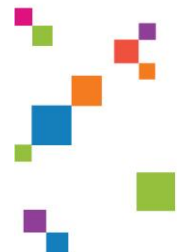




# Foresight Research Report: Environment and Resource Sustainability in Museums



## Document Overview

The following research report is designed to provide an overview of key strategic issues relevant to the future of California communities and museums. We hope that this report will be of interest to California museum professionals working to improve service to their community and to plan for the future.

From the Spring of 2012 to the Summer of 2013, a team of museum professionals participating in the California Association of Museum's *Leaders of the Future: Museum Professionals Developing Strategic Foresight* training project conducted their own secondary (*desktop*) research on current conditions, trends, and plans for a *baseline forecast* that postulates the most expected future for museums in the domain of the environment and sustainability. A group of members of the California Association of Museum's Foresight Committee completed this report. The authors of this report include:

Megan Conn, Development Manager, Turtle Bay Exploration Park (team leader)  
Leslie Matamoros, Museum Assistant, Museum of History and Art, Ontario  
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Members of CAM's Green Museums Initiative Committee advised on this report and commend the Foresight Committee for including the issues addressed here in their work.

This report is the first phase in the development of a baseline forecast and is intended to define the idea of "Environment and Resource Sustainability in Museums," explore the most pressing issues and possible futures that may result from these circumstances, and create a framework upon which a baseline forecast could be presented. Major sections include:

**Domain Definition:** Describes the main elements of this subject matter

**Current Assessment:** Describes a current snapshot of the domain highlighting key stakeholders, timelines, and issues within society and museums

**Trends/Projections:** Describes observable trends (changes over time) along with their direction and momentum

**Plans:** Outlines stated and potential plans by leading stakeholders and outliers

**Baseline Forecast:** Combines elements to reveal the most likely future(s) for this domain across different time horizons: 2015, 2020 and 2030

Note: Document includes embedded and bracketed hyperlinks for sources.

The following foresight research report was developed as part of the *Leaders of the Future: Museum Professionals Developing Strategic Foresight* project. Funding for the project is provided by the Institute of Museum and Library Services and the James Irvine Foundation.



the James Irvine foundation

The *Environment and Resource Sustainability in Museums* domain refers to the study of both the natural environment and resources necessary to support museums' success and the communities they serve.

### **Strategic Objectives: Environment and Sustainability in Museums**

Ensuring California museums act as good stewards for the natural environment and their own resources so that they may remain relevant and of service to their communities well into the future

Providing context and resource materials for awareness, education, and professional training opportunities so that museum professionals can become better caretakers of the environment and their institutions

### **Introduction & Domain Definition: Environment and Sustainability in Museums**

California has long been seen as a trendsetter on environmental issues. In the early 1960s, before the publication of Rachel Carson's *Silent Spring*, the environmental planning organization California Tomorrow was formed. The group was comprised of conservationists, planners, regulators and California residents and it called for comprehensive planning to address environmental challenges faced by the state. The issues California Tomorrow addressed such as sustainable land use, both for agriculture and housing; conservation of water and energy resources; preservation of California's coastline, deserts, lakes and forests; transportation planning; and regional government are still being debated and grappled with today. Despite the dissolution of the California Tomorrow project, its legacy remains. California's museums are working to become good stewards of the environment and are attempting to make our institutions more sustainable, both ecologically and financially.

Environmental sustainability is a large domain. There has even been some [discussion](#) in the Leaders of the Future online group over whether or not the term "sustainability" should be used. Some people feel it is overused and "meaningless." According to the Merriam Webster definition, the definition of sustainability is:

Able to be used without being completely used up or destroyed

Involving methods that do not completely use up or destroy natural resources

Able to last or continue for a long time (<http://www.merriamwebster.com/dictionary/sustainable>)

Sustainability is based on a simple principle: Everything that we need for our survival and well-being depends, either directly or indirectly, on our natural environment. Sustainability creates and maintains the conditions under which humans and nature can exist in productive harmony, that permit fulfilling the social, economic and other requirements of present and future generations.

