

**UHERO**

THE ECONOMIC RESEARCH ORGANIZATION  
AT THE UNIVERSITY OF HAWAII

ENERGY AND GREENHOUSE GAS SOLUTIONS  
PROGRAM

# UH Mānoa Energy and Greenhouse Gas Monitoring, Benchmarking Analysis Project (BeMAP)

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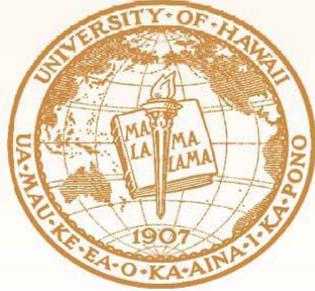
APRIL 27, 2011

HAWAII SUSTAINABILITY AND POLLUTION  
PREVENTION PARTNERSHIP

# Why UH Mānoa Energy?

*“The university system is the second largest consumer of electricity in the islands (after the U.S. military)... The university can be a model and motivator for action in the larger community off campus.”* – Carlos Perez, Hawaiian Electric Company Manager for Energy Solutions

# UHM and HECO Partnership - 2007



30 % Energy Reduction by 2020  
50 % Energy Reduction by 2050  
25 % Renewable by 2050  
Energy and Water Self Sufficient by 2050

## **The core goals:**

1. Engage in rigorous analysis that informs a global community of scholars.
2. Develop and maintain data and models on Hawai'i energy, economy, and the resulting greenhouse gas emissions.
3. Develop energy, economic, and environmental solution-oriented analyses for legislators and the business community.
4. Design interactive education and outreach programs that integrate energy, environment, and economics for a variety of levels - K-20, as well as the general community.
5. Showcase Hawai'i solutions that demonstrate a sustainable alternative for others.

# UH Mānoa as a Leader in Energy Conservation

UH Mānoa is recognized as a national leader in benchmarking, monitoring, and reducing energy and greenhouse gas emissions, as demonstrated by our leadership in The Climate Registry (TCR), American College and University Presidents' Climate Commitment (ACUPCC), and Energy Star reporting.

- UHM is **FOUNDING** reporter to The Climate Registry
- UHM is the **FIRST** university to participate in TCR
- UHM is the **FIRST** and **ONLY** institution to participate in Hawai'i to participate in TCR



