

Culture Over Carbon— Recommendations for Cultural Institutions

The Dalí Museum | St. Petersburg, FL

The following energy saving strategies have been successfully implemented by leadership and staff of cultural institutions nationwide to reduce operating costs and greenhouse gas emissions while working within budget and staffing constraints.

The recommendations are organized into three categories to provide a variety of options: a high-level roadmap, strategies to prioritize, and long-term investments.



Maximizing building efficiency and planning for decarbonization starts by understanding how your facility currently uses energy, identifying improvement areas, and making short and long term plans.

Understand your Energy Baseline

Make Plans and Identify Funding

Get Stakeholder Buy-in

Share Successes and Best Practices



These strategies offer the biggest “bang for your buck” when looking to improve energy efficiency and move toward decarbonization, while protecting collections and improving conditions for staff and visitors.

Leverage daylight and upgrade to efficient lighting

Replace inefficient systems

Keep equipment running at peak performance



Major building improvements require a larger upfront investment but can provide long-term benefits. These strategies can be incorporated into longer-term plans.

Decarbonize strategically

Invest in resiliency



High-Level Roadmap

1. UNDERSTAND YOUR ENERGY BASELINE

Get an energy assessment

Available at low to no cost through your local utility, energy assessments (also called energy audits) examine building energy systems, analyze consumption, and provide prioritized recommendations to improve energy performance and occupant comfort. Auditors work closely with the building owner and management to understand problem areas and provide cost effective solutions. Assessments also help unlock incentives to make building improvements. To learn more about what is available for your institution, contact your local utility.

Organize and track your energy data

Start collecting building energy data. It may be challenging at first, but it will get easier with more practice and experience. ENERGY STAR PortfolioManager® is a free tool from the EPA that helps institutions understand energy consumption patterns, identify efficient buildings on campus, pinpoint effective performance improvements, and track energy saving results. The tool also includes guidance on common issues cultural institutions experience such as tracking delivered fuel (e.g., propane) consumption.

2. MAKE PLANS AND IDENTIFY FUNDING

Develop short- and long-term decarbonization plans

Carbon reduction plans set goals to phase out operational carbon and meet specific building and/or portfolio needs. Understanding the context of the existing fuel types, building location(s), and planned improvements can help cultural institutions achieve incremental carbon reductions over time. Having a plan helps staff prioritize big-picture activities such as tracking carbon emissions as well as budgeting and planning energy-efficient replacements for equipment failures. This is important because emergency replacements for mechanical systems don't allow time for research into energy efficient alternatives or acquiring components that may be difficult to procure. A forward-looking attitude and proactive replacement plan for major mechanical systems ensures funds are set aside for their replacement and can avoid future stressful decision-making and funding constraints.

Prepare for expected public policies, particularly benchmarking

These policies require public and private businesses to measure and track energy performance and carbon emissions over time. Being armed with information about building performance allows owners to make efficiency improvements, ultimately reducing carbon and supporting jurisdictional climate goals. See the [Culture Over Carbon Codes & Policies Factsheet](#) for more information about the importance of preparing for carbon reduction policies.

Identify funding support

Funding for energy saving projects can come from a variety of sources (including but not limited to government/ municipal entities, utilities, philanthropies, and local financial institutions). Talk to your utility, contact your local department of energy, monitor local project funding and research new funders to start. Energy Service Companies (ESCOs) offer efficiency-as-a-service financing solutions that remove upfront cost barriers. Allocate staff time to research options and apply for incentives and grants as part of your continual fundraising efforts. Prioritize implementation of these upgrades when the funding is awarded so that your savings can begin immediately, and then be channeled to other efficiency projects.



© Alex Potemkin from Getty Images Signature

Leverage incentives and financing to upgrade over time

You don't have to do everything at once; funding and financing for upgrades can be tackled over time. Work with your team to make an upgrade plan that syncs with the natural lifecycle of your building/ appliances. As you complete projects, use the monetary savings on your utility bill to invest in higher cost projects.

