

MCAS Cherry Point Energy and Water Management Plan

**FY 09 Plan
With outlook through FY 15**



June 2009

1.0 Executive Summary	3
2.0 The Energy and Water Reduction Plan for FY 09	
2.1 Energy Reduction	4
2.1.1 Status	
2.1.2 Planned Actions and Cost	
2.1.3 Will Goal be Met	
2.2 Water Reduction	7
2.2.1 Status	
2.2.2 Planned Actions and Cost	
2.2.3 Will Goal be Met	
2.3 Renewable Energy	10
2.3.1 Status	
2.3.2 Planned Actions and Cost	
2.3.3 Will Goal be Met	
2.4 Sustainable Design:	12
2.4.1 Status	
2.4.2 Planned Actions and Cost	
2.4.3 Will Goal be Met	
Appendix A – Summary of Overall Energy Program Goals	A-1
B – Abbreviations and Acronyms	B-1

MCAS Cherry Point Energy and Water Reduction Plan (E&WRP)

1.0 Executive Summary – FY 09 Plan.

Energy and water management are vital to our national security. The Energy Independence and Security Act of 2007 spells that out; requiring all federal agencies to reduce energy consumption intensity (MBTUs/KSF) by 3% per year and water consumption intensity (KGAL/KSF) by 2% per year. This act, combined with the Energy Policy Act of 2005, Executive Order 13423, the National Defense Authorization Act of 2007 and the National Energy Conservation Policy Act of 1978 provides clear guidance and direction that energy and water management is a high priority. The Commandant of the Marine Corps' "Ten by '10" plan further reinforces these goals, and places the responsibility for their implementation and success on every Marine. Energy efficiency and independence is more critical today, when our operating budgets are already strained, than at any time in the past. Every \$10 increase in the price of a barrel of oil increases the Department of Navy's shore infrastructure costs by over \$60 million. Energy efficiency leads not only to dollar savings in the shore infrastructure budget, it also furthers our progress towards national energy independence. And, while it is fully realized that funding for additional programs and mandates is scarce, it should also be realized that energy independence and preservation of natural resources are national priorities.

Water is one of our most precious natural resources, and although the United States has an abundant supply, it is not evenly distributed throughout the country. Many areas are severely undersupplied. Marine Corps installations have a tremendous opportunity to lead by example in their communities to showcase innovative and cost-effective water efficiency strategies. Potable water usage consumes a significant amount of energy for treatment, pumping, and heating. In addition to the imperatives to conserve water resources water usage efficiency should be an integral part of every comprehensive energy management program.

Maintaining installation fiscal integrity amidst increasing demands on the operating budget and imperatives to invest in energy efficiency is a constant challenge. To meet the challenge requires the commitment of all personnel within the fence line, especially leadership. All installation and tenant commands are to be included in the design and implementation of this E&WRP. The entire installation population, especially the Facilities Energy Manager, is responsible for helping to identify opportunities for energy savings and to implement appropriate energy efficiency measures. Additionally, the individual tenant commands are responsible for reducing energy and water use within their organizations. Their role in energy and water management is a critical element to the success of the E&WRP.

MCAS Cherry Point's ENERGY AND WATER REDUCTION PLAN FOR FY 09

2.0 The Energy and Water Reduction Plan for FY 09

This Energy and Water Reduction Plan (E&WRP) primarily covers the strategies and actions needed in order to achieve all energy and water management program goals as summarized in Appendix A by the common deadline of 2015.

2.1 Energy Reduction

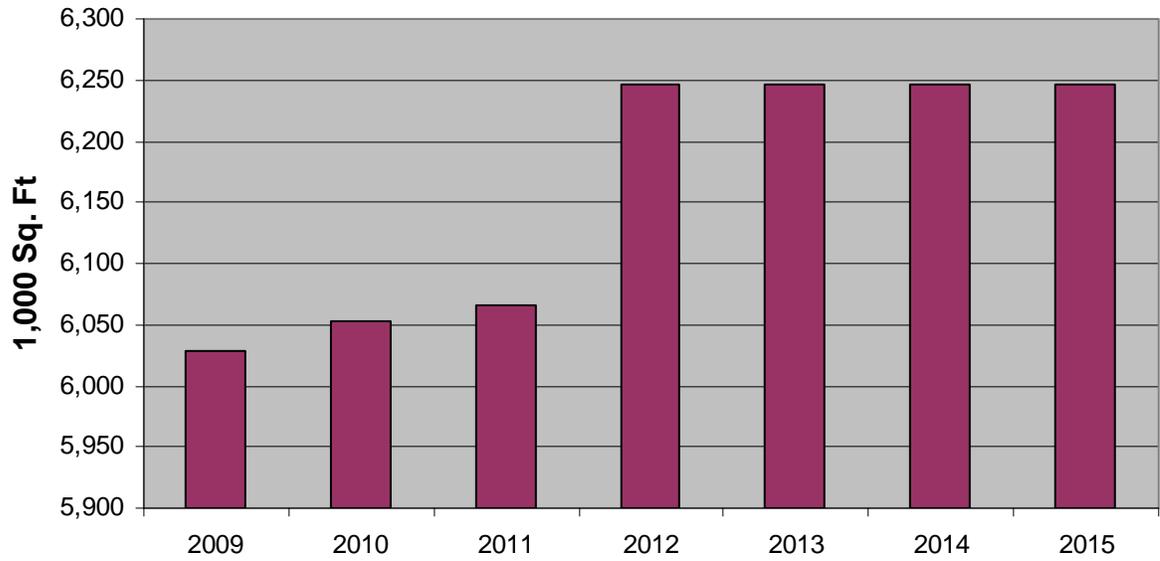
MCAS Cherry Point's 2003 energy baseline is 139.4 MBtu/ksf. Using the annual progressive reduction of 3% gives a goal of 97.6 MBtu/ksf in 2015.

