

**Supplemental Report of the
2008 Budget Act
Item 1760-001-0666
Green Buildings
3(a) through (e)**

March 1, 2009



Overview

This report satisfies the requirements set forth in the 2008 Supplemental Report Language, Item 1760-001-0666, #3 - Green Buildings. This item requires the Department of General Services (DGS) to report to the Legislature certain information related to its Green Building program. This report is organized to address the information requested in each of the five subcategories numbered (a) through (e) under Item 3.

Item 3(a) – Leadership in Energy and Environmental Design (LEED) Certifications

Requirement

(a) The DGS shall, by March 1, 2009, and annually thereafter, report to the Legislature on all new, renovated, and leased buildings and their Leadership in Energy and Environmental Design (LEED) certification status; all existing buildings that have achieved LEED certification and the level of certification, including those certified in accordance with the department's Green Building Initiative; and the status of LEED recertification for buildings that have been LEED certified. Include in the report:

- 1. How many new State building projects under DGS' jurisdiction are not designed to LEED-NC Silver standards, and why;*
- 2. How many meet LEED-NC Silver standards; and*
- 3. How many exceed LEED-NC Silver standards and how it was determined feasible to do so.*

Response

The DGS maintains a Green Building Inventory which depicts the LEED certification status of each building in the State's portfolio that is being tracked by the DGS. The Inventory is available on the internet. The Directory of Green Buildings website¹ contains a map of California, with flags identifying both existing State-owned facilities, as well as new State construction projects that have achieved, or are currently pursuing, LEED certification from the U.S. Green Building Council. On that page, there is also a link to the same data in an Excel spreadsheet format.² It should be noted that the buildings in this database fall under the Governor's Executive Branch authority, and do not include facilities owned or operated by the University of California Regents,

¹ <http://www.greenbuildings.dgs.ca.gov/search.asp>

² <http://www.documents.dgs.ca.gov/dgs/pio/green/GB%20Spreadsheet.xls>

California State University Trustees, or community college systems, courts, or K-12 public schools.

Using data from this inventory, answers to the above questions are as follows:

1. There are zero new State building projects under the DGS' jurisdiction that are not designed to LEED-New Construction (NC) Silver standards. All projects for new construction and major renovations are designed to LEED-NC Silver standards. This is in keeping with the Executive Order (EO) S-20-04. Buildings less than 10,000 square feet are designed to LEED-NC Silver standards even though a formal certification is not required.
2. Approximately 223 buildings are actively pursuing LEED-NC Silver standards as of October 2008. Certifications have been achieved on 12 buildings so far: 3-Gold, 5-Silver, 4-Certified. The remaining buildings are in various phases of design and construction. The final determination for LEED-NC Silver certification will be provided by the US Green Building Council at the completion of construction.
3. Two projects administered by the DGS exceeded LEED-NC Silver criteria—the new Department of Motor Vehicles field office in San Ysidro and the DGS East End building in Sacramento occupied by the Department of Education. Through innovative design, the DGS was able to achieve a Gold rating on these two projects without exceeding the established construction budget. The Administration's policy, pursuant to EO S-20-04, requires the design of new buildings or major renovations to LEED-NC Silver, or better. Higher certification levels are pursued if they can be achieved without exceeding the project's established scope, schedule, and budget. The 3rd project to achieve Gold certification is the new CalPERS Headquarters building located at 400 Q Street. CalSTRS is also pursuing the Gold level in its construction of a new headquarters building in West Sacramento.

Item 3(b) – Life Cycle Cost/Benefits of LEED Silver

Requirement

(b) Estimates of life cycle costs, if any, and benefits of designing and constructing State buildings to achieve LEED-NC silver certification, based upon a representative sample of State building projects that begin construction during the report period. Information should be included defining what factors were included in cost and benefit calculations.

Response

LEED Considerations

LEED is a third-party certification program and a nationally accepted benchmark for the design, construction, and operation of high performance green buildings. LEED

promotes a whole-building approach to sustainability by recognizing performance in five key areas of human and environmental health: sustainable site development, water savings, energy efficiency, materials selection and indoor environmental quality, with additional recognition for innovation and design on a project specific basis. Projects are evaluated under a 69-point rating system. For LEED-NC Silver certification, a project must achieve a minimum of 33 points and meet a series of prerequisites in each of the key areas.

In response to the inherent complexity of contemporary building projects, LEED points can be achieved through a wide variety of design and construction measures. From a cost perspective, each of these measures can be cost neutral, more expensive or less expensive than their non-LEED equivalents. From a benefit perspective, each measure can provide quantitative or qualitative benefits, only some of which can be easily monetized.