3. GET STAKEHOLDER BUY-IN

Identify and empower champions and present your plan

Find a "champion" to support your plan and move energy-saving projects forward. Put together a PowerPoint or report for your stakeholders to outline your plan and the benefits to your institution. Communicate all the benefits of proposed projects, including return on investment as well as non-financial benefits like alignment with the mission, increased comfort, environmental impact, and increased educational opportunities. Organizations who can elicit buy-in from all levels are most successful (ex. executives prioritize energy savings, implementation staff are motivated to find opportunities to save, and facilities/maintenance staff are trained to operate systems most efficiently.) Once you have signoff to move ahead, share this information with your community.

Find and use sustainability synergies

Many institutions do not have a designated sustainability team or the necessary resources allotted to energy tracking and sustainability efforts. However, there may

be people who are willing to help and energy tracking mechanisms that already exist within your institution. For example, the financial department will likely be monitoring energy bills. In this scenario, streamlining energy data tracking into existing financial monitoring may provide easy entry to tracking energy consumption (e.g., add a column for kWh in an existing spreadsheet instead of starting from scratch). Don't be afraid to be persistent. Keep your overall goals in mind to help staff make decisions that will ensure success.

4. SHARE YOUR SUCCESSES AND BEST PRACTICES

Network and share your findings

As you complete energy and carbon reduction activities, network and share your findings with other institutions to increase the sector's collective knowledge. Everyone must start somewhere; your experience can kick-start someone else's path.

Use visual tools

An energy dashboard is a great opportunity to visually present building energy consumption and production and the associated GHG emissions. Interactive displays can be integrated into exhibits as educational or motivating, depending on the audience and the data available. Some energy tracking programs allow occupants to track energy use from a website or their smartphones, will send educational messages and reminders about energy reduction at peak hours, and provide a comparison to peer buildings' use to encourage savings.





Strategize to Prioritize

1. USE EFFICIENT LIGHTING AND HARVEST FREE DAYLIGHT

Lighting upgrades

Upgrading lighting is considered the “low-hanging fruit” energy savings. LED bulbs are not only more efficient and have a longer lifespan, but they also generate less heat which reduces utility bills by lessening cooling needs.

Bring daylight into appropriate spaces

Daylight sensors can save energy by automatically turning off the lights when there is adequate sunlight in a room. Use shades to control glare, heat gain, and to protect artifacts.

Use reflective surfaces and light shelves

Reflective surfaces and light shelves can bring light deeper into spaces, reduce the need for electrical lighting, and lead to better light quality.

2. REPLACE OR PLAN TO REPLACE INEFFICIENT, FOSSIL FUEL-POWERED SYSTEMS

Electric building technologies

Electric building technologies deliver the same thermal comfort as traditional gas, propane, or fuel oil equipment with lower emissions and more efficiently than their counterparts. Heat pumps for space and water heating can be four times more efficient compared to gas heat or electric resistance heat. Air source heat pumps, the most common type today, work like an air conditioner in reverse: they harvest heat from the outside air and use it to heat the building. Heat pump water heaters, with a similar efficiency to their space conditioning counterparts, can create significant energy and cost savings to meet hot water needs. Central heat pump water heater systems are an option for buildings with existing boiler plants for domestic hot water.

Be electrification ready

In tandem with other projects, look for opportunities to install high-capacity electrical panels, electrical chases and conduit runs, and place electrical outlets near gas equipment for future equipment conversion (e.g., electric vehicle charging, onsite solar, domestic hot water).

Look for low global warming potential refrigerants

HVAC equipment, refrigeration and freezer units, chillers, and fire extinguishing systems all use refrigerants. Most

refrigerants are high global warming potential (GWP) chemicals that can be up to thousands of times more polluting than carbon dioxide alone. Refrigerant leak detection systems can improve a system’s performance and minimize the release of high GWP chemicals directly into the environment. Leaks require more refrigerants to recharge the system, releasing even more potent emissions.

