U H E R O

Energy & Greenhouse Gas Solutions

Economic Impact of Climate Change Policy

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Legislative Hearing on Global Climate Change
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University of Hawai'i Economic Research Organization

- ***Energy and Greenhouse Gas Solutions*** -- economic solutions to climate change in Hawaii
- www.uhero.hawaii.edu/eggs/
- Paul Bernstein, Makena Coffman, Mike Hamnett, Steve Alber, Craig Coleman, Iman Nasseri, Carl Bonham, and more…

www.soest.hawaii.edu/coasts/sealevel

Hawai‘i Climate Change Solutions: Act 234

- Cap State GHG Emissions to 1990 by 2020
  - Hawai‘i is 0.3% of U.S. GHG Emissions
    - Not in Spite of … Because of
    - Leadership role in the U.S. & Pacific
  - Emphasis on market-based mechanisms and to minimize “leakage”
- Greenhouse Gas Emissions Reduction Task Force

Obama Energy Environmental Team

- **Steven Chu, Secretary of Energy**
  - Motivated by interest in climate change, he led Lawrence Berkeley National Lab into a broad research program on energy technologies
- **Lisa Jackson, Environmental Protection Agency Administrator**
  - As head of New Jersey's Department of Environmental Protection, she helped develop the Regional Greenhouse Gas Initiative (RGGI)
- **Nancy Sutley, Chair of the White House Council on Environmental Quality**
  - Sutley currently serves as the Deputy Mayor for Energy and Environment for the City of Los Angeles
- **Carol Browner, Assistant to the President for Energy and Climate Change**
  - As head of EPA during Clinton Administration brought climate change issue to the forefront and designated it as requiring action
- **Heather Zichal, Deputy Assistant to the President for Energy and Climate Change**
  - Co-chair for the Energy and Environment Policy Team for the Obama Transition Team
- **John Holdren, Presidential Science Advisor**
  - While president of the American Association for the Advancement of Science (AAAS), he argued publicly for swift action on climate change.
- **Jane Lubchenco, head of National Oceanic and Atmospheric Administration (NOAA)**
  - She has been critical of the Bush administration's lack of respect for climate science, and for its inaction on greenhouse-gas emissions.

Mandatory Regional Initiatives in the U.S.

- Regional Greenhouse Gas Initiative (RGGI)
  - Connecticut, Delaware, Maine, New Hampshire, New Jersey, New York, Vermont, Rhode Island, Massachusetts, & Maryland
  - Goal: **2005 levels by 2018**, CO_2 only in Electric Sector
  - Cap–and–Trade (2 auctions held, 3rd scheduled in March)
    - » September, 2008 - 12.5M allowances sold for $3.07 each
    - » December, 2008 - 31.5M allowances sold for $3.38 each
- Western Climate Initiative (WCI)
  - Arizona, California, New Mexico, Oregon, Washington, Utah, British Columbia, Manitoba & Montana
  - Goal: **15% below 2005 by 2020**, all sources, all major GHGs
  - Cap-and-Trade with the rollout details TBD
- Midwestern GHG Reduction Accord
  - Illinois, Iowa, Kansas, Michigan, Minnesota, Wisconsin (observers include Indiana Ohio, South Dakota and Ontario)
  - Early stages - role of agricultural offset projects important

California Moving Forward

- December 11, 2008 CA Air and Resources Board approves Scoping Plan to meet Global Warming Solutions Act of 2006
- Key elements include:
  - Energy efficiency programs as well as building and appliance standards;
  - Statewide renewables energy mix of 33 percent;
  - Cap-and-trade program linking with Western Climate Initiative;
  - Targets for transportation-related GHGs for regions throughout California and pursuing policies and incentives;
  - Adopting and implementing measures pursuant to existing State laws and policies, including California's clean car standards, goods movement measures, and the Low Carbon Fuel Standard;
  - Creating targeted fees, including a public goods charge on water use, fees on high global warming potential gases, and a fee to fund the administrative costs of the State's long-term commitment to AB 32 implementation.