The goal of this report is to present reasonable estimates of the costs and benefits of designing and constructing State building projects to achieve LEED-NC Silver or better certification. The life cycle cost analysis focuses on building systems whose costs and benefits are quantifiable, expressed in dollars and available from current project data. These typically involve resources or services the State must purchase to operate the building, such as energy and water. The analysis does not consider LEED points whose benefits are not readily quantifiable or where data was not available.

Life Cycle Cost Assessment Assumptions

The National Institute of Standards and Technology (NIST) Handbook 135, 1995 edition, defines Life Cycle Cost (LCC) as “the total discounted dollar cost of owning, operating, maintaining, and disposing of a building or a building system.” Life Cycle Cost Analysis (LCCA) is an economic evaluation technique that determines the total cost of owning and operating a facility over period of time. The LCCA for this report was done on an incremental basis to present the difference between the LEED project as designed and constructed and a project that would have met minimum code requirements. The following economic assumptions, updated as of September 2008, were used in the analysis to compute the benefits, in both total and net present value dollars, for the selected building systems:

LCCA Analysis Criteria	DGS Input
Building Life	30 years
Discount Rate (from the State Treasurer’s Office)	4.8%
General Rate of Inflation	3.4%
Electric Power Rate Escalation (added to inflation)	-0.3%
Natural Gas Rate Escalation (added to inflation)	1.23%
Routine Annual O&M (added to inflation)	0.0%
Major Repair/Replacements (added to inflation)	0.0%
Solar PV Panel Annual Degradation	0.0%

The costs of achieving the LEED certification were computed using the incremental cost

of the higher performing systems or assemblies, and the LEED accreditation, design and documentation costs.

Representative Sample

The projects selected for the initial reporting period include the new construction of a small field office and a large multi-story office building:

- Department of Motor Vehicles San Ysidro Field Office, San Ysidro
- Department of Transportation District 3 Headquarters Office Building, Marysville

Brief project descriptions and the LCCA computations for these projects are attached. The breadth of the representative sample should increase in future reporting periods as the analytical and data collection requirements are identified and incorporated into the scope of work for projects currently under development.

LEED Costs and Benefits

The costs and benefits of designing and constructing the representative sample State building projects to achieve their LEED-NC certification is summarized below:

Project	LEED Cert. Level	Total Project Cost	LEED Current Cost ^a	LEED Total Benefits ^b	LEED NPV Benefits	NPV Benefit Cost Ratio ^c
DMV Field Office San Ysidro, CA	Gold	\$8,619,429	\$177,748	\$548,942	\$206,060	1.16
Caltrans District 3 Headquarters Office Building, Marysville	Silver	\$75,655,000	\$622,000	\$5,738,443	\$2,688,740	4.32

Notes: a. Costs associated with all LEED measures.
 b. Total dollar savings over the 30-year analytical period not adjusted for the time or value of money.
 c. LEED NPV Benefits ÷ LEED Current Costs.

Item 3(c) – High Performance Schools

Requirement

(c) The DGS shall provide the number of schools being built in California and how many of those are built to Collaboration for High Performance Schools or similar standards, and what DGS plans to do to increase the number of new school sites that are built to

such standards.

Response

Number of High Performance Schools in California

School construction takes approximately six years from the start of planning a school campus to the completion of its construction. There are now 26 schools in California that have been certified by the Collaborative for High Performance Schools (CHPS), a standard that was published in 2001. There are 33 school districts, of the 1,000 in California, that have a resolution to build all their schools to CHPS standards. Based on number of students in California, this constitutes approximately 25 percent of all school construction in California since many of the large school districts have signed on to build to these green standards. Currently there are an additional 125 school projects registered to attain CHPS certification.

LEED for Schools was published in April 2007, and there are 29 school projects registered in California to attain this LEED certification.

Current activities by the DGS that encourage High Performance Schools

1. Incentive grants for High Performance Schools per Proposition 1D are available for incorporating green features in schools. The DGS' Division of the State Architect (DSA) has plan reviewed and approved 57 school projects to date, with seven additional plan checks underway. Funds in the amount of \$89 million are still available, and are being distributed by the Office of Public School Construction (OPSC). The average grant is calculated at \$267,000.
2. The DSA is beginning to take the necessary steps for the State of California to make schools resource and energy efficient. Grid neutral is defined as a "site that produces as much electricity as it uses in a year," and the DSA is encouraging all schools going through plan review to make provisions for a grid neutral campus starting in 2010. The DSA recently collaborated with stakeholders and subject matter experts to develop a guidebook for the design and renovation of schools in order to attain higher energy efficiency and on-site energy generation, and to introduce a compelling business case for school districts to embark on this effort.

A series of workshops was conducted in September and October 2008 to gain insight and information on the following six components of attaining grid neutrality for new and existing schools:

- comprehensive planning
- energy efficient designs
- energy generating technology
- energy measurement
- maintenance and operations
- innovative funding

The guidebook detailing a “set of solutions” to communicate to stakeholders and school board members of K-12 and community colleges the recommended means, methods, and economics of how to become grid neutral will be presented at the Green California Schools Summit in Anaheim in December 2008.