Add an energy-efficient humidity control solution

Traditional HVAC systems that remove moisture from the air (dehumidify) by cooling it below the dew point use a significant amount of energy to meet the strict humidity requirements in galleries, storage spaces, and other tightly controlled zones in a building. Adding other dehumidification technologies, such as desiccant or enthalpy wheels, can save energy by using a chemical process to remove and control moisture that does not rely on energy-intensive cooling, particularly in humid climates. An HVAC professional can aid in evaluating the best option.

Evaluate ways to partition spaces and invest in zonal sensors where possible

Tightly controlled temperature and humidity are important considerations for many cultural institutions, but large, open spaces can make this challenging. Investing in more sensors can help operators understand areas that are more challenging to control. This information can be used to partition spaces with the strictest requirements or make temperature and humidity control more efficient.

Install and maintain automatic building system controls

Automated controls for heating, cooling, lighting, and other building systems allow the systems to work together and create efficiencies.

3. KEEP EQUIPMENT RUNNING AT PEAK PERFORMANCE

Invest in ongoing commissioning and training

Regular equipment commissioning ensures efficient and effective building system and controls operation to optimize energy use and reduce operating costs. Trained commissioning professionals can provide training and documentation to onsite building operations staff (e.g., facilities/maintenance), which will enable in-house staff to identify energy efficiency issues and opportunities.



Long-Term Investments

1. USE MAJOR RENOVATIONS AS AN OPPORTUNITY TO DECARBONIZE

Improve the building envelope

Upgrading the building envelope (e.g., walls, windows, and doors) can optimize the other building systems. For example, high efficiency windows and trees or shade structures can control the amount of heat gain due to sunlight, minimizing the energy needed for heating, cooling, and lighting. Upgraded envelopes may also facilitate cost savings when HVAC equipment is replaced; downsizing the HVAC system capacity may be possible due to the reduced overall heating and cooling needs of the building.

Seek low embodied carbon materials

Building construction materials alone are responsible for about 11% of all global carbon emissions. As cultural institutions consider renovations and expansions to their buildings, thoughtful material selection can easily change a building's embodied carbon and reduce global climate emissions. Strategies include reducing the amount of material used, reusing materials where possible, selecting materials that minimize product replacement, and choosing low embodied carbon materials (e.g., wood and bio-based materials, local materials, high recycled content). More information can be found in the [Insider's Guide to Talking About Carbon Neutral Buildings](#).

