PACOM ENERGY INITIATIVES (U)

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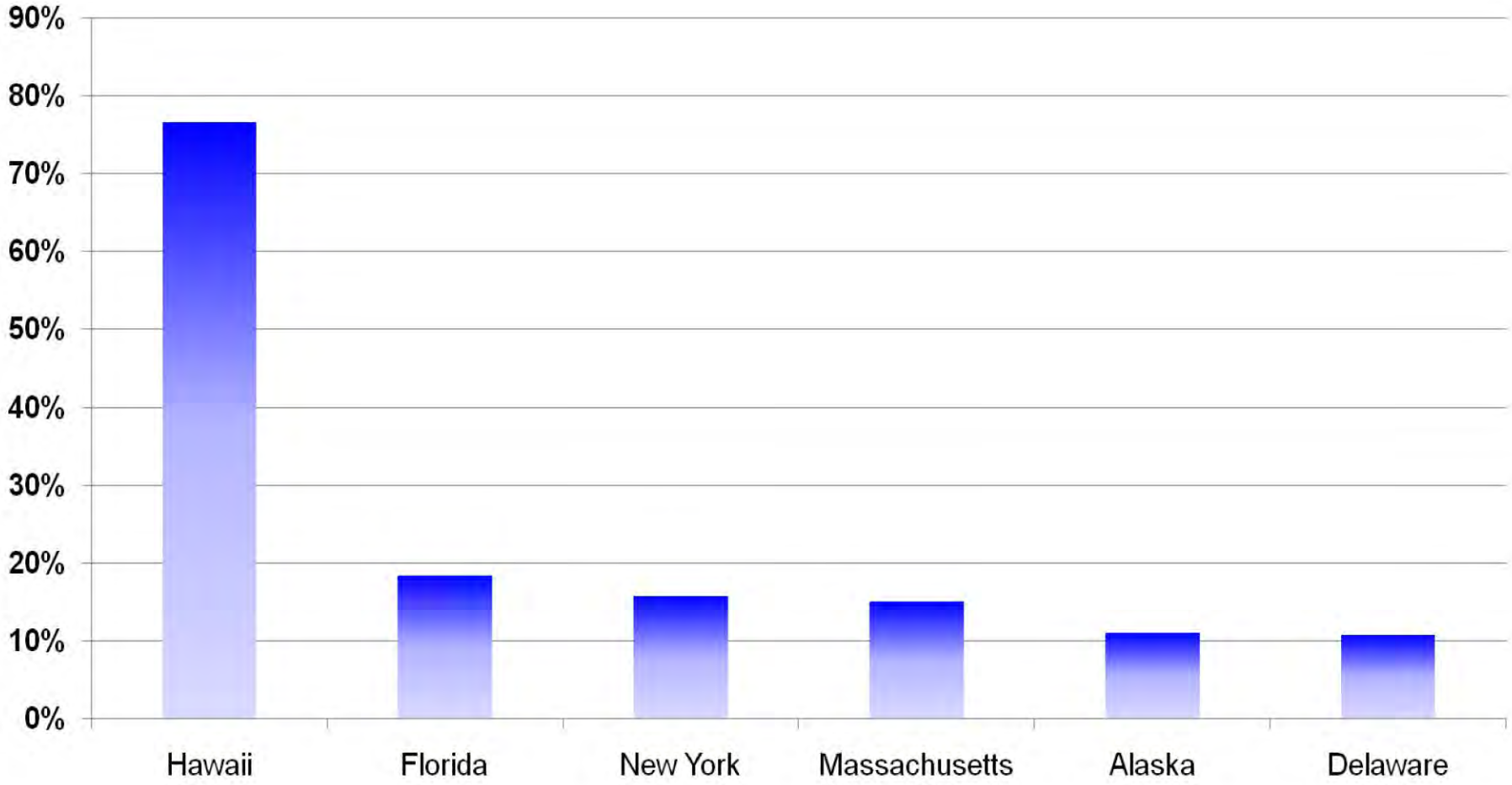
Overview

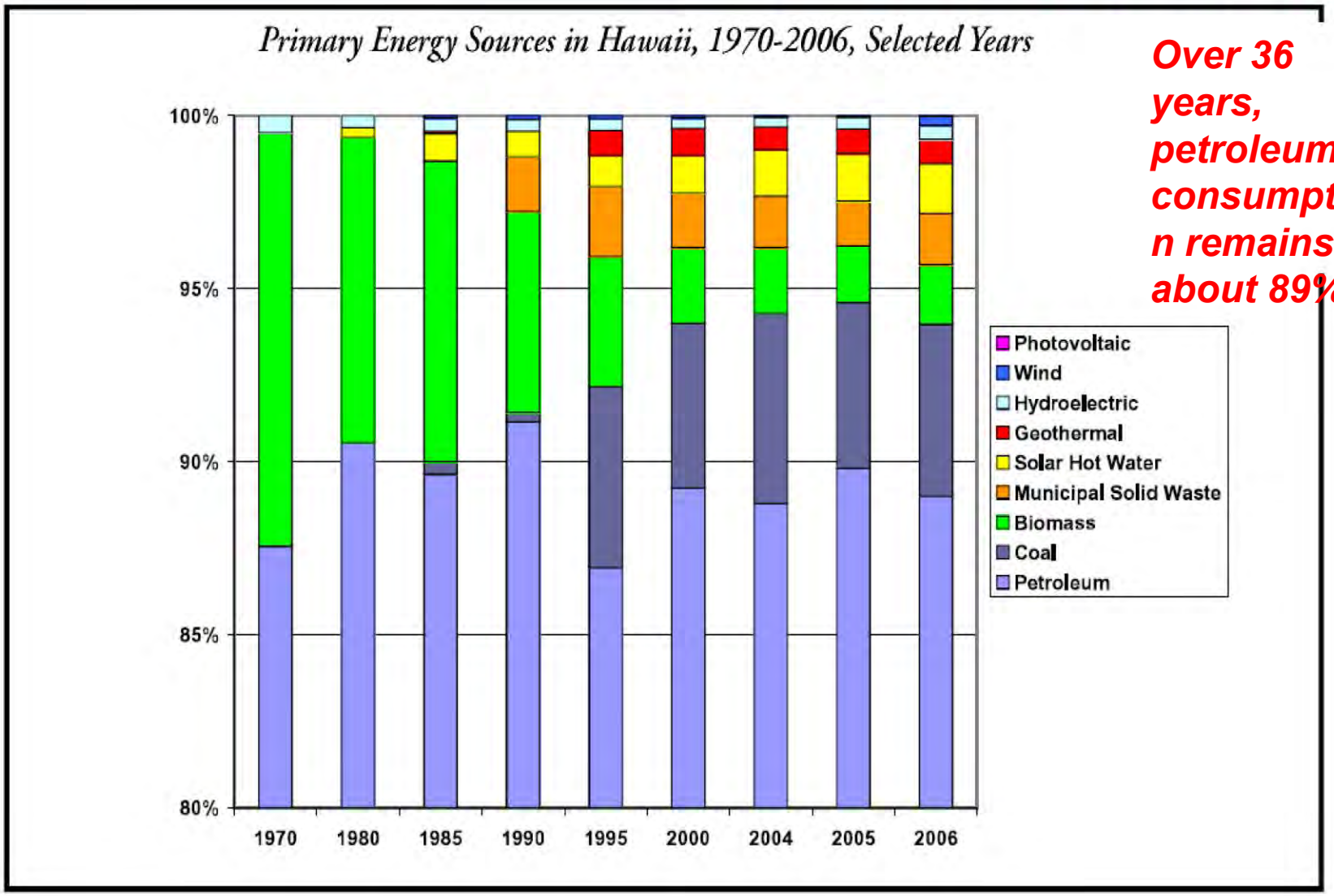
- Background – The Hawaii Story
- Strategies – In Two Phases
- Funded Energy Projects
- Unfunded Energy Projects
- FEMP Proposal
- Energy Experimentation
- Questions

Petroleum Dependence



Petroleum dependence for electricity – top six states

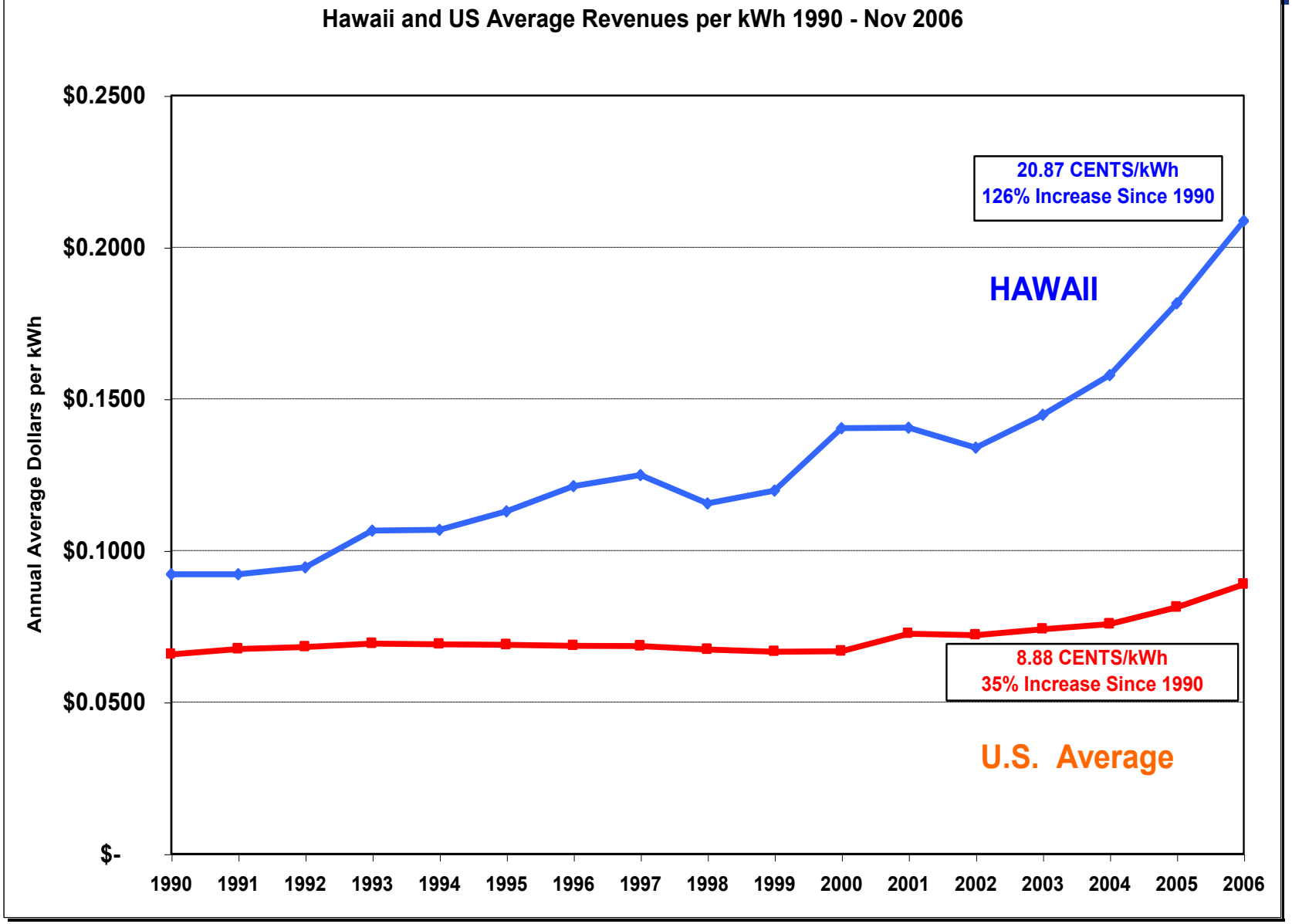
Hawaii's Energy Landscape



Over 36 years, petroleum consumption remains at about 89%

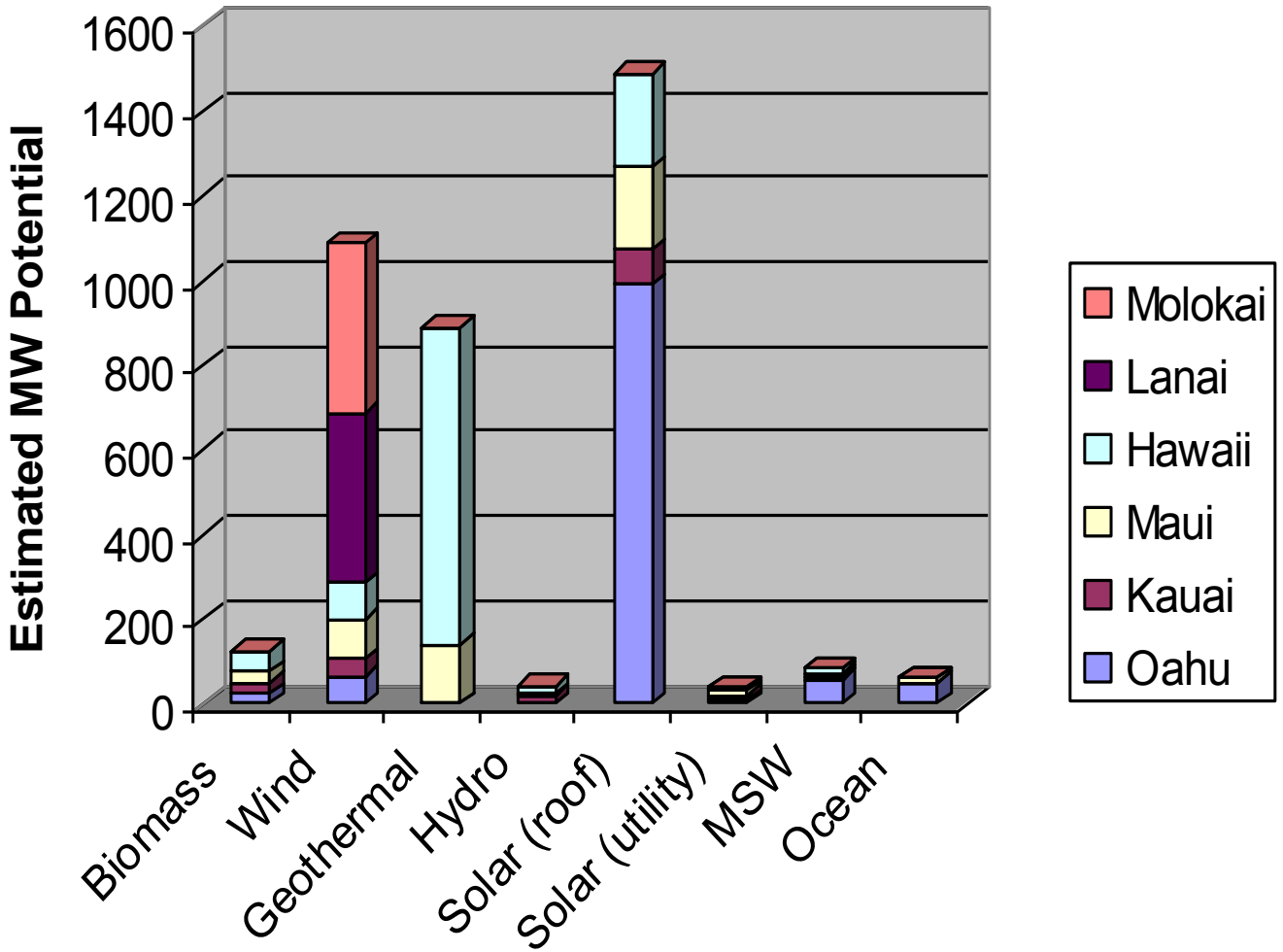
Despite objective, little progress made – the needle has not moved

Comparison of Electricity Prices



As of 30 APR 2009

Hawaii Renewable Energy Generation



http://hawaii.gov/dbedt/info/energy/

Hawaii Clean Energy Initiative

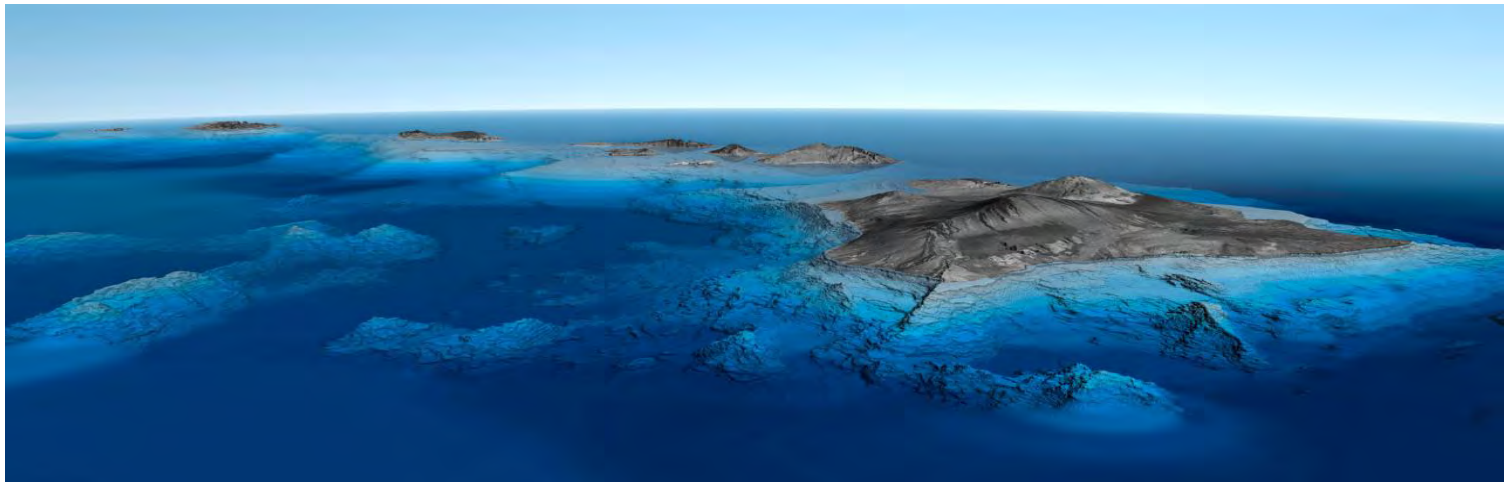
- State Energy Agreement
  - Goal of 70% renewable energy by 2030
  - 30% through energy efficiency measures
  - Requirement is 10% renewable electricity by 2010, 15% by 2015, 25% by 2020, 40% by 2030
    - No more than 30% of renewables may be imported bio fuels in utility-owned units through 2015
  - 700MW of new renewable in the next 5 years, 1100 by 2030
  - Undersea cable connecting Oahu with Maui County
  - 400MW wind power in Maui County
  - No new fossil fuel plants without retiring equal size plants

DoD represents 15% of electric usage in Hawaii

We must lead the effort

PACOM Energy Strategy X 2

- Energy Partnership Strategy with the State of Hawaii
  - Target completion date is Summer 09



- Energy Security Strategy for the broader AOR
  - To be completed in fall 09
- Over-arching rationale:
  - Become energy independent
  - Be good neighbors to the State of Hawai'i
  - Improve energy security across the Pacific
  - Free up resources for mission requirements

Progress to Date

- Convened a forum of mid-level stakeholders
  - PACOM J3, J4, J5, J8, PACFLT, PACAF, USARPAC, MARFORPAC, NAVFAC, IMCOM, Corps of Engineers, Coast Guard, DESC, DOE, State of Hawaii, Asia-Pacific Center, etc. (Inclusive rather than exclusive)
  - Chaired by J8. Facilitated by J81
  - Collaborative vice directive process
  - First step in permanent decision-making body and possible funding conduit
- Developed Organizational Charter
- Developed vision statement, strategic goal and sub-goals for partnership with the State of Hawaii

Progress to Date (cont)

- **Charter Statement:**

  "The PACOM Energy Partnership and Strategy Council (PEPSC) develops and supports implementation of energy partnership strategies in the Pacific."

State Partnership

- **Vision Statement:**

  "USPACOM, in partnership with the State of Hawaii, will develop key strategies and implement innovative solutions to harness clean, efficient, secure, renewable and sustainable energy for the benefit of the people of Hawaii and the Asia Pacific Region."

- **Strategic Goal:**

  "Match or exceed the State of Hawaii goals."

Progress to Date – State Partnership Sub-goals

- Minimize dependence on fossil fuels
  - Reduce power consumption
    - Reduce consumption at least 3% per yr and 30% by 2015
  - Reduce petroleum use in ground transportation (TBD, Diet PEPSC)
- Develop renewable energy resources
  - Maximize clean alternative energy
    - 10% renewable by 2010, 15% by 2015, 25% by 2020, 40% by 2030
    - 100% of new on-base distributed generation electricity will be renewable with the following exceptions:
      - Fuel fired electric plants will be biofuel capable and will use biofuel when feasible
      - Tactical and mobile electrical generating systems are excluded
  - Reduce greenhouse gas emissions
    - Meet or exceed all federal goals and assist the State of Hawaii in meeting their goals

State Partnership Strategic Sub-goals (cont)

- Develop renewable energy resources (cont.)
  - Emphasize sustainability
    - Design new building to use 30% less energy
    - Design new buildings such that fossil fuel-generated energy consumption is reduced 55% by 2010, 65% by 2015, 80% by 2020, 90% by 2025, and 100% by 2030 (2003 baseline)
    - Design new buildings 30% better than ASHRAE standards
    - Design major renovations to use 20% less energy
    - Ensure 15% of facilities meet the Federal Leadership in High Performance and Sustainable Buildings MOU by 2015
    - All new construction/major renovation will be LEED Silver

Progress to Date – State Partnership Sub-goals

- Exercise leadership
  - Establish a replicable model for the Pacific
  - Increase energy security
    - Protect 100% of Task Critical Assets
    - "Island" 100% of Oahu installations
      - Schofield Barracks
      - Kaneohe Marine Corps Base Hawaii
      - Pearl/Hickam Joint Base
      - Fort Shafter
  - Implement demonstration projects
  - Improve technical education outreach to the local schools
  - Increase our collective knowledge of energy

Recent PACOM Energy Projects

- 6.8 MW photovoltaic (PV) project on roofs of Army family housing units in Hawaii
- 309 KW PV project on a hangar roof at Ford Island, HI
- 250 KW wind turbines at Tin City Long Range Radar Station, AK
- 250 KW molten carbonate fuel cell at Pacific Missile Range Facility (PMRF) Kauai, HI
- 64 KW rooftop PV project on two buildings at Kaneohe Marine Corps Base, HI
- 50 KW solar array at Naval Station Guam
- Fuel cell hybrid vehicles & experimental prototype hydrogen fuel station powered by 120 KW solar array at Hickam AFB, HI
- Installation of solar water carports at Pearl Harbor ($2M project)

Hydrogen fuel station - Hickam

Recent PACOM Energy Projects (cont.)

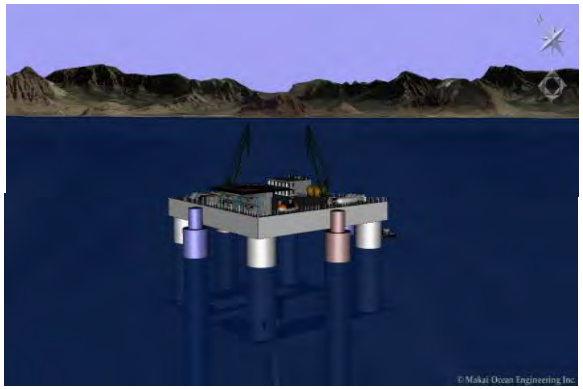
- 39 MW co-generation electrical plant at Yokosuka, Japan valued at $105M procured via Energy Savings Performance Contract
- Solar hot water for dorms and rooftop PV for Intermediate Maintenance Facility ($3M project funded) at Pearl Harbor, HI
- Solar hot water systems on privatized homes
- Replaced 50 yr old co-generation plant at Elmendorf AFB, AK by switching to the local electrical grid and installing 233 boilers in 125 buildings, exceeded saving 27% in 1st year
- 40 KW wave energy "PowerBuoy" experimental prototype in Kaneohe Bay housing, fitness centers, dorms, etc.

Old generation plant – Elmendorf AFB, Alaska

Wave energy generating "PowerBuoy" – Kaneohe Bay

Unfunded PACOM Energy Projects

- Retro-fit spray foam insulation for all PACOM buildings ($400M)
- Waste-to-energy electrical power plants (2 for $31M)
- Biofuel electrical power plants (3 for $295M)
- Smart grid and islanding circuitry ($227M)
- Heating and A/C upgrades ($200M)
- Smart metering ($80M)
- Ocean Thermal Energy Conversion pilot plants (3 for $969M)
- Voltage regulators ($200M)
- Landfill gas-to-energy plants (2 for $14M)
- Energy conservation for data centers ($50M)
- Solar photovoltaic (PV) rooftop and ground arrays ($1.4B)



10 MW OTEC Pilot Plant

Unfunded PACOM Energy Projects (cont)

- Wind turbines ($58M)
- Solar PV carports ($23M)
- Solar hot water systems ($7M)
- Building envelope improvements ($46M)
- Hydrogen fuel generation plant ($10M)
- Lighting efficiency upgrades ($18M)
- Net zero energy installation ($50M)
- Retro and continual commissioning ($6M)
- Light/temperature smart monitoring and control systems ($2M)
- Cogeneration multi-fuel plant ($27M)
- Electric vehicles and charging stations ($25M)

TOTAL = $4.2B

FEMP Proposal

- PACOM J8 Deputy recently met with FEMP's Richard Kidd

- Presented 7 ideas for FEMP projects with PACOM
  1. Comprehensive Energy Assessment
     - Renewable energy mix, energy efficiency priorities, WTE study, economic analyses, upgrade to FEDS 6.0
  2. Energy Manager Training and Development
     - On-the-road training to Oahu, Guam, Okinawa, Korea, mainland Japan and Alaska (2 sites)
  3. Smart Grid and Islanding Circuitry Feasibility Study
     - For JB Pearl-Hickam and for Schofield Barracks

FEMP Proposal (cont)

4. Alternative Contracting Assistance
   - PPA, ESPC, UESC, IDIQ, etc.

5. Data Center Energy Efficiency Analyses
   - Recommend prioritized improvements to chillers, air handlers, ventilation systems, power distribution systems, window upgrades, servers, etc.

6. Liquid Desiccant Solar Ventilation Air Conditioning Demo
   - 2 systems, equipment purchased separately, FEMP would provide report on findings

7. Industrial Efficiency Analyses
   - Recommend prioritized improvements to equipment inside industrial back shops

Joint Experiments

1. Data Center Energy Reduction
   - EPA estimates that data centers represent 1.5% of energy consumption in the U.S.
   - 10% of data center usage is federal, costing govt $450M
   - Data center power consumption doubled from 2000-2006
   - Inefficient - 50% goes to powering equipment, 50% to cooling
   - State-of-the art energy efficient servers and data centers can reduce power consumption by as much as 80% (EPA)
   - Partnering with MARFORPAC Experimentation Center (MEC), DISA and NAVFAC to experiment on the DISA Defense Enterprise Computing Center (DECC) Pacific
   - First step is advance metering & baseline data collection
   - Step 2 through N is a series of efficiency measures such as:
     - Energy efficient windows/doors
     - Upgraded ventilation, chillers, air handlers
     - Voltage regulators
     - Blade servers, etc.

Joint Experiments (cont)

2. Spray Foam Insulation
   - OSD Power Surety Task Force (PSTF) has had great success with spray foam insulation in desert environment – energy savings up to 60%
   - Texas A&M University installed $7M sq ft of insulation in the 1980s with payback in 4.5 yrs & virtually no maintenance costs
   - Need to test it in Hawaii's climate
   - Partnering with PSTF, Hawaii ANG, and Hickam AFB to insulate guard hangar

Joint Experiments (cont)

3. Energy Conservation Incentives for Military Family Housing (MFH) Residents Overseas
   - Currently no incentive for base residents to conserve energy
   - Privatized housing stateside is in the process of charging residents for utilities
   - U.S. Army says overall energy consumption down 10% at 8 installations under new system
   - Iroquois Point and Barber's Point housing consumption down 37% after Navy divested
   - AF is executive agent for all MFH on Okinawa with 8,000+ units
   - J81 will perform Design of Experiments on sampling of units with 0%, 25%, 50% and 75% rebate plus other factors added by Kadena
   - 18th CEG/CC aware and fully supportive, "I'm all over that."
   - Will require legal review and possible policy waiver

Joint Experiments (cont)

4. Power Off PCs Overnight
   - According to DOE, even Energy Star® PCs & monitors use up to 23W of power during sleep mode
   - 100,000 PCs in PACOM use as much as 14GWh of electricity per year during nights/weekends costing up to $2M
   - But comm world pushes patches to PCs overnight
   - USARPAC and IMCOM-Pacific established policy as of 1 Jul 08
     - Mandates PC users power down at night
     - Pop-up asks if user wants patches installed
     - Click yes, patch installed, then PC powered down remotely

Discussion

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