Item 3(d) – Green Building Reports

Requirement

(d) The DGS shall provide all reports produced pursuant to S-20-04 and the Green Building Action Plan is this report to the Legislature.

Response

All reports produced by the DGS in connection with EO S-20-04 and the Green Building Action Plan can be found on the Green California website maintained by the DGS at: www.green.ca.gov. California’s Green Building Directory can be found on this site, along with links to numerous other data related to the greening of the State’s buildings.

Item 3(e) – Avoiding Duplicate Reports

Requirement

(e) For those items required in subdivision (a), (b), (c), and/or (d) that are already included in other reports provided to the legislature or are generally available; DGS may fulfill this requirement by citing where that information can be found (including page numbers when applicable).

Response

This provision is recognized and appreciated as it is consistent with the DGS’ efforts to encourage and follow sensible conservation measures and avoid duplication in reporting. Rather than duplicating data, we have incorporated appropriate citations and web links above to indicate where the pertinent data can be found.

Summary – The Green Building Program and DGS’ Commitment

The goal of the Green Building Program is to site, design, deconstruct, construct, renovate, operate, and maintain State buildings that are models of energy, water, and materials efficiency; while providing healthy, productive and comfortable indoor environments, and long-term benefits to Californians. Under the Governor’s and

Legislature's leadership, California is leading by example on energy efficiency and conservation, sustainability, green building, and green purchasing practices. From the buildings our department owns and operates to the products we buy, the DGS is committed to environmentally friendly, energy- and resource-efficient practices and policies.



LEED Life Cycle Cost Assessment Costs / Benefits

Attachments

October 2008

Leadership in Energy and Environmental Design – LEED Life Cycle Cost Assessment Analysis

Department of Motor Vehicles San Ysidro Field Office

Life Cycle Benefits Summary

Area of Savings	Total Savings	Net Present Value of Savings
Electric Power	\$341,087	\$160,898
Solar PV Savings	\$34,289	\$17,287
Natural Gas	\$39,434	\$17,771
Water	\$21,421	\$10,105
Total Savings	\$436,230	
Net Present Value of Savings		\$206,060

Life Cycle Costs Summary

Incremental LEED Cost Categories	Total Savings	Net Present Value of Savings
Hard Costs	\$107,748	-
Soft Costs	\$70,000	-
Total LEED Incremental Costs	\$177,748	\$177,748

Life Cycle Benefit / Cost Ratio

Net Present Value of Benefits	\$206,060
Incremental LEED Costs	\$177,748
Benefit / Cost Ratio	1.16

DGS Inputs³

Escalation Factor Assumptions

Current Year	2007	Year Building is placed into service
General Inflation	3.40%	General Inflation Rate
Discount Rate	4.80%	The State's estimated Cost of Capital
Reinvestment Rate	0.00%	The rate of return on reinvested project cash flow (Savings)
Rounding	-2	

³ These inputs were provided by DGS as of 1 October 2008

Specialized Escalation Factor Assumptions

Routine Annual O&M, added to inflation	0.00%
Major Repairs/Replacements (added to inflation)	3.40%
Utility Electric Rate Escalation (added to inflation)	-0.30%
Utility Demand Rate Escalation (added to inflation)	-0.30%
Natural Gas Rate Escalation (added to inflation)	1.23%
Photovoltaic degradation factor, per year	0.80%

Natural Gas

First Year Natural Cost Savings	\$640
Total Electric Power Inflation Rate	4.00%

Period	Calendar Year	Energy Cost Savings	Cumulative Cost Savings	Cumulative NPV Savings
1	2008	\$640	\$640	\$612
2	2009	\$666	\$1,306	\$1,222
3	2010	\$692	\$1,998	\$1,829
4	2011	\$720	\$2,718	\$2,432
5	2012	\$749	\$3,466	\$3,033
6	2013	\$779	\$4,245	\$3,631
7	2014	\$810	\$5,055	\$4,226
8	2015	\$842	\$5,897	\$4,818
9	2016	\$876	\$6,773	\$5,408
10	2017	\$911	\$7,684	\$5,994
11	2018	\$947	\$8,631	\$6,578
12	2019	\$985	\$9,617	\$7,159
13	2020	\$1,025	\$10,641	\$7,737
14	2021	\$1,066	\$11,707	\$8,313
15	2022	\$1,108	\$12,815	\$8,885
16	2023	\$1,153	\$13,968	\$9,455
17	2024	\$1,199	\$15,166	\$10,022
18	2025	\$1,247	\$16,413	\$10,587
19	2026	\$1,297	\$17,710	\$11,149
20	2027	\$1,348	\$19,058	\$11,708
21	2028	\$1,402	\$20,460	\$12,264
22	2029	\$1,458	\$21,919	\$12,818
23	2030	\$1,517	\$23,435	\$13,369
24	2031	\$1,577	\$25,013	\$13,917
25	2032	\$1,641	\$26,653	\$14,463
26	2033	\$1,714	\$28,368	\$15,009
27	2034	\$1,791	\$30,159	\$15,555
28	2035	\$1,872	\$32,031	\$16,101
29	2036	\$1,956	\$33,988	\$16,647
30	2037	\$2,044	\$36,032	\$17,193
Total Cash Flow from Savings			\$341,087	
Net Present Value of Savings				\$17,193