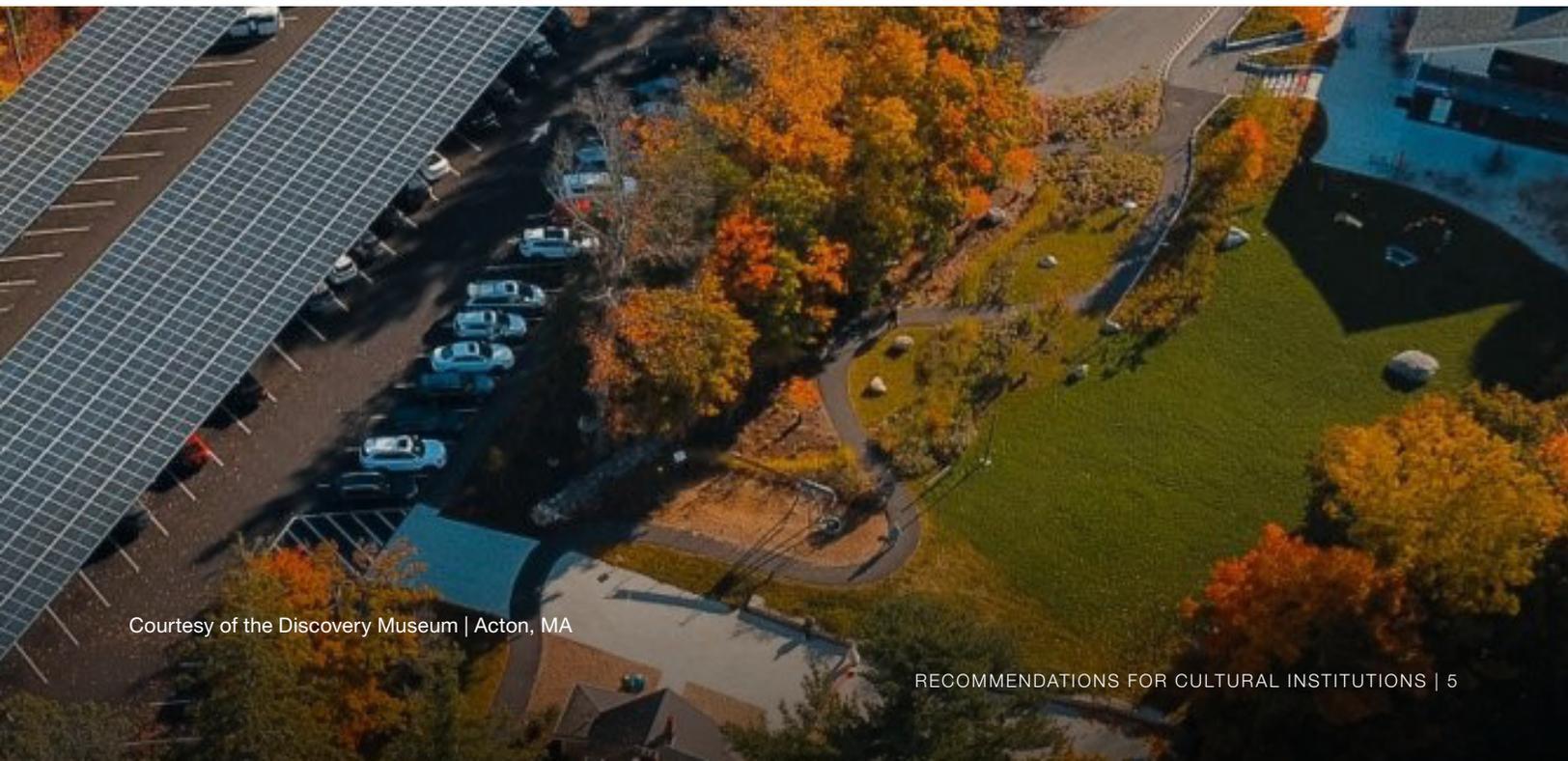
2. MAKE YOUR INSTITUTION MORE RESILIENT

Prioritize onsite renewables and utilize off-site renewables

Incorporate onsite renewables to produce emission-free energy, which offsets operational emissions and decreases the amount of electricity needed from the grid. This strategy is best implemented in tandem with or following energy efficiency upgrades – decreasing overall energy consumption will reduce the size of the renewable system needed. Solar photovoltaics (PV) is a typical option for generating energy onsite. If onsite energy generation is not an option, off-site renewables can be considered through a power purchase agreement, community solar program, or opting into utility-delivered renewables.

Build resiliency through building-grid integration and onsite energy storage

Building-grid integration allows buildings and the electrical grid to coordinate energy supply and demand to optimize energy consumption, reduce peak demand, offer more clean energy, and provide a reliable electricity supply. Cultural institutions can implement strategies to adjust their use (e.g., heating, cooling, lighting) to reduce consumption, minimize community-wide service impacts, and avoid peak energy rates. Strategies may include the installation of smart controls and utilizing energy storage and/or batteries.



Courtesy of the Discovery Museum | Acton, MA



National Museum of African American History & Culture | Washington DC

About Culture Over Carbon

The Culture Over Carbon project provides cultural institutions actionable data and recommendations to understand how their buildings use energy, help create roadmaps to reduce energy at individual institutions and the sector overall, and lower carbon and other greenhouse gas (GHG) emissions to reduce their impacts on climate change.

Under the project, over 130 cultural institutions from across the country provided energy-use data for over 240 buildings. Analysts evaluated the data, looking for field-wide use patterns, and provided recommendations for key efficiency actions. The analysts provided recommendations to prepare institutions for expected building code and policy changes that may impact them.

This project is funded by a National Leadership grant (2021-2023) from the Institute of Museum and Library Services (IMLS) and supported by these organizations:

