

**INITIAL STATEMENT OF REASONS  
FOR PROPOSED BUILDING STANDARDS  
OF THE CALIFORNIA BUILDING STANDARDS COMMISSION  
REGARDING THE 2022 INTERVENING CODE ADOPTION CYCLE  
CALIFORNIA CODE OF REGULATIONS, TITLE 24, PART 11  
(BSC 04/22)**

The Administrative Procedure Act (APA) requires that an Initial Statement of Reasons be available to the public upon request when rulemaking action is being undertaken. The following information required by the APA pertains to this particular rulemaking action:

**STATEMENT OF SPECIFIC PURPOSE, PROBLEM, RATIONALE and BENEFITS**

Government Code Section 11346.2(b)(1) requires a statement of specific purpose of each adoption, amendment, or repeal and the problem the agency intends to address and the rationale for the determination by the agency that each adoption, amendment, or repeal is reasonably necessary to carry out the purpose and address the problem for which it is proposed. The statement shall enumerate the benefits anticipated from the regulatory action, including the benefits or goals provided in the authorizing statute.

This proposed action by the California Building Standards Commission proposes for adoption mandatory green building standards for occupancies within its authority (BSC-CG), building upon a framework of voluntary measures adopted in 2008, and makes modifications and clarifications to the 2022 California Green Building Standards Code (CALGreen) during the 2022 Intervening Code Adoption Cycle. The intent of the CALGreen Code continues to: (1) reduce greenhouse gas (GHG) emissions from buildings; (2) promote environmentally responsible, cost-effective, healthier places to live and work; and (3) respond to the directives by the Governor in 2008 to develop a green building code.

**General Electric Vehicle (EV) Charging statement for Items 1, 5-7, 17 & 18:** California adopted [Assembly Bill AB 32](#) (Nunez, Chapter 488, Statutes of 2006), California Global Warming Solutions Act of 2006: Emissions Limit, which mandates the state reduce its greenhouse gas emission levels to 40 percent below 1990 levels by 2030. Assembly Bill 32 can be found at

([https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill\\_id=200520060AB32](https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=200520060AB32))

California's transportation sector comprises 41 percent of the greenhouse gas emissions statewide when considering mobile source direct emissions according to CARB's [Current California GHG Emission Inventory Data | California Air Resources Board](#). Reducing emissions from the transportation sector not only helps California reach its greenhouse gas emission goals but can also lead to better air quality through the reduction of criteria pollutants. The webpage can be found at (<https://ww2.arb.ca.gov/ghg-inventory-data>).

Other agencies acknowledge the importance of building codes in their plans and recommendations to achieve greenhouse gas and air pollutant remission reduction goals. The Governor's Office of Business and Economic Development (GO-Biz) and California Public Utilities Commission (CPUC) indicated building codes are necessary to continue to increase EV charging infrastructure during new construction. This information can be found at the [California Zero-Emission Vehicle Market Development Strategy](#) webpage ([https://static.business.ca.gov/wp-content/uploads/2021/02/ZEV\\_Strategy\\_Feb2021.pdf](https://static.business.ca.gov/wp-content/uploads/2021/02/ZEV_Strategy_Feb2021.pdf))

[453952700.PDF \(ca.gov\)](#) and  
(<https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M453/K952/453952700.PDF>).

Governor's Executive Orders B-16-2012, B-48-2018 and N-79-2020 set the goal of having over 1.5 million zero-emission vehicles (ZEVs) on California roadways by 2025, 5 million ZEVs on California roadways by 2030, and 100 percent sales of electric vehicles by 2035, respectively. The California Air Resources Board (CARB) adopted the Advanced Clean Cars II Regulation on August 25, 2022, and estimates that as a result there will be approximately 5.8 million ZEVs and PHEVs on California roads by 2030. By 2035, CARB staff estimates there will be 12.6 million.

CARB staff expects drivers to continue to rely on home charging if available and supplement their charging needs with public charging stations. Currently, early ZEV adopters typically have a higher income and may live in a single-family home with consistent access to home charging. However, as ZEV driver demographics shift away from early adopters to the majority of the market, there may be an increased demand for public and workplace charging.

As of April 2022, there were 28,671 public Level 2 chargers and 6,659 public DCFCs in California. Per the California Energy Commission's (CEC) recent [Assembly Bill 2127](#) (Ting, Chapter 365, Statutes of 2018) staff report California has a gap in the number of Level 2 chargers expected to be installed by 2025 to support California's 1.5 million ZEV target under Executive Order B-16-2012. The gap only widens over longer time horizons. CEC's AB 2127 staff report estimates 186,403 to 189,564 workplace chargers and 17,476 to 17,934 DCFCs will need to be installed statewide to support 5 million ZEVs by 2030. BSC-CG code proposals will help further increase market penetration of ZEVs through increased visibility of charging stations and more charging opportunities to ZEV drivers. Assembly Bill 2127 can be found at ([https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill\\_id=201720180AB2127](https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180AB2127)).

BSC-CG proposed action for medium-and heavy-duty vehicles will also support the implementation of the Governor's Executive Order N-79-20 to achieve a benchmark for having a 100 percent zero-emissions medium- and heavy-duty fleet in California by 2045, with interim goals for drayage trucks in 2035. In June and July of 2020, 15 states signed the Multi-State Medium- and Heavy-Duty Zero Emission Vehicle Memorandum of Understanding to support widespread electrification of medium- and heavy-duty vehicles. This initiative is a Memorandum of Understanding signed by the governors of California, Connecticut, Maryland, Massachusetts, New York, Oregon, Rhode Island, Pennsylvania, Hawaii, Maine, New Jersey, Colorado, North Carolina, and Vermont, and the mayor of Washington D.C. The initiative demonstrates the commitment to support a successful and growing market for electric vehicles, an important strategy to help reduce emissions of criteria air pollutants and GHGs, and to reduce dependence on petroleum-based fuels. BSC-CG proposed amendments to the 2022 CALGreen Code will support the Executive Order, the multi-state Memorandum of Understanding, and other state and local laws and policies.

The proposed changes to the building standards with statewide application will lead to substantial environmental benefits through reduction in energy use, GHG emissions, criteria pollutants, and fossil fuel dependency, leading to improved public health, and potentially result in significant cost savings (avoided costs) associated with future installation of EV charging stations at nonresidential buildings.

**General Bird-Friendly statement for Items 2 & 20:** The proposed addition to the voluntary section Chapter A5 of Part 11, Title 24, California Code of Regulations, are being proposed to implement and make specific requirements for bird-friendly building design for nonresidential buildings. Specific rationale is provided for each item below.

**General CALGreen Carbon Reduction Collaborative (CCRC) statement for Items 3, 4, 8-13, 16, 19 & 21 - 25:** BSC-CG, pursuant to its authority for green building standards for nonresidential occupancies for which no other state agency has authority, and the Division of the State Architect (DSA) propose to add new mandatory and voluntary green building standards to further support the reduction of greenhouse gas emissions when buildings 50,000 square feet and greater are renovated or newly constructed. The purpose, need, and benefit of these regulations is a first step to address the impact of building materials on carbon emissions. To maximize flexibility, three alternative pathways are provided:

1. Building Reuse: When an existing building 50,000 square feet or greater undergoes and alteration or addition, 45 percent of the building's structural elements and enclosure must be maintained.
2. Whole Building Life Cycle Assessment: a cradle-to-grave life cycle assessment shall be conducted on new buildings 50,000 square feet and greater, that demonstrates a 10 percent reduction in Global Warming Potential (GWP).
3. Product GWP compliance-prescriptive path: building materials installed in new buildings 50,000 square feet or greater shall comply with prescriptive product GWP's. A weighted average exception is provided for concrete. Product GWP and requirements for Type III Environmental Product Declaration shall be included in the construction documents.

**CCRC Background:** When the California Green Building Standards Code (CALGreen) was first published in 2008 it included several greenhouse gas (GHG) and embodied carbon reduction topics such as building reuse, material sources and their recycled content, and life cycle assessment. The purpose of CALGreen is to improve public health, safety and general welfare by enhancing the design and construction of buildings through the use of building concepts having a reduced negative impact or increase positive environmental impact and encouraging sustainable construction practices in the following categories:

1. Planning and design
2. Energy efficiency
3. Water efficiency and conservation
4. Material conservation and resource efficiency
5. Environmental quality

In response to enacted Legislation and Executive Orders since 2008, many other CALGreen sections have been updated such as stormwater pollution prevention, bicycle parking, parking for clean air vehicles, electric vehicle charging, light pollution reduction, indoor and outdoor potable water use reduction, construction waste management, building commissioning, recycled water use, indoor pollutant control, and indoor and outdoor air quality. However, the forementioned carbon reduction topics have had less attention in recent years.

**Petition:** The American Institute of Architects California (AIACA), submitted a petition in 2019 requesting that California adopt the Zero Code, a reach code to supplement the California Energy Code. The petition requested the Zero Code be included as a voluntary

path to decarbonization in the CALGreen Code, allowing local jurisdictions to adopt it as a means forward for building decarbonization. The Zero Code integrates cost-effective energy efficiency standards with on-site and/or off-site renewable energy, resulting in Zero-Net-Carbon (ZNC) buildings. Because of the energy component, the California Building Standards Commission forwarded the petition to the California Energy Commission who denied the petition.

BSC-CG and DSA continued conversations with the AIACA and other sustainable and design professional organizations, such as the Carbon Leadership Forum, RMI, New Building Institute, California Construction and Industrial Material Association, various representatives from the concrete industries, and the U.S. Green Building Council to find a path forward to include carbon reduction practices in CALGreen. According to these organizations and other research identified in the Technical, Theoretical, and Empirical Study, Report, or Similar Documents section of this ISOR, “[i]n the building industry, **embodied carbon** refers to the greenhouse gas emissions arising from the manufacturing, transportation, installation, maintenance, and disposal of building materials. In contrast, **operational carbon** refers to the greenhouse gas emissions due to building energy consumption. Of those emissions, building operations are responsible for 27 percent annually, while building materials and construction (typically referred to as embodied carbon) are responsible for an additional 20 percent.” Architecture 2030 data indicates that for the 2020-2040 period, the gigatons of CO<sub>2</sub> emitted will be 57% from embodied carbon, and 43% from operational [energy use] carbon.

According to the [2021 Integrated Energy Policy Report](#) Volume I-Building Decarbonization, produced by the California Energy Commission, “in new building projects, on average, up to 50% of total GHG emissions, considered over a 30-year building life, are from the embodied carbon associated with the initial construction, and nearly 70% of that is from just six materials — concrete and steel (by far the most significant), flat glass, insulation, masonry, and wood products. There are, however, significant variations in estimations of the contribution of embodied carbon to the lifetime emissions from a building that warrant further analysis and contextualization for California.” The report can be found at (<https://www.energy.ca.gov/data-reports/reports/integrated-energy-policy-report/2021-integrated-energy-policy-report>).

To achieve California’s decarbonization objectives, mandated by California law, will require significant reductions in both operational and embodied carbon.

**CCRC workgroup:** BSC-CG, DSA and HCD conducted four [pre-cycle workshops](#) (April 4, May 19, June 30, September 8, 2022) which resulted in the creation of a CALGreen Carbon Reduction Collaborative (CCRC), development of a CCRC charter and open discussions about potential amendments to CALGreen to better align CALGreen with current California climate action laws and executive orders. The state agencies asked the participants to look at the existing CALGreen Code and provide non-energy related suggestions, but within the scope of Title 24 and the CALGreen Code that could advance sustainable construction. State agencies with green building subject matter expertise provided overviews of their authority and responsibility for air quality, energy efficiency, sustainable pavement, and carbon reduction efforts. Interested parties and individuals

from the product manufacturing industry also provided presentations describing built examples of current and emerging best practices in building decarbonization which address both operational and embodied carbon reduction practices. These projects were documented using tools such as how some design professionals are currently including whole building life cycle assessment (WBLCA) and environmental product declarations (EPD). Workshop meeting materials can be found at (<https://www.dgs.ca.gov/BSC/Rulemaking/2022-Intervening-Cycle/2022-PreCycle>).

During the public CCRC workshops, other issues related to building decarbonization were described by participants. These included recommended changes to construction waste management, building reuse, life cycle assessment, global warming potential product declarations, cool and sustainable pavements to mitigate heat island effect, mitigation for extreme heat impacts that result from already locked in climate deterioration, and options for reducing the carbon impacts of high use, high impact materials such as cement and concrete. These recommendations and subsequent coordination resulted in the express terms draft regulations in Items 3, 4, 8-13, 16, 19 & 21 - 25. Specific rationale for each code change is noted below in the item numbers.

### **Executive Orders, Legislation and State Agency reports:**

California law has established many climate action objectives, the rationale behind them, and assessment and management frameworks which taken together, mandate rapid and wide-ranging building sector decarbonization. Citations that follow are examples that broadly support the actions being proposed in this regulatory proposal.

[Assembly Bill 32](#) (Nunez, Chapter 488, Statutes of 2006) known as the California Global Solutions Act requires California to reduce GHG emissions to 1990 levels by 2022. AB 32 also requires the California Air Resources Board (CARB) to develop a Scoping Plan to achieve carbon neutrality. Assembly Bill 32 can be found at ([https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill\\_id=200520060AB32](https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=200520060AB32)).

[Senate Bill 32](#) (Pavely, Chapter 249, Statutes of 2016) enhanced the statewide greenhouse gas emissions reduction to 40 percent below the 1990 level by 2030. Senate Bill 32 can be found at ([https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill\\_id=201520160SB32](https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201520160SB32)).

CARB's May 10, 2022 draft [2022 Scoping Plan Update](#) includes future areas of consideration, including building reuse, lifecycle assessment, embodied carbon in building materials. "As decarbonized buildings consume less energy to operate, lifecycle emissions become more important than operational emissions alone. Therefore, reducing embodied carbon associated with building materials becomes increasingly important to address. Embodied carbon of buildings—referring to GHG emissions from extracting and manufacturing building materials—contributes at least 11 percent of all energy-related emissions annually world-wide. Studies may underestimate embodied carbon; a full life-cycle emissions assessment would include transportation and disposal of building materials. Embodied carbon can be reduced through cost-effective management practices including the optimal use of building materials with high-recycled or low-carbon products. Voluntary certification programs (e.g., LEED, Living Building Challenge, Passive House) and the Carbon Leadership Forum offer concrete pathways such as re-use of existing buildings and material to reduce the embodied carbon of new and existing buildings. Future actions that reduce embodied carbon could include promoting voluntary certification and providing market certainty through long-term programs focused on

embodied carbon such as incentives, procurement programs, and requirements for new construction that can drive manufacturers' investment in low-carbon technologies and transition their product portfolio." CARB's report can be found at (<https://ww2.arb.ca.gov/our-work/programs/ab-32-climate-change-scoping-plan>)

[Senate Bill 1389](#) (Bowen, Chapter 568, Statutes of 2002) requires the California Energy Commission to, *[c]onduct assessments and forecasts of all aspects of energy industry supply, production, transportation, delivery and distribution, demand, and prices. The Energy Commission shall use these assessments and forecasts to develop energy policies that conserve resources, protect the environment, ensure energy reliability, enhance the state's economy, and protect public health and safety."* (**Pub. Res. Code § 25301(a)**). Senate Bill 1389 can be found at ([https://leginfo.ca.gov/faces/billNavClient.xhtml?bill\\_id=200120020SB1389](https://leginfo.ca.gov/faces/billNavClient.xhtml?bill_id=200120020SB1389)).

The 2021 Integrated Energy Policy Report (IEPR) provides information and policy recommendations on advancing a clean, reliable, and affordable energy system for all Californians. [The 2021 Integrated Energy Policy Report](#) Volume I-Building Decarbonization includes discussions about Embodied Carbon in building materials and the need for changes in CALGreen to address low-carbon design and construction criteria. The report can be found at (<https://www.energy.ca.gov/data-reports/reports/integrated-energy-policy-report/2021-integrated-energy-policy-report>).

According to the Department of General Service's (DGS) [Legislative Reports](#) "The BCCA was introduced as Assembly Bill [Assembly Bill 262](#) (Bonta, Chapter 816, Statutes of 2017). It addressed the greenhouse gases associated with the production of construction products used in California state public works projects. According to the author, the bill was meant to "level the playing field" and benefit those manufacturers who have made a conscious effort to lower greenhouse gas emissions in the production of materials. The bill was signed into law by Governor Edmund G. Brown Jr. on October 15, 2017. The BCCA was subsequently amended by [Assembly Bill 1817](#) (Ting, Chapter 37, Statutes of 2018) and [Assembly Bill 137](#) (Ting, Chapter 77, Statutes of 2021). The DGS Legislative report can be found at (<https://www.dgs.ca.gov/Resources/Legislative-Reports>).

The BCCA targets carbon emissions associated with the manufacturing of structural steel, concrete reinforcing steel, flat glass, and mineral wood board insulation. State agencies that award contracts ("awarding authorities") are responsible for ensuring that these materials, when used in public works projects, do not have a GWP [global warming potential] that exceeds the limit set by DGS. The EPD [environmental product declaration] is used to establish the GWP limit (and ultimately determine compliance).

[Assembly Bill 2446](#) (Holden, Chapter 352, Statutes of 2022) requires State Air Resources Board, by July 1, 2025, to develop, in consultation with specified stakeholders, a framework for measuring and then reducing the average carbon intensity of the materials used in the construction of new buildings, including those for residential uses. The Legislative intent recognizes that in recent years, building decarbonization has become a growing priority for the state. As a result, the State Air Resources Board and Energy Commission may include building decarbonization in future updates to the Scoping Plan and Integrated Energy Policy Report. The California Energy Code, Part 6 of Title 24, addresses energy and water efficiency requirements for the operation of newly constructed buildings, additions to existing buildings, and alterations to existing buildings. However, those standards do not address the construction phase of buildings, or the

broader lifecycle impacts beyond direct energy and water inputs during the operation or use phase of the building. Assembly Bill 2446 can be found at ([https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill\\_id=202120220AB2446](https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202120220AB2446)).

[Senate Bill 27](#) (Skinner, Chapter 237, Statutes of 2021) requires the California Natural Resources Agency (CNRA) to create a Carbon Sequestration and Climate Resiliency Project Registry. The Registry is intended to facilitate funding of nature-based and direct air capture projects that deliver on California’s climate goals. Senate Bill 27 can be found at ([https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill\\_id=202120220SB27](https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202120220SB27)).