Electric Power Calculations

First Year Electric Power Cost Savings \$7,054

Total Electric Power Inflation Rate 3.10%

Period	Calendar Year	Annual Energy Cost Savings	Cumulative Cost Savings	Cumulative NPV Savings
1 (First Year)	2008	\$7,054	\$7,054	\$6,731
2	2009	\$7,273	\$14,327	\$13,353
3	2010	\$7,498	\$21,825	\$19,867
4	2011	\$7,731	\$29,555	\$26,276
5	2012	\$7,970	\$37,526	\$32,580
6	2013	\$8,217	\$45,743	\$38,783
7	2014	\$8,472	\$54,215	\$1,278
8	2015	\$8,735	\$62,950	\$50,887
9	2016	\$9,005	\$71,955	\$56,793
10	2017	\$9,285	\$81,240	\$62,602
11	2018	\$9,572	\$90,812	\$68,318
12	2019	\$9,869	\$100,681	\$73,941
13	2020	\$10,175	\$110,856	\$79,472
14	2021	\$10,491	\$121,347	\$84,914
15	2022	\$10,816	\$132,163	\$90,267
16	2023	\$11,151	\$143,314	\$95,534
17	2024	\$11,497	\$154,810	\$100,715
18	2025	\$11,853	\$166,664	\$105,812
19	2026	\$12,221	\$178,884	\$110,827
20	2027	\$12,599	\$191,483	\$115,760
21	2028	\$12,990	\$204,473	\$120,613
22	2029	\$13,393	\$217,866	\$125,388
23	2030	\$13,808	\$231,674	\$130,085
24	2031	\$14,236	\$245,910	\$134,705
25	2032	\$14,677	\$260,587	\$139,251
26	2033	\$15,132	\$275,719	\$143,723
27	2034	\$15,601	\$291,321	\$148,123
28	2035	\$16,085	\$307,406	\$152,451
29	2036	\$16,584	\$323,989	\$156,709
30	2037	\$17,098	\$341,087	\$160,898
Total Energy Cost Savings			\$341,087	
Net Present Value of Savings				\$160,898

Solar Photo-Voltaic Electric Power

First Year Solar Photo-Voltaic Electric Power Cost Savings \$1,599

Total Electric Power Inflation Rate 3.10%

Solar Panel Annual Degradation Factor 0.80%

Service Life Year	Calendar Year	Annual Energy Savings Initial Estimate in Dollars	Annual Energy Savings Adjusted for PV Panel Degradation	Incremental Costs Operations (Cost of annual panel cleaning)	Incremental Costs Equipment Repairs	Annual Cost Savings	Cumulative Cost Savings	Cumulative NPV Savings
1 (First Year)	2006	\$1,599	\$1,599	(\$260)		\$1,339	\$1,339	\$1,278
2	2007	\$1,649	\$1,635	(\$268)		\$1,367	\$2,706	\$2,523
3	2008	\$1,700	\$1,672	(\$276)		\$1,396	\$4,102	\$3,736
4	2009	\$1,752	\$1,710	(\$285)		\$1,425	\$5,528	\$4,917
5	2010	\$1,807	\$1,749	(\$294)		\$1,455	\$6,983	\$6,068
6	2011	\$1,863	\$1,788	(\$303)		\$1,485	\$8,468	\$7,189
7	2012	\$1,920	\$1,828	(\$312)		\$1,516	\$9,984	\$8,281
8	2013	\$1,980	\$1,869	(\$322)		\$1,547	\$11,531	\$9,344
9	2014	\$2,041	\$1,911	(\$332)		\$1,579	\$13,110	\$10,380
10	2015	\$2,105	\$1,953	(\$342)		\$1,611	\$14,721	\$11,388
11 (Inverter Replacement)	2016	\$2,170	\$1,996	(\$353)	(\$8,382)	(\$6,739)	\$7,982	\$7,364
12	2017	\$2,237	\$2,040	(\$364)		\$1,677	\$9,659	\$8,319
13	2018	\$2,306	\$2,085	(\$375)		\$1,710	\$11,369	\$9,249
14	2019	\$2,378	\$2,131	(\$387)		\$1,744	\$13,113	\$10,154
15	2020	\$2,452	\$2,177	(\$399)		\$1,778	\$14,891	\$11,034
16	2021	\$2,528	\$2,224	(\$411)		\$1,813	\$16,705	\$11,890
17	2022	\$2,606	\$2,272	(\$424)		\$1,849	\$18,553	\$12,724
18	2023	\$2,687	\$2,321	(\$437)		\$1,885	\$20,438	\$13,534
19	2024	\$2,770	\$2,371	(\$450)		\$1,921	\$22,359	\$14,322
20	2025	\$2,856	\$2,422	(\$464)		\$1,958	\$24,316	\$15,089
21 (Inverter Replacement)	2026	\$2,945	\$2,473	(\$479)	(\$11,710)	(\$9,715)	\$14,601	\$11,459
22	2027	\$3,036	\$2,526	(\$494)		\$2,032	\$16,633	\$12,183
23	2028	\$3,130	\$2,579	(\$509)		\$2,070	\$18,703	\$12,888
24	2029	\$3,227	\$2,633	(\$525)		\$2,109	\$20,812	\$13,572
25	2030	\$3,327	\$2,688	(\$541)		\$2,147	\$22,959	\$14,237
26	2031	\$3,430	\$2,744	(\$558)		\$2,186	\$25,145	\$14,883
27	2032	\$3,537	\$2,801	(\$575)		\$2,226	\$27,371	\$15,511
28	2033	\$3,646	\$2,859	(\$593)		\$2,266	\$29,637	\$16,120
29	2034	\$3,759	\$2,917	(\$611)		\$2,306	\$31,943	\$16,713
30	2035	\$3,876	\$2,977	(\$630)		\$2,346	\$34,289	\$17,287

