

**U H E R O**

# **Policy Options for Greening Hawaii's Carbon and Energy Profiles**

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**University of  
Hawai'i  
Economic  
Research  
Organization**

# HB 226

- Reduce carbon emissions to 1990 levels by 2020
- Implementation Task Force (recommend specifics)
  - 4 members from affected business sectors, deputy director of DOH's Environmental Health Administration (or designee), director of DBEDT (or designee), 2 members from UH's CCC, 2 members from environmental organizations
  - Cost effective rules and market-based mechanisms to achieve targets
- Role of DOH
  - Work with DBEDT to “update” 1997 inventory of emission sources by December 31, 2008
  - Establish limits, especially for electricity gen and auto emissions
  - Monitor and enforce compliance

# Market-based incentives for carbon reduction: tax or cap & trade?

- Carbon tax: usually thought to be inferior. The political system can choose quantity but not price.
- Cap and trade (e.g. European Union, California proposal)
  - Cap quantity at below current level; gradually reduce to 1990 level. Market decides the price.
  - California: ceiling on aggregate emissions for “sources or categories of sources,” declining from 2012 through 2020.

# Limiting Emissions: Outstanding Problems and Questions

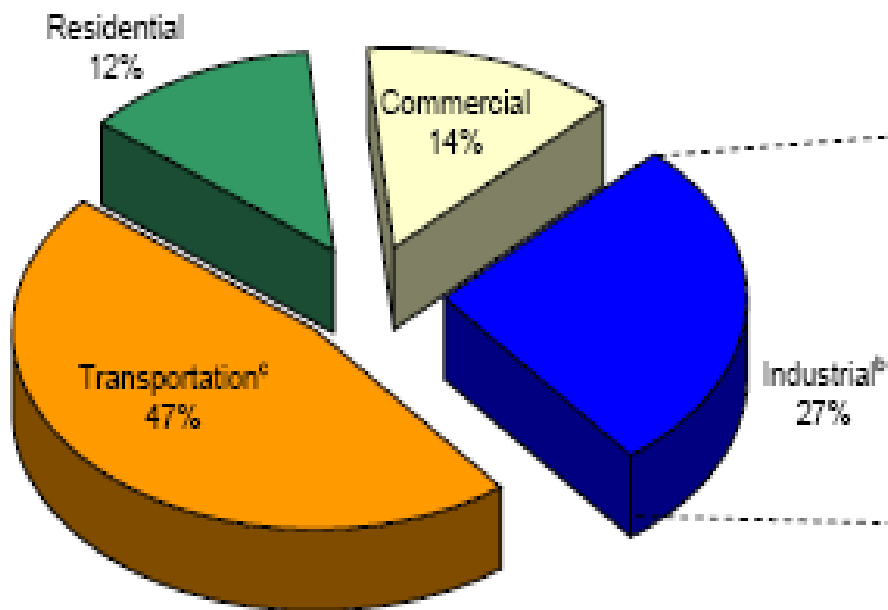
- 1990 inventory: How to update DBEDT inventory? Who will certify? (Capture theory)
- Give away initial allocation:
  - 1990 emission levels for all existing firms. Problems:
    1. Must allow for small and non-point sources; sequestering
    2. Technology has changed. Industries that have switched since 1990 or are switching to energy efficient technology anyway get windfall profit
  - Goal: Cost-effective compliance (equalize marginal avoidance cost across regulated sources, unregulated sources and sequestration sources)
- Auction permits: revenue can be used for lump-sum tax rebates for producers or general taxpayers.
- Give some; auction some.

# Regulated Sources

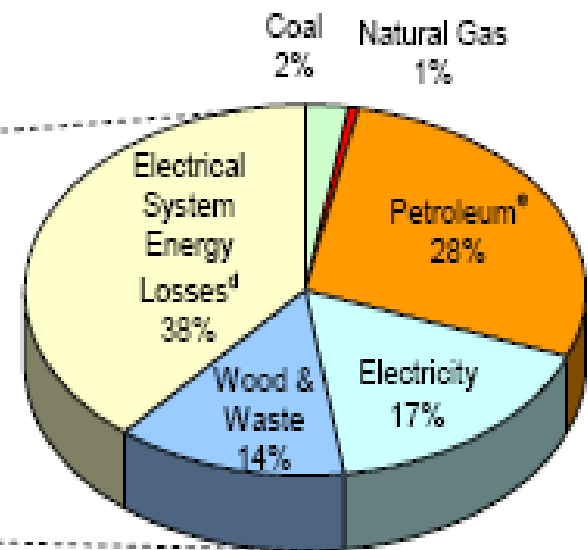
- Electric utilities
- Gasoline (refining + imports); exempt airlines
- Natural gas
- Non-electricity industrial energy
- Other commercial energy
- Military and other large users
- Medium and small-sized business. How small?

# Hawaii Industries

Hawaii Industries Use 27% of Energy Supply, End-Use Sectors of Energy, as a percent of total energy consumed<sup>a</sup>



Hawaii Industries' Energy Usage<sup>b</sup>, as a percent of total energy usage<sup>a</sup>



# Global Warming Potential

**Table 2.3 Estimated Global Warming Potential of Hawaii  
Greenhouse Gas Emissions, 1990 (Tons CO<sub>2</sub> Equivalent)**

<b>Sector</b>	<b>GWP</b>	<b>% Total GWP</b>	<b>% Energy GWP</b>
<b>Energy Use</b>			
Residential Sector	94,804	0.5%	1%
Commercial Sector	282,412	1.5%	2%
Industrial Sector	837,599	4.5%	5%
Electricity Sector	7,652,966	40.7%	46%
Marine Transportation	155,599	0.8%	1%
Air Transportation	3,865,711	20.6%	23%
Ground Transportation	3,923,915	20.9%	23%
<b>Subtotal</b>	<b>16,813,006</b>	<b>89.4%</b>	<b>100%</b>
<b>Non-Energy Sources</b>			
Oil Refining	5,214	0.03%	
Cement Production	109,274	0.6%	
MSW Management	1,366,464	7.3%	
Wastewater Treatment	22,594	0.1%	
Domestic Animals	294,096	1.6%	
Manure Management	133,232	0.7%	
Sugar Cane Burning	14,106	0.1%	
Fertilizer	52,920	0.3%	
<b>Subtotal</b>	<b>1,997,900</b>	<b>10.6%</b>	
<b>Total</b>	<b>18,810,906</b>	<b>100.0%</b>	

\*Municipal solid waste

# Three ways of meeting target

1. Reduce emissions among regulated sources
2. Reduce emissions among unregulated sources (apply for and sell credits)
3. Offset credits for sequestration
  - HB 226 does not distinguish these. (Further legislation?)
  - Sequestration problems: benchmark, measurement, efficiency, carbon life-cycle problems. Stanford InVest method (IPCC).
  - Unregulated sources: requires certification (claims adjustor)



# Production or Consumption?

- SB 234 leaves question to task force.
- Consumption arguably “at cause.”
- Production cheaper (airlines aside) because most consumer goods imported.
- “More control provides superior leadership.” Who will follow? Theory suggests other States may free ride.
- Airline fuel: production base => we pay for non-resident tourists, not our own trips. Consumption base => we only pay for our trips.
- Hybrid: production base but exempt airlines

# What are offset credits?

- **Offset 1:** "GHG emission trading programs operate by capping the emissions of a fixed number of individual facilities or sources. Under these programs, tradable 'offset credits' are issued for project-based GHG reductions that occur at sources not covered by the program."
  - » World Resources Institute/World Business Council for Sustainable Development
- **Offset 2:** Tradable offset credits issued for sequestration

# Additionality

- A carbon credit (offset) should also prove *additionality*, i.e. that a carbon dioxide reduction project would not have occurred absent the concern for the mitigation of climate change. More succinctly, a project that has proven additionality is beyond business as usual.
- In contrast, an ideal standard is the efficient level of sequestration before accounting for benefits of climate-change mitigation.

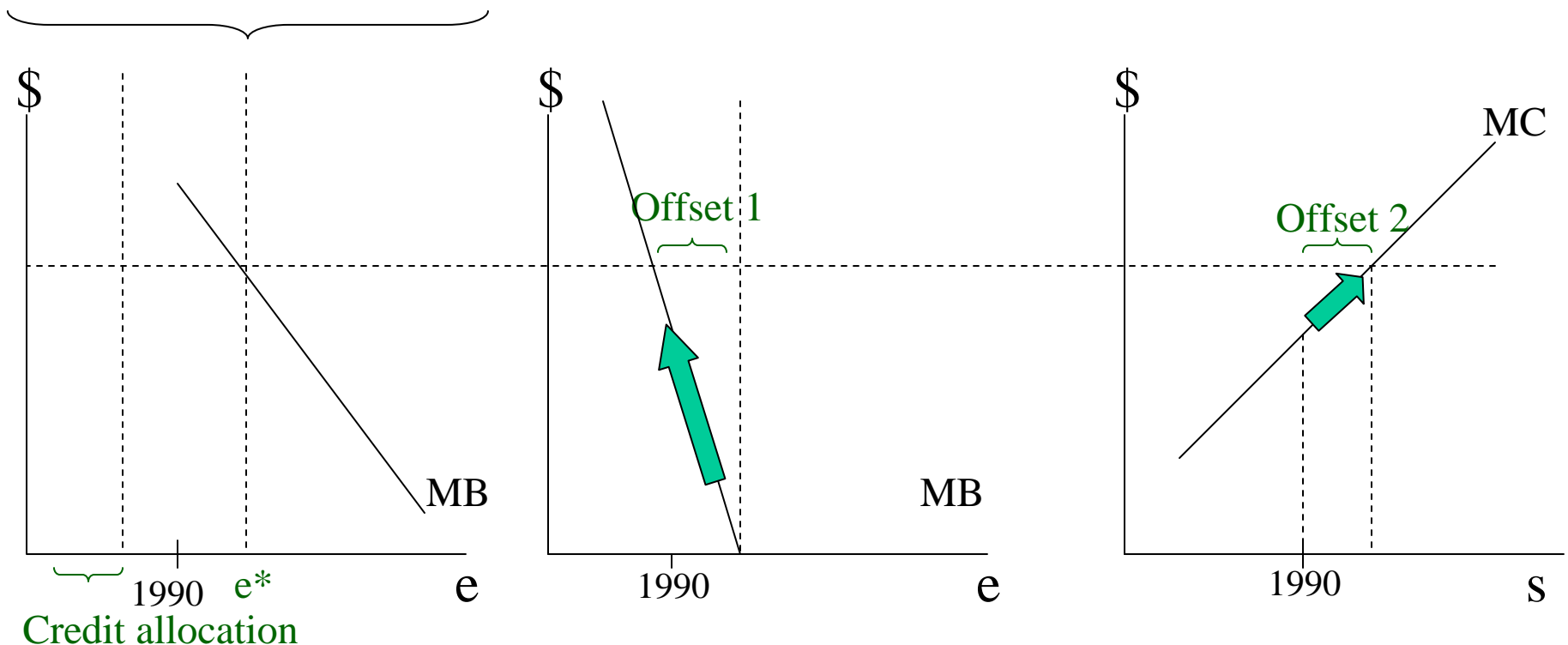
# Planning the Carbon Market: Credits and Offsets

Regulated sources

Unregulated sources

Sequestration sources

$$e^* = CA + \text{Offset 1} + \text{Offset 2}$$



$$e^* - \text{Offset 1} - \text{Offset 2} = 1990$$

# SB 3185

- Renewable Portfolio Standards (6/2/06): By 2020, 20% net energy sales must be *represented* by renewable energy. Minimum 10% from “renewable” *generation* of electricity (incl H-Power)
  - Rest can come from “renewable savings” brought about by use of heat pumps, solar water heaters, etc. that “replace” electricity-using devices. (You can count devices installed in the 80s.)
- Achieve 10% (minimum 5% from generation) by 2010.