[Senate Bill 596](#) (Becker, Chapter 246, Statutes of 2021) established the intent of the Legislature that attaining net-zero or net-negative emissions of greenhouse gases from the cement and concrete sector become a pillar of the state’s strategy for achieving carbon neutrality and develop a comprehensive strategy for the state’s cement sector to achieve net zero-emissions of greenhouse gases used within the state as soon as possible, but no later than December 31, 2045. Senate Bill 596 can be found at ([https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill\\_id=202120220SB596](https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202120220SB596)).

[Executive Order B-55-18](#), ordered a statewide goal to achieve carbon neutrality as soon as possible, but no later than 2045, and achieve and maintain net negative emissions thereafter. The Executive Order can be found at (<https://www.ca.gov/archive/gov39/wp-content/uploads/2018/09/9.10.18-Executive-Order.pdf>).

In a [Letter from the Office of the Governor to Chair of the California Air Resources Board July 22, 2022](#), “[c]alifornia is in the midst of a climate crisis. Drought, wildfire, and extreme heat have become everyday realities. We are compelled to do more. . . . Buildings are a large source of carbon pollution, and decarbonization of California’s buildings must be accelerated to achieve our climate targets.” The letter can be found at ([https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwi08cuU8b\\_6AhUBOH0KHRUzApgQFnoECA8QAQ&url=https%3A%2F%2Fwww.gov.ca.gov%2Fwp-content%2Fuploads%2F2022%2F07%2F07.22.2022-Governors-Letter-to-CARB.pdf%3Femrc%3D1054d6&usg=AOvVaw0WfnvWDyl4q2HrrJ80codN](https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwi08cuU8b_6AhUBOH0KHRUzApgQFnoECA8QAQ&url=https%3A%2F%2Fwww.gov.ca.gov%2Fwp-content%2Fuploads%2F2022%2F07%2F07.22.2022-Governors-Letter-to-CARB.pdf%3Femrc%3D1054d6&usg=AOvVaw0WfnvWDyl4q2HrrJ80codN)).

**Specific Proposed Regulatory Actions:** BSC-CG proposes to amend the 2022 CALGreen Code during the 2022 Intervening Code Adoption Cycle. It is BSC’s intent to provide clarity to the code user in consistent reference nomenclature to other parts of Title 24. The rationale for each adoption by chapter, division, and section is listed below.

## ITEM 1

### Chapter 2 DEFINITIONS, Section 202 (Electric Vehicle Charging)

BSC-CG is proposing to adopt new and amend existing definitions as shown in the Express Terms for use in the 2022 CALGreen voluntary section for nonresidential buildings.

**ELECTRIC VEHICLE EV CHARGER.** BSC-CG is proposing to adopt an existing definition for Electric vehicle EV charger. The term EV charger was previously adopted by HCD in CALGreen code and BSC-CG is adopting it since it is used in the current EV regulations.

**ELECTRIC VEHICLE CHARGING STATION (EVCS).** BSC-CG is proposing to adopt and amend an existing definition for Electric Vehicle Charging Station (EVCS). The term EVCS was previously adopted by HCD in CALGreen. BSC-CG also uses this term in their

nonresidential regulations and DSA defines EVCS in the California Building Code, Chapter 11B. The amendment to add the word receptacle(s) will more broadly include all types of EV charging equipment that can be installed in an electric vehicle charging station. This definition and amendment are needed since BSC-CG is proposing EV regulations that include the use of receptables for EV charging.

**ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE).** BSC-CG is proposing to amend the definition for Electric vehicle supply equipment (EVSE). The amendment is to add “personnel protection system,” to the definition which aligns with the current 2022 California Electrical Code definition of the same term. The amendment is needed to maintain consistency between the California codes.

**LEVEL 2 ELECTRIC VEHICLE (EV) CHARGER.** BSC-CG is proposing to adopt the definition for Level 2 electric vehicle EV charger. This amendment will align with HCD’s current proposed same definition during the 2022 Intervening Code Adoption Cycle. This definition specifies the minimum power amperage requirements. This definition is needed since BSC-CG has provisions requiring Level 2 electric vehicle supply equipment and Level 2 chargers are part of the equipment.

**LEVEL 2 ELECTRIC VEHICLE SUPPLY EQUIPMENT.** BSC-CG is proposing to adopt the definition for Level 2 electric vehicle supply equipment. This amendment will align with HCD’s definition already codified during the 2021 Triennial Code Adoption Cycle. This definition is needed since BSC-CG is proposing EV regulations that allow the use of Level 2 charging to create EVCS as proposed in Section 5.106.5.3.2. This definition is also needed that allows for the use of Level 2 charging for the power allocation method proposed in Section 5.106.5.3.6. Adopting this definition maintains consistency and clarity for the code users and the regulated community.

**LOW POWER LEVEL 2 ELECTRIC VEHICLE (EV) CHARGING RECEPTACLE.** BSC-CG is proposing to adopt and amend an existing definition for low power Level 2 electric vehicle (EV) charging receptacle. This term was previously adopted by HCD in CALGreen. This definition is being amended to simplify it by removing superfluous information regarding the EV driver. The definition is needed since BSC-CG is proposing EV regulations in Sections 5.105.5.3.2.2 that allow the use of low power Level 2 charging to comply with EV capable spaces in Table 5.106.5.3.1 and in new Section 5.106.5.3.6 with associated Table 5.106.5.3.6 for the power allocation compliance method.

When installed Low Power Level 2 provides supplemental EV charging for EV car owners that may not have adequate access to charging at home or at multi-family, apartments, and condos and for public schools and community students and staff.

**CAC Recommendation (if applicable):**

[Enter CAC recommendation(s), if any]

**Agency Response:**

[Enter the agency's response to CAC recommendation(s)]

## ITEM 2

### Chapter 2 DEFINITIONS, Section 202 for BIRD-FRIENDLY

**2 X 2 RULE.** BSC-CG proposes to adopt the term “2 x 2 rule.” Birds are highly aware of their body size (like wingspan) and how they can safely navigate through a complex 3D environment. Hummingbirds are the smallest species that are highly affected by collisions - they will avoid flying through gaps 2” x 2”, and subsequently, in turn, coating or frit must meet these dimensions. This smaller spacing will also effectively deter birds with larger wingspans.

**ADHESIVE MARKER.** BSC-CG proposes to adopt the term “adhesive marker.” Markers can be transferred from the tape to a window’s exterior, leaving an attractive, unobtrusive grid of dots that make the glass visible to birds while providing more than 98-percent-clear viewing from inside.

**FILM.** BSC-CG proposes to adopt the term “film.” Patterns can also be applied to existing glass with the use of film products. Applied to external surfaces, including windows, film products can be designed with any image or pattern. Film laminates are often applied to buildings for purposes such as security or advertising (just as they are on transit vehicles for advertising purposes). However, the film on buildings can be used simply for the protection of birds; it need not serve any other purpose and can be integrated with the architectural design of the building.

**GLASS, ACID ETCHED.** BSC-CG proposes to adopt the term “glass, acid etched.” This includes different common means of treating the glass, so it is translucent. It is moderately visible to the human eye. A marker created by a process whereby hydrofluoric acid washes across the surface of the glass, creating a smooth, non-porous surface. The acid etch process does not affect visible light transmittance and can create a variety of patterns. Acid etch visual markers are provided on the exterior surface of glass.

**GLASS, FRITTED.** BSC-CG proposes to adopt the term “glass, fritted.” This option is the most visible to the human eye, and therefore can offer the most data around efficacy in protecting birds (if humans can see it, birds can too). Frit patterns can be the most economical solution in new projects. Glass manufactured with a ceramic-based paint fused to its surface.

**GLASS SURFACE.** BSC-CG proposes to adopt the term “glass surface.” The outer most surface of glass is considered surface 1. Which has the most effective solution for deterrent of birds. The surface of glazing on which visual markers are applied.

Note: As an example, in the case of regular double-pane insulating glass units (IGUs), there are four surfaces: the first surface is on the exterior, followed by the second and third surfaces and, finally, the fourth surface, which is on the interior of the building.

**MATURE TREE CANOPY.** BSC-CG proposes to adopt the term “mature tree canopy.” Birds have evolved to fly through tree canopies at speed. This ability to navigate tight places is a benefit in most natural settings but may be a liability in the built environment. With buildings built so close to tree canopies, birds don’t see glass as a barrier and then fly into the glass from the trees.

**ULTRAVIOLET (UV).** BSC-CG proposes to adopt the term “ultraviolet (UV).” The electromagnetic radiation that falls on the electromagnetic spectrum between visible light

and X-rays, with a wavelength from 10 nm to 400 nm. Birds have the ability to perceive wavelengths between 300 nm and 400 nm.

**VISUAL MARKER.** BSC-CG proposes to adopt the term “visual marker.” Visual markers consist of opaque contrasting points or patterns etched into or applied onto the exterior or interior surfaces of glass. Patterns applied closer to the first (exterior) surface, in combination with low reflectance glass, are most visible and effective for birds.

**CAC Recommendation (if applicable):**

[Enter CAC recommendation(s), if any]

**Agency Response:**

[Enter the agency's response to CAC recommendation(s)]

**ITEM 3**

**Chapter 2 DEFINITION, Section 202 for CCRC**

**BUY CLEAN CALIFORNIA ACT.** Assembly Bill 262 (Bonita, Chapter 816, Statutes of 2017) requires the Department of General Services to establish, and publish in the State Contracting Manual, a maximum acceptable global warming potential for each category of eligible materials per the law. The maximum acceptable global warming potential (GWP) limit are established by the Department of General Services (DGS), in consultation with the California Air Resources Board (CARB). The BCCA targets carbon emissions associated with the production of structural steel (hot-rolled sections, hollow structural sections, and plate), concrete reinforcing steel, flat glass, and mineral wool board insulation. When used in public works projects, these eligible materials must have a GWP that does not exceed the limit set by DGS. The proposed CCRC regulations rely on the work conducted by DGS and references the Buy Clean California GWP limits.

**CRADLE-TO-GATE.** The proposed definition aligns with industry standard terminology and is necessary because it is used in the proposed Environmental Declaration definition. It's provided to minimize confusion with the term cradle-to-grave. Cradle-to-gate refers to the carbon impact of a building product from the moment it's produced to the moment it is installed in a structure.

**CRADLE-TO-GRAVE.** The proposed definition aligns with industry standard terminology and is used in the proposed CCRC regulations. Cradle-to-grave covers the entire lifecycle of a product. It is a full analysis of a building product from the raw materials to the disposal of the product in an attempt to determine its full carbon footprint.

**DECONSTRUCTION.** Feedback from the Bay Area Deconstruction Work Group during the four CCRC meetings suggested Section 5.408.1 Construction waste management, should be modified. See the rationale below. The revised section includes the term deconstruction, thus necessitating a definition.

**ENVIRONMENTAL PRODUCT DECLARATION.**

**TYPE III ENVIRONMENTAL PRODUCT DECLARATION (EPD).**

**PRODUCT-SPECIFIC EPD.**

**FACTORY-SPECIFIC EPD.**

**INDUSTRY-WIDE EPD (IW-EPD).**

**REFERENCE STUDY PERIOD.**

BSC-CG (and DSA-SS/CC) proposes to add the new definitions listed above to support the three carbon reduction compliance paths listed below. Feedback during the three CCRC meetings also promoted the recycle sections to be looked at.

**CAC Recommendation (if applicable):**

[Enter CAC recommendation(s), if any]

**Agency Response:**

[Enter the agency's response to CAC recommendation(s)]

**ITEM 4**

**Chapter 5 NONRESIDENTIAL MANDATORY MEASURES, DIVISION 5.1-  
PLANNING AND DESIGN, SECTION 5.105 DECONSTRUCTION AND REUSE OF  
EXISTING STRUCTURES**

**5.105 Deconstruction and Reuse of Existing Structures, (Reserved)** This section was previously reserved for future use and this code cycle BSC-CG and DSA are proposing to add new mandatory regulations for the reuse of existing structures. This regulation does not require that an existing building be reused, it requires if a building is being reused, a minimum 45 percent of the existing building primary structural elements shall be maintained. Studies have shown building reuse almost always offers environmental savings over demolition and new construction, when comparing buildings of equivalent size and function. According to [The Greenest Building: Quantifying the Environmental Value of Building Reuse](#), "it can take between 10 to 80 years for a new energy efficient building to overcome, through efficient operations, the climate change impacts created by its construction. The study finds that the majority of building types in different climates will take between 20-30 years to compensate for the initial carbon impacts from construction." This report can be found at [forum.savingplaces.org/HigherLogic/System/DownloadDocumentFile.ashx?DocumentFileKey=5119e24d-ae4c-3402-7c8e-38a11a4fca12&forceDialog=0](http://forum.savingplaces.org/HigherLogic/System/DownloadDocumentFile.ashx?DocumentFileKey=5119e24d-ae4c-3402-7c8e-38a11a4fca12&forceDialog=0).

According to the AIACA, "reusing a building – including interior renovations and energy upgrades – has a much lower embodied carbon footprint than new construction – typically 50 to 75% lower, depending on the extent of the renovation. But reuse without improving efficiency is not enough, we also need to reduce current operating emissions by implementing efficiency upgrades, electrification, and cleaner sources of electricity.

Reusing and improving existing buildings also has a societal benefit – it can help rebuild existing neighborhood and financial equity, create local jobs, strengthen community control, and increase neighborhood resilience. Investment in communities that have been subjected to historic discrimination and economic redlining has the potential to bring sustainable and equitable climate solutions that also have meaningful economic outcomes to the most impacted communities. To make this potential a reality, decisions must be made by and benefits accrued to those impacted or affected by the improvements." This information can be found in [What you can do right now: Reuse and Retrofit Existing](#)

[Buildings](https://aiacalifornia.org/wp-content/uploads/2020/12/What-You-Can-Do-Right-Now-Reuse-and-Retrofit-Existing-Buildings.pdf): (aiacalifornia.org/wp-content/uploads/2020/12/What-You-Can-Do-Right-Now-Reuse-and-Retrofit-Existing-Buildings.pdf)

Further, the U.S. Environmental Protection Agency EPA created the [Waste Reduction Model \(WARM\)](#) “to provide high-level estimates of potential greenhouse gas (GHG) emissions reductions, energy savings, and economic impacts from several different waste management practices. WARM estimates these impacts from baseline and alternative waste management practices—source reduction, recycling, anaerobic digestion, combustion, composting and landfilling.” The information can be found at (www.epa.gov/warm).

The Figure 1 test scenario inserted several common building materials that could be reused rather than demolished and sent to a landfill. The figure estimates that material reuse (also called source reduction which is the waste reduction from not creating a material in the first place) can have significant equivalent carbon emissions savings compared to recycling or landfilling materials during demolition and construction activities.

Figure 1. Savings from Materials Reuse Compared to Landfilling in Metric Tons of Carbon Dioxide Equivalents

Material	Basecase Scenario: Landfill 100 Tons (MTCO <sub>2</sub> E)	Alternative Scenario: Reuse / Source Reduce 100 Tons (MTCO <sub>2</sub> E)	Change due to Reuse/Recycling: (MTCO <sub>2</sub> E)
Asphalt Concrete	2.0	-11.1	-13.1
Asphalt Shingles	2.0	-19.0	-21.0
Carpet	2.0	-368.3	-370.3
Dimensional Lumber	-92.3	-213.3	-120.9
Fiberglass Insulation	2.0	-37.7	-39.8
Medium-density Fiberboard	-85.4	-241.4	-156.0
Structural Steel	2.0	-166.8	-168.8

Source: US EPA WASTE Reduction Model (WARM), version 15, <http://www.epa.gov/WARM>

**5.105.1 Scope.** The scoping section includes alterations, combined floor area of 50,000 square feet or greater, and additions to existing buildings 50,000 square feet or greater to comply with one of the three options: reuse 45 percent of the building, whole building life cycle assessment, or product GWP compliance prescriptive path. For more information about the compliance paths, see items 3, 4, 8-13, 16, 19 & 21 - 25 below.

**5.105.2 Reuse of existing building.** When an addition or alteration to an existing building occurs a minimum 45 percent of the building primary structural elements such as foundations, columns, beams, walls, floors, and lateral elements shall be maintained. Portions of a building deemed structurally unsound or hazardous, and hazardous material shall not be included in the calculation.

**5.105.2.1 Verification of compliance.** A verification section is included that requires the construction documents demonstrate compliance. The intent of this this section is to provide clear compliance for design professionals and assist local jurisdictions with enforcement. A sample worksheet WS-3 is added to CALGreen Chapter 8 that can be included in the construction documents.

**5.105.3 Deconstruction (Reserved).** This section is added as a place holder for future use to address the deconstruction portion of the main section.

**CAC Recommendation (if applicable):**

[Enter CAC recommendation(s), if any]

**Agency Response:**

[Enter the agency's response to CAC recommendation(s)]

**ITEM 5**

**Chapter 5 SITE DEVELOPMENT, Section 5.106.5.3 Electric vehicle (EV) charging and subsections**

**5.106.5.3.** BSC-CG is proposing to amend code Section 5.106.5.3 Electric vehicle (EV) charging to clarify that compliance with the EVCS regulations can be achieved using the requirements in either Section 5.106.5.3.2 Electric vehicle charging stations (EVCS), or Section 5.106.5.3.6 Electric vehicle charging stations (EVCS)-Power allocation method.

**5.106.5.3.2.** Electric vehicle charging stations (EVCS) and related subsections were amended to allow the use of one DCFC to be substituted for five Level 2 EVSE. Currently one DCFC is allowed to be substituted for 5 EV capable spaces without EVSE.

**5.106.5.3.2.1.** The new proposal in subsection 5.106.3.2.1 allows for DCFCs to be substituted on a 1 to 5 ratio for both EV capable spaces (already allowed) or independently Level 2 EVSEs. This proposal allows more flexibility to install DCFCs in certain occupancies with short dwell times where DCFC chargers may be better suited to provide adequate customer EV charging. This amendment is aimed at addressing comments heard from the various CALGreen Electric Vehicle Workgroup participants during the four pre-cycle workshops held between April 14, 2022 and September 22, 2022.