Participants in a November 2012 John F. Kennedy University Museum Studies program colloquium, facilitated by Sarah Brophy, identified a truly sustainable museum as exhibiting the following characteristics:

- It will be for everyone, whether in person, online, or to simply benefit from its existence in the community
- It will be self-aware and systems-aware
- It will embrace institutional-wide values
- It will lead by example and be trusted
- It will possess beauty
- It will excel at problem solving and be nimble
- It will anticipate outcomes and consequences
- It will maintain closed loops for resource use through a cradle-to-cradle design philosophy
- It will convey multiple perspectives
- It will be part of an integrated community/region/globe
- It will be supported by a diverse and thoughtful financial portfolio

As can be seen in this list created at the Symposium, and in our daily vernacular, sustainability often refers to socio-economic equality, and fiscal or economic endurance, and indeed, the concept of sustainable development marries two important insights: environmental protection does not preclude economic development; and economic development must be ecologically viable now and in the long run. However, for the purposes of this report, we will specifically be focusing on current and future issues and trends in environmental sustainability as they relate specifically to museums, so we can begin thinking about how this massive issue will impact our institutions and beyond.

### A Brief History

As a result of years of dedicated work by early pioneers in what would become the environmental movement such as John Muir, Theodore Roosevelt, Aldo Leopold, and Rachel Carson, the concept of environmental sustainability gained a foothold in the 1970s, with the creation of the Environmental Protection Agency (1970), Earth Day (1970), the Endangered Species Act (1973), and the Bureau of Land Management (1976). The first public murmurs of the idea of sustainable development were seen in the [Brundtland Commission's](#) 1987 report "[Our Common Future](#)," which noted, "Sustainable development is the kind of development that meets the needs of the present without compromising the ability of future generations to meet their own needs."



In the early 1990s the environmental movement became more mainstream; the U.N. held the "[Earth Summit](#)" in Rio de Janeiro in 1992, and membership in environmental organizations, like the Sierra Club, grew. Yet progress slowed significantly in 1994 with the rise of the conservative moment and efforts to curb environment regulations and support for the environment has ebbed and flowed ever since.

While some of the first museums were focused displaying curiosities of the natural world, the concept of incorporating "green" practices in museums had its first discussions in the 1970s. In 1971, the American Association of Museums (as it was then called) formed a 15-member ad hoc committee on the environment that conducted a survey of U.S. museums about their role in educating the public about human ecology. The report produced, *Museums and the Environment: A Handbook for Education*, contained brief introduction to the science of ecology and major environmental issues, suggested

exhibit and programming ideas, and survey results. In 1972, the International Council on Museums hosted the conference “Museums and the Environment” in France.

Most conversations regarding the environmental sustainability began initially in science and children’s museums, and then spread to zoos and aquariums. In 1981, the Coyote Point Museum for Environmental Education opened as the nation’s first museum dedicated to environmental education. Interest grew and in 1990 ICOM hosted the conference [“Museology and the Environment”](#) ICOM in Zambia. The Association of Children’s Museums launched [greenexhibits.org](#) launched in 2005 and the [PIC Green Committee](#) was formed by the American Alliance of Museums in 2008. Progress continued, with the Green Science Advisory Group of the Association of Zoos & Aquariums developing [Sustainable Practices Toolbox](#) in 2011 and in 2013 the Summit on Sustainability Standards in Museums took place at the AAM conference in Baltimore.

In 2004, the Mark Twain House & Museum is the first museum in the nation to attain LEED certification. Several children’s museums became [LEED certified](#) during the mid-2000s, such as the Children’s Discovery Museum of Normal, Illinois in 2005. Like their predecessors, in an article appearing in the Sept/Oct 2006 edition of the American Alliance of Museum’s *Museum News*, Sarah S. Brophy and Elizabeth Wylie challenged all types of museums to establish green practices, noting “You don’t have to be a science or children’s museum to choose cork or bamboo – or make any other sustainable choices. Anyone in the preservation business has a huge opportunity to use sustainable design and educate audiences about the responsibilities for caring for collections in perpetuity.”

