



DEPARTMENT OF GENERAL SERVICES

**Recommendations and Progress
for Implementing
Energy Efficiency Measures
in State Facilities**

**Pursuant to Government Code
15814.22 and 15814.28**

December 3, 2010

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pursuant to G.C. 15814.22 and 15814.28**

Overview

This report provides recommendations for energy efficiency measures to be taken in State facilities as required by Government Code (GC) Sections 15814.28 and 15814.22. The requirements of these two statutes are as follows:

15814.28. *The department shall, no later than March 1, 2009, and biennially thereafter, make the recommendations required in Section 15814.22, and report on all of the following for projects under its jurisdiction:*

- (a) The progress made toward implementing energy efficiency measures in State facilities.*
- (b) The most common energy efficiency measures being implemented.*
- (c) The obstacles preventing further implementation of energy efficiency measures.*
- (d) How current efforts and ideas can be incorporated into the Governor's five-year infrastructure plan described in Section 13102.*

15814.22. *The Department of General Services, in consultation with the California Energy Resources Conservation and Development Commission and other State agencies and departments, shall develop a multiyear plan, to be updated biennially, with the goal of exploiting all practicable and cost-effective energy efficiency measures in State facilities. The department shall coordinate plan implementation efforts, and make recommendations to the Governor and the Legislature to achieve energy efficiency goals for State facilities.*

Progress Report – Government Code 15814.28 (a)

In accordance with GC Section 15814.28 (a), the DGS is to report on the progress made toward implementing energy efficiency measures in State facilities. Progress on this and a variety of other related measures is reported quarterly to the Green Action Team (GAT). Progress as of November 2008 is summarized in the table on the following page. Additional information can be found in the GAT meeting notes (<http://www.green.ca.gov/GreenActionTeam/meetings.htm>) on the State's green website¹.

¹ The State's green website (www.green.ca.gov) provides an overview and web links to information about a multitude of green efforts.

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	Objective	Progress to Date
LEED – New Construction (NC) Silver	<p>Attain LEED Silver standard for all new and renovated State buildings over 10,000 square feet (SF).</p> <p>Same for buildings under 10,000 SF but certification not required.</p>	<ul style="list-style-type: none"> • DGS is meeting these objectives by having all new and renovated buildings designed and constructed to a minimum of LEED Silver standards. • 13 buildings have received formal certifications (3-Gold, 6-Silver, 4-Certified). • The remaining 222 buildings in the portfolio have been designed to meet LEED Silver standards, and are in the design or construction phase. When construction is complete, formal certifications will be sought for the 208 buildings over 10,000 SF. • The DGS has implemented policy and a commissioning toolkit for State agencies to conduct in-house commissioning of small buildings. • The DGS and Caltrans were awarded the State’s first LEED-CI Silver award for the build-out of 17,000 SF of 11th floor space in the District 07 Headquarters Building.

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	Objective	Progress to Date
LEED – Existing Buildings (EB)	<p>Attain LEED-EB standard for all DGS State-occupied buildings over 50,000 SF.</p> <p>Same for buildings under 10,000 SF, but certification not required.</p>	<ul style="list-style-type: none"> • The DGS received USGBC approval for pilot volume certification program. • The DGS has contracted with CTG Energetics to provide LEED-EB certification, recertification, and training. • 59 facilities will have site assessments complete by March 2009. • LEED-EB Certification Goal is to have 24 buildings of the total 60 buildings over 50,000 SF certified by December 2009: <ul style="list-style-type: none"> • 6 buildings have <u>received</u> LEED-EB Certification: (2 Platinum and 4 Gold). • 6 buildings scheduled to submit to USGBC on January 31, 2009. • 4 buildings scheduled to submit to USGBC on April 31, 2009. • 4 buildings scheduled to submit to USGBC on July 1, 2009. • 4 buildings scheduled to submit to USGBC on August 31, 2009. • LEED-EB Overview Training: <ul style="list-style-type: none"> • First session begins December 1, 2008 at the Ziggurat Auditorium in West Sacramento. • Second session set for January 2009 in Southern California. • Third session set for March 2009- time and place TBD. • LEED-EB Accredited Professional Training -Six week course, 2 hours per session: <ul style="list-style-type: none"> • February 2009 – time and place TBD. • September 2009 - time and place TBD.
Benchmarking	<p>Benchmark all occupied State facilities by 2007 (nearly 1,500 benchmarkable facilities representing more than 100 million SF) with results to be delivered April 2008.</p>	<ul style="list-style-type: none"> • Energy Star Portfolio Manager benchmarking accounts have been created and initial energy data has been posted for virtually all State facilities under the Executive Branch’s jurisdiction. • The DGS conducted training for State agencies on how to access and utilize data in the Portfolio Manager system. • Additional training is being developed to help agencies identify and prioritize those facilities that would benefit most from utility-provided site audits, energy efficiency projects, and retro-commissioning.