**SIGNATORY OF**  
AMERICAN COLLEGE & UNIVERSITY  
PRESIDENTS' CLIMATE COMMITMENT

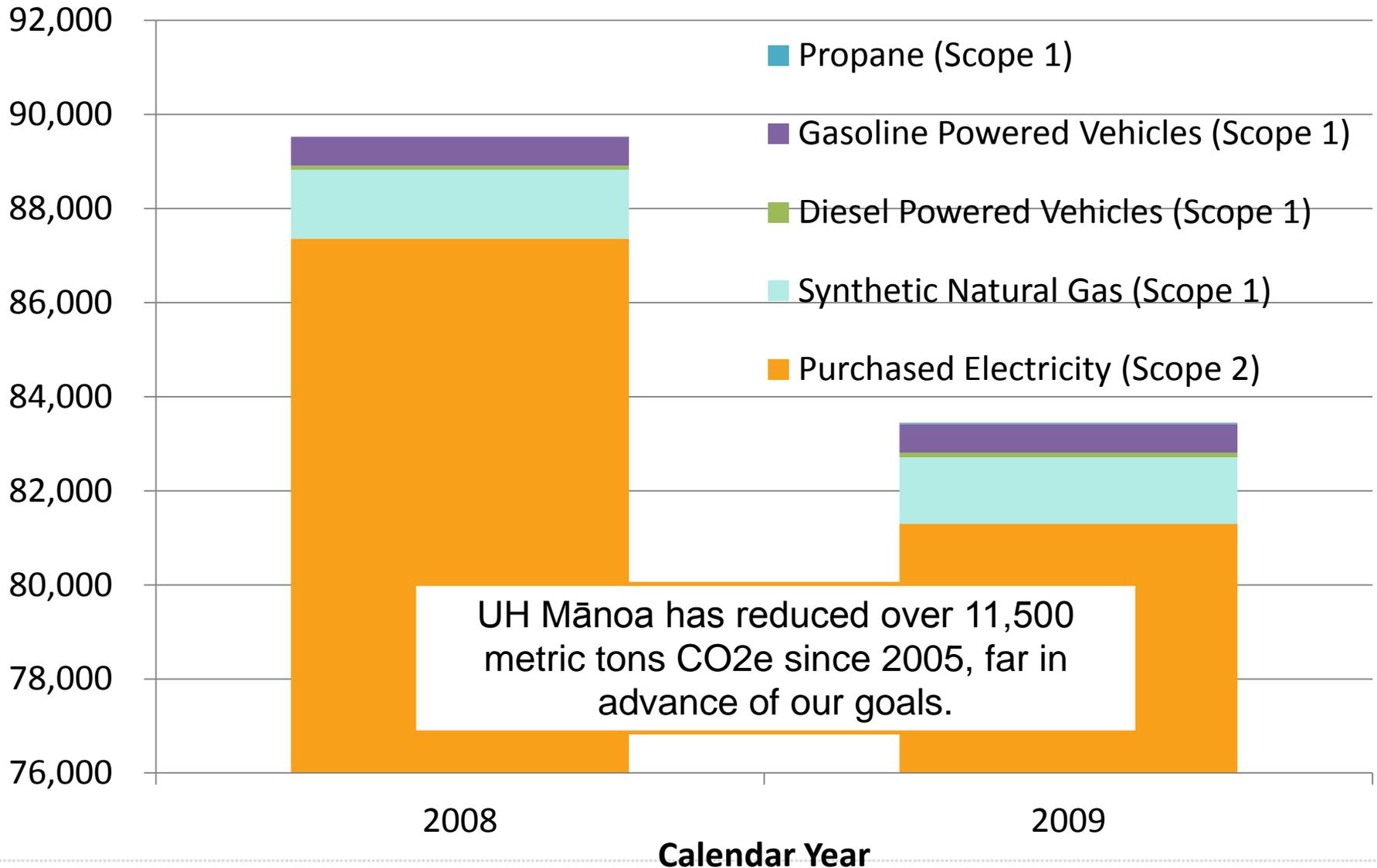


## Successfully reported UH Mānoa's 2008 and 2009 GHG emissions inventories to TCR

- UH Mānoa reduces energy and GHG emissions by over 11,500 metric tons CO<sub>2</sub>e since 2005, far in advance of our goals.

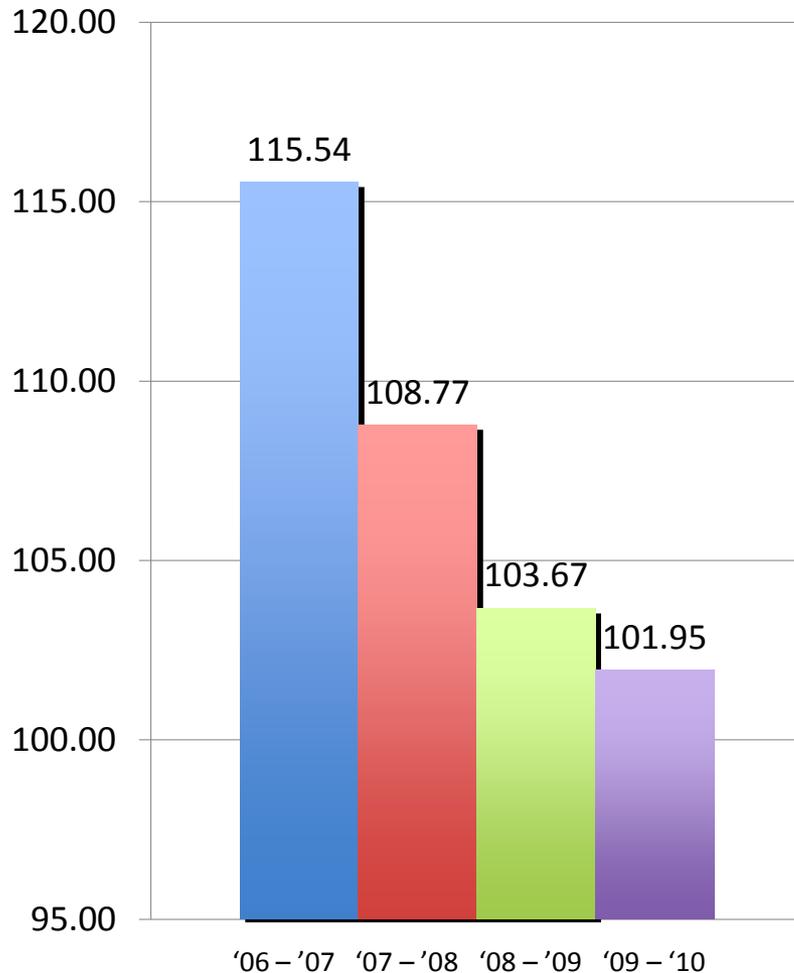
# Scope 1 and 2 GHG Emissions for UH Manoa