The California Association of Museums and its [Green Museums Initiative](#) is providing leadership in advancing museums towards a more sustainable museum community. The Green Museums Initiative (GMI) was created in 2006 to inspire and support California museums to develop green business practices, eco-friendly facility-management, and sustainable programming. They have created the [Green Museums Accord](#) an institution-wide pledge for museums to be environmentally responsible. In 2013, CAM and the American Alliance of Museums teamed up to take the Green Museums Accord national and encourage even greater participation in the effort to make museums and communities green. With its 2011 [IGNITE!](#) project CAM and the Green Museums Initiative made a call to action for museums to become catalysts for sustainability. In 2011, IGNITE! hosted a series of regional meetings of museum leaders, scientists, environmentalists, community stakeholders, and artists to discuss how to preserve ecosystems and promote healthy communities in their area. The convenings included a [keynote](#) by environmentalist, entrepreneur, and author Paul Hawken, and resulted a [report](#) to the field and brought together artists to create statewide traveling exhibition, [Ignite! The Art of Sustainability](#).

## **Stakeholders**

Currently, there are many key corporate stakeholders supporting the work of environmental sustainability, ranging from large companies such as Ford and General Electric to mid-level companies such as Seventh Generation and Tom’s of Maine [\[Source\]](#). They realize this is not just good for their corporate image, but can produce benefits in their immediate bottom line, such as in energy savings and cutting production costs.

[Numerous environmental non-governmental organizations](#) exist to conduct advocacy and policy work, generate discussion, and educate the public in preserving the environment. In the arena of policy and legal issues two notable organizations are the Natural Resources Defense Council and the Environmental Defense Fund. Organizations focusing on advocacy and action include the Nature Conservancy and the Earth Island Institute. The National Audubon Society, Sierra Club, and numerous other non-profits have

the mission to build awareness of environmental issues. Government agencies such as the UN Conference on Environment and Development, Intergovernmental Panel on Climate Change, the National Oceanic and Atmospheric Administration are essential to watch for leadership on the global level. Educational Institutions such as the Department of Environmental Science, Policy and Management at the University of California, Berkeley; the Natural Resource Management & Environmental Sciences Department at California Polytechnic State University; the College of Agriculture and Environment at the University of California, Davis; and the School of Sustainability at Arizona State University are key players regarding research and new discoveries in climate change and the related environment impact.

### Key Certainties and Uncertainties

The scientific community is clear about many of the following facts. Other areas regarding the environment are not so certain.

- [CO2 levels are rising](#) – Both atmospheric CO2 and climate change are accelerating. Climate scientists say we have years, not decades, to stabilize CO2 and other greenhouse gases [\[Source\]](#).
- Global warming – In the past century alone, the temperature has climbed 0.7 degrees Celsius, roughly ten times faster than the average rate of ice-age-recovery warming. While not certain, models predict that Earth will warm between 2 and 6 degrees Celsius in the next century [\[Source\]](#).
- Rising gas prices – According to one future scenario, current oil production will drop 50% by 2020 [\[Source\]](#). Gas supplies are running out (albeit slowly) and the number of people worldwide who will have an “American-style life” will triple by 2040 causing oil prices to rise [\[Source\]](#).
- Peak oil (the point in time when the maximum rate of extraction of petroleum is reached) – a recent study by the University of Maryland acknowledges the imminent threat of peak oil and calls for immediate action by government, private and commercial sectors to reduce global economic vulnerability [\[Source\]](#).
- Population growth and increased consumption – There are now 7 billion people on earth and with the current rate of global population growth humans will continue to [impact the environment substantially](#). California has 38 million people and while the birthrate is declining in the US, there are still indications of a pending environmental crisis on a global scale [\[Source\]](#).
- Waste – In 2010, Americans generated about [250 million tons of waste](#). It remains uncertain whether we can meet the challenge to substantially reduce this amount.
- Energy consumption– Global energy demand is expected to triple by 2050, according to the Institute for the Future’s [Carbon Economy report](#). The people in the US are 5% of the world’s population, yet we use 20% of its energy [\[Source\]](#). It is uncertain how we will meet the global need for energy in the future.
- Open space – While California has a better-than-average sprawl rate, in the rest of the country metropolitan area populations grew by 150% with land area growing by 455% [\[Source\]](#). Uncertainty remains as to whether this trend will continue or we will learn to build will less sprawl.
- Cost of making “eco-friendly” decisions is high. There are some [tax incentives](#) for installing energy-efficient devices in a home, but it seems slightly confusing as not all products qualify for the incentive.



