

**INITIAL STATEMENT OF REASONS
FOR
PROPOSED BUILDING STANDARDS
OF THE
CALIFORNIA BUILDING STANDARDS COMMISSION (CBSC)**

**REGARDING ADOPTION OF AMENDMENTS TO THE 2010 CALIFORNIA BUILDING STANDARDS
CODE, TITLE 24, CALIFORNIA CODE OF REGULATIONS (CCR), PARTS 2, 3, 4, 5 and 6 in TITLE 24,
CCR, PART 11, CALIFORNIA GREEN BUILDING STANDARDS CODE**

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 AND RATIONALE:

This proposed action by CBSC adopts mandatory and voluntary green building standards for occupancies within its authority, building upon a framework of voluntary measures adopted by CBSC in 2008. The intent of the new version of the code continues to be 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 in the Governor's legislative veto messages announced at the conclusion of the 2007-2008 legislative session.

(1) GHG reduction has been mandated in recent years by the Governor through executive orders and in his signing into law AB 32 in 2006. AB 32 requires a cap on GHG emissions by 2020, mandatory emissions reporting, and an ongoing market-based compliance program.

Nonresidential green building can make a significant reduction in GHG for the following reasons:

- Nonresidential buildings are projected to account for 37% of electricity and 16% of natural gas consumed in California in the next ten years¹;
- Over the next 25 years, GHG emissions from nonresidential buildings are predicted to grow faster than from any other sector, at 1.8% per year through 2030¹;
- Construction investment in nonresidential buildings in California totaled over \$21 billion in 2006²;
- Buildings have a long lifespan of 50 to 100 years over which they consume energy and produce GHG¹; and
- Technology, construction techniques, and various green building points-based programs, utility incentives, local ordinances, and state agency programs already exist to make substantial reductions in GHG.

(2) Furthermore, GHG emissions reduction and environmental sensitivity by buildings may prove to save builders money, though initial costs may be higher.

- An October, 2003 report to California's Sustainable Building Task Force stated that a 2% increase in upfront costs for green building features would result in savings of 20% of construction costs in 20 years.³
- Studies have shown that improved air quality and thermal comfort results in occupant satisfaction and improved worker productivity, and that giving occupants some control over lighting and acoustics may improve them further.⁴
- CBSC staff has looked into costs and benefits of those measures it proposes as mandatory for the 2010 edition of the code. Summaries of its findings are included in the rationales of those code sections shown below.

(3) Green building legislation proposed in the 2007-2008 legislative session (AB 35 concerning state-owned buildings, AB 888 concerning commercial B-occupancy buildings, and AB 1035 concerning residential construction) was vetoed by the Governor. In his veto messages, the Governor expressed his support for development of green building standards, but that they should not be statutory, conflict with current safety standards, and rely on private entities to set standards. He directed CBSC to work with state agencies to develop standards, gleaned from nationally recognized programs⁵ and the input of other state agencies, ensuring an open public adoption process, for the 2010 code.

The proposed standards are amendments to Parts 2, 3, 4, 5, and 6 of Title 24 and are being placed into Title 24, Part 11, the California Green Building Standards Code, to provide clarity to users designing or constructing to the green building standards. It is the intent of CBSC to integrate these standards into their respective parts at a future date.

The proposed changes to the building standards with statewide application will lead to substantial environmental benefits through reduction in the use of energy, water, and raw materials; improved public and building occupant health due to improved indoor air quality; and overall reduced detrimental environmental impacts.

Specific Proposed Regulatory Actions: CBSC proposes to amend the 2007 California Green Building Standards Code (CGBC) in a 2010 edition. The rationale for each adoption by chapter, division, and section is listed below.

CHAPTER 1. ADMINISTRATION

CBSC is proposing to amend of this chapter as follows:

Section 101.1: Add the acronym CALGREEN as a handy reference to the formal, but longer, title of the code, the

California Green Building Standards Code. No regulatory effect is expected from this editorial change.

Section 101.2: In Item 5, delete the word “air” to match the title of the “Environmental Quality” chapters for residential and nonresidential buildings.

Section 101.3: Add a paragraph describing voluntary tiers for achieving at least a 15% increase in energy efficiency, which is state policy agreed upon in 2008 among the Governor, Agency secretaries, and the Chair of the California Energy Commission.

Section 101.3.1: Correct a reference to state law, an editorial correction.

Section 101.7: Clarify the intent of the 2010 version of the code to establish minimum mandatory green building standards as directed by the Governor at the close of the 2007-2008 legislative session.

Section 101.7.1: In Item 1, add a sentence clarifying that, when amending the building codes for green building standards, local jurisdictions may consider specific local environmental conditions as climatic findings; and, in Item 4, spell out “Public Resources Code” for clarification.

Section 101.11: Update the effective use of the code to recognize the minimum mandatory standards and voluntary measures, including voluntary tiers, as well as how to use the state agency checklists.

Section 102.1: Incorporate a recommendation by a stakeholder to allow separate submittal of additional construction documents which may be requested by the enforcing agency.

Section 103.1: In Item 1, add Health and Safety Code Section 18930.5 to the list of authoritative laws cited by CBSC. This law was added to California Building Standards Law by SB 1473 (Ch. 719, Stats 2008) to grant CBSC authority to develop green building standards for occupancies where no other agency has authority or expertise.

The proposed new language in Chapter 1 is consistent with the standards and format used in other parts of the California Building Standards Code.

CHAPTER 2. DEFINITIONS, Section 202

CBSC proposes to adopt definitions for “conditioned floor area”, “directly” and “indirectly conditioned space”, and “process space”, derived from the 2007 California Energy Code, at the request of a stakeholder. These additions define terms used in the existing definition for “conditioned space” and provide clarity to the code user. Also, CBSC proposes a definition for “exfiltration” opposite to an existing definition for “infiltration”. CBSC also proposes new definitions derived from California statute that provide clarity to the code user regarding terms related to construction waste disposal: “disposal”, “diversion”, “hazardous waste”; “inert solids or inert waste”, “recycle or recycling”, “re-use”, and “solid waste”. Definitions for landscape “plants” and “resilient flooring” were also added to provide clarity.

CHAPTER 3. GREEN BUILDING, Section 303, VOLUNTARY TIERS

Section 303 was added after discussion at the Green Building Code Advisory Council (GB CAC) to provide clarity to the code user concerning phased projects and tenant improvements.

Section 304.1 Purpose: CBSC is proposing this new California section to provide clarity to the code user regarding the intent of voluntary tiers.

Section 304.1.1 Tiers: This new section describes the use of voluntary measures in Appendices A4 and A5, and how they are to be incorporated into tiers to achieve environmental benefits above the minimum mandatory standards.

CHAPTER 5. NONRESIDENTIAL MANDATORY MEASURES

The following nonresidential new building standards proposed as mandatory for the 2010 version of the code are now found in Chapter 5. This chapter is divided into divisions, each of which covers topics from the 2008 code’s chapters 4 through 8, respectively. The intent is to separate these provisions from those applicable to residential occupancies found in Chapter 4.

Division 5.1 PLANNING AND DESIGN

Section 5.102 Definitions. The definition for “low-emitting and fuel efficient vehicles” is brought into Division 5.1 from the 2008 Appendix A, correlating with a mandatory section on designated parking.

Section 5.106.1 Storm water pollution prevention plan. In 2007, The Green Building Code Advisory Council (GB CAC) recommended that CBSC coordinate storm water pollution protection plan provisions with those of the Department of Housing and Community Development, which require storm water protection for all residential projects, including those under one acre. Now that residential and nonresidential are separated, CBSC proposes to adopt language previously reviewed by the State Water Resources Control Board (SWRCB).

Currently SWRCB issues permits to ensure a Storm Water Prevention Plan (SWPPP) in compliance with applicable state regulations is issued and implemented for projects which are larger than one acre. This section will apply to nonresidential construction projects less than one acre which are outside the scope of the SWRCB. This section will help prevent pollution from storm water runoff by retaining soil on site and restricting sedimentation from reaching storm water drainage systems and receiving streams or rivers.

Section 5.106.4 Bicycle parking and changing rooms. The regulation would make it mandatory for all for non-residential buildings with over 10 tenant-occupants to provide short- and long-term bicycle parking and shower and locker facilities (or document arrangements with nearby changing/shower facilities), meet a local ordinance, or a university campus policy, whichever is stricter.

Although there is cost associated with implementing the bicycle parking regulations, the impact is minimal when

compared to the overall construction cost. Vehicle parking is determined at the local level, typically based on building square footage, visitor traffic, or seats in assembly occupancies. Short term parking is to be required for transient users (occasional visitors, retail customers, etc.). Long-term bicycle parking and changing rooms are restricted to tenant-occupants, as distinguished from visitors. For a typical 10,000 square foot office building in the suburbs of Sacramento, about 30 parking spaces would be required, 5% of which is 2. This might be divided between visitors and tenant-occupants, but calculating long-term parking based on the full 5% yields a small number. A visitor rack, 2 long-term bicycle spaces, 1 shower and 3 lockers would add up to about \$5500. If the building costs 1.5 million dollars to build, bicycle parking and changing facilities would account for less than .5% of the construction cost. As projects get larger, the percentage declines further.

The benefits of implementing a bicycle parking regulation would promote bicycle ridership, with the resulting benefits:

- Reducing the number of vehicles from the roadways and therefore reducing green house gas emissions.
- Also, such a regulation would promote some indirect benefits such as biking, running, walking and other forms of aerobic exercising during breaks or during the lunch hour which would promote health and wellness.
- The health benefits both mental and physical of riding a bicycle and other forms of exercise are well documented and could reduce health-related costs borne by business owners.

These, along with increased employee productivity, clearly outweigh the insignificant cost associated with implementing such a regulation.

Section 5.106.5.2 Designated parking. This section requires that a graduated number of parking stalls be reserved and marked for any combination low-emission, alternative fuel, and carpool vehicles. The measure provides direction to the designers and builders to the stenciled words to be applied in each designated stall. Separate signage is not required, but could be installed at the owner's discretion.

The purpose of this measure is to reward carpool users and drivers of either low-emission or alternate fuel vehicles for reducing greenhouse gas emissions by assuring that parking is available to them. It can be accomplished for a very low cost of approximately \$30 per stall, including labor, CBSC has learned in consultation with designers familiar with this concept. Optional signage would add another \$125 per stall. The cost of stall painting only for a project with 70 parking spaces, for example, would be estimated to be under \$200. For a large project with 500 spaces, it should be under \$1500. The benefits of this provision include the fuel saved and pollution reduced by the building end users for deciding to raise their own environmental consciousness by driving low-emitting and fuel efficient vehicles.

Section 5.106.8 Light pollution reduction. CBSC in this section proposes to provide a reference to the energy code for light pollution control. While the energy code's provisions emphasize the energy efficiency of outdoor lighting, they also mandate cutoff luminaires and provide performance standards that are tailored for the various lighting zones specified in Chapter 10 of the CAC. Thus they have some traction in the arena of reducing light pollution.

The reference to IESNA RP-33-99 in the code advisory committee version has been omitted to avoid the impression that all of the IESNA recommendations are mandated. However, the strategies listed from the IESNA guidelines give designers additional tools to meet the provisions of the energy code and further to mitigate light escaping a project site at night, while balancing costs and benefits.

- Cutoff luminaires are commonly selected from distributors' commodity product lines, whereas often more expensive, designer luminaires do not comply with the light distribution parameters of cutoff luminaires. Thus, cutoff luminaires are typically readily available at an economic price. Cost of installation of such fixtures should be comparable to other outdoor lighting fixtures.
- Confining indoor light trespass within buildings and outdoor light trespass within the site through conscious design and controls should reduce light pollution. This may well enhance enjoyment of night skies and provide educational opportunities about heavenly bodies. It may also promote occupants' and neighbors' well-being through the experience of natural circadian rhythms of hormones, often suppressed by modern-day light levels and habits, which regulate sleep and wakefulness.
- The cost of controls to dim or turn off unnecessary indoor or outdoor lighting is in addition to the fixtures, but should be paid back in energy savings and longevity of luminaires. The exceptions to this standard are a pointer to existing regulations in the CBC mandated by law for safety on campus parking lots and walkways through adequate lighting, and an exception for nighttime safety and security recommended in a public comment.

Section 5.106.10 Grading and paving. This section mandates that sites are graded such that surface water is moved away from buildings to prevent mold and structural damage in the building. Grading and paving plans, typically required by enforcing agencies, will show how this is to be accomplished. Providing such information on plans should not add to the cost of the project, and since most, if not all, projects require some grading, the actual grading should not as well. Benefits may be realized in terms of building longevity and occupant well-being

Division 5.2 ENERGY EFFICIENCY

CBSC is not proposing mandatory energy efficiency standards, referring instead to the California Energy Commission (CEC) for these standards, and at the request of the CEC, including a note referring to the intent of state energy policy for green building.

Division 5.3 WATER EFFICIENCY AND CONSERVATION

The provisions of this division were developed in discussion with staff from the Department of Water Resources (DWR) and are designed to provide greater water savings consistent with the statements in specific purpose and rationale of this document. DWR has since proposed changes to its Model Efficient Landscape Water Ordinance (MO) for approval by the Office of Administrative Law, intended to go into effect on January 1, 2010, some of which are reflected in CBSC proposed provisions. Comments from the California Energy Commission, California Urban Water Conservation Council, California Landscape Contractors Association, and the Plumbing Manufacturers Institute were also taken under consideration.

Section 5.301.1 Scope. CBSC is proposing to bring this section forward from the 2008 voluntary code. This section provides the code user with necessary general knowledge regarding the goals and items covered by this chapter.

Section 5.302.1 Definitions. CBSC is proposing bringing forward some definitions from the 2008 code, repealing those that are not used in the Chapter, amending one for clarity and adding another. These definitions provide guidance to the user on the meaning of words used within this chapter. Through adoption of these sections CBSC is providing the code user with clarity on proper use of terms that are used in the code.

Section 5.303.1 Meters. CBSC is proposing the adoption and amendment of this section from the 2008 code to provide clarity to the code user regarding the use of meters, submeters, and dedicated meters. When installed, the building operator will have the ability to establish a water use baseline within various sections of the potable water system, indoors and out. This will provide the building operator to isolate and identify areas within the potable water system that have significant increases in water use due to leaks, overuse, etc.

For large projects with multiple tenants, CBSC proposes separate meters for potential high water users. CBSC also initially proposed in this section a separate meter for outdoor water use, and at a recommendation during code development, moved this section to Section 5.304.2, the outdoor water use section.

Section 5.303.2 20% savings, Table 5.303.1, and Table 5.303.2. CBSC is proposing the adoption of these sections and tables from the 2008 code to provide clarity to the code user regarding indoor water use conservation. Currently the California Energy Commission (CEC) adopts regulations to establish the minimum water flow rates for specified fixtures and fixture fittings in Title 20 of the California Code of Regulations. The CEC includes shower heads, faucets and other plumbing fixtures and fittings in its definition of appliance and flow rates adopted by the CEC mirror those set by the U.S. Department of Energy. In addition, the US Environmental Protection Agency (EPA) has drafted specifications for high-efficiency residential fixtures under its WaterSense program.

In February of this year the Governor issued a proclamation declaring emergency drought conditions and requesting that "All urban water users immediately increase their water conservation activities in an effort to reduce their individual water use by 20 percent". CBSC is proposing to require reduction of indoor water use by 20% to meet the Governor's goals. These sections specify two methods to meet the 20% reduction: 1) a prescriptive 20% reduction in the flow rate of each fixture from what is currently allowed and; 2) a method to calculate base line water compared to the proposed water use.

Section 5.303.4 Wastewater reduction. CBSC is proposing the amendment of this section from the 2008 code to provide clarity to the code user regarding achieving reduction in overall indoor potable water use and impact on municipal water supply and wastewater treatment. The amendment requires that a 20% reduction be realized, aligning with the indoor water use provisions of Section 5.303.2.

Section 5.303.6 Plumbing fixtures and fittings. CBSC is proposing this new section in response to comments received during the previous code cycle. It prescribes specifications for plumbing fixtures and fixtures, including references to US EPA's WaterSense label, for fixture types that could be used to meet the 20% reduction. CBSC proposes specifications, including WaterSense, for those instances in nonresidential buildings where residential-type fixtures may be installed, for example, in a staff toilet or employee lounge, as well as those for commercial fixtures. This has been put into table format, more like the plumbing code referenced standards, in response to comments from the Green Building Code Advisory Committee (GB CAC).

Received earlier by the Governor were comments from the Kohler Company expressing concern that manufacturers would not be able to meet the regulations' effective date of July 1, 2011 for high efficiency toilets (HET), because manufacturers were prepared for meeting the provisions of AB 715 (Stats. 2007, c. 499, Laird). That law addresses the percentage of product models that a manufacturer must offer for sale during specified years. The law does not address the volume or type of HET models that are to be offered for sale. And, HET are only one type of fixture among other fixtures throughout a project that could be installed to meet the 20% reduction.

Kohler's concern is directed more to the residential market, as is the law, and even after building activity resumes robust levels in the wake of current recession, the demand for residential HET in nonresidential construction will lag behind residential. HCD has committed to proposing a modification to the California Plumbing Code for residential applications to allow local governments to modify the requirement for HET toilets, on a case by case basis, between July 1, 2011 and January 1, 2014, when the law requires all toilets sold in California to be HET.

Section 5.304.1 Landscape ordinance. CBSC is proposing the adoption of this section from the 2008 code with a name change from "Water budget" to provide clarity to the code user regarding potable water use conservation in irrigation systems. This section is consistent with DWR's statutory authority to develop a model ordinance regarding

water use. The MO or local ordinance is already mandated by the state for adoption by local jurisdictions. It now makes reference to the MO for prescriptive measures which can be used to meet the water budget.

Section 5.304.2 Outdoor potable water use. CBSC initially proposed a new section to provide clarity to the code user by listing measures that may be employed to meet the water budget. It is proposing this new section for the requirement for a separate meter to measure outdoor potable water use.

Currently, the MO requires separate meters for indoor and outdoor water use for projects with 5000 or more square feet of landscaped area. CBSC proposed initially to require separate meters for areas between 500 and 5000 square feet, but agreed with DWR and other commenters that the requirements should not be required for landscaped areas under 1000 square feet.

- CBSC has learned that the cost of a 1" meter should be under \$800, installed.
- Most water purveyors CBSC contacted indicated that new water service would be provided by the purveyor, but the submeter would be installed by the owner.
- If we consider a 10,000 square foot office building costing approximately \$150 per square foot, with a strip of irrigated landscape between 1000 and 5000 square feet, the 1" meter would amount to less than .1% of the construction cost.

The benefits of separate metering for landscape irrigation include:

- The amount of outdoor water saved through use of meters, resulting in a lower water bill for the owner and a rapid payback of the cost of the meter.
- Also, monitoring of the irrigation meter for early detection of leaks would also save water and money for the owner in the long run, after repairs to the system are factored in.
- Encouraging maintenance of the irrigation control and delivery system to keep the system operating efficiently with little or no waste of water and money.

Subsection 5.304.3 Irrigation system. CBSC is proposing this new section to provide clarity to the code user regarding irrigation controllers. It provides that weather- or soil moisture-based ("smart") controllers be installed for new nonresidential projects with between 1000 square feet (originally proposed at 500 square feet like 5.304.2) and 2499 square feet of landscaped area, with areas of 2500 square feet and above included in the MO. CBSC proposes that "smart" controllers be installed in landscape projects not covered in DWR's MO and will push the date of requirement up one year from enforcement of the energy commission's standards to be adopted by the commission by January 1, 2010 and mandated across the state after January 1, 2012, pursuant to AB 1881 (Ch. 559, Stats 2006).

According to the Irrigation Association, "smart" controllers cost about three times as much as conventional ones, with higher end pricing for those that control more zones and have more features, such as an integral rain sensor. If required for 1000 to 2499 square feet, there might be fewer zones requiring simpler and thus cheaper controllers.

Climate-based models may require a small monthly fee to receive data from local weather stations. Benefits include:

- The amount of outdoor water and energy saved when weather or soil moisture indicates water is not needed for the plants in the various hydrozones.
- Additionally, controllers can be programmed to prevent overwatering in summer and early fall, when California generally gets no rain, based on soil types, plants, and other features of the landscape, like shade.
- An indirect benefit is the reduction of liabilities for preventable overwatering resulting in water damage (erosion, foundation damage, mold, and premature death of trees) and runoff, which can migrate to other properties and to stormwater systems and may include contaminants.

One manufacturer estimates that "smart" systems pay for themselves in less than two years.

Division 5.4 MATERIAL CONSERVATION AND RESOURCE EFFICIENCY

Division 5.4 provisions from the 2008 code address buildings' water resistance and moisture management, intended to extend building life, and recycling of construction and demolition (C & D) waste. Comments received during the previous code adoption cycle recommended that recycling at least 50% of C & D waste is doable and could be mandated. Research by CBSC staff confirmed this claim and found that contractors that recycle C & D waste typically achieve a higher percentage than 50%. The provisions in the division also include a pointer to an existing law, also cited in the 2008 code, requiring recycling areas be provided and identified for building occupants.

Section 5.401.1 Scope. CBSC is proposing the adoption of this section to provide clarity to the code user regarding the application of the measures contained in the chapter. This section provides the code user with necessary general knowledge regarding the goals and items covered by this chapter.

Section: 5.402.1 Definitions. CBSC is proposing the adoption of this section to provide clarity to the code user regarding the use of definitions. These definitions provide guidance to the user on the meaning of key words used within this chapter.

Section 5.407.1 Weather protection. CBSC is proposing the adoption of this section from the 2008 code to provide clarity to the code user regarding weather protection, preventing damage to the structure and mold contamination. The section refers to regulations already in place.

Section 5.407.2 Moisture control, 5.407.2.1 Sprinklers, and 5.407.2.2 Entries and openings. CBSC is proposing the adoption of these sections from the 2008 code to provide clarity to the code user regarding moisture control as it

applies to structures, preventing mold contamination and damage to the structure and interior finishes. The requirements are minimal and can be addressed through proper design and installation of landscape irrigation systems and components and building elements. No costs are anticipated for special materials, and it would seem that compliance with the requirements can be demonstrated in construction plans and specifications and verified during construction.

Section 5.408.1 Construction waste diversion. CBSC is proposing the adoption of this section from the 2008 code to provide clarity to the code user regarding the diversion of (C & D) waste. The section recognizes local ordinances for diversion that may be more stringent and supplant the need for individual project waste management plans.

Section 5.408.2 Construction waste management plan. CBSC is proposing the adoption of this section from the 2008 code to provide clarity to the code user regarding the use of a waste management plan intended to save raw materials and preserve landfill space, where local regulations do not apply. CBSC has included a sample waste management plan in Chapter 8, which can be used by specifiers and contractors and tailored as needed for each user. CBSC has provided an exception for isolated jobsites where C & D waste processing facilities are not readily available, as determined by the enforcement agency.

Based on CBSC staff research, including interviews with several general contractors that routinely implement construction waste management plans (WMPs), the cost of developing WMPs will be minimal, using a standard template such as that provided by the CBSC in the Chapter 8. The typical time to fill out a form should be roughly 2-4 hrs (\$200-\$400) for basic WMP and 4-8 hrs (\$400-\$800) for detailed WMP.

Section 5.408.3 Construction waste. CBSC is proposing the adoption of this section from the 2008 code to provide clarity to the code user regarding the diversion of at least 50% of the construction waste generated from a landfill. Landfills produce significant amounts of methane gas, a direct greenhouse gas.

Implementation of the WMP and diversion includes at a minimum

- The establishment of dedicated bins for waste to be recycled (mixed or sorted depending on the type of diversion facility available) and materials to be reused or salvaged otherwise;
- Monitoring to ensure the waste is uncontaminated, not otherwise discarded, and the bins are kept clean;
- Contracting with a hauler to weigh and haul the waste to the diversion facilities; and
- Maintenance of records of money collected for recyclables, discounted haul rates and/or tipping fees in lieu of direct payment, weight tickets, and signatures and other forms of validation that reflect the kind and amounts of materials that have been recycled.

The costs of implementing the WMP and diverting at least 50% of C & D waste basically depend on the size of the building project and the level of detail in the plan. There is a cost associated with the time it will take a laborer to manage and oversee the daily waste diversion activity. Based on the data collected from various sources and studies, it appears that:

- The cost to develop and implement a basic level WMP for a small non-residential project in the range of less than 5 million is approximately \$4,000. A more detailed high level WMP implementation cost is approximately twice the cost of a basic WMP.
- The cost to develop and implement a basic level WMP for a large non-residential project in the range of 50-75 million is approximately \$20,000. A detailed WMP implementation cost approximately twice the cost of a basic WMP.

Regardless of the scale of the project, however, the cost is negligible and typically amounts to less than 1 percent of the total construction cost. And this cost is partially offset by the recycling cost savings as diverted waste typically saves costs in money collected for recyclables, discounted haul rates, and reduced tipping fees.

According to a training document from Department of General Services (DGS) for state building projects, the direct benefits of recycling are that it:

- Increases longevity of existing landfills
- Prevents costly process of siting new landfills
- Prevents emissions of air/water pollutants
- Conserves energy
- Preserves resources
- Creates jobs
- Decreases green house emissions
- Stimulates development of greener technologies
- Cost savings from lower disposal fees, avoided labor and implementation expenses.

DGS also notes benefits to the community. There are also subtle economic returns from recycling:

- Avoided are the costs of collecting and burying "trash".
- The burden of future environmental cleanup and associated public health liabilities is reduced.
- Recycling also provides new jobs and affiliated industries.

