

**CALIFORNIA BUILDING STANDARDS COMMISSION  
GREEN BUILDING  
WORKSHOP**

**October 30, 2014 - Agenda Item 5d**

**DRAFT EXPRESS TERMS for the 2016  
CALIFORNIA GREEN BUILDING STANDARDS CODE,  
(CALGreen), PART 11,  
CALIFORNIA BUILDING STANDARDS CODE,  
TITLE 24, CALIFORNIA CODE OF REGULATIONS**

- **Statement of specific purpose, problem, rationale and benefits:**

A California stakeholder (Ed Pike from Energy Solutions in support of PG&E) is proposing the following:

1. Amend existing mandatory and/or voluntary plumbing fixture flow rates to make them more water efficient.
2. Propose new mandatory and/or voluntary requirements for commercial kitchen equipment.
3. Propose new mandatory and/or voluntary requirements for outdoor water use.

**History:**

Water is essential for supporting and sustaining California's environmental, economic, and public health needs. Improving water efficiency is a well-established statewide policy goal. Legislation enacted in 2009 (SB X7 7) established the goal of achieving a 20 percent reduction in urban per capita water use in California by 2020. In addition, California's Global Warming Action Plan calls for establishing indoor and outdoor water efficiency standards and water recycling to help achieve California's greenhouse gas reduction goals. Twenty percent of the electricity used in California is attributed to water supply, conveyance, treatment, and distribution. The California Public Utilities Commission has directed the Investor Owned Utilities (electricity utilities) to pursue water efficiency activities to help achieve energy savings goals.

A 2014 study of the economic impacts of the current drought concluded that the 2014 drought will result in a total statewide economic cost of \$2.2 billion, with a total loss of 17,100 seasonal and part-time jobs.<sup>1</sup>

CALGreen provides an opportunity to achieve additional water savings in response to these policies by strengthening existing mandatory and/or voluntary requirements for both indoor and outdoor water use. A number of government and non-government entities have made substantial progress establishing water efficiency standards, which can serve as a model for updates to the CALGreen water efficiency standards. The standards listed below have been established through public vetting processes:

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<sup>1</sup> University of California Davis Center for Watershed Sciences. 2014. *Economic Analysis of the 2014 Drought for California Agriculture*. Available online at: [https://watershed.ucdavis.edu/files/biblio/DroughtReport\\_23July2014\\_0.pdf](https://watershed.ucdavis.edu/files/biblio/DroughtReport_23July2014_0.pdf).

- California's Model Water Efficiency Landscape Ordinance (MWELO)
  - Developed by the California Department of Water Resources through a public rulemaking process. More information available at: <http://www.water.ca.gov/wateruseefficiency/landscapeordinance/>
- WaterSense® Specifications
  - Developed by the United States Environmental Protection Agency, WaterSense Program through a public vetting process. More information available at: <http://www.epa.gov/watersense/index.html>.
- ENERGY STAR® Specifications
  - Developed by the United States Department of Energy, Energy Star Program through a public vetting process. More information available at: <http://www.energystar.gov/>.
- 2012 Green Plumbing and Mechanical Code Supplement: For Use with all Codes (IAPMO GPMCS)
  - Developed by the International Association of Plumbing and Mechanical Officials through a public vetting process. More information available at: [http://www.iapmo.org/pages/iapmo\\_green.aspx](http://www.iapmo.org/pages/iapmo_green.aspx).
- ASHRAE Standard 189.1 Standard for the Design of High-Performance, Green Buildings: Except Low-Rise Residential Buildings
  - Developed by ASHRAE through a public vetting process. More information available at: <https://www.ashrae.org/resources--publications/bookstore/standard-189-1>.
- Leadership in Energy and Environmental Design (LEED) Building Design and Construction Rating System, Version 4
  - Developed by the United States Green Building Council through a public vetting process. More information available at: <http://www.usgbc.org/leed#overview>.
- International Green Construction Code
  - Developed by the International Code Council through a public vetting process. More information available at: <http://www.iccsafe.org/CS/IGCC/Pages/default.aspx>
- Other standards that have been developed with input from industry stakeholders through a public review process.