## Current Assessment

In our research, four primary areas came to light in which museums are currently integrating environmental sustainability.

### Operations and facilities

- According to research by scientists at the Lawrence Livermore National Laboratory, the University of California, Merced and the National Center for Atmospheric Research, California temperatures have jumped statewide by more than 2.1 degrees Fahrenheit between 1915 and 2000 [[Cool California](#)]. Some museums, such as the Workman and Temple Family Homestead Museum in the City of Industry, are already being affected by changes in weather trends and have changed the time of year they host outdoor events.
- According to the U.S. Energy Information Administration, [electricity prices rose](#) in every region of the U.S. in the first half of 2013. In a response to rising energy costs, institutions such as Turtle Bay Exploration Park in Redding, California, are switching to LED lights in the main museum. This has saved the institution approximately \$15,000 a year.
- In California, as of April 2012, 31 existing State buildings (10.7 million square feet) have been certified to the U. S. Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) Rating System for Existing Buildings [[Source](#)]. Furthermore, California receives funding through the [Energy Efficiency and Conservation Block Grant](#) (EECBG) program, which directs funding to local governments and the states to perform energy efficiency retrofits and establish retrofit programs for municipal and community buildings. California museums, particularly new buildings, are striving to meet LEED standards. Two recent notable examples are the [California Academy of Sciences](#) and the [Exploratorium](#).
- Some museums have worked to lower their utility costs and their environmental impact by installing solar panels. One example is the Santa Cruz Surfing Museum, which received a \$10,000 solar panel donation in 2013 [[Source](#)].
- The California Academy of Sciences has a [Commuter Incentive Program](#) for their employees, which encourages walking, biking, taking public transit, or carpooling to work. Employees can get subsidies for public transit passes; earn extra money, or extra vacation time [[Source](#)].
- The Western Center for Archaeology and Paleontology and the Center for Water Education were a result of the building of the Diamond Valley Lake Reservoir. Fossils were found during the construction, which led to the organization of the Western Center for Archaeology and Paleontology; and the Los Angeles Metropolitan Water District of Southern California seized the opportunity to educate the public about water. Both museums were built using sustainable means in Hemet, California, and now educate visitors about the connection between life and water and about green building practices [[Source](#)].

### Exhibitions and collections

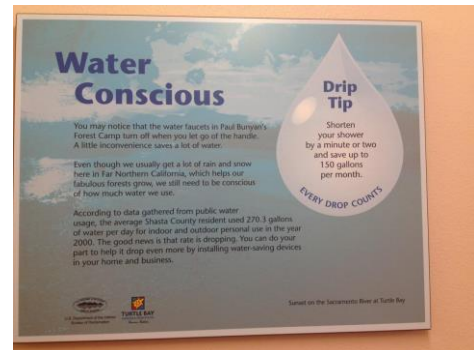
- There is a current trend in museums to employ [best practices in environmental sustainability](#) and use the three Rs (Reduce, Reuse, [Recycle](#)) in both exhibition development and fabrication and in collections care [[Source](#)]. Museum support organizations are providing [information](#) and encouragement [[Source](#)]. However, they are also leading by example. For instance, the California Association of Museums is offering vegetarian meals

during their conference to minimize environmental impact. The Association also has a Green Museums Initiative whose goal it is "to inspire and support California museums to develop green business practices, eco-friendly facility-management, and sustainable programming." [\[Source\]](#)

- According to the Environmental Protection Agency, electricity generation is the largest U.S. emissions source, accounting for about 32% of total U.S. greenhouse gas emissions since 1990 [\[Source\]](#). As a result, environmentally-conscious museums are now tasked to find new lighting solutions, such as [LED](#), that use less electricity, thus helping their bottom-line and air quality. One good example is the Museum of Northern Arizona's new [Easton Collection Facility](#), which addresses areas of efficient energy use, indoor air quality, and water conservation in its green building strategies.
- Museums are also looking to reuse and purchase [eco-friendly materials](#). The [Field Museum](#) is one of many institutions committed to reusing exhibition materials and has a database for reuse of office furniture.

### Visitors and in-house services

- California's agriculture and food systems are extremely productive, but many scholars and scientists view them as unsustainable [\[Source\]](#). These systems put stress on natural resources and habitats, as well as compromising the health of rural communities and those who grow and harvest our food. Some museums are becoming leaders in educating the public about food sustainability and serving as examples in their cafes, such as the [Monterey Bay Aquarium](#). These leaders in sustainability usually also offer compost, recycling and landfill options for discarding leftover food and throwaway dishes. [\[Source\]](#)
- Many museums are integrating environmental messages for visitors into their facilities onsite. Turtle Bay Exploration Park includes basic interpretive elements on garbage and recycling cans, on bathroom stalls and other public areas.



### Outreach and community engagement

- The Monterey Bay Aquarium also created the Seafood Watch program, which "helps consumers and businesses make choices for healthy oceans." [\[Source\]](#)
- As the cost of gasoline increases, transportation to and from museums has already become a challenge for visitors. Some museums, such as the Santa Cruz Museum of Art & History, are combating this with bringing museums to community sites (ex: the idea of ["pop-up" museums](#)). Others are using [outreach vans](#) in hopes of getting their programs to the schools to ease the burden of transporting many students to the museums.
- The percentage of Americans who agree the earth is warming because of man-made activity has fallen from 50% in 2006 to 34% in 2010 [\[Source\]](#). A [number of museums](#) are making it their mission (and are expending great resources) to provide scientific information on climate change in exhibitions, like [Bill Nye's Climate Lab](#) at the Chabot Space & Science Center.



## Trends & Projections

By examining current trends in the area of the environment and sustainability, we can consider how these trends might impact our museums and/or provide opportunities for new initiatives and community service.

### Operations and facilities

- The [current drought](#) in California will cause a severe water crisis in the state. Some climatologists are predicting a possible “megadrought.” Are museums equipped to handle a water crisis?
- The Colorado River is expected to experience 10-30% decline in runoff over 30 years, with a 50% chance that by 2017 reservoir levels in Lake Mead will be too low to generate hydroelectric power [\[Source\]](#). How will this impact power usage in Southern California museums?
- In Northern California, the Bureau of Reclamation has estimated that the [Sierra snowpack](#) could be reduced by half as soon as a decade from now. The declining Sierra snowpack ([52% reduction by 2090](#)) will have an impact on water and power availability and cost. How will museums throughout the state use less water? How will the decline affect the tourist industries?
- Increased use of LEDs for lighting as incandescent bulbs are no longer produced [\[Source\]](#). The city of Los Angeles has [replaced thousands of streetlight fixtures with LED blubs](#). This four-year long project slashed carbon emissions by 47,583 metric tons. As LEDs become [cheaper and greener to produce](#), museums will embrace their use. Yet, recent issues, including changing paint color, have been discovered about [LED safety](#) with collections.
- Although movement is slow and [uncertain](#), there will be an increase in renewable energy sources, like [solar](#) [\[Source\]](#).
- Like many other [social](#) and environmental organizations, museums are seeing their facilities as reflections of their environmental commitment and making certain their construction considers sustainability, [energy efficiency](#) and health. [Future climate change](#) must also be factored into successful future construction.
- Cities are [hot in many respects](#). [Green roofs](#) and other building strategies can help reduce the [Urban Heat Island Effect](#) in city areas.
- Trends indicate an increased desire by consumers for buying green products. The California Department of General Services has rules on “[buying green](#)” products. Museums will also be making this kind of commitment in the future, both formally and informally.
- An increased amount of [e-Waste](#) and interest in its recycling is an ongoing trend. Many communities have [collections facilities and programs](#), and businesses offer recycling for their customers and reuse programs. Can museums help contribute to this reuse and recycling awareness as more and more e-products are introduced?

