase daylight zones this can improve the appearance of the lights in a building to the desired design and save additional energy since the primary zone is increased. The daylight sensor must be located in the original primary zone as defined in 130.1(d)1, in order to insure that lighting will dim as envisioned.

CEC response: The Standards define the minimum amount of daylighting controls required in a building (i.e., it identifies the luminaires that, at minimum, must be controlled by daylighting controls). The Standards do not prevent the installation of additional daylight controls in areas outside those specified in Part 6, and a PAF exists for installing controls in
“secondary sidelit daylit zones”, so no change is needed for installation of additional controls as suggested.

(We would not “increase daylight zones” as this would give an inappropriate impression that more daylight controls are required by law to be installed; to do so, we would need to define “tertiary daylit zones” only to specify that there are no requirements applicable to these zones, and our feeling is this would simply create confusion.)

16. **Allow Daylighting Sensors with Primary and Secondary Functionality**

130.1(d), Add a clarification in the code stating that one daylighting sensor with primary and secondary functionality can be used for both the primary and secondary zones. This can cut the number of devices in half and avoid potential problems. Sometimes the primary sensor dimming the lights in the primary zone can trigger a change in the secondary zone sensor. And the secondary zone sensor can in turn dim and trigger a change back to the primary zone in an infinite loop. One device can limit complications.

**CEC response:** We will examine the phrasing of this Section in the 2019 Standards; it is not our intent to disallow this type of configuration.

17. **Simplify and Reformat Section 130.1(b) Multi-level Control Requirements**

As of 2016 there are several lighting control sections: 130.1(a) Area Controls, (b) Multi-level controls, (c) Auto-shutoff controls, (d) daylighting controls, and (e) ADR. All of these sections are triggered by different requirements and have different exceptions that may cause confusion and complications. For example, what happens if an area is 0.4w/sf for lighting? It is exempt from multi-level controls but not daylighting controls. Daylighting controls exception is 0.3w/sf, and daylighting requires multi-level. So now multi-level lighting is required again. Please see the below current and proposed lighting control breakdown format.

An Overview of Current Requirements for 2016 Standards Section 130.1:

<table>
<thead>
<tr>
<th>Current Sections</th>
<th>Required for</th>
<th>Exceptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>130.1(a) Area Controls</td>
<td>enclosed spaces</td>
<td>(see Standards)</td>
</tr>
<tr>
<td>130.1(b) Multi-level</td>
<td>100sf or larger &amp; 0.5w/sf or lar</td>
<td>rooms with 1 Luminaire</td>
</tr>
<tr>
<td>130.1(c) Shut-off Controls</td>
<td>all interior area</td>
<td>see Standards</td>
</tr>
<tr>
<td>130.1(d) Daylighting Control</td>
<td>daylit/skylit zones</td>
<td>120s or less; 24sf glazing or .3w/sf or less</td>
</tr>
<tr>
<td>130.1(e) Demand Response</td>
<td>buildings&gt;10,000sf &amp; &gt;0.5w/sf</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Consider moving the daylighting section 130.1(d), and demand response section 130.1(e) into the Multi-level section 130.1(b); and have all of the Multi-level controls (now including daylighting & ADR) required for areas higher than 0.5w/sf. This makes logical sense for
daylighting and demand response to be put into the multi-level section because both of these control requirements require multi-level controls in any event. There would be no need to even look at daylighting and demand response sections if multi-level isn’t required. Automatic Demand Response already has a 0.5w/sf or larger requirement, so there is no change there. Daylighting has a 0.3w/sf requirement that would be bumped up to 0.5w/sf to line up with the rest of the multi-level controls. Consider removing the 1 luminaire exception from multi-level controls and using a 120w or less exception instead, because if there is only 1 fixture it is going to be less than 120w. The nice thing about having the 120w exception and the 0.5w/sf requirement is that these are numbers and numbers can be easily reduced in future code revisions to become more stringent.

<table>
<thead>
<tr>
<th>Proposed Sections</th>
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<th>Exceptions</th>
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<tr>
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<td>enclosed spaces</td>
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<td>130.1(b) Multi-level</td>
<td>0.5w/sf or larger</td>
<td>rooms 120w or less</td>
</tr>
<tr>
<td>1-Daylighting Controls</td>
<td>(24sf glazing or less)</td>
<td>N/A</td>
</tr>
<tr>
<td>2-Demand Response</td>
<td>buildings&gt;10000sf</td>
<td>N/A</td>
</tr>
<tr>
<td>130.1(c) Shut-off Controls</td>
<td>all interior areas</td>
<td>see Standards</td>
</tr>
</tbody>
</table>

**CEC response: We will examine the phrasing of this Section in the 2019 Standards.**

18. **Align Egress Lighting Title 24 and CBC Requirements**

Separate egress lighting control requirements from all other lighting control requirements. In 130.1(a), make all egress lighting exempt from mandatory manual controls. The current 2016 Standards exception to Section 130.1(a)1 states that only 0.2 w/sf in any area during occupied hours are exempt from area controls. In several cases, for example, in corridors the same lights are often used as both egress and general lighting to achieve the desired foot-candle values required by CBC Section 1006. So in many cases the egress lights are often controlled by manual dimmers which is not the intent of the CBC. Even by placing the manual dimmer in an area that is inaccessible the building owner can manually lower the light levels below the designed light levels the engineer of record deemed as safe. This would not change the total area wattage allowance.