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	Objective	Progress to Date
Retro-Commissioning (RCx)	<p>Retro-Commission approximately 90 buildings greater than 50,000 SF by June 30, 2013.</p> <p>Each building re-commissioned every five years after initial retro-commissioning.</p>	<ul style="list-style-type: none"> • 25 RCx projects are at or nearing completion. • The energy efficiency measures implemented to date have a verified electricity savings of 10.3%. Projected electricity savings for measures yet to be implemented is 14.9%. Projected natural gas savings is 16%. • A total of 18 more buildings are underway; investigative reports are due March 2009.
Energy Star Leasing	<p>Seek Energy Star leases for space over 5,000 SF beginning in 2006 for new leases and in 2008 for existing leases.</p>	<ul style="list-style-type: none"> • 71 Energy Star scored leases out of 1,855 total. • All build-to-suit leases will be LEED-Silver: <ul style="list-style-type: none"> • 4 are completed (DMV in Clovis, Riverside, Hollywood, and Tracy), • 1 in construction (CHP in Sacramento) • 6 projects in design (DMV in Rancho Cucamonga, Lodi, Stockton, El Monte, Thousand Palms, and DIR in San Luis Obispo). • 2,000 letters were sent advising lessors of Energy Star preference. • 1,160 additional letters/emails were sent to general commercial market expressing the State's preference for Energy Star, and requesting the real estate community's support in this effort.

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	Objective	Progress to Date
Solar and Other Clean On-Site Generation	Evaluate the merits of clean on-site generation for all new or renovated buildings.	<ul style="list-style-type: none"> • Eight solar photovoltaic (PV) projects completed since 2006, providing 4.2 megawatts on line. • As of October 21, 2008, Phase II Solar RFP III, 16 CSU solar projects awarded for a total of 8 megawatts. • Developing a Master Service Agreement for the pursuit of additional solar PV installations at State facilities. • Developing a new Request for Proposal for additional large solar PV projects at State facilities. • SMUD funded feasibility study completed for potential biomass fueled energy generation system at Folsom State Prison. Final report not yet issued. Discussions underway on implementation strategy. • Stanford Mansion fuel cell construction completed; currently in start up and commissioning phase. • Discussions underway with SoCal Edison and PG&E for installation of fuel cell systems at State facilities. Evaluating siting opportunities. • Assisting CalFire with siting of potential biomass energy generation project at Parlin Forks Conservation Camp. Technical feasibility study in process. • Coordinating with California Department of Corrections and Rehabilitation (CDCR) to evaluate and pursue wind energy generation opportunities at several CDCR facilities with sufficient wind resources.

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Common Energy Efficiency Measures – G.C. 15814.28(b)

Subdivision (b) of Section 15814.28 of the Government Code directs the DGS to report on the most common energy efficiency measures being implemented.

Based on the RCx studies that have been completed, the most common energy efficiency measures being implemented in State facilities include:

1. Optimized HVAC and lighting scheduling
2. HVAC economizer optimization
3. VAV box calibration
4. Variable frequency drives
5. Occupancy sensors
6. Optimize sequence of operations for control systems
7. Control systems upgrades

Preliminary audits received from energy services companies indicate the most common energy efficiency measures implemented during the energy retrofit projects will be:

1. Lighting upgrades
2. Boiler replacements
3. Chiller replacements
4. Motor replacements

Obstacles – G.C. 15814.28(c)

Subdivision (c) directs the DGS to report on obstacles preventing further implementation of energy efficiency measures.

