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United States Pacific Command Energy Strategy in Cooperation with the State of Hawaii



Prepared by: U.S. Pacific Command Resources and Assessment Directorate (J8)
In collaboration with: The PACOM Energy Partnership and Strategy Council (PEPSC)

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Forward:

We at U.S. Pacific Command (USPACOM) understand the importance of energy issues facing our country and the State of Hawaii. U.S. military forces in Hawaii require three gigawatts of electricity on an average day and represent the single largest consumer of electricity in the islands. We applaud the state's efforts to harness Hawaii's resources and lessen Hawaii's dependence on fossil fuels for its energy needs. We recognize that the success of the Hawaii Clean Energy Initiative depends largely on the cooperation of U.S. military forces stationed here – neighbors blessed with the opportunity to share in the beauty of these islands. USPACOM supports the tenets of the Hawaii Clean Energy Initiative.

This document represents a commitment to specific goals with the State of Hawaii. We are confident that the strategic goals and objectives herein will help support Hawaii's effort to achieve a clean and secure energy future.

STEPHEN D. TOM
Major General, U.S. Army
Chief of Staff

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“It falls on us to choose whether to risk the peril that comes with our current course or to seize the promise of energy independence. And for the sake of our security, our economy and our planet, we must have the courage and commitment to change.” President Barack Obama – 25 January 2009

Vision Statement: USPACOM, in cooperation with the State of Hawai'i, will develop key strategies and implement innovative solutions to harness clean, efficient, secure, renewable and sustainable energy for the benefit of the people of Hawai'i and the Asia Pacific region.



Examples of innovation include the “Power Buoy” in Kaneohe Bay and a hydrogen fueling station at Hickam Air Force Base, acquired by the Air Force and operated by the Hawaii Center for Advanced Transportation Technologies (HCATT).

Background – The Hawaii Energy Story: Hawaii is the #1 consumer of petroleum for electricity by percent in the United States, receiving 75% of their electricity from oil. Alaska is a distant second with 11% dependence on petroleum for electricity (Figure 1). Over the last 30 years, the Hawaii energy demand for petroleum has remained relatively unchanged although dependence on fossil fuels increased significantly due to the loss of the local sugar cane industry and the bagasse (leftover sugar cane bi-products) that was previously used as a biofuel feedstock to generate electricity. That resource was largely

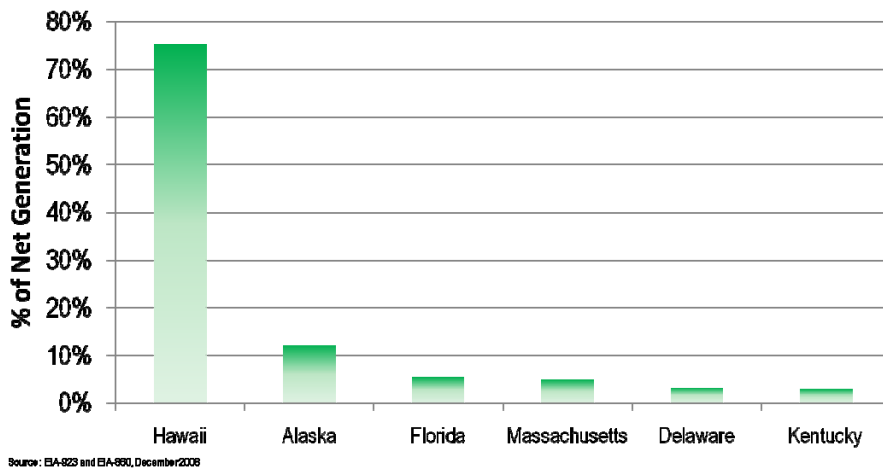


Figure 1. Top Six States in Dependence on Petroleum for Electricity. Source: State of Hawaii Department of Business Economic Development and Tourism (DBEDT)

replaced by coal. In the meantime, Puna geothermal plant was built on the Big Island harnessing the energy of volcanic heat, and the hPower waste-to-energy plant was built on Oahu harnessing the energy stored in household and industrial garbage. More recently, solar power became more common with advancing solar technology and various tax credits (Figure 2).