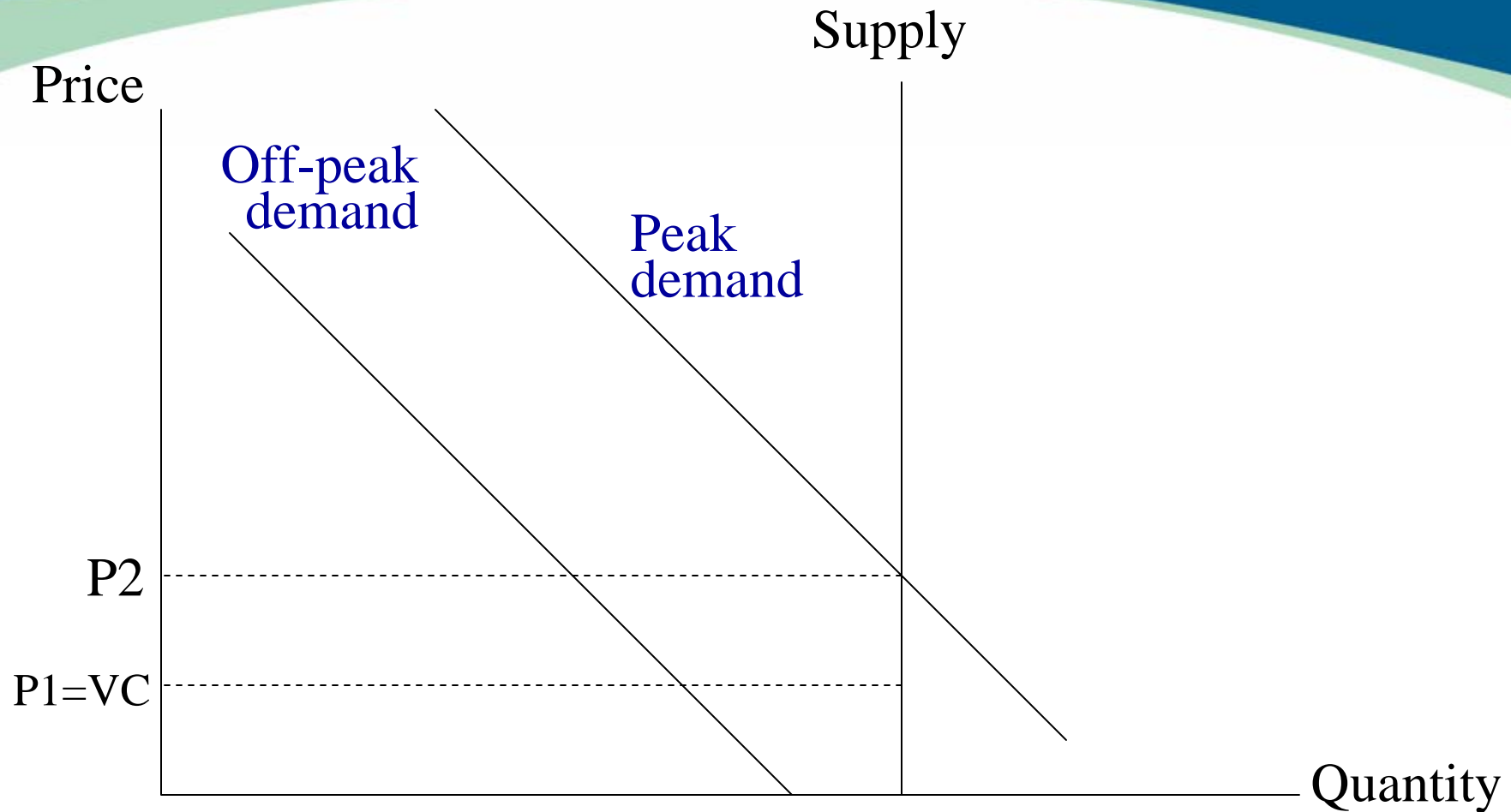
## 2010 target will be met.

- Renewable generation already around 6%. If renewable savings comprise at least 4% of net electricity sales, then HECO (including HELCO and MECO) has already met its 2010 requirement.

