



Hawai'i Natural Energy Institute Research Highlights

Grid Integration & Energy Efficiency

Reducing Greenhouse Gas Emissions from Building Operation

OBJECTIVE AND SIGNIFICANCE: The goal of the project was to provide professional and academic technical support and content development to the City and County of Honolulu Climate Change Commission (CCC), for development of a Commission white paper intended to provide technical and policy guidance to the building industry and city leaders in the context of climate change mitigation. This work was a collaboration between HNEI, the University of Hawai'i School of Architecture Environmental Research and Design Lab (ERDL), and the CCC.

BACKGROUND: The CCC is charged with gathering the latest science and information on climate change impacts to Hawai'i and to advise the Mayor and City Council as they look to draft policy and engage in planning for future climate scenarios and reducing Honolulu's contribution to global greenhouse gas (GHG) emissions. The city's initiatives are intended to support the efforts of the State of Hawai'i in meeting its Climate Action Plan goals.

PROJECT STATUS/RESULTS: The white paper, "[Reducing Greenhouse Gas Emissions From Building Operation – Guidance Document](#)", was presented to and accepted by the CCC in July 2022.

"This guidance document provides potential actions for the City's consideration in order to mitigate climate change through reduction of GHG emissions from buildings' operational energy use and to adapt to climate change through the implementation of sustainable and resilient development policies and design strategies. This paper supports implementation of the Honolulu Climate Action Plan and Hawai'i Clean Energy Initiative and informs the upcoming Honolulu Climate Adaptation Plan.

The body of the paper discusses key factors that shape the built environment, including objectives, context, and potential actionable steps. These key design influences include codes, policies, incentives, and education. The paper then addresses the need for future research in climate change and summarizes a discussion with an industry focus group. The appendix includes specific design strategies for passive and energy-efficient building design."

Based on current trends and studies of Honolulu and other U.S. cities, the Commission suggests the following for the City & County of Honolulu in the paper:

1. Adopt the following targets modified from the 2030 Challenge¹ to mitigate the building sector's contribution to climate change.
 - a. All new buildings, developments, and major renovations shall be designed to meet a fossil fuel, GHG-emitting, energy consumption performance standard of 70% below the regional average/median for that building type in the 2003 Commercial Building Energy Consumption Survey (CBECS).
 - b. At a minimum, an equal amount of existing building area shall be renovated annually to meet a fossil fuel, GHG-emitting, energy consumption performance standard of 70% of the regional average/median for that building type.
 - c. The fossil fuel reduction standard for all new buildings and major renovations shall be increased as follows.
 - i. 80% in 2025
 - ii. 90% in 2030
 - iii. Carbon neutral in 2040 (using no fossil fuel GHG emitting energy to operate)
2. Convene a task force to advise the City on creating a roadmap that identifies actions and timelines to meet GHG emissions reduction targets in the Honolulu Climate Action Plan (strategy 5), the Hawai'i Clean Energy Initiative, and the 2030 Challenge. This roadmap could include the following recommendations.
3. Support the adoption of the most recent building energy codes and stretch/reach codes to require and motivate best practices.
4. Require building energy benchmarking and disclosure for buildings over 25,000 sf.
5. Encourage existing buildings to improve energy efficiency over time.
 - a. Investigate energy auditing, building commissioning, and cost-effective energy-efficient retrofits.
 - b. Investigate building performance standards.

6. Incentivize building owners, occupants, designers, and builders to adopt practices to reduce GHG emissions from building operation through financial incentives, energy efficiency standards, tax benefits, loans, grants, expedited permitting, and new financial tools.
7. Support education and ongoing training of professional designers, builders, and code enforcement officials to meet the goals of the 2030 Challenge, the AIA's Framework for Design Excellence, and the previously mentioned codes, policies, practices, and incentives.¹

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¹ ibid