Installation Energy Management in the Eastern Mediterranean

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NAVFAC EURAFSWA, PWD Souda Bay
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Navy - Overview

- Baseline consumption – 47.6 million MBTU
  - Approximate value of $952M annually
Navy Shore Energy Goals – Focus is on Energy Security

SECNAV

- 50% total ashore energy from *alternative sources* by 2020
- 50% installations *net-zero consumers* by 2020
- 50% reduction in *vehicle petroleum* use by 2015

CNO

- 50% *ashore consumption reduction* from 2003 baseline by 2020

EO 13693

- 25% *ashore energy intensity reduction* from 2015 baseline by 2025
- 25% of total energy consumption from *clean energy sources* by 2025
- 36% *ashore water consumption intensity* reduction from 2007 baseline by 2025
- 30% reduction of *vehicle green house gas emissions* from 2014 baseline by 2025
  - Utilize Fleet Management System and Vehicle Telematics by March 2017
NSA Souda Bay – Where We Are
NSA Souda Bay – Community Context

NSA Souda Bay is composed of the following sites:

- Marathi Pier Port Facility
- NSA Souda Bay
- NATO Magazine Area
- NATO Ordnance Facility
- Mobile Mine Assembly Group (MOMAG) Site
- NATO Missile Firing Installation (NAMFI)
- NATO Fuels Facility
- Doppler Radar Tower
- Athens Airport (U.S. Mail and Cargo)
- MALAXA Radio Site

Source: Installation Development Plan
NSA Souda Bay – Overview

• **Mission:**
  To extend Joint and Fleet Warfighting capability through Operational Support to US, Allied and Coalition Forces deployed within the EUCOM/ CENTCOM/AFRICOM AOR by providing, operating and sustaining superior facilities and services dedicated to combat readiness and security of ships, aircraft, detachments and personnel.

• **Characteristics:**
  - Largest Deep Water Port in Mediterranean
  - Located primarily within a Greek Air Force (HAF) Base
  - Foreign National Indirect Hire staff (HAF employees)
  - New mission requirements increase demand for space on a constrained footprint

• **Installation Size:** 155 Acres (63 hectares)

• **Base Population:** ~1100
NSA Souda Bay - Main Site Existing Land Use

Legend
- Operations
- Maintenance
- Industrial
- Administration
- Residential
- Community
- Recreation
- Parking
- Open Space
- Installation Boundary
- Gate
- Facilities & Structures

<table>
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<th>Land Use</th>
<th>Acres</th>
<th>Hectares</th>
<th>Percent</th>
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<td>Administration</td>
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<td>Utilities/Parking</td>
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<td>3.4</td>
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Source: Installation Development Plan
NSA Souda Bay – Water and Energy Challenges

- **Water/Power provided by Public Utility Providers:**
  - Brittle infrastructure, subject to collapse at any time

- **Economic crisis in Greece:**
  - Restricts re-investment in infrastructure

- **Massive increase in tourism in recent years:**
  - Causes spikes in PPC demand at the “wrong” time of year for water (dry season) and power (hot season)

- **Land constraints:**
  - 155 acres consigned to US gov’t by the Greek Ministry of Defense: fully built out

- **Demand Management:**
  - Increasing demand on energy and water due to evolving missions of supported task forces (US and NATO)
  - Ability to level demand (peak shaving) and store energy for use during peak demand
US Naval Support Activity, Souda Bay, Greece was established

US Air Force and Navy Reconnaissance Missions were transferred from Hellenikon Air Base, Athens

Supported Operation Desert Storm

Supported Operation Allied Force

Supported Operation Enduring Freedom

Supported Operation Iraqi Freedom

Supported Operation Odyssey Dawn - Operation Unified Protector
In response to Navy Shore Energy objectives, CNIC developed a Navy Shore Energy Management Tool Suite to assist stakeholders in identifying, optimizing and tracking energy opportunities and investments.
**Goals 6.0** is a dynamic analysis tool used to benchmark energy consumption and identify efficiency opportunities for achieving the Navy-wide 50% energy reduction requirement.