Total Energy Cost Savings
Net Present Value of Savings

\$34,289
\$17,287

Water Consumption

First Year Use Savings \$443
Total Water Supply Inflation Rate 3.10%

Period	Calendar Year	Annual Water Cost Savings	Cumulative Cost Savings	Cumulative NPV Savings
1 (First Year)	2007	\$443	\$400	\$423
2	2008	\$457	\$900	\$839
3	2009	\$471	\$1,371	\$1,248
4	2010	\$485	\$1,856	\$1,650
5	2011	\$501	\$2,357	\$2,046
6	2012	\$516	\$2,873	\$2,436
7	2013	\$532	\$3,405	\$2,819
8	2014	\$549	\$3,953	\$3,196
9	2015	\$566	\$4,519	\$3,567
10	2016	\$583	\$5,102	\$3,932
11	2017	\$601	\$5,703	\$4,290
12	2018	\$620	\$6,323	\$4,644
13	2019	\$639	\$6,962	\$4,991
14	2020	\$659	\$7,621	\$5,333
15	2021	\$679	\$8,300	\$5,669
16	2022	\$700	\$9,000	\$6,000
17	2023	\$722	\$9,722	\$6,325
18	2024	\$744	\$10,467	\$6,645
19	2025	\$767	\$11,234	\$6,960
20	2026	\$791	\$12,025	\$7,270
21	2027	\$816	\$12,841	\$7,575
22	2028	\$841	\$13,682	\$7,874
23	2029	\$867	\$14,549	\$8,169
24	2030	\$894	\$15,443	\$8,460
25	2031	\$922	\$16,356	\$8,745
26	2032	\$950	\$17,316	\$9,026
27	2033	\$980	\$18,295	\$9,302
28	2034	\$1,010	\$19,305	\$9,574
29	2035	\$1,041	\$20,347	\$9,842
30	2036	\$1,074	\$21,421	\$10,105
Total Energy Cost Savings			\$21,421	
Net Present Value of Savings				\$10,105

Baseline Water Use from LEED Docs	291,747 gallons
Design Case Water use	164,607 gallons
Annual Water Savings	127,140 gallons
Gallons per 100 cubic feet	748
Water Rate per HCF	\$2.6060
Sewer Rate per HCF Water Usage	\$0.0000
Cost of Water per HCF	\$2.61
Annual Water Savings in HCF	170 HCF
Annual Water / Sewage Cost Savings	\$442.95

Project Description⁴

Department of Motor Vehicles San Ysidro Field Office

Project Overview	Details
Size	14,656 square feet on a 3.32 acre site
Location	San Ysidro
Completion Date	October 2006
Building Type	Government
Energy Efficiency	33.5% better than Title 24
LEED Credits	Sustainable Sites (4 credits) Water Efficiency (3 credits) Energy & Atmosphere (14 credits) Materials and Resources (3 credits) Indoor Environmental Quality (13 credits) Innovation & Design (5 credits) Total Credits Received: 42
Team	Department of Motor Vehicles (Building Owner) Department of General Services (Project Management) Roesling Nakamura Terada Architects (Architect) Bender Dean Engineering (Mechanical Engineers) BSE Engineering (Electrical Engineers) SDG&E® (Utility)
Financial Summary	Construction Cost: \$368 per sq. ft. Owner Incentives: \$13,814 Design Team Incentives: \$4,202 Annual Savings: \$10,462
Resource Summary	Annual Electricity Saved: 53,179 kWh Annual Gas Saved: 1,545 Therms Annual Water Saved: 105,781 gallons

The California Department of Motor Vehicles (DMV) in San Ysidro opened its state-of-the-art building in October 2006. This is the first California state building in San Diego County to achieve Leadership in Energy and Environmental Design (LEED®) Gold Certification from the U.S. Green Building Council.

