

**To:** Simon Lee, The California Energy Commission.

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**Date:** February 9, 2015

**Re:** Recommended Improvements for 2016 California Title 24 Building Codes

California Energy Commission

**DOCKETED**

**15-BSTD-01**

**TN # 74625**

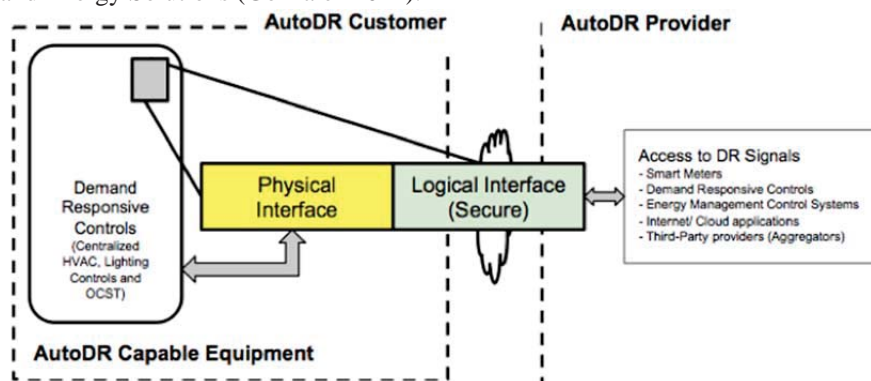
**FEB 20 2015**

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### I. General Recommendations

- More technical detail should be added in the code language using diagrams and/or more specific terms and explanations on how demand-responsive controls (or AutoDR capable equipment) can receive and respond to the AutoDR signals from an external provider, including links to the physical and the logical interfaces. The below figure shows an example of such detail. There are additional illustrations in the published documents from Southern California Edison (Energy Design Resources 2014) and Energy Solutions (Gonzalez 2014).



**Figure:** Mapping Physical and Logical Interfaces for Demand Response Signals  
(Ghatikar et al. 2015)

- Code-triggers for retrofits should be clearly defined for indoor lighting controls and HVAC systems. Some publicly available references suggest that 2013 Title 24 compliance is required when at least 10% of luminaires in a given space are altered. (Lutron 2014), but there are no specific requirements for the code triggering retrofits mentioned in 2013 Title 24 codes.

- Acceptance testing processes and compliance requirements should be clearly explained. For example, steps required to simulate a DR signal is not clearly described. This lack of clarity leaves open-ended questions and confusion within the industry to develop AutoDR compliant products. From where does the control receive a signal? Is the signal a standards-based messaging protocol?
- A list of requirements for the standards-based messaging protocol, not just for the OCSTs, should be clearer. For example, in case of OpenADR 2.0, there are testing and certification procedures required to comply with OpenADR 2.0 standards. Such clarity in language ensures interoperability between the customer systems and utility's DR signals, but this is not the case for all SGIP standards that don't have certification for interoperability. The self-certification for OCST and sign lighting would mean that the systems installed by the customers might not be interoperable with any utility's DR signals.
  - *"the communications capabilities shall enable demand responsive control through receipt of DR signals based on communications standards" (CEC 2013)*

## II. Technical Recommendations

### 1. California Title 24 Building Code

- Architects and engineers are used to learning the technical details from diagrams, and it is critical to summarize the requirements in succinct formats to follow through easily and clearly. Communicate information visually by adding tables and figures. For example:
  - Which equipment and systems should be enabled for Auto-DR?
  - How can CA Title 24 help architects and engineers explain the concept of Auto-DR to their clients?
  - How do architects and engineers draft equipment and system with Auto-DR capabilities on our drawings?
  - What equipment and systems do we need to enable for Auto-DR?
  - How do we meet the testing requirements and what is the procedure that we need to go through step-by-step?
- It is challenging to cross reference information between two documents, 2013 Title 24 codes and reference appendices.

