

Building Better Buildings:



An Update on State Sustainable Building Initiatives



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FOREWORD X

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“When we build, let us think that we build forever.” John Ruskin

Three years ago, Governor Davis issued Executive Order D-16-00, which established sustainable building goals for California state government. Through the leadership of the Sustainable Building Task Force (SBTF), a partnership of more than 40 state agencies, California is now at the forefront of the nation’s green building movement. The many remarkable achievements of the SBTF serve as a model for other states, communities, and school districts throughout the country. These accomplishments include:

- Building the first LEED Gold state owned office building in the country, the Education Headquarters Building, which is saving taxpayers \$500,000 a year in energy costs alone;
- Including sustainable building performance standards, such as energy efficiency, in over \$2 billion of state construction and renovation contracts;
- Finalizing the most comprehensive economic analysis of green building developed to date, *The Costs and Financial Benefits of Green Building*, which demonstrates that sustainable building is cost-effective;
- Constructing many high visibility state “leadership buildings,” which are models of sustainability, including the Caltrans District 7 Office building in Los Angeles;
- Promoting on-site renewable energy, such as the installation of over an acre of photovoltaic panels on the roof of the Franchise Tax Board Building in Rancho Cordova – which is the largest array on any state office building in the country;
- Supporting the University of California Board of Regents in the adoption of a landmark *Green Building Policy and Clean Energy Standard*, which will impact over 20 million gross square feet of construction over the next 10 years;
- Assisting the Chancellor of the new 10th University of California campus, UC Merced, in her goal to construct the greenest campus in the country with an initial target of LEED Silver for all construction; and
- Impacting the sustainability of K-12 bond funded school construction throughout the state by providing funding and technical assistance to support the work of the Collaborative for High Performance Schools (CHPS), including the construction of 13 demonstration high performance schools.

This report highlights the efforts of the Sustainable Building Task Force over the past two years. The progress that California state government has made is truly significant. We have witnessed culture changes in the Department of General Services and the Department of Finance -- two agencies with the ultimate responsibility for the integration of sustainable principles into the state's capital outlay process; groundbreaking partnerships among diverse state entities that previously had no interaction; and extensive education to promote sustainability in new infrastructure areas, such as affordable housing, libraries, and historic preservation.

While these and the many other Task Force accomplishments would not have been possible without utilizing a team approach, one person deserves special recognition for his extraordinary leadership in the greening of California state government. For the past three years, Arnold Sowell, the Undersecretary of the State and Consumer Services Agency, has provided unwavering vision and support of the Governor's sustainable building goals. His background at the California Integrated Waste Management Board allowed him to help bring together all relevant state agencies and other partners to ensure that California builds the most sustainable buildings possible. He has truly been the glue that held this Task Force together and led it to achieve this remarkable and "sustainable" progress.

I also want to give special recognition to the two Task Force members who co-authored this report with Undersecretary Sowell: Amanda Eichel and Kathy Frevert. These individuals, in collaboration with all members of the Sustainable Building Task Force, have demonstrated a strong commitment to sustainability in all areas, including buying green, driving green, building green, managing green, and saving green. This team has a remarkable track record in transforming California state government into a national leader in the sustainability arena.

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EXECUTIVE SUMMARY X

California state government's sustainable building initiatives and programs clearly place the state at the forefront of the nation's green building movement. The state's leadership is evidenced by a diverse range of policy and program accomplishments, including the construction of the nation's first LEED Gold state owned office building; groundbreaking research showing that sustainable building is a cost-effective financial investment; the construction of the 10th University of California campus in Merced that will ultimately be the greenest campus in the world; the adoption by the UC Board of Regents of a systemwide *Green Building Policy and Clean Building Standard*, which will revolutionize the way the University builds buildings; and the construction of high performance K-12 schools with state school construction bond funds.

Sustainable buildings use key resources like energy, water, materials, and land much more efficiently than buildings that are simply built to code. They create healthier work, learning, and living environments, with more natural light and cleaner air, and are cost effective -- saving taxpayer money. Investing in appropriate sustainable features on the front end of construction, such as dimmable lights and high efficiency HVAC systems, pays off during the life of the building, often many times over.

Two Executive Orders, issued by Governor Davis, launched California on the sustainable building road.

- Executive Order D-16-00, signed in August 2000, establishes the Governor's sustainable building goal: "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 environment and long-term benefits to Californians." ¹
- Executive Order D-46-01, signed in October 2001, provides guidance on the process the Department of General Services will use to locate and lease space, including such considerations as proximity to public transit and affordable housing; preserving structures of historic, cultural, and architectural significance; opportunities for economic renewal; and sensitivity to neighborhood and community concerns.²

To help implement the Governor's sustainable building goals, the Secretary of the State and Consumer Services Agency, Aileen Adams, established the Sustainable Building Task Force (SBTF), a unique partnership of more than 40 governmental agencies. Members include the California Integrated Waste Management Board, the California Energy Commission, the Department of Health Services, the Department of General Services, the Air Resources Board, the University of California, the Community College system, and the Department of Finance. Over the past several years, this group has worked to use its

combined building, environmental, and fiscal expertise to integrate sustainable building into the state's capital outlay program, including several nationally recognized projects.

Building Better Buildings: An Update on State Sustainable Building Initiatives (Blueprint 2003) is the first in a series of progress reports on the state's sustainable building efforts. Specifically, the report highlights notable policy and program achievements; describes key Task Force partnerships; provides an in-depth look at several significant sustainable building projects; and details Task Force goals for the coming years.

Some of the Task Force's most significant accomplishments over the last two years include:

- Over \$2 billion of current state contracts for capital outlay design and construction projects now include energy efficiency and sustainable building performance criteria.
- The Education Headquarters Building (Block 225) of the Capitol Area East End Complex became the first state government owned building in the nation to receive the distinguished Leadership in Energy and Environmental Design (LEED) Gold Award from the US Green Building Council in January 2003.
- The pioneering economic analysis report, *The Costs and Financial Benefits of Green Buildings*, indicates that investing an additional 0 to 2% of a building's construction costs in sustainable building design measures upfront results in savings of 20% or more of those construction costs over the building's lifetime (assumed, conservatively, to be 20 years). In other words, an initial upfront investment of up to \$100,000 to incorporate green building features into a \$5 million project would result in a savings of \$1 million (in today's dollars) over the life of the building. This report, which has attracted national interest, is scheduled for release in October 2003.
- Last year the average energy use in state buildings was reduced by 20%. In particular, energy efficiency at the five building Capitol Area East End Complex exceeds Title 24 energy requirements by over 30% (42% at the Block 225 Education Building), resulting in nearly \$500,000 in energy savings annually. Other operations and maintenance best practices in state facilities focus on environmentally friendly cleaning product standards, building material emissions testing, and integrated pest management.
- An acre (50,000 square feet) of photovoltaic panels, the largest rooftop array on any state building, at the Franchise Tax Board Butterfield State Office Building, supplies nearly a half a megawatt (470 kWp) of electricity. This is enough electricity to power more than 400 homes in the Sacramento area.

- The University of California Board of Regents, with significant input from the Task Force, adopted a landmark, system-wide *Green Building Policy and Clean Energy Standard* to guide new construction and major renovation projects on the 10 UC campuses. This policy will impact over 20 million square feet of space slated for construction over the next ten years.
- The Chancellor of the University of California Merced, with support from the UC Merced “Red Team” chaired by the Secretary of the State and Consumer Services Agency, established a goal to construct the greenest campus in the country with an initial target of LEED Silver for all construction.
- Over 150 representatives from the public, private and non-profit sectors attended the UC Merced “Conference on Building and Operating Sustainable College Campuses in the 21st Century”. The conference was planned in large part by members of the Sustainable Building Task Force and supported by a grant from the U.S. Environmental Protection Agency.
- Thirteen high performance demonstration schools under construction throughout the state serve as models for the integration of high performance features into \$15 billion of bond funded school construction projects statewide.
- Five school districts in California, including the Los Angeles Unified School District, have adopted the high performance school construction guidelines established in the Collaborative for High Performance Schools (CHPS) *Best Practices Manual*. This Manual serves as a national model for high performance school construction and has also been adapted for use by the Federal Department of Energy and the State of Massachusetts.
- The Office of Library Construction included sustainable building design questions in bond funding applications for over \$130 million library construction dollars allocated during the first round of funding. Eight library projects, approved during the first funding cycle, will pursue LEED certification.
- The Division of the State Architect launched the Sustainable Schools Website to provide a comprehensive clearinghouse on sustainable school construction issues.
- A *Sustainable Facilities* category was added to the 2003 Governor’s Environment and Economic Leadership Awards, the most prestigious environmental award given by the state.
- The USC Marshall School of Business Women’s Leadership Board, a group of undergraduate students (both men and women), worked with the SBTF to develop a business school case study on the organizational process the SCSA used to integrate sustainability into the capital outlay process.
- The Department of General Services established a standard for the use of environmentally preferable cleaning products in state buildings.

Even with these major accomplishments, California's path to sustainability is paved with policy considerations and program issues that still need to be addressed. Targets for the coming years include:

- Obtaining a cost-effective LEED Silver level or higher for major state projects;
- Encouraging all school construction projects to use the Collaborative for High Performance Schools criteria to ensure that bond funds are spent wisely on schools that will stand the test of time;
- Publishing and implementing recommendations developed in the economic analysis report, *The Costs and Financial Benefits of Green Buildings*;
- Working to incorporate in statute the sustainable building policies and programs implemented through Executive Order D-16-00;
- Developing recommendations to establish renewable energy and green power standards for state projects;
- Integrating "total building" commissioning and facility performance evaluations as standard Department of General Services policy for all new construction, infrastructure, and rehabilitation projects to ensure that state buildings continue to operate as designed over time; and
- Adopting performance guidelines to incorporate environmentally friendly practices into facility operations and maintenance.

As we move forward to pursue these and other goals, the Sustainable Building Task Force remains steadfastly committed to improving the state's building process one step at a time, ever mindful of John Muir's observation that:

***"WHEN ONE TUGS AT A SINGLE THING IN NATURE, (S)HE FINDS IT
ATTACHED TO THE REST OF THE WORLD."***

I.X INTRODUCTION X

Two Executive Orders, issued by Governor Davis, launched California on the sustainable building road.

- Executive Order D-16-00, signed in August 2000, establishes the Governor's sustainable building goal: "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 environment and long-term benefits to Californians."³
- Executive Order D-46-01, signed in October 2001, provides guidance on the process the Department of General Services will use to locate and lease space, including such considerations as proximity to public transit and affordable housing, preserving structures of historic, cultural, and architectural significance, opportunities for economic renewal; and sensitivity to neighborhood and community concerns.⁴

To implement these Executive Orders, the Secretary of the State and Consumer Services Agency (SCSA), Aileen Adams, formally convened an interagency Sustainable Building Task Force (SBTF) comprised of over 40 state agencies, including representatives with energy, environmental, fiscal, construction, property management, and historic preservation expertise (Member agencies are listed in Appendix A). The SBTF meets regularly, and the role it plays in coordinating, managing, and guiding the state's sustainable building efforts establishes it as one of the most successful state agency working groups ever initiated.

In December 2001, the SCSA and SBTF released an initial report, *Building Better Buildings: A Blueprint for Sustainable State Facilities (Blueprint)*.⁵ The *Blueprint* outlines a ten-point plan to achieve the Governor's sustainable building goals, including recommendations to:

1. Modify the state's capital outlay policies and institutionalize the Sustainable Building Task Force to ensure that the Governor's sustainable building goals are met.
2. Incorporate life cycle costing, integrated design, commissioning, and post-occupancy evaluation into the state's capital outlay programs.
3. Develop cost-effective building performance, operation, and maintenance standards.
4. Invest additional resources for full-scale implementation of sustainable building practices.