Metric Tons CO<sub>2</sub>e



# Energy Efficiency Measures Paying Off

Total electricity consumption of UH Manoa campus (GWh) for each academic year



## Energy Star result in a glance:

- Significant reduction in electricity consumption
- Laboratory buildings (Agriculture science facility, Pacific Ocean Science Technology(POST), Bilger addition, Holmes hall, Biomedical science building), have the highest rank of Energy consumption followed by Hamilton Library, and Saunders Hall

# BeMAP Process – Next Step

May

- 2010 GHG inventory and procure a TCR third-party verifier
- Review GHG emissions reductions at University campuses and their Climate Action Plans ( - June)

June

- Build Climate Action Plans
- Streamline reporting with factors and equations pre-specified, and data sources itemized

July

- Completion of 2010 GHG inventory
- TCR third-party verification
- Launching of reporting

August

- Climate Action Plans in Effect

## Other EGGIS Contributions to the Community

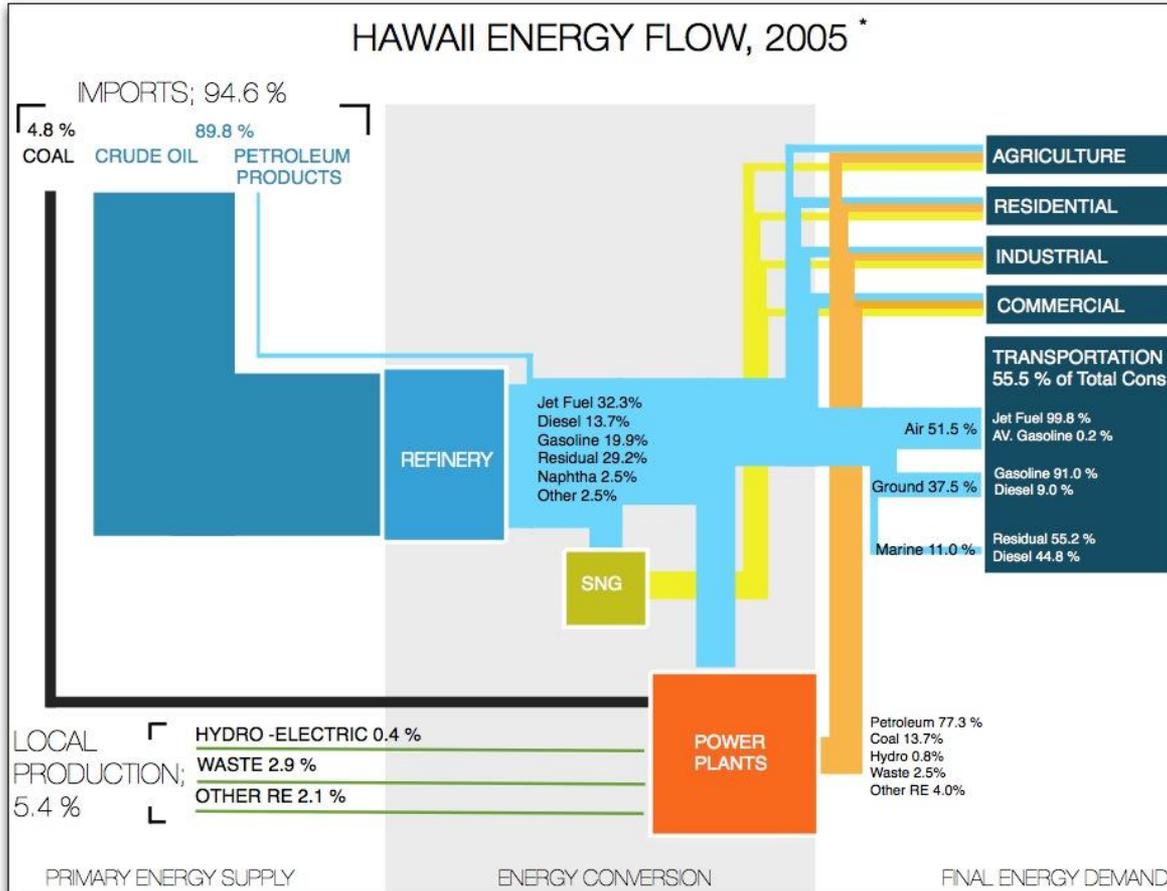
- Hawai'i GHG emissions profile 1990 and 2005
- Biofuels life cycle GHG analysis on biofuels implementation in the state of Hawai'i
- Waikīkī sea water air conditioning project
- GHG accounting and inventory verification training via GHG Management Institute
- Hawai'i Clean Energy Day at State Capitol