Furthermore, communities that are viewed as being environmentally responsible are more likely to attract progressive industries and the workforce to run them. It is important to look at the whole chain of economic benefits from construction waste management and diversion. What may appear to be a break-even venture, or incur a slight cost

increase of a project, in fact has more return for a community than is initially apparent.

Section 5.408.4 Excavated soil and land clearing debris. CBSC is proposing the adoption of this section from the 2008 code to provide clarity to the code user regarding soil and land debris, reducing the amount of material going to the landfill. During the previous code adoption cycle, commenters and California Integrated Waste Management Board (CIWMB) staff stated that this provision is both doable and beneficial. This code cycle, a comment from a member of the wood products community questioned the efficacy of recycling stumps. Though no specific end uses of these materials are described in the measure, CIWMB posits that “the main point is to provide as many diversion options (as possible) and let the market determine the method.” Generally, it may be stated that the costs and benefits of recycling these C & D materials would be similar to those described above.

Section 5.410.1 Recycling by occupants and Section 5.410.1.1 Sample Ordinance. CBSC is proposing the adoption of this section from the 2008 code to provide clarity to the code user regarding the establishment of recycling areas for occupants. In Section 5.410.1.1, CBSC is proposing to provide direction to the code user regarding Space allocation for recycling areas. This section references the regulations developed by CIWMB. It also references the statutory authority which is known as the California Solid Waste Reuse and Recycling Access Act of 1991.

Section 5.410.2 Commissioning. Previously adopted as a voluntary measure in the 2008 CGBSC, building commissioning was initially proposed as mandatory for new buildings over 5000 square feet for the 2010 CGBSC in response to comments received that commissioning is effective in improving the efficiency of building systems and pays for itself over a short period of time. CBSC cites a 2004 study done by Lawrence Berkeley National Laboratory⁶.

A summary of the report by the authors indicates the following: “We analyze results from 224 buildings across 21 states, representing 30.4 million square feet of commissioned floor area (73 percent in existing buildings and 27 percent in new construction). These projects collectively represent \$17 million (\$2003) of commissioning investment. The new-construction cohort represents \$1.5 billion of total construction costs.

“We develop a detailed and uniform methodology for characterizing, analyzing, and synthesizing the results. For existing buildings, we found median commissioning costs of \$0.27/ft², whole-building energy savings of 15 percent, and payback times of 0.7 years. For new construction, median commissioning costs were \$1.00/ft² (0.6 percent of total construction costs), yielding a median payback time of 4.8 years (excluding quantified non-energy impacts).”

The summary goes on to describe additional savings realized through commissioning: “These results are conservative insofar as the scope of commissioning rarely spans all fuels and building systems in which savings may be found, not all recommendations are implemented, and significant first-cost and ongoing non-energy benefits are rarely quantified. Examples of the latter include reduced change-orders thanks to early detection of problems during design and construction, rather than after the fact, or correcting causes of premature equipment breakdown. Median one-time non-energy benefits were -\$0.18/ft²-year for existing buildings (10 cases) and -\$1.24/ft²-year for new construction (22 cases)—comparable to the entire cost of commissioning. . . .

“New-construction commissioning is more strongly driven by non-energy objectives such as overall building performance, thermal comfort, and indoor air quality, whereas existing-building commissioning is more strongly driven by energy savings objectives. The need for commissioning in new construction is indicated by our observation that the number of deficiencies identified in new-construction exceed that for existing buildings by a factor of three.”

In response to comments from the public and GB CAC, CBSC has modified this section to apply only to large projects 10,000 square feet and over. It established less complex provisions in new Section 5.410.3, below, for projects under 10,000.

Section 5.410.3 Testing, adjusting and balancing. These new provisions provide clarity to the code user for means of achieving quality control for building systems in projects under 10,000 feet as noted above. The costs are anticipated to be less than those for commissioning, but are anticipated still to provide significant benefits in reduced change orders, correction of fewer deficiencies, increased building performance, and occupant well-being.

Division 5.5 ENVIRONMENTAL QUALITY

The emphasis of this chapter addresses indoor air quality (IAQ), which is important to human health because individuals spend a large fraction of their time indoors at their residences, schools and workplaces.

The California Air Resources Board (ARB) and the California Department of Public Health (CDPH), during the last code adoption cycle and in this current cycle, assisted CBSC and the other proposing agencies with IAQ standards. Many of the standards refer to ARB VOC regulations or guidelines currently in place, and to other sources identified by ARB and CDPH.

Section 5.501.1 Scope. CBSC is proposing the adoption of this section to provide clarity to the code user regarding the measures contained in the CGBC. This section provides the code user with necessary general knowledge regarding the goals and items covered by this chapter.

Section 5.502.1 Definitions. CBSC is proposing the adoption of this section to provide clarity to the code user regarding the use of definitions. These definitions provide guidance to the user on the meaning of key words used within this chapter. Through adoption of these sections CBSC is providing the code user with clarity on proper use of terms that are used in the CGBC.

Section 5.503.1 Fireplaces. CBSC is proposing the adoption of this section from the 2008 code to provide clarity to the code user regarding the use of gas and wood burning appliances listed in this section. For those limited commercial applications such as multi-use rooms in churches, ski-lodges, and lounge areas of restaurants when a fireplace is desired, CBSC proposes to restrict the types of fireplaces that can be installed. The regulations are consistent with the requirements currently in Title 24, Part 6.

For gas appliances, the only ones allowed would be direct-vent, sealed combustion for the following reasons:

- Unvented gas fireplaces are not permitted for installation in California.
- Direct-vent are widely available and recommended by fireplace dealers, who stated in interviews that, while B-vent types are also available and cheaper, B-vents are usually only installed where direct-vent types cannot be.
- Since B-vents need to be ducted through the roof, they may also be more expensive to install, especially in a multi-story building.
- Direct-vent efficiency ratings run from 65% to 93%. Thus, the direct cost of the direct-vent gas fireplaces may be cheaper in terms of installation and will be offset over time compared to B-vents, which are typically not rated for efficiency.

Wood-burning fireplaces and stoves are regulated under the EPA's clean air act provisions, which are recognized in California by the Air Resources Board.

- Open wood-burning fireplaces are not allowed in new construction in California, and
- Some air districts, like the south coast's, prohibit all wood-burning appliances in new developments.

Regulating the types of fireplaces meets Health and Safety Code §18930(a) because, as amenities in new nonresidential construction, they are not required for heat but are typically installed for effect. The cost of direct-vent gas appliances may be offset with energy efficiency and cheaper installation. Wood-burning appliances are already regulated at state and local levels, and these provisions do not conflict with those regulations.

Section 5.504.2 Indoor air quality (IAQ) post-construction. CBSC is proposing the adoption of this section from the 2008 code to provide clarity to the code user regarding the use of temporary ventilation after construction is complete. The provisions of this section are consistent with best practices for health safety measures relating to IAQ during post-construction.

During the last code cycle, CBSC worked with the Air Resources Board (ARB) to develop the language, declining to include testing protocol suggested by a commenter. ARB advises building flush-out after construction in all cases, with a need for air testing only if an IAQ problem arises or when mitigation efforts need to be measured for their effectiveness. Also, scientific consensus has not been achieved for testing methodology and acceptable pollutant levels.

Based on the data collected from various sources and a case study performed, it appears that the cost to implement the flush-out requirements can vary depending on the size of the building, the climate zone and the time of the year (summer vs. winter) with the winter being more expensive.

Flush-out cost for various building sizes in a climate zone similar to San Jose California for 14 days during the winter months can be estimated as follows:

- 20,000 sf: $20,000 \times 0.77 \text{ cents/sf/day} = \$154.00 \text{ day} \times 14 \text{ days} = \$2,156.00$;
- 40,000 sf: $40,000 \times 0.77 \text{ cents/sf/day} = \$308.00 \text{ day} \times 14 \text{ days} = \$4,312.00$;
- 60,000 sf: $60,000 \times 0.77 \text{ cents/sf/day} = \$462.00 \text{ day} \times 14 \text{ days} = \$6,468.00$;
- 100,000 sf: $100,000 \times 0.77 \text{ cents/sf/day} = \$770.00 \text{ day} \times 14 \text{ days} = \$10,780.00$

The cost is minimal when compared with the overall building construction costs (based on a \$150/sf cost). A 20,000 sf building $\times \$150/\text{sf} = 3 \text{ million}$ would cost about .01% to flush out, with the ratio holding true for other size buildings at that construction cost.

While incurring minimal costs, the flush out benefits are significant as they provide healthy indoor air quality by removing contaminants found in materials, finishes and furnishings that gradually off-gas into the interior space. These contaminants include volatile and semi-volatile organic compounds (VOCs and SVOCs) and small particulate substances that act as eye and throat irritants. Reduction of VOC and SVOCs not only promotes healthier indoor air quality for occupants but also leads to a more pleasant environment by reducing the objectionable odors found in newly occupied buildings. Reducing air contaminants and odors from buildings occupied by workers should increase employee productivity and reduce employee health claims relating to indoor air quality.