**5.106.5.3.2.2.** A new provision has been added in Section 5.106.5.3.2.2 to allow the use of Low Power Level 2 receptacles to be substituted for EV capable spaces without EVSE. The specific amendment allows for two low power Level 2 charging receptacles to be permitted to reduce the minimum number of required EV capable spaces without EVSE by one. This new provision would allow greater flexibility to promote the installation of lower power Level 2 chargers or receptacles to replace the EV capable spaces without EVSE. This amendment is aimed at promoting the installation of these types of low power chargers that are essential for employees at office buildings and other similar occupancies. This amendment is aimed at addressing comments heard at December 2021 Commission hearing from the EV Access for All Coalition and others to allow use of low power level charging and to consider longer dwell times. Similar comments were heard from the various CALGreen Electric Vehicle Workgroup participants during the four pre-cycle workshops held between April 14, 2022 and September 22, 2022.

The proposed changes to the building standards with statewide application will lead to

substantial environmental benefits through reduction in energy use, GHG emissions, criteria pollutants, and fossil fuel dependency, leading to improved public health, and potentially result in significant cost savings (avoided costs) associated with future installation of EV charging stations at nonresidential buildings.

This measure will protect public health and safety, the environment, and the general welfare of California residents.

**5.106.5.3.4.** BSC-CG is proposing editorial changes to Section 5.106.5.3.4 title by adding the full name of the acronym EVCS.

**Section 5.106.5.3.5.** New code Section 5.106.5.3.5 Electric vehicle charging station signage has been added to replace the “Note” for EVCS signs.

**Table 5.106.5.3.1,** BSC-CG is proposing to amend the table to add a new footnote number 3 to advise the code user to ensure that at least one Level 2 EVSE shall be provided. The footnote has also been added to column 3 of the table. This amendment is needed to prevent the code user from installing only DCFCs since not all vehicles can charge with the fast chargers and may need a Level 2 EVSE.

**5.106.5.3.6.** BSC-CG is proposing to add a new code Section 5.106.5.3.6 Electric vehicle charging stations (EVCS)- Power allocation method and associated new Table 5.106.5.3.6. This new proposed method, solely based on power in kVA, is meant to be used in lieu of the EVCS requirements in Section 5.106.5.3.2 and associated Table 5.106.5.3.1. This proposed alternative was crafted using the required power allocation in amps for the EV capable spaces from Table 5.106.5.3.1. The new Table 5.106.5.3.6 shows the required EV capable spaces in column 2 converted into kVA using 40-amps per space which equates to 6.6 kVA using 32A at 208v. Footnotes in Table 5.106.5.3.6 have been added to indicate the minimum kVA required for level 2 EVSE and the requirement of installing at least one level 2 EVSE. The kVA calculation for 6.6 kVA minimum for the EV capable space was based on the minimum codified requirements for a level 2 charger “a dedicated 208/240 volts, 40-ampere minimum branch circuit”. Knowing that the standard circuit breakers typically allow only 80% of their rating, the amperage was calculated as follows;  $40A \times 80\% = 32A$ . To convert the 32A to kVA, 208v is used because it is most common, and because it was the lower of the 2 voltages which results in increased chargers. See below for the kVA at 6.6 kVA calculation for both level 2 EVSE and EV capable spaces using the power allocation method.

$$kVA = \frac{32A \times 208v}{1000} = 6.6kVA$$

Table footnote 4 has been added to indicate that the maximum allowed kVA to be utilized for EV capable spaces which is set at 75 percent. The total amount of required kVA is 20 percent of the total spaces in a parking facility from Table 5.106.5.3.6. 25 percent of this total kVA is required to be EVCS and since a minimum of 25 percent is required for EVCS only 75 percent of the kVA can be used for EV capable spaces.

This power method calculation aligns with the codified EV capable spaces required in Table 5.106.5.3.1 and provides consistency between the two tables.

This new proposed compliance method allows the flexibility to use any kVA combination of EV capable space, Low Power Level 2, Level 2 or DCFC chargers. This compliance method also addresses concerns of dwell times since the owner in coordination with the

equipment suppliers and utility companies can decide what is best for their specific project.

Additionally, these proposals allow for the build-out of all EV capable spaces. Furthermore, when installed, Low Power Level 2 provides supplemental EV charging for EV car owners that may not have adequate access to charging at home or at multi-family, apartments, and condos and for public schools and community students and staff.

**CAC Recommendation (if applicable):**

[Enter CAC recommendation(s), if any]

**Agency Response:**

[Enter the agency's response to CAC recommendation(s)]

**ITEM 6**

**Chapter 5 SITE DEVELOPMENT, Section(s) 5.106.5.4 Additions or Alterations to existing buildings or parking facilities**

**Rationale:** BSC-CG proposes adopt a new code section referenced above for additions and alterations. The BSC-CG proposal is in response to the Governor’s veto message of Assembly Bill 684 (2019) which directed BSC-CG to research, develop, and propose building standards regarding the installation of future EV charging infrastructure for parking spaces for existing nonresidential development. Although the bill was vetoed by the Governor, the Governor stated in the veto message that it would be best to address the issue administratively to balance charging infrastructure objectives with affordability. While the Governor’s veto message was mostly directed at HCD, BSC-CG is using the message as a directive to develop EV charging regulations for qualifying additions and alterations for nonresidential developments.

BSC-CG proposes that the new code section(s) require EV charging installation and apply to additions or alterations to existing buildings or parking facilities for various permitted activities, e.g., work includes an increase in power supply to an electric service panel as part of a parking facility addition or alteration, installation of photovoltaic systems covering existing parking spaces, or when additions or alterations to existing buildings are triggered and meet the scoping provisions found in Section 301.3 and the scope of work includes an increase in power supply to an electric service panel.

The majority of California’s building stock was constructed prior to when the CALGreen EV charging regulations were approved and effective. There is significant potential for existing buildings to support California’s 2030 and 2035 ZEV deployment goals through this measure, while ensuring infrastructure deployments are accomplished as cost-effectively at the time of other major renovations.

**5.106.5.4.** BSC-CG is proposing to add a new code Section 5.106.5.4 for Additions or Alterations to existing buildings or parking facilities and subsections.

BSC-CG proposes this section for adoption to require the installation of EV charging for qualifying additions and alterations for a property owner or manager to meet EV charging requirements similar as required for new construction. In essence there are two methods of compliance for the new proposed code change, either comply with Section 5.106.5.4.1 or 5.106.5.4.2 as applicable.

**5.106.5.4.1.** This code section is triggered when existing buildings or parking areas without

previously installed EV capable infrastructure undergo a qualifying addition or alteration as listed in Section 5.106.5.4 and only applicable when parking spaces are being added or altered.

**5.106.5.4.2.** This code section is triggered when existing buildings or parking areas with previously installed EV capable infrastructure undergo a qualifying addition or alteration as listed in Section 5.106.5.4 and only applicable when parking spaces are being added or altered.

**CAC Recommendation (if applicable):**

[Enter CAC recommendation(s), if any]

**Agency Response:**

[Enter the agency's response to CAC recommendation(s)]

**ITEM 7**

**Chapter 5 SITE DEVELOPMENT, Section(s) 5.106.5.5 Electric vehicle (EV) charging: medium-duty and heavy-duty vehicles**

**5.106.5.5.** BSC-CG is proposing to amend code current Section 5.106.5.4 and associated subsections and Table 5.106.5.4.1 for Electric vehicle (EV) charging: Electric vehicle charging readiness requirements for warehouses, grocery stores and retail stores with planned off-street loading spaces. Specifically, renumbered Section 5.106.5.5 and renumbered Table 5.106.5.5.1 have been amended to add two new building types (office buildings and manufacturing facilities) to require EV infrastructure for future installation of medium- and heavy-duty EVSE.

BSC-CG proposes this section for adoption, which includes a mandatory requirement to install EV supply and distribution equipment, spare raceway(s) or busway(s) and adequate capacity for transformer(s), service panel(s) or subpanel(s) at the time of construction in accordance with the California Electrical Code to provide up to 400kW for zero-emission vehicle (ZEV) fueling in new office buildings and manufacturing facilities with off-street loading spaces to support the future addition of chargers for medium- and heavy-duty vehicles.

This change will help improve air quality and support the estimated emissions reductions from current California Air Resources Board (CARB) regulations which include: 19 million metric tons of carbon dioxide equivalent (MMTCO<sub>2e</sub>) total by 2050 from the Innovative Clean Transit Regulation, 0.5 MMTCO<sub>2e</sub> total by 2040 from the Zero-Emission Airport Shuttle Regulation, and 1.7 MMTCO<sub>2e</sub> per year by 2040 from the Advanced Clean Trucks Regulation. These estimated emissions reductions do not include those from the Advanced Clean Fleets Regulation currently under development. The proposed infrastructure additions could also be used to support zero-emission material handling equipment, and additional requirements to increase infrastructure for this equipment will be revisited in a future code cycle.

**CAC Recommendation (if applicable):**

[Enter CAC recommendation(s), if any]

**Agency Response:**

[Enter the agency's response to CAC recommendation(s)]

**ITEM 8**

**Chapter 5 NONRESIDENTIAL MANDATORY MEASURES, DIVISION 5.4- MATERIAL CONSERVATION AND RESOURCE EFFICIENCY, SECTION 5.401 GENERAL**

**5.401.1 Scope.** Amendments are proposed to the existing scoping section to include greenhouse gas (GHG) emission reduction and provide clarity.

**CAC Recommendation (if applicable):**

[Enter CAC recommendation(s), if any]

**Agency Response:**

[Enter the agency's response to CAC recommendation(s)]

**ITEM 9**

**SECTION 5.402, DEFINITIONS**

**5.402 Definitions.** The appropriate new defined terms are added to the list for consistency in the code. However, the terms definitions are in Chapter 2.

**CAC Recommendation (if applicable):**

[Enter CAC recommendation(s), if any]

**Agency Response:**

[Enter the agency's response to CAC recommendation(s)]

**ITEM 10**

**SECTION 5.408, CONSTRUCTION WASTE REDUCTIONS, DISPOSAL AND RECYCLING**

**5.408.1 Construction waste management.** Feedback from the Bay Area Deconstruction Work Group during the four CCRC meetings suggested Section 5.408.1 Construction waste management, should be modified to use industry terms and clarify the types of nonhazardous building waste. The amendments include cleanup language using the defined term deconstruct.

**CAC Recommendation (if applicable):**

[Enter CAC recommendation(s), if any]

**Agency Response:**

[Enter the agency's response to CAC recommendation(s)]

## ITEM 11

### Chapter 5 NONRESIDENTIAL MANDATORY MEASURES, DIVISION 5.4- MATERIAL CONSERVATION AND RESOURCE EFFICIENCY, SECTION 5.409 LIFE CYCLE ASSESSMENT

**Section 5.409 Life cycle assessment**, was a section previously reserved for future use and this code cycle BSC-CG and DSA are proposing to add new mandatory regulations for whole building life cycle assessment (WBLCA). WBLCA is one compliance path. Item 12 below contains a product global warming potential (GWP) compliance path, giving the design professionals options.

**5.409.1 Scope.** The new scoping section requires a newly constructed building 50,000 square feet or greater to comply with either of the two carbon reduction paths; Section 5.409.2 Whole building life-cycle assessment (WBLCA) or 5.409.3 Product GWP compliance path. Alterations to an existing building where the combined floor area is 50,000 square feet or greater, may comply with either of the two paths listed above or Section 5.105.2 Reuse of existing buildings.

**5.409.2 Whole-building life-cycle assessment.** This section requires a cradle-to-grave WBLCA be performed in accordance with ISO 14044 reference standard, excluding the operating energy, and demonstrate a 10 percent reduction in global warming potential (GWP) compared to building similar in size, function, complexity, type of construction, material specification and location.

Projects must exclude operating energy analysis in the WBLCA because energy efficiency savings over a building's lifecycle are captured by the California Energy Code (Title 24, Part 6). ISO 14044 is the foremost standard that address the assessment of the environmental aspects of a building for all life cycle stages. WB LCA modeling programs use ISO 14040 as the trusted source to compare products and projects across all four phases of LCA. Excluding operational energy from the calculation eliminates teams' ability to trade operational energy savings for embodied carbon. Further, other sections of Title 24 address requirements for operational energy.

**5.409.2.1 Building components.** This section clarifies which building components are included in the whole building life cycle analysis. The scope is limited to primary and secondary structural elements.

**5.409.2.2 Reference study period.** This subsection specifies that 60 years is the assumed building lifespan and study period for the WBLCA assessment.

**5.409.2.3 Verification of compliance.** This subsection specifies that the GWP analysis shall be included in the construction documents. Including the GWP analysis in the project documents will make verification of compliance simpler and allow building owners to review the environmental impacts of their project material choices, leading to greater awareness of embodied carbon impacts throughout the design and construction industry. Designers must include the product selection considerations as identified from the WBLCA to ensure that the modeled products are included in the final building. Since the code specifies the requirements that WBLCA software must comply, the reporting will be consistent when the code is followed.

**NOTES:** The notes include software options for performing the GWP analysis. Some are free of charge, others for fee.

**CAC Recommendation (if applicable):**

[Enter CAC recommendation(s), if any]

**Agency Response:**

[Enter the agency's response to CAC recommendation(s)]

**ITEM 12**

**Chapter 5 NONRESIDENTIAL MANDATORY MEASURES, DIVISION 5.4- MATERIAL CONSERVATION AND RESOURCE EFFICIENCY, SECTION 5.409 LIFE CYCLE ASSESSMENT**

**5.409.3 Product GWP compliance-prescriptive path and 5.409.3.1.** The new section offers an additional compliance path, utilizing specific product categories and maximum acceptable GWP values listed in Table 5.409.3. This approach provides project teams a prescriptive option to specify lower carbon materials based on product purchasing and procurement during construction. The target materials are based on the Buy Clean California Act (BCCA) and represent 175 percent BCCA GWP values, except for concrete products which are not included in BCCA. The concrete ready mixed and lightweight ready-mixed values are based on 175% of the National Ready Mix Concrete Association (NRMCA) 2021 version 3 Pacific Southwest regional benchmark values. Concrete high-strength concrete is not included in the benchmark values, and it should be calculated at 130 percent of the ready-mixed values in the table.

Concrete, being a unique regional product, is allowed a weighted average calculation for all concrete mixes used on a project. Project teams can choose for each mix to comply with the GWP value in the table, or they can use the calculation provided to illustrate that, collectively, the concrete mixes do not exceed the allowed GWP value. This approach was considered after the California Construction and Industrial Material Associate, California Nevada Cement Association, National Ready Mixed Concrete Association, and American Concrete Institute (referred to below as the Concrete Industry) provided the recommendation to use an average approach.

**5.409.3.1, Exception and Equation.** During the CCRC meetings the concrete/cement industry provided feedback that various regions in California may not be able to comply with prescriptive maximum acceptable GWP values in Table 5.409.3, so the exception allows concrete to be considered one product category, rather than several, and calculate a weighted average maximum GWP using the exception equation 5.409.3.1. The weighted average approach also allows more flexibility by allowing projects the ability to trade-off concrete mixes in situations where certain applications may fall outside the prescriptive limits but that are necessary for the project.

**5.409.3.2 Verification of compliance.** This subsection specifies that calculations demonstrating compliance and PDF copies or links to Type III EPDs referenced in the calculations shall be included in the construction documents. Also, any updated EPD that were subsisted after the construction permit was issued shall be provided to the owner at the close of construction. Updated EPDs may be submitted to the enforcement agency, if requested. Including the GWP analysis in the project documents will make verification of compliance simpler and allow building owners to review the environmental impacts of their

project material choices, leading to greater awareness of embodied carbon impacts throughout the design and construction industry.

**NOTES:** Sample worksheets intended to assist with compliance are provided in Chapter 8. BSC-CG will make every effort to provide electronic versions that can be used by design professional and local enforcement entities.

**Table 5.409.3 Product GWP limits**, is based on the Buy Clean California Act (BCCA) and represents 175 percent BCCA GWP values, except for concrete products which are not included in BCCA. The Concrete values are based on Industry-Wide Environmental Product Declaration (IW-EPD) regional concrete values and represents 130 percent of the ready-mix concrete GWP values. The concrete ready mixed and lightweight ready-mixed values are based on 175% of the National Ready Mix Concrete Association (NRMCA) 2021 version 3 Pacific Southwest regional benchmark values. Concrete high-early strength concrete is not included in the benchmark values, and they should be calculated at 130 percent of the ready-mixed values in the table

**CAC Recommendation (if applicable):**

[Enter CAC recommendation(s), if any]

**Agency Response:**

[Enter the agency's response to CAC recommendation(s)]

**ITEM 13**

**Chapter 5, DIVISION 5.4-MATERIAL CONSERVATION AND RESOURCE EFFICIENCY,  
Section 5.410 BUILDING MAINTANANCE AND OPERATION**

**5.410.2 Commissioning, Note and Informational Notes.** BSC-CG is proposing and editorial change to add a / between and or. BSC-CG is proposing to amend the Informational Notes found at the end of Section 5.410.2. Specifically, Informational Note 1 is being repealed and note 2 will be renumbered as note 1.

This amendment is needed since BSC-CG was advised that International Accreditation Service (IAS) no longer support AC 476 and therefore this note is no longer applicable.

**CAC Recommendation (if applicable):**

[Enter CAC recommendation(s), if any]

**Agency Response:**

[Enter the agency's response to CAC recommendation(s)]

**ITEM 14**

**Chapter 6 REFERENCED ORGANIZATIONS AND STANDARDS, AND MATERIALS,  
SECTION 601 GENERAL**

**601.1,** The second sentence is proposed for change to correct the grammar.

**ACI AMERICAN CONCRETE INSTITUTE,** ACI CT-21 is added to the reference standards table since these standards are used in the amended Section A5.405.5.2.1.1 Mix design equation.

**EN EUROPEAN STANDARD**, EN 1504 AND EN 15978-2011 are added to the reference standards table since these standards are referenced in the new CCRC regulations.