Key Questions for any Policy

- What emission sources are covered?
- What are the emission or emission intensity targets and timetables?
- Innovation incentives and barriers?
- Carbon tax, cap and trade, or command and control?
- Who pays and how is the burden distributed?
- How would policy be integrated with a National policy?

Key Questions for GHG Policy Design

- What emissions are covered?
- What are the GHG targets and timetables?
- What policy instrument? Cap & trade? Carbon tax? Command & Control?
- How will GHG regulation affect other energy policies? (ie Renewable Portfolio Standard)
- Who pays and who bears the burden?
- How would State policy integrate with National policy?

Climate Policy and Hawai‘i

- Economic impacts of reducing GHGs depend on:
  - The energy intensity of economic activity
  - The targets set, and magnitude of the future reductions required to meet goals
  - Options available for reducing emissions
    - » Innovative solutions
    - » Fuel Switching
    - » Conservation
    - » Efficiency Improvements
    - » New technology options

Hawaii's GHG Situation is Different

- Large oil dependency but little coal or gas
- Importance of air and marine fuels
- No electricity transfer between islands
- Short commuting distances
- Economic dependency on tourism and military
- No industrial base
- Fragile ecosystem
- Limited scope for carbon trading

- While we can learn from other places….
- Hawai‘i’s uniqueness means that …
- **We cannot simply copy a GHG program from elsewhere and expect it to serve our interests**
- ***WE MUST FIND OUR OWN SOLUTIONS***

Energy & Greenhouse Gas Solutions

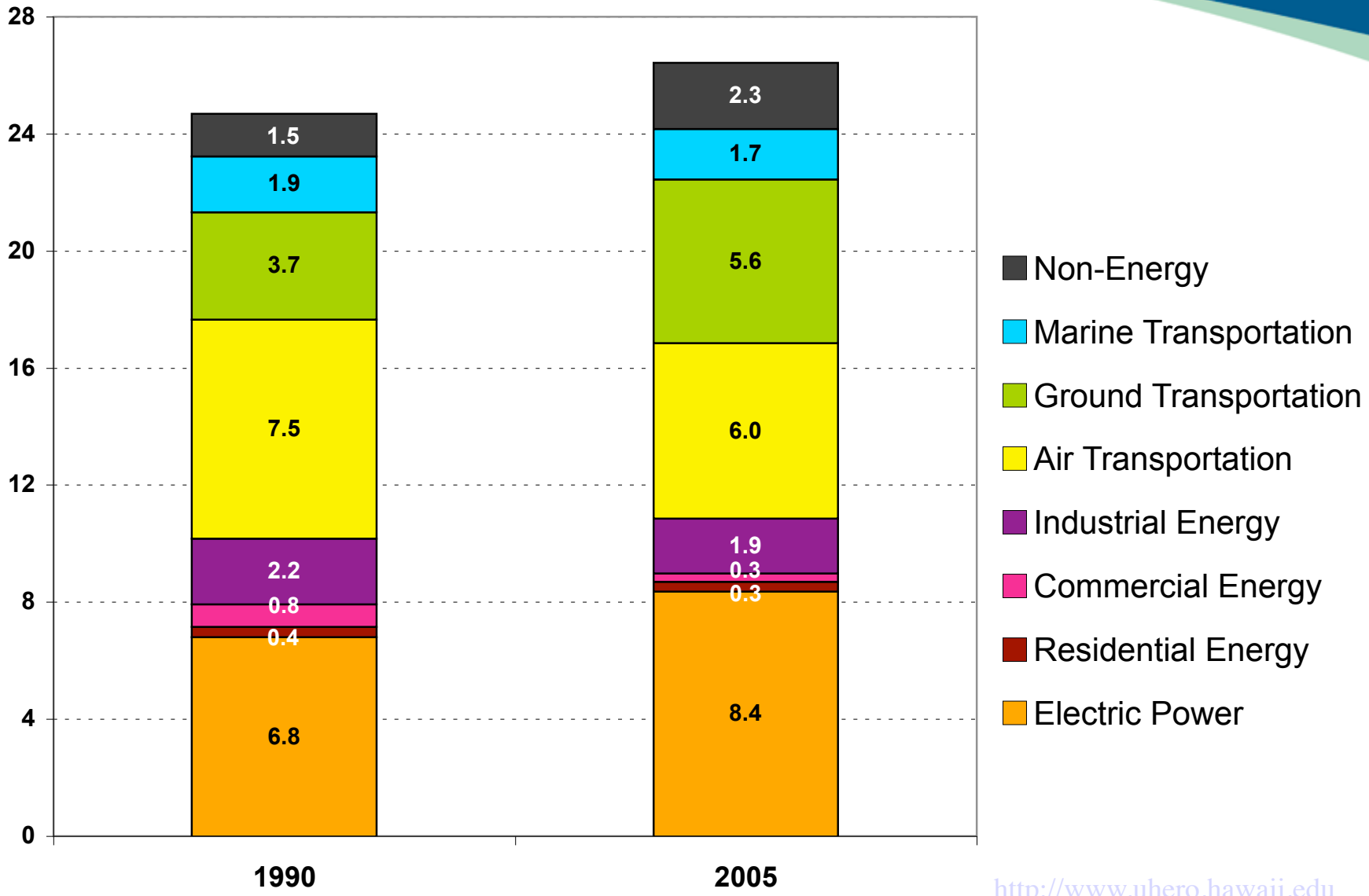
- **PHASE I:** Compile bottom-up data on economic activity, fossil fuel use, and GHG emissions in Hawai‘i
- **PHASE II:** Model economic impact of alternative GHG reduction strategies; biofuels analysis
- **PHASE III:** Long-range projections and other impacts including transportation; land use; sequestration