# National Recognition

- The team was invited to present at the Science Education and New Civic Engagement Responsibilities (SENCER) Washington DC Symposium and Capitol Hill Poster Session



# University of Hawai'i Economic research Organization Energy and Greenhouse gas Solutions Program



Missing direct link of energy consumption to economic sector activity

**Opportunity:**  
Convert existing fuel data to useful, granular economic levels.

**Benefits:**  
Improve modeling of energy policy impacts on Hawaii's economy

Missing direct link of energy consumption to economic sector activity

Economic Sectors **
Agriculture
Mining and Construction
Food Processing
Other Manufacturing
Transportation
Information
Utilities
Wholesale Trade
Retail Trade
Finance and insurance
Real estate and rentals
Professional Services
Business services
Educational services
Health services
Arts and entertainment
Accommodation
Eating and drinking
Other services
Government
Total interindustry demand
PCE
Visitor expenditures
Gross private investment
State and local government
Federal government: military
Federal government: civilian
Exports
Total Output

\* Konan, DE and HL Chan. 2009. "Greenhouse gas emissions in Hawaii i: Household and visitor expenditure analysis." Energy Economics.  
 \*\* DBEDT. 2008. Condensed table categorization used in "The 2005 State Input-Output Study For Hawaii".

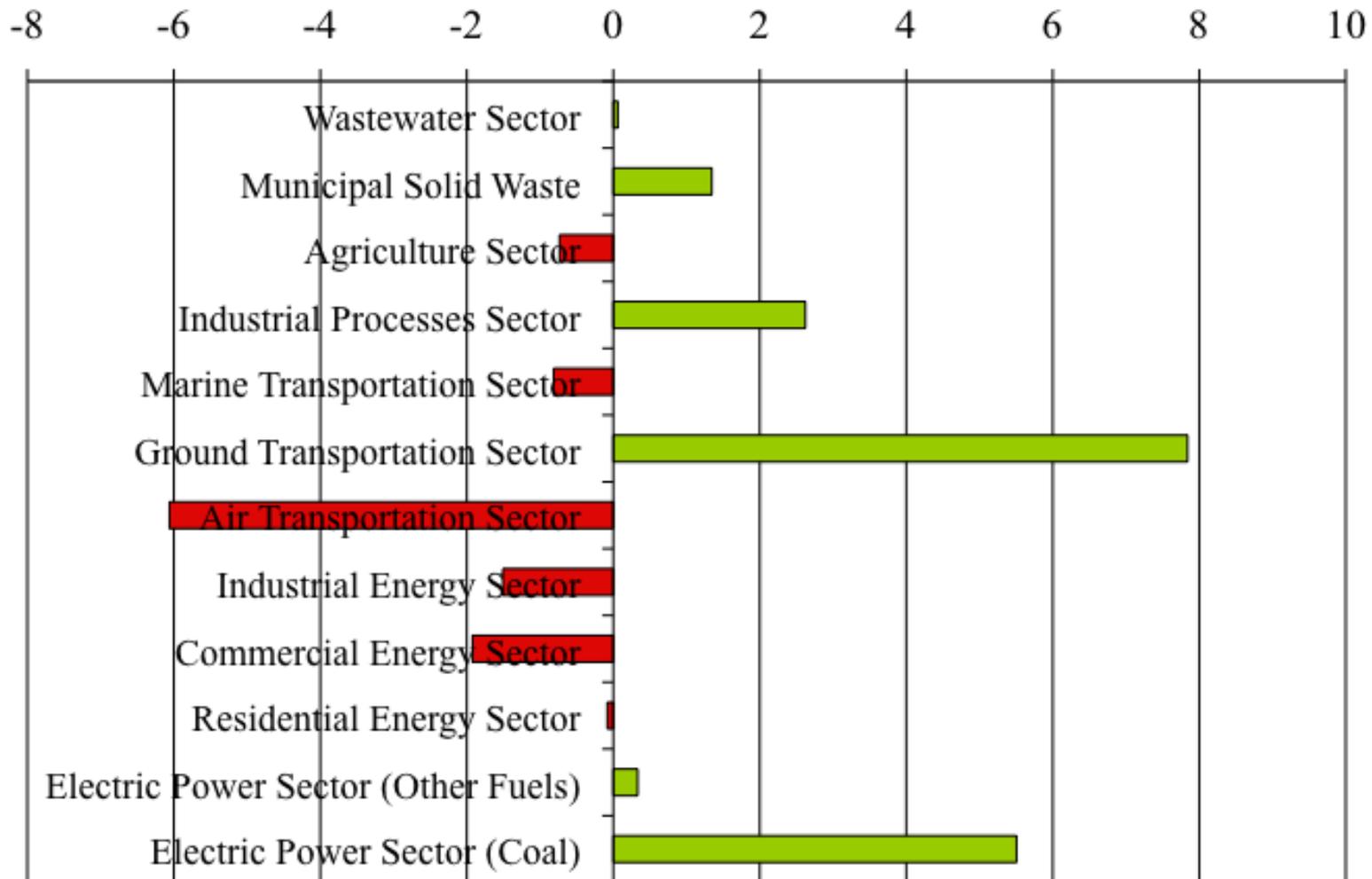
# GHG Emissions State of Hawaii

<b>Amount of GHG Emission (MMTCO2E)</b>	<b>1990</b>	<b>2005</b>
<b>Energy</b>	<b>23.232</b>	<b>24.161</b>
<b>Stationary Energy Sources</b>	<b>10.163</b>	<b>10.854</b>
Electric Power Sector	6.804	8.362