2.1.1 Status

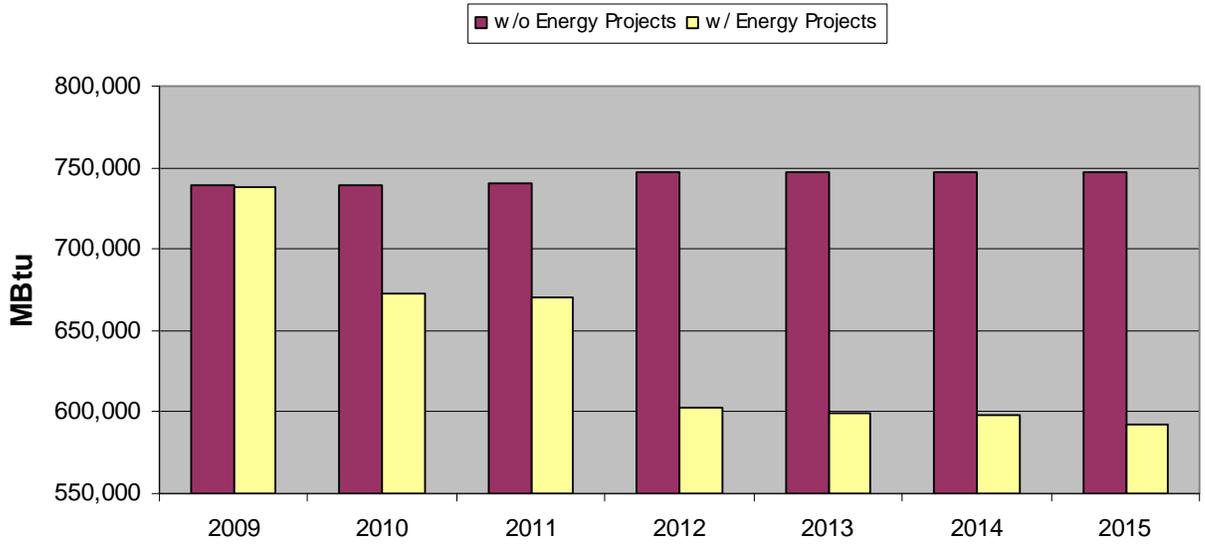
Since the energy baseline was established, MCAS Cherry Point has undertaken many energy conservation measures such as implementing a condensate return system at the Central Heating Plant, replacing incandescent lights with compact fluorescents (CFL), establishing 28 watt (vs. 32 watt) fluorescent lamps as standard, implementation of load-shedding routines and building temperature setbacks through an EMCS, and installing a solar photovoltaic system at Building 1016. These and other efforts have resulted in an energy intensity of 122.5, 12% below the baseline. However, energy usage must continue to be reduced to meet the 2015 goal of 97.6 MBtu/ksf. Several projects are ongoing or under development to insure that this goal is met. Section 2.1.2 describes these projects and indicates the expected energy savings. The base is currently entering a significant growth period with an expected increase in gross building square footage. We view this as a unique opportunity to improve the mean energy efficiency of our facilities, and section 2.4 will discuss the sustainable design concepts we will implement to achieve that. However, these added buildings will cause gross energy consumption to increase. Graphs 1 and 2 show the air station's respective square footage growth and energy consumption. Graph 2 has two series to show the results with and without energy reduction efforts. The red bar indicates rising energy consumption due to the increase in facility square footage. Note that the energy consumption does not increase as substantially as the square footage. This is a result of the new buildings being more energy efficient than existing facilities. The lighter bar shows the expected energy savings as a result of implementing the measures in section 2.1.2.