The facility was designed to maximize energy conservation in accordance with a California Executive Order directing all state agencies to reduce energy consumption by 20% by the year 2015.

The DMV building is a showcase for innovation in HVAC design. Two highly efficient HVAC technologies have been creatively combined to save energy and provide a

⁴ As provided in a 2007 brochure from San Diego Gas & Electric.

healthy, comfortable environment for both employees and customers. Air conditioning for the DMV staff area is provided by an underfloor air distribution system which incorporates floor diffusers for individual air flow and temperature control. The waiting area for DMV customers is served by energy-efficient thermal displacement ventilation.

Visitors walking into this naturally lit building will be pleasantly surprised. Glazed windows and skylights throughout increase natural light. Strategically placed windows, outside views from 90% of the regularly occupied interior spaces and local control of space temperatures, make the San Ysidro DMV a place where employees enjoy coming to work and customers can conduct business in comfort.

Sustainable Features

SUSTAINABLE SITES: Storm drains have filters, preventing pollution from entering the waterways. A cool roof reflects the sun’s heat to maximize energy savings and minimize the heat island effect.

WATER EFFICIENCY: Waterless urinals and motion sensors, on both toilets and low-flow faucets, use 41% less potable water than 6standard fixtures. Native and adapted plants with medium to low water usage combined with a high-efficiency irrigation system reduce potable water use for site irrigation by 68%.

ENERGY & ATMOSPHERE: The specially designed floor and wall registers will supply air to the occupied spaces at moderate temperatures and cool only the occupied zone. Energy efficient fluorescent and high pressure sodium lights were installed throughout the project. Additional energy savings come from motion and photocell sensors. Daylighting is provided by extensive northern windows, skylights and clerestories. Task and zonal lighting have individual controls. A 5.4 kilowatt photovoltaics system is installed on-site to provide clean, renewable energy serving 7% of the building’s electric load. Wind renewable energy credits offset 100% of the building’s energy use.

Sustainable Features	Projected Annual Site kWh
Baseline Title 24	177,820
With Building Energy Efficiency	124,641
With Photovoltaics System	115,437

MATERIALS AND RESOURCES: Approximately 58% of the construction waste was prevented from going to the landfill by recycling. Recycled products used in the new building’s construction include steel framing, concrete, glazing, and furniture. At least 20% of the building materials were manufactured locally, minimizing energy needed for transportation. Per state mandate, provisions are made for employees to recycle paper, cardboard, aluminum and glass.

INDOOR ENVIRONMENTAL QUALITY: Carbon dioxide monitors ensure adequate ventilation effectiveness. Carpets, paints and adhesives containing low volatile organic compounds were used throughout to improve indoor air quality. Walk-off mats at each major entrance trap dirt particles and pollutants.

INNOVATION & DESIGN: To maintain a high quality of indoor air, the DMV has established a Green Housekeeping Plan and a Pest Management Plan, which exclude the use of toxic chemicals. Signage throughout the building educates customers and employees about LEED and the specific green measures implemented into the DMV site and building.

Lessons Learned

“IT REALLY DIDN’T COST MORE TO GO GREEN”: According to Mr. Alafranji (architect and project director at the Department of General Services), a comparable non-LEED DMV was built in Sacramento for \$5.2 million while the San Ysidro building cost \$5.4 million. The \$200K increase in cost was primarily attributable to increased labor and material costs in the San Diego region.

LEED GUIDELINES: Use the LEED reference guide. Work diligently, follow the guide to the letter, and LEED certification or higher can easily be achieved. Require at least one person from the General Contractor's team to be a LEED Accredited Professional.

OCCUPANCY COMFORT: Consider and plan for the comfort needs of employees early in the design process to ensure an improved work environment.