# Economic Approach to Energy Transition and Carbon Reduction: Price Incentives

- Efficiency pricing: charge marginal cost for the marginal units. Intramarginal blocks and hook-up charge can be adjusted for normal returns.
- Transparent billing

# Peak-load Pricing (e.g, Con Ed of NY, PG&E of CA)

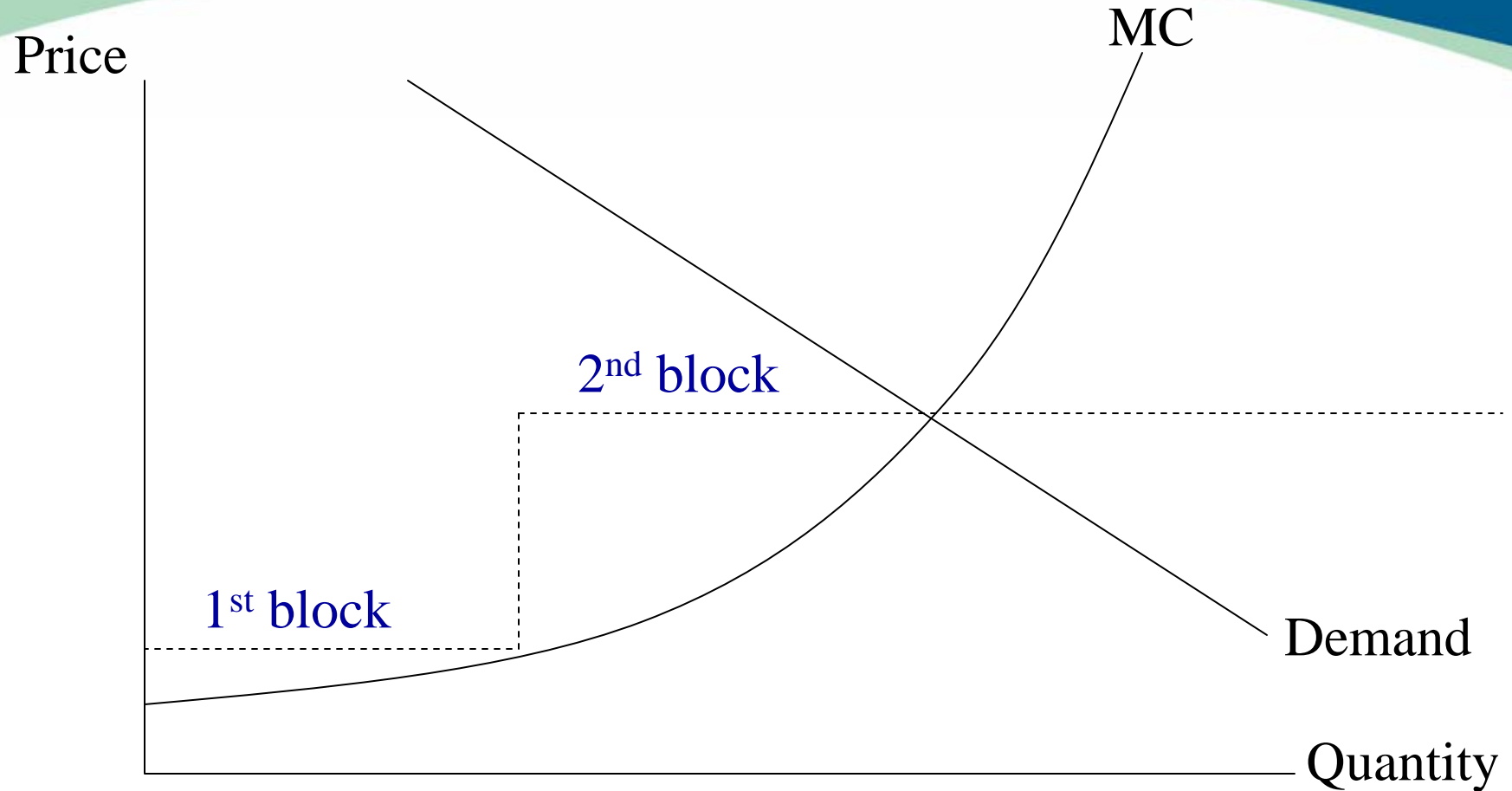




# Demand Management avoids Capacity Expansion

- Flex contracts (e.g. California fridge control)
  - a) Flat rebate (Hawaii)
  - b) Proportional rebate (preset prices)
  - c) Proportional rebate (peak load prices)

# Block Pricing



# Net Metering for Renewable Generation

- Reconciliation period should allow more complete banking (e.g. a Sept. 30 ending date would fail to compensate consumers with summer surplus)
- Monthly fixed customer charge (\$7) should be minimal (reading meter and billing).