After receiving comments from the GB CAC and the industry coalition as to the need for commercial buildings to be occupied as soon as possible after substantial completion, ARB recommended mitigating language to allow for early occupancy than the original proposal, which was derived from CHPS. This would allow the building owner to gain some income during this period and lessen the cost impact.

Section 5.504.3 Covering of air ducts and protection of mechanical equipment during construction. CBSC is proposing the adoption of this section from the 2008 code to eliminate uncertainty and provide clarity to the code user regarding the covering of duct systems and equipment during construction. Unprotected ducts for heating and air conditioning equipment can accumulate dust, debris and other airborne contaminants during the construction process

and contribute to poor indoor air quality. This proposal will require ducts and equipment to be covered or sealed to prevent the contamination during construction.

Section 5.504.4 Finish material pollutant control 5.504.4.1 Adhesives and sealants, 5.504.4.2 Paints and coatings, Table 5.504.4.1 and Table 5.504.4.2. CBSC is proposing the adoption of these sections to provide clarity to the code user regarding indoor air quality. Most indoor air pollution comes from sources inside the building. Paints, stains, adhesives, carpeting, upholstery, manufactured wood products, pesticides, and cleaning agents may emit volatile organic compounds (VOCs), including formaldehyde. Research shows that some VOCs can cause chronic and acute health effects at high concentrations, and some are known carcinogens. Low to moderate levels of multiple VOCs may also produce acute reactions. CBSC is proposing adoption of VOC limits applicable statewide developed by the ARB and is including tables to assist the code user in identification of the VOC limits for adhesives, sealants, paints and other coatings.

Sections: 5.504.4.3 Carpet systems, 5.504.4.3.1 Carpet cushion and 5.504.4.3.2 Carpet adhesive. CBSC is proposing the adoption of these sections to provide clarity to the code user regarding indoor air quality. Most indoor air pollution comes from sources inside the building. Paints, stains, adhesives, carpeting, upholstery, manufactured wood products, pesticides, and cleaning agents may emit volatile organic compounds (VOCs), including formaldehyde. Research shows that some VOCs can cause chronic and acute health effects at high concentrations, and some are known carcinogens. Low to moderate levels of multiple VOCs may also produce acute reactions. CBSC is proposing carpet systems be labeled or documented to meet the Carpet and Rug Institute's (CRI) Green Label Plus program. Green Label Plus carpeting is currently widely available.

Sections: 5.504.4.4 Composite wood products. CBSC is proposing the adoption of this section and subsections to provide clarity to the code user regarding the use of formaldehyde in interior finish materials. In buildings, the most significant sources of formaldehyde are likely to be pressed wood products made using adhesives that contain urea-formaldehyde (UF) resins. Formaldehyde exposure at elevated levels (above 0.1 parts per million) may cause a wide range of health related issues. Pressed wood products made for indoor use include: particleboard (used as sub-flooring and shelving and in cabinetry and furniture); hardwood plywood paneling (used for decorative wall covering and used in cabinets and furniture); and medium density fiberboard (used for drawer fronts, cabinets, and furniture tops). Medium density fiberboard contains a higher resin-to-wood ratio than other UF pressed wood product and is generally recognized as being the highest formaldehyde-emitting pressed wood product. Recent regulations promulgated by ARB are cited for these composite wood products.

Section 5.504.4.7 Resilient flooring systems. CBSC is proposing the adoption of this section to provide clarity to the code user regarding VOC emissions of interior resilient flooring systems. Emission limits are based on the Collaborative for High Performance Schools (CHPS) Low-emitting Materials List or the FloorScore certification standards developed by the Resilient Floor Covering Institute (RFCI). The availability of product lines on the CHPS list and/or certified as FloorScore compliant is quite robust, and CBSC staff contacted several listed manufacturers, including Armstrong, Mannington, Stainmaster, and Roppe. All of these manufacturers' products are certified by RFCI in conjunction with Scientific Certification Systems (SCS). These manufacturers also stated that they no longer offer products that do not comply. Therefore, for the long list of manufacturers and products on the CHPS list, there is no cost comparison to non-complying products and there is an adequate supply of product.

Section 5.504.5.3 Filters. CBSC is proposing the adoption of this section to provide clarity to the code user regarding outdoor air contaminants that enter the building. CBSC is proposing as mandatory the installation of HVAC filters with at least a Minimum Efficiency Reporting Value (MERV) of 8. This filter features 100% synthetic electrolytically charged filtration media, which actively attracts and holds airborne contaminants.

The direct cost of such filters is minimal compared to MERV 5 filters. A 2002 report in the Indoor Air journal on filter efficiency authored in part by personnel from the Lawrence Berkeley National Laboratory, W.J. Fisk and D. Faulkner, indicates cost of filtration in a typical office building, relative to no filtration. "With a supply airflow rate per occupant typical of US office buildings the corresponding filtration cost range is \$0.70 to \$1.80 per person per month, which is insignificant relative to the salaries, rent, or health insurance costs." More efficient filters reside at the higher end of the range.

Direct costs are less of a challenge than possible peripheral costs which might result from choosing an HVAC system with higher MERV filtration.

- Upsizing mechanical units or increasing fan motor amperage and
- More frequent replacement of higher MERV filters, which will collect more particulate matter and will clog easier than MERV 5.

Manufacturers representatives from Carrier and mechanical engineers consulted opined that

- "Going to a MERV 8 should not increase the size of the HVAC system other than the smallest size offerings of light commercial equipment, and most likely only if the filter module would be external to the unit versus integrated within the enclosure".
- The fan motors, which apparently operate within a range, would most likely not be affected (except maybe light commercial). "Fan motor amperage draw would increase if the filter media area was not increased by increasing the depth of the filter from the normal 1-inch for a MERV 5 'construction' filter, to 2 inches for a pleated MERV 8, like a Farr 30/30 or an AAF Perfect Pleat Ultra. The HVAC equipment manufacturers

should be able to accommodate the code change by offering 2-inch filter tracks on all affected equipment, either as a standard or as a low-cost accessory.”

- Some see the need to implement a more stringent filter change program to ensure that the MERV 8 filters are being routinely replaced.

Benefits of MERV 8 filters include:

- Reducing intake of outside air pollutants and promoting a healthier indoor air quality (IAQ) for occupants, producing a healthier working environment and reducing objectionable outside odors and air contaminants in buildings.
- Also, upgrading the standard from MERV 5 to MERV 8 not only improves the IAQ for the occupants, it better protects the heat transfer equipment in the airstream, improving the kW/ton performance of the refrigeration cycle.

Section 5.504.6 Ozone depletion and greenhouse gas reductions; Sections 5.504.6.1 CFCs, and 5.504.6.2

Halons. CBSC is proposing the adoption of these sections to provide clarity to the code user regarding the installation of HVAC, refrigeration, and fire suppression systems that use chlorofluorocarbons (CFCs) and halons. The 2008 code included, and this is proposed for the new code, a voluntary prohibition against the use of hydrochlorofluorocarbons (HCFCs) in these systems. Making such a provision mandatory currently would be difficult, because there are no effective substitutes. HCFCs are slated by the Montreal Protocol and federal government to be phased out completely by 2030. HCFCs also have much shorter atmospheric lifetimes than CFCs and thus present less of a greenhouse gas and ozone hazard.

Currently, federal law prohibits the use of CFCs and halons in new installations, but they are still available for use in existing systems. Since CBSC’s provisions in this code are intended to apply to new construction, there appears to be no option but to comply and assist with the reduction of GHG emission from structures, one of the primary goals of the CGBSC.

Section 5.504.7 Environmental tobacco smoke (ETS) control. CBSC is proposing the adoption of this section to provide clarity to the code user regarding the elimination of environmental tobacco smoke and its impact on indoor and outdoor air quality.

This provision imposes some design restrictions for locating building openings such as doors, operable windows and air intakes, but only if an outdoor smoking area is provided. There are no additional costs associated with incorporating this into a design, and minimal ones for posting signage to inform building inhabitants and visitors of restricted areas. The benefits are the health and well-being of building occupants not exposed to second-hand smoke.

Section 5.505.1 Indoor moisture control. CBSC is proposing the adoption of this section to provide clarity to the code user regarding moisture control. CBSC is proposing to include references to direct the code user to the California Building Code for general ventilation and moisture control requirements. CBSC is including these requirements to address moisture and mold issues that can affect indoor air quality.

