The New Sustainable California Academy of Sciences, San Francisco, USA

**Project data**

**Type of project**
Architecture (education)

**Start of construction**
September 2005

**Author**
Renzo Piano (with Chong Partners Architecture)

**Further authors**

Further main authors: Ph.D John Patrick Kocilek, Natural scientist, California Academy of Sciences, San Francisco, California, USA; and EP Jean Rogers, Environmental Engineer and Sustainability Consultant for the project, Ove Arup and Partner, California Ltd., San Francisco, California, United States of America.

**Project description by author**

Founded in 1853, the California Academy of Sciences (CAS) is the largest cultural institution in the City of San Francisco, one of the ten largest natural history museums worldwide, and has a mission to explore and explain the natural world. CAS is in the final design stage of a new building project that will re-conceive the tradition of natural history museums, and serve as a role model and inspiration to the world on how innovative design can achieve outcomes that are beautiful, functional, sustainable from an economic, environmental and social point of view. The new CAS will be at the forefront of green building design, showcasing world-class architecture that fully integrates green building features to reflect its mission to protect the natural world.

Pritzker Prize Laureate Renzo Piano’s design for the new CAS was inspired by the natural world, reflecting its beauty and interdependence, and works in harmony with the landscape surrounding the museum. The new building is designed to naturally fit into its Golden Gate Park (GGP) landscape, the undulating living roof, covered with over twenty-two acres of native plant species, will echo the contours of the landscape. Close collaboration between architects and engineers has yielded innovative strategies to help preserve the natural integrity of the park, conserve water and energy, reduce pollution, maximize natural ventilation and light, and use environmentally friendly building materials. Designed to meet the highest standards of environmental excellence, the new CAS is expected to receive a Platinum rating in Leadership in Energy and Environmental Design (LEED) from the U.S. Green Building Council, the highest certification level possible.

Sustainability is a key element in the new CAS project, and the new building is being designed to an integral part of the community so it serves and on an educational tool. The public will be able to see and understand many of the principles of sustainable design, and the building’s operation, such as energy performance and production, and indoor air quality sustainable collection management, and the green planetarium. Exhibits will explain the benefits of the living roof and other green components and systems in the building.

In 2000, with an expected annual attendance of 1,600,000, the new CAS will set a standard of sustainable architectural design for civic buildings, teach the public about environmental stewardship, conservation and science, and promote the need to protect the Earth’s fragile environment. The new CAS is a City of San Francisco Department of the Environment green building pilot project and will be an architectural landmark in San Francisco.

**Comment of the Holcim Awards 2005 jury for North America**

This project successfully demonstrates the effective integration of concerns for sustainable construction with sophisticated architectural design. Paving the way for the ecological renaissance, this project is an exemplar of new environmental design – i.e., with features such as the living roof, public plaza, and planetarium. Equally worthy of merit is the material research using mock-ups that test the energy efficiency and visual effectiveness of the proposed methods of construction. Of equal value is the refined sensitivity for design and systems, displayed, for example, by reclaiming the roof for a public green zone, using solar energy and natural ventilation, as well as deploying high-efficiency electric lighting throughout the building. The cited reductions in energy consumption are also worthy of attention. This project provides evidence of how technical and natural systems can be optimally merged without compromising aesthetic impact. The project contributes a poetically rich and rigorously considered addition to the existing environment.

**Relevance to target issues (by author)**

**Quantum change and transferability**

The new CAS will fully integrate green building features with high performance building measures particularly highlighting the use of sustainable construction features for large public exhibit spaces. Examples of sustainable design excellence are: through use of natural solar lighting, natural ventilation, high-efficiency electric lighting and commissioning, the building will use 30% less energy than a building of comparable size. CAS will not need an air conditioning system, an aspect unique for a museum space, due to the innovative ergonomic design of the roof and ventilation system; and the green roof and drainage system will mitigate heat island effect and storm water runoff. Displays throughout the new CAS will teach sustainable architecture to the expected 1,600,000 annual visitors.

**Ethical standards and social equity**

The CAS project is a public/private partnership, and has the official approval and support of the City of San Francisco. Every city government committee vote was unanimous; deliberations were always public. Community involvement has been part of the project since the beginning. CAS formed a Community Advisory Group in 2001, comprised of community representatives, educators, environmentalists, and park advocates to ensure community input. CAS is working with the SF Human Rights Commission to encourage disadvantaged business enterprises to participate in the bid process within each building trade. CAS is committed to paying prevailing wages, conforming to city law, and supports the participation of labor apprentice programs of subcontractors performing work on the project.

**Eco logical quality and energy conservation**

The new CAS will return one acre of land to GGP. Solar power will provide 30% of clean energy (60% of energy needs) and remaining energy will be purchased from grid source renewables, preventing significant greenhouse gas emissions. Use of reclaimed water and low-flow fixtures will use 20% less water than required by code. Building materials will be 100% recycled content, and 20% local materials.

**Economic performance and compatibility**

Innovative financing is in place to manage the risk of price escalation and inflation by issuing conduit bonds for capital improvement that are paid back by fundraising, separating bid packages to lock in prices especially on items from Europe (glass & PV cells), and contingency and escalation percentages in the budget. SF voters have twice passed supporting bond measures totaling $166.95000.

**Contextual response and aesthetic impact**

Every effort has been made to minimize the impact of the new CAS on the natural world and to make maximum use of natural elements to form a stronger relationship between CAS and GGP Visitors will be struck by distinctive features that make CAS more inviting and integrated with the park: the rolling green roof, grass lawn, expansive floor-to-ceiling glass walls, and abundant natural light.

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