The primary obstacle faced by the DGS in carrying out Green Building Action Plan strategies is lack of funding for the diagnostic, design and development activities that must be conducted as a precursor to implementing energy efficiency measures. The “greening” of new and existing buildings provides opportunities to save energy, reduce greenhouse gas emissions, and deliver other benefits such as water savings, lower operating costs, and occupant health and productivity improvements.

Construction of new green buildings is relatively straight forward, with all green building measures included in the appropriated project budgets. However, new buildings represent a relatively small percentage of the potential to capture significant benefits in terms of energy and greenhouse gas reductions. Retro-commissioning or retrofitting existing buildings account for the majority of the opportunity.

Aside from the normal State budget process, there currently is no special mechanism for funding the implementation of energy efficiency measures in existing buildings, which are achieved primarily through retro-commissioning and retrofit projects. RCx

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projects diagnose and optimize (tune-up) existing systems and equipment, while retrofit projects replace older equipment with more efficient equipment. The RCx projects completed thus far by DGS have reduced electricity usages by approximately 10 percent and natural gas usages by approximately 16 percent.

The implementation of energy efficiency improvements requires an initial investment for diagnostic evaluations, project design, and development activities, which is then recovered in the form of reduced or avoided future costs of energy and avoided costs of operations and maintenance. The RCx projects completed by DGS have required an initial investment of approximately \$0.85 to \$1.25 per square foot for diagnostic studies and simultaneous implementation of “tune-up” measures, which is recovered within two to three years. This relatively short payback period, coupled with “soft” costs of financing and administration, make financing these projects not practical.

To date, RCx projects have been funded out of existing operations and maintenance (O&M) budgets, but since project implementation and payback timelines span multiple fiscal years, it is not possible for future cost avoidances to offset the funding required for subsequent projects. Moreover, diverting O&M funds from critical maintenance and repair projects to pay for RCx projects would be counter-productive by undermining efforts to improve overall building energy efficiency.

Retrofit projects, on the other hand, require much larger initial investments that are recovered over longer periods such as 10 years or more. Some of the investment can be offset by utility incentive programs, and most of the remainder can be financed through the DGS Golden State Financial Marketplace (GS \$Mart) program, or utility “on-bill financing” programs. However, project design and development must be completed before these financings can be sought, and funding for this has not been appropriated and is not available from other sources.

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Long Range Planning – G.C. 15814.28(d)

Subdivision (d) directs the DGS to report on how current efforts and ideas can be incorporated into the Governor's five-year infrastructure plan described in Section 13102.

For the past several years, the DGS' five-year infrastructure plan has reported the energy efficiency measures utilized in the department's facilities planning. The DGS' Fall update to the plan for Fiscal Year 2009-10 contains a number of planning measures specifically associated with energy efficiency including:

1. The California Global Warming Solutions Act of 2006 (AB 32) related to climate change and greenhouse gas emissions reduction initiatives arising from the improvement of existing buildings; and
2. Energy Efficiency and Sustainable Building Measures directed by EO D-16-00 and EO S-20-04, including objectives for LEED certification of existing State buildings.

The Green Building Initiative – G.C. 15814.22

The requirements set forth in GC Section 15814.22 are being met through the Governor's [Executive Order \(EO\) S-20-04](#), the [Green Building Action Plan](#), and the Green Action Team, collectively referred to as the Green Building Initiative (GBI).

The Green Action Team

The Green Action Team (GAT) was established in conjunction with issuance of EO S-20-04 specifically to oversee and direct progress toward the goals of the Order and the accompanying Green Building Action Plan. The GAT is chaired by the Secretary of the State and Consumer Services Agency, and includes as members the Director of the Department of Finance, the Secretary of the Business, Transportation, and Housing Agency, the Secretary of the Environmental Protection Agency, the Secretary of the Resources Agency, and the Secretary of Education. The Chair of the California Energy Commission, the assigned California Public Utilities Commission Commissioner, and a representative from the real estate industry also actively participate. The Department of General Services (DGS) provides staff support to the GAT.

The Green Building Action Plan states that the GAT, in cooperation with other agencies and organizations as appropriate, shall oversee and direct progress toward the goals of the Green Building Order (EO S-20-04), and shall recommend any additional actions, mandates or legislation that may be warranted to ensure progress consistent with the Green Building Order.