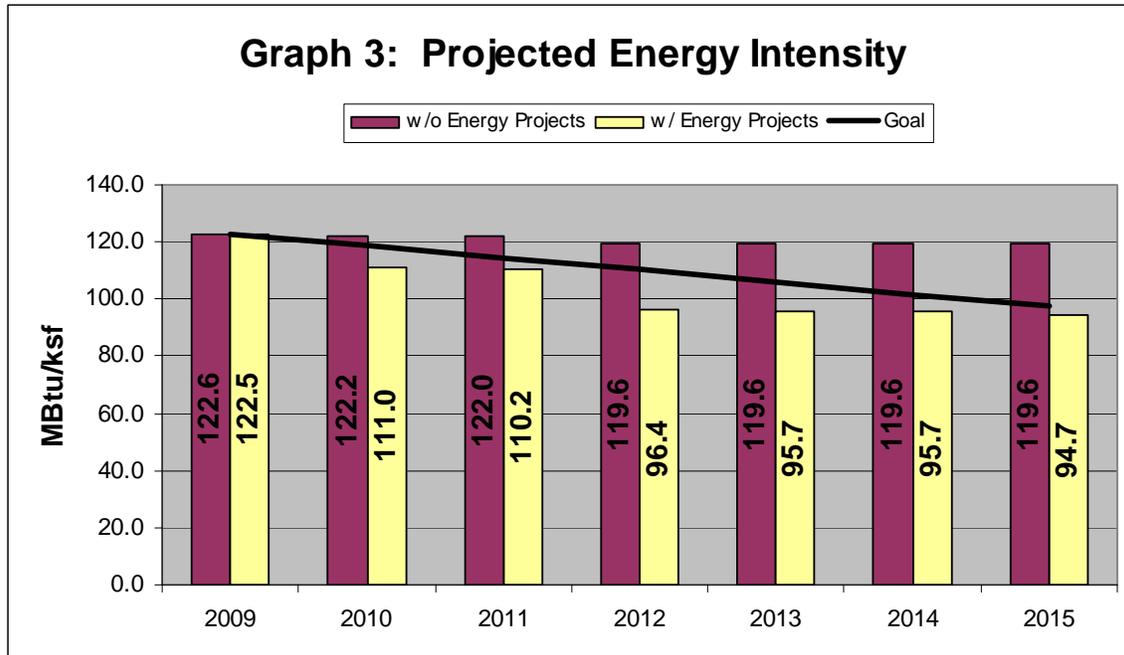
<i>MCAS Cherry Point Energy Goal Reductions</i>				
	<i>MBTU</i>	<i>KSF</i>	<i>MBTU/KSF</i>	<i>Intensity</i>
<i>2003</i>	<i>841,395</i>	<i>6,035</i>	<i>139.4</i>	<i>0.0%</i>
<i>2009</i>	<i>738,719</i>	<i>6,028</i>	<i>122.5</i>	<i>-12.1%</i>
<i>2010</i>	<i>672,100</i>	<i>6,053</i>	<i>111.0</i>	<i>-20.3%</i>
<i>2011</i>	<i>668,778</i>	<i>6,067</i>	<i>110.2</i>	<i>-20.9%</i>
<i>2012</i>	<i>602,074</i>	<i>6,247</i>	<i>96.4</i>	<i>-30.9%</i>
<i>2013</i>	<i>597,977</i>	<i>6,247</i>	<i>95.7</i>	<i>-31.3%</i>
<i>2014</i>	<i>596,755</i>	<i>6,247</i>	<i>95.5</i>	<i>-31.5%</i>
<i>2015</i>	<i>591,799</i>	<i>6,247</i>	<i>94.7</i>	<i>-32.0%</i>

Graph 1: Projected Building Square Footage



Graph 2: Projected Energy Usage





It is important to remember that the energy reduction goals pertain to energy intensity. Graph 3 shows the resulting energy intensity from the new facilities. Again, the darker bars indicate the effect of failing to implement energy reduction projects. Note that the addition of energy efficient buildings and the demolition of older buildings cause a slight reduction in intensity, but is not sufficient to bring the station total below the goal. The lighter bars show that the proposed energy projects reduce the energy intensity steadily and remain below the goal through 2015 with the final intensity being 94.7, well below the goal of 97.6. This provides some cushion in the event the projects do not meet the estimated savings.

2.1.2 Planned Actions and Cost

The table below shows the infrastructure projects currently planned for execution and the effect they will have on the overall energy reduction plan as a portion of the overall 30% mandated reduction.

