The Carbon Inventory Project 2023

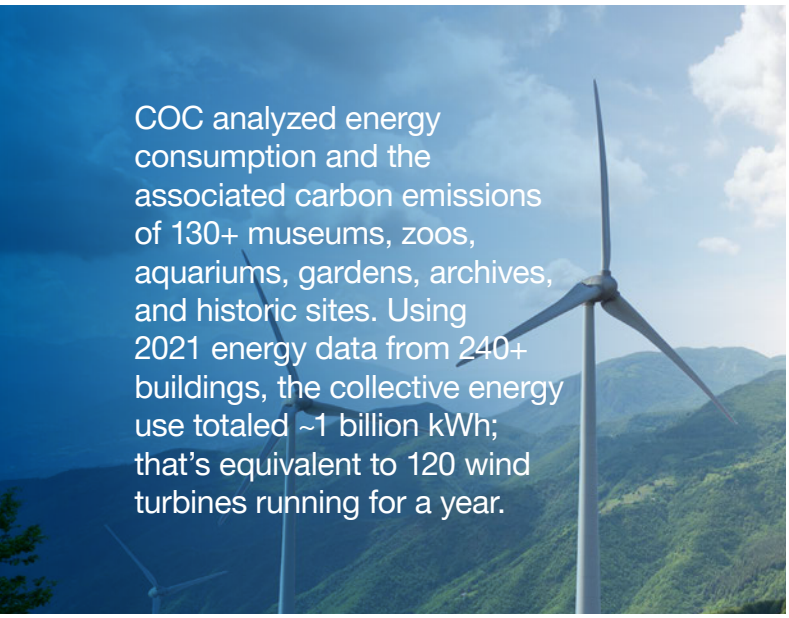
Cultivating the U.S. Cultural Sector's Commitment to Understanding and Reducing Energy-Use Carbon Emissions

Exploratorium
San Francisco, CA

Energy Data Supports the Sector's Carbon Impact Accounting

Cultural Institutions are critical resources for communities: these sites have the power to address climate change and model opportunities to limit climate impacts. With energy consumption in buildings accounting for an estimated 40% of global carbon emissions,[1] and approximately 30,000 cultural institutions in the U.S.,[2] it's clear that focusing on energy use is a critical early step toward decreasing the sector's climate impact. National governments alone cannot implement or influence sufficient change to reduce carbon emissions to mitigate the worst impacts of a changing climate. The rest of society must help fill the gap. Cultural institutions are not exempt from this critical work.

This factsheet presents the results of the 2023 Carbon Inventory Project (CIP), part of the Institute of Museum and Library Services funded research project, Culture Over Carbon (COC): Understanding Museums' Energy Use.



COC analyzed energy consumption and the associated carbon emissions of 130+ museums, zoos, aquariums, gardens, archives, and historic sites. Using 2021 energy data from 240+ buildings, the collective energy use totaled ~1 billion kWh; that's equivalent to 120 wind turbines running for a year.

COC's results highlighted the cultural sector's potential to greatly impact overall carbon emissions by reducing energy consumption in buildings.

When the initial COC research process revealed difficulty collecting energy data as the most common barrier to participation, the COC project team created CIP. Its goals were to:

1. Help staff at cultural institutions build capacity to monitor and report their own energy use,
2. Familiarize them with the free energy management tool ENERGYSTAR® PortfolioManager® (ESPM),
3. Provide aggregate data to raise awareness about the impacts of energy-use carbon emissions, and
4. Use that knowledge to advance environmental leadership in the U.S. cultural sector.

From October 2022 – June 2023, the project team provided U.S. cultural institutions with resources and trainings focused on ESPM, and developed a spreadsheet tool for institutions that use an alternative method for measuring energy consumption. Participants used these tools to report their 2022 energy consumption and carbon footprint associated with energy use. Their aggregate data on the following pages represents a sample of the thousands of cultural institutions nationwide.

1 "Building Industry Steps up to Address Climate Change." New Buildings Institute, November 8, 2022. https://newbuildings.org/news/building-industry-steps-up-to-address-climate-chan/.

2 Based on analysis from Institute of Museum and Library Services, November 2018. https://www.imls.gov/research-evaluation/data-collection/museum-data-files.

Results

Participants represented a cohort of 80 cultural institutions including museums, zoos, aquariums, historic sites, and botanical gardens.

Gross Floor Area (ft^2)

The 80 institutions who participated in CIP manage a combined

20 million ft^2

of conditioned space, which equates to more than 450 acres.