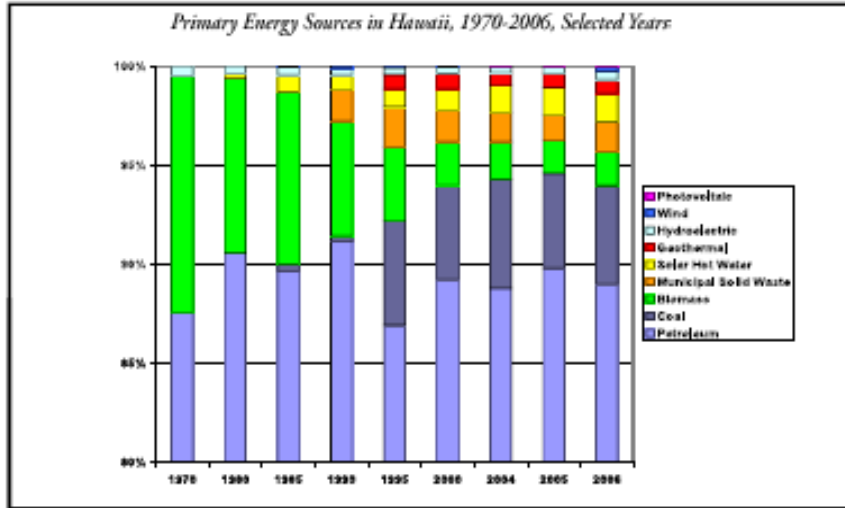


Figure 2: Historical Energy Sources for Hawaii Since 1970.
Source: State of Hawaii Department of Business
Economic Development and Tourism (DBEDT)

Hawaii has an abundance of renewable resources available in the form of wind, wave, solar, geothermal and ocean thermal energy. However, much of it is concentrated in the wrong places. For example, geothermal is predominately on the Big Island, and wind power is most bountiful on Moloka'i and Lana'i. Without an undersea cable, there is no means of getting this electricity from where it is produced on the outer islands to where it's primarily needed in the population center of Oahu. Unlike the mainland U.S. where municipalities and utilities can borrow energy from neighboring regions, Hawaii doesn't have that capability. Each island must produce all its electricity locally and consume it locally.



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Compounding the problem, there are no local fossil fuel resources in the islands so everything must be imported long distances to one of the most remote locations on earth. As fuel prices steadily rose and domestic U.S. production fell, the awareness of Hawaiian dependence of fossil fuels continued to grow. An equal awareness of the harmful nature of fossil fuels to global climate change resulted in decisive action by the Hawaii state government.

On 31 January 2008 Hawaii Governor Linda Lingle unveiled the Hawaii Clean Energy Initiative (HCEI) as part of her State of the State Address establishing an overall goal to achieve 70% clean energy by 2030. In October 2008 Governor Lingle announced a unique energy agreement between the state, the U.S. Department of Energy, the utilities represented by Hawaiian Electric Industries, and the consumer advocate. This agreement provided more detail to HCEI with these major elements:

- **10% renewable electricity by 2010, 15% by 2015, 25% by 2020, 40% by 2030**
- **30% of overall renewable energy goal will be achieved through energy efficiency measures**
- **No more than 30% of renewables may be imported bio fuels in utility-owned units through 2015**
- **700MW of new renewable energy in the next 5 yrs, 1100MW by 2030**
- **An undersea cable connecting Oahu with Maui County**
- **400MW of wind power in Maui County**
- **No new fossil fuel plants without retiring equal size plants**
- **Decoupling Hawaiian Electric profits from sales making them more of an energy broker with less incentive on selling electricity to consumers**
- **Feed-in tariffs giving independent power producers the ability to sell electricity to Hawaiian Electric**

The State of Hawaii intends to reach their goal of 70% clean energy by 2030 through a combination of 30% reduction in consumption using a variety of energy efficiency initiatives, and 40% renewable generation harnessing the abundance of nature's power. The state doesn't plan on stopping at 70%, nor does it want to wait until 2030.

In January 2009, the Director of Resources and Assessment at USPACOM formed a consortium from across DoD, DOE, and the state who named themselves the PACOM Energy Partnership and Strategy Council (PEPSC). What follows is the council's vision for how USPACOM will partner with the State of Hawaii to support the HCEI.