Residential Energy Sector	0.350	0.330
Commercial Energy Sector	0.762	0.287
Industrial Energy Sector	2.246	1.874
<b>Mobile Energy Sources</b>	<b>13.069</b>	<b>13.307</b>
Air Transportation Sector	7.487	5.991
Ground Transportation Sector	3.666	5.601
Marine Transportation Sector	1.916	1.715
<b>Non-Energy Sources</b>	<b>1.456</b>	<b>2.269</b>
<b>Industrial Processes Sector</b>	<b>0.197</b>	<b>0.844</b>
<b>Agriculture Sector</b>	<b>0.634</b>	<b>0.453</b>
<b>Waste</b>	<b>0.625</b>	<b>0.972</b>
<b>Grand Total</b>	<b>24.687</b>	<b>26.430</b>

# Greenhouse Gas Emissions (MT CO2E Per Capita)



# What are the biggest changes since 1990?



% GHG emissions change contribution by sector

# Ground Transportation GHG Emissions (Tot. , Per Cap.)



# Resident and Visitor Energy and GHG Emissions

	Energy, trillion BTU	GHG emissions MMTCO <sub>2</sub> e
Total	323.3	23.4
Resident	126.4	9.3
Visitor	72.9	5.2
Visitor less air	33.5	2.4
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Per annum	MBTU	GHG metric tons
Resident	104	7.7
Visitor	464	32.9
Visitor less air	213	15.4
Per capita	267	19.3
<b>Visitor factor</b>	<b>4.4</b>	<b>4.3</b>
<b>Visitor factor less air</b>	<b>2.0</b>	<b>2.0</b>

The background features a large, light gray watermark of the University of Hawaii seal. The seal is circular and contains a central torch with a flame, flanked by two stylized leaves. The text "UNIVERSITY OF HAWAII" is arched across the top, and "MALAMALAMA" is written across the middle. The year "1907" is at the bottom. The Hawaiian text "MAU KE EA O KA 'ĀINA I KĀ" is also visible at the bottom of the seal.

**Mahalo!**

For more information, contact  
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