### Exhibitions and collections

- Sharing economies, such as [Airbnb](#) and [Zipcar](#), are a rapidly growing trend (Airbnb has grown from 120,000 listings in 2012 to 300,000 at the end of 2013). People are sharing tools, cars, tasks, and a multitude of other goods and services. In California, the Hayward Area Historical Society proposed to create [The Loop: An Exhibit Reuse Program](#), an online listing of unwanted exhibition furniture, props, graphics, educational collections, interactive elements, and crates.

- There is a movement for natural resources, such as rivers, to be treated as “personhoods.” Yet, recently a lawsuit to achieve “personhood” of four chimpanzees was [struck down in court](#). In the discussion of who speaks for these “people,” where do the voices of museum curators and other professionals fit in the narrative?

### Visitors and in-house services

- Use of electric vehicles is on the rise. The City of Palo Alto recently required new home construction to include charging stations [\[Source\]](#). Will museums be able to provide adequate charging stations for their guests?
- With the potential of reducing 3.6 billion car miles per year, high speed rail could mean positive gains for traffic and smog reduction and ease of travel (including for museum tourists) up and down the state [\[Source\]](#). But with financing issues, rising costs, delays, court-issues and less-than-stellar public support, the project viability is still up in the air [\[Source\]](#). What will become of the high speed rail projects in California and across the nation?
- Climate is impacting crops, and local climate shifts could force crops such as [vineyards](#) to new locations. How will that affect museums that rely heavily on the agriculture industry as funders or on revenue from agricultural tourism?
- California lawmakers have proposed a new law that would ban single-use plastic bags and charge a fee for other types of bags [\[Source\]](#). A number of communities already enforce this legislation. Is it time for museum gift shops to start carrying reusable bags, such as the [ChicoBag](#), invented here in the Golden State?

### Outreach and community engagement

- With improvements in geolocation, data and online tools, community [environmental mapping](#) and persuasive technology help people see how they’re doing in regards to monitoring their environmental impact. Museums might create programs and [community-wide games](#) such as the [San Francisco Urban Eco Map](#).
- Oceanic research increases as the ocean is viewed as a final frontier, and one deserving of protection. [Open Sailing](#) hopes to build an international ocean station to enable “intelligent human activities at sea.”
- Urban farming continues to grow in [California](#). Botanical Gardens and other museums with land might seize the opportunity to educate people on xeriscaping and food gardens.
- There is an [increase in number](#) of [farmers markets](#) and interest in local food sourcing, including in [schools](#) and [hospitals](#). One great example is Project Eat in Alameda County, which has capitalizes on the fact that “students will eat what they grow.” [\[Source\]](#)
- An increased interest in [repurposing materials for art](#) and other uses. Museums have been picking up on this trend in exhibits and programs and will increase this in future. The Children’s Museum of San Diego developed an exhibition called [TRASH](#) of local artwork to help visitors think about waste as being more than trash for disposal and asking questions about waste.
- Recycling is also the way to go when it comes to acquiring program materials and supplies. A great place for Bay Area museum educators and teachers is the East Bay Depot of Creative Reuse [\[Source\]](#) in Oakland.
- Despite the 2012 California voter-declined prop 37, which would have required labeling of all food products containing genetically modified organisms, advocates still are seeking alternative means of food labeling [\[Source\]](#).

## Plans

The following examines what some California and federal stakeholders are expected to do in the area of the environment and sustainability between now and 2030.

