

CHAPTER 6.

SUSTAINABILITY AND SMART GROWTH

6.1 SUSTAINABILITY

6.1.1 Overview

Sustainability and smart growth work to meet the needs of the present without compromising the ability of future generations to meet their own needs. In this case, it is an approach that ensures that our military maintains its mission, readiness, national defense, training and international defense commitments and quality of life for the military; including the ability to adjust to changing geo-political realities while encouraging local economic growth, preserving the environment, and working to improve the quality of life for Guam and CNMI residents and visitors.

In order to reduce environmental impact and address limited resources, the DoD, including the Navy and Marine Corps, have adopted guidance and policies that promote sustainable planning, design, development, and operations. The guidance and policies work to decrease energy use, minimize reliance on traditional fossil fuels, protect and conserve water, enhance indoor air quality, and reduce the environmental impact of materials use and disposal. It is the DoD's goal that proposed development would be sized, planned, and developed in a manner that is sustainable and works to preserve and protect limited resources.

By choosing sustainability and smart growth, the DoD can create development that is attractive, safe, and healthy for soldiers and their dependents; foster development and operations that meet mission requirements while encouraging social, civic, and physical activity; and work to protect the environment while stimulating economic growth throughout Guam and CNMI. Impacts on Guam's and CNMI's limited resources can also be reduced along with up front and operating/maintenance costs for the military over the life of the facilities.

6.1.2 Laws, Requirements, and Guidance

A successful sustainability and smart growth approach for the DoD is based on federal, Navy, and Marine Corps policies and guidance. Under numerous laws and official policies and guidance, development and operations associated with the military build-up on Guam and CNMI are required to achieve varying degrees of energy efficiency, pollution reduction, transportation improvements, reduction in water demand, and a right sized footprint as it relates to various features of the project. The policies and guidance also require that new development be designed to meet U.S. Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) Silver Certification for New Construction (LEED-NC).

6.1.2.1 Relevant Federal Policies, Laws

Relevant Federal policies and laws are:

- Energy Policy Act of 2005
- Memorandum of Understanding (MOU) for Federal Leadership in High Performance and Sustainable Buildings (Guiding Principles)
- Executive Order 13423 Strengthening Federal Environmental, Energy, and Transportation Management
- Energy Independence and Security Act of 2007

- National Defense Authorization Act 2007

6.1.2.2 Navy, Marine Corps, and Joint Region Marianas Policies and Guidance

Navy, Marine Corps, and Joint Region Marianas policies and guidance consist of:

- Engineering & Construction Bulletin 2008-01 Energy Policy Act of 2005 Implementation and USGBC LEED Certification
- UFC 1-900-01 Selection of Methods for the Reduction, Reuse, and Recycling of Demolition Waste
- Unified Facility Code (UFC) 3-210-10 Low Impact Development
- UFC 4-030-01 Sustainable Development
- Naval Base Guam Instruction 4100.1 Energy Management Program
- Naval Base Guam Instruction 11330.1 Water Conservation Program
- OPNAVINST 5090.1B, Chapter 14, Solid Waste Management and Resource Recovery Ashore.

Table 6.1-1 also provides a more detailed summary of relevant federal policies and guidance.