- **Rationale for Proposed Code Changes:**

Despite well-established policy goals, water supplies are rapidly diminishing due to ongoing extreme drought, shifts in regional climate patterns, and population growth. On January 17, 2014 Governor Brown proclaimed a State of Emergency and directed state agencies to take emergency actions to prepare for and respond to drought conditions. California urgently needs to address its water shortage by deploying all possible solutions, including establishing more stringent water efficiency standards. For nonresidential buildings, the proposed changes will impact indoor water use, including water use from commercial

kitchen equipment, and potentially also outdoor water use for landscaping. The rationale for water conserving plumbing fixtures and fittings, commercial kitchen fixtures, and outdoor water use are provided below.

### Water Conserving Plumbing Fixtures and Fittings

Restroom water use is the largest indoor water use in most commercial buildings. In recent years, technological innovation has resulted in plumbing fixtures that use less water while maintaining the same high-quality performance users expect. Dual-flush toilets and waterless urinals and “pint” urinals that consume 0.125 gallons per flush (gpf), or one pint per flush, have been gaining market share. Codes and Standards Enhancement (CASE) Initiative Reports developed in 2013 for California’s Appliance Efficiency Standards (Title 20) Rulemaking conclude that efficiency standard for water closets and urinals that are more stringent than the current CALGreen standards are technically feasible and cost effective.

Compliant products are readily available and adopting more stringent standards would result in cost savings to individual consumers and the state. The Title 20 CASE Reports state that more stringent standards are justified for all products sold in California.<sup>2</sup> The same efficiency levels are also justified for all new construction, particularly because plumbing systems in new buildings can be designed with the more efficient fixture standards in mind. The proposed urinal standard will result in an estimated annual savings of 110 million gallons per year and an embedded electricity savings of 1.1 GWh per year in 2027.

In addition to proposed mandatory requirements based on the Title 20 proposals, voluntary requirements for indoor water use may be appropriate. One change to consider is updating the indoor water budget requirements to allow the use of non-potable water (such as rainwater, on-site gray water, or recycled water) for flushing toilets and urinals in nonresidential buildings as an alternative compliance option.

Existing CALGreen voluntary standards may also be feasible as mandatory standards, such as the existing voluntary requirements for clothes washers and dishwashers.

Finally, the water efficiency requirements for showerheads were updated during the 2013 code cycle. One issue that was not addressed fully during the 2013 cycle was the necessity to install a shower valve that is capable of meeting temperature control performance requirements at the lower flowrate as required by the new showerhead efficiency requirements. To prevent scalding due to mismatched shower valves, it may be prudent to include a provision that requires shower valves to meet the temperature control requirements at a flow rate of 2.0 gallons per minute or lower.

### Commercial Kitchen Fixtures

Approximately 15 percent of total water use in commercial and institutional facilities occurs in commercial food service facilities, with over half of the water for food preparation and dishwashing.<sup>3</sup> CALGreen does have voluntary standards for commercial kitchen equipment ice makers, steamers and ice makers. However, other model codes like ASHRAE 189.1 and the IAPMO Green Plumbing and Mechanical Code Supplement include more robust standards as shown below in Table 1 below in the discussion of potential code language.

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<sup>2</sup> Title 20 CASE Report for Toilets and Urinal Water Efficiency (2013), Statewide Utility Codes and Standards Team. [http://www.energy.ca.gov/appliances/2013rulemaking/documents/proposals/12-AAER-2C\\_Water\\_Appliances/California\\_IOUs\\_and\\_Natural\\_Resources\\_defense\\_Councils\\_Responses\\_to\\_the\\_Invitation\\_for\\_Standards\\_Proposals\\_for\\_Toilets\\_and\\_Urinals\\_2013-07-29\\_TN-71765.pdf](http://www.energy.ca.gov/appliances/2013rulemaking/documents/proposals/12-AAER-2C_Water_Appliances/California_IOUs_and_Natural_Resources_defense_Councils_Responses_to_the_Invitation_for_Standards_Proposals_for_Toilets_and_Urinals_2013-07-29_TN-71765.pdf).