- In 2006, the Legislature passed and Governor Schwarzenegger signed AB 32, the Global Warming Solutions Act of 2006, which set the 2020 greenhouse gas emissions reduction goal into law. It directed the California Air Resources Board ([ARB or Board](#)) to begin developing discrete early actions to reduce greenhouse gases while also preparing a [scoping plan](#) to identify how best to reach the 2020 limit [[Source](#)].
- In October 2013, California entered into a regional climate pact with Oregon and Washington states and British Columbia. All agreed to put a price on carbon, invest together on clean energy technologies and support greener transportation [[Source](#)]. The state of California also administers the [Green California](#) program to reduce its “environmental footprint through sustainable state government operations and practices including energy efficient building design and construction, renewable energy generation at state facilities, environmentally preferable purchasing, and green vehicle policies. California also has a [Climate Change portal](#) on its website to encourage prevention measures to reduce greenhouse gas.
- California Department of General Services Best [Practices Manual](#) and [Working Green](#) Program.
- Rancho Cucamonga showcases sustainability efforts of local businesses and encourages green business practices throughout the community through its [Green Business Program](#). Numerous other communities also participate in this statewide greening initiative [[Source](#)].
- The [California Solar Initiative](#) offers solar incentives to energy customers (except new homes). The CSI Program has a goal to install 1,940 MW of new solar by 2017.
- The [Frontier Project](#) is a Southern California nonprofit organization featuring a sustainable demonstration building to educate resident consumers, commercial builders, and advocates about the latest methods and technologies in water, energy, and site conservation.
- On October 5, 2009, President Obama signed Executive Order 13514 that set sustainability goals for Federal agencies and focuses on making improvements in their environmental, energy and economic performance. The [Executive Order](#) required Federal agencies to submit a 2020 greenhouse gas pollution reduction target and to increase energy efficiency, reduce fleet petroleum consumption, conserve water, reduce waste, support sustainable communities, and leverage Federal purchasing power to promote environmentally responsible products and technologies.

## Baseline Forecast

### 2015

California museums gather together and make a commitment to sustainability by re-working vision and mission statements to include a section on sustainability in exhibits, programs, collections and building infrastructure. More than 90% of California’s museums sign onto the [CAM Green Museums Accord](#) and pledge to this commitment that also includes strategies like buying green, re-purposing, and local sourcing. Funding is secured and a program to create The Loop, an online listing of unwanted exhibition furniture, props, graphics, educational collections, interactive elements, and crates launches with great success.

The last few years have seen a trend of people moving back into the cities and out of the suburbs which oftentimes result in shorter commutes, less gas usage, and more people walking, biking or using public transit to move around their urban environment. This will bode well for museums located within city limits that are easily accessible by public transit or even on foot. These museums will see an increase in attendance and program participation.

## **2020**

New bill passes in California. All public and commercial buildings will be inspected for [carbon footprint](#). Facilities will receive a letter grade or a score according to their inspection. The total carbon footprint score will be posted at a public entrance. This may encourage businesses to lower carbon emissions while giving customers an option to shop at low emission buildings.

Driving and flying decline as oil supply declines and prices skyrocket around 2020. Remote museum sites are seeing fewer visitors because of lack of accessible public transportation. They must rely on local neighborhoods for repeat visitors. These museums must have a steady rotation of exhibits and programming to entice patrons to return. Other more geographically isolated museums are expanding their service to beyond exhibitions to provide other needed services to the community. Museum sites found near transportation hubs are experiencing an influx in visitors. Their staffing and facilities are overwhelmed and exhibits are in need of continual repair.

Local historical sites are having difficulty complying with the lower carbon footprint requirements. Restrictions on how historical buildings can be modified plus the scarcity of expertise leave these buildings vulnerable to enhancements. Many institutions file for State and Federal grants but competition is high and many are left without additional funding for upgrades. Susceptible museums must find other ways to promote carbon efficiency by drawing on partnerships with local governments, businesses and non-profits. Instead, some refocus on the exterior of their institution in providing green-spaces and tree-friendly native landscapes.

## **2030**

Global warming continues. In order to reduce the use of gas and other resources, pop-up and virtual museums are the new model. Museums have consolidated property and staff. Artifacts are now placed in off-site storage in collaboration with other museums, both sharing space and collections. Exhibits are versatile, appearing in public and private spaces and 3D printers have facilitated reproduction of artifacts to make them more accessible to a wider audience. The public is no longer only interested in experiencing the original artifact, but content to handle reproductions.

Yet, many historical sites are revitalized. Large tour groups are forming to visit more remote sites and these museums are working collaboratively with private tour companies. There is an increased interest in seeing the “real thing.” Tour itineraries fit multiple sites in one day to keep carbon emissions low. Attendance increases during peak traveling seasons. In order to accommodate multiple larger groups in one day, historical sites must rework their programming to fit the strict schedule of tour groups.