Table 6.1-1. Summary of Federal Policies and Guidance

	<i>Energy Policy Act of 2005</i>	<i>EO 13243</i>	<i>Federal Sustainable Performance MOU</i>	<i>DOE 10 CFR</i>
Water Efficiency	<ul style="list-style-type: none"> Apply water conservation technologies 	<ul style="list-style-type: none"> Reduce water consumption intensity 2% annually through 2015 or by 16% by the end of 2015 	<ul style="list-style-type: none"> 20% less potable water than U.S. Environmental protection Agency (USEPA) -1992 Water efficient landscape and irrigation strategies Reduce outdoor potable water use by 50% 	Not applicable (NA)
Renewable Energy	<ul style="list-style-type: none"> 3% renewable 2007-2009 5% renewable 2010-2012 7.5% renewable 2013 and continuing Double credit for renewable produced on federal lands 	<ul style="list-style-type: none"> 50% renewable energy is from new renewable sources Install renewable energy sources on agency 	NA	NA
Energy Efficiency	<ul style="list-style-type: none"> Energy Star/Federal Energy Management Program-recommended products required 30% less energy consumption than American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) Standard 90.1 2004 baseline Sustainability applied to site, design, and under construction 	<ul style="list-style-type: none"> Reduce energy intensity by 3% annually through 2015 or by 30% by the end of 2015 compared to ASHRAE 90.1-2004 baseline Earn Energy Star 7 targets 	NA	<ul style="list-style-type: none"> Meet Energy Star 7 targets Reduce energy by 30% compared to ASHRAE 90.1-2004 baseline building
Hydrochloro-fluorocarbon's Carbon	NA	<ul style="list-style-type: none"> Reduce greenhouse gas emission intensity 3% annually or 30% by the end of 2015 	NA	NA
Indoor Air Quality	NA	NA	<ul style="list-style-type: none"> ASHRAE standards 55-2004 and 62-2004 Moisture control preventing buildings damage and mold Use low-emitting materials Protect indoor air quality during construction 	NA

6.2 IMPLEMENTATION STRATEGIES AND OBJECTIVES

6.2.1 Navy Energy Policy

The Navy has already developed a five year energy plan that can be used by Naval Facilities Engineering Command Marianas to attain compliance with the Navy's energy and sustainability goals. These goals are designed to ensure that new facilities comply with legal mandates including:

- *Energy Intensity*. Reduce energy usage by 3% annually or 30% by 2015 relative to 2003.
- *Renewable energy*. Increase renewable electricity use 1.5% per year for a total of 25% of consumption from renewable sources by 2025 with 50% of the required renewable energy coming from new renewable sources that were acquired after January 1, 1999.
- *Water*. Reduce water consumption 2% per year (16% by 2015) relative to 2007.
- *Sustainable Buildings*. About 2% per year of existing facilities (15% by 2015), meet the Federal Leadership in High Performance and Sustainable Buildings MOU. The MOU includes reducing the energy cost 20% below 2003 standards, reducing indoor water use at least 20% below the baseline for the facility, and reducing outdoor water use for landscaping by 50% with respect to conventional vegetation.
- *New Facility Design*. Design all new facilities 30% more efficient than ASHRAE standard 90.1-2004.
- *New Facility Construction*. Construct new facilities to LEED Silver.
- *Metering*. Install remote readable electricity meters annually on 25% (all by 2012) of facilities consuming more than \$35,000 per year electricity. Meter additional facilities and utilities as practical based on business case analysis.
- *Energy Efficient Products*. Purchase energy efficient (USEPA energy star, and Federal Energy Management Program) products.
- *Leases and Services Contracts*. Include energy and water program requirements in leases & services contracts.

6.2.2 Master Planning and Design

A significant consideration and component of the master plan for the Guam and CNMI Military Relocation is the integration of sustainability and smart growth guidance, policies, practices, designs, systems, and operations and maintenance. To assess and quantify the results of potential sustainability and smart growth strategies and courses of action, the project planners would utilize the Sustainable Systems Integration Model (SSIM), a proprietary, multisystem planning, environmental, and economic evaluation tool. SSIM outputs would help guide master planning and design, and would work to support LEED and low impact development efforts with quantifiable information.

In order to populate and assess outputs of the SSIM, master planning smart growth and sustainability workshops were conducted on Guam in January of 2009 and Hawaii in March of 2009. Additional workshops would be conducted throughout 2009. Stakeholders participating to date have included federal representatives from Navy, Marine Corps, and U.S. Fish and Wildlife Service. Government of Guam agencies represented included Guam Environmental Protection Agency, Department of Land Management, and Bureau of Statistics and Planning. In addition, several consultants and the Guam Contractors Association provided additional expertise and local knowledge. While not in attendance to date, representatives from USEPA helped organize the charrettes and facilitated stakeholder conference calls.