The efforts directed by the GAT fulfill the requirements described in the two Government Code sections cited above. The Green Building Action Plan essentially meets the requirements of both Section 5814.22 and Section 15814.28 by providing a multiyear plan designed to explore and implement all practical and cost-effective energy efficiency

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measures in State facilities. The plan also provides the recommended methods for achieving energy efficiency goals for State facilities. In providing staff support to the GAT, the DGS is coordinating plan implementation efforts.

The GAT meets quarterly and reviews progress on the various efforts to implement energy efficiency measures. Specific status reports are provided by implementation teams for each of the primary initiatives, and other relevant information and topics are shared and discussed.

The Green Building Action Plan

EO S-20-04, along with the Green Building Action Plan and the GAT are collectively referred to as the GBI. The GBI specifies:

1. That the State commit to aggressive action to reduce State building electricity usage by retrofitting, building, and operating the most energy and resource efficient buildings by taking all cost-effective measures described in the Green Building Action Plan for facilities owned, funded or leased by the State and to encourage cities, counties, and schools to do the same.
2. That State agencies, departments, and other entities under the direct executive authority of the Governor cooperate in taking measures to reduce grid-based energy purchases for State-owned buildings by 20 percent by 2015, through cost-effective efficiency measures and distributed generation technologies.

EO S-20-04 and the Green Building Action Plan identified five primary initiatives to promote green buildings and energy efficiency in State facilities:

1. Leadership in Energy and Environmental Design for New Construction and Major Renovations (LEED-NC)

The Green Building Action Plan requires “*all new State buildings and major renovations of 10,000 sq. ft. and over and subject to Title 24 to be designed, constructed, and certified at LEED-NC Silver or higher, (or LEED-EB as applicable.) ... Building projects less than 10,000 sq. ft. shall use the same design standard, but certification is not required.*”

The LEED–NC rating system defines a performance standard for designing and building commercial, institutional, and government buildings in a way that produces quantifiable benefits for occupants, the environment, and their owners. Targeting the design phases of a building, LEED–NC addresses the environmental impacts of site and materials selection, demolition, and construction.

LEED–NC promotes improved practices in the integrated design approach from start to finish (commissioning), site selection and development, water and energy use, environmentally preferred construction products/finishes/furnishings, waste stream

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management, indoor environmental quality, and innovation in sustainable design and construction.

2. LEED Rating System for Existing Buildings (LEED-EB)

LEED-EB maximizes operational efficiency while minimizing environmental impacts. It provides a recognized, performance-based benchmark for building owners and operators to measure operations, improvements and maintenance on a consistent scale. LEED for Existing Buildings is a road map for delivering economically profitable, environmentally responsible, healthy, productive places to live and work.

The Green Building Action Plan provides that *“all existing State buildings over 50,000 square feet shall meet LEED-EB standards (including meeting an Energy Star rating of at least 75, or equivalent established by the CEC) by no later than 2015 to the maximum extent cost-effective....”*

3. Benchmarking

The goal of this initiative is to implement a Web based benchmarking tool that will also contain energy usage and cost information for State facilities back to January 2003. This tool can then support other programs that will be relying on this information, such as LEED-EB, the Climate Change Initiative, and tracking energy use reductions based on retro-commissioning and energy retrofit activities. The current Web based tool being employed by the program is the ENERGY STAR™ Portfolio Manager which is managed by the United States Environmental Protection Agency (US EPA).

The Green Building Action Plan provides that *“all occupied State-owned buildings, beginning no later than July 2005 and completed by 2007, shall be benchmarked for energy efficiency, using guidelines established by the CEC.... Building managers of low-rated buildings shall prepare a plan to undertake cost-effective efficiency retrofit projects.”*

4. Retro-commissioning (RCx)

The Green Building Action Plan requires that *“all State buildings over 50,000 square feet shall be retro-commissioned, and then re-commissioned on a recurring 5-year cycle, or whenever major energy consuming systems or controls are replaced. This will assure that energy and resource consuming equipment is installed and operated at optimal efficiency.”*

Existing-building commissioning, also known as RCx, is an event in the life of a building that applies a systematic investigation process for improving or optimizing a building's overall performance and the way it's maintained and operated. The RCx process most often focuses on dynamic energy-using systems with the goal of reducing energy waste, obtaining energy cost savings, and identifying and fixing existing problems. Although RCx may include recommendations for capital

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improvements, the primary focus is on using operations and maintenance tune-up activities and diagnostic testing to optimize the building systems.