<sup>3</sup> EPA WaterSense. <http://www.epa.gov/watersense/commercial/types.html#tabs-restaurants>.

ENERGY STAR has also established water efficiency standards for ice makers and commercial dishwashers, while WaterSense has established standards for pre-rinse spray valves. Given California's water shortage, it is important that CALGreen's water efficiency standards for commercial kitchen equipment adopt all feasible model codes.

### Outdoor Water Use

Landscaping accounts for nearly half of urban water usage in California.<sup>4</sup> While outdoor water use accounts for a significant portion of urban water use, there are not many existing requirements for outdoor water use in current building codes. As a result, establishing requirements for outdoor water use can result in significant water savings, especially for new construction that falls below the applicability thresholds of California's Model Water Efficiency Landscape Ordinance.

Several of the existing CALGreen voluntary standards pertaining to irrigation and landscaping in nonresidential building sites may be well-suited as mandatory standards. In fact, a number of local jurisdictions have already adopted voluntary CALGreen provisions into their municipal code, thereby making CALGreen standards mandatory in their jurisdictions. This demonstrates that the existing voluntary CALGreen standards are viable in a range of geographic regions and climates.<sup>5</sup> These measures are expected to result in additional potential water savings if adopted as mandatory state-wide standards, with the specific level of savings dependent on the level of stringency adopted.

In addition, applicability of additional requirement could be considered for the voluntary section of the code based on specific MWELO requirements for non-residential facilities less than 2500 square feet. One example is Section 492.15 stormwater management to recharge groundwater and protect water quality. Sections A5.304.2.1 and 5.304.2 contain examples of outdoor water requirements on facilities that are either greater than 500 square feet or 1000 square feet. Potential revisions to the outdoor water use requirements in CALGreen are under consideration, and no specific changes to these water standards are proposed at this time.

- **Proposed code language for the 2015 Triennial Code Adoption Cycle**

## **NONRESIDENTIAL MANDATORY MEASURES**

### **SECTION 5.303 INDOOR WATER USE**

#### **5.303.3 Water Conserving Fixtures and Fittings**

**5.303.3.1 Water closets.** The ~~effective~~ maximum flush volume of all water closets shall not exceed 1.28 gallons per flush. The effective flush volume of dual flush toilets shall not exceed 1.06 gallons per flush. Tank-type water closets shall be certified to the performance criteria of the U.S. EPA WaterSense<sup>®</sup> Specification for Tank-Type Toilets.

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<sup>4</sup> California Water Plan Update 2013 — Public Review Draft. <http://www.waterplan.water.ca.gov/cwpu2013/prd/>.

<sup>5</sup> Cities and Towns within the counties of Los Angeles, Marin, Napa, Santa Clara, Sonoma, and Ventura have adopted CALGreen voluntary standards related to outdoor water usage into their codes.

**Note:** The effective flush volume of a dual flush toilet is defined as the composite, average flush volume of two reduced volume flushes and one full volume flush.

**5.303.3.2 Urinals.** The effective flush volume of urinals shall not exceed ~~0.5~~ 0.125 gallons per flush.

**5.303.3.3.3 Shower Valves.** Shower valves shall meet the temperature control performance requirements of ASSE 1016 or ASME A112.18.1/CSA B125.1 when tested at 2.0 gpm (0.13 L/s).

*Additional items that are being considered include:*

- *Water budget: A percent reduction similar to the current voluntary A5.3 could be considered.*
- *Commercial clothes washers and dishwashers: Move existing voluntary CALGreen requirements in Section A5.303.3 to the mandatory section of CALGreen. The existing voluntary language is provided below for reference:*

**A5.303.3 Appliances and fixtures for commercial applications.** Appliances and fixtures shall meet the following:

1. Clothes washers shall have a maximum Water Factor (WF) that will reduced the use of water by 10 percent below the California Energy Commissions' WF standards for commercial clothes washers located in Title 20 of the California Code of Regulations.
2. Dishwashers shall meet the following water use standards:
  - a. Residential—ENERGY STAR.
    - i. Standard Dishwasher – 4.25 gallons per cycle.
    - ii. Compact Dishwasher – 3.5 gallons per cycle.
  - b. Commercial—refer to Table A5.303.3.