Project Description	Expected Energy Savings (MBtu)	Estimated Cost	Funds Source	Year	Percent Reduction
Advanced metering expansion	200	\$610,000	FSRM	2009	0.03%
Solar photovoltaic at B159	230	\$642,000	FSRM	2009	0.11%
Solar photovoltaic at B194	130	\$349,000	FSRM	2009	0.07%
Solar Pool Heater	13,000	\$360,000	ARRA	2010	1.75%
EnergyStar washers	180	\$70,000	EIP	2010	0.02%
Building	4,900	\$930,000	EIP	2010	0.66%

envelope/energy improvements					
Building voltage regulation	3,100	\$250,000	EIP	2010	0.42%
LED street and parking lot lighting	2,300	\$1,150,000	EIP	2011	0.31%
Reverse Osmosis Filter at Steam Plant	45,000	\$400,000	ARRA	2011	6.1%
Solar thermal	2,200	\$430,000	ECIP	2011	0.34%
ESPC	55,100		ESPC	2012	7.2%
Biomass at steam plant	31,000		ESPC	2012	4.1%
Electricity generation at Central Heating Plant	2,500		ESPC	2013	0.32%
Improved office lighting	900	\$1,000,000	EIP	2013	0.42%
Solar thermal at five barracks	1,600	\$1,100,000	ECIP	2013	0.21%
Ground source heat pumps	300	\$500,000	ECIP	2014	0.04%
Solar photovoltaic	365	\$750,000	ECIP	2015	0.05%
Solar thermal at fifteen barracks	4,600	\$3,225,000	ECIP	2015	0.6%
Total	167,605	\$11,766,000			22.75%

In addition to these concrete actions, a series of programs are in place with potential for energy reduction whose measurement is more subjective in nature and administrative in implementation:

- Revised energy and water conservation instruction
- Individual energy awareness
- Building / unit level energy awareness and recognition
- Building energy monitor program
- Quarterly energy conservation boards

2.1.3 Will Goal be Met

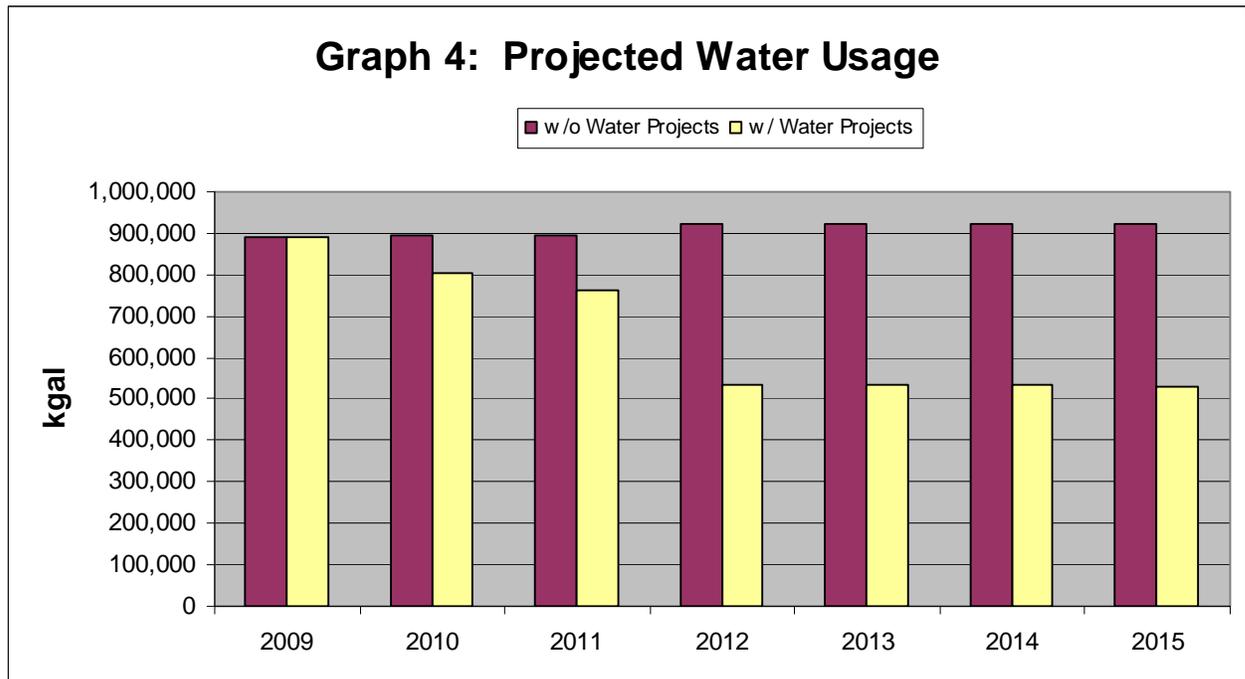
The added 22.75% in reductions shown here will, when combined with those already achieved, result in a reduction of energy intensity of 32% below the baseline. This exceeds the Federal mandate by 2%.