Section 5.506.1 Outside air delivery. CBSC is proposing the adoption of this section to provide clarity to the code user regarding the mechanical or natural delivery of outdoor air to buildings. CBSC is proposing to include references to direct the code user to the California Energy Code, Title 24, Part 6 and Title 8, Chapter 4 for requirements.

Section 5.506.2 Carbon dioxide (CO₂) monitoring. CBSC is proposing the adoption of this section to provide clarity to the code user regarding carbon dioxide monitoring systems to protect occupant health and minimize GHG emissions. It is limited to buildings equipped with demand control ventilation and as provided in the California Energy Code, Part 6, Title 24.

5.507.5 Acoustical control, 5.507.5.1 Exterior noise transmission, and 5.507.5.2 Interior sound. CBSC is proposing the adoption of these sections to provide clarity to the code user regarding environmental acoustics. Cost information on exterior walls meeting the requirement for at least STC 50 includes:

- Many common exterior wall assemblies meet the STC 50 rating; it is simply a matter of choosing one to meet the STC 50 or better, resulting in no extra cost.
- Specifying STC 30 windows may or may not add cost depending on the quality of the windows, allowing choices that could result in no extra cost.
- CBSC initially proposed a mandatory standard for interior party walls with an STC rating of 50. This could most easily be achieved with a sound assembly using resilient channels, which CBSC learned would cost about 15% more than a similar assembly with no sound rating. After public comment from industry representatives, CBSC has lowered the rating to 40, which is more readily achievable than 50 and should be adequate for commercial application. If the walls in question have a fire rating, most assemblies exceed 40. STC 50 is largely dependent on staggered studs and resilient channels, and is required primarily in multi-family housing, where people need privacy and quiet for rest and relaxation.
- Any other method of achieving the required STC is allowable provided it is shown to achieve the required rating.

These are no- or low-cost requirements that would provide a positive health and psychological impact on building occupants subject to the provisions of these sections. The provisions potentially save employers, the state, and health insurers money through healthy work attendance and increased productivity.

CHAPTER 6. REFERENCED STANDARDS

CBSC is proposing renumbering and maintaining this California chapter.

Section: 601.1 General. CBSC is proposing the renumbering and amendment of this section to provide clarity to the code user regarding standards referenced in the CGBSC. This section provides the code user with contact information and references cited for organizations that have developed standards referenced or used in the CGBSC.

CHAPTER 7. INSTALLER AND THIRD PARTY QUALIFICATIONS

CBSC is proposing renumbering and maintaining this California chapter.

Sections: 701, 702 and 703. CBSC is proposing the maintenance of the section headings of this California chapter to eliminate uncertainty and provide clarity to the code user. Currently, CBSC is not proposing to adopt any new requirements for installers or third party inspectors. In future adoption packages CBSC may develop training or certification requirement for persons involved with the verification of some technical installations contained in the CGBSC.

CHAPTER 11. APPLICATION CHECKLISTS AND WORKSHEETS in the 2008 CGBSC is being reformatted and renumbered. In Chapter 8 are located the Water Use Worksheets and new forms to assist code users with implementation of Section 5.408, Construction Waste Management. CBSC is proposing adoption of application checklists in a new California appendix, A5, Division A5.7.

APPENDIX A5. NONRESIDENTIAL VOLUNTARY MEASURES

The following nonresidential new building standards proposed as voluntary for the 2010 version of the code are now found in Appendix A5. Like Chapter 5, this appendix is divided into divisions, each of which covers topics from the 2008 code's chapters 4 through 8, respectively, as well as some from the 2008's Appendix A. These are included to provide code users with optional standards they may want to consider incorporating into the design and construction of new nonresidential occupancy buildings.

Division A5.1 SITE PLANNING AND DESIGN

Section A5.101.1 General. CBSC proposes the repeal of Section A101.1, Scope, and proposes adoption of this new California section to provide clarity to the code user regarding the measures contained in the CGBSC. This section provides the code user with necessary general knowledge regarding the intent of this chapter. CBSC also proposes in a preface to recognize the authority of local jurisdictions over land use policies and encourage those entities to coordinate land use and planning with this code. CBSC proposes in the preference references to provisions in SB 375 (Stats 2008, Ch. 728) to provide clarity to the code user. This standard, recommended by ARB, assists that agency with local projects' and jurisdictions' meeting ARB's GHG target.

Section A5.102.1 Definitions. CBSC is proposing renumbering this section to provide clarity to the code user regarding the use of definitions. These definitions provide guidance to the user on the meaning of words used within this chapter. Through adoption of these sections CBSC is providing the code user with clarity on proper use of terms that are used in the CGBSC. CBSC proposes the repeal of the definition of "wattles", which is no longer used in the nonresidential standards.

Section A5.103.1 Community connectivity. CBSC proposes a new section to provide clarity to the code user regarding, to the extent possible, locating a building project near neighborhood services. Voluntary compliance would encourage walking and use of transit as transportation modes to and from the project, thus reducing traffic and the resulting greenhouse gas emissions.

Section A5.103.2 Brownfield or greyfield site redevelopment or infill area development. CBSC proposes a new section to provide clarity to the code user regarding, to the extent possible, locating a building project on a greyfield, infill area, or fully remediated Brownfield,. Voluntary compliance should lessen impacts of building on undeveloped land.

Section A5.104.1 Plan to protect or restore habitat and A5.104.2 Reduce development footprint and optimize open space. CBSC initially proposed these new sections to provide clarity to the code user regarding conservation and restoration of open space features when building on greenfield sites. These preserve habitat for wildlife and native plants, allow for percolation of stormwater, and create pleasant surroundings for building occupants. In response to a "disapprove" recommendation by the GB CAC on A5.104.1, citing potential conflicts with state and federal laws, CBSC has withdrawn A5.104.1 for further study in the next code cycle. It is retaining A5.104.2, renumbering it, in response to support of open space requirements by the environmental community.

Section A5.104.5 Birds. CBSC initially proposed a new section to provide clarity to the code user regarding measures recommended when building adjacent to migratory bird paths or open space. Reflective glass buildings kill millions of protected species of birds each year, and buildings lighted at night cause migrating birds to stray from their paths. This measure would reduce the decline of bird populations, which are already impacted by loss of habitat to development on both ends of their migrations; however, this received a "disapprove" recommendation from the GB CAC and has raised concerns from the AIA about potential professional liability. Despite stated support from CEC staff, CBSC is withdrawing this provision for further study in the next code adoption cycle.

Sections A5.105.1.1 Existing building structure and A5.105.1.2 Existing non-structural elements

CBSC is renumbering and maintaining this voluntary section from the 2008 CGBSC to provide clarity to the code user regarding measures to conserve resources and reduce waste and transportation impacts. **Section A5105.1.3 Salvage** has been amended based on public comment during code development.

Section A5.106.1.2 Storm water design. CBSC is renumbering and maintaining this voluntary section from the 2008 CGBSC to provide clarity to the code user regarding means to achieve pre-project hydrology and pollutant loading.

Section A5.106.3 Low impact development (LID). CBSC proposes a new voluntary section to provide clarity to the code user regarding measures to reduce stormwater runoff from projects and enhance groundwater recharge, listing strategies recommended by the State Water Resources Control Board and the US Environmental Protection Agency.

Section A5.106.5.1 Designated parking for fuel efficient vehicles. CBSC proposes two new “tier” sections to provide clarity to the code user regarding reduction of single occupant automobile use and its impacts on development and pollution. The tiers allow code users to provide designated parking at more restrictive levels of 10% and 12% than the 8% for this cost-effective standard in the mandatory section of the code, 5.106.5.

Section A5.106.5.2 Electric vehicle charging. CBSC is renumbering and maintaining this voluntary section from the 2008 CGBSC to provide clarity to the code user regarding measures to encourage the use of plug-in electric vehicles as low-emission alternatives to gasoline-powered vehicles.

Section A5.106.6 Parking capacity. CBSC is renumbering and maintaining this voluntary section from the 2008 CGBSC to provide clarity to the code user regarding reduction of on-site parking, as approved locally, to encourage building occupants to use public transit or other means of transportation. It could also result in a reduction of paved area that produces stormwater runoff, heat island effects, and loss of open space.

Sections A5.106.7 Exterior wall shading and A5.106.8 Air conditioner condensing unit shading. Making reference to provisions in the California Energy Code, these sections are intended to reduce the heat island effect of building walls and enhance the efficiency of air conditioner condensing units. While there may be a cost associated with man-made or vegetative shade devices, if integrated into the design of the building and site, such devices should add little to the cost of a project. It would be anticipated that mitigating surface heat from buildings and increased building occupant comfort would offset what small additional costs the devices might incur. There is a pointer to Chapter 7A of the California Building Code for shading material limitations in wildland-urban interface (WUI) areas. After a “disapproval” recommendation from the GB CAC on A5.106.8, CBSC is withdrawing the air conditioner section for further study in the next code adoption cycle, but retaining the pointer to the WUI regulations for exterior wall shading with vegetation.