**Goals by Installation**

<table>
<thead>
<tr>
<th>Installation</th>
<th>FY16 Consumption (MBTU)</th>
<th>EUI (MBTUKSF)</th>
<th>FY03 - FY16 Reduction (MBTU)</th>
<th>FY03 - FY16 Reduction (%)</th>
<th>FY17-FY20 Reduction Goal (MBTU)</th>
<th>FY17-FY20 Reduction Goal (%)</th>
<th>Impact to Region Goal</th>
<th>Impact to Navy Goal</th>
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<tbody>
<tr>
<td>N3379A - Camp Lemonnier Djibouti</td>
<td>871,093</td>
<td>654.47</td>
<td>(773,777)</td>
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<td>N62588 - NSA Naples</td>
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<td><strong>(469,828)</strong></td>
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<td><strong>333,633</strong></td>
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NSA Souda Bay – NAVY Tool Suite (GOALS)

CIRCUITS and Modeled Energy Use Data FY16 (MBTU)

Installation Tailored Energy Goal: 28%

Consumption Data Breakdown

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<th>CIRCUITS UA</th>
<th>Modeled</th>
<th>Total</th>
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<td>23,753</td>
<td>8,604</td>
<td>32,357</td>
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CIRCUITS + Modeled as % of DUERS: 96%
CIRCUITS as % of DUERS: 71%
Total Number of Goals Subject Facilities: 98

Data Assessment

- Installation Data Assessment Score: 81.2%
- Facilities with valid area: 91.0%
- Facilities with valid cost code: 100.0%
- Facilities with CIRCUITS UA Data: 50.0%
- Facilities with CIP Data: 69.8%
- DUERS Alignment: 94.0%

DUERS Alignment Score: 94.0%
- PPV Housing: 200.0%
- Non Navy Facility: 88.9%
- Vacant Facility: 100.0%

Commodity Use

- Electric: 100%
- Natural Gas: 0%

Modeled Costs and Savings by ECM

<table>
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<tr>
<th>ECM Name</th>
<th>Total Expected Energy Reduction (MBTU)</th>
<th>Total Expected ECM Cost ($K)</th>
<th>Total Expected Energy Cost Savings ($K)</th>
<th>Average Payback (yr)</th>
<th>Count of Selected ECMs</th>
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<td>Additional Potential</td>
<td>169</td>
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Booz Allen Hamilton
strategy and technology consultants
### NSA Souda Bay – NAVY Tool Suite (GOALS)

#### Energy Reduction Potential (MBTU) by ECM Type and Building Type

<table>
<thead>
<tr>
<th>Building Type</th>
<th>ECM Type</th>
<th>Boiler Plant Improvements</th>
<th>Other Plant Improvements</th>
<th>Building Automation Systems/Energy Management (EMSs)</th>
<th>Heating, Ventilation, and Air Conditioning</th>
<th>Lighting Improvements</th>
<th>Building Envelope Modifications</th>
<th>Chilled Water, Hot Water, and Steam Distribution Systems</th>
<th>Electric Motors and Drives</th>
<th>Refrigeration</th>
<th>Appliance/PlugLoad Reductions</th>
<th>Commissioning Measures</th>
<th>Building Type Total</th>
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<td>4,174</td>
<td>972</td>
<td>138</td>
<td>2,644</td>
<td>650</td>
<td>1</td>
<td>169</td>
<td>475</td>
<td></td>
<td>9,399</td>
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<tr>
<td><strong>Count of ECMs:</strong></td>
<td></td>
<td>0</td>
<td>17</td>
<td>43</td>
<td>49</td>
<td>49</td>
<td>49</td>
<td>0</td>
<td>43</td>
<td>19</td>
<td>48</td>
<td>49</td>
<td></td>
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</tr>
</tbody>
</table>

*Total Potential (MBTU): 9,399*
NSA Souda Bay – NAVY Tool Suite (GOALS)

Energy Consumption and Percent of Buildings Above Benchmark

- Energy to Benchmark
- Energy Above Benchmark
- % of Facilities Worse than Benchmark

Booz | Allen | Hamilton
strategy and technology consultants
Energy Return on Investment (eROI) is a user-friendly web-enabled tool that facilitates project development and ensures financial viability.

Key Benefits:
- Provides weighted score designed to monetize all benefits of energy projects
- Captures data required to assess performance of an energy project
- Facilitates project development, tracking, and measurement and verification
- Streamlines complete project submission & approval process
NSA Souda Bay – NAVY Tool Suite (eROI)

Goals of the eROI tool Suite:
• Project development support and analysis
• Project portfolio analysis and programming
• Project tracking

Shore Energy Tool Suite

Project Development
Plan, create, review, submit, and approve eROI projects. Maintain projects in this workspace until approved by CNIC HQ and moved into the Project Tracking module.

Project Tracking
Update programmed projects between project approval and project award. Make changes to project scope, costs, or performance.

Measurement and Verification
Post execution, measure project and facility level reduction performance against planned expectations.

Shore Energy Implementation Plan (SEIP)
Track progress toward achieving Navy Energy Goals.

Energy Project List (EPL)
Comprehensive listing of energy and water projects impacting the Navy’s portfolio. Changes made in Project Development and Project Tracking modules are automatically reflected in the EPL. View and update past project scope, costs, or performance data.
# NSA Souda Bay – NAVY Tool Suite (eROI)

## Energy Management Control Systems (EMCS)

<table>
<thead>
<tr>
<th>Project Number</th>
<th>Project Name</th>
<th>STATUS</th>
<th>FY Programmed</th>
<th>Technology Type</th>
<th>Technology</th>
<th>Fund Type</th>
<th>Total Life-Cycle Cost ($)</th>
<th>Annual Energy Cost Savings ($)</th>
<th>Annual Non-Energy Cost Savings ($)</th>
<th>Simple Payback (Years)</th>
<th>Savings Investment Ratio (SIR)</th>
<th>eROI</th>
</tr>
</thead>
<tbody>
<tr>
<td>C17-05</td>
<td>Solar Water Heating System (Bldg. 8, 11, &amp; 48)</td>
<td>Operational</td>
<td>2007</td>
<td>Solar Thermal</td>
<td>Operational</td>
<td>ECIP</td>
<td>$429,100</td>
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<tr>
<td>N33391-07-D-1102</td>
<td>1 MWR Solar Pool Heater</td>
<td>Operational</td>
<td>2010</td>
<td>Solar Thermal</td>
<td>Operational</td>
<td>Local</td>
<td>$60,210</td>
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<tr>
<td>P-1088</td>
<td>200 KW Solar Carport</td>
<td>Operational</td>
<td>2010</td>
<td>Solar Photovoltaic</td>
<td>Operational</td>
<td>ECIP</td>
<td>$1,850,000</td>
<td></td>
<td></td>
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<tr>
<td>P-1204</td>
<td>Solar Water Heating - Bldg 2 and 66</td>
<td>Operational</td>
<td>2013</td>
<td>Solar Thermal</td>
<td>Operational</td>
<td>ECIP</td>
<td>$262,977</td>
<td></td>
<td></td>
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<td>RM 14-2069</td>
<td>LED - EXTERIOR/HIGH BAY LIGHTING</td>
<td>Swing</td>
<td>2014</td>
<td>Lighting Systems</td>
<td>Rollout</td>
<td>EIE</td>
<td>$785,527</td>
<td>$26,896</td>
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<tr>
<td>ACQ158-14-17</td>
<td>Solar Hot Water System at B84</td>
<td>Operational</td>
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<td>Solar Thermal</td>
<td>Operational</td>
<td>O&amp;M/N</td>
<td>$81,235</td>
<td>$5,882</td>
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<td>N66171-12-0-D-1011</td>
<td>Energy Star Electrical Appliances (Washers, Dryers, etc.)</td>
<td>Operational</td>
<td>2015</td>
<td>Energy Efficient Products</td>
<td>Operational</td>
<td>Local</td>
<td>$72,495</td>
<td>$36,972</td>
<td></td>
<td>1.98</td>
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<tr>
<td>RM13-0717</td>
<td>B39 ENERGY IMPROVEMENTS</td>
<td>Operational</td>
<td>2015</td>
<td>Facility Energy Improvements</td>
<td>Operational</td>
<td>Local</td>
<td>$963,962</td>
<td>$92,719</td>
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<td>7.16</td>
<td>2.78</td>
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<td>RM13-0705</td>
<td>B38 ENERGY IMPROVEMENTS</td>
<td>Operational</td>
<td>2015</td>
<td>Facility Energy Improvements</td>
<td>Operational</td>
<td>Local</td>
<td>$334,234</td>
<td>$34,699</td>
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<td>9.66</td>
<td>2.61</td>
<td>4.30</td>
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<td>RM13-0718</td>
<td>B36 ENERGY IMPROVEMENTS</td>
<td>Operational</td>
<td>2015</td>
<td>Facility Energy Improvements</td>
<td>Operational</td>
<td>Local</td>
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<td>$79,840</td>
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<td>RM13-0763</td>
<td>LED LIT UPGRADING</td>
<td>Operational</td>
<td>2015</td>
<td>Lighting Systems</td>
<td>Operational</td>
<td>Local</td>
<td>$604,408</td>
<td>$35,665</td>
<td>$15,815</td>
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<td>RM13-0562</td>
<td>Non-Potable Water Irrigation System Upgrade</td>
<td>Operational</td>
<td>2016</td>
<td>Water Conservation Non-Potable</td>
<td>Operational</td>
<td>Local</td>
<td>$348,757</td>
<td>$59,605</td>
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<td>8.41</td>
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<td>PTC X005</td>
<td>B68 Upgrade Walk-In Freezers</td>
<td>Operational</td>
<td>2016</td>
<td>Energy Recovery Systems</td>
<td>Operational</td>
<td>Local</td>
<td>$40,000</td>
<td>$3,176</td>
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<td>12.70</td>
<td>2.00</td>
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<td>RM13-3000</td>
<td>B84 Energy Improvements</td>
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<td>2016</td>
<td>HVAC</td>
<td>Awarded</td>
<td>Local</td>
<td>$229,055</td>
<td>$17,331</td>
<td>$4,203</td>
<td>13.22</td>
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<td>RM13-3001</td>
<td>Various Energy Improvements</td>
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<td>2016</td>
<td>Solar Thermal</td>
<td>Awarded</td>
<td>Local</td>
<td>$589,729</td>
<td>$43,017</td>
<td>$8,214</td>
<td>14.14</td>
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<td>Awarded</td>
<td>2016</td>
<td>Electrical Energy Systems</td>
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<td>eMMPR</td>
<td>$1,042,276</td>
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<td>2017</td>
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<td>RME</td>
<td>$1,852,030</td>
<td>$204,292</td>
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<td>8.38</td>
<td>2.11</td>
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<td>ECM for various buildings</td>
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<td>2017</td>
<td>Facility Energy Improvements</td>
<td>Awarded</td>
<td>RME</td>
<td>$1,852,030</td>
<td>$204,292</td>
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<td>2.11</td>
<td>2.44</td>
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<td>RM 14-2286</td>
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<td>2017</td>
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<td>RME</td>
<td>$1,852,030</td>
<td>$204,292</td>
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<td>8.38</td>
<td>2.11</td>
<td>2.44</td>
</tr>
<tr>
<td>RM 15-2716</td>
<td>LED INTERIOR LIGHTING</td>
<td>Awarded</td>
<td>2018</td>
<td>Lighting Systems</td>
<td>Awarded</td>
<td>EIE</td>
<td>$608,937</td>
<td>$46,976</td>
<td></td>
<td>8.55</td>
<td>1.50</td>
<td>2.80</td>
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<tr>
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<td>Awarded</td>
<td>2018</td>
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<td>EIE</td>
<td>$608,937</td>
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<td>1.50</td>
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<td>2018</td>
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<td>EIE</td>
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<td>8.55</td>
<td>1.50</td>
<td>2.80</td>
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<td>RM 15-2716</td>
<td>LED INTERIOR LIGHTING</td>
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<td>2018</td>
<td>Lighting Systems</td>
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<td>EIE</td>
<td>$608,937</td>
<td>$46,976</td>
<td></td>
<td>8.55</td>
<td>1.50</td>
<td>2.80</td>
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<tr>
<td>RM 15-2716</td>
<td>LED INTERIOR LIGHTING</td>
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<td>2018</td>
<td>Lighting Systems</td>
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<td>$46,976</td>
<td></td>
<td>8.55</td>
<td>1.50</td>
<td>2.80</td>
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<td>LED INTERIOR LIGHTING</td>
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<td>$608,937</td>
<td>$46,976</td>
<td></td>
<td>8.55</td>
<td>1.50</td>
<td>2.80</td>
</tr>
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<td>RM 15-2716</td>
<td>LED INTERIOR LIGHTING</td>
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<td>Lighting Systems</td>
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<td>EIE</td>
<td>$608,937</td>
<td>$46,976</td>
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<td>8.55</td>
<td>1.50</td>
<td>2.80</td>
</tr>
<tr>
<td>P995</td>
<td>Energy Management Control Systems (EMCS)</td>
<td>Planned</td>
<td>2020</td>
<td>EMCS or HVAC Controls</td>
<td>Planned</td>
<td>ECIP</td>
<td>$2,345,087</td>
<td>$255,063</td>
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<td>9.49</td>
<td>2.27</td>
<td>2.56</td>
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<tr>
<td>P991</td>
<td>ECIP - Solar Carport</td>
<td>Planned</td>
<td>2021</td>
<td>Solar Photovoltaic</td>
<td>Planned</td>
<td>ECIP</td>
<td>$1,500,020</td>
<td>$117,957</td>
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<td>8.83</td>
<td>2.43</td>
<td>2.97</td>
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<tr>
<td>P998</td>
<td>ECIP - Upgrade Solar Carport Panels</td>
<td>Planned</td>
<td>2022</td>
<td>Solar Photovoltaic</td>
<td>Planned</td>
<td>ECIP</td>
<td>$993,002</td>
<td>$130,870</td>
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<td>8.11</td>
<td>2.38</td>
<td>3.10</td>
</tr>
</tbody>
</table>
Shore Energy Implementation Portfolio (SEIP) is an energy investment portfolio that reviews and forecasts Navy, Region and Installation performance towards achieving Navy-wide energy mandates.

More specifically, SEIP:

- Captures all Navy energy projects—past, present and future
- Summarizes energy management trends, projects and compliance progress
- Analyzes the effectiveness of all Navy energy investments
- Establishes future funding requirements to meet Navy objectives
NSA Souda Bay – Water and Energy Goals

- **Energy Dashboard (SEIP)**

  **Goals Summary**

<table>
<thead>
<tr>
<th>Intensity</th>
<th>MBTU/KSF</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015 Baseline</td>
<td>67</td>
<td>0%</td>
</tr>
<tr>
<td>2016 Target</td>
<td>66</td>
<td>-3%</td>
</tr>
<tr>
<td>2016 Current</td>
<td>53</td>
<td>-6%</td>
</tr>
<tr>
<td>Current Goal Status</td>
<td>Met</td>
<td></td>
</tr>
<tr>
<td>2025 Target</td>
<td>50</td>
<td>-25%</td>
</tr>
<tr>
<td>2025 Forecast</td>
<td>45</td>
<td>-33%</td>
</tr>
<tr>
<td>Remaining to Target</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Target Goal Status</td>
<td>Met</td>
<td></td>
</tr>
</tbody>
</table>

  *DUERS data represents Goal Subject Facilities*

  **Forecast to Goals**

  **Commodity Breakdown**

  - ELC: 75%
  - COL: 0%
  - FBD: 0%
  - FOR: 0%
  - FSD: 0%
  - FSR: 0%
  - FSX: 25%
  - NAG: 0%
  - PPG: 0%
  - STM: 0%

  **Select Year:** 2016

  **Project Costs/Energy Savings**

  - Total Energy Cost Savings: $7
  - Total Project Costs: $9
  - Energy Savings: $1
  - Cost: $4
  - 2016: $2
  - 2017: $3
  - 2018: $3
  - 2019: $4
  - 2020: $6
  - 2021: $4
  - 2022: $5
  - 2023: $3
  - 2024: $2
  - 2025: $1
  - 2026: $0
NSA Souda Bay – Water and Energy Goals
Navy Shore Geospatial Energy Module (NSGEM) is an interactive web map and reporting capability that integrates the authoritative data systems to visualize monthly energy use Navy-wide.

Key Features

- Installation Mapping (Visualization)
- Data Assessment Score (DAS)
- Installation Tenant Map & Report
- Facility Scorecards
- POC Tracking (new)
NSA Souda Bay – NAVY Tool Suite (NSGEM)

- Visualization (Benchmarks)
NSA Souda Bay – NAVY Tool Suite (NSGEM)

- Visualization (Dashboard)
NSA Souda Bay – NAVY Tool Suite (NSGEM)

• NSGEM Data Assessment Score

![NSGEM Data Assessment Score Report](Image)

<table>
<thead>
<tr>
<th>Billing Month</th>
<th>INFADs</th>
<th>Circuits</th>
<th>WW CI</th>
<th>Overall</th>
<th>Score Breakdown</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 2017</td>
<td>96/95</td>
<td>95/95</td>
<td>85/82</td>
<td>85.52</td>
<td>96.0 INFADs (%)</td>
</tr>
</tbody>
</table>

Previous 6 Month Facility Count / Score Trend

![NSGEM Data Assessment Score Metrics](Image)

- INFADs Record Counts (% Facilities in INFADs): 96.0%
- KSF Areas in Null (Blank, Black): 98.3%
- Primary Use Category Code is Not Blank: 99.6%
- KSF Area in Range: 98.3%
- Tenant Command is Not (Null, Blank, Black): 89.2%
- Condition Rating in Non: 98.3%
- Preponderant User is Not (Null, Blank, Black): 98.3%
- Circuits (% Facilities in Circuits UA): 74.3%
- NFA ID Available: 87.9%
- Occupied Space Matches INFADs KSF Area: 80.6%
- Worldwide CI: 81.5%

Print Date: August 02, 2017
nsgem-support@qloino.com
FOR OFFICIAL USE ONLY

Data Assessment Score for Site

<table>
<thead>
<tr>
<th>Month</th>
<th>Overall Score</th>
<th>INFAD Score</th>
<th>KSF Score</th>
<th>CI Score</th>
<th>Worldwide CI</th>
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<tr>
<td>May 13</td>
<td>80</td>
<td>80</td>
<td>80</td>
<td>80</td>
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<tr>
<td>Jun 13</td>
<td>75</td>
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<td>Jul 13</td>
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<tr>
<td>Sep 13</td>
<td>60</td>
<td>60</td>
<td>60</td>
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<td>60</td>
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25 Energy Exchange: Connect • Collaborate • Conserve
NSA Souda Bay – NAVY Tool Suite (NSGEM)

- Tenant & Facility Reporting
NSA Souda Bay – NAVY Tool Suite (NSGEM)

- Solar Potential (Micro-Renewables)
The Installation Energy Manager or IEM –

- is an essential advocate for an effective Energy Management Program
- has a 100% focus (NOT a collateral duty) on energy and water issues
- is a local energy and water subject matter expert with direct access to the installation’s commanding officer
- has a community of fellow IEMs at Navy bases throughout the region which offer opportunities to collaborate and compete
- is the Steward of the Energy Management “three-legged stool”
<table>
<thead>
<tr>
<th>Three-Legged Stool</th>
<th>Resiliency</th>
<th>Awareness</th>
<th>Culture Change-Behavior</th>
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</thead>
<tbody>
<tr>
<td><strong>Renewables:</strong></td>
<td><strong>Community Welcome Briefing (‘INDOC’):</strong></td>
<td><strong>Energy Biggest Loser (eBL):</strong></td>
<td></td>
</tr>
<tr>
<td>• Passive Solar Hot Water</td>
<td>• Informs newcomers of community’s expectations regarding energy and water conservation practices at the installation</td>
<td>• Conceived as a practical demonstration of the usefulness of AMI</td>
<td></td>
</tr>
<tr>
<td>• PV Carports</td>
<td><strong>Bldg Energy Monitor (BEM) Program/Zone Inspection (ZI) Program:</strong></td>
<td>• Pitted one building’s occupants collectively vs the other’s (Biggest losers got pizza)</td>
<td></td>
</tr>
<tr>
<td><strong>Micro-grid/Smart-grid:</strong></td>
<td>• BEM responsibilities are collateral duty to service members</td>
<td>• Evolved into a month-long regional competition between installations</td>
<td></td>
</tr>
<tr>
<td>• Power Generation</td>
<td>• Actively engaged leadership with regular, on-site inspections of facilities, including energy and water issues</td>
<td><strong>Fuel For the Fleet (F³):</strong></td>
<td></td>
</tr>
<tr>
<td>• Energy Management Control Systems</td>
<td><strong>Public Affairs:</strong></td>
<td>• Year-long competition between installations to reinforce cultural change</td>
<td></td>
</tr>
<tr>
<td>• Advanced Metering Systems</td>
<td>• Enthusiastic Public Affairs Office makes it easy to inform the community</td>
<td>• Readings taken monthly, quarterly and at year end</td>
<td></td>
</tr>
<tr>
<td><strong>Net Zero:</strong></td>
<td><strong>Energy/Water Nexus:</strong></td>
<td><strong>Notional Billing:</strong></td>
<td></td>
</tr>
<tr>
<td>• Building Integrated Photovoltaic Systems (BIPV) Building 61</td>
<td>• The connection between the two is not intuitive to the general public!</td>
<td>• activities don’t need to pay for energy/water bills ... so it’s “free”</td>
<td></td>
</tr>
<tr>
<td><strong>Funding Sources (AF/NWCF/ECIP/ESPC):</strong></td>
<td><strong>Name and Shame:</strong></td>
<td>• Notional billing is intended to “hit ‘em in their pocketbooks” to drive home the impact of their actions</td>
<td></td>
</tr>
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Projects – Past, Present and Planned

- **Projects (RMe/eMMRP/ECIP); examples as follows:**
  - LED Exterior and Interior Lighting (Occupancy and Daylight Sensors)
  - High Efficiency HVAC
    - Variable Refrigerant Flow Systems
    - Air