"We have a choice. We can remain the world's leading importer of oil, or we can become the world's leading exporter of clean energy. We can hand over the jobs of the future to our competitors, or we can confront what they have already recognized as the great opportunity of our time: the nation that leads the world in creating new sources of clean energy will be the nation that leads the 21st century global economy. That's the nation I want America to be." President Barack Obama – 27 May 2009

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Strategic Goal: Match or exceed the State of Hawaii goals

The PEPSC determined that a singular strategic goal was the best way to communicate support toward the Hawaii Clean Energy Initiative. It's simple and straightforward, sincere and heartfelt, and buttressed by a variety of strategic sub-goals and measurable objectives.

Goal #1: Minimize dependence on fossil fuels

Oil is the central problem that needs to be addressed. Whether it's adding renewables, becoming more energy efficient, converting to electric vehicles, or conserving energy by turning off lights, the purpose of all these initiatives is to wean ourselves from petroleum and its harmful side effects.

Sub-goal #1.1: Reduce power consumption

Objective #1.1: Reduce energy intensity at least 3% per yr and 30% by 2015

This is a mandatory federal requirement from Executive Order 13423 of 2007. Whereas the Hawaii Clean Energy Initiative calls for a 30% reduction in consumption by 2030, USPACOM will strive to reach this goal throughout military installations in Hawaii by 2015.

Sub-goal #1.2: Reduce petroleum use in ground transportation

Objective #1.2: Reduce non-tactical vehicle fossil fuel consumption by 2% per year

In 2006, 54.7% of Hawaii's total energy consumption took place in the transportation sector. In order to reach 70% clean energy by 2030, drastic changes will need to be made in the types of cars and trucks on the roads in Hawaii and the types of fuel they use. USPACOM aims to lead that change.

Goal #2: Develop renewable energy resources

Sub-goal #2.1: Maximize clean alternative energy

Objective #2.1.1: 10% renewable by 2010, 15% by 2015, 25% by 2020, 40% by 2030

This objective matches the HCEI guidance and exceeds the Energy Policy Act of 2005, which mandates that all federal agencies consume 5% of their electricity from renewable sources by 2010, 7.5% by 2013, and 25% by 2025. To achieve this objective, USPACOM is pursuing options for a variety of solar, wind, wave, biofuel, landfill gas-to-energy, and Ocean Thermal Energy Conversion (OTEC) electricity generation projects.



An example of a renewable energy project is this Building Integrated Photovoltaic (BIPV) rooftop on a barracks at Kaneohe Marine Corps Base, Hawaii

In addition, DoD is working with the U.S. Department of Energy on a comprehensive energy assessment that will assist in prioritizing the various options.

Objective #2.1.2: 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

USPACOM agrees with the state's desire to take fuel-fired petroleum generators out of service. There are plans to build new biofuel-capable generators on military installations, but every effort will be made to run them using clean biofuel except in extreme circumstances. In times of emergency, military diesel generators are currently used to power critical facilities. However, as more renewables are installed on military installations with smart grids that can use that power when the rest of the grid is down, the need for emergency diesel fuel will be replaced by alternative energy sources such as wind, solar and back-up power from energy storage devices.

Goal #3: Reduce greenhouse gas emissions

Objective #3: Meet or exceed all federal goals and take measures to reduce greenhouse gas emissions in support of Act 234, Hawaii's Global Warming Solutions Act

In the process of achieving strategic sub-goals #1 and #2, i.e. minimizing dependence on fossil fuels and developing renewable energy, an organization would automatically and naturally reduce greenhouse gas (GHG) emissions commensurately. This objective has no quantifiable federal measures because there are currently no written requirements to reduce greenhouse gases. The most widely recognized standard for GHG emissions, the

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Kyoto Protocol was adopted in 1997, signed in 2005 and ratified by 183 nations. In it, the global goal is to reduce greenhouse gases 5.2%, by 2012 while the U.S. quota is 7%. The United States signed the agreement, but never ratified it and is therefore not formally subjected to the 7% quota. Act 234, Hawaii's Global Warming Solutions Act, is a law that was passed by the Hawaii State Legislature in 2007 which requires Hawaii to reduce its statewide greenhouse gas emissions to 1990 levels by January 1, 2020. USPACOM accepts the role of a good neighbor and intends to reduce GHG emissions.