**ISO INTERNATIONAL ORGANIZATION FOR STANDARDIZATION**, ISO 14044-2006, ISAO 21930-2017, and ISO 21931-2017 are added to the reference standards table since these standards are referenced in the new CCRC regulations and are nationally recognized

**CAC Recommendation (if applicable):**

[Enter CAC recommendation(s), if any]

**Agency Response:**

[Enter the agency's response to CAC recommendation(s)]

**ITEM 15**

**Chapter 8 COMPLIANCE FORMS, WORKSHEETS AND REFERENCE MATERIALS**

**WORKSHEET (WS-3) Building reuse**, is added to Chapter 8 to support Section 5.105.1 Verification of compliance for building reuse. Use of the worksheet is not mandatory; however, it is provided to assist in showing compliance. The worksheet includes the area of the existing building, area of aggregate addition if applicable, and various options for calculating structural and nonstructural elements to show a reuse of 45 percent minimum primary structural elements (foundations; columns, beams, walls, and floors; and lateral elements) and existing building enclosure (roof framing, wall framing and exterior finishes).

**WORKSHEET (WS-4) Whole Building Life Cycle Assessment**, is added to Chapter 8 to support Section 5.409.2 Verification of compliance for whole building life cycle assessment. Use of the worksheet is not mandatory; however, it is provided to assist in showing compliance.

**WORKSHEET (WS-5) Product GWP Compliance- Prescriptive Path**, is added to Chapter 8 to support Section 5.409.3 Verification of compliance for GWP Compliance. Use of the worksheet is not mandatory; however, it is provided to assist in showing compliance.

**WORKSHEET (WS-6) Documentation of Compliance of existing Building Reuse Tier 1 and Tier 2**, is added to Chapter 8 to support Section A5.105.2 Verification of compliance for building reuse tiers 1 and 2. Use of the worksheet is not mandatory however; it is provided to assist in showing compliance.

**WORKSHEET (WS-7) Product GWP Compliance-Prescriptive Path 1 and Tier 2**, is added to the Chapter 8 to support Section A5.409.3 Verification of compliance for product GWP compliance. Use of the worksheet is not mandatory; however, it is provided to assist in showing compliance.

**CAC Recommendation (if applicable):**

[Enter CAC recommendation(s), if any]

**Agency Response:**

[Enter the agency's response to CAC recommendation(s)]

**ITEM 16**

**Appendix A5 NONRESIDENTIAL VOLUNTARY MEASURES, DIVISION A5.1-**

## PLANNING AND DESIGN, SECTION A5.105 DECONSTRUCTION AND REUSE OF EXISTING STRUCTURES

**A5.105.1 – A5.105.1.3**, these existing sections include voluntary requirement to maintain 75 percent of the exiting building structure and at least 50 percent of the interior nonstructural elements. To align with the new mandatory requirements in Section 5.105.1 Scope, and Section 5.106.2 Reuse of existing buildings, the existing voluntary sections are being repealed and rewritten to include the scope and requirements for Tier 1 and Tier 2 Reuse of existing buildings.

**A5.105.1 Scope**, is added to clarify the Tier 1 and Tier 2 compliance paths for alterations and additions to buildings with a floor area of 50,000 square feet or greater and buildings with a floor area of 50,000 square feet or less. Section A5.105.1 contains 4 options to clarify the various scenarios.

1. Alteration to existing building with a combined area of 50,000 square feet or greater.
2. Additions to existing building with a combined area of 50,000 square feet or greater. This scenario has an exception for combined addition to existing building two times the area or more of the existing building is not required to meet compliance with Section a 5.105.2.
3. Alterations to existing building where the aggregate floor area is less than 50,000 square feet.
4. Additions to existing building where the total floor area combined with the existing building is less than 50,000 square feet.

**A5.105.2 Reuse of existing building**, contains the specifics for the four options listed in Scope.

**A5.105.2.1 Tier 1**, requires 75 percent of the combined existing building's primary structural elements and existing building enclosure shall be maintained during and addition or alteration.

**A5.105.2.2 Tier 2**, requires 75 percent of the combined existing building's primary structural elements and existing building enclosure shall be maintained during and addition or alteration. Tier 2 also requires when an alteration occurs to an existing building, 30 percent of the existing interior nonstructural elements (interior walls, doors, floor coverings, ceiling systems) shall be maintained.

**A5.105.2.3 Verification of compliance.** A verification section is included that requires the construction documents demonstrate compliance. The intent of this this section is to provide clear compliance for design professionals and assist local jurisdictions with enforcement. A sample worksheet WS-6 is added to CALGreen Chapter 8 that can be included in the construction documents.

**A5.105.3 Deconstruction (reserved).** This section is reserved for future use.

**CAC Recommendation (if applicable):**

**[Enter CAC recommendation(s), if any]**

**Agency Response:**

**[Enter the agency's response to CAC recommendation(s)]**

## ITEM 17

### Appendix A5, DIVISION A5.106 PLANNING AND DESIGN, Section A5.106 SITE DEVELOPMENT

**A5.106.5.1** BSC-CG is proposing to amend code Section A5.106.5.1 Designated parking for clean air vehicles to change the verbiage “fuel-efficient” to “high efficient”. This is an editorial amendment with no change in regulatory effect and is needed to align with the new definition for “ZERO-EMITTING AND HIGH EFFICIENT VEHICLE” which is codified in the 2022 CALGreen Code.

**A5.106.5.1.1 Tier 1.** BSC-CG is proposing to amend code Section A5.106.5.1 Designated parking for clean air vehicles to change the verbiage “fuel-efficient” to “high efficient”. This is an editorial amendment with no change in regulatory effect and is needed to align with the new definition for “ZERO-EMITTING AND HIGH EFFICIENT VEHICLE” which is codified in the 2022 CALGreen Code.

**A5.106.5.1.2 Tier 2.** BSC-CG is proposing to amend code Section A5.106.5.1 Designated parking for clean air vehicles to change the verbiage “fuel-efficient” to “high efficient”. This is an editorial amendment with no change in regulatory effect and is needed to align with the new definition for “ZERO-EMITTING AND HIGH EFFICIENT VEHICLE” which is codified in the 2022 CALGreen Code.

**A5.106.5.1.3** BSC-CG is proposing to use existing code section number A5.106.5.1.3 with the title Future EV charging spaces which is new code language and is needed to clarify that future EV charging spaces count toward designated parking for clean air vehicles. Additionally, a note was added to clarify that Future EV charging spaces shall count toward the total parking spaces required by the local enforcing agencies.

**A5.106.5.1.4 [formerly A5.106.5.1.3]** BSC-CG is proposing to renumber existing code section from A5.106.5.1.3 Parking stall markings to code Section A5.106.5.1.4. This amendment is needed since new code language for EV charging spaces was added using the existing code section number A5.106.5.1.3 above.

**A5.106.5.1.5 [formerly A5.106.5.1.4]** BSC-CG is proposing to renumber existing code section from A5.106.5.1.4 Vehicle designations to new code section number A5.106.5.1.5. This amendment is needed since existing code section number A5.106.5.1.4 has been used for Parking stall markings above.

**CAC Recommendation (if applicable):**

**[Enter CAC recommendation(s), if any]**

**Agency Response:**

**[Enter the agency's response to CAC recommendation(s)]**

## ITEM 18

### Appendix A5, DIVISION A5.106 PLANNING AND DESIGN, Section A5.106 SITE DEVELOPMENT

**A5.106.5.3** BSC-CG is proposing to amend code Section A5.106.5.3 Electric vehicle (EV) charging and the titles to the code sections mentioned and to renumber code Section A5.106.5.3.2 Tier 2 to A5.106.5.3.3. This is an editorial amendment.

**A5.106.5.3.1 Tier 1.** BSC-CG is proposing to amend code Section A5.106.5.3.1 Tier 1 to refer the code user to the appropriate mandatory code section for EV capable space requirements and to clarify that compliance with the EVCS regulations can be achieved using the requirements in either Section A5.106.5.3.1 Tier 1, or Section A5.106.5.3.2 Electric vehicle charging stations (EVCS)-Power allocation method. Other changes include the reference to Section 5.106.5.3.2 for the permitted use of DCFCs to create EVCS. A reference to new Section 5.106.5.3.2.1 has been added which allows for DCFCs to be substituted on a 1 to 5 ratio for both EV capable spaces (already allowed) or independently Level 2 EVSEs. Also, an editorial correction to specifically refer the code user to Section 5.106.5.3.3 for the allowed use of ALMS.

The proposed changes to the building standards with statewide application will lead to substantial environmental benefits through reduction in energy use, GHG emissions, criteria pollutants, and fossil fuel dependency, leading to improved public health, and potentially result in significant cost savings (avoided costs) associated with future installation of EV charging stations at nonresidential buildings.

This measure will protect public health and safety, the environment, and the general welfare of California residents.

**Table A5.106.5.3.1 Tier 1 [formerly A5.106.5.3.1].** BSC-CG is proposing to amend the title for Table A5.106.5.3.1 by adding the word “Tier 1” after the table number. The other change made to the EV table is to add new footnote 3 to clarify that to the code requires the installation of at least one Level 2 EVSE to create electric vehicle charging stations (EVCS).

**A5.106.5.3.2.** BSC-CG is proposing to use existing code section number A5.106.5.3.2 for new code language titled Electric vehicle charging stations (EVCS)- Power allocation method. A related Table A5.106.5.3.2 Tier 1 has been added.

**Table A5.106.5.3.2 Tier 1.** This newly added table is solely based on power in kVA and is meant to be used in lieu of the EVCS requirements in Table A5.106.5.3.1 Tier 1. This proposed alternative was crafted using the required power allocation in amps for the EV capable spaces from Table A5.106.5.3.1 Tier 1. The new Table A5.106.5.3.2 Tier 1 shows the required EV capable spaces in column 2 converted into kVA using 40-amps per space which equates to 6.6 kVA using 32A at 208v. Footnotes in the table have been added to indicate the minimum kVA required for Level 2 EVSE and the requirement of installing at least one Level 2 EVSE. The kVA calculation for 6.6 kVA minimum for the EV capable space was based on the minimum codified requirements for a Level 2 charger “a dedicated 208/240 volts, 40-ampere minimum branch circuit”. Knowing that the standard circuit breakers typically allow only 80 percent of their rating, the amperage was calculated as follows;  $40A \times 80\% = 32A$ . For converting the 32A to kVA, 208v is used because it is most common, and because it was the lower of the 2 voltages which results in increased chargers. See below for the kVA at 6.6 kVA calculation for both Level 2 EVSE and EV capable spaces using the power allocation method.

$$kVA = \frac{32A \times 208v}{1000} = 6.6kVA$$

Table footnote 4 has been added to indicate that the maximum allowed kVA to be utilized for EV capable spaces which is set at 67 percent. The total amount of required kVA is 30 percent of the total spaces in a parking facility from Table A5.106.5.3.2. 33 percent of

this total kVA is required to be EVCS and since a minimum of 33 percent is required for EVCS only 67 percent of the kVA can be used for EV capable spaces.

This power method calculation aligns with the codified EV capable spaces required in new Table A5.106.5.3.2 and provides consistency between the two tables.

**A5.106.5.3.3 Tier 2 [formerly A5.106.5.3.2 Tier 2]** BSC-CG is proposing to renumber the existing code section number A5.106.5.3.2 Tier 2 to A5.106.5.3.3 and to refer the code user to the appropriate mandatory renumbered Table A5.106.5.3.3 and code section for EV capable space requirements. Language has been added to clarify that compliance with the EVCS regulations can be achieved using the requirements in either renumbered Section A5.106.5.3.3 Tier 2 or new code Section A5.106.5.3.4 Electric vehicle charging stations (EVCS)-Power allocation method. Other changes include the reference to Section 5.106.5.3.2 for the permitted use of DCFCs to create EVCS. A reference to new Section 5.106.5.3.2.1 has been added which allows for DCFCs to be substituted on a 1 to 5 ratio for both EV capable spaces (already allowed) or independently Level 2 EVSEs. Also, an editorial correction to specifically refer the code user to Section 5.106.5.3.3 for the allowed use of ALMS.

The proposed changes to the building standards with statewide application will lead to substantial environmental benefits through reduction in energy use, GHG emissions, criteria pollutants, and fossil fuel dependency, leading to improved public health, and potentially result in significant cost savings (avoided costs) associated with future installation of EV charging stations at nonresidential buildings.

This measure will protect public health and safety, the environment, and the general welfare of California residents.

**Table A5.106.5.3.3 Tier 2. [formerly Table A5.106.5.3.2]** BSC-CG is proposing to amend the table by renumbering it to A5.106.5.3.3 and by adding the word “Tier 2” after the table number. The other change made to the EV table is to add new table footnote 3 to clarify that to the code requires the installation of at least one Level 2 EVSE to create electric vehicle charging stations (EVCS).

**A5.106.5.3.4.** BSC-CG is proposing to add a new code Section A5.106.5.3.4 Electric vehicle charging stations (EVCS)- Power allocation method. A related Table A5.106.5.3.4 Tier 2 has been added.

**Table A5.106.5.3.4 Tier 2.** This newly added table is solely based on power in kVA and is meant to be used in lieu of the EVCS requirements in Table A5.106.5.3.3 Tier 2. This proposed alternative was crafted using the required power allocation in amps for the EV capable spaces from Table A5.106.5.3.3 Tier 2. The new Table A5.106.5.3.4 Tier 2 shows the required EV capable spaces in column 2 converted into kVA using 40-amps per space which equates to 6.6 kVA using 32A at 208v. Footnotes in the table have been added to indicate the minimum kVA required for Level 2 EVSE and the requirement of installing at least one Level 2 EVSE. The kVA calculation for 6.6 kVA minimum for the EV capable space was based on the minimum codified requirements for a Level 2 charger “a dedicated 208/240 volts, 40-ampere minimum branch circuit”. Knowing that the standard circuit breakers typically allow only 80% of their rating, the amperage was calculated as follows;  $40A \times 80\% = 32A$ . For converting the 32A to kVA, 208v is used because it is most common, and because it was the lower of the 2 voltages which results in increased chargers. See below for the kVA at 6.6 kVA calculation for both Level 2

EVSE and EV capable spaces using the power allocation method.

$$kVA = \frac{32A \times 208v}{1000} = 6.6kVA$$

Table footnote 4 has been added to indicate that the maximum allowed kVA to be utilized for EV capable spaces which is set at 67 percent. The total amount of required kVA is 45 percent of the total spaces in a parking facility from Table A5.106.5.3.2. 33 percent of this total kVA is required to be EVCS and since a minimum of 33 percent is required for EVCS only 67 percent of the kVA can be used for EV capable spaces.

This power method calculation aligns with the codified EV capable spaces required in new Table A5.106.5.3.4 and provides consistency between the two tables.

**CAC Recommendation (if applicable):**

**[Enter CAC recommendation(s), if any]**

**Agency Response:**

**[Enter the agency's response to CAC recommendation(s)]**

**ITEM 19**

**APPENDIX A5 NONRESIDENTIAL VOLUNTARY MEASURES, DIVISION A5.1 –  
PLANNING AND DESIGN, SECTION A5.106 SITE DEVELOPMENT**

**Section A5.106.11 Reduction of Heat island effect.** BSC-CG is proposing minor edits to the title of this section accommodate shade tree voluntary regulations and clarify the difference between several different heat island effects; hardscape, cool roof and shadetrees.

**A5.106.11.2 Cool roof.** BSC-CG is proposing minor edits to the title of this section, removing “for reduction of heat island effect” since this subsection is part of the main section Reduction of heat island effect.

**A5.106.11.2.4 Verification of compliance.** This section is renumbered to A5.106.11.2.4 to be appropriately placed as a subsection to Section A5.106.11.2.

**A5.106.11.3. Shade trees.** BSC-CG is proposing new voluntary measure for shade trees. Many jurisdictions have local ordinances, municipal or zoning code regulations for shade trees, but some do not. BSC-CG has received calls from a few local jurisdictions asking if they can amend Title 24 to include shade tree regulations and use the DSA mandatory regulations found in Section 5.106.12. DSA proposed and the commission approved these regulations for inclusion in the 2019 Intervening Code Adoption Cycle and citing the following benefits:

- A. Trees are linked to public health, water quality, energy savings, and air quality.
- B. Experiencing trees outside or viewing them from indoors at schools have proven to:
  - Provide opportunities for physical activity known to improve cognitive function, learning and memory.
  - Provide shade to prevent skin cancer.
  - Encourage imagination and creativity, cognitive and intellectual development, and social relationships.

- Positively impact cognitive functioning and ability to concentrate.
- Lower stress levels which influence self-discipline.
- Improve student test scores and overall academic performance.

C. Shading parking lots and other asphalt areas:

- Lowers urban heat island impacts by reducing surface and ambient air temperatures lowering levels of air pollution.
- Reduces evaporated gasoline and oils that contribute to air pollution ozone
- Slows storm water runoff.
- Extends the life span of asphalt pavement by nearly 30 percent.
- Reduces the heat island effect on asphalt which has a direct correlation to the length of air pollution going after sunset and to health impacts on student lungs.

D. An increase of trees in city areas (urban forests) increases outdoor air quality and reduces carbon emissions.

HCD also has voluntary shade tree regulations for residential occupancies that local jurisdictions can adopt.

This proposed voluntary regulations also supports the April 2022 California Natural Resource Agency [Protecting Californians from Extreme Heat](#) report found at ([mclist.us7.list-manage.com/track/click?u=afffa58af0d1d42fee9a20e55&id=797e1bca13&e=326d0d3a48](https://mclist.us7.list-manage.com/track/click?u=afffa58af0d1d42fee9a20e55&id=797e1bca13&e=326d0d3a48)). Also, during discussions with California Department of Transportation (Caltrans), they strongly recommended adding the shade tree regulations because they have a significant impact on reducing heat island effect.

**CAC Recommendation (if applicable):**

**[Enter CAC recommendation(s), if any]**

**Agency Response:**

**[Enter the agency's response to CAC recommendation(s)]**

**ITEM 20**

**Appendix A5, DIVISION A5.106 PLANNING AND DESIGN, Sections A5.102 DEFINITIONS and A5.107 BIRD-FRIENDLY BUILDING DESIGN**

**BIRD-FRIENDLY BUILDING DESIGN**

BSC-CG is proposing to add Section A5.107 Bird-Friendly Building Design and adopt amendments that address bird-friendly standards for planning and design of buildings that specifically reduce the negative impact of bird deaths caused by collisions with buildings.