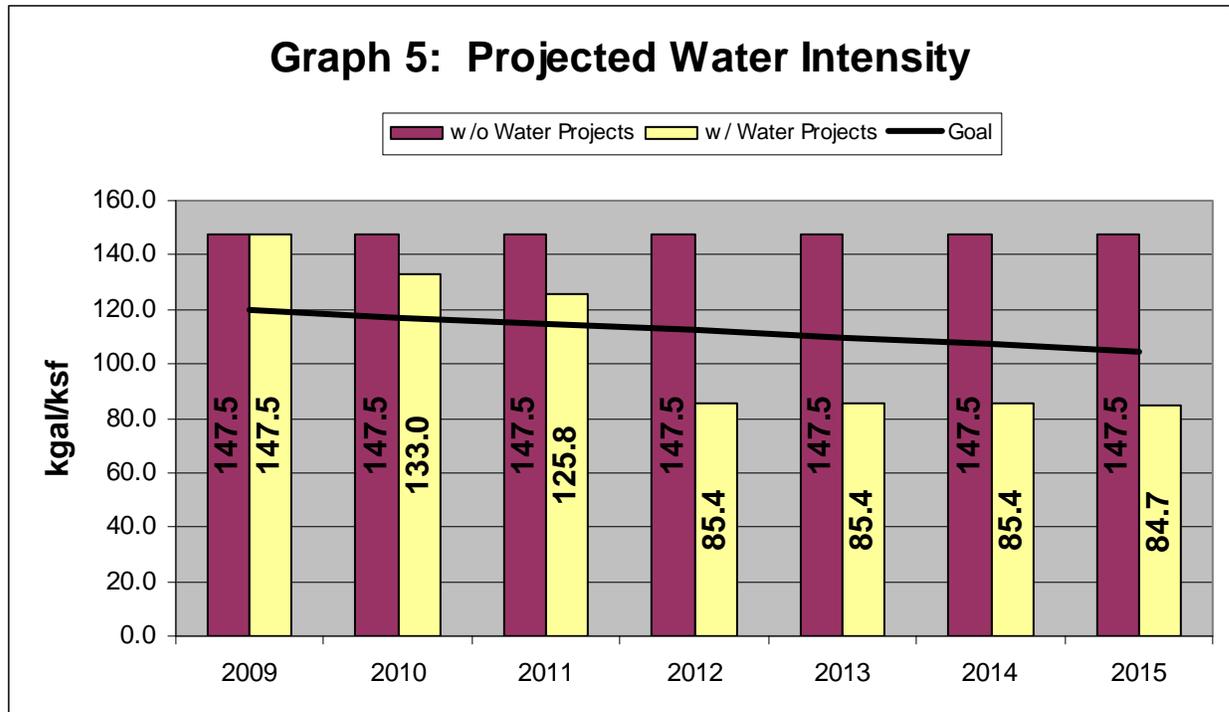
2.2 Water Reduction

MCAS Cherry Point's water baseline is 124.6 kgal/ksf. Using the annual progressive reduction of 2% for water gives a goal of 104.7 kgal/ksf in 2015.

2.2.1 Status

Since the water consumption baseline was established in 2007, MCAS Cherry Point's water use has increased rapidly. This can be attributed primarily to the change in state law regarding the residual chlorine levels required in potable water distribution pipelines. The many "dead legs" and oversized lines in the piping system require daily flushing to maintain residual chlorine levels. Beginning in 2008, maintenance began flushing an estimated 240,000 gallons per day. This has caused the water intensity to increase from the baseline to the current 147.5, 18% above goal. To meet the 16% reduction requirement, water use must be reduced 34% from the current level. Section 2.2.2 lists proposed projects to reduce water usage, including one to eliminate the wasteful flushing. Without water meters or industry benchmarks, it is difficult to accurately project water consumption. In the absence of hard data about the locations, quantities, and patterns of usage, our ability to identify the best candidate projects is restricted. A request for funding for water meters will be submitted in the 2010 EIP. Graph 4 shows the projected water usage based on the current water intensity. As in the previous energy graphs, the dark bars indicate projected water consumption if water conservation measures are not implemented and the lighter bars include expected water savings. Similarly, Graph 5 shows the projected water intensity.





2.2.2 Planned Actions and Cost

We have identified some high payback infrastructure projects in our distribution and treatment system which will allow us to meet Federal mandates. The complete list of proposed projects is below:

Project Description	Expected Water Savings (kGal)	Estimated Cost	Funds Source	Year	% Reduction
Distribution system modifications to reduce flushing	87,600	\$397,000	EIP	2010	9.8%
Reclaimed water for athletic field irrigation	2,184	\$468,000	EIP	2011	0.24%
Reclaimed water use at Central Heating Plant	41,975	\$820,000	EIP	2011	4.69%
Clearwell overflow modifications	251,850	\$1,415,000	EIP	2012	27.3%
Total	383,609	\$3,100,000			42.03%

2.2.3 Will Goal be Met

If the projects listed above are funded, the water intensity should be reduced to a final intensity of 84.7 kgal/ksf, 19% below the goal of 104.7.