Phase I

Data on Economy, Energy, GHGs Visitors, Residents

http://www.uhero.hawaii.edu

Graph comparing 1990 2005 MMTCO2e



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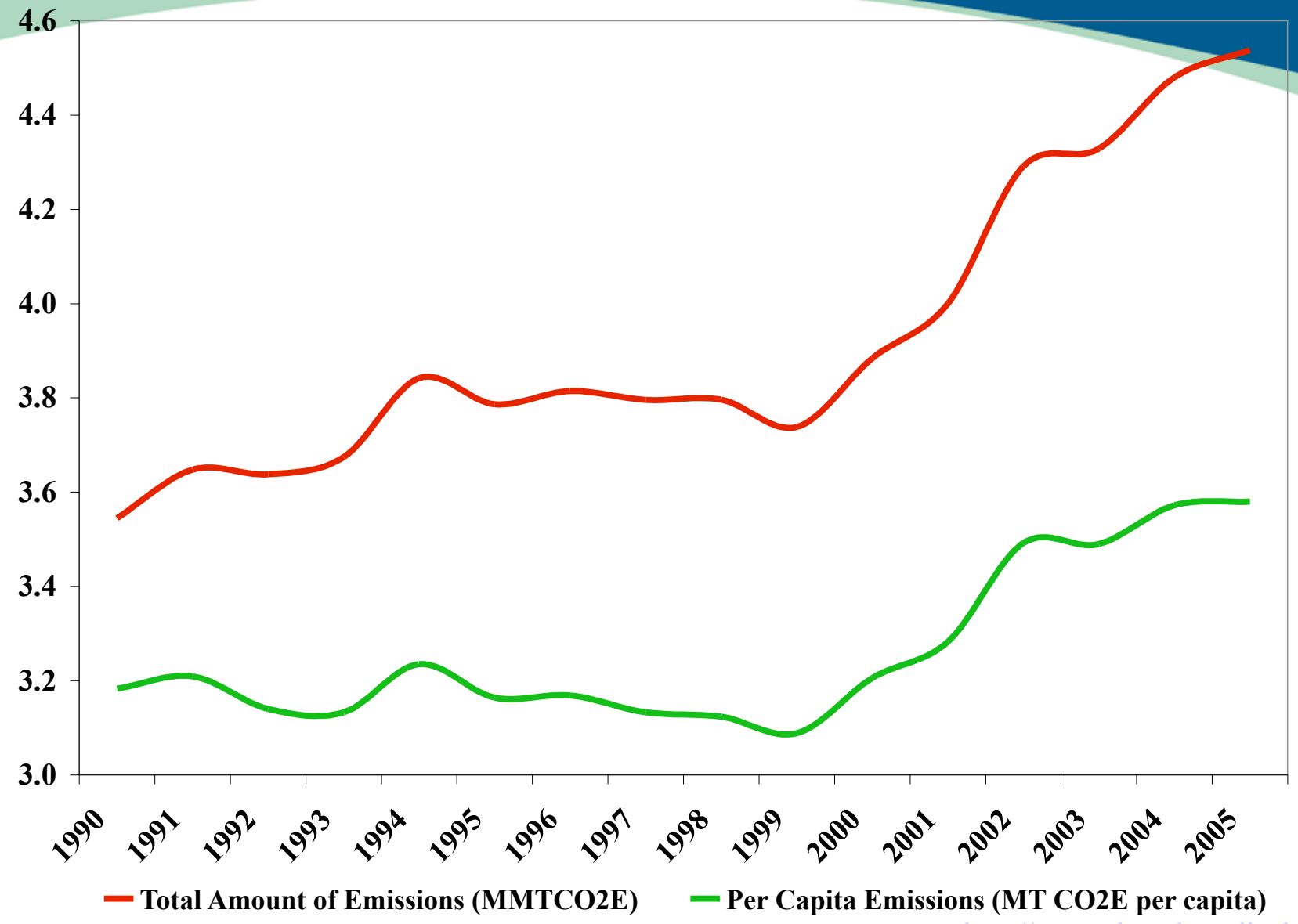
Resident and Visitor GHG Emissions