**Background:** BSC-CG received a petition (March 25, 2019) to include bird-friendly building design as a voluntary measure in the 2019 Intervening Code Adoption Cycle. The California Building Standards Commission has the authority under Health and Safety Code (HSC) 18930.5 to propose green building standards for nonresidential buildings across California.

BSC-CG reviewed and determined that the petition met the criteria for a petition as shown in Title 24, Part 1, California Administrative Code, Article 3, Section 1-315. Thus, BSC-CG agreed to carry the petition in the 2019 Intervening Code adoption Cycle.

During the 2019 Intervening Code Adoption Cycle the bird-friendly building design regulations were brought to the GREEN & PEME, AD-HOC Code Advisory Committee meeting March 4, 2020. There were a number of questions brought up, and BSC-CG was asked to have the regulations reviewed by State Fire Marshal and California Energy Commission to resolve for possible conflicts. CAC recommended to BSC-CG a further study for the proposal, BSC-CG chose to withdraw the regulations, conduct more research and move forward in the 2022 intervening code cycle. The triennial code cycle requires BSC-CG to devote time to the adoption of the model codes. Due to the amount of research required and the amount of time to prepare standards for adoption, BSC-CG chose not to propose bird-friendly building design standards for adoption during the 2021 triennial code adoption cycle.

### **2022 Intervening Code Adoption Cycle:**

Regarding the proposal to add bird-friendly building design strategies in the voluntary code provisions, BSC-CG conducted two stakeholder workshops; one on June 7, 2022, and the second one on September 9, 2022. These workshops were attended by state agencies, interested parties and stakeholder representatives such as Keish Environmental, San Joaquin Audubon Society, USGBC, CBIA, State Fire Marshal, American Bird Conservancy, CollidEscape, and National Fenestration Rating Council.

BSC proposes to add Section A5.107 and sub-sections A5.107.1, A5.107.2, A5.107.3 with exception, and A5.107.3.1. Bird-Friendly Building Design, and subsections, adopt the proposed amendments that address bird-friendly standards for planning and design of buildings. The intent of these voluntary standards is to reduce the number of bird deaths caused by collisions with buildings. BSC-CG is proposing concepts and alternative materials to vision glazing and other building features for designers and developers to use when designing buildings to reduce bird collision. Cities such as San Francisco, Oakland, San Jose, Palo Alto, Sunnyvale and Richmond have adopted legislation or guidelines to address bird collisions. Additionally, cities such as New York, Toronto, Chicago and the State of Minnesota have already adopted bird-friendly building guidelines, some regulatory, some voluntary. The City of Portland, Oregon created a guide “Resource guide for bird-friendly building design,” first edition July 2012, that followed those of the American Bird Conservancy, and has recently moved forward from guidelines to an administrative rule for bird-friendly building treatments refer to Portland, bird-friendly ordinance for codified ordinance. By identifying and incorporating bird-friendly strategies for designers and developers, the number of birds killed by collision with buildings will likely be reduced. A study by Cornell’s Laboratory of Ornithology, which cites work by the American Bird Conservancy, shows upwards of 1 billion bird deaths by collision in the United States.

In May 2019 Canada adopted a National Standard of Canada for bird-friendly building design (CSA A460:19). CSA A460 covers bird-friendly building design in both new construction and existing buildings intended to reduce bird collisions with buildings.

These regulations address research provided in the petition that cites the sheer number of bird deaths, numbering in the hundreds of millions, caused by collisions with buildings across the nation. Populations at risk are generally small perching birds, or passerines, that utilize various migratory routes from summer breeding grounds to winter feeding areas, and some residents. In general, it is the smaller species that fly at lower altitudes that are in most danger of collisions in California. Also at risk are shorebirds and raptors. All of these birds perform environmental services for humans in controlling insect and rodent populations and in pollinating plants and spreading seed; and give many human observers great pleasure to the tune of a \$40 billion bird-watching industry.

The State Fire Marshal and the California Energy Commission reviewed the proposed regulations for conflict with other Title 24 codes. No conflicts found with regulatory language including glazing requirements and nighttime conditions lighting, as the regulatory language references the California Energy Code. To help avoid any conflict there may be with the State Fire Marshal and the California Building Code regarding the exterior strategies for the glazing such as slats or cladding assemblies, BSC-CG chose to add language that provides the code reader with information regarding exterior treatments that may be in high fire severity zones may also have to comply with Chapter 7A of the California Building Code, as this applies only to nonresidential buildings.

What creates the greatest threat to these birds is building glass, which birds and humans alike find invisible. However, birds' poor depth and contrast perception as well as the speed at which they approach building glass puts them at high risk for collision. Most building collisions occur in morning hours but building lighting can create reflections and disrupt birds' orientations, causing some collisions to occur at night.

Material alternatives to vision glass for the treatment of building areas posing the greatest risk for collision do not need to be prohibitively expensive and can be cost-neutral. Portland, Oregon, in its bird-friendly guidelines, notes that vision glass is the least energy efficient of façade materials, attributing an operating cost to it that is higher than that of patterned glass. A House of Representatives proposal for bird safe design for federal building (H.R. 919) was opined by a Congressional Budget Office to generate no premium in cost. Portland cites cost studies of a local library and a health center, comparing vision glass to fritted or UV-patterned glass and found increases of .05% and .03%, respectively, in the overall building costs. Independently, this author evaluated building materials for cost, finding that opaque materials like concrete or plaster are about half the cost of glass. Some designers of bird-friendly buildings note that costs are not significant if the features are incorporated early in design; retrofitting elements to shield glass will add cost, but economical options can be found.

Any cost impacts of bird-friendly building design are further tempered by findings that lower floors typically are those that pose the most threat to at-risk birds and incorporating specialty features is not necessary over an entire tall building.

### **Statewide significance**

Beginning in 2010, local jurisdictions in Toronto and San Francisco proposed ordinances to address this problem. Since then, many other California jurisdictions have done so,

including San Jose and Oakland, and there is a good deal of variety in the policies. The United States Green Building Council (USGBC) initiated a pilot credit in its Leadership in Energy and Environmental Design (LEED) green building rating system, which ABC has incorporated into a model ordinance.

Many birds utilize the Pacific Flyway to travel from summer breeding grounds to winter feeding areas, flying from as far away as Siberia to South America and back, almost a billion birds of over 350 species. Many of these are waterfowl, managed for hunting and conservation; these ducks, geese and swans face habitat loss and other threats but are not typically at risk by building collisions. It is the smaller species that fly at lower altitudes that are in most danger, and they occur throughout California in migration, with some stopping to breed or winter here, within our communities.

With many species already in decline due to building sprawl and loss of habitat, the direct kills of often-healthy birds from collisions with building glass exacerbates their fragile existence. To paraphrase the Portland guidelines, consistent bird-friendly building design policy is necessary for comprehensive urban sustainability strategy to which a green building code is a major contributor.

### **California Policy and Legislation**

Governor Newsom's Executive Order [N-82-20](#) pledged to preserve 30 percent of habitat by 2030 (the 30 x 30 pledge) (which the Biden Administration has since also declared) with the intent of stemming declines in biodiversity. Agencies were tasked with coordinating efforts to ensure that biodiversity is considered in fulfilling their mandates. To do its part, BSC-CG is proposing voluntary bird-friendly building standards to mitigate bird deaths caused by collisions with buildings. The Executive Order can be found at [gov.ca.gov/wp-content/uploads/2020/10/10.07.2020-EO-N-82-20-.pdf](http://gov.ca.gov/wp-content/uploads/2020/10/10.07.2020-EO-N-82-20-.pdf)

Species extinctions have defined the global biodiversity crisis, but extinction begins with loss in abundance of individuals that can result in compositional and functional changes of ecosystems. Bird numbers across North America have sharply declined in the last 50 years, according to a study by Cornell University published in 2019. Millions of birds have perished annually due to climate change, habitat loss and commercial activities like resource extraction and agricultural practices. The American Bird Conservatory (ABC) has estimated that roughly the same number are killed by buildings in the U.S. each year.

Finally, the purpose of Title 24, as noted by a member of the 2020 Ad Hoc Code Advisory Committee, is to protect the safety of human beings, not animals. Of course, in the early years when buildings collapsed and burned to due to inadequate knowledge and building practices, this was the case. However, since then Title 24 has expanded to include energy consumption and civil rights (access), and CALGreen defines a Green Building as one that minimizes its impact on the environment, the occupants and the community. It puts the environment front and center and recognizes that buildings can have a negative impact on biodiversity, including birds, that it has the authority to address.

A legislative intervention as requested by the CAC would appear gratuitous given BSC-CG's authority for green building standards and CALGreen's definition of a Green Building. However, BSC-CG worked with nongovernmental organizations in spring and summer of 2020 to obtain legislative authority, but the pandemic restricted the legislative agenda to a minimum.

During the 2021/2022 legislative season, AB 2382 Light Pollution Control was enrolled September 1, 2022, then vetoed by the Governor 9/23/22. A portion of the vetoed message included, “AB 2382 would establish new light reduction requirements for outdoor lighting fixtures installed or replaced on structures or lands that are owned, leased, or managed by a state agency. While I appreciate the stated goals of this bill to conserve energy and decrease ambient light in the night sky, the provisions create an overly broad mandate that raises concerns for health and safety, security, and crime prevention. Further, the California Green Building Standards Code includes light pollution reduction standards for nonresidential buildings. These standards are developed during a public, deliberative process.”

**Section A5.102.1 Definitions.** The terms listed reflect the proposed new defined terms used in this appendix and consistent with the new definitions in Chapter 2.

**Section A5.107 Bird-friendly building design.** BSC-CG proposes to adopt this section, which includes bird-friendly building design for new construction and an existing building that includes the addition or replacement of 50 percent or more of the exterior glazing. The intent is to reduce bird collisions with buildings. This voluntary provision provides bird-friendly building design requirements can be used as a uniform guideline by the design professionals and can be adopted by local jurisdictions through their ordinance process for glazing, building-integrated structures, and overall building and site design.

**Section A5.107.1 Required elevation treatment.** BSC-CG proposes to adopt this section for glazing that covers the many design aspects of glazing which helps to minimize the risk of bird collisions. Regular glazing on buildings creates fly-through conditions that birds cannot detect or see. Glass can have an image or pattern screened, printed, or applied to the glass surface. By using patterns of various sizes and densities, manufacturers can create any kind of image, translucent or opaque. Ceramic frit and acid-etched patterns are commonly used to achieve design objectives other than preventing bird collisions, including a reduction in the transmission of light and heat, privacy screening, or branding, but these images in the glass also project enough visual markers to be perceived by birds and to help them avoid collisions with the glass.

The size and spacing of visual markers are important factors that affect the degree of risk reduction for bird collisions. The larger the markers and the denser the pattern, the more effective they are in appearing as solid objects to birds. Studies have shown that visual markers spaced a maximum of 2 x 2 horizontally are effective at deterring bird collisions with glass.

Patterns can also be applied to existing glass through the use of film products. Applied to external surfaces, including windows, film products can be designed with any image or pattern. The film on buildings can be used simply for the protection of birds; it need not serve any other purpose and can be integrated with the architectural design of the building.

Building-integrated structures, such as recessed windows, awnings, sunshades, exterior screens, shutters, grilles, decorative facades that wrap entire structures, and balconies or overhangs that provide shading below their projections can help deter birds. Without completely obscuring vision, building-integrated structures such as these can reduce the amount of visible glass, obscure glass from view, mute reflections during certain times of

the day, and provide visual cues for birds to avoid an area. They can be used in retrofits or be an integral part of an original design.

Screens, grilles, shutters, and exterior shades are some of the more commonly used elements that can make glass safer for birds. Screens and nets are still among the most cost-effective methods for protecting birds, and netting can often be installed so it is nearly invisible. Decorative grilles are also part of many architectural traditions and can be used to project visual markers to birds; exterior decorative grilles can serve as a bird-friendly feature. Shutters and exterior shades have the additional advantage that they can be closed temporarily (e.g., during times most dangerous to birds, such as migration and fledging).

“The Condor – Ornithological Applications” concluded that less than 1% of bird strikes occur on high rise buildings; high rise buildings are considered 75 ft and higher. BSC-CG is proposing bird-friendly mitigation strategies be installed on no less than 90 percent of a building elevation, measured from grade to 40-ft. height (or adjacent mature tree canopy). Additionally, no less than 60 percent of the building elevation above 40-ft. above grade to top of building elevation shall incorporate bird-friendly strategies. Many local jurisdictions throughout the state and other states tend to vary in height limits, being anywhere from 35 feet to 75 feet height. Understanding the height of the tree canopy may increase the height of the bird-friendly glazing in California.

**A5.107.2 Special conditions.** BSC-CG proposes to adopt this section to minimize fly-through conditions and black hole (passage) effects in building and structures. The elimination of potential fly-through conditions in a building helps to reduce potential collision hazards for birds. Glass bridges, walkways, and outdoor railings, free-standing glass architectural elements, and building corners where glass walls or windows are perpendicular are dangerous because birds can see through them to sky or habitat on the other side.

**A5.107.3 Nighttime conditions.** BSC-CG proposes to adopt this section to minimize nighttime collisions which occur because the illumination of buildings creates a beacon effect for night migrating birds. When weather conditions are favorable, these birds tend to fly high (over 150 m) and depend heavily on visual references to maintain their orientation. However, during inclement weather, they often descend to lower altitudes, possibly in search of clear sky celestial cues or magnetic references and are liable to be attracted to illuminated buildings or other tall, lighted structures.

Night lighting also affects daytime collisions by temporarily increasing the number of migratory birds in urban areas. When the sun rises and those trapped birds begin to move about, forage, or seek an escape, they often encounter the deadly effects of reflective and transparent glass.

The Audubon Society has been committed to mitigating the problem and advocating for dark skies for migrating birds. Through research, Audubon has determined that, “while lights can throw birds off their migration paths, bird fatalities are more directly caused by the amount of energy the birds waste flying around and calling out in confusion.”

BSC proposes the adoption of the exception where emergency lighting is required to access building in an emergency and/or nighttime security.

**A5.107.3.1 Systems or operation and maintenance manual.** BSC-CG proposes to adopt this section regarding an operation/maintenance manual describing the building's interior lighting should be reduced after business hours in non-residential buildings and from sunset to sunrise in all cases. Whenever possible, task lighting rather than building lighting should be used during these times.

**CAC Recommendation (if applicable):**

**[Enter CAC recommendation(s), if any]**

**Agency Response:**

**[Enter the agency's response to CAC recommendation(s)]**

## **ITEM 21**

### **Appendix A5 NONRESIDENTIAL VOLUNTARY MEASURES, DIVISION A5.4-MATERIAL CONSERVATION AND RESOURCE EFFICIENCY, SECTIONS A5.401 GENERAL, A5.402 DEFINITIONS, A5.405 MATERIAL SOURCES and A5.406 LIFE CYCLE ASSESSMENT**

**A5.401.1 Scope,** this section is amended to include the GHG emission reduction consistent with mandatory Section 5.401.1

**CAC Recommendation (if applicable):**

**[Enter CAC recommendation(s), if any]**

**Agency Response:**

**[Enter the agency's response to CAC recommendation(s)]**

## **ITEM 22**

### **SECTION A5.402, DEFINITIONS**

**A5.402.1 Definitions.** The terms listed are updated to include the terms used in this appendix and consistent with the new definitions in Chapter 2.

**CAC Recommendation (if applicable):**

**[Enter CAC recommendation(s), if any]**

**Agency Response:**

**[Enter the agency's response to CAC recommendation(s)]**

## **ITEM 23**

### **SECTION A5.405, MATERIAL SOURCES**

#### **A5.405.2.1 Certified Wood Components - Sustainability Standards.**

BSC-CG was approached by several members of the ASTM committee with the request to include the ASTM D7612 into CALGreen as a standard for responsible and certified wood sourcing which ensures that forests have been sustainably managed and that the wood fibers come from traceable sources. BSC-CG worked with several committee members on the proposal. In addition, BSC-CG staff reached out to Sustainable Forestry Initiative (SFI)

and Forest Stewardship Council (FSC) to obtain information on their certification programs and to garner input on the proposed language.

The benefit derived from the proposal is that these forest management standards expand protection of water quality, prohibit harvest of rare old-growth forest, prevent loss of natural forest cover and prohibit highly hazardous chemicals. The standards also promote sustainable forest management in North America and responsible procurement of forest products. Certified lumber provides assurance that this wood product has been harvested from a sustainably managed forest. Adding these sustainable forestry wood standards will give local jurisdictions the ability to exceed the CALGreen code minimum standards and provide options for owners and builders to include sustainable wood building products in projects.

Responsible or Certified Sources classified in accordance with ASTM D7612 are currently recognized in the USGBC Legal Wood Pilot Credit, the 2020 ICC 700 National Green Building Standard, the 2015 International Green Construction Code, and the USDA Bio preferred Federal Procurement Policy. The Green Building Initiative Consensus Committee is currently reviewing a proposal to add D7612 as well. Adding ASTM D7612 to CALGreen would provide a consensus-based solution already in place in other green building programs.

Additional information about ASTM D7612 is available at [responsiblesource.com](http://responsiblesource.com) (<http://responsiblesource.com/>)

**A5.405.2.3 (formerly A5.405.2.2) Rapidly renewable materials.** Section A5.405.2.2 renumbered but not change to regulatory language.

**CAC Recommendation (if applicable):**

**[Enter CAC recommendation(s), if any]**

**Agency Response:**

**[Enter the agency's response to CAC recommendation(s)]**

## ITEM 24

### SECTION A5.405, MATERIAL SOURCES

**A5.405.5 Cement and concrete.** During the CCRC pre-cycle workshops, DSA and BSC-CG requested feedback from interested parties on the existing CALGreen regulations, such as necessary updates to keep up with industry changes, current practices etc. The Concrete Industry submitted comments requesting changes to Section A5.405.5 and its Subsections.

**A5.405.5.2 Concrete.** The sentence is amended to clarify the Engineer of Record will approve the use of concrete manufactured with cementitious material, and as permitted in the subsections.