#### a. General Provisions

##### SECTION 100.1 - DEFINITIONS AND RULES OF CONSTRUCTION

- *"Demand Responsive Control" is a kind of control that is capable of receiving and automatically responding to a demand responsive signal.*
  - Would the control to be allowed to receive a signal manually?
  - Should the control receive and/or respond to a signal automatically?
  - What does it exactly mean by "a kind of control" and "capable"? In what components of communication architecture?
  - What signal? e.g. event, DR, and/or pricing etc? Include definitions of price and event signal from reference appendices.
- A figure that explains how DDC and EMCS are automatically receiving and sending a signal from the utility company and/or the entity selected by an occupant would be very helpful.
- The definition of "Standards based Messaging protocol" is missing in section 100.1. Clearly list standards-based messaging protocols as shown below:

1. Open Standards – Communication with entities outside the Connected R/F System that enables connected functionality (sections 4D, 4F, 4G and 4H) must use, for all communication layers, standards that are:
  - a. Included in the Smart Grid Interoperability Panel (SGIP) Catalog of Standards,<sup>1</sup> and/or
  - b. Included in the NIST Smart Grid framework Tables 4.1 and 4.2, and/or
  - c. Adopted by the American National Standards Institute (ANSI) or another well-established international standards organization such as the International Organization for Standardization (ISO), International Electrotechnical Commission (IEC), International Telecommunication Union (ITU), Institute of Electrical and Electronics Engineers (IEEE), or Internet Engineering Task Force (IETF).

(Reference: ENERGY STAR® Program Requirements Product Specification for Residential Refrigerators and Freezers Eligibility Criteria Version 5.0)

**b. Requirements of HVAC Systems and Equipment**

**SECTION 120.2 – REQUIRED CONTROLS FOR SPACE-CONDITIONING SYSTEMS**

- The definition of “Automatic demand shed control” is missing in section 100.1. We need to verify if the control needs a capability of receiving or responding to a signal automatically.

**Refer to SECTION 150.1 – PERFORMANCE AND PRESCRIPTIVE COMPLIANCE APPROACHES FOR NEWLY CONSTRUCTED RESIDENTIAL BUILDINGS**

- Specific description is needed - the signal needs to be receiving or responding automatically.

**c. Requirements of Lighting Controls and Equipment**

**SECTION 130.1 – INDOOR LIGHTING CONTROLS THAT SHALL BE INSTALLED**

- *Section 130.1 (h) Lighting power in buildings larger than 10,000 square feet shall be capable of being automatically reduced in response to a Demand Response Signal*
  - Building area (conditioned and unconditioned) larger than 10,000 square feet
  - Should all the controls need to be enabled for Auto-DR?
  - Specific explanations need to be added on how lighting power (which lighting controllers) shall be capable of being automatically reduced in response to a Demand Response Signal.
  - The word, “reduced,” is not consistently used in other parts of the sections. Instead, it is often worded, “receiving and automatically responding to a demand responsive signal.”

**SECTION 130.5 – ELECTRICAL POWER DISTRIBUTION SYSTEMS**

- The underlined part should be added to the definition of “Demand Responsive Control” in Section 100.1 if it is true that any demand responsive controls should automatically respond to at least one standards based messaging protocol.

*(e) Demand responsive controls and equipment. Demand responsive controls and equipment shall be capable of receiving and automatically responding to at least one standards based messaging protocol which enables demand response after receiving a demand response signal.*

**2. Reference Appendices**

**Appendix JA5 - Technical Specifications For Occupant Controlled Smart Thermostats (OCST)**

- Parts about communication architecture and techniques are not written in an intuitive language for architects and engineers to understand. Too many technical terms are used, and they are not clearly defined and there are no figures. *Illustrated examples describing how price signals with pricing information, DR signals, and event responses are sent and received by the OCST should be added.*

**References**

California Energy Commission (CEC), Building Energy Efficiency Standards, 2013

Energy Design Resources, “Automated Demand Response in New Construction: Technical Design Guidelines,” First Edition, 2014.

Ghatikar, G., E. H. Y. Sung, and M.A. Piette, “Diffusion of Automated Grid Transactions Through Energy Efficiency Codes,” European Council for an Energy Efficient Economy (ECEEE), 2015 (In press).

Gonzalez, A., H. Hauenstein, G. Ghatikar, and P. Eilert, “Unlocking the Smart Grid Through Building Codes and Communication Standards: Code Opportunities to Increase DR Transactions,” ACEEE, 2014.

Lutron, “CA Title 24 Lighting and Receptacle Control Requirements for Commercial Buildings,” 2014