5. Energy Star Leasing

The Green Building Action Plan provides that *“DGS and other State agencies will seek out and select whenever cost-effective State facility leases for spaces of 5,000 square feet or more in buildings that meet a minimum U. S. EPA Energy Star rating whenever such spaces are cost-effective and meet the State’s programmatic needs, beginning in 2006 for new leases, and beginning in 2008 for renewal leases.*

In addition to Energy Star Leasing, the DGS has made efforts to align, where possible, the State’s leasing program with the green initiatives being implemented by other divisions of the DGS. All build-to-suit leases will, where cost effective, be constructed to a minimum rating of LEED–NC Silver. Significantly large leases or long-term leases will pursue sustainable practices including LEED–EB, LEED for Commercial Interiors (CI) and RCx when the savings can be realized over the committed term of the lease. Compliance with these goals will vary by project scope and lease term. Additionally, the DGS has modified the lease tracking programs to include the tracking of sustainable efforts.

The California Green Buildings Standards Code

The California Building Standards Code is published in its entirety every three years by order of the California Legislature. The California Legislature delegated authority to various State agencies, boards, commissions and departments to create building regulations to implement the State’s statutes. These building regulations or standards have the same force of law, and take effect 180 days after their publication unless otherwise stipulated. The California Building Standards Code applies to all occupancies in the State of California as annotated.

The [Draft 2010 California Green Buildings Standards Code](#) (also known as the CALGreen Code and effective January 1, 2011) are pending publication by the International Code Council. The California Green Building Standards Code is Part 11 of twelve parts of the official compilation and publication of the adoption, amendment and repeal of building regulations to the California Code of Regulations, Title 24, also referred to as the California Building Standards Code.

The purpose of this code is to improve public health, safety and general welfare by enhancing the design and construction of buildings through the use of building concepts having a reduced negative impact, or positive environmental impact and encouraging sustainable construction practices in the following categories:

1. Planning and design.
2. Energy efficiency.
3. Water efficiency and conservation.

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4. Material conservation and resource efficiency.
5. Environmental quality.

The provisions of this code shall apply to the planning, design, operation, construction, use and occupancy of every newly constructed building or structure, unless otherwise indicated in this code, throughout the State of California. It is the intent that this code serve as a validation of California green building requirements.

Provisions of this code shall apply to the following buildings, structures, and applications regulated by State agencies as referenced in the Matrix Adoption Tables and as specified in Sections 103 through 106, except where modified by local ordinance pursuant to Section 101.7. When adopted by a State agency, the provisions of this code shall be enforced by the appropriate enforcing agency, but only to the extent of authority granted to such agency by statute.

1. State-owned buildings, including buildings constructed by the Trustees of the California State University, and to the extent permitted by California laws, buildings designed and constructed by the Regents of the University of California and regulated by the Building Standards Commission. See Section 103 for additional scoping provisions.
2. Energy efficiency standards regulated by the California Energy Commission.
3. Low-rise residential buildings constructed throughout the State of California, including but not limited to, hotels, motels, lodging houses, apartment houses, dwellings, dormitories, condominiums, shelters for homeless persons, congregate residences, employee housing, factory-built housing and other types of dwellings containing sleeping accommodations with or without common toilets or cooking facilities regulated by the Department of Housing and Community Development. See Section 104 for additional scoping provisions.
4. Public elementary and secondary schools, and community college buildings regulated by the Division of the State Architect.
5. Qualified historical buildings and structures and their associated sites regulated by the State Historical Building Safety Board within the Division of the State Architect.
6. General acute care hospitals, acute psychiatric hospitals, skilled nursing and/or intermediate care facilities, clinics licensed by the Department of Public Health and correctional treatment centers regulated by the Office of Statewide Health Planning and Development.
7. Graywater systems regulated by the Department of Water Resources and the Department of Housing and Community Development.