**A5.405.5.2.1 Supplementary cementitious materials (SCM).** Item 5 is amended to provide greater clarity to language, and the variable *SL* should be italicized as in the equation. Item 8 was added per Concrete Industry request. Extensive research has shown that several types of ground glass can perform well as a pozzolanic material in concrete. This research supported the development of American Society for Testing and Materials (ASTM) C1866/C1866M-20, Standard Specification for Ground-Glass

Pozzolan for Use in Concrete. About 8.4 million tons of container glass is sent to landfills each year. A New York City project that replaced 50 percent of the cement with ground glass pozzolan reduced the global warming potential (GWP) for the concrete by 40 percent. Cost Impact: Including Ground-Glass Pozzolan may potentially offer more SCM options and/or a lower-cost alternative.

Item 8 is renumbered to 9.

**A5.405.5.2.1.1 Mix design equation. Exception.** Per Concrete Industry request, a reference to American Concrete Institute (ACI) CT-21 for high early strength is added to the exception. To clarify the definition of high early strength concrete, the proposed code change refers to the definition in ACI CT 21, which defines high early strength concrete as “concrete that, through the use of additional cement, high-early-strength cement, or admixtures, has accelerated early-age strength development.” This reference will help prevent confusion among project owners, construction firms, engineers, and suppliers on how concrete mixes are defined as high early strength concrete and therefore how to apply the CALGreen code in those instances.”

Equation A5.4-14 is amended to add “or blended SCM” to clarify that blended supplementary cementation material can be used in the calculation. Traditional sources of SCMs, such as fly ash, have become scarce, there are new products available that blend different SCMs, such as fly ash and natural pozzolans. The code language should be updated to ensure these alternatives can be used. Referencing a wider variety of available SCMs, should help reduce costs and provide flexibility.

**A5.405.5.3 Additional means of compliance, A5.405.5.3.1 Cement, A5.405.5.3.1.1 Alternative fuels, and A5.406.5.3.1.2 Alternative power,** are proposed for repeal since additional means of compliance specific to the manufacturing of cement is not within the control of the engineer of record or enforcing entity and does not affect concrete properties for performance. Encouraged use of renewable energy to manufacture of materials is outside the scope of Title 24 and can be encouraged by state policy or other regulatory state agencies. This can also be encouraged by requiring sustainable products be used in construction.

**A5.405.5.3 (formerly A5.405.5.3.2) Concrete manufacture** is renumbered from A5.405.5.3.2 to use available Section A5.405.5.3. The section title is amended to add “manufacture” and the section is amended to add engineer of record since they are responsible for approving the alternate concrete manufacturing techniques.

**A5.405.5.3.2.1 Alternate Energy** is proposed for repeal since as this is not in the control of the engineer of record or enforcing entity and does not affect concrete properties for performance.

**A5.405.5.3.1 (formerly A5.405.5.3.2.2) Recycled aggregates** is renumbered from A5.405.5.3.2.2 to use available Section A5.405.5.3.1. Item 2 is amended to include aggregate or crushed concrete aggregate as suggested by the Concrete Industry. Subsections a and b are added to Section item 2 to clarify the terms recycled concrete aggregate (RCA) and crushed concrete aggregate (CCA), the two main sources of recycled aggregate from concrete.

Several studies indicate the benefits of using RCA and CCA. Caltrans' report *A Comprehensive Literature Review of Using Recycled Concrete Aggregates in Concrete Pavement* Report Number: CP2C-2019-105 (Sept. 2019) cites

“concrete is responsible for 5 percent of man-made emissions of carbon Dioxide (3). Incorporating RCA can reduce Carbon emissions drastically based on an analysis done using the Life Cycle Assessment (LCA). From the LCA, it was found that 58.8% of carbon emissions are reduced when 1 ton of NA [natural aggregate] is substituted with 1 ton of RA [recycled aggregate].” Other studies include, [Concrete Pavement Recycling Series: Quantifying the Sustainable Benefits of Concrete Pavement Recycling](#), found at (<https://intrans.iastate.edu/app/uploads/2018/12/Recycling-tech-brief-2-sustainability-final.pdf>).

Cost Impact: The ability to use recycled aggregate, whether from demolition concrete or recently returned concrete, can reduce extraction and transportation costs related to using natural sources of aggregates. The Caltrans report cites several papers and case studies on cost savings in its economic analysis. This includes that some states report savings of up to 60 percent.

Item 3 is amended to repeal the “as approved by the engineer and enforcement authority” since additional means of compliance is not within the control of the engineer of record or enforcing entity and does not affect concrete properties for performance.

**A5.405.5.3.2 Mixing water (formerly A5.405.5.3.2.3)** is renumbered A5.405.3.2

**A5.405.5.3.3 High strength concrete (formerly A5.405.5.3.2.4)** is renumbered A5.405.5.3.3.

**A5.405.5.3.4 Later Ages of Maturity**, is a new proposed voluntary section that permits longer age of maturity for concrete as long as it is in compliance with ASTM C 31 and 39. This section was suggested by the Concrete Industry during the CCRC meetings. The standard 28 days for age of maturity encourages more cement use. By permitting longer ages of maturity, the amount of cement can be reduced while also allowing for more options to increase the use of supplementary cementitious materials (SCM), such as fly ash and natural pozzolans, in a mix and that can show improved later performance for the concrete. Certain applications, such as foundations, may be particularly applicable for longer maturity times since foundations will not experience the full structural loads for months. Cost Impact: Since this section provides more options for concrete aging and supplementary cementitious materials, there is potential to reduce costs.

**A5.405.5.3.5 Returned Fresh Concrete**, is a new proposed voluntary section suggested by the Concrete Industry during the CCRC meetings. Often a concrete pour does not use all the concrete mix in a mixer truck, and that mix can be incorporated into a new mix. Re-using returned fresh (also called plastic) concrete is one of the best ways to conserve natural resources and reduce carbon impacts. Re-using returned fresh concrete has the benefit of conserving the aggregates, water, and cementitious materials used in the original mix. Accepted practices and use of admixtures can extend the life of concrete and make it feasible to use the returned fresh concrete.

The California Air Resource Board Assembly Bill 32, [2008 June DRAFT Scoping Plan](#), at page 39, reads, “cement: Concrete and cement are the foundation of our infrastructure: freeways, canals, dams, transmission towers, house foundations and high-rise buildings. However, the manufacturing of cement is very CO<sub>2</sub>-intensive. Much of California’s cement is produced in just 11 plants in the state. However, the industry faces stiff competition from cement importers – about 40 percent of the state’s cement is imported. CARB is considering approaches that would reduce emissions during the production process, reducing the carbon-intensity of cement when used in concrete, and reducing the amount of concrete that is delivered to job sites but not used. Since cement imports are a major part of California’s cement use, all of these approaches include consideration of both in-state production and imported cement.” The 2008 June Draft Scoping Plan can be found at (<https://ww2.arb.ca.gov/our-work/programs/ab-32-climate-change-scoping-plan/2008-scoping-plan-documents>). Also refer to The California Air Resource Board [Climate Change Draft Scoping Plan, Appendices June 2009 Discussion Draft](#) (<https://ww3.arb.ca.gov/cc/scopingplan/document//draftscopingplanappendices.pdf>).

Caltrans has had a specification since 2014 allowing use of 15% returned fresh concrete in minor concrete. It is now a Standard Specification in Section 90-9. In *Environmental Impacts of Recycled Plastic Concrete*, a report for Caltrans by the Climate Earth found that recycling of returned fresh concrete results in a 15.3% reduction in carbon footprint and a 16.2% reduction in embodied energy per yard of concrete.

In 2017, ASTM adopted C 1798, *Standard Specifications for Returned Fresh Concrete for Use in a New Batch of Ready-Mixed Concrete*. It allows the use of up to 50% returned plastic concrete in a new mix. “This standard recognizes unused concrete, in a fresh state, as an ingredient for a new batch of concrete and outlines all the processes, verification requirements and recording procedures to guarantee the highest levels of quality.”

The [Public Resources Code Section 16000](#) encourages use of returned fresh concrete. The Code section can be found at ([https://leginfo.legislature.ca.gov/faces/codes\\_displaySection.xhtml?sectionNum=16000.&lawCode=PRC](https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?sectionNum=16000.&lawCode=PRC)). Section 16000 was amended by [Assembly Bill 221](#), (Quirk-Silva, Chapter 154, Statutes of 2013) ([https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill\\_id=201320140AB221](https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201320140AB221)).

Most recently, the Governor Newsom signed into law, [Assembly Bill 2953](#) (Salas, Chapter 872, Statutes of 2022) that requires local governments to have standards for accepting recycled materials in aggregate base, concrete, and asphalt equivalent to or better than Caltrans. For concrete, this means allowing use of recycled concrete materials in minor concrete, allowing the use of returned plastic concrete in minor concrete, and use of supplementary cementitious materials. Assembly Bill 2953 can be found at ([https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill\\_id=202120220AB2953](https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202120220AB2953)).

**CAC Recommendation (if applicable):**

[Enter CAC recommendation(s), if any]

**Agency Response:**

[Enter the agency's response to CAC recommendation(s)]

**ITEM 25**

**Appendix A5 NONRESIDENTIAL VOLUNTARY MEASURES, DIVISION A5.4-MATERIAL CONSERVATION AND RESOURCE EFFICIENCY, SECTION A5.409 LIFE CYCLE ASSESSMENT**

**A5.409.1 General** is proposed for repeal and replaced with Tier 1 and Tier 2 Scoping provisions. See below for more information.

**A5.409.1 Scope and Items 1 through 4** are new sections that specify Tier 1 and Tier 2 compliance based on new project size, alterations to an existing building, additions to an existing building.

Item **1** requires new buildings with a combined floor area of 50,000 square feet or greater to comply with either Section A5.409.2 Whole building life cycle assessment, or Section A5.409.3 Product GWP compliance prescriptive path.

Item **2** is specific for alterations to an existing building when the combined floor area is 50,000 square feet or greater to comply with either Section A5.105.2 Reuse of existing building, Section A5.409.2 Whole building life cycle assessment, or Section A5.409.3 Product GWP compliance prescriptive path.

Item **3** is specific to additions to an existing building where a combined floor area of 50,000 square feet or greater to comply with either Section A5.105.2 Reuse of existing building, Section A5.409.2 Whole building life cycle assessment, or Section A5.409.3 Product GWP compliance prescriptive path. The Exception prohibits the use of Section A5.105.2 Reuse of existing building, if the combined addition to existing building is two times the area or more of the existing building.

Item **4** requires new buildings with a combined floor area of less than 50,000 square feet, to comply with either mandatory Section 5.409.2 Whole building life cycle assessment or Section 5.409.3 Product GWP compliance prescriptive path for Tier 1 compliance. For Tier 2 compliance use voluntary Sections A5.409.2.1 or A5.409.2.1 or Section Tier 1 shall be used.

Item **5** is specific for alterations to an existing building when the aggregate floor area is less than 50,000 square feet, to comply with either Section 5.105.2 Reuse of existing building, Section 5.409.2 Whole building life cycle assessment, or Section 5.409.3 Product GWP compliance prescriptive path for Tier 1. For Tier 2, use either Section A5.105.2.1 Reuse of existing buildings Tier 1, Section A5.409.2.1 Whole building life cycle assessment Tier 1, or Section A5.409.3 Product GWP compliance-prescriptive path Tier 1.

Item **6** is specific to additions to an existing building where a combined floor area is less than 50,000 square feet, to comply with either mandatory Section 5.105.2 Reuse of existing building, Section 5.409.2 Whole building life cycle assessment, or Section 5.409.3 Product GWP compliance prescriptive path for Tier 1. For Tier 2 either Section A5.105.2.1 Reuse of existing buildings Tier 1, Section A5.409.2.1 Whole building life cycle assessment Tier 1, or Section A5.409.3 Product GWP compliance-prescriptive path Tier 1.

The **exception** prohibits the use of Sections 5.105.2 and A5.105.2 Reuse of existing building, if the combined addition to existing building is two times the area or more of the existing building.

**A5.409.2 Whole building life cycle assessment** includes the Tier compliance for whole building life cycle assessment.

**A5.409.2.1 Tier 1**, is consistent with mandatory Section 5.409.2 requiring a cradle-to-grave whole building life cycle assessment in accordance with ISO 14044, excluding energy, but demonstrate a 15 percent reduction in GWP verses the 10 percent required in the mandatory section.

The **exception** clarifies that for building reuse, the baseline is not required.

**A5.409.2.2 Tier 2**, is consistent with mandatory Section 5.409.2 requiring a cradle-to-grave whole building life cycle assessment in accordance with ISO 14044, excluding energy, but demonstrate a 20 percent reduction in GWP verses the 10 percent required in the mandatory section.

The **exception** clarifies that for building reuse, the baseline building shall not be for new construction, existing materials shall be maintained and the GWP percent reduction shall be achieved through new design and construction.

**A5.409.3 Product GWP compliance – prescriptive path**, is consistent with mandatory Section 5.409.3 requiring products to comply with the maximum acceptable GWP value listed in the compliance table resulting in a 15 percent reduction in total GWP.

**A5.409.3.1, Exception and Equation**, the exception and equation are consistent with the mandatory section.

**Table A5.409.3 Product GWP Limits Tier 1 and Tier 2**, The new voluntary table sets the maximum acceptable GWP limits for each Tier. Each product listed in the table that is installed in the new or altered construction, shall have a Type III environmental product declaration (EDP). The EDP can be either product-specific or factory-specific.

**Table footnotes**, are consistent with mandatory Section 5.409.3 and Table 5.409.3, however the values GWP values in the voluntary table are based on 150 percent of the Buy Clean California Act, verses 175 percent in the mandatory table. The Concrete values are based on Industry-Wide Environmental Product Declaration (IW-EPD) regional concrete values and represents 130 percent of the ready-mix concrete GWP values. The Concrete ready mixed and lightweight ready-mixed Tier 1 values are based on 150% of the National Ready Mix Concrete Association (NRMCA) 2021 version 3 Pacific Southwest regional benchmark values. Tier 2 is based on 100%. Concrete high-early strength concrete is not included in the benchmark values it should be calculated at 130 percent of the ready-mixed values in the table

**A5.409.3.2, Verification of Compliance**, this subsection is consistent with the mandatory sections.

**A5.409.5 (formerly A5.409.2) Whole building life cycle assessment of additional impacts A5.109.2** is renumbered to A5.409.5 and moved below new section A5.409.1 Scope.

**A5.109.2.1 Building components, Exceptions and Notes** are repealed from the whole building life cycle assessment because the WBLCA mandatory and voluntary sections are amended to conduct a WBLCA in accordance with ISO 14044 rather than specifying specific building methods or products in CALGreen.

**A5.409.5.1 (formerly A5.409.2.2) Impacts to be considered**, is renumbered to A5.409.5.1 and adjusted to align with new voluntary sections. Item 1, Climate change (greenhouse gas) is repealed since the new voluntary sections include various options to mitigate greenhouse gas emissions through building reuse, whole building life cycle assessment and product GWP compliance paths.

**A5.109.3 Materials and system assemblies and Note** are repealed because the new voluntary WBLCA mandatory and voluntary sections are amended to conduct a WBLCA in accordance with ISO 14044 rather than specifying specific building methods or products in CALGreen.

**A5.409.4 Substitution for prescriptive standards** is repealed because the new voluntary WBLCA mandatory and voluntary sections are amended to conduct a WBLCA in accordance with ISO 14044 rather than specifying specific building methods or products in CALGreen.

**A5.409.5 Verification of compliance** is repealed because the new voluntary WBLCA mandatory and voluntary sections are amended to conduct a WBLCA and contain verification of compliance.

**CAC Recommendation (if applicable):**

[Enter CAC recommendation(s), if any]

**Agency Response:**

[Enter the agency's response to CAC recommendation(s)]

**ITEM 26**

**Appendix A5, DIVISION A5.601 CALGreen Tier 1 and Tier 2, Section A5.601 SITE DEVELOPMENT**

**A5.601.2.4.** BSC-CG is proposing to amend code Section A5.601.2.4 subsection “1. From Division A5.1,” item 1a to change the word “fuel” to “high” for consistency with other similar amendments in the code for designated parking for high efficient vehicles. Item 1c is being amended to provide the correct reference to Table A5.106.11.2.2.2.

**A5.601.3.1.** BSC-CG is proposing to add a new code Section A5.601.3.1 Prerequisites to provide charging language and clarify that to achieve CALGreen tier 2 status, a project must meet all of the mandatory measures in Chapter 5 and, in addition, meet the provisions listed in Sections A5.601.3.3 and A5.601.3.4 and required voluntary Tier 2 measures needed listed in this section.

**A5.601.3.4.** BSC-CG is proposing to amend code Section A5.601.3.4 Voluntary measures for Tier 2 to remove the reference to Table A5.601.3.4 which is no longer in the code. An editorial correction to Section A5.601.3.4 subsection “1. From Division A5.1,” item 1c to provide the correct reference to Table A5.106.11.2.2.3.

These amendments are editorial corrections and align with similar verbiage found in the Tier 1 code Sections A5.601.2.1 Prerequisites and A5.601.2.4 Voluntary measures for Tier 1 and provides consistency between the two similar voluntary tiers.

**CAC Recommendation (if applicable):**

**[Enter CAC recommendation(s), if any]**

**Agency Response:**

**[Enter the agency's response to CAC recommendation(s)]**

**ITEM 27**

**Appendix A5, DIVISION A5.602, VERIFICATION GUIDELINES**

**MANDATORY MEASURES CHECKLIST, TIER 1 CHECKLIST AND TIER 2 CHECKLIST**

**A5.602.** BSC-CG is proposing to amend the MANDATORY MEASURES CHECKLIST tables to update the code sections listed in the table based on the final proposed code updates to the mandatory code sections.

**A5.602.1.** BSC-CG is proposing to amend the TIER 1 CHECKLIST tables to update the code sections listed in the table based on the final proposed code updates to the mandatory and voluntary Tier 1 code sections.

**A5.602.2.** BSC-CG is proposing to amend the TIER 2 CHECKLIST tables to update the code sections listed in the table based on the final proposed code updates to the mandatory and voluntary Tier 2 code sections.