	Tons CO2e
TOTAL	22,404,828
Residents	8,726,951
Visitors	5,047,687
Visitors less air	2,153,275
PER CAPITA (ANNUAL)	18.5
Per avg resident	7.2
Per avg visitor	32.1
Per avg visitor less air	13.7
Visitor factor	4.5

Excludes IPPs and non-energy
Direct and Indirect GHG emissions

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



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GHG Intensity per $m (kg CO2E)

Electricity	5,894,339	Automobile rental	208,948
Synthetic gas	5,844,185	Parking lots	193,570
Air transportation	1,861,079	Petroleum manufacturing	172,038
Commercial fishing	1,656,366	Crops	170,758
Sightseeing transport	455,134	Animal	165,566
Transit	437,018	Health services	161,134
Ground transportation	407,576	Travel reservations	156,304
Laundry	390,717	Chemical manufacturing	155,664
Recreation	338,407	Other manufacturing	152,709
Hotels	311,373	Clothing manufacturing	139,771
Golf courses	301,890	Construction and mining	122,648
Other services	289,835	Education private	114,282
Waste management	281,875	Retail trade	92,672
Trucking	269,215	Wholesale trade	83,255
Restaurants	262,406	Information	78,835
Water transportation	258,510	Real estate rental	72,079
Water sewer	253,681	Landscaping services	70,777
Amusement	227,279	Finance, professional	68,869
Food processing	218,676	Performing arts	58,830

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Summary Remarks

- Act 234 emissions have increased by about 14 % from 1990 to 2005
- Per dollar output, Hawai‘i is more GHG intensive in 2005 than in 1990
- Power and transport account for about 70% of all GHG emissions
- Ground transportation contributes about 20 percent and is growing rapidly
- Visitor expenditures are twice as GHG intensive as residents (4.5 if including air)

Future stages

- Compute marginal abatement cost
  - Put a price on Carbon
  - Simulate economic impacts of carbon tax or C&T
- Evaluate Biofuel solutions
- Ground transportation solutions: Plug-in Hybrid vehicles, mass transit, bicycles
- Model long range economic impact of capping GHGs at % of 2005 levels by 2050

Supporters

- HECO
- Saafeld Foundation
- RCUH, UHERO, HNEI
- Mānoa Climate Change Commission
- Hawai‘i Community Foundation
- Hawai‘i State Department of Health
- SENCER.. National Science Foundation