Goal #4: Emphasize sustainability

Objective #4.1: Design new building to use 30% less energy

Objective #4.2: 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)

Objective #4.3: Design new buildings 30% better than American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) standards

Objective #4.4: Design major renovations to use 20% less energy

Objective #4.5: Ensure 15% of facilities meet the Federal Leadership in High Performance and Sustainable Buildings MOU by 2015

Objective #4.6: All new construction and major renovation will meet Leadership in Engineering and Environmental Design (LEED) Silver criteria



An example of a sustainable design is this new military housing development at Aliamanu Military Reservation, Oahu. The privatized housing developers, Actus Lend Lease, installed solar hot water systems on all homes and photovoltaic roofs on all detached garages.

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USPACOM has a tremendous opportunity to incorporate sustainable design practices into all their new construction and renovation projects. This technique limits the “carbon footprint” from the beginning and is a very cost effective way of reaching energy efficiency objectives. A small extra investment up front will reap dividends for decades to come.

Goal #5: Exercise leadership

Sub-goal #5.1: Establish a replicable model for the Pacific

Today’s energy landscape offers a once-in-a-generation chance to set a positive path for the entire Asia Pacific region. Whatever USPACOM does in Hawaii will be directly applicable to Guam because of their common climates, remoteness and reliance on fossil fuels. The military community in Guam also has the unique opportunity to build a new energy efficient infrastructure literally from the ground up in the coming years as U.S. Marines and their families re-locate there from Okinawa.

Alaska is equally important since it has the highest energy intensity in the nation while Japan and Korea both have high energy costs. Therefore, the impact of energy improvements in these regions will be tremendous. Recognizing the importance of this link between Hawaii and the rest of the Pacific, the next task of the PEPSC is to build an Energy Security Strategy for the USPACOM area of responsibility that will set the region on a path to energy independence.

Sub-goal #5.2: Increase energy security

In July 2008, the Defense Science Board issued a report on DoD Energy Strategy that concluded: “Critical national security and homeland defense missions are at an unacceptably high risk of extended outage from failure of the electric grid.” Likewise, in May 2009, the Center for Naval Analyses Military Advisory Board (MAB) echoed those concerns in “Powering America’s Defense: Energy and the Risks to National Security.” They concluded: “The nation’s current energy posture is a serious and urgent threat to national security.” This threat is caused by two primary factors according to the MAB. 1) “Dependence on oil undermines America’s national security on multiple fronts.” 2) “A fragile domestic electricity grid makes our domestic military installations, and their critical infrastructure, unnecessarily vulnerable to incident, whether deliberate or accidental.”

The message is clear and unequivocal. In order to achieve energy security, the nation must wean itself from oil and shore up the national grid structure. For USPACOM, this means gaining some level of redundancy when the grid goes down so the mission can continue without interruption.

Objective #5.2.1: Protect 100% of Task Critical Assets

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Objective #5.2.2: Take steps to “island” the following Hawaii installations:

- Schofield Barracks
- Kaneohe Marine Corps Base Hawaii
- Pearl/Hickam Joint Base
- Fort Shafter
- Pacific Missile Range Facility, Kauai

At first blush it may appear as though USPACOM wants to extricate itself from the grid. This is not the case. It's essential to stay connected to the grid to both receive and provide power. The purpose of this desire to “island” military bases is three-fold. First, islanding makes it possible to operate independently in times of emergency in order to perform the mission. Second, with power that's generated on base the military can better assist the local community in their recovery from a natural disaster or other outage. Third, with smart grid and islanding circuitry, any excess power generated on a military installation can be fed to facilities outside the gates such as hospitals, supermarkets, schools, emergency shelters, etc.