Leadership in Energy and Environmental Design – LEED Life Cycle Cost Assessment Analysis

Department of Transportation District 3 Headquarters
Office Building

Life Cycle Benefits Summary

Area of Savings	Total Savings	Net Present Value of Savings
Electric Power	\$4,797,409	\$12,263,038
Natural Gas	\$863,718	\$389,230
Water	\$77,316	\$36,471
Total Savings	\$5,738,443	
Net Present Value of Savings		\$2,688,740

Life Cycle Costs Summary

Incremental LEED Cost Categories	Total Savings	Net Present Value of Savings
Hard Costs	\$300,000	-
Soft Costs	\$322,000	-
Total LEED Incremental Costs	\$622,000	\$622,000

Life Cycle Benefit / Cost Ratio

Net Present Value of Benefits	\$2,688,740
Incremental LEED Costs	\$622,000
Benefit / Cost Ratio	4.32

DGS Inputs⁵

Escalation Factor Assumptions

Current Year	2009	Year Building is placed into service
General Inflation	3.40%	General Inflation Rate
Discount Rate	4.80%	The State's estimated Cost of Capital
Reinvestment Rate	0.00%	The rate of return on reinvested project cash flow (Savings)
Rounding	-2	

⁵ These inputs were provided by DGS as of 1 October 2008

Specialized Escalation Factor Assumptions

Routine Annual O&M, added to inflation	0.00%
Major Repairs/Replacements (added to inflation)	3.40%
Utility Electric Rate Escalation (added to inflation)	-0.30%
Utility Demand Rate Escalation (added to inflation)	-0.30%
Natural Gas Rate Escalation (added to inflation)	1.23%
Photovoltaic degradation factor, per year	0.50%

Electric Power Calculations

First Year Electric Power Cost Savings \$99,215
 Total Electric Power Inflation Rate 3.10%

Period	Calendar Year	Annual Energy Cost Savings	Cumulative Cost Savings	Cumulative NPV Savings
1 (First Year)	2009	\$99,215	\$99,215	\$94,671
2	2010	\$102,291	\$201,506	\$187,806
3	2011	\$105,462	\$306,967	\$279,430
4	2012	\$108,731	\$415,698	\$369,568
5	2013	\$112,102	\$527,800	\$458,244
6	2014	\$115,577	\$643,377	\$545,482
7	2015	\$119,160	\$762,536	\$631,304
8	2016	\$122,854	\$885,390	\$715,734
9	2017	\$126,662	\$1,012,052	\$798,795
10	2018	\$130,589	\$1,142,641	\$880,508
11	2019	\$134,637	\$1,277,278	\$960,896
12	2020	\$138,811	\$1,416,641	\$1,039,980
13	2021	\$143,114	\$1,559,202	\$1,117,780
14	2022	\$147,550	\$1,706,752	\$1,194,319
15	2023	\$152,124	\$1,858,877	\$1,269,617
16	2024	\$156,840	\$2,015,717	\$1,343,692
17	2025	\$161,702	\$2,177,419	\$1,416,567
18	2026	\$166,715	\$2,344,134	\$1,488,259
19	2027	\$171,883	\$2,516,017	\$1,558,788
20	2028	\$177,212	\$2,693,229	\$1,628,173
21	2029	\$182,705	\$2,875,934	\$1,696,433
22	2030	\$188,369	\$3,064,303	\$1,763,585
23	2031	\$194,208	\$3,258,511	\$1,829,648
24	2032	\$200,229	\$3,458,740	\$1,894,640
25	2033	\$206,436	\$3,665,176	\$1,958,577
26	2034	\$212,835	\$3,878,011	\$2,083,356
27	2035	\$219,433	\$4,097,445	\$2,083,356
28	2036	\$226,236	\$4,323,680	\$2,144,232
29	2037	\$233,249	\$4,556,930	\$2,204,121
30	2038	\$240,480	\$4,797,409	\$2,263,038
Total Energy Cost Savings			\$4,797,409	
Net Present Value of Savings				\$2,263,038

Natural Gas

First Year Natural Gas Cost Savings \$14,018

Total Natural Gas Inflation Rate 4.63%

Period	Calendar Year	Energy Cost Savings	Cumulative Cost Savings	Cumulative NPV Savings
1	2009	\$14,018	\$14,018	\$13,376
2	2010	\$14,667	\$28,685	\$26,730
3	2011	\$15,346	\$44,031	\$40,063
4	2012	\$16,057	\$60,088	\$53,374
5	2013	\$16,800	\$76,888	\$66,663
6	2014	\$17,578	\$94,466	\$79,931
7	2015	\$18,392	\$112,858	\$93,177
8	2016	\$19,243	\$132,101	\$106,402
9	2017	\$20,134	\$152,235	\$119,605
10	2018	\$21,066	\$173,302	\$132,787
11	2019	\$22,042	\$195,343	\$145,948
12	2020	\$23,062	\$218,406	\$159,087
13	2021	\$24,130	\$242,536	\$172,205
14	2022	\$25,247	\$267,783	\$185,302
15	2023	\$26,416	\$294,200	\$198,377
16	2024	\$27,639	\$321,839	\$211,431
17	2025	\$28,919	\$350,758	\$224,464
18	2026	\$30,258	\$381,017	\$237,476
19	2027	\$31,659	\$412,676	\$250,467
20	2028	\$33,125	\$445,801	\$263,436
21	2029	\$34,659	\$480,459	\$276,385
22	2030	\$36,263	\$516,722	\$289,313
23	2031	\$37,942	\$554,665	\$302,219
24	2032	\$39,699	\$594,364	\$315,105
25	2033	\$41,537	\$635,901	\$327,970
26	2034	\$42,825	\$678,725	\$340,626
27	2035	\$44,152	\$722,878	\$353,077
28	2036	\$45,521	\$768,398	\$365,326
29	2037	\$46,932	\$815,331	\$377,376
30	2038	\$48,387	\$863,718	\$389,230
Total Cash Flow from Savings			\$863,718	
Net Present Value of Savings				\$389,230