2.3 Renewable Energy

Renewable energy has only recently come in to use on an appreciable scale here at MCAS Cherry Point. A brief recap of the major types of renewable energy and their potential for use here follows:

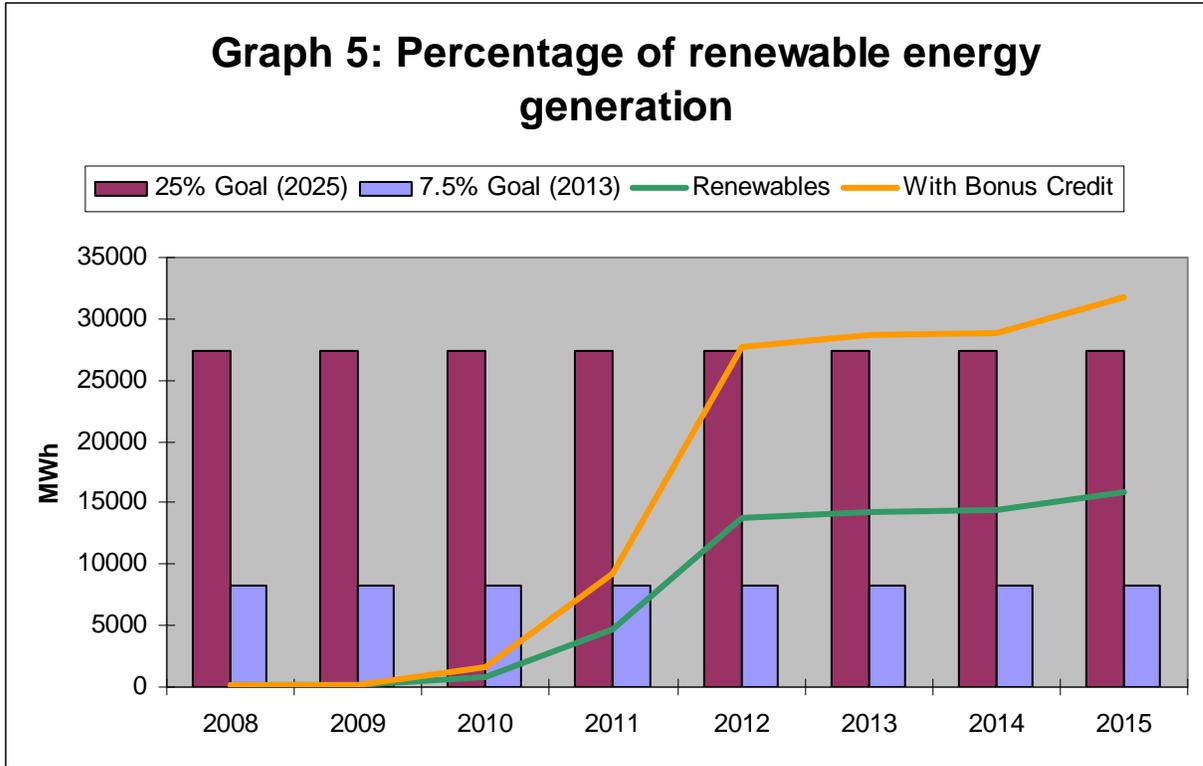
- Solar: medium to high. North Carolina's sun index of 0.9 (18th highest of the lower 48 states) means a great degree of solar availability and solar concentrations are medium for the US at around 5 kWh/m²/day. (Source: NREL http://www.nrel.gov/gis/images/map_pv_national_lo-res.jpg) It is currently in use on the station and many projects are in development to increase solar generation.
- Wind: poor. The Havelock area is rated NREL Class 1+ (7 being the highest) for wind power development and the highest payback applications require tall towers whose construction would be severely restricted on an active air station. The potential for wind development at the coastal range facilities is greater and should be a potential area for examining the potential to off-grid any usage there. (Source: NCSU's Coastal Wind Initiative http://www.ncsc.ncsu.edu/programs/The_Coastal_Wind_Initiative.cfm)
- Geothermal: No potential for geothermal power generation exists. The Havelock area generates 45-49 microWatts/in² of thermal heat, towards the bottom end of the scale. Ground source heat pumps are the only exploitable option. (Source: American Association of Petroleum Geologists' Geothermal Map of North America <http://smu.edu/geothermal/2004NAMap/2004NAMap.htm>)
- Methane: Limited. An old landfill which was capped 15 years ago has limited development potential. Another potential source is recovering the methane produced in the sewer treatment plant's digesters for process use.
- Biomass: We are currently developing plans to supplement the central heating plant fuel with Biomass.