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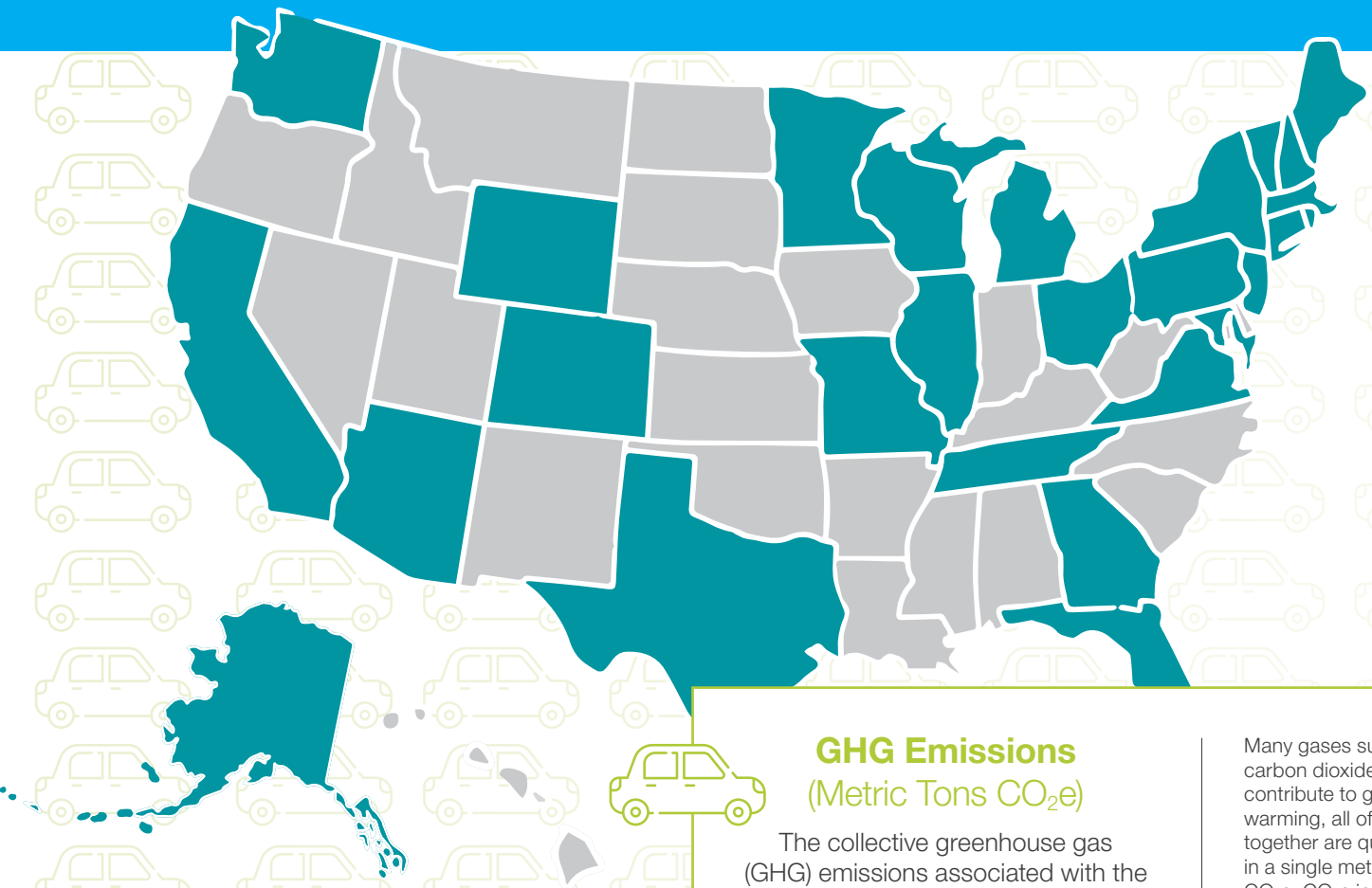
This is about the size of all of Disneyland!



GHG Emissions (Metric Tons CO_2e)

The collective greenhouse gas (GHG) emissions associated with the 2022 energy consumption of CIP participants were more than 187,000 metric tons CO_2e. This is equivalent to the annual emissions of over

41,000

gasoline-powered passenger cars.

Many gases such as carbon dioxide significantly contribute to global warming, all of which together are quantified in a single metric called CO_2e. CO_2e indicates the total equivalent carbon dioxide emitted as a result of the reported annual energy consumption. Understanding the scale of the sector's total emissions is important for defining the scope of change necessary, attracting funding for changes, and reporting on the success of both funding and effort.