Sub-goal #5.3: Implement demonstration projects

There are a variety of demonstration projects already underway and many that are still in planning. The aforementioned Power Buoy and hydrogen fueling station have been ongoing for several years. Currently, USPACOM is performing experiments on the value of spray foam insulation in Hawaii and is making a series of improvements to the Defense Enterprise Computing Center at Pearl Harbor to measure the energy reductions of each improvement. Likewise, PACOM is cooperating with the Department of Energy on an emerging technology called liquid desiccant solar cooling to be demonstrated at Marine Corps Base Hawaii. Finally, PACOM is embarking on a Joint Capability Technology Demonstration (JCTD) that will focus on cyber defense of a smart grid.



This building at Hickam AFB has spray foam insulation on the roof as part of a demonstration project

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The Defense Enterprise Computing Center Pacific is a test bed for a series of energy efficiency improvements

Sub-goal #5.4: Improve technical education outreach to the local schools

In order to achieve the stated PACOM Energy Partnership Strategy objectives, PACOM must ensure that future generations of military and civilian leaders are educated in the role energy plays in our nation's future. One example of just such an effort is the Navy Energy Conservation School Outreach program. In its third year, this program was implemented in six local schools: Holy Family Catholic Academy, Pearl Harbor Kai Elementary School, Lehua Elementary School, ASSETS School, Momilani Elementary School, and the Navy Home School Group. The program is sponsored by the Naval Facilities Engineering Command (NAVFAC) Hawaii Energy Team and Navy Region Hawaii and emphasizes education of energy conservation to students in schools with a high percentage of Navy dependents. The vision is to reinforce good energy conservation behavior of workplace employees by increasing the energy awareness of their children and families. The program includes energy presentations conducted by the Energy Team followed by a coloring contest in which students demonstrate their knowledge of energy conservation with the winners getting their drawing displayed in key areas and media such as Region Energy Conservation Calendars. The program reached 2,300 students in the 2008-09 school year while 650 students participated in the coloring contest.

Sub-goal #5.5: Increase our collective knowledge of energy

In addition to educating the children, it's equally important to educate the work force. Every military installation in Hawaii has an energy awareness program designed to raise knowledge of good energy practices among the military workforce. Finally, the 2009 Asia Pacific Clean Energy Summit and Expo, hosted by the state energy office in cooperation with U.S. Pacific Command and the Defense Energy Support Center is another form of education. The Summit provided a forum for government, defense department officials, industry professionals, customers and facilitators in the U.S. and

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Asia-Pacific region to learn more about public policy, emerging technologies and opportunities, energy efficiency, and security issues that transcend national borders. Not only was the Summit an educational opportunity, but more importantly it's another instance of USPACOM cooperating with the State of Hawaii to push the agenda of a cleaner energy future for the people of Hawaii.

Ways and Means:

This strategy includes a wide variety of goals that will take decades to achieve. In order to reach these ends, an equally wide array of ways and means must be used. The ways or methods can generally be categorized into leadership and innovation. Leadership includes initiatives like the aforementioned Asia Pacific Clean Energy Summit and Expo, which the PEPSC hopes to make an annual event. But it encompasses so much more. It requires people at the most senior levels of USPACOM to take an active role in developing energy strategies, resourcing those strategies, and frequently reviewing the progress and revising the strategies. We intend to conduct semi-annual energy and sustainability briefings at the general/flag officer level to track our progress, while the PEPSC will re-visit this strategy annually and update it as necessary. Without a process to monitor progress, this strategy becomes a hollow document, and PACOM vows not to let that happen.

As for innovation, the possibilities are endless especially in the area of alternative financing. A majority of the goals in this strategy can be achieved through a set of unfunded projects already identified and prioritized by the PEPSC. Using alternative financing, many of the energy projects can be completed with little to no up-front cost to the government.

The means or resources required to reach these energy goals will be enormous. Once again, there are various avenues within the government to acquire funding and all of them will be pursued subject to applicable policy and fiscal constraints. Perhaps the largest resource required in this effort will be human capital. It will take a concerted effort by all military personnel in Hawaii to change their habits. One of the ways to facilitate this behavioral change is to be able to measure consumption and hold individuals and organizations accountable for their energy usage. The ability to measure consumption will soon improve dramatically as all military services plan on installing advanced meters by 2012 and privatized housing contractors are starting to charge military family housing residents for energy usage above the norm. Another critical faction of human capital required in this endeavor is the collection of immensely talented and dedicated people who are responsible for executing the strategy.

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