2.3.1 Status

Renewable electricity consumption is measured in MWH. The National Defense Authorization Act of 2007 requires that 25% of all federal agencies' electricity consumption must come from renewable sources by 2025, and the Commandant of the Marine Corps' Ten by '10 plan reiterates this goal. Interim goals of 5% by FY2010 and 7.5% by FY2013 are also mandated.

In FY 08, MCAS Cherry Point consumed 109,737 MWH of electricity. Noting that gross energy consumption is expected to remain constant in the near term future even as energy intensity decreases, this number will be used as a steady state for future usage. In order to provide 25% of that amount from renewable sources, 27,434 MWH would need to be derived from renewable energy sources by FY2025. Interim requirements are 5487 MWH by FY2010 and 8230 MWH by 2013. MCAS Cherry Point currently utilizes 90

MWh of renewable electricity, leaving 5397 MWh of renewable electricity yet to be obtained in order to meet the FY2010 goal. Renewable electricity consumption can occur through the installation of renewable generation or through the purchase of green power from a utility provider. This EWRP addresses a strategy for both methods.



2.3.2 Planned Actions and Cost:

ASN (I&E) energy program preference is to install renewable energy generation, if economically feasible, before purchasing renewable energy from a utility provider. Furthermore, ASN does not support the concept of buying renewable energy credits as a method of attaining these goals. During FY15 MCAS Cherry Point expects to be able to increase renewable electricity usage to a total of 16,065 MWh, which will bring MCAS Cherry Point’s renewable electricity usage up to a total of 14.64% of our electricity consumption as outlined in the table below:

Project Description	Expected Energy Savings (MWh)	Estimated Cost	Funds Source	Year	Percent Renewable
Solar photovoltaic at B159	243	\$642,000	FSRM	2010	0.22%
Solar photovoltaic at B194	146	\$349,000	FSRM	2010	0.13%
Solar Pool Heater	3,809	\$360,446	ARRA	2010	3.47%
Solar thermal at barracks	647	\$430,000	ECIP	2011	0.59%
Biomass at steam plant	9,204		ESPC	2012	8.39%

Solar thermal at five barracks	480	\$1,500,000	ECIP	2013	0.44%
Ground source heat pumps	84	\$500,000	ECIP	2014	0.08%
Solar photovoltaic	107	\$750,000	ECIP	2015	0.10%
Solar thermal	1345	\$1,820,000	ECIP	2015	1.23%
Total	16,065	\$6,351,446			14.64%

2.3.3 Will Goal be Met:

The plan for implementation of renewables has multiple goals. The initial goal of 5% renewables by 2010 will not be met by a considerable margin. However, the second interim goal of 7.5% by 2013 will be exceeded by 5.5%. Once all renewable energy programs currently under development are completed, our percentage of renewables should be up to 14.5%. In accordance with EPACT 2005 section 203, subsection (c): “(c) *CALCULATION.—For purposes of determining compliance with the requirement of this section, the amount of renewable energy shall be doubled if— (1) the renewable energy is produced and used on-site at a Federal facility*”, we can double that figure to 29% and be compliant with the end state requirement of 2025. While this does meet the goal, the potential for expanding renewable energy generation with existing and emergent technologies must be continually assessed.

2.4 Sustainable Design.

Sustainable design principles are to be implemented in all new construction projects and existing buildings. The Marine Corps has adopted the US Green Building Council’s (USGBC) Leadership in Energy and Environmental Design (LEED™) Green Building Rating System as our guidance and metric for incorporating sustainable principles into our new facilities. The Commandant’s “Ten by ’10” plan requires LEED™ – Silver certification for all new Military Construction Projects as well as major renovations. “Ten by ’10” also mandates the use of energy star equipment and the phase-out of incandescent bulbs.

Sustainable design principles are to be implemented in all major renovation projects, and 15% of the square footage of all existing facilities needs to meet the criteria of the Federal Leadership in High Performance and Sustainable Buildings Memorandum of Understanding (MOU) by FY2015.

2.4.1 Status:

Building square footage is anticipated to grow significantly in the coming years. The key to meeting Federal mandates for energy and water reduction during this intense phase of growth is to ensure that energy efficient measures are considered during the design phase. MCAS Cherry Point currently has four projects in the design phase that will be LEED Silver Certified, the 2nd MAW/Station Operations Facility, the Consolidated Club, the Bachelor Enlisted Quarters, and the EMS/Fire Vehicle Facility. All of these facilities are scheduled for occupation in 2011. As part of the 2nd MAW/Station Operations project, three older buildings are scheduled for demolition and two temporary facilities will be

removed. This will also improve the energy intensity as these buildings are less energy-efficient than the facility that will replace them. In addition to these, a Child Development Center and an Unmanned Aerial Vehicle facility are in the design phase. These facilities were started before the LEED certification requirement, however, they will be constructed using practices that will make them 30% more energy efficient than required by current building code. In addition to new buildings, existing buildings must also be energy efficient in order to meet the energy reduction goal. Building renovation designs are reviewed by the station energy manager to insure that energy conservation practices are addressing the requirement to exceed ASHRAE 90.1 energy efficiency standards by 30%.