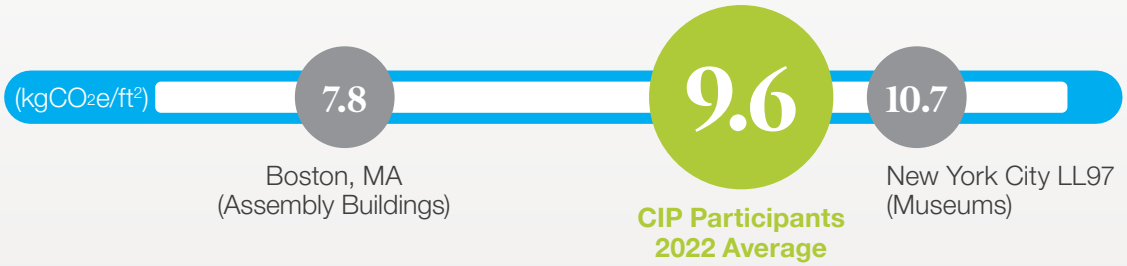
Results Cont'd

GHG Emissions Intensity ($kgCO_2e/ft^2$)

CIP participants reported an average GHG intensity ranging from less than zero (due to onsite renewables) to approximately 49 $kgCO_2e/ft^2$, with an overall average of around 9.6 $kgCO_2e/ft^2$. This metric will become increasingly important as more local jurisdictions adopt benchmarking requirements, with Boston, MA and New York City, NY already requiring commercial buildings (which includes museums) to meet emissions intensity limits starting in 2024 (NYC) and 2025 (Boston). The limits shown below are for the closest building type through 2029. Limits will become more stringent in future years.

GHG Emissions Intensity divides the total GHG emissions by the floor area of the building. It is helpful when comparing energy consumption between buildings because it normalizes consumption by building size. A building could have high GHG Emissions, but a low GHG Emissions Intensity if they are using a relatively low amount of energy or cleaner energy sources for the size of their building.

GHG Emissions Intensity Comparision:
CIP Participants vs. Two Local Benchmarking Mandates



Learning Highlights

The findings from CIP revealed:

- CIP participants account for about **5% of the estimated 4 million metric tons of CO_2e emitted by the entire cultural sector in 2022.** If the entire sector made the effort to reduce their annual energy consumption by 30%, the related GHG emissions reductions would be equivalent to the annual emissions of 3 natural gas-fired power plants or 271,000 passenger vehicles.
- Energy account management was challenging for a number of participants at the outset, but proved valuable to all. The variety of monitoring techniques, including the availability and accessibility of building specifics and energy use information contributed to challenges.
- However, those with up-to-date data found it highly actionable. Some with updated ESPM data reported easy use for capital planning work and funding applications. Quarterly updates appeared to be the most successful approach to data maintenance.

Museum of Russian Icons | Clinton, MA

What's Next?

Summer 2023: The complete Culture Over Carbon report will be released. The report will include recommendations for energy management in cultural institutions.

The Future of Benchmarking: The CIP Team and Environmental Protection Agency are collaborating on a survey to create a building performance category for museums in ESPM. The survey will require 200+ participants.

To receive communications about the next steps of the CIP initiative, sign up **here**.

Phipps Conservatory and Botanical Gardens' Center for Sustainable Landscapes | Pittsburgh, PA
Photo Credit: Denmarsh Photography, Inc.

Thank You

Thank you to all the participants contributing to this work. Some museums participated anonymously; the following institutions opted to share their names as participants in the project:

Academy Museum of Motion Pictures
Aldrich Contemporary Art Museum
Anchorage Museum
Art Museum of Southeast Texas
Atlanta History Center
Blithewold Mansion and Gardens
Carnegie Museum of Art
Carnegie Museum of Natural History
Carnegie Science Center
Chicago Children's Museum
Clark Art Institute
COSI
Customs House Museum and Cultural Center
Denver Art Museum
Edsel & Eleanor Ford House
Exploratorium
Hauser & Wirth
Henry Art Gallery
Henry Vilas Zoo
Historic New England
Kansas City Zoo
La Plata County Historical Society / Animas Museum
Long Island Children's Museum
Madison Children's Museum
Meeteetse Museum District
Museum of Contemporary Art Chicago
Museum of Discovery and Science
Museum of Russian Icons
Museum of Science, Boston
National Nordic Museum
Oakbrook Park Chumash Indian Corporation
Phipps Conservatory and Botanical Gardens
Science Museum of Minnesota
SFMOMA (San Francisco Museum of Modern Art)
Smithsonian Institution
The Andy Warhol Museum
The Henry Ford
The Wild Center
Toledo Museum of Art
Wilson Museum
Yale University Art Gallery

The Carbon Inventory Project is funded by an Institute of Museum and Library Services National Leadership Grant. Partners include the New England Museum Association, New Buildings Institute, and Environment & Culture Partners. For more information about the project visit: **https://tinyurl.com/LearnCIP**

nbi new buildings institute
INSTITUTE of Museum and Library SERVICES
Environment & Culture Partners
nema NEW ENGLAND MUSEUM ASSOCIATION