TABLE A5.303.3  
COMMERCIAL DISHWASHER WATER USE

TYPE	HIGH-TEMPERATURE— MAXIMUM GALLONS PER RACK	CHEMICAL—MAXIMUM GALLONS PER RACK
Conveyer	0.70 (2.6 L)	0.62 (4.4 L)
Door	0.95 (3.6 L)	1.16 (2.6 L) [BSC] 2.26 (8.6 L) [DSA-SS]
Undercounter	0.90 (3.4 L)	0.98 (3.7 L)

**5.303.4 [New Mandatory Section] Appliances and Fixtures for Commercial Applications**

*The exact CALGreen efficiency levels for commercial kitchen equipment have not been determined. It is recommended that the standards be based on existing standards in LEED (version 4), the IAPMO GPMCS, IGCC and/or ASHRAE 189.1, some of which are in turn based on ENERGY STAR Specifications. The table below provides a summary of the existing requirements in IAPMO GPMCS and ASHRAE 189.1. Throughout the rulemaking process, it will be determined if the commercial kitchen equipment standards should be mandatory or voluntary standards in CALGreen; and whether to include a performance option that provides an overall water savings target as an alternative to installation of specific measures.*

**Table 1: Potential Requirements for Commercial Kitchen Equipment, based on ASHRAE 189.1-2011 or 2012 IAPMO GPMCS**

Product	Current CALGreen Standard	ASHRAE 189.1 Standard	IAPMO GPMCS	LEED	Additional Codes	
Cubed Ice Makers	A5.303.3(3) Ice makers shall be air cooled	Shall use air-cooled machines compliant with ENERGY STAR® requirements	<b>406.1.1 Ice Makers.</b> Ice makers shall be air cooled and shall be in accordance with Energy Star for commercial ice machines.	X	IGCC	
Connectionless Steam Cooker	A5.303.3(4) Food steamers shall be connectionless or boilerless	Shall use boilerless/ connectionless food steamer with max water use of 2.0 gallons per hour in full operation mode.	<b>406.1.2 Food Steamers.</b> All steamers shall consume not more than 5.0 gallons (19 L) per hour per steamer pan in the full operational mode.	X	IGCC	
Connected Steam Cooker				X	IGCC	
Rack-based Dishwashers	Table A5.303.3 Commercial Dishwasher Water Use		ENERGY STAR  max water factor of 5.8 gallons per full operating cycle	X	IGCC	
	<b>Type</b>	<b>High-temperature—Maximum Gallons per Rack</b>				<b>Chemical—Maximum Gallons per Rack</b>
	Conveyer	0.70 (2.6L)				0.62 (4.4L)
	Door	0.95 (3.6L)				1.16 (2.6L) [BSC] 2.26 (8.6L) [DSA-SS]
Undercounter	0.90 (3.4L)	0.98 (3.7L)				
Combination Ovens (boiler-based)	A5.303.3(6) Combination ovens shall not consume more than 10 gph (38 L/h) in full operation mode.	Max water use of 10 gallons per hour in full operational mode	<b>406.1.3 Combination Ovens.</b> Combination ovens shall not consume more than 3.5 gph (13 L/h) per pan in full operation al mode.	X	IGCC	
Dipper Wells	No standards in CALGreen	N/A	<b>406.1.5 Dipper Well Faucets.</b> Where dipper wells are installed, the water supply to a dipper well shall have a shutoff valve and flow control. The flow of water into a dipper well shall be limited by at least one of the following methods:  (1) <b>Maximum Continuous Flow.</b> Water flow shall not exceed the water capacity of the dipper well in one minute at supply pressure of 60 psi (414 kPa), and the maximum flow shall not exceed 2.2 gpm (0.14 L/s) at a supply pressure of 60 psi (414 kPa). The water capacity of a		IGCC	

			dipper well shall be the maximum amount of water that the fixture can hold before water flows into the drain. (2) <b>Metered Flow.</b> The volume of water dispensed into a dipper well in each activation cycle of a self closing fixture fitting shall not exceed the water capacity of the dipper well, and the maximum flow shall not exceed 2.2 gpm (0.14 L/x) at a supply pressure of 60 psi (414) kPa).		
Commercial Kitchen Faucets	No standards in CALGreen	Hands-free in food prep and in dish room of commercial kitchen			
Grease Interceptors	No standards in CALGreen	No standard	<b>406.1.4 Grease Interceptors.</b> Grease interceptor maintenance procedures shall not include post-pumping/cleaning refill using potable water. Refill shall be by connect4ed appliance accumulated discharge only.		
Pre-rinse Spray Valve	A5.303.3 limits to 1.6 gpm with cleaning requirement	Max water use of 1.3 gpm and comply with a 26-second performance requirement when tested with ASME F234	<b>402.7 Commercial Pre-Rinse Spray Valves.</b> The flow rate for a pre-rinse spray valve installed in a commercial kitchen to remove food waste from cookware and dishes prior to cleaning shall not be more than 1.3 gpm (0.08L/s) at 60 psi (414kPa). Where pre-rinse spray valves with maximum flow rates of 1.0 gpm (0.06L/s) or less are installed, the static pressure shall be not less than 30 psi (207 kPa). Commercial kitchen pre-rinse spray valves shall be equipped with an integral automatic shutoff.	X	WaterSense, IGCC

**SECTION 5.304  
OUTDOOR WATER USE**

**5.304 Outdoor Water Use**

*Specific CALGreen efficiency levels for outdoor water usage, and whether such measures should be mandatory or voluntary, have not been determined. We recommend that the current voluntary measures presented in Table 2 be considered for inclusion in the mandatory section of the code.*

**Table 2: Existing CALGreen Nonresidential Voluntary Measures that Could be Considered for Inclusion in the Mandatory Section of CALGreen**

<b>CALGreen Section #</b>	<b>Measure Name</b>	<b>Description</b>
A5.304.2.1	Outdoor potable water use	Water meters for areas >500 square feet and <1000 square feet (the applicability threshold for 5.304.2.1)
A5.304.4	Potable Water Reduction	Reduce potable water use by amount equal to between 60% and 100% of evapotranspiration rate through use of plant type, irrigation method, greywater, recycled water, treated waste or rainwater
A5.304.6	Restoration of areas disrupted by construction; Previously developed sites	Use of native and/or adaptive plants
A5.305.2	Irrigation systems	Use of recycled water

**NONRESIDENTIAL VOLUNTARY MEASURES**

**SECTION A5.303  
INDOOR WATER USE**

**A5.303.1 Water Conserving Fixtures and Fittings**

**A5.303.1.1 Water closets.** All water closets shall be either:

1. Single-flush with a maximum flush volume that does not exceed 1.06 gallons per flush; or
2. Dual-flush and compliant with 5.303.3.1.

Tank-type water closets shall be certified to the performance criteria of the U.S. EPA WaterSense Specification for Tank-Type Toilets.



### **A5.303.3 Appliances and Fixtures for Commercial Applications**

*See Table 1 above for examples of commercial kitchen standards that could be adopted into CALGreen. The exact CALGreen efficiency levels for commercial kitchen equipment have not been determined. Throughout the rulemaking process, it will be determined if the commercial kitchen equipment standards should be mandatory or voluntary standards in CALGreen and whether to include a performance option that provides an overall water savings target as an alternative to installation of specific measures.*

## **SECTION A5.304 OUTDOOR WATER USE**

### **A5.304.4 Potable water reduction**

*Under consideration.*