**CAC Recommendation (if applicable):**

**[Enter CAC recommendation(s), if any]**

**Agency Response:**

**[Enter the agency's response to CAC recommendation(s)]**

**TECHNICAL, THEORETICAL, AND EMPIRICAL STUDY, REPORT, OR SIMILAR DOCUMENTS**

Government Code Section 11346.2(b)(3) requires an identification of each technical, theoretical, and empirical study, report, or similar document, if any, upon which the agency relies in proposing the regulation(s).

**Electric Vehicle: Section 5.106.5.3 Electric Vehicle EV charging for Light-duty electric vehicles** proposal, study and reports are as follows:

- Staff referenced [Current California GHG Emission Inventory Data | California Air Resources Board](https://ww2.arb.ca.gov/ghg-inventory-data) (https://ww2.arb.ca.gov/ghg-inventory-data)
- Staff referenced [CEC\) recent AB 2127 staff report](https://efiling.energy.ca.gov/getdocument.aspx?tn=236237), to estimate the number of charging stations that would be required to support 5 million ZEVs by 2030. (https://efiling.energy.ca.gov/getdocument.aspx?tn=236237)
- [California's Employment Development Department \(Size of Business Data\)](https://labormarketinfo.edd.ca.gov/LMID/Size_of_Business_Data_for_CA.html) (https://labormarketinfo.edd.ca.gov/LMID/Size\_of\_Business\_Data\_for\_CA.html)
- Staff reviewed the 2021 National Construction Estimator, 67th Edition, Edited by Richard Pray, Craftsman Book Company, October 2020021 National Construction Estimator 67th Edition.

- [National Electric Vehicle Infrastructure Program \(NEVI\) | California Energy Commission](#)

(<https://www.energy.ca.gov/programs-and-topics/programs/national-electric-vehicle-infrastructure-program-nevi>)

- Staff reviewed CARB Technical Analysis: [2019 CARB report \(Electric Vehicle \(EV\) Charging Infrastructure-Nonresidential\)](#) EV Charging Infrastructure Nonresidential Building Standards 2019/2020 Intervening Code Cycle.

([https://ww2.arb.ca.gov/sites/default/files/2020-08/CARB\\_Technical\\_Analysis\\_EV\\_Charging\\_Nonresidential\\_CALGreen\\_2019\\_2020\\_Intervening\\_Code.pdf](https://ww2.arb.ca.gov/sites/default/files/2020-08/CARB_Technical_Analysis_EV_Charging_Nonresidential_CALGreen_2019_2020_Intervening_Code.pdf))

**Section 5.106.5.5 Electric vehicle (EV) charging: medium-duty and heavy-duty vehicle proposals**, study and citation forthcoming (study will be published to [title24stakeholders.com/](https://title24stakeholders.com/) (<https://title24stakeholders.com/>)).

### **Bird-Friendly:**

Government Code Section 11346.2(b)(3) requires an identification of each technical, theoretical, and empirical study, report, or similar document, if any, upon which the agency relies in proposing the regulation(s).

- Sheppard, Christine and Phillips, Glenn, Bird-Friendly Building Design, 2nd Ed. (The Plains; VA. American Bird Conservancy [ABC], 2015)
- Resource Guide for Bird-Friendly Building Design, 1st Edition. 2012, Portland, Oregon, [Portland Oregon Resource Guide for Bird-Friendly Building Design](#) ([https://docslib.org/doc/5138333/Resource Guide for Bird-Friendly Building Design PORTLAND, OREGON](https://docslib.org/doc/5138333/Resource%20Guide%20for%20Bird-Friendly%20Building%20Design%20PORTLAND,%20OREGON))
- Follow the Pacific Flyway in California State Parks, California Department of Parks and Recreation, [California Parks Pacific Flyway](#) (<https://www.parks.ca.gov/pages/712/files/030404.pdf>)
- March 4, 2004, article
- Bird Migration: Birds of the Pacific Flyway undated article, [Bird Migration: Birds of the Pacific Flyway \(perkypet.com\)](#) (<https://www.perkypet.com/articles/pacific-flyway-migration>)
- CSA Bird-Friendly Building Design Standard, [CSA Standard – BirdSafe](#) (<https://birdsafeca.com/csa-bfbd/>)
- The Condor – Ornithological Applications
- Audubon Society, Making buildings safe for birds 2008
- Bird Watching, preventing birds from hitting windows with these products

### **CCRC:**

California Air Resources Board (CARB) Draft 2022 Scoping Plan Update, Achieving Carbon Neutrality by 2045 [ww2.arb.ca.gov/draft-scoping-plan](https://ww2.arb.ca.gov/draft-scoping-plan) (<https://ww2.arb.ca.gov/our-work/programs/ab-32-climate-change-scoping-plan/2022-scoping-plan-documents>)

California Air Resources Board (CARB) [2008 Final Scoping Plan \(May 2009 version\)](https://ww3.arb.ca.gov/cc/scopingplan/document/adopted_scoping_plan.pdf)  
([https://ww3.arb.ca.gov/cc/scopingplan/document/adopted\\_scoping\\_plan.pdf](https://ww3.arb.ca.gov/cc/scopingplan/document/adopted_scoping_plan.pdf))

The California Air Resource Board [Climate Change Draft Scoping Plan, Appendices June 2009 Discussion Draft](https://ww3.arb.ca.gov/cc/scopingplan/document/draftscopingplanappendices.pdf)  
(<https://ww3.arb.ca.gov/cc/scopingplan/document/draftscopingplanappendices.pdf>)

California Energy Commission [The 2021 Integrated Energy Policy Report](https://www.energy.ca.gov/data-reports/reports/integrated-energy-policy-report/2021-integrated-energy-policy-report) Volume I-  
Building Decarbonization (<https://www.energy.ca.gov/data-reports/reports/integrated-energy-policy-report/2021-integrated-energy-policy-report>)

California Natural Resource Agency [Protecting Californians from Extreme Heat](https://mclist.us7.list-manage.com/track/click?u=afffa58af0d1d42fee9a20e55&id=797e1bca13&e=326d0d3a48) April 2022  
(<https://mclist.us7.list-manage.com/track/click?u=afffa58af0d1d42fee9a20e55&id=797e1bca13&e=326d0d3a48>)

[Final Extreme Heat Action Plan \(ca.gov\)](https://resources.ca.gov/Newsroom/Page-Content/News-List/Final-Extreme-Heat-Action-Plan) (<https://resources.ca.gov/Newsroom/Page-Content/News-List/Final-Extreme-Heat-Action-Plan>)

American Institute of Architects, Architecture 2030, <https://architecture2030.org/embodied-carbon-actions/>  
(<https://architecture2030.org/embodied-carbon-actions/>)

Carbon Leadership Forum, Understanding Embodied Carbon, [1 - Embodied Carbon 101 - Carbon Leadership Forum](https://carbonleadershipforum.org/embodied-carbon-101/)  
(<https://carbonleadershipforum.org/embodied-carbon-101/>)

U.S. Environmental Protection Agency [Waste Reduction Model \(WARM\)](https://www.epa.gov/warm) EPA created the Waste Reduction Model (WARM) to provide high-level estimates of potential greenhouse gas (GHG) emissions reductions, energy savings, and economic impacts from several different waste management practices. WARM estimates these impacts from baseline and alternative waste management practices—source reduction, recycling, anaerobic digestion, combustion, composting and landfilling. The webpage can be found at (<https://www.epa.gov/warm>).

Natural Trust for Historic Preservation, The Greenest Building: Quantifying the Environmental Value of Building Reuse, [Natural Trust for Historic Preservation, the Greenest Building: Quantifying the Environmental Value of Building Reuse](https://archdaily.com/204449/the-greenest-building-quantifying-the-environmental-value-of-building-reuse)  
(<https://archdaily.com/204449/the-greenest-building-quantifying-the-environmental-value-of-building-reuse>)

The U.S. Energy Information Administration, 2018 Commercial Buildings Energy Consumption Survey consumption and expenditures website, Table B7 Building size, floorspace, indicates that 50,000 sq ft threshold will apply to about 15% of buildings, but influence about 50% of square footage. [Energy Information Administration \(EIA\)- About the Commercial Buildings Energy Consumption Survey \(CBECS\)](https://www.eia.gov/consumption/commercial/data/2018/bc/html/b7.php)  
(<https://www.eia.gov/consumption/commercial/data/2018/bc/html/b7.php>)

*What you can do right now: Reuse and Retrofit Existing Buildings:* [Reuse and Retrofit Buildings](https://aiacalifornia.org/wp-content/uploads/2020/12/What-You-Can-Do-Right-Now-Reuse-and-Retrofit-Existing-Buildings.pdf) (<https://aiacalifornia.org/wp-content/uploads/2020/12/What-You-Can-Do-Right-Now-Reuse-and-Retrofit-Existing-Buildings.pdf>)

U.S. Energy Information Administration, 2018 Commercial Building Energy Consumption Survey, [Energy Information Administration \(EIA\)- Commercial Buildings Energy Consumption Survey \(CBECS\)](https://www.eia.gov/consumption/commercial/) (<https://www.eia.gov/consumption/commercial/>), [2018 Commercial Buildings Energy Consumption Survey](https://www.eia.gov/consumption/commercial/)

(<https://www.eia.gov/consumption/commercial/data/2018/pdf/CBECS%202018%20C&E%20Flipbook.pdf>)

[CALTRANS GHG and Mitigation Report Aug 2020](#)

*A Comprehensive Literature Review of Using Recycled Concrete Aggregates in Concrete Pavement* Report Number: CP2C-2019-105 (Sept. 2019)

Sustainable Pavements Program – Federal Highway Administration –  
(<https://www.fhwa.dot.gov/pavement/sustainability/>)

National Concrete Pavement Technology Center – Concrete Recycling –  
(<https://cptechcenter.org/concrete-recycling/>)

[Concrete Pavement Recycling Series: Quantifying the Sustainable Benefits of Concrete Pavement Recycling](#) (<https://intrans.iastate.edu/app/uploads/2018/12/Recycling-tech-brief-2-sustainability-final.pdf>)

[Concrete Pavement Recycling Series: Concrete Pavement Recycling and the Use of Recycled Concrete Aggregate \(RCA\) in concrete Paving Mixtures](#)  
([https://intrans.iastate.edu/app/uploads/2019/02/RCA\\_TB1\\_introduction.pdf](https://intrans.iastate.edu/app/uploads/2019/02/RCA_TB1_introduction.pdf))

*Environmental Impacts of Recycled Plastic Concrete*, a report for Caltrans by Climate Earth

**For Section A5.106.11.3 Shade trees**, the following studies show that an increase of trees in city areas (urban forests) increases outdoor air quality and reduces carbon emissions:

([http://calfire.ca.gov/resource\\_mgt/resource\\_mgt\\_urbanforestry](http://calfire.ca.gov/resource_mgt/resource_mgt_urbanforestry))

(<http://www.sactree.com/pages/471>)

(<http://www.isa-arbor.com/>)

([https://staff.washington.edu/kwolf/KW\\_CV/](https://staff.washington.edu/kwolf/KW_CV/); <http://depts.washington.edu/hhwb/>)

([https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwj2jdKF0c\\_7AhXFNEQIHZBnAZ0QFnoECA0QAQ&url=https%3A%2F%2Fwww.treepeople.org%2Fwp-content%2Fuploads%2F2021%2F07%2Ftree-planting-cost-benefit-analysis-a-case-study-for-urban-forest-equity-in-los-angeles.pdf&usg=AOvVaw0unMPIXqoy86j8ZgQpLy77](https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwj2jdKF0c_7AhXFNEQIHZBnAZ0QFnoECA0QAQ&url=https%3A%2F%2Fwww.treepeople.org%2Fwp-content%2Fuploads%2F2021%2F07%2Ftree-planting-cost-benefit-analysis-a-case-study-for-urban-forest-equity-in-los-angeles.pdf&usg=AOvVaw0unMPIXqoy86j8ZgQpLy77))

## STATEMENT OF JUSTIFICATION FOR PRESCRIPTIVE STANDARDS

Government Code Section 11346.2(b)(1) requires a statement of the reasons why an agency believes any mandates for specific technologies or equipment, or prescriptive standards are required.

California's building standards codes have historically been a mix of performance and prescriptive provisions and reference standards. This code is no different, and wherever possible, a performance option is included to provide flexibility to the code user.

This proposal will enable California to meet its low carbon and emissions reductions goals, as well as to save the state and regulated community money by providing needed infrastructure during initial construction rather than later incurring expensive retrofit costs.

**Bird-Friendly:** The California Building Standards Code has historically been a mix of performance and prescriptive provisions and reference standards. The CALGreen code is

no different, and wherever possible, a performance option is included to provide flexibility to the code user.

**CCRC:** These regulations incorporate both performance and prescriptive standards. Including both options offers alternative compliance approaches depending on the project and knowledge of the design professional.

## **CONSIDERATION OF REASONABLE ALTERNATIVES**

Government Code Section 11346.2(b)(4)(A) requires a description of reasonable alternatives to the regulation and the agency's reasons for rejecting those alternatives. In the case of a regulation that would mandate the use of specific technologies or equipment or prescribe specific action or procedures, the imposition of performance standards shall be considered as an alternate. It is not the intent of this paragraph to require the agency to artificially construct alternatives or describe unreasonable alternatives.

### **Electric Vehicle:**

#### **For Light-duty vehicle proposals, the alternatives are as follows:**

**Alternative 1:** BSC-CG initially proposed that for existing facilities completing a qualifying addition or alteration, 10 percent of the added or altered spaces would need to be EV capable.

Staff estimates that 29,524 to 36,413 spaces would be EV capable, with a statewide construction cost of \$19.9 million (29,524 x \$675.07) to \$37.2 million (36,413 x \$1,020.87). CARB staff estimates a statewide benefit of \$186.7 million to \$254.1 million from avoided future retrofit costs. If this proposal was adopted, staff estimates an annual greenhouse gas reduction potential ranging from 44,000 to 69,000 metric tons of CO<sub>2</sub> equivalent. Based on comments received by BSC-CG from stakeholders, BSC-CG rejected the original existing facilities proposal in favor of a more stringent one.

**Alternative 2:** Staff considered giving the developers the option of installing low power Level 2 charging receptacles in a maximum of 10 percent of spaces. For newly constructed nonresidential buildings, staff estimates a maximum 53,773 to 66,399 spaces could have low power Level 2 charging, with a construction cost of \$42.0 million (53,773 low power Level 2 charging receptacles x \$781.05) to \$98.0 million (66,399 low power Level 2 charging receptacles x \$1,147.60). Staff estimates a statewide benefit of \$334.4 million to \$443.1 million. Over the 1.5-year lifetime of this amendment staff estimates a potential greenhouse gas reduction ranging from 297,000 to 468,000 metric tons of CO<sub>2</sub> equivalent.

Based on comments received by BSC-CG from stakeholders, BSC-CG rejected to pursue this proposal to propose a code amendment that promoted greater flexibility during implementation.

**For the Medium-and heavy-duty vehicle proposals,** the modifications that BSC-CG proposes during this intervening code cycle are intended to add necessary provisions of the mandatory code being used in California to meet electric vehicle deployment goals as set forth by the Governor's Executive Orders B-48-2018 and N-79-20 to achieve a benchmark for having a 100 percent zero-emissions medium- and heavy-duty fleet in California by 2045, with interim goals for drayage trucks in 2035. There are no reasonable alternatives to ensure that we meet this goal that retain the high cost- effectiveness for infrastructure development.

**Bird-Friendly:** BSC-CG has not identified any reasonable alternatives to these proposed regulations, which do not mandate the use of specific technologies or equipment. The proposed regulations contain several alternative options to achieve results. This is a voluntary provision intended to provide options to building owners/designers to protect biodiversity and prevent bird collision in buildings of up to 40 feet or more.

**CCRC:** The American Institute of Architects California (AIACA), submitted a petition in 2019 requesting that California adopt the Zero Code, a reach code to supplement the California Energy Code. The Zero Code integrates cost-effective energy efficiency standards with on-site and/or off-site renewable energy, resulting in Zero-Net-Carbon (ZNC) buildings. Due to the energy component, CBSC forwarded the petition to the California Energy Commission because CBSC does not have authority to promulgate regulations pertaining to energy, but the California Energy Commission denied the petition. Subsequently, CBSC entered into discussions with stakeholders to ascertain how the goals of the petitioners and stakeholders could be integrated into CALGreen, for which BSC-CG has broad authority pursuant to Health and Safety Code Section 18930.5.

### **REASONABLE ALTERNATIVES THE AGENCY HAS IDENTIFIED THAT WOULD LESSEN ANY ADVERSE IMPACT ON SMALL BUSINESS**

Government Code Section 11346.2(b)(4)(B) requires a description of any reasonable alternatives that have been identified or that have otherwise been identified and brought to the attention of the agency that would lessen any adverse impact on small business.

**Electric Vehicle regulation Items 1, 5-7, 17 & 18:** For the Light-duty and Medium-and heavy-duty vehicle proposals, no alternatives were identified to lessen the adverse impact on small business, but most of the modifications to the code are proposed for facilitation of understanding and compliance by the code user. Those proposals that are new to the code or are made more stringent have been thoroughly vetted through stakeholder outreach and have been justified by proposing parties as to cost/benefit.

A reasonable alternative would be to propose no change to the code, allowing for the natural progression of technology, which would ultimately result in greater building retrofit overall costs than the changes in this proposal.

**Bird-Friendly regulation Items 2 & 20:** No alternatives were identified to lessen any adverse impact on small businesses.

**CCRC regulation Item 3, 4, 8-13, 16, 19 & 21 - 25:** BSC-CG has determined that no reasonable alternative considered by BSC-CG or that has otherwise been identified and brought to the attention of BSC-CG would be more effective in carrying out the purpose for which the action is proposed or would be as effective and less burdensome to affected small businesses than the proposed action. In addition, no reasonable alternative considered by BSC-CG or that has otherwise been identified and brought to the attention of BSC-CG would be more cost-effective to affected small businesses and equally effective in implementing the statutory policy or other provisions of law.

### **FACTS, EVIDENCE, DOCUMENTS, TESTIMONY, OR OTHER EVIDENCE OF NO SIGNIFICANT ADVERSE IMPACT ON BUSINESS**

Government Code Section 11346.2(b)(5)(A) requires the facts, evidence, documents, testimony, or other evidence on which the agency relies to support an initial determination that the action will not have a significant adverse economic impact on business.