# Incentivize and Facilitate: Don't Dictate

- **The man of system ... is so enamoured with the supposed beauty of his own ideal plan ... that he cannot suffer the smallest deviation from any part of it. ... He seems to imagine that he can arrange the different members of a great society with as much ease as the hand arranges the different pieces upon a chess-board. He does not consider ... that, in the great chess-board of human society, every single piece has a principle of motion of its own, altogether different from that which the legislature might choose to impress upon it.**

-- Adam Smith

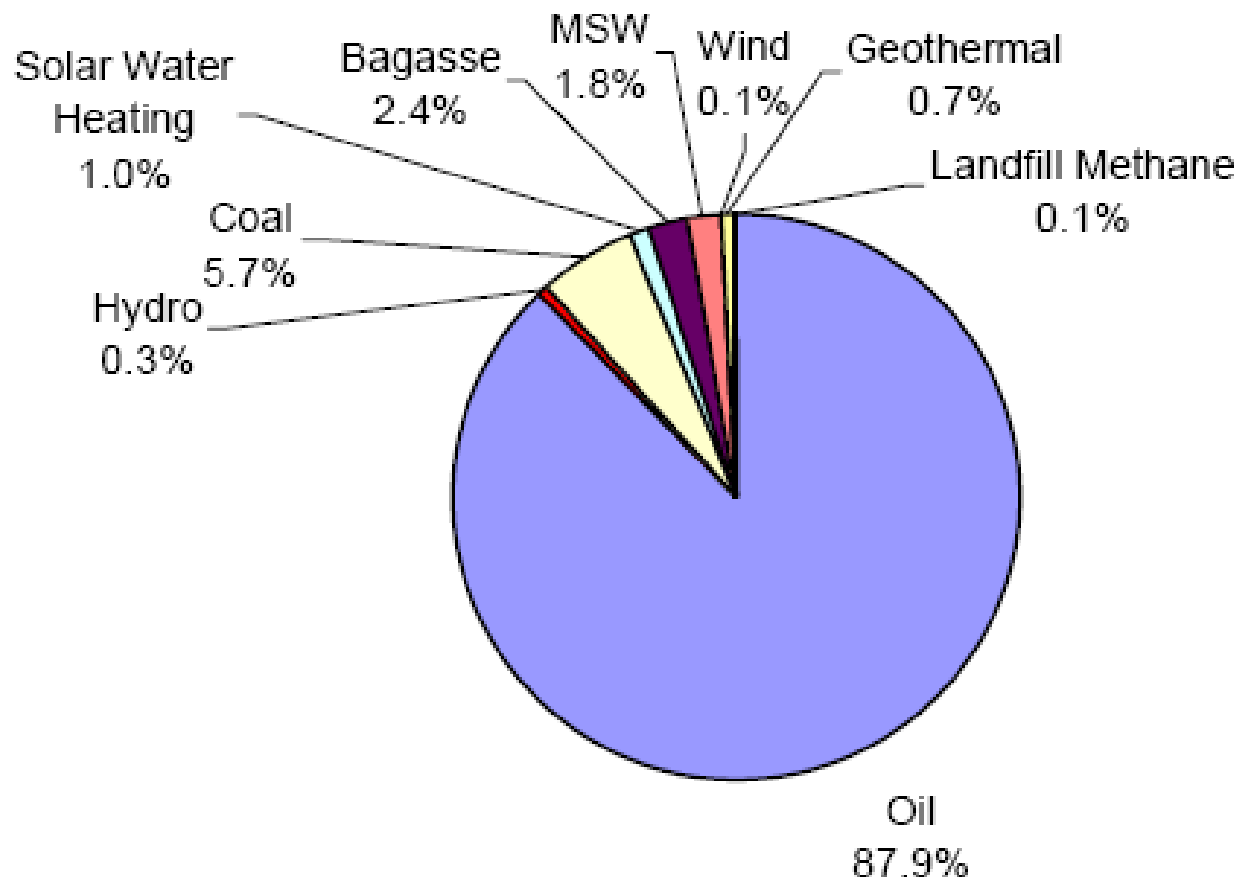
- Unfunded mandates
  - Redundant
  - Unintended consequences
- Get the prices right, including environmental costs