Smaller institutions are unable to keep up with the new virtual museum models and find themselves in a technological desert. They begin to promote “back to the basics” outreach programs with hands on do-it-yourself projects focusing on recyclable materials, while introducing older technology and hand held tools.

Sea level rise has caused the flooding, relocation, and closure of museums and aquariums along the coastline. However, Monterey and the Aquarium hired engineers from the Netherlands to design a retaining wall in the Monterey Bay so they are fine. Tourism in these communities has had to shift due to decreased beach and nature activities and have moved inland, creating new opportunities for those communities.

Ski resorts in the Sierra Nevada, where there is no longer a substantial snowpack, have been converted communal living centers with new museums and informal learning facilities needed.

Of the few remaining, zoos, aquariums and botanical gardens have an increased population of species that are extinct in the wild, displacing more "common" species entirely. Seed banks are now a major source of income for these institutions as they hold patents on many species germplasm. Forward-thinking collections managers saw this need coming a formed and patent seeking group in the mid 2020s.

## **Additional Resources**

Green Museums Initiative of the California Association of Museums –  
<http://www.calmuseums.org/index.cfm?fuseaction=Page.ViewPage&PageID=941>  
Includes a multitude of resources including [Green Museums Best Practices](#).

*The Green Museum: A Primer on Environmental Practice*, Sarah S. Brophy and Elizabeth Wylie, Alta Mira Press, 2008.

Teaching Sustainability; Teaching Sustainably, "Teaching Sustainability for Future Cultural Resource Professionals", Kristen Bartles, Editor, Grand Valley State University, Allendale, MI. Expected Spring 2012.

Museum News - It's Easy Being Green: Museums and the Green Movement -  
<http://www.bmuse.net/easybeinggreen.pdf>

The Clinton Foundation -  
<http://climatepositivedevelopment.org/download/attachments/294975/ClimatePositiveFramework+v1.0+2011+.pdf?version=1&modificationDate=1331574106709>

The Green Building Certification Institute - <http://www.usgbc.org/sites/default/files/CMP-Guide.pdf>

Why We All Should Care: Building a Case for Sustainable Building Design in Museums -  
<http://www.greenexhibits.org/connect/WhyCareSusDesEG2.pdf>

The Sustainable Museum: It's Not Easy Being Green  
[http://www.greenexhibits.org/connect/the\\_sustainable\\_museum.pdf](http://www.greenexhibits.org/connect/the_sustainable_museum.pdf)

Green Museums: A Step By Step Guide - <http://www.museumsassociation.org/download?id=282631>

Green Practices: Stanford University - [http://sustainablechoices.stanford.edu/pdfs/SCP\\_PocketSize1.pdf](http://sustainablechoices.stanford.edu/pdfs/SCP_PocketSize1.pdf)

Green Museums & Green Exhibits: Communicating Sustainability through Content and Design - [https://scholarsbank.uoregon.edu/xmlui/bitstream/handle/1794/8260/Byers\\_fall2008\\_project.pdf](https://scholarsbank.uoregon.edu/xmlui/bitstream/handle/1794/8260/Byers_fall2008_project.pdf)

Data Base of State Incentives for Renewable Inefficiency - <http://www.dsireusa.org/>

Environmental Guidelines for Exhibit Design - <http://www.astc.org/pubs/dimensions/2003/nov-dec/index.htm>

U.S. Green Building Council - <http://www.usgbc.org/>

Cool California <http://www.coolcalifornia.org/business-calculator>

Global Reporting Initiative - <https://www.globalreporting.org/Pages/default.aspx>

CDC - [http://www.cdc.gov/healthycommunitiesprogram/pdf/sustainability\\_guide.pdf](http://www.cdc.gov/healthycommunitiesprogram/pdf/sustainability_guide.pdf)

Association of Zoos and Aquariums - <http://www.aza.org/sustainable-practices/>

Environmental Protection Agency – <http://www.epa.gov/greenpower>