Participants identified specific elements to be included in the concept sustainability effort for the military base build-up with a primary focus on the proposed Marine Cantonment area. Areas of focus and approaches for sustainability on Guam include:

- Water
 - *Water Conservation.* Identify and specify appropriate conservation fixtures and devices.
 - *Irrigation.* Eliminate use of irrigation systems and water use for landscaping. Meet water use reduction requirements as codified in the Energy Policy Act of 2005 or the Energy Independence and Security Act of 2007. Identify minimum areas requiring irrigation such as recreation fields and other special use areas and possibly outfit them with artificial turf.
 - *Grey Water Use.* Evaluate options for use of grey water for irrigation and toilet flushing. Rainwater Harvesting. Investigate harvesting, storage and distribution systems
 - *Stormwater Quality, Quantity, Infiltration and Groundwater Recharge.* Design the base storm drainage system in compliance with Low Impact Development UFC criteria and other modern storm water management features. Prepare a Low Impact Development manual for the program in compliance with laws, reduce water use by up to 20% inside buildings and 50% outside buildings.
- Energy
 - *Minimizing Energy Demand.* As codified under recent laws, reduce demand for energy by 30% by 2015, eliminate use of fossil fuels by 2050, and generate 5% of hot water needs from solar sources.
 - Identify and evaluate systems and elements that would minimize energy demand, meter all new buildings to monitor energy use, and use Energy Star fixtures.
 - *Onsite Energy Generation.* Evaluate options such as photovoltaic, solar water systems, renewable sources and district heating and cooling.
 - Reduce the heat island effect through the use of shading, light colors and reduction in impermeable surfaces.
- Transportation
 - *Bicycle and Pedestrian Oriented Site Planning.* Design the site to facilitate and encourage non-motor vehicle traffic.
 - *Internal Shuttle.* Include a clean fuel shuttle system for the site, addressing location and time based transportation requirements.
 - *Integrate On-Site Transportation with Off-Site Transportation.* Design on site transportation to conveniently connect with offsite high-capacity (non-individual motor vehicle) systems such as an off-site shuttle. Create denser neighborhoods within walking distance to service and work facilities.
- Waste Management
 - Establish an Integrated Waste Management Program to include all sites.
 - Recycle 50% of construction waste and reuse building materials.
 - Expand the existing Navy and Air Force Recycling Programs to include the new sites, to be coordinated with Government of Guam
 - Purchase materials with various percentages of recycled content.

6.2.3 Application of LEED Tools

The U.S. Green Building Council's LEED program is a tool to measure performance on various sustainability outcomes and to assist with meeting legal mandates outlined above. The Marine Corps is

required to pursue a LEED Silver rating for its new facilities on Guam. Silver certification is achieved by achieving a certain number of credits under the LEED rating system. For the cantonment, the Marine Corps and master planners are reviewing increased density of structures, mixed use building designs and service areas, facilities to increase walking, bike use, mass transit, and a reduction of accommodations for vehicles. Such actions work toward developing LEED-NC Campuses. Whereas LEED-NC is submitted on a single building by building basis, a LEED-NC Campus allows for the grouping of several facilities into a “campus” for submittal. Similar to the campus designation, the LEED-Neighborhood Development (ND) criteria is focused on a development area or neighborhood in achieving various credits. Where this is not feasible, facilities can still be submitted on an individual basis. LEED Silver credits are awarded if more than 50% of non-hazardous construction and demolition debris is recycled or salvaged and additional credit is given if 75% recycling rates are achieved. The master planners are working with the various DoD entities to apply LEED standards to their respective facilities and operations.

6.2.3.1 LEED-NC for New Construction and Campuses

LEED-NC would be applied to individual buildings of the Guam development. LEED credits would be sought for energy efficiency, water use reduction, smart design of the facility and its location, improved indoor air quality, commissioning of the mechanical systems and efficiencies in operation and maintenance.

6.2.3.2 LEED-ND for Neighborhood Development

The LEED-ND rating system is designed to certify exemplary development projects that perform well in terms of smart growth, new urbanism, and green buildings in a holistic neighborhood approach. The LEED-ND rating system is organized into three sections: smart location and linkage, neighborhood patterns and design, and green construction and technology.

LEED for Schools and LEED for Homes tools may be used for various aspects of this project where the LEED-NC and LEED-ND application may not be appropriate or beneficial to sustainability goals.