130.1(d & e), make all egress lighting exempt from automatic daylighting controls and automatic demand response. This would reduce the chance of failure by reducing the amount and layers of controls. As stated in CBC 1006.1 “The means of egress, including the exit discharge, shall be illuminated at all times the building space served by the means of egress is occupied.”

140.6, Please refer to Table 140.6-C Area Category Method Lighting Power Density Values. Add a footnote for exiting rooms commonly used for egress paths such as corridors, stairs, lobbies, and vestibules for additional area wattage allowance. Area controls allow 0.2w/sf of
egress lighting to be uncontrolled. It would be reasonable to increase the area wattage in select egress rooms by 0.2w/sf (or more to cover any egress lighting dark spots, of low lighting levels from manual dimming and automatic controls such as daylighting and shut off controls).

CEC response: We will examine the phrasing of this Section in the 2019 Standards. The intent is that dedicated egress lighting is exempt from control requirements (provided it uses no more than 0.2 watts per square foot of power). We do not see a reason to exclude general lighting along the means of egress from daylighting control requirements, even if it is also used to meet means of egress illumination requirements: by definition, the control would only reduce the lighting when there is sufficient natural light to meet means of egress illumination requirements.

We would not increase the total LPD of a space by 0.2 to allow dedicated egress systems, as it would be more appropriate to specify that dedicated egress lighting systems using no more than 0.2 watts per square foot are not included in calculation of the LPD of the space.

19. **Lighting Wiring Exemption for New/Altered Egress/Emergency Power**

141.0(b)21: per the current 2016 Standards, Lighting Wiring Alterations that alter or add a circuit feeding existing luminaires must meet several requirements including 140.6 area lighting allowance. Even though the fixtures and controls are not changed several upgrades are required to meet the new code. This becomes difficult when you have a project where you want to move emergency fixtures to a more reliable power source. For example, if you want to remove all of the old emergency batteries and connect to new emergency circuit. For this to be compliant all of your existing fixtures located in the same rooms must meet the area wattage allowance for the entire room and the existing emergency fixtures must meet the new control requirements. I propose an exception to section 141.0(b)2I for altering or adding a circuit to emergency fixtures, for purposes of life safety and a better overall emergency system.

CEC response: This seems reasonable; we will see if this can be included in the 2019 Standards, and if not, we will include consideration in the 2022 Standards.

20. **Raise the exception to 35w for Exterior Fixture Occupancy Control**

130.2(c)3 Exception 3B: there are many exterior fixtures that are just above 30w that hit that desired foot-candle values for exterior areas. If the exception rose a few watts like 35w, many unnecessary controls could be avoided.

CEC response: We would need a specific justification for 35w that prevents this from becoming a slippery slope argument.

21. **Add parking structures to Exception 1 to Section 130.1(a)2.**

CEC response: We would need a justification for this change, though it makes sense to allow lighting controls to be located in guard stations.

22. **Exterior motion sensors**

Allow motion sensors for exterior lighting to turn lighting off to comply with Section 130.2(c)3 (B) if not intended for safety or security.
CEC response: We will need to research the reason why full-off behavior is restricted; I don’t believe the current language is intended to prohibit auto-off, but is instead intended to require partial-off ability. We may be able to rephrase to require partial-off capability without prohibiting full-off operation if this is found to be appropriate.

23. Compliance Forms

Add the sequence of operations to project T24 compliance forms to be completed by the EEOR.

CEC response: We would need to better understand what is being requested here – if this is solely a change to compliance forms, then it would not require inclusion in the rulemaking.

24. Commissioning

Section 120.8 Commissioning: reduce square footage requirement from 10,000 to 5,000 square feet.

CEC response: A complete code change proposal demonstrating cost-effective energy savings is required for this proposal (noting that the original reason for the limit is that not enough energy savings is available in a building less than 10,000 square feet for the expected improvement in efficiency from commissioning to offset the added cost of commissioning).

25. Section 120.8 (c)

Add Sequence of Operations and add outdoor lighting systems and controls.

CEC response: We will consider removing the word “indoor” from this Section; we would need to better understand what Part 6 requirements are referred to by “sequence of operations” in order to know if it is appropriate to specify in this Section.

26. Compliance Pathway Sec. 120.8

Incorporate Section 120.8 deliverables into the Compliance/Certificate of Occupancy pathway. Include on Compliance, Installation, and Acceptance Testing Certificates.

CEC response: If this is solely suggested as a change to forms, then we do not need to include in the rulemaking process (and can discuss separately).