# Mahalo!

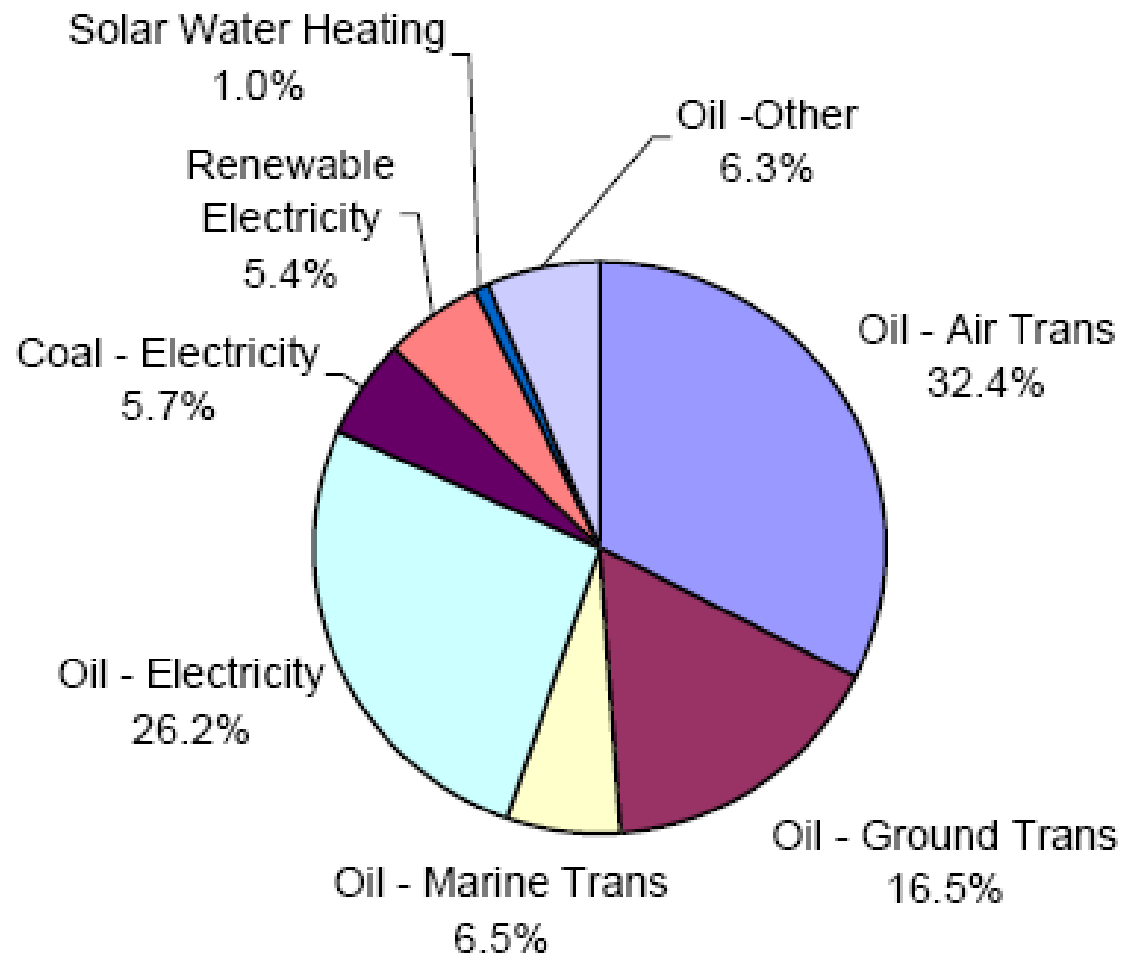
(Any conclusions and/or opinions herein are not necessarily those of UHM or UHERO)



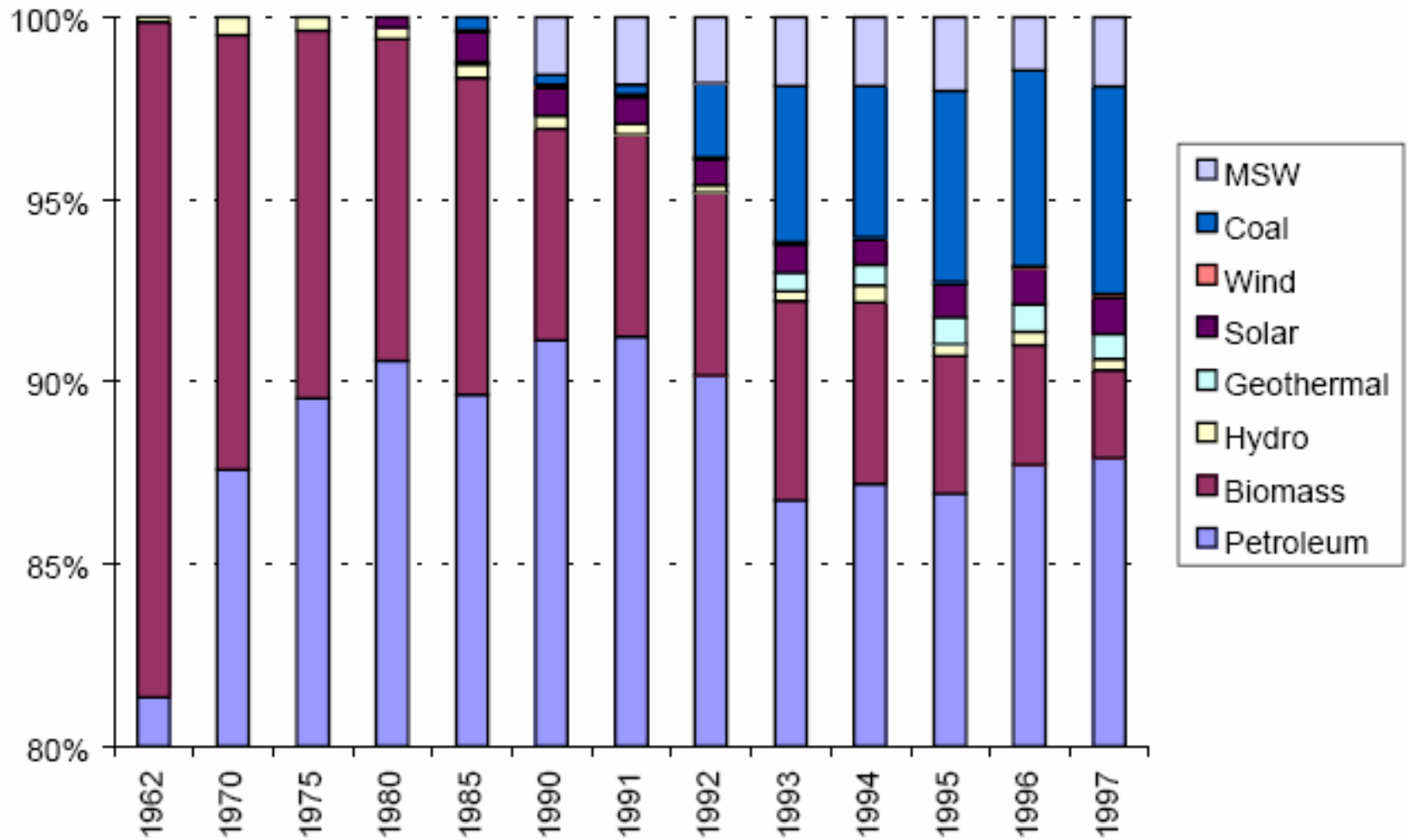
# Energy Consumption by Fuel or Source



# Energy Consumption by Sector



# Energy Diversification





# Electricity Generation