Water Consumption

First Year Use Savings \$1,599
 Total Water Supply Inflation Rate 3.10%

Period	Calendar Year	Annual Energy Cost Savings	Cumulative Cost Savings	Cumulative NPV Savings
1 (First Year)	2009	\$1,599	\$1,599	\$1,526
2	2010	\$1,649	\$3,247	\$3,027
3	2011	\$1,700	\$4,947	\$4,503
4	2012	\$1,752	\$6,699	\$5,956
5	2013	\$1,807	\$8,506	\$7,385
6	2014	\$1,863	\$10,369	\$8,791
7	2015	\$1,920	\$12,289	\$10,174
8	2016	\$1,980	\$14,269	\$11,535
9	2017	\$2,041	\$16,310	\$12,873
10	2018	\$2,105	\$18,415	\$14,190
11	2019	\$2,170	\$20,585	\$15,486
12	2020	\$2,237	\$22,822	\$16,760
13	2021	\$2,306	\$25,128	\$18,014
14	2022	\$2,378	\$27,506	\$19,248
15	2023	\$2,452	\$29,958	\$20,461
16	2024	\$2,528	\$32,486	\$21,655
17	2025	\$2,606	\$35,092	\$22,830
18	2026	\$2,687	\$37,778	\$23,985
19	2027	\$2,770	\$40,548	\$25,122
20	2028	\$2,856	\$43,404	\$26,240
21	2029	\$2,945	\$46,349	\$27,340
22	2030	\$3,036	\$49,385	\$28,422
23	2031	\$3,130	\$52,515	\$29,487
24	2032	\$3,227	\$55,742	\$30,534
25	2033	\$3,327	\$59,068	\$31,565
26	2034	\$3,430	\$62,499	\$32,578
27	2035	\$3,536	\$66,035	\$33,576
28	2036	\$3,646	\$69,681	\$34,557
29	2037	\$3,759	\$73,440	\$35,522
30	2038	\$3,876	\$77,316	\$36,471
Total Energy Cost Savings			\$77,316	
Net Present Value of Savings				\$36,471

Baseline Water Use from LEED Docs 1,554,425 gallons
 Design Case Water use 899,190 gallons
 Annual Water Savings 655,235 gallons
 Gallons per 100 cubic feet 748
 Water Rate per HCF \$0.9959
 Sewer Rate per HCF Water Usage \$0.8524
 Cost of Water per HCF \$1.83
 Annual Water Savings in HCF 876 HCF
 Annual Water / Sewage Cost Savings \$1,598,96

Project Description

Department of Transportation District 3 Headquarters Office Building

This 209,000-gross square foot office building was designed and constructed by the Sacramento office of New York-based Turner Construction Co. and Los Angeles-based AC Martin Partners, along with Clark Pacific of Sacramento as a design-build project. It replaced an existing 45,000 square foot 71-year-old facility located on the same site. Plans call for the old building to be demolished and a 3,000 gross square foot daycare center built in its place.

The new five-story structure will be occupied by 800 employees with a cafe, 200-seat auditorium, teleconferencing rooms and outdoor surface parking with 440 spaces on and off site. To fit in with the rustic motif of Marysville the building's facade was covered with earth-toned brick and scaled down to three stories where it fronts the city street. The entire structure is pre-cast concrete beams, columns and floor planks which provides solar mass to even out temperature swings in the building. This cooling aspect, along with a series of other environmentally friendly features, helped the building receive a LEED silver rating.

Other LEED elements include mature tree shading along the main entrance; recycled carpeting; and extensive day-lighting with the help of high-performance glazing, light cells and a 4,800-sq-ft, four-story atrium canyon in the center of the building. The atrium has a south-facing window system at the top to filter in natural lighting throughout the interior. It also utilizes exhaust fans to perform night flushing of air to increase air quality and cut down on air-conditioning usage.

Total project funding was \$75,655,000, with a construction cost of \$65,596,282 to the design-build entity. The project broke ground in December of 2006 with office building occupancy slated for December 2008, followed by the Daycare facility being available by October, 2009."