Section A5.106.9 Building orientation. CBSC is renumbering and maintaining this voluntary section from the 2008 CGBSC to provide clarity to the code user regarding, when site conditions permit, orienting the building for passive heating and cooling, intended to save energy used by mechanical systems.

Section A5.106.11 Heat island effect. CBSC is proposing this voluntary section as a recognized method for reducing global warming. This section was originally proposed for the 2008 CGBSC, but was withdrawn by CBSC in response to public comment. Both ARB and CEC recommend standards for non-roof (site and paving) and roof reduction of heat island effect, because, aside from saving energy for cooling buildings, they reduce greenhouse gases such as CO₂ and ozone that energy generation and urban heat create. The roof standards have two tiers of achievement intended for mitigation of heat.

Division A5.2 ENERGY EFFICIENCY

Section A5.201.1 Scope. This section provides clarity to the code user regarding voluntary means of achieving enhanced building energy efficiency in this division.

Section A5.202.1 Definitions. CBSC is proposing renumbering this section to provide clarity to the code user regarding the use of definitions. These definitions provide guidance to the user on the meaning of words used within this chapter. Through adoption of these sections CBSC is providing the code user with clarity on proper use of terms that are used in the CGBSC. CBSC proposes the addition of a new definition for “Grid Neutral” describe projects that produce their own electricity.

Section A5.203.1 Energy performance. CBSC is renumbering and maintaining this voluntary section from the 2008 CGBSC to provide clarity to the code user regarding reduction of energy use and GHG emissions in two tiers of efficiency above the requirements in the California Energy Code. A minor amendment is proposed to reference CEC’s 2008 Energy Efficiency Standards instead of the 2007 edition of the 2007 energy code. The standards do not go into effect until at least January 1, 2010.

Section A5.204.1 ENERGY STAR equipment and appliances. CBSC is renumbering and maintaining this voluntary section from the 2008 CGBSC to provide clarity to the code user regarding a prescriptive measure to save energy with builder-installed units.

Section A5.204.2 Energy monitoring. CBSC is renumbering and maintaining this voluntary section from the 2008 CGBSC to provide clarity to the code user regarding recording building energy use to track consumption and increase energy efficiency.

Section A5.204.3 Demand response. CBSC is renumbering and maintaining this voluntary section from the 2008 CGBSC to provide clarity to the code user regarding automated demand response strategies to reduce peak HVAC demand and total lighting load.

Section A5.204.4 Building orientation and shading. CBSC is proposing only a reference to the provisions in Section A5.106.11.

Section A5.211.1 On-site renewable energy. CBSC is renumbering and maintaining this voluntary section from the 2008 CGBSC to provide clarity to the code user regarding means of providing clean energy from sources other than power plants, either on- or off the grid.

Section A5.211.2 Green power. CBSC is renumbering and maintaining this voluntary section from the 2008 CGBSC to provide clarity to the code user regarding encouraging utility customers to participate in local utilities' renewable energy programs, if offered.

Section A5.211.3 Prewiring for future solar. CBSC proposes to add a new voluntary section to provide clarity to the code user regarding prewiring for future roof-mounted solar installations, both on- and off-grid.

Section A5.212.1 Elevators and escalators. CBSC is renumbering and maintaining this voluntary section from the 2008 CGBSC to provide clarity to the code user regarding controls to reduce the electrical demand of these systems during non-peak usage.

Section A5.213 Energy efficient steel framing. CBSC is renumbering and maintaining this voluntary section from the 2008 CGBSC to provide clarity to the code user regarding avoiding thermal bridging in steel framing.

Division A5.3 WATER EFFICIENCY AND CONSERVATION

Section A5.301.1 Scope. This section provides clarity to the code user regarding voluntary means of achieving enhanced water efficiency indoors and outdoors in this division.

Section A5.302.1 Definitions. CBSC is proposing renumbering this section to provide clarity to the code user regarding the use of definitions. These definitions provide guidance to the user on the meaning of words used within this chapter. CBSC proposes the addition of a new definition for "Plants" to describe adaptive plants as distinguished from invasive plants.

Section A5.303.1.1.1 Outdoor potable water use. CBSC is proposing a new voluntary reach standard to provide clarity to the code user regarding installation of a separate landscape water meter for landscape areas between 500 and 1000 square feet.

Section A5.303.2.1 30% Savings. CBSC is proposing a new voluntary reach standard to provide clarity to the code user regarding indoor water use conservation. This provision exceeds the mandatory indoor water use requirement by 10% and is considered easily reachable by commenters to CBSC. In new Sections A5.303.2.2 and A5.303.2.3, 35% and 40% savings, respectively, CBSC proposes more stringent standards for which the code user may reach in the interest of assisting California with water conservation.

Section A5.503.3 Appliances. CBSC is renumbering and maintaining this voluntary section from the 2008 CGBSC to provide clarity to the code user regarding indoor water use conservation of appliances.

Section A5.303.5 Dual plumbing. CBSC is renumbering and maintaining this voluntary section from the 2008 CGBSC to provide clarity to the code user regarding providing dual plumbing in new buildings when recycled water is available.

Section A5.304.3 Potable water reduction and A5.304.4 Potable water elimination. CBSC is renumbering and amending this voluntary section from the 2008 CGBSC to provide clarity to the code user regarding a target reductions of 50%, 60% and 100% in water use conservation in irrigation systems to meet the goals of the CGBSC.

Sections A5.304.5 Restoration of areas disturbed by construction and A5.304.6 Previously developed sites. CBSC proposes a new voluntary section to provide clarity to the code user regarding restoration of landscape areas disturbed during construction and on previously developed or graded sites by planting with local native/adapted vegetation. The purposes are to mitigate stormwater runoff and to encourage the planting of adaptive, non-invasive vegetation.

Section A5.304.7 Graywater irrigation system. CBSC is renumbering and maintaining this voluntary section from the 2008 CGBSC to provide clarity to the code user regarding a method to assist in the target reduction water use conservation measures.

Section 604.5 Rainwater or stormwater collection systems. CBSC proposes to repeal this section from the 2008 CGBSC, since CBSC has included a section on low-impact development in Division A5.1.

Division A5.4 MATERIAL CONSERVATION AND RESOURCE EFFICIENCY

Section A5.404.1 Wood framing systems. CBSC is renumbering and maintaining this voluntary section from the 2008 CGBSC to provide clarity to the code user regarding conservation of materials and labor in wood construction.

Section A5.402.1 Definitions. CBSC is proposing renumbering this section to provide clarity to the code user regarding the use of definitions. These definitions provide guidance to the user on the meaning of words used within this chapter/

Section A5.404.1 and Section A5.404.1.1 Structural Integrity. CBSC is renumbering and moving forward this voluntary section from the 2008 CGBSC regarding wood framing to provide clarity to the code user regarding maintaining the safety of the structure while utilizing the advanced framing methods of conservation of wood in construction. CBSC proposes minor amendments to caution that fire-rated assemblies can neither be compromised in employing optimal value engineering.

Section A5.404.1.2 Framing Specifications. CBSC is renumbering and moving forward this voluntary section from the 2008 CGBSC to provide clarity to the code user regarding techniques recognized as advanced framing.

Section A5.405.1 Regional materials. CBSC is renumbering and moving forward this voluntary section from the 2008 CGBSC to provide clarity to the code user regarding conservation of material through utilization of locally produced materials.

Sections A5.405.2 Bio-based materials. CBSC is renumbering and moving forward this voluntary section from the 2008 CGBSC to provide clarity to the code user regarding conservation of material through utilization of renewable building materials. These include rapidly renewable building materials. CBSC was unable to achieve consensus with stakeholders on the issue of certified wood and will continue to develop a standard through the next code cycle.

Sections A5.405.3 and A5.405.4, Reused and recycled materials. CBSC is renumbering and amending this voluntary section from the 2008 CGBSC to provide clarity to the code user regarding utilization of recycled materials and use of existing or salvaged materials with decreased embodied energy. Proposed are two levels of achievement, recommended by ARB and CEC based on availability of materials, of 10% and 15% recycled content based on estimated cost of materials.

Section A5.405.5 Cement and concrete. CBSC is amending and moving forward this voluntary section from the 2008 CGBSC to provide clarity to the code user regarding conservation of material through utilization of supplementary cementitious materials (SCMs) in the manufacture of cement and concrete. These standards were recommended by CalTrans engineers and others as applicable to cement and concrete in nonresidential buildings, unless otherwise directed by the project engineer. Additional considerations including alternate fuels, power generation, recycled or reclaimed water, and recycled aggregates are proposed.