**Electric Vehicle Light-duty vehicle regulation Items 1, 5, 6, 17 & 18:** Of the proposed changes, the only one with a certain cost impact to businesses would be the flexibility for low power Level 2 charging receptacles instead of EV capable. BSC-CG has determined that allowing EV Capable spaces to be replaced with low power Level 2 charging receptacles will marginally increase the cost to businesses by 0.4 to 0.6 percent of the total cost of installing low power Level 2 receptacles. **See Attachment A1-Cost Analysis.**

**Electric Vehicle Medium-and heavy-duty vehicle regulation Item 7:** BSC-CG has determined that this regulatory action would marginally increase costs to newly constructed specified California nonresidential buildings. The increase in construction costs would add approximately 0.5 percent to the total new construction costs of manufacturing facilities and office buildings with off-street loading spaces, with significant benefits to Californians due to improved air quality and GHG emissions reduction. Without these code changes, the future cost to retrofit buildings to comply with CARB ZEV regulations, is estimated to be roughly ten times the cost of the proposed code changes. **See Attachment A2-Cost Analysis.**

**Bird-Friendly regulation Items 2 & 20:** BSC-CG has made the initial determination that the action will not have a significant adverse economic impact on business as the cost of compliance is negligible at less than 1% of the total building cost. **See Attachment B - Cost Analysis**

**CCRC regulation Items 3, 4, 8-13, 16, 19 & 21 - 25:** An analysis provided by RMI and Energy Solutions (available upon request) and AIACA (available upon request) indicate that compliance with the LCA option may range from \$8,238,617 to \$11,500,000 statewide annually, or 0.1 percent to 2.5 percent of total construction costs, noting that this calculation assumes all buildings subject to this regulation will choose the LCA compliance path, which is unlikely. The LCA compliance path is also the costliest of the three options.

The product GWP compliance-prescriptive path, may or may not impose a marginal cost to the project owner and is difficult to determine. This compliance requires an EPD be provided with the construction documents for specified products. However, manufactures of concrete, steel, flat glass, mineral wood board insulation, and mineral wood board to are responsible for developing EPD's for their products. An analysis provided by California Construction and Industrial Materials Association (CalCIMA) (available upon request) indicated that it would cost approximately \$1.5 million for concrete mixing plants in California that do not currently have EPDs to obtain EPDs. However, it is unlikely that all concrete mixing plants, nor all other affected product manufacturers in California, will seek to obtain EPDs at once in the following year. Data was not provided by the glazing, steel, or mineral wood board industries.

Cost data for the building reuse compliance method are unknown as numerous variables exist that cannot be forecasted such as the condition of an existing building, design decisions, and the cost to purchase various buildings across the state. However, there is a possibility that exercising this option may save a project owner money when compared to the other two compliance options. **See Attachment C - Cost Analysis**

## **ASSESSMENT OF EFFECT OF REGULATIONS UPON JOBS AND BUSINESS EXPANSION, ELIMINATION OR CREATION**

Government Code Sections 11346.3(b)(1) and 11346.5(a)(10)

BSC has assessed whether and to what extent this proposal will affect the following:

**A. The creation or elimination of jobs within the State of California.**

**Electric Vehicle:** These regulations may cause some jobs to be created for the manufacturing, installation, and maintenance of Electric Vehicle Supply Equipment (EVSE), and for EV capable; installation of raceway and panel capacity to support future installation of EVSE. No jobs are expected to be eliminated.

**Bird-Friendly:** Types of jobs or occupations impacted: construction jobs, window manufacturers, window designers, the different strategies: Parachute cord makers, Tempura Paint dealers, screens and netting maker/installers, tape, decals and film manufacturers.

**CCRC:** This regulation may cause jobs to be created for the analysis of whole building LCA and EPDs. This regulation will not affect the elimination of jobs within the State of California.

**B. The creation of new businesses or the elimination of existing businesses within the State of California.**

**Electric Vehicle:** These regulations will likely promote the expansion of businesses currently involved with EV manufacturing, installation, maintenance, and technology development, and some special trade construction businesses may be created for EV capable installations. No business is expected to be eliminated.

**Bird-Friendly:** New businesses in the window manufacturing, window designs may be created by these regulations.

**CCRC:** This regulation may cause the creation of businesses that that provide whole building lifecycle analysis or creation and analysis of EPDs. This regulation will not affect the elimination of jobs within the State of California.

**C. The expansion of businesses currently doing business within the State of California.**

**Electric Vehicle:** These regulations will likely promote the expansion of businesses currently involved with EV manufacturing, installation, maintenance, and technology development within the State of California.

**Bird-Friendly:** These regulations may impact the expansion of businesses currently doing business with the State of California, but that figure is unknown.

**CCRC:** This regulation may cause the expansion of businesses doing business within the State of California that that provide whole building lifecycle analysis or creation and analysis of EPDs, or employ such analysts in-house.

## **D. The benefits of the regulation to the health and welfare of California residents, worker safety, and the state's environment.**

**Electric Vehicle:** These regulations will increase the sustainability of California's natural resources by reducing fuel use, GHG emissions, criteria pollutants, and fossil fuel dependence. Additionally, updating and clarifying the minimum current CALGreen codes will provide increased protection of public health and safety, worker safety and the environment.

**Bird-Friendly:** These regulations will increase the protection of bird species across California. Governor Newsom's Executive Order [N-82-20](#) pledged to preserve 30 percent of habitat by 2030 (the 30 x 30 pledge) (which the Biden Administration has since also declared) with the intent of stemming declines in biodiversity. Agencies were tasked with coordinating efforts to ensure that biodiversity is considered in fulfilling their mandates. The Executive Order can be found at [gov.ca.gov/wp-content/uploads/2020/10/10.07.2020-EO-N-82-20.pdf](http://gov.ca.gov/wp-content/uploads/2020/10/10.07.2020-EO-N-82-20.pdf).

**CCRC:** These regulations will further support the reduction of greenhouse gas emissions, and provide increased protection of public health and safety, worker safety and the environment.

## **ESTIMATED COST OF COMPLIANCE, ESTIMATED POTENTIAL BENEFITS, AND RELATED ASSUMPTIONS USED FOR BUILDING STANDARDS**

Government Code Section 11346.2(b)(5)(B)(i) states if a proposed regulation is a building standard, the initial statement of reasons shall include the estimated cost of compliance, the estimated potential benefits, and the related assumptions used to determine the estimates.

**Electric Vehicle Charging statement:** For Light-duty Vehicles, the following apply:

### **1. Mandatory New Construction Regulations:**

#### **a. Allowance for Low Power Level 2 Charging Receptacles**

In newly constructed nonresidential buildings, the proposed amendment gives developers the option of installing low power Level 2 charging receptacles instead of EV capable spaces, resulting in 161,318 to 199,196 spaces with low power Level 2 receptacles. The cost of low power Level 2 charging receptacles (raceway, panel capacity, wiring, receptacles, protective bollards) is estimated to range from \$781.05 to \$1,476.60. Staff estimates that if all EV capable spaces were now low power Level 2 charging receptacles, the statewide initial construction cost would range from \$126.0 million (161,318 spaces x \$781.05) to \$294.1 million (199,196 spaces x \$1,476.60), with an estimated statewide benefit of \$668.8 million to \$866.3 million. Staff estimates an annual statewide greenhouse gas emissions reduction of 592,000 to 934,000 metric tons CO<sub>2</sub> equivalent when installing low power Level 2 charging receptacles instead of EV capable spaces.

#### **b. Power Allocation Method Table**

Staff ran two analyses on the table, one with the installation of DCFCs and one

without the installation of DCFCs. The mandatory EV requirements start requiring EV infrastructure when there are at least 10 total parking spaces. For parking lots with 10 or more spaces, staff estimated for sites without DCFCs, the cost ranges from \$0 to \$90,254.67 per site and for locations with DCFCs the cost ranges from \$0 to \$105,157.51 per site. However, the actual costs are highly dependent on the site developer, the building's function, and the charging level distribution (number of EV capable, low power Level 2 receptacles, Level 2 EVSE and DCFC).

c. Alternative Compliance with DCFC

Staff could not estimate the construction cost of the alternative DCFC pathway, since staff has no way to estimate the number of DCFCs that would be installed or the power levels that developers may be likely to install.

## 2. Voluntary Tier 1 Measures New Construction

a. Allowance for Low Power Level 2 Charging Receptacles

In newly constructed nonresidential buildings, BSC-CG proposes to allow the low power Level 2 charging receptacle substitution to apply to Tier 1 measures. If Tier 1 measures were mandatory, and all developers elected to use this option, staff estimates 216,166 to 266,922 spaces would have low power Level 2 charging receptacles. Staff estimates a construction cost ranging from \$168.8 million to \$394.1 million and a statewide benefit of \$1,344.3 million to \$1,741.2 million. CARB staff estimates an annual greenhouse gas emissions reduction of 793,000 to 1,252,000 metric tons CO<sub>2</sub> equivalent.

b. Power Allocation Method Table

In newly constructed nonresidential buildings, staff ran two analyses on the table, one without the installation of DCFCs and one with the installation of DCFCs. Staff estimated for sites without DCFCs, the cost ranges from \$4,157.90 to \$131,453.50 per site and for locations with DCFCs that cost ranges from \$4,157.90 to \$164,741.07 per site. However, the actual costs are highly dependent on the site developer, the building's function, and the charging level distribution (number of EV capable, low power Level 2 receptacles, Level 2 EVSE and DCFC).

c. Alternative Compliance with DCFC

Staff could not perform an analysis on the DCFC compliance pathway. Staff cannot estimate the number of DCFCs that will be installed under the pathway or the power level of the installed DCFCs.

## 3. Voluntary Tier 2 Measures New Construction

a. Allowance for Low Power Level 2 Charging Receptacles

In newly constructed buildings, BSC-CG proposes to apply the optional installation of low power Level 2 charging receptacles instead of EV capable spaces for Tier 2 measures. If all developers install low power Level 2 receptacles instead of EV capable spaces, staff estimates a total of 324,249 to 400,384 spaces with low power Level 2 charging receptacles. Staff estimates a total construction cost of \$253.3 million to \$591.2 million, and a statewide benefit of \$2,016.5 million to \$2,611.9 million. Staff estimates an annual greenhouse gas reduction ranging from 1,190,000

to 1,877,000 metric tons CO<sub>2</sub> equivalent.

b. Power Allocation Method Table

In newly constructed nonresidential buildings, staff ran the two analyses, one without the installation of DCFCs and one with the installation of DCFCs. Staff estimated for sites without DCFCs, the cost ranges from \$4,832.97 to \$188,548.61 per site and for locations with DCFCs that price ranges from \$4,832.97 to \$242,918.78 per site. However, the actual costs are highly dependent on the site developer, the building's function, and the charging level distribution (number of EV capable, low power Level 2 receptacles, Level 2 EVSE and DCFC).

c. Alternative Compliance with DCFC

Staff could not perform an analysis on the DCFC compliance pathway. Staff cannot estimate the number of DCFCs that will be installed under the pathway or the power level of the installed DCFCs.

#### 4. Mandatory Existing Facilities Regulations

a. EV Capable and EVSE Requirements

The proposed amendments would require during qualifying additions and alterations for a property owner or manager to meet EV charging requirements in Section 5.106.5.3 and Table 5.106.5.3. Staff estimates 44,285 to 54,619 spaces would be retrofitted as EV capable spaces. The cost of EV capable infrastructure (raceway and panel capacity) is estimated to range from approximately \$675.07 to \$1,021.87. Staff estimates an annual statewide construction cost ranging from \$29.9 million (44,285 EV capable spaces x \$675.07) to \$55.8 million (54,619 EV capable spaces x \$1,021.87). Staff estimates an annual statewide greenhouse gas emissions reduction of 65,000 to 103,000 metric tons CO<sub>2</sub> equivalent when property owners install EV capable spaces.

Staff estimates that 13,035 to 16,241 spaces would be required to install Level 2 EVSE. The average cost of a Level 2 charger ranges from \$1,597.80 to \$2,054.89. Staff took the average of over 30 non-networked and networked chargers to estimate an average cost of a nonnetworked Level 2 charger and a networked Level 2 charger. The cost of other components (wiring, panel capacity, conduit, protective bollards) adds another \$998 - \$1,828 per Level 2 EVSE space, bringing the total cost for Level 2 EVSE to \$2,595.80 to \$3,882.89 per space. Staff estimates requiring 25% of EV capable spaces to have Level 2 EVSE will have a construction cost ranging from \$33.8 million (13,035 Level 2 EVSE x \$2,595.80) to \$63.1 million (16,241 Level 2 EVSE x \$3,882.89). Note that in some developments, EVSE unit costs will not be assumed by the developer, and instead could be accounted for as charging service fees by an EVSE provider directly to drivers. For this analysis, CARB staff assume the most conservative approach where costs are assumed by the developer. Staff estimates an annual greenhouse gas emissions reduction of 48,000 to 77,000 metric tons of CO<sub>2</sub>.

Overall, the proposed amendment will have an estimated construction cost ranging from \$63.7 million to \$118.8 million. Staff estimates a total greenhouse gas emissions reduction of 129,000 to 205,000 metric tons of CO<sub>2</sub> saved annually.

b. Allowance for Low Power Level 2 Charging Receptacles

In existing buildings, the proposed amendment gives developers the option of installing low power Level 2 charging receptacles instead of EV capable spaces. Over the 1.5-year lifetime of the proposed amendment, staff estimates a maximum of 88,571 to 109,239 spaces would have low power Level 2 charging receptacles. Staff estimates a statewide construction cost of \$69.2 million to \$161.3 million. If all EV capable spaces had low power Level 2 charging receptacles, staff estimates an annual potential greenhouse gas reduction of 217,000 to 342,000 metric tons of CO<sub>2</sub> equivalent.

c. Power Allocation Alternative Pathway and DCFC Alternative Pathway

The power allocation table will also apply to existing facilities. Staff ran two analyses, one without the installation of DCFCs and one without the installation of DCFCs. Mandatory existing building EV requirements will be required when 10 or more spaces are added or altered. For existing buildings with 10 or more parking spaces, staff estimated for existing sites without DCFCs, the cost ranges from \$6,395.07 to \$88,322.34 per site and for locations with DCFCs the cost ranges from \$6,395.07 to \$112,813.87 per site. However, the actual costs are highly dependent on the site developer, the building's function, and the and the charging level distribution (number of EV capable, Level 2 EVSE, low power Level 2 receptacles and DCFC).

d. Alternative compliance with DCFC

Staff could not estimate the construction cost of the alternative DCFC pathway, since staff has no way to estimate the number of DCFCs that would be installed or the power levels that developers may be likely to install.

**See Attachment A1** for additional information.

For Medium-and heavy-duty vehicle proposals, initial construction costs of \$333 million are estimated be incurred between the beginning of 2023 and the end of 2030 due to the adoption of this proposed mandatory measure and are estimated to save \$1.2 billion in future building electrification retrofit costs. The proposed code changes amount to an average additional cost of \$1.00 per square foot. This measure will protect public health and safety, the environment, and the general welfare of California residents. **See Attachment A2** for additional information.

**Bird-Friendly:** BSC-CG has made the initial determination that the action will not have a significant adverse economic impact on business as the cost of compliance is negligible at less than 1% of the total building cost. For existing buildings replacement windows may be up to 7.5% of the cost to replace windows with bird-friendly building design strategies.

Material alternatives to vision glass for the treatment of building areas posing the greatest risk for collision do not need to be prohibitively expensive and can be cost-neutral. Portland cites cost studies of a local library and a health center, comparing traditional glass to fritted or UV-patterned glass and found increases of .05% and .03%, respectively, in the overall building costs, of which under 10% were expended on building skin. Many

designers of bird-friendly buildings note that costs are not significant if the features are incorporated early in design; retrofitting elements to shield glass will add cost, but economical options can be found. **See Attachment B - Cost Analysis.**

**CCRC:** An analysis provided by RMI and Energy Solutions (available upon request) and AIACA (available upon request) indicate that compliance with the LCA option may range from \$8,238,617 to \$11,500,000 statewide annually, or 0.1% to 2.5% of total construction costs, noting that this calculation assumes all buildings subject to this regulation will choose the LCA compliance path, which is unlikely. The LCA compliance path is also the costliest of the three options.

The product GWP compliance-prescriptive path, may or may not impose a marginal cost to the project owner and is difficult to determine. This compliance requires an EPD be provided with the construction documents for specified products. However, manufactures of concrete, steel, flat glass, mineral wood board insulation, and mineral wood board to are responsible for developing EPD's for their products. An analysis provided by California Construction and Industrial Materials Association (CalCIMA) (available upon request) indicated that it would cost approximately \$1.5 million for concrete mixing plants in California that do not currently have EPDs to obtain EPDs. However, it is unlikely that all concrete mixing plants, nor all other affected product manufacturers in California, will seek to obtain EPDs at once in the following year. Data was not provided by the glazing, steel, or mineral wood board industries.

Cost data for the building reuse method are unknown as numerous variables exist that cannot be forecasted such as the condition of an existing building, design decisions, and the cost to purchase various buildings across the state. However, there is a possibility that exercising this option may save a project owner money when compared to the other two compliance options.

The benefits of this regulation include reduced greenhouse gas emissions, construction waste management, building reuse, life cycle assessment, the use of global warming potential product declarations, mitigation for extreme heat impacts that result from already locked in climate deterioration, and options for reducing the carbon impacts of high use, high impact materials such as cement and concrete, as well as worker safety, health and welfare of California residents, and an improvement in the State's environment.

## **DUPLICATION OR CONFLICTS WITH FEDERAL REGULATIONS**

Government Code Section 11346.2(b)(6) requires a department, board, or commission within the Environmental Protection Agency, the Resources Agency, or the Office of the State Fire Marshal to describe its efforts, in connection with a proposed rulemaking action, to avoid unnecessary duplication or conflicts with federal regulations contained in the Code of Federal Regulations addressing the same issues. These agencies may adopt regulations different from these federal regulations upon a finding of one or more of the following justifications: (A) The differing state regulations are authorized by law and/or (B) The cost of differing state regulations is justified by the benefit to human health, public safety, public welfare, or the environment.

**Electric Vehicle, Bird-Friendly, and CCRC:** These regulations do not duplicate nor conflict with federal regulations.