27. Section 130.1 Multi-level Lighting Controls

Reduce “enclosed area” from 100 to 50 square feet. Eliminate 0.5 watts per square foot threshold.

CEC response: A complete code change proposal demonstrating cost-effective energy savings in these conditions is required for this proposal: both of these thresholds exist because it was determined that there is not sufficient installed lighting power for the energy cost reduction attributable to dimming to offset the cost of the associated controls.

28. Section 130.2 (c) 3

EXCEPTION 3 to Section 130.2(c)3, remove exceptions A, B, and C.

CEC response: We will examine the phrasing of this Section, and the need for these Exceptions, in the 2019 Standards.
29. **Residential “Whole House” Lighting Control**
   Whole home lighting control system for large homes like in ASHRAE 90.2; last man out switch (this is what they call it in England). We want this for home 3500 sf or larger. Must include All OFF
   
   **CEC response:** A complete code change proposal demonstrating cost-effective energy savings in these conditions is required for this proposal.

30. **Residential Dimmers**
   Avoid backsliding (i.e. taking out dimmers as compliance option) in residential structures
   
   **CEC response:** We will be specifying that dimmers are required in all habitable spaces in 2019, to avoid unintended overreach of dimming requirements (e.g., dimmers internal to cabinetry). Automatic off controls remain required in occupiable, non-habitable spaces (bathrooms, garages, laundry rooms, and utility rooms), noting that 150.0(k)2K currently specifies dimming controls or vacancy controls, and the presence of the vacancy controls meant that dimming controls were not additionally required in those spaces.

31. **No Dwelling LPD Maximum**
   Oppose maximum LPD allowance for rooms in dwellings so as not to reduce the effect of controls.
   
   **We are not looking at defining residential LPDs.**

32. **Landscape and Outdoor Residential Lighting**
   Control all outdoor lights on a residential property, not just those connected to a building. These lights should not be on all day. Require automatic adjustment for based on daylight level or daylight hours (i.e. daylight sensors or astronomical timeclock can comply).
   
   **CEC response:** Residential lighting not attached to a dwelling (which does mean physically mounted on the structure) is not within our regulatory authority; we are not able to pursue this. Local ordinances may be able to do so, which are approvable under 10-106, though I am not certain if you or your members are familiar with the local ordinance approval process.

33. **Plans**
   Simplify documentation requirements in plans.
   
   **CEC response:** We are perpetually interested in ways to simplify and streamline documentation and compliance, and we welcome specific recommendations for changes.

34. **Outcome-Based Codes and Networking**
   Based on building type, occupancy, operating hours and other factors, set lighting energy “budget” for building. Meter building systems, require systems to be networked, measure actual energy performance. Recognize the numerous issues involved, although advances have been made elsewhere in the world—e.g., “LENI” (Lighting Energy Numeric Index) in UK. Outcome basis allows significant reduction in detail and prescriptiveness of code language with focus on overall performance and true energy savings that can be publicly reported.
CEC response: As noted for item 1, a post-occupancy approach to compliance is not possible to legally implement or enforce, thus we would not be able to pursue an “outcome-based” compliance path.

35. Daylighting

Simplify daylighting code by requiring daylight scheduling to daylight zones (lighting power off or reduced); determine how to keep Title 24 at “strategy” level for daylighting without excessive prescriptive detail.

CEC response: We will examine the phrasing of this Section in the 2019 Standards.

36. Tuning, Testing and Commissioning

Modify test procedures to include oversight of pre-construction and review of permits and plans to determine points for testing in post-construction phase. Make better use of sec. 120.8. Bring acceptance testing and commissioning into an integrated process, along with post-occupancy verification of building performance. Educate and train all participants in the process so that they know what they are doing, why it is done, and what outcomes are reasonable, not simply “ticking boxes”.

CEC response: We are not legally able to delegate additional oversight or review authority to acceptance testers, nor do we have any authority to impose post-occupancy requirements.

(To explain, this should not be taken to mean we discourage one-stop-shop professionals that are able to offer start-to-finish compliance advice and provide tracking and compilation of compliance documents as a service, in addition to being certified to perform acceptance testing. There is simply a limit on what we can require an acceptance tester to have signed: in the case of “I have performed a required test, and these are the results” the test is what’s required, and the signature is necessary to create an affidavit that the test was performed and what its results were. “I have reviewed these documents and find them to be complete and satisfactory” is not authority we can delegate and thus not work we can require an acceptance tester perform: the AHJ expressly possesses this authority, and as governmental authority involving judgment and discretion it cannot be delegated to nongovernmental entities.)

37. Education and Training

Provide credit within Title 24 for use of certificated design professionals—the more competent the team, the more allowance provided. Improve compliance by improving skills and training of all involved in the design-approval-construction-testing-operations pathway. Nothing is gained by increasing stringency without providing skills to meet and test new requirements.

CEC response: This creates a situation where possessing certain certificates allows worse (i.e., more energy consuming) design, which would be contrary to statutory direction. We would not be able to pursue this.