Section A5.406.1 Choice of materials. CBSC is renumbering and moving forward this voluntary section and subsections from the 2008 CGBSC to provide clarity to the code user regarding selective use of materials utilizing specific criteria, thus saving cost, indoor air quality, and raw materials.

Section A5.408.3.1 Enhanced construction waste reduction. CBSC is proposing new voluntary reach standards to provide clarity to the code user regarding increased construction waste diversion through recycling or salvage to 65% for Tier 1 and 80% for Tier 2, keeping consistency with 15% increments. CBSC staff, in its research interviews with contractors on the mandatory proposal at 50%, found that some contractors are already exceeding 50% and are able to meet these standards.

Section A5.409.1 Materials and system assemblies. CBSC is renumbering, reformatting and moving forward this voluntary section from the 2008 CGBSC to provide clarity to the code user regarding life cycle analysis. The section provide nonregulatory references to software and information about life cycle assessment of materials to select those with the lowest embodied energy and GHG potentials.

Division A5.5 ENVIRONMENTAL QUALITY

A5.504.1 Indoor air quality during construction. CBSC is renumbering and moving forward this voluntary section and subsections from the 2008 CGBSC to provide clarity to the code user regarding providing temporary ventilation during construction. CBSC proposes a minor amendment to delete the requirement for MERV 13 filters to be installed prior to occupancy.

Section A5.502.1 Definitions. CBSC is proposing renumbering this section to provide clarity to the code user regarding the use of definitions. These definitions provide guidance to the user on the meaning of words used within this chapter. CBSC is repealing a definition in the 2008 code for "HVAC units, small", which is no longer needed, and is adding definitions proposed by ARB to provide clarity to the code user concerning formaldehyde resins used in composite wood.

Section A5.504.4.5.1 Early compliance with formaldehyde limits. CBSC is renumbering and moving forward this voluntary section from the 2008 CGBSC to provide clarity to the code user regarding early compliance with formaldehyde limits established in ARB's phased regulations. CBSC proposes an amendment to for a Tier 1 reach standard for no-added formaldehyde resins and a Tier 2 for ultra-low emitting formaldehyde resins at the recommendation of the ARB.

Sections A5.504.4.7 Resilient flooring systems Tier 1 and A.504.4.7.1 Resilient flooring systems, Tier 2. CBSC proposes these new voluntary reach standards to provide clarity to the code user regarding VOC emissions of interior resilient flooring systems. The levels of voluntary compliance are 80% and 90%, respectively, of floor area scheduled to receive resilient flooring.

Section A5.504.4.8 Thermal Insulation, Tier 1 and A5.504.8.1 Thermal Insulation, Tier 2. CBSC is proposing to move this voluntary standard forward into Appendix A5 of the 2010 CGBSC as a Tier 1 reach standard for thermal insulation. CBSC proposes to add a new standard for No-Added Formaldehyde thermal insulation which, when added to the Tier 1 standard, provides a Tier 2 reach option.

Section A5.504.4.9 Acoustical ceilings and wall panels. CBSC is renumbering and moving forward this voluntary section from the 2008 CGBSC to provide clarity to the code user regarding VOC emissions of interior acoustical ceiling and wall panels.

Section A5.504.5 Hazardous particulates and chemical pollutants. CBSC is renumbering and moving forward this voluntary section and subsections from the 2008 CGBSC to provide clarity to the code user regarding minimizing and controlling pollutant entry into buildings and cross-contamination of regularly occupied areas.

Section A5.504.5.3.1 Filters. CBSC proposes a new voluntary section to provide clarity to the code user regarding improving indoor air quality through the use of air filtration media with a MERV 13 rating.

Section A5.507.1 Lighting and thermal comfort controls, A5.507.1.1 Single-occupant spaces, A5.507.1.1.1 Lighting, A5.507.1.1.2 Thermal comfort, and A5.507.1.2 Multi-occupant spaces. CBSC is renumbering and moving forward this voluntary section from the 2008 CGBSC to provide clarity to the code user regarding the use of individual environmental controls, within the parameters of the California Energy Code, that would provide a positive health and psychological impact on persons utilizing the provisions of these sections.

Section A5.507.2 Survey of indoor environmental quality. CBSC initially proposed the renumbering, amending, and moving forward this voluntary section from the 2008 CGBSC to provide clarity to the code user regarding the use of occupant surveys that would provide a positive health and psychological impact on persons utilizing the provisions of this section. The provisions would potentially save employers, the state, and health insurers money through healthy work attendance and increased productivity. The amendments would make clearer that this is the building owner's option. However, on a "disapproval" recommendation of the GB CAC based on this not applying directly to a newly constructed building, but coming along well after occupancy, CBSC has elected to withdraw this section for further study in a future code adoption cycle.

A5.507.3 Daylight, A5.507.4 Views, A5.507.4.1 Interior office spaces, and A5.507.4.2 Multi-occupant spaces CBSC is renumbering and moving forward this voluntary section from the 2008 CGBSC to provide clarity to the code user regarding connectivity to the outdoor environment that, within the parameters of the California Energy Code, would provide a positive health and psychological impact on persons utilizing the provisions of these sections. The provisions potentially save employers, the state, and health insurers money through healthy work attendance and increased productivity.

Sections A5.508.1.3 Hydrochlorofluorocarbons (HCFCs) and A5.508.1.4 Hydrofluorocarbons (HFCs). CBSC proposes new voluntary sections recommended by CDPH to provide clarity to the code user regarding the installation of HVAC and refrigeration equipment that does not contain these ozone-depleting and global warming chemicals. The chemicals, while not as harmful as chlorofluorocarbons, are being phased out by EPA in the coming years and replacement products are becoming available.

Division A5.6 VOLUNTARY TIERS

Sections A5.601.2 and A5.601.3, CALGREEN TIER 1 and TIER 2, respectively, build on the voluntary reach standards for energy efficiency above the California Energy Code in Section A5.203.1. In addition to the 15% and 30% increased energy savings, these voluntary standards include additional measures from Appendix A5 for compliance with each tier. The tiers are intended for adoption by cities, counties, and cities and counties desiring to go beyond the base code to and assist the state in achieving the goals of AB 32.

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

¹ California Energy Demand 2008-1018 Staff Revised Forecast, California Energy Commission, November 2007, CEC-200-2007-015-sf2

² California Construction Review, August 27, 2007; reports almost \$21 billion in private nonresidential construction (does not include public sector).

³ Third-year report of progress of California's Sustainable Building Task Force in response to Governor Gray Davis' Executive Order D-16-00.

⁴ S. Abbaszadeh, L. Zagreus, D. Lehrer, and C. Huizenga (Center for the Built Environment, U.C. Berkeley), Occupant Satisfaction with Indoor Environmental Quality in Green Buildings, 2006

⁵ Including LEED NC 2.2, Green Globes, the Collaborative for High Performance Schools, Global Green, draft ASHRAE 189P, NAHB/ICC.

⁶ Mills, E., H. Friedman, T. Powell, N. Bourassa, D. Claridge, T. Haasl, and M.A. Piette. 2004, "The Cost-Effectiveness of Commercial Buildings Commissioning: A Meta-Analysis of Existing Buildings and New Construction in the United States." (Lawrence Berkeley National Laboratory Report No. 56637.)

CONSIDERATION OF REASONABLE ALTERNATIVES

CBSC considered alternative measures to be brought forward as mandatory into the 2010 CGBSC. Following the Governor's veto messages during the 2007-2008 legislative session, some mandatory measures are needed to move the

state forward in implementation of AB 32, among other things. The measures selected were vetted with a focus group of state agency representatives, industry representatives, and environmental advocates, and the ones presented are those that are cost effective and achievable. Voluntary measures are retained in an appendix for code users and local jurisdictions to apply as they determine appropriate. Keeping a mix of mandatory and voluntary measures will allow designers, builders, and building inspectors and officials a learning period and flexibility of application.

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

No alternatives were identified to lessen the adverse impact on small businesses, because the mandatory measures were analyzed as to cost-benefit and were seen to be beneficial to builders.

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

- The third-year report of progress of California's Sustainable Building Task Force in response to Governor Gray Davis' Executive Order D-16-00 indicates that an increase in upfront construction costs for green features, especially in the energy sector, will be paid back during the life of a building.
- CBSC has done reviews of the cost impacts weighed against the benefits on the individual measures, which are cited above.

DUPLICATION OR CONFLICTS WITH FEDERAL REGULATIONS

Federal regulations may be adopted for use in California by those state and local agencies with authority for clean air, clean water, water conservation, energy conservation, and waste management. Those regulations may be cited in the proposed guidelines as they are applied in California.