5. Develop comprehensive annual reporting requirements to measure progress in implementing the state's sustainable building goal.
6. Develop leadership buildings to showcase sustainable building practices.
7. Develop sustainable building technical assistance and outreach tools, including a training program for state departments, as well as local government and private sector partners.
8. Create programmatic, fiscal, and administrative incentives to facilitate the implementation of successful sustainable building approaches, including a Governor's sustainable building award.
9. Implement guidelines to acquire leased space with cost-effective sustainable building features.
10. Provide Task Force assistance to other state agencies and departments in key infrastructure areas.

Building Better Buildings: An Update on State Sustainable Building Initiatives (Blueprint 2003) chronicles the state's progress in implementing this ten-point action plan. *Blueprint 2003* begins with a brief background section on California's definition of green building, followed by a discussion of policy and program accomplishments. The report then highlights the many public, private, and non-profit partnerships developed by the Sustainable Building Task Force. Finally, it presents a series of case studies, which describe several leadership buildings and a statement of Task Force goals for the next two years. *Blueprint 2003* can also be downloaded from the California Integrated Waste Management Board's green building website at www.ciwmb.ca.gov/GreenBuilding/TaskForce.

II.XTHE CONTEXT FOR GREEN BUILDING IN CALIFORNIA X

Although sustainable building may mean slightly different things to different people, generally speaking, sustainable buildings use key resources like energy, water, materials, and land much more efficiently than buildings that are simply built to code. They are also designed and operated to create healthier and more productive work, learning, and living environments, through the use of natural light and improved indoor environmental quality. From a fiscal perspective, sustainable building is cost-effective, saving taxpayer money by reducing operations and maintenance costs.

There are three green building performance standards, the Leadership in Energy and Environmental Design (LEED) Rating System^{™,6}, the Collaborative for High Performance Schools design criteria,⁷ and the Labs for the 21st Century Environmental Performance Criteria,⁸ each with national application, which currently set the standard for California's green building efforts.

LeX ership in Energy anX Environmental Design (LEED) RAting System[™] X

While there is no universally accepted way to compare the diverse range of green processes and technologies, one standard has gained widespread industry acceptance -- the United States Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) Green Building Rating System^{™.9} LEED[™] is a nationally recognized sustainable building rating system designed to evaluate new and existing commercial, institutional, and high-rise residential buildings. The LEED system is based on a list of 7 prerequisites and 34 performance based "credits" worth up to 69 points, and divided among six categories, including Sustainable Sites, Water Efficiency, Energy & Atmosphere, Materials & Resources, Indoor Environmental Quality, and Innovation & Design.

Four LEED certification categories are possible. Each represents an increasing level of sustainability and number of credits achieved.

LEED Certified	26-32 points
LEED Silver	33-38 points
LEED Gold	39-51 points
LEED Platinum	52+ points

Although LEED was originally developed for commercial projects, new LEED application guides specific to other infrastructure areas and project types are under development. Most notable are: LEED for Campus (addresses the unique needs of a multiple building application); LEED for Existing Buildings (guides the

sustainable operation and maintenance of facilities); LEED for Commercial Interiors (specific to major and minor renovations that do not result in significant structural changes); and LEED for Labs (coordinates the Labs21 Environmental Performance Criteria with those developed for LEED). Several SBTF members participate in these LEED committees, which are responsible for developing new LEED applications.

Many states, cities, counties, institutions of higher education, private firms, and non-profit organizations have adopted green building principles. As of August 2003, there were over 3,100 members in the US Green Building Council.¹⁰ With USGBC membership now extending internationally (there are LEED registered projects in India, China, Canada, and Sri Lanka), LEED is truly the international industry standard for green building.

The Task Force interacts quite extensively with many of these entities through trainings, forums, and USGBC chapter meetings. In particular, the SBTF has taken a leadership role in the development of a Sacramento Committee (SacCom) of the Northern California Chapter of the USGBC, which held its first meeting in August 2003, and hosted nearly 100 attendees.

IN DEPTH: LEED IN CALIFORNIA X

Nearly 20% of USGBC member organizations are located in California,¹ and of over 800 projects registered nationally for LEED certification, nearly 140 of these are located in California,² more than in any other state. Within California, the cities of Long Beach, San Diego, San Francisco, San Jose, Santa Monica, Los Angeles Community College District, San Diego Community College District, San Mateo County, and Los Angeles city and county have all made commitments to use LEED for new construction projects. In addition, the city of Oakland, Alameda County, and the University of California system have developed their own LEED-based green building guidelines, and the City of Pleasanton recently passed an ordinance requiring both public and private buildings to meet the LEED Certified level.

Collaborative for High Performance Schools Best Practices Manual X

The Collaborative for High Performance Schools, or CHPS, was developed to specifically address the design and construction of K-12 schools in California.¹¹ CHPS is a diverse group of government, utility, and non-profit organizations that are working to improve the quality of education for California's children. The goal of CHPS is to create a new generation of K-12 public "high performance" school facilities in California -- CHPS design principals also apply to private schools as well as higher education facilities.

CHPS defines "high performance schools" as healthy, comfortable, resource efficient, safe, secure, adaptable, and easy to operate and maintain. Research shows that high performance schools promote higher student test scores, help school districts retain quality teachers, lower operating costs, increase average daily attendance (ADA), reduce liability, as well as support environmental stewardship and joint use.

CHPS developed a three volume *Best Practices Manual* for High Performance Schools, including a set of building design criteria to "rate" CHPS schools.¹² CHPS is self-certifying, and CHPS schools must score 28 out of 81 possible points for eligibility. With Task Force support, CHPS is currently completing a fourth volume of the Best Practices Manual, the *Maintenance and Operations* of high performance facilities, which should be published in early 2004. This manual will not only guide the operations and maintenance of K-12 school facilities, but will provide valuable direction to other state facilities as well.

Although there is currently no interchangeability between the CHPS and LEED rating systems, CHPS is working with the USGBC to develop a Memorandum of Understanding, which would formally establish a partnering relationship between CHPS and the USGBC. CHPS and LEED are very compatible, and Task Force members are working diligently to incorporate both into state programs and outreach opportunities.

IN DEPTH: CHPS DEMONSTRATION SCHOOLS X

The California Energy Commission, California Integrated Waste Management Board, Investor Owned Utilities, and others contributed resources to fund 13 CHPS demonstration projects throughout the state. These schools are under construction and will be models of energy and materials efficiency, daylighting, and other sustainable features.

Currently, five school districts throughout the state have passed resolutions adopting the CHPS criteria for all future school construction, including Los Angeles Unified School District, Santa Ana Unified School District, San Rafael City Schools, Coast Community College District, and Dry Creek Joint Elementary School District.¹ In addition, the CHPS Best Practices Manual and Criteria have also been adopted by the state of Massachusetts² and the Federal Department of Energy.³ For more information about CHPS and to view high performance school case studies, please visit: <http://www.chps.net>.

Laboratories for the 21st Century Environmental Performance CriteriaXX

The federal Department of Energy and the US Environmental Protection Agency established the Labs21 program to guide the construction of sustainable laboratory facilities.¹³ This program relies upon three components:

- 1) Partnership Program: The pilot Labs21 Partnership Program includes 15 corporations, universities and government agencies that have committed to taking either a new or existing laboratory facility through the Labs21 process. These pilot partners are in turn provided with technical support and assistance to ensure that facilities are designed to the highest environmental standards possible. The full Labs21 Partnership Program will be rolled out at the October 2003 Labs21 Conference and will then be open to all laboratory facilities throughout the US.¹⁴
- 2) Training: A full day design course is offered at various locations throughout the country. The course will be offered in two California locations in November of 2003 (San Diego, CA: November 19 and Los Angeles, November 20).¹⁵ In addition, Labs21 offers a student design competition, a phone forum, and a federal laboratories forum.¹⁶

- 3) Tool Kit: The Labs21 Tool Kit includes both information resources and design process tools. In particular, a series of Environmental Performance Criteria (EPC) that closely follow the LEED Rating System, but include provisions to address the more energy and water intensive nature of laboratory facilities, guide the design and construction of sustainable laboratories.¹⁷ In addition to the EPC, the Labs21 tool kit also includes a design intent tool to guide the commissioning process and a process manual, which is currently under development.¹⁸

The SBTF is working with the UC and other higher education systems to promote the incorporation of Labs21 into the construction of new lab facilities. In particular, the Task Force is interested in the retrofit of existing facilities with energy efficient lamps and “low flow” fume hoods.¹⁹

III. POLICY AND PROGRAM ACCOMPLISHMENTS

Over the past two years the Task Force has achieved several significant policy and program accomplishments in such areas as contracting requirements, operations and maintenance, research and development, training and education, on-line resources, and outreach. In addition to implementing new programs, many of these Task Force accomplishments involve new levels of interaction, teamwork, and partnering among diverse state agencies.

The Task Force has not confined its green building activities to state owned and operated facilities. A concerted effort also has been made to educate private and public sector entities and integrate sustainable building criteria into areas where state resources provide funding for the design and construction of different infrastructure types, including affordable housing, libraries, schools, and laboratories.

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\$2 Billion in Contract Funds Reflect Sustainable Building Criteria

Sustainable building and energy efficiency criteria are now included in all Department of General Services' Architect and Engineering (A&E) design, construction, and leasing contracts. For example, contracts for new construction and major renovation of state facilities now include criteria specifying that buildings either surpass the Title 24 energy efficiency standard by a minimum of 10% or meet other energy efficiency criteria.²⁰ To date, \$2 billion in capital outlay contracts include these sustainable building and energy efficiency guidelines.

In an effort to simplify and standardize the contracting process, the state recently decided to utilize the LEED rating system in place of existing internal sustainable building and energy efficiency performance criteria.²¹ As a result, all significant state projects will soon be required to meet the LEED Certified level, and many projects are targeting even higher levels of sustainability, as set forth in the Goals Section of this report. State leasing contracts also include "sustainable criteria" or guidance specifications. These criteria address indoor environmental quality, and include energy efficiency and construction waste diversion requirements.

To support this new performance guideline, 36 Department of General Services Real Estate Services Division staff have completed the LEED intermediate training course, and 3 staff have subsequently passed the LEED Accreditation Exam and are now registered LEED Accredited Professionals.²² In addition, four staff in the Waste Board's Green Building Section have received LEED Professional Accreditation.

IN DEPTH: STATE PROJECT ACHIEVES LEED GOLD X

In January 2003, the Education Headquarters Building (Block 225) of the Capitol Area East End was awarded the LEED™ Gold Rating from the US Green Building Council. This is the first state government building in the country to receive a LEED Gold rating for sustainable design. Other notable state buildings seeking LEED certification include Blocks 171-174 of the Capitol Area East End Complex and the Franchise Tax Board Butterfield State Office Building in Sacramento; the Caltrans District 7 Headquarters Building in Los Angeles; and the City Centre State Office Building in San Diego. In addition, the CalPERs Headquarters Expansion Project is targeting a sustainable building goal of LEED Silver. Many of these projects are discussed in greater detail in the leadership building section of this report.

Operations and Maintenance Recognize Xs Key to Building Performance X

SBTF activities to improve operations and maintenance practices at state facilities are being implemented on several fronts:

Cal/EPA Building: A “LEED for Existing Buildings” Pilot Project

The California Environmental Protection Agency Headquarters Building, a building currently leased by the state from the City of Sacramento, is one of 80 facilities nationally, and 8 buildings in California participating in the LEED for Existing Buildings pilot program.²³ It is anticipated that this building will earn a Platinum LEED-EB rating – the highest level possible. Several new operations and maintenance practices have been implemented in this building with impressive results. For example, savings in energy alone are \$100,000 annually, and janitorial complaints have dropped by 70%. Building management reports that due to energy efficiency, water conservation, waste diversion and other changes, its operations and maintenance budget is 82 cents less per square foot than the Sacramento average.

Operations and Maintenance Guidelines Under Development

The SBTF is developing maintenance and operations guidelines for use in state-owned buildings based, in concept, on guidelines already developed by the State of Pennsylvania.²⁴ Specifically, the state will likely adopt the Green Seal GS-37 standard for environmentally preferable cleaning products.²⁵ Although this standard represents the most rigorous level of environmental

performance currently available, GS-37 requirements are not as stringent as current California protocol for Indoor Air Quality. A SBTF working group has therefore developed an Indoor Air Quality supplement to GS-37, which will be submitted to Green Seal for recommended inclusion in the next revision (scheduled for 2004) of this standard.

State Embraces Whole Building Commissioning

Commissioning is considered a fundamental component of sustainable building. The SBTF is actively pursuing the use of commissioning as a means to save money and improve the performance of buildings. Commissioning includes evaluation of systems and processes through design, construction, and occupancy and has great potential to provide the state with data on building performance that is essential to making improvements. Implementation of commissioning is anticipated to result in significant cost savings due to reduced change orders, increased energy efficiency, and reduced operating costs.

In 2002, the Division of the State Architect (DSA) developed a Commissioning Strategic Plan for California school districts (K-12 and community colleges), titled, *Adopting the Commissioning Process for the Successful Procurement of Schools*.²⁶ With support from the Department of Finance and the Energy Commission's Public Interest Energy Research (PIER) Program, the SBTF is developing an implementation plan to integrate the commissioning process into all future state construction projects. The state's commissioning activities are also being coordinated with the UC System and USGBC to ensure that in-house commissioning efforts will be recognized by the LEED rating system. For more on the state's commissioning efforts, see the California Commissioning Collaborative discussion in the partnership section of this report.

DGS Evaluates Building Occupant Satisfaction

In 2000, the state initiated a Post Occupancy Evaluation (POE), now known as Facility Performance Evaluation, Program.²⁷ This effort included the creation of a POE strategic plan, followed by an implementation plan in November 2001. Quick response studies, one of five key components of the strategy, were performed on two projects in 2002 -- the Division of Motor Vehicles (DMV) Headquarters, fourth floor renovation and DMV Mission Valley State Office Building.²⁸ These evaluations identify occupant issues and will serve as a useful tool in improving maintenance services and building performance. Additional evaluations are planned for the Capitol Area East End Complex and the San Francisco Civic Center, as well as other DGS facilities as funding becomes available.

To support facility assessments at the over 1000 school districts throughout the state, the SBTF is developing a POE Toolkit for Schools, which is nearly complete. This self-assessment toolkit will provide teachers with the resources necessary to conduct air quality, light level, and energy efficiency testing of their classrooms and school facilities.

DGS Buildings Benchmarked

The United States Environmental Protection Agency and the Department of Energy jointly developed the Energy Star Benchmarking Tool for buildings.²⁹ The Energy Star Benchmarking tool compares building energy use across a national database and ranks buildings accordingly. Because this benchmarking tool ranks buildings nationwide, there is limited consideration of regional variables. In particular, California energy standards as delineated in Title 24 are more stringent than elsewhere in the country.³⁰ As a result, a California building that achieves a high benchmarking score (indicating eligibility for Energy Star labeling) may not actually be a particularly energy efficient California building.

In order to create a more California friendly Energy Star benchmarking tool, additional California buildings must go through the benchmarking process. Over the last two years, 16 state-owned facilities have been benchmarked using the Energy Star benchmarking tool. Twelve of these buildings have scored 90 or above (75 points are required to achieve Energy Star status). Two additional buildings are currently going through the submission process and one is being audited for eventual benchmarking. Additionally, the SCSA, through the School Energy Efficiency Program, intends to benchmark roughly 200 California K-12 school facilities. Using this additional data, the SBTF will work with the US EPA to refine the Energy Star Benchmarking Program and more thoroughly incorporate its technical assistance tools into the state's operations and maintenance protocols.

Task Force Initiates Groundbreaking Research

Because misperceptions still exist about the cost of green buildings and the unproven nature of certain sustainable technologies or practices, the SBTF has initiated a number of studies, demonstration projects, and air quality testing procedures to begin the process of separating green building fact from fiction.

Economic Analysis Shows Sustainable Building Is Cost-Effective

The Costs and Financial Benefits of Green Building, an economic analysis commissioned by the Sustainable Building Task Force, is the most comprehensive green building cost benefit study completed to date. The results of this study will dramatically increase the nation's understanding of what it really costs to build green. Among other things, the study analyzed the costs and financial benefits of sustainable building at the LEED Silver and Gold levels, and found that a 0 to 2% upfront investment in sustainable design (up to the LEED Gold level) will yield 20% savings over the life of the building (assumed conservatively to be 20 years). In other words, an initial upfront investment of up to \$100,000 to incorporate green building features

into a \$5 million project would result in a savings of \$1 million (in today's dollars) over the life of the building, assumed, conservatively, to be 20 years.

The report considers both direct and indirect financial benefits, including values for energy, water and waste reduction, as well as values for the more indirect benefits associated with employee productivity gains and health improvements. Although the total direct and indirect savings associated with greening is significant, direct benefits alone are still three times greater than any additional upfront costs.

In addition, the analysis shows that the incremental cost of building green is decreasing, in particular as project teams gain valuable experience and the demand for green products increase. The final report, which will be available on the SBTF website,³¹ also includes recommendations for additional research. Clearly, this report provides those with fiscal and construction expertise a defensible, informed rationale for making sustainable building funding decisions.

Analysis Shows LEED Certified Is Standard State Practice

Although only one LEED project has been completed and a number of additional state projects are currently registered for LEED certification, the SBTF wanted a clear picture of how standard state building practice measured up against the LEED rating system. Recently, the SBTF completed a preliminary LEED credit analysis to determine the LEED rating of standard state design and construction practice. Findings indicate that with little to no additional cost and/or effort, the state should be able to deliver buildings at the LEED Silver level. This study was conducted primarily for new construction projects in urban areas, however analysis also considered suburban and rural sites, as well as renovation projects.

Report Outlines How to Manage the Cost of Green Buildings

The sustainable building process requires a new way of delivering buildings. More work must be completed upfront to address design issues, energy modeling, and material selection. The SBTF, in collaboration with the Alameda County Waste Management Authority, commissioned a report to identify factors that influence green building costs and provide recommendations on how to best manage these costs. This report, scheduled for completion in October 2003, provides general cost-saving strategies and explores cost management opportunities specific to four building types: laboratories, affordable housing, libraries, and K-12 schools.

Emissions Testing Continues During Occupancy

Prior to building material selection at the Capitol Area East End Complex, manufacturers of materials with indoor air quality implications were required by the design/build teams to submit test results for each product showing that they met the requirements of an environmental specification (known as

Section 01350) developed specifically for this project. After completion of the construction, prior to modular office furniture installation, as well as after the installation of the modular office furniture and prior to occupancy, indoor air sampling for volatile organic compounds (VOCs) and aldehydes, including formaldehyde, was conducted at each of the five buildings. Testing was intended to ensure that the concentrations of the target chemicals were below the concentrations set forth at the beginning of the project by each design/build team. One building (Block 225) was sampled extensively during the flush-out period as well as after occupancy.

The Indoor Air Quality Section of the Department of Health Services, with funding from the US EPA, is continuing to monitor the indoor air quality of the five building Capitol Area East End Complex. The goal of this 18-month research study is to determine the effects of building materials, office furniture, occupant activities, and cleaning/maintenance products on indoor air quality by measuring indoor chemical concentrations. Collected data will be reported to the Department of General Services, who will, in turn, share this information with the Health and Safety officers of the two Departments occupying the Complex.

Study Considers Benefits of Raised Floors

With the installation of the first Under Floor Air Distribution (UFAD) system in a state building (Block 225 of the Capitol Area East End Complex), the Department of Finance requested that a study be undertaken to quantify the costs and benefits of the UFAD system. The UC Berkeley Center for the Built Environment, a leader in raised floor research, is conducting a field study to determine the positive and negative impacts of underfloor vs. conventional air distribution systems. The study will measure and collect data over a specified time frame at two of the new Capitol Area East End buildings, evaluating energy use, indoor environmental quality, occupant satisfaction and comfort, and operating/churn/life-cycle costs.³²

Study Measures Material Emissions

The Materials Emission Testing Study,³³ conducted by the Department of Health Services (DHS), measured emissions from products common to classrooms and state construction compared to emissions from products categorized as recycled content, low VOC, and/or rapidly renewable. Released in June 2003, the study findings indicate that recycled content materials perform to the same level as standard products; however, both may emit chemicals of concern. The DHS and California Integrated Waste Management Board are working with industry to review testing protocols and assist in improving product performance.

Study Evaluates Air Quality in California's Classrooms

*Environmental Health Conditions in California's Portable Classrooms*³⁴ is a comprehensive study of the indoor environmental conditions of portable and permanent classrooms in California. Preliminary findings of the study, conducted by the Air Resources Board and the Department of Health Services, indicate that the indoor environmental conditions of many California K-12 classrooms do not meet relevant guidelines and standards. The report makes a series of recommendations to improve the indoor environmental conditions of California's classrooms, including better compliance with existing worker health and safety regulations, self-assessment of classroom conditions by schools, application of "best practices" such as those developed by CHPS, and better training for school district operations and maintenance staff.

Training, Education, and Outreach Remains Top Priorities

SBTF training, education, and outreach efforts include development of technical assistance programs, on-line resources, conference participation, as well as classroom activities.

2000 Building Professionals Trained

The Department of General Services, in collaboration with the California Integrated Waste Management Board, has trained over 2000 architects, engineers, consultants, planners, designers, state and local government employees, and school facilities personnel on sustainable materials selection, construction waste management, and sustainable design. These efforts began with state employees and have expanded to local government staff in Sacramento, San Francisco, Irwindale, Stockton, Los Angeles and San Diego. As part of this effort, a comprehensive Sustainable Building Training Manual³⁵ is available at no cost. In addition, DSA, CIWMB, and SCSA together sponsored over 20 high performance school training sessions at locations throughout the state.

Waste Board Contract Provides Technical Assistance

The California Integrated Waste Management Board (CIWMB) selected the firm of Berkebile Nelson Immenschuh McDowell Architects (BNIM) to provide a team of highly specialized sustainable building design experts to assist the Sustainable Building Task Force. Current priority projects include affordable housing design, the use of tire-derived products for appropriate sustainable building applications, and improving the quality of classroom design.

Marshall School Develops Business Case Study

The USC Marshall School of Business Women's Leadership Board, a group of undergraduate students (both men and women), worked with the SBTF to develop a business school case study on the organizational process the SCSA used to integrate sustainability into the capital outlay process. To inform the case study development process, the USC students visited Sacramento and conducted a series of interviews with the key players in this "dilemma."

Using these interviews, the students developed a written case study and accompanying video. The case was subsequently presented to a class of students to "solve" the dilemma relying only on the information provided. The Secretary of the State and Consumer Services Agency was involved in the judging of the presented solutions. It is likely that this case will be used in future class discussions and potentially could serve as an educational tool at other business schools across the country.

Library Bond Projects Include Sustainable Features

The Office of Library Construction (OLC), under the direction of the State Librarian, strongly encourages the California Public Library Construction and Renovation Bond Act Fund recipients, to design new libraries or renovate existing libraries according to the sustainable building design concepts advocated by the SBTF.

\$200 million in state bond funds are currently available for grants to local jurisdictions for the construction and renovation of public libraries.³⁶ In December 2002, the first of three series of applications, totaling more than \$130 million, were approved.³⁷ The second application deadlines closed in March 2003 and the third cycle deadline is set for January 2004. Second cycle applications are currently under review. Although the Library Bond did not explicitly require sustainable building criteria, the State Librarian took several significant steps to ensure that libraries constructed with these funds would be sustainable. For example:

- Information on sustainable building was supplied to all applicants via the Office of Library Construction website (www.olc.library.ca.gov).
- Technical assistance information and workshops contained sustainable building materials.
- Part 2 of the Library Bond application package advises applicants to observe sustainable building in their conceptual designs (including water, energy and material efficiency).³⁸
- Two books, *Energy Management Strategies in Public Libraries*³⁹ by Edward Dean and *Sustainable Library Designs*⁴⁰ by Johanna Sands, were commissioned by the State Librarian and are being distributed to grantees and the public to raise awareness of sustainable building.

In the first library bond construction cycle, the Board approved 8 projects that are planning to meet Leadership in Energy and Environmental Design (LEED) standards.

A second State Library Program, the California Cultural and Historic Endowment, requires the disbursement of roughly \$130 million in Proposition 40 funds for projects of historic and cultural significance. The SBTF plans to work with the State Librarian to ensure that projects granted funds under this program also incorporate sustainable building systems and technologies, where possible.

On-Line Classes Now Available

Through a partnership between Shasta College, the California Integrated Waste Management Board, and the SBTF, a series of sustainable design courses are under development. The first course, *Introduction to Sustainable Design*, was piloted nationwide at no charge to participants in early 2003. Over 100 “students” participated in this initial offering, with 50 individuals completing all required assignments. A second free of charge pilot course will be offered in early Fall 2003.

Three additional courses, *Sustainable Design: Siting, Energy Efficiency, and Indoor Environmental Quality*, *Sustainable Design: Construction Waste Management, Materials Selection*; and *Specifications: Making the Most of Materials Selection in Sustainable Design* are based on training sessions developed by the CIWMB and converted to online courses by Christine Flowers, a Professor at Shasta College on loan to the Waste Board. A total of 11 environmental-related, on-line courses are under development, each will be hosted by Shasta College. Students will receive 4 credit hours, and up to 30 students may enroll per course offering. All courses are being designed to meet the AIA’s Continuing Education Health Safety and Welfare credit.

Green Building Website Receives Over 150,000 Visitors

The Sustainable Building Task Force Website,⁴¹ hosted by the CIWMB, received over 150,000 visitors in the past year. This website includes a wealth of information for the novice green builder, as well as those well-versed in this area. Green building events are listed; links to state, federal, and local government green building programs are provided; case studies of outstanding green buildings across the country and within California are presented; and new information is continually added (e.g. historic preservation and affordable housing pages are currently under development).

State Architect Launches Sustainable Schools Website

The Division of the State Architect launched its Sustainable Schools Website⁴² in March 2003, which offers a comprehensive clearinghouse on sustainable school construction. The website includes suggestions on incorporating sustainable building practices into school design; sustainable building guidelines; high

performance school case studies; and links to relevant incentive information and school design training programs.

The website also contains two important technical resources for schools:

- Video Streaming Series. DSA, in collaboration with CHPS, has produced a series of online videos⁴³ on high performance school construction, including such topics as site analysis, energy performance, water resources, daylighting, building materials, and indoor environmental quality.
- Environmentally Preferable Products Database. As required by SB 373, DSA is developing an Environmentally Preferable Products Database for Sustainable Buildings. The database will collect information on materials (e.g. recycled content, VOCs, and life cycle costs) for use in High Performance Schools and other state buildings. A supplementary grant provided by the US EPA's Pollution Prevention Program will allow the database to include several additional material categories for analysis.

Conferences Highlight Sustainable Building

- Conference on Building and Operating Sustainable College Campuses in the 21st Century. The UC Merced "Conference on Building and Operating Sustainable College Campuses in the 21st Century" took place in April 2003 with support from a U.S. Environmental Protection Agency grant and assistance from the SBTF.⁴⁴ The conference had three primary objectives: (1) to share plans, progress and experiences in building a sustainable UC Merced campus with college administrators and planners, (2) to inform participants about sustainable practices, and (3) to provide opportunities for participants to learn more about green activities occurring at other educational institutions in California and elsewhere. Over 150 participants from higher education, state government and the private sector attended the two-day event. Plans are already underway for a follow up Conference in June 2004.
- Housing Conference Offers Green Building Session. The 2002 annual Department of Housing and Community Development Affordable Housing Conference featured a green building track, developed with the help of the SBTF. The track focused on actual construction projects throughout the state, including Santa Monica's Colorado Court⁴⁵ and Emeryville's Resourceful Building Project.⁴⁶ Due to its success, a green building track will again be included in the 2003 conference, featuring green affordable housing success stories and available tools and incentives for state and local agencies, non-profits, and private developers.

Task Force Authors Sustainable Building Articles

- Environmental Goals and Policy Report. With the passage of AB 857⁴⁷ the Governor's Office of Planning and Research (OPR) was tasked with developing a revised Environmental Goals and Policy Report (EGPR). In order to develop a report that will accurately reflect the state's planning goals for the next 20-30 years, OPR convened a working group of state agencies to advise this process. The EGPR, scheduled for completion in Fall 2003, will develop the State's plan for sustainable development. The SBTF is providing comments and helping to establish goals and policy priorities for the final report.
- Building Better Buildings: Sustainable Building Activities in California Higher Education Systems. An article on the SBTF and its partnership with the University of California, California State University, and California Community College systems was featured in the Spring 2003 Edition of "Planning for Higher Education," the Journal of the Society for College and University Planning. This edition was a special issue focused on sustainability.⁴⁸ Many of the activities outlined in the article for future action by the SBTF and California's higher education systems have been accomplished or are currently ongoing, including adoption of the UC system wide Green Building Policy and Clean Energy Standard and coordination of the UC Merced conference on sustainable building in higher education institutions.
- American Council for an Energy-Efficient Economy (ACEEE) Summer Study. The SCSA published a paper in the ACEEE Summer Study 2003 proceedings, *Sustainability and Industry: Increasing Energy Efficiency and Reducing Emissions*,⁴⁹ related to research on quantifying the costs and benefits of green building.
- Greenbuild International Conference and Expo. Five abstracts submitted by SBTF members were accepted for inclusion in the US Green Building Council's 2003 International Conference and Trade Show⁵⁰ to be held in November 2003. Topics include: costs and benefits of green building, managing the costs of LEED, Building Materials Emissions Testing Study, greening the modular furniture contract, and the diversion of construction and demolition waste in California.
- The Planning Report. *The Planning Report* is a monthly newsletter, which explores land use planning and managed growth issues in California. State and Consumer Services Agency Secretary, Aileen Adams, was interviewed for the September 2003 edition of *The Planning Report*, to discuss California state government's progress in the sustainable building arena.⁵¹ This interview highlights leadership projects, particularly high performance schools and the new UC Merced campus, which will be the greenest campus in the nation.

Agency Promotes Sustainable Building

One key to the successful implementation of any new initiative is executive support. The SCSA Secretary and Undersecretary have been keynote speakers at a number of sustainable building forums, including:

- Bren Hall Opening Ceremony at the Donald Bren School of Environmental Science & Management, UC Santa Barbara
- Dedication of the Education Headquarters Building, Block 225 of the Capitol Area East End Complex, Sacramento, CA
- Dedication of the Photovoltaic Array on the Roof of the Franchise Tax Board, Rancho Cordova, CA
- Kick-off Event for San Diego Chapter of USGBC – “LEEDing San Diego into a Sustainable Future”, San Diego, CA
- Local Government Commission Building a Sustainable Infrastructure for the 21st Century Conference, Monterey, CA
- Testimony to the UC Board of Regents, Grounds and Buildings Committee, Oakland, CA
- UC Merced, Conference on Building and Operating Sustainable College Campuses in the 21st Century, opening remarks, Modesto, CA
- Sustainable Northwest Sustainability Forum, Portland, OR

IN DEPTH: High School Green Design Project PiloteXX

The Center for Advanced Research and Technology (CART) is a joint magnet school for high school juniors and seniors, administered by the Fresno and Clovis Unified School Districts. CART provides intensive educational opportunities in 13 lab areas for its students using a public/private partnership model. The architecture lab at CART traditionally engages students in 4 design projects during the course of the school year. As one of the few high school architecture programs in the state, CART provided an opportunity for the State and Consumer Services Agency, through its School Energy Efficiency (SEE) Program, to develop and implement an energy efficiency and green building curriculum.

The School Energy Efficiency Program, through a grant from the California Public Utilities Commission, provided funding to assist in the creation and implementation of a “green” design project. Students worked in teams to apply new green and energy efficient design concepts to a real design problem, a Boys and Girls Community Center, in the Fresno and Clovis communities.

The project relied on a multi-faceted learning approach, including lectures; small group collaboration; participation in a design charette; oral and written reports; a design competition; and field trips to green buildings. The ultimate goal of the CART project is to tie the application of green building and energy efficiency to learning in the classroom. A teaching guide is in the process of being developed, complete with curriculum and lessons learned from the project. The SBTF and SEE Program staff hope to replicate this project in other high school architecture programs in the state.

Environmental Awards Program Now Recognizes Sustainable Facilities X

For the first time in its ten-year history, the 2003 Governor’s Environment and Economic Leadership Awards (GEELA),⁵² considered the most prestigious environmental award in the state, include a *Sustainable Facilities* category. The SBTF worked closely with the GEELA staff to initiate this new award category and is currently in the process of helping to evaluate applications. A total of fifteen submissions in the Sustainable Facilities category were received and awards will be presented in November 2003.

IV. SIGNIFICANT PARTNERSHIPS ESTABLISHED X

The momentum around sustainable building is capturing the attention of California cities and counties, federal, state, and local governments, nonprofit organizations, and international bodies. An abundance of new laws, fiscal incentives, performance guidelines, building technologies, and construction projects focused on sustainable building pervade the national landscape. The Task Force has forged strong relationships with public, private, and non-profit sector entities inside and outside California that are working on green building issues. This section highlights California's many sustainable building collaborations and partnerships.

Institutions of Higher Education Adopt Green Policies and Practices X

Over the next decade, California's higher education institutions will be involved in over \$20 billion of new construction and building renovation – making higher education the most prolific builder in California during this time. Recognizing the impact that higher education systems will have on the construction industry, the SBTF has emphasized partnering with the University of California, California State University, and California Community College systems.

IN DEPTH: ENERGY STAR FOR DORMS PROGRAM X

The SBTF is working with the federal Department of Energy to implement an Energy Star for dorm rooms project within each of California's systems of higher education. This program, modeled after a successful project at Tulane University,¹ will select dorm rooms located on four campuses (at least one CSU, UC, and CCC campus) and outfit these rooms with energy star appliances. The SBTF program will also include the use of recycled content and/or low VOC materials.² Students will be involved in recording and analyzing energy use, as well as promoting energy efficiency across the various systems.

University of California

The UC Board of Regents' Committee on Grounds and Buildings passed a resolution in December 2002 calling for a feasibility study to explore implementing a system-wide green building policy and clean energy standard. In response to this resolution, the UC Office of the President (UCOP) convened a Steering Committee comprised of design and energy experts, key state government officials (including the Secretary of the State and Consumer Services Agency), and campus fiscal and budget administrators to guide the study. In July 2003, the UC Regents passed a system-wide green building policy and clean energy standard for all future UC campus construction.⁵³

The SBTF has also been working closely with the following UC campuses:

University of California, Merced

UC Merced will be the first major research university built in the 21st Century and the tenth UC campus. The UC Merced administration has already made a firm commitment to sustainability -- establishing a goal of achieving the LEED™ Silver rating for the entire campus. The State and Consumer Services Agency (SCSA) Secretary is the chair of the UC Merced Implementation Team (Red Team), and the SCSA has been involved in a number of building, land use, transportation, and housing issues related to the campus. UC Merced is also a pilot partner in the Labs for the 21st Century initiative co-sponsored by the United States Environmental Protection Agency and Department of Energy.

University of California, Santa Barbara

UCSB has established a tentative goal of LEED Silver for all new campus construction within the Facilities and Construction departments. It is the intention of the University to make this a campus-wide policy in the near future. To help implement this goal, UCSB has established a Central Campus Sustainability Committee (CCSC). This group meets monthly to coordinate campus goals and set policy.

The University and the State have initiated conversations with the US Green Building Council to determine the extent to which in-house commissioning (performed by UC Santa Barbara Facilities Managers or Building Property Management at the state level) will be accepted for the LEED commissioning prerequisite and additional commissioning (Energy and Atmosphere Credit 3).⁵⁴ Traditionally, the USGBC has required a third party "Commissioning Agent" which often translates into significant costs to the project. UCSB and the SBTF are interested in developing commissioning expertise in house and making it standard practice for all new and existing facilities.

Davis Langdon Adamson (DLA) is working with the Donald Bren School of Environmental Science and Management at UC Santa Barbara to complete a follow-up report on the costs of greening Bren Hall (currently the only Platinum LEED 1.0 building in California). This report will develop

a better understanding of the actual cost of greening the Bren design, including construction costs, operations savings, environmental benefits, and the cost implications of designing Bren to LEED 2.1 and LEED Labs standards.

The cost implications of building LEED on the UC Santa Barbara campus are also being developed. DLA has met with the SBTF to present their findings and incorporate suggestions. Preliminary findings suggest that it is possible to build LEED 2.1 Certified on the UC Santa Barbara campus for added cost, that Silver adds between .5 and 1.5%, and that the cost for LEED Gold and Platinum can range anywhere from 1 to 15%.

California State University (CSU)

The California State University understands the strong correlation between environmentally friendly construction and occupant satisfaction, and is committed to implementing these principles in new and renovated facilities on its 23 campuses. The CSU system is committed to the design of new and renovated structures utilizing best practices to provide energy-efficient systems; lower life cycle costs for construction and equipment; and durable finishes in support of university academic programs. The CSU Committee for Development of Sustainable Design Policy will finalize the CSU policy for presentation to the Board of Trustees in January 2004. The policy will provide a consistent standard with a CSU-administered certification process to ensure that campuses consider available technologies for all construction projects. Sustainable design is considered part of a holistic design process, similar to the inclusion of accessibility, with no designation of additional funding.

Specific capital projects with strong sustainable components include the following:

CSU Chico

Chico State has taken strides to incorporate LEED standards on their new Student Services Building. This project will serve as a demonstration project for the implementation of this standard, and will likely be designed to the LEED Gold level. In recognition of state agency programs, and embracing holistic green design, Chico State held an official signing of the LEED application for this project in Sacramento in September 2003. Costs for this certification were provided for the project by non-state sources.

CSU Northridge

Northridge has completed a photovoltaic (PV) array in a surface parking area (Lot D6). This installation has an output of 225 kilowatts of direct current (DC) electricity, and provides shaded parking spaces. A second PV array in Lot B1, now under construction, will provide 467 kilowatts of DC power. The campus has also installed six micro-turbines fueled by natural gas, each generating 30 kilowatts of co-generated power.

CSU Sonoma

The renovation of Salazar Hall, completed in Fall 2002, features a unique system of low-energy cooling, lighting control, and high-efficiency glazing, which results in energy usage 42 percent lower than what is required by the state's building standards. The building features an air circulation system that provides 100 percent fresh air to the facility at all times. In addition, a 1,200-module solar panel system on the roof of Salazar Hall will provide 96 kilowatts of direct-current electricity. The campus is planning at least two additional photovoltaic projects.

IN DEPTH: MOSS LANDING MARINE LABORATORY X

Moss Landing Marine lab (MLML) is a 60,000 square foot, multi-purpose building built overlooking the Pacific Ocean at Moss Landing, California. The new MLML building replaced the old laboratory complex that was destroyed in the Loma Prieta Earthquake in 1989.

During 2002, MLML was chosen as one of 80 buildings in the USA to pilot the US Green Building Council's new program for Existing Buildings, LEED-EB. Although not originally designed as a 'green, sustainable' building, the LEED-EB process has shown that MLML stands out as an example of sustainable construction and operation.

Highlights include:

- Passively designed building with excellent vision glazing, operable windows and exterior shading.
- 21 acres of newly replanted native species, including species that were on the federal endangered list.
- Rainwater runoff directed to a newly constructed wetland and conservation areas.
- Use of only "Greenseal" products, eliminating zinc from the floor polishes and sealers, and further reducing the impact of all cleaning products from the custodial operation.
- All paper hand towels contain at least 100% recycled content and 40% post-consumer content. They are also chlorine free.

MLML's submission paperwork for LEED-EB is nearly complete, and the building is currently on target for a Gold rating.

California Community Colleges

In an effort to assess the growing operational and maintenance needs of roughly 108 community college campuses, the Chancellor's Office contracted to conduct comprehensive facility condition life cycle assessments. Data from these assessments will be compiled, tracked and rolled into a systemwide online planning and management tool, known as Fusion. This Fusion program will be used to inform the CCC system about its facilities and enable policy-makers to make better decisions about future investments in new construction, renovation and retrofit projects. It is anticipated that this effort will result in improved facility planning, better maintained and operated buildings, and more sustainable capital outlay projects. The CCC has also developed a statewide energy management plan that includes alternative technologies, renewable energy, and sustainable construction strategies.

DeAnza Community College

De Anza College will begin construction on the Kirsch Center for Environmental Studies in December 2003. The Center will showcase energy efficiency, resource conservation, renewable energy technology, and will be one of the first outstanding of a sustainable building in the California Community College system. This 22,000 square foot classroom integrates east-west orientation for passive solar benefits and daylighting, uses an advanced natural ventilation system, incorporates recycled/nontoxic materials and paints, as well as on-site photovoltaic electrical generation, raised floor air distribution, and other energy innovations.⁵⁵

Los Angeles Community College District

In March 2002, the Board of Trustees of the Los Angeles Community College District (LACCD), the largest district in the state including 9 campuses and some 120,000 students, made a commitment that all future new construction projects funded by Proposition A monies would become LEED™ Certified. In addition, new LACCD buildings must obtain between 15 and 25 percent of their energy demand from renewable energy sources, including at least 10% from onsite generation, such as photovoltaics and wind power.⁵⁶

San Diego Community College District

In September 2003, the San Diego Community College District, the second largest district in the state, adopted LEED certification for new construction projects. The Board of Trustees made this commitment for \$685 million in Proposition S construction projects.

Partnering With the Architecture and Building Community

The SBTF plans to expand partnership opportunities with the American Institute of Architects (AIA), the California Architects Board, and Building Code officials in the upcoming months.

- In 1989, the AIA established the Committee on the Environment⁵⁷ to address the issue of sustainable design. The SBTF will coordinate education and outreach efforts with the AIA's California Council to provide continuing education credits for sustainable design courses developed through this partnership.
- The California Architect's Board,⁵⁸ within the Department of Consumer Affairs, is responsible for certifying architects in California. The SBTF has begun to discuss sustainable building design training with the Board and to explore the inclusion of sustainable design questions on the architect's board exam.
- Recently, the California Building and Standards Commission adopted a new building code, the National Fire Protection Association (NFPA) 5000 building code, the NFPA Uniform Fire Code, and some provisions of the International Residential Code Council to serve as the basis for the next California Building Code and California Fire Code.⁵⁹ This code is still being revised for use in California, and the SBTF will work with code officials to incorporate sustainable building considerations into the final document.

IN DEPTH: FEDERAL NETWORK FOR SUSTAINABILITY¹ X

The Federal Network for Sustainability (FNS) is a voluntary partnership among federal agencies on the West Coast of the United States (particularly California, Washington and Oregon) geared toward the promotion of sustainable environmental stewardship and the implementation of the President's "Greening Government" executive orders. The group was established in 2000 when 11 members signed a *Statement of Unity* on Earthday, detailing the core values of the Network, to develop and coordinate the Network; seek linkages and partnerships; create and manage an information sharing clearinghouse; develop and deliver training for network members; communicate ideas through conferences and meetings; and, be a catalyst for change.

To support these values and the promotion of sustainable environmental stewardship, FNS has adopted 5 initiatives with specific project goals and milestones:

1. Copier Paper
2. Environmental Management Systems
3. Green Power
4. Electronics Products Stewardship
5. Sustainable Buildings

The SBTF and FNS first began working together on green building issues several years ago with a joint meeting to explore issues in common. Since that time, the SBTF has continued to coordinate with the FNS on several issues, including: US Department of Navy Projects, US Green Building Council chapter activities, and multi-state partnership opportunities developed through the Sustainable Northwest Sustainability Forum in Portland, OR.

Task Force Generates New State Agency Working Groups X

Although the SBTF has been the primary forum for discussing sustainable building issues, Task Force activities have expanded and become so varied that participants recognized the need to form subgroups to address specific issues. The following sections describe the work of some of these subgroups:

Affordable Housing Working Group

This group works with the Department of Housing and Community Development and others interested in housing issues to promote green building practices among the developer community, establish a green building website, design and construct an affordable housing project, and expand bond program policies to encourage the greening of affordable housing projects.

Driving Green Task Force

Building siting decisions and building energy use have a tremendous effect on infrastructure requirements and transportation systems. Several factors prompted the organization of the Driving Green Task Force, including Executive Order D-46-01, the Renewable Portfolio Standard law,⁶⁰ and the state's climate change activities. The Driving Green Task Force (DGTF) complements the goals outlined in these initiatives by addressing issues related to fuel efficiency in the state fleet, energy independence, greenhouse gas emissions, environmentally friendly practices, telecommuting policies, vehicle procurement specifications, the alternative fuel infrastructure, and employee travel policies. The DGTF will also attempt to develop partnerships with other public and private entities engaged in vehicle use policy, using a \$100,000 grant from the California Integrated Waste Management Board.

Environmentally Preferable Purchasing Task Force

The work of this group was initially founded in the East End Green Team's efforts to create a green modular office furniture specification. Following the enactment of AB 498 (Chan),⁶¹ which requires Department of General Services and the California Environmental Protection Agency to "provide state agencies with information and assistance regarding environmentally preferable purchasing", the Green Team became the "Environmentally Preferable Purchasing Task Force" (EPPTF). The EPPTF now meets every month to focus on green procurement issues involving purchasing policies and the development of environmentally friendly specifications for building materials and technologies.

Grant Awarded to Support Cooperative Purchasing of Carpet

The US Environmental Protection Agency recently awarded the EPPTF a \$30,000 grant to draft a new state carpet specification and to develop a process for cooperative purchasing of environmentally preferable products.

Developing an environmentally friendly carpet specification is an important undertaking for California as we recently added our name to the signatories of the Memorandum of Understanding for Carpet Stewardship. This MOU commits the State of California to a ten-year schedule to increase the amount of reuse and recycling of post-consumer carpet and to reduce the amount of waste carpet going to landfills. In this agreement, California joins with seven other states, the Federal Government, environmental organizations, and industry in tackling this significant waste management issue. This year, through the efforts of motivated private recycling businesses, California diversion of carpet has increased from negligible levels to approximately 20% (or approximately 40,000 tons).

State Develops Environmentally Preferable Purchasing Priorities

To address the issue of environmentally preferable purchasing, the SBTF worked with a nationally recognized expert, Green Seal, to develop.⁶²

- A list of priority product/service categories based on purchasing volume, environmental impact, environmental improvement potential, policy/programmatic priorities, and contracting opportunities;
- A list of criteria to determine the environmental attributes of specific products and commodities; and
- Guidelines to address the environmental impacts of procurement processes by introducing life cycle costing, use and end-of-life management factors into specifications.

Environmentally Preferable Purchasing Website Launched

The California Integrated Waste Management Board, in collaboration with the Environmentally Preferable Purchasing Task Force, launched the EPP Website in Spring 2003.⁶³ The website is intended to provide valuable tools and resources, case studies, and information on current state EPP projects.

Historic Preservation Working Group

There is a clear synergy between historic preservation and sustainable building -- reusing or preserving a building in most instances is more environmentally friendly than building new. Recently, the State Office of Historic Preservation and the Division of the State Architect have spearheaded an effort to integrate these two compatible areas into the work of the SBTF.

This working group is currently in the process of developing a green and historic webpage for the state's Green Building Website, drafting a greening of historic preservation brochure, and planning a series of "green building" sessions for the upcoming 2004 California Historic Preservation Conference. Additionally, the group is working to establish green criteria for the 2004 Governor's Historic Preservation Awards and identifying a historic preservation demonstration project for the SBTF to pursue.

Relocatables Working Group

Over 80,000 portable classrooms are currently located on California K-12 school campuses, and many of these units are over 20 years old and in various states of disrepair. Recent research conducted by the California Air Resources Board and the Department of Health Services indicates that the indoor environmental quality of these units need to be addressed. The Relocatables Working Group is charged with drafting improved specifications for new portable classrooms, and a white paper that identifies data collection needs and makes recommendations to develop a retrofit program for existing portables and establish new operations and maintenance guidelines for new and existing facilities.

Integrated Pest Management Working Group

The project management team at Block 225 of the Capitol Area East End Complex has established a fairly aggressive integrated pest management approach using beneficial bugs and native plantings. IPM practices generally result in healthier landscapes at lower cost due to reduced use of pesticides, which greatly offset any increased costs of labor. However, few other state projects and landscaped areas currently utilize IPM practices to their full potential. The Task Force is interested in expanding IPM efforts at Capitol Park, in direct response to Assembly Bill 2472 (Simitian).⁶⁴

To address this issue, an IPM Working Group was established by the SBTF to draw upon the expertise of the East End Team, the California Integrated Waste Management Board, the California Department of Pesticide Regulation, and the San Francisco Department of the Environment. San Francisco has established a comprehensive IPM program in Golden Gate Park, which, like Capitol Park, exhibits a wide variety of flora and fauna. The IPM group has started to develop a plan, which will include the training of state property management staff and ultimately the designation of an IPM point person.

Complementary Working Groups Support SBTF Activities X

In addition to the above subgroups, SBTF members are also very active with several other interagency task forces, programs, and working groups that are complementary to the SBTF efforts.

California Commissioning Collaborative

The California Commissioning Collaborative⁶⁵ is developing a protocol to track and assess the costs and benefits of whole building commissioning, which will be applied to a series of selected demonstration projects. The testing protocol will specify data collection points, data collection methods, project reporting formats, and a cost/benefit analysis mechanism for new and existing facilities. A minimum of four case studies (including both new construction and existing facilities) will be included in the demonstration program. Once case studies are complete the collaborative will compile results and deliver commissioning trainings statewide.

Fuel Cell Collaborative

The California Stationary Fuel Cell Collaborative⁶⁶ is comprised of a core group of state agencies, including the Air Resources Board, the California Energy Commission, and the Department of General Services, in addition to the National Fuel Cell Research Center. The mission of the Collaborative is to promote the commercialization of stationary fuel cells in California. Fuel cells help to:

- Reduce or eliminate air pollutants and greenhouse gas emissions;
- Increase energy efficiency and promote energy reliability; and
- Promote energy diversity, energy independence, and secure a sustainable energy future.

To address these needs and vulnerabilities, the Collaborative has committed to increasing the generation of power from renewable resources from the current level of 12 percent to 20 percent by the year 2010. The Fuel Cell Collaborative has set an initial goal of installing 50 to 250 megawatts of capacity by 2006 in California.

The Public Interest Energy Research (PIER) Program

The Public Interest Energy Research (PIER) Program⁶⁷ awards up to \$62 million annually for energy efficiency research and development in six program areas including "Residential and Non-Residential Buildings End-Use Energy Efficiency." Reports this past year cover issues related to relocatable classrooms and building commissioning, among many others.⁶⁸ Over the next few months, the SBTF plans to seek PIER funding to expand its green building research efforts.

Energy Policy Advisory Committee

The Energy Policy Advisory Committee (EPAC) is the oldest active energy conservation task force in California state government, initially authorized through Executive Orders in the 1980's. EPAC is made up of the energy conservation program managers from the ten largest energy consuming state institutions and departments. EPAC meets on a quarterly basis to review the current and future condition of the energy industry to determine how best to optimize energy use at state facilities

Joint Agency Climate Team

Convened by the Resources Agency, this group is working to coordinate state efforts to mitigate the impacts of global climate change. The passage of AB 1493⁶⁹ brought the issue of climate change and greenhouse gas emissions to the forefront of many state agendas. To date a series of 10 initiatives have been developed by JACT members and will be used to determine future efforts in this area. Task Force members helped to craft an initiative on building energy efficiency and associated impacts of global climate change.

Recycled Water Task Force

The Recycled Water Task Force⁷⁰ was created by Governor Davis' signing of AB 331 (Goldberg)⁷¹ in October 2001. The State Department of Water Resources, in conjunction with the State Water Resources Control Board and the Department of Health Services, administers the Task Force. The Task Force, in collaboration with many other experts, developed recommendations to increase the use of recycled water. The study found that there is a potential to increase the amount of recycled water use in California from the current level of approximately 500,000 acre-feet to about two million acre-feet annually by 2030. This will free

up an amount of freshwater equivalent to 30 to 50 percent of the domestic water needs of the 17 million new Californians expected by 2030.

The Recycled Water Task Force identified and adopted 26 issues with respective recommendations to address obstacles, impediments, and opportunities for California to increase its recycled water usage. Recommendations associated with thirteen of these issues were adopted as key recommendations deserving of more immediate attention. The SBTf plans to pilot some of the report's building and technology recommendations into future state construction projects.

IN DEPTH: SUSTAINABLE PARKS PROGRAM X

In 2002, the Department of Parks and Recreation established a *Sustainable Design Task Force* with the goal of integrating sustainability into the development and operations of state parks. To implement the goals of the Task Force, the department issued a Design Directive to its Service Centers which stated, in part, that sustainable design features needed to be included in all building designs and specifications, where possible. Several State Park facilities are already incorporating sustainable design as delineated by the Task Force and Design Directive:

- **Tule Elk Preserve:** incorporates a \$35,000 photovoltaic system to pump water for wildlife at the reserve
- **Picacho:** 4 Clivus Multrum composting toilets were installed to replace existing chemical toilets resulting in significant savings and reduced maintenance requirements.
- **Angel Island:** Onsite run-off will be recycled and utilized for irrigation.
- **Cardiff State Beach:** Seaside Day Use Area has a solar roof where the panels are the roof, not attached to it.
- **Hearst Castle, San Luis Obispo Coast District:** a demonstration project showcases photovoltaic, fuel cell, microturbine, wind and hydro technologies to supply primary power and to offset peak power requirements.

V.X RECOGNIZING LEADERSHIP X

Recognizing leadership, excellence, and innovation in the area of sustainable building is an important way to educate the community at large about the green design and construction. The Task Force is working to integrate sustainable building practices into specific projects. This section describes the awards program and highlights ten leadership building projects.

The CXpitol Area EXst End Complex⁷² X

As discussed earlier, this \$392 million, five building, 1.5 million square foot complex is the largest state government office building project in California's history. The complex consolidates the majority of the Departments of Health Services and Education from various locations around Sacramento, housing more than 6,000 state employees.

The Capitol Area East End Complex "greening" process started roughly four years ago with the decision to incorporate sustainable building practices into the project's design and construction documents. To facilitate this process, the Secretary of the State and Consumer Services Agency convened representatives from the California Integrated Waste Management Board, California Energy Commission, Department of Health Services, and California Air Resources Board to assist the Department of General Services and Department of Finance in reaching consensus on this groundbreaking effort. This inaugural "green building" effort marked the beginning of the Sustainable Building Task Force.

Some of the complex's most significant sustainable building features include:

- Energy efficiency measures enable the complex to exceed the 1998 Title 24 standards by 30%, saving an estimated \$500,000 in annual energy costs.
- The modular furniture meets new environmental specifications that are considered the most "sustainable" in the world and was ultimately less expensive than the standard product.
- The strongest indoor air quality strategies ever used by DGS were integrated very early into construction process, and included extensive building material testing and a thorough building flush out.
- Materials were selected for high recycled content and low pollutant emissions, including carpet with 53% recycled content and acoustical ceiling tiles with 82% recycled content.

- The first DGS-installed under floor air distribution system in the Block 225 building allows individual temperature control to enhance employee productivity and comfort.
- 5,000 photovoltaic panels produce up to 160 kilowatts of electricity on-site.
- “Cool roofing” material reflects sunlight and reduces cooling costs up to 40%.
- More than 30,000 square feet of salvaged marble flooring from the historic Library and Courts Building was incorporated into the main lobbies of all five buildings.
- 97% of construction waste -- more than a quarter of a million tons – was diverted from landfill disposal. Ten 60-foot historic California fan palm trees were removed and re-planted in Capitol Park.
- “Smart” light controls, high-efficiency indirect fluorescent lighting, window glazing, and open workstations optimize natural light penetration.
- Interior and exterior water efficiency measures include low-flow plumbing fixtures and plant-segregated irrigation systems.
- Electric vehicle charging stations, preferred carpool and alternative fuel vehicle parking, and bicycle lockers and shower facilities promote clean air.
- Rubberized Asphalt Concrete (RAC), which incorporates crumb rubber from recycled tires into the asphalt mixture, was used to pave the roadways around the complex. The RAC diverted 11,000 tires, equating to 66 tons (132,000 pounds) of waste tires, from the landfill.

Through the incorporation of these and many other sustainable building features, the Department of Education Building was able to achieve a United States Green Building Council (USGBC) Leadership in Energy and Environmental Design (LEED™) Gold rating, making it the most sustainable building ever built in state government history. The four remaining East End Buildings are expected to achieve LEED Silver.

University of California, Santa Barbara, Donald Bren School of Environmental Science & Management⁷³

Bren Hall is an 84,672 square foot, \$22 million building on the UCSB campus that houses the Donald Bren School of Environmental Sciences and Management. The building contains a laboratory wing, central courtyard, faculty and staff offices, as well as classrooms and conference rooms. Bren Hall opened in May 2002 and is one of the “greenest” buildings in the United States, achieving a Platinum rating under the US Green Building Council’s Leadership in Energy and Environmental Design (LEED) program -- one of only two buildings in the country to receive such an honor.

Some of the building’s sustainable features include:

- Operable windows that interlock with the heating system; motion/heat/ambient light sensors; an efficient boiler; a chiller that is connected to the campus loop; and a cool roof combine to enable the building to surpass 1998 Title 24 requirements by 31 percent.
- Building orientation maximizes the potential for daylighting and takes advantage of natural cooling from outside air (the office wing has no air conditioning system and relies on ocean breezes for cooling).
- A variable air volume (VAV) fume hood system in the lab wing with control systems corrects for pressure changes in the labs, reduces laboratory energy use, and maintains high levels of indoor air quality.
- Reclaimed water utilized for landscape irrigation and waterless urinal technology is employed throughout the building, resulting in savings of 160,000 gallons of water annually.
- On-site energy generation from rooftop photovoltaic panels supplies roughly 10 percent of the building’s energy needs. A total of thirty percent of the building’s energy is supplied by renewable sources, purchased from recovered landfill waste gas.
- Over 90 percent of construction and demolition debris was recycled.
- High percentages of recycled content materials comprise the exterior envelope and interior finishes including: structural steel, concrete, carpet, rubber flooring, ceiling tiles, and insulation. For example, restroom countertops are 80 percent post-consumer content recycled glass and restroom partitions are 90 percent recycled content plastic.

Bren Hall has become the model green building within the UC system, and will serve as a prototype for the design of the UC Merced campus, which is scheduled to open in fall of 2004.

CaltraXs District 7 HeX quarters⁷⁴ X

Construction of this 716,200 square foot, \$190 million project began in April 2002, with completion anticipated in late 2004. This project is one of the first state facilities to participate in the *Excellence in Public Buildings* program, which outlines eight priority areas, including architectural excellence, sustainability and energy efficiency, integration of public art, cost-effectiveness, safety and security, customer satisfaction, accessibility, and community input.

Some of the more unique sustainable features incorporated into the project include:

- A 13-story, full building height atrium provides natural daylight to the interior core of building, ensuring that as many occupants as possible can enjoy the benefits of improved indoor environmental quality.
- High performance glazing, occupancy sensors, daylight dimmers, high efficiency chillers, and other HVAC system components work together to conserve energy and reduce utility bills. In addition, workers will have the ability to control light levels at their desks, improving efficiency and occupant control.
- Photovoltaic panels will provide approximately 95 kW of clean, renewable energy.
- Over 90% of construction & demolition waste will be diverted from landfill disposal through material recycling and salvage.
- An innovative exterior Scrim Panel rotates to optimize shading based on the sun's orientation, letting daylight in, but keeping solar heat out.
- Modular furniture, initially developed for use at the Capitol Area East End Complex, is considered the most sustainable in the world.
- A Building Automation System allows for central control and greater system efficiency.

Franchise Tax Board Butterfield Way State Office Building Complex⁷⁵

Located in Sacramento, the Franchise Tax Board's Butterfield Way State Office Building Complex includes 850,000 square feet of renovations of two existing buildings and 1,000,000 square feet of new office, warehouse and central plant space. The existing Building 2 incorporates over an acre (50,000 square feet) of photovoltaic panels that supply nearly a half a megawatt (470 kWp), generating enough electricity to power more than 400 homes in the Sacramento area. This is the largest single rooftop array on a state building. In addition, the project has been designed to accept additional photovoltaic systems and thermal energy storage as funding becomes available.

This \$211 million project is expected to be complete in August 2005. Although not originally targeted to use LEED, the design team has now established a goal of achieving the LEED Certified level. Sustainable components of this renovation and new construction project include:

- Natural bio-swales are incorporated in the parking lot to control water quality in storm water runoff.
- The project is expected to exceed Title 24 energy efficiency standards by more than 20 percent through the incorporation of fixed sunscreens at all east, west and south facing windows, low-e glass, a central heating and cooling plant with energy management system and variable frequency drives, smart lighting controls, and an energy star rated roof.
- Alternative transportation is encouraged through the incorporation of 300 bicycle lockers, shower and change facilities; extensive pedestrian walkways; and preferred parking for car/vanpools.
- The new facility is sited within one hundred feet of a Light Rail Park and Ride Station, helping to reduce the number of single occupancy trips to and from the site.
- A 75 percent recycling and diversion goal has been established for construction and demolition waste recycling. The reuse of demolished asphalt and concrete as sub-base in the parking lot areas, as well as ground up greenwaste as mulch resulted in the diversion of approximately 20,000 tons of material from the landfill.
- Existing oak and walnut trees and shrubs that were not preserved were chipped and used as landscaping mulch.
- Materials were selected with consideration for low volatile organic compounds (VOCs), recycled content, and other environmentally friendly qualities such as ease of cleaning, maintenance, ability to be recycled, and life cycle cost.

Science Center School⁷⁶ X

The Science Center School, located in Exposition Park, will be an affiliated charter school within the Los Angeles Unified School District. Its Center For Science Learning will operate under the jurisdiction of the California Science Center, a state museum that has over 1.3 million visitors a year. Together these two institutions will serve as a professional development school and a model for how to integrate the school facility into the surrounding community. The governance structure for the school will be an ongoing partnership between the Science Center and the School District to ensure its development as a neighborhood school with a thematic emphasis on mathematics, science, and technology. The Center for Science Learning will provide professional development in science, math, and technology for other educators. The school is scheduled to open in the late spring or early summer 2004.

The school itself is a dramatic example of the synergies between historic preservation and sustainability.

- The historic Armory Building is being reused according to historic preservation requirements. This results in a significant diversion of construction and demolition debris from the landfill.
- Shielding the school is a shrubbery berm that faces Exposition Boulevard. This berm replaces more traditional landscaping, will require minimal upkeep, and is drought resistant. It will also absorb particulate matter from street traffic.
- The school will have a sod roof consisting of a juniper type shrub, which will soon develop a dense and extensive rooting system. The sod roof is drought resistant, requires minimal maintenance, and should help to stabilize interior temperatures – keeping the building cool in the heat and holding heat during the cool months.
- An unconditioned atrium in the Armory will save energy and a science garden will add a greening effect.
- All existing Armory windows will be resealed for improved insulation, and a building automation system installed for maximum energy effectiveness.
- Recycled materials and products, such as paint and carpets, will be utilized whenever practical.

CalPERS Headquarters Expansion Project⁷⁷

The California Public Employees' Retirement System (CalPERS) is a public pension fund providing retirement and health benefits to state and local public employees. Its new headquarters expansion (550,000 gross square feet and 450,000 square feet of underground parking) will cover two full downtown Sacramento blocks with two U-shaped office buildings of 4 and 6 stories each. The project features a sculptured glass atrium, a layered pattern of shading devices on the clear glass and aluminum facade, a trellis-covered veranda, a raised floor air distribution system, and several outdoor terraces. The project contains some first-floor retail space as well as an underground vehicle and pedestrian concourse connecting the existing Lincoln Plaza Building to the new buildings. Anticipated completion is Spring 2005.

CalPERS is a LEEDTM registered project and is aiming for a LEED Silver certification. From the very beginning of the project, CalPERS demonstrated a commitment to using sustainable design principles:

- Early in the process, the entire team participated in a green building workshop to prioritize the green strategies for the project.
- The project will incorporate a 73kW array of photovoltaic panels providing 5% of the building's energy.
- Energy savings should exceed the Title 24 code requirements by 25%, and metering will measure, monitor, and verify the efficiency of the building systems.
- Underground parking is provided (for almost 1,000 parking spaces) to reduce the urban heat island effect and to lessen the development footprint.
- Green materials will include bamboo flooring, recycled-content and regionally manufactured materials, and FSC-certified wood doors and work surfaces.
- More than 75% of construction waste will be recycled.
- The project will implement almost all of the LEED Indoor Environmental Quality strategies, including low-emitting materials, daylighting and views, construction IAQ management, thermal comfort, and increased ventilation effectiveness.

LaView Terrace Library⁷⁸ X

Construction of the 10,700 square foot, \$4.3 million, 68th Branch of the Los Angeles Public Library system and its Environmental Awareness Resource Center was completed in January 2003. This project, considered by some to be the most environmentally friendly building in Los Angeles, was envisioned as a sustainable building demonstration project. As such, the project is a model of energy and water efficiency, use of recycled content materials, and drought tolerant landscaping. The project, which received a grant from the California Integrated Waste Management Board, will submit for LEED certification at the Gold or Platinum level in late 2003.

Significant sustainable building features include:

- A cooling tower that circulates internal air through cool water, windows with sensors to respond to heat and humidity, and a trellis structure on the west-facing entry plaza combine to reduce heat absorption and the need for air conditioning on hot summer days.
- Skylight designs in concert with exterior shading devices and smart lighting controls combine to produce enhanced interior lighting and energy efficiency levels forty percent better than those found in traditional libraries.
- Photovoltaic panels generate help to offset the energy demand of this facility.
- A number of recycled content and rapidly renewable interior finish materials were included in the project, including bamboo flooring and recycled content carpet, walls, panels and tiles.
- Permeable pavement in parking areas and stormwater retention ponds reduce runoff and promote on-site infiltration and irrigation.

This building exemplifies sustainable systems and will serve as a model for green library construction throughout the state.

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Camp Arroyo Environmental Education Center⁷⁹ X

Located in Livermore, California, Camp Arroyo is a residential youth camp facility designed to serve up to 200 children. This environmental education camp serves middle school students, as well as critically ill children and other guests. The facility was designed to demonstrate state-of-the-art sustainable design principles, and incorporates these and other ecological principles into the camp's environmental education curriculum.

Construction of Camp Arroyo began in September 1999, supported in part by a grant from the CIWMB. The energy efficient design includes the use of solar energy for water and space heating; durable, resource efficient and recycled-content building materials including straw bale, stabilized earth, sustainably harvested wood, recycled plastic toilet partitions, recycled glass tiles and countertops, recycled newspaper insulation, and wheat straw wall paneling; water conservation measures and on-site alternative wastewater treatment.

The Camp Arroyo Environmental Education Center was recognized by the American Institute of Architects (AIA) Committee on the Environment as one of the Top Ten Green Projects for 2002.⁸⁰

CHPS Demonstration School: Cahuenga Elementary School⁸¹ X

Cahuenga Elementary School is a 55,000 square foot campus in Los Angeles Unified School District with enrollment of over 800 students. School construction is targeted to commence in September 2003. Cahuenga Elementary will be the first facility in LAUSD to use the Collaborative for High Performance Schools (CHPS) guidelines and criteria. It is anticipated to achieve 48 (out of a possible 81) CHPS points, making it one of the greenest schools in the state. As mentioned previously, LAUSD adopted CHPS criteria as the system-wide standard for new school construction projects.

Significant high performance and sustainable features include:

- High solar reflectivity surfaces, ample landscaping, and shading strategies minimize urban heat island effect (and therefore reduce air conditioning needs)
- Exterior occupancy sensors turn off lights when not in use, and design features limit light pollution.
- A combination of daylighting, smart lighting controls, and high efficiency HVAC systems allow the school to exceed Title 24 energy efficiency code requirements by 35%.
- Porous surfaces, such as open grid pavement, promote groundwater infiltration and minimize runoff.
- Natural bioswales capture and treat storm water runoff on site.
- Carefully selected materials, a tight building envelope, and a quiet HVAC system promote optimal acoustic performance and quality of learning in classrooms.
- Climate appropriate landscaping and efficient irrigation techniques significantly reduce exterior water use.
- High efficiency plumbing features are used in all indoor applications to reduce water use.
- Ceiling tiles, wall panels, paint, insulation, and concrete have high-recycled content and low emissivity.
- Over 75% of construction waste will be diverted from the landfill.
- Design and construction site management measures prohibit dust and microbial growth.

CalEPA Headquarters Building⁸² (leased space) X

The California Environmental Protection Agency Headquarters stands 25 stories tall, covers 950,000 square feet, and is home to 6 boards, departments, and offices, including the Office of the Secretary. The building is a model of environmentally friendly operations and maintenance practices and is the first state project to participate in the USGBC's Leadership in Energy and Environmental Design for Existing Buildings (LEED-EB) Pilot Program, anticipating a Platinum rating.

Some of the building's sustainable features include:

- The facility was designed and is operated with optimal air quality, energy efficiency, recycling, and resource efficiency in mind. 42 policies and structural elements protect the integrity of these priorities.
- High levels of energy efficiency enable the building to be identified as an Energy Star facility. The structure scored 96 of 100 points for two years in a row – making it the most efficient high-rise structure in the Nation.
- In cooperation with SMUD, Cal/EPA purchases 100% Greenergy – promoting the development of green power generation.
- Air quality is of highest priority, and established policies control everything from the type of carpet used, to the type and timing of the use of construction and cleaning products, to the ban of leaf blowers and pesticides. Employees and visitors are also encouraged to avoid wearing fragrances while in the building.
- Aggressive recycling programs allowed for the recycling of over tons of materials in 2002, and the use of over 120,000 worms in the composting program “ate” 10 tons of organic garbage. Compost made is used in the landscaping on the grounds. Major structural elements must be recycled and recyclable, and may not be sent to landfill. That includes furniture, carpet, and ceiling tiles, among other items.
- Eight waterless urinals are installed in the facility, as part of a pilot testing program, and will save up to 320,000 gallons of water per year.
- Siting considerations and significant transportation incentives and programs have resulted in 65% of the Cal/EPA employees' using alternative transportation modes such as public transit, car/vanpooling, cycling, and teleworking.
- Cal/EPA maintains an agency-wide Environmental Management System, which continuously measures outcome of environmental efforts, and provides new goals and timetables for new accomplishments. Cal/EPA has also established a 20% CO² reduction goal, over 2000 levels, by the year 2010.

VI. GOALS FOR 2003 – 2005 X

In its December 2001 report, *Building Better Buildings: A Blueprint for Sustainable State Facilities*, the Sustainable Building Task Force set out a ten-point action plan to implement the Governor's sustainable building goals, as established in Executive Orders D-16-00 and D-46-01. As detailed throughout this document, many of these implementation milestones have been met, exceeded, are significantly underway. The road to sustainability, however, must be marked with signs that consistently show progress. With this principle in mind, the Task Force established the following goals as next in its series of sustainable building milestones.

1. **Environmental Leadership Performance Standard.** Establish the performance goal of obtaining a cost effective LEED Silver level (or higher) for appropriate state projects such as offices and other institutional buildings. Use LEED as a design guide for other less applicable state projects, including warehouses and parking structures. For projects unable to meet the LEED silver level without additional upfront cost, establish a procedure for life cycle cost analysis of additional green building features and systems necessary to reach this standard. Components that achieve payback during the life of the system should be included in design.

Supplement LEED as appropriate with other standards including California Special Environmental Requirements Section 01350. Advocate that school construction projects use the Collaborative for High Performance Schools (CHPS) criteria.

2. **Economics and Financing.** Finalize the economic analysis report, *The Costs and Financial Benefits of Green Building*, and update processes and decision-making to support financing of sustainable building projects.
3. **Project Implementation Process Changes.** Incorporate sustainable building and life cycle costing language in policy and administrative documents that define project scopes:
 - Establish green building and energy efficiency requirements as standard practice in the **State Administrative Manual (SAM)**.
 - Make changes to the standard DGS Protocol for project implementation to reflect energy efficiency and green building as initial project goals. Bidding documents including specifications and qualifications should reflect this change.
 - Ensure through changes to A&E documents that experienced sustainable building professionals are part of the design and construction team.
4. **Legislation.** Seek to codify sustainable building policies and programs implemented through the executive order into statute. Pursue opportunities to make sustainable building language standard in infrastructure, construction, bond and related legislative measures.

5. **Renewable Energy.** Analyze and make recommendations to establish renewable energy and green power standards for state projects. Use the Renewable Portfolio Standard, which establishes a requirement for state purchase of 20% of energy from renewable sources by 2017, as a guide and take advantage of incentive programs.
6. **Commissioning.** Integrate “total building” commissioning⁸³ and facility performance evaluations as standard Department of General Services policy for all new construction, infrastructure, and rehabilitation projects. Designate a “plant manager” from Building Property Management at time of initial design concept discussions to follow project implementation, including ultimate responsibility for building operations and maintenance.

Develop commissioning guidelines for new K-12 school facilities, and integrate them into the state funding and permitting process. For other smaller and/or less applicable projects, pursue abbreviated forms of commissioning, including sampling.
7. **Operations and Maintenance.** Identify, define, and adopt building operation and maintenance performance guidelines for state facilities focusing on resource efficiency, extending the useful life of facilities, and incorporating environmentally friendly practices. Review LEED for Existing Buildings (LEED-EB) and its application for incorporation into Department of General Services building performance guidelines. Work with the Department of Finance to include a state infrastructure operations and maintenance element in the next budget letter to ensure adequate state resources are available to protect state infrastructure assets, and provide long term savings.
8. **Measuring Performance.** Develop a series of economic, social, and environmental performance indicators, including data collected from commissioning and facility performance evaluations. Develop a building performance feedback loop to improve existing and future buildings. Assist other infrastructure areas, specifically K-12 school districts, in measuring the performance of their facilities.
9. **Outreach and Training.** Update and continue to improve outreach, education, training, and on-line resources, especially in these priority infrastructure areas: schools, historic preservation, DGS facilities, and affordable housing. Expand sustainable building collaborations, in particular, research activities with public, private, and non-profit sector entities.
10. **Leadership and Partnership Opportunities.** Expand SBTF involvement in public and private leadership projects and pursue funding opportunities to support these projects. Develop demonstration projects for priority infrastructure areas, including renovation and/or rehabilitation projects, affordable housing and residential construction, historic buildings and properties, lease buildings, libraries, veteran homes, educational facilities, laboratories, modular and relocatable structures, hospitals, and museums.

VII.XCONCLUSION: TWO YEARS IN REVIEW X

California's sustainable building programs, initiatives, and accomplishments over the last two years position the state as one of the national leaders in this area. Two Executive Orders, issued by Governor Davis, establish the state's green building goals and guide the state's implementation strategy, which is anchored in environmental stewardship and fiscal responsibility. This report, *Building Better Buildings: An Update on State Sustainable Building Activities*, details the commitment of the Sustainable Building Task Force and its public, private, and non-profit affiliates to design and construct leadership buildings, develop innovative programs, expand partnership opportunities, and conduct pioneering research.

Clearly, significant policy considerations and program issues still lie ahead on California's road to sustainability; however, the Sustainable Building Task Force remains steadfastly committed to improving the state's building process one step at a time, ever mindful of John Muir's observation that:

***“WHEN ONE TUGS AT A SINGLE THING IN NATURE, (S)HE FINDS IT
ATTACHED TO THE REST OF THE WORLD.”***

Appendix A: Sustainable Building Task Force Members X

STATE AGENCIES	
Business, Transportation and Housing Agency	http://www.bth.ca.gov/
Department of Housing and Community Development	http://housing.hcd.ca.gov/
Department of Transportation	http://www.dot.ca.gov/hq/oppd/rescons/rchomepg.htm
California Environmental Protection Agency	http://www.calepa.ca.gov/
Air Resources Board	http://www.arb.ca.gov/
Department of Pesticide Regulation	http://www.cdpr.ca.gov/
Department of Toxic Substances Control	http://www.dtsc.ca.gov/
Integrated Waste Mgt Board	http://www.ciwmb.ca.gov/greenbuilding
Office of Environmental Health Hazard Assessment	http://www.oehha.org/home.html
State Water Resources Control Board	http://www.swrcb.ca.gov/
Department of Finance	http://www.dof.ca.gov/
Health and Human Services Agency	http://www.hhsdc.ca.gov/
Department of Health Services	http://www.cal-iaq.org/
Office of Planning and Research	http://www.opr.ca.gov/
Office of the State Librarian	http://www.library.ca.gov/
Resources Agency	http://resources.ca.gov/
California Energy Commission	http://www.energy.ca.gov/
Department of Forestry and Fire Protection	http://www.fire.ca.gov/php/index.php
Department of Parks and Recreation	http://www.parks.ca.gov/
Department of Water Resources	http://www.dwr.water.ca.gov/
Office of Historic Preservation	http://www.ohp.parks.ca.gov/
State and Consumer Services Agency	http://www.scsa.ca.gov/
California Science Center	http://www.casciencectr.org/
California Public Employees Retirement System	http://www.calpers.ca.gov/
Dept of General Services	http://www.dgs.ca.gov/default.htm
California Power Authority	http://www.capowerauthority.ca.gov/default.htm
Division of the State Architect	http://www.dsa.dgs.ca.gov/default.htm
Energy Management Division	http://www.emd.dgs.ca.gov/default.htm
Real Estate Services Division	http://www.resd.dgs.ca.gov/default.htm
Procurement Division	http://www.pd.dgs.ca.gov/default.htm
Franchise Tax Board	http://www.ftb.ca.gov/
State Treasurer's Office	http://www.treasurer.ca.gov/
Youth and Adult Correctional Agency	http://www.yaca.state.ca.us/
California Youth Authority	http://www.cya.ca.gov/
Department of Corrections	http://www.cdc.state.ca.us/
Prison Industry Authority	http://www.yaca.state.ca.us/
INSTITUTIONS OF HIGHER EDUCATION	
California Community Colleges	http://www.cccco.edu/
De Anza College	http://www.deanza.fhda.edu/
Foundation for California Community Colleges	http://www.foundationccc.org/
California State University	http://www.calstate.edu/CPDC/

INSTITUTIONS OF HIGHER EDUCATION	
Humboldt State University	http://www.humboldt.edu/
University of California	http://www.ucop.edu/
UC Berkeley	http://www.berkeley.edu/
UC Merced	http://www.ucmerced.edu/
UC Office of the President	http://www.ucop.edu/
UC Santa Barbara	http://www.ucsb.edu/
California Institute for Energy Efficiency	http://ciee.ucop.edu/
LOCAL GOVERNMENTS	
City of Los Angeles	http://www.ci.la.ca.us/ead/EADWeb-MWR/Sust/sustainable_building.htm
City of San Diego	http://www.ci.san-diego.ca.us/environmental-services/ridgehaven.shtml
City of San Francisco	http://www.ci.sf.ca.us/sfenvironment/aboutus/greenbldg/
City of San Jose	http://www.ci.san-jose.ca.us/esd/GB-HOME.HTM
STATE GOVERNMENT	
State of Washington-Governor's Office	http://www.governor.wa.gov/
FEDERAL GOVERNMENT	
Department of the Navy	http://www.navfac.navy.mil/
Federal Network for Sustainability	http://www.federalsustainability.org
UTILITIES	
Sacramento Municipal Utility District	http://www.smud.org/hp/index.html

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COVER PHOTOS / ART CREDITS

(From top, clockwise)

Science Center School
California Science Center
Los Angeles, CA

This K–5 elementary school exemplifies the synergies between
historic preservation and sustainability.
Rendering by Morphosis

Donald Bren School of Environmental Science and Management
University of California, Santa Barbara
This university office and research facility received the LEED 1.0
Platinum award, one of only two such projects nationwide.
Photo by Timothy Hursley

Franchise Tax Board Butterfield State Office Building
State of California
Sacramento, CA
This building contains over an acre of photovoltaic panels—the
largest array on any state office building in the country.
Photo by Fred Cordano

Department of Education Headquarters
State of California
Sacramento, CA
This building is the first state government owned LEED 2.0
Gold building in the nation.
Photo by Erhard Pheiffer.