2.4.2 Planned Actions and Cost:

We will follow current mandates for LEED certification for new construction, but will also aggressively pursue LEED for Existing Buildings certification for major renovation and repair projects when it is financially feasible and compatible with the scope of the renovation work. We have also several targeted projects in the future to do limited building envelope improvements that have been demonstrated effective in the past. In addition to this, an aggressive program of building recommissionings will be required to bring the square footage of high performance facilities (HPFs) up to meet the goal. Starting in 2012 and lasting for four years, it will convert 180,000 SF per year of existing facilities. This will encompass a variety of efficiency improvements, building envelope retrofits, and new, green technology implementations. This program will not take precedence over requirements for the current level of effort to operate and maintain the base facilities.

FY	Total SF	SF of High Performance Facilities	Percentage SF in HPFs	SF to make goal
2009	6,028,000	25000	0.4%	879200
2010	6,053,000	38515	0.6%	869435
2011	6,067,000	218506	3.6%	691544
2012	6,250,000	398254	6.4%	539246
2013	6,250,000	578002	9.2%	359498
2014	6,250,000	757750	12.1%	179750
2015	6,250,000	937498	15.0%	0

2.4.3 Will Goal be Met:

If this plan is followed and funding is made available to implement retrofits to existing facilities, the goal of 15% of square footage in high performance facilities will be met. We also anticipate that there will be additional

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APPENDIX A – SUMMARY OF ENERGY GOALS

Energy Reduction:

3% reduction per year based on FY2003 consumption
(Measure: Energy Intensity (MBTU/KSF))

Water Reduction:

2% reduction per year based on FY2007 consumption
Measure: Water Intensity (KGAL/KSF)

Renewable Energy:

3% of electrical consumption from renewable sources by FY2007
5% of electrical consumption from renewable sources by FY2010
7.5% of electrical consumption from renewable sources by FY2013
25% of electrical consumption from renewable sources by FY2025
Measure: Total renewable electricity consumption / Total electrical consumption

Sustainable Design:

15% of existing facilities must meet the criteria of the Federal Leadership in High Performance and Sustainable Buildings by FY2015.

Measure: Number of facilities meeting the criteria / Total number of facilities (%)

Additionally:

All MCON and special projects must be designed to LEED Silver rating level.

Beginning in FY2010 new facilities and major renovations will need to consume less fossil fuel than comparable facilities consumed in FY2003 by the following amounts:

- 55% less fossil fuel consumption after FY2010
- 65% less fossil fuel consumption after FY2015
- 80% less fossil fuel consumption after FY2020
- 90% less fossil fuel consumption after FY2025
- 100% less fossil fuel consumption after FY2030

Energy Efficient Product Purchases:

Purchase energy efficient products (those listed by Environmental Protection Agency energy star, and Department of Energy Federal Energy Management Program).

APPENDIX B - ACRONYMS

ASHRAE Engineers	American Society of Heating, Refrigerating and Air Conditioning
ASN (I&E)	Assistant Secretary of the Navy (Installations and Environment)
DON	Department of the Navy
BEM	Building Energy Monitor
BMS	Business Management System
ECIP	Energy Conservation Investment Program
EWRP	Energy and Water Reduction Plan
ESCO	Energy Services Company
ESPC	Energy Savings Performance Contracts
EUL	Enhanced use Lease
FEC	Facilities Engineering Command
FY	Fiscal Year
GMT	General Military Training
HVAC	Heating, Ventilation and Air Conditioning
KGAL	Thousand Gallons
KSF	Thousand Square Foot
KW	Kilowatt
KWH	Kilowatt Hour
LEED	Leadership in Energy and Environmental Design
MBTU	Million British Thermal Unit
MCON	Military Construction
MOU	Memorandum of Understanding
MWH	Megawatt Hour
NAVFAC	Naval Facilities Engineering Command
PLP	Product Line Plan
POA&M	Plan of Actions and Milestones
PPA	Power Purchase Agreement
P/PV	Public / Private Venture
PW	Public Works
PWO	Public Works Officer
REM	Resource Efficiency Manager
SECNAV	Secretary of the Navy
SRM	Sustainment, Restoration and Modernization
UEM	Utilities and Energy Management
UESC	Utility and Energy Services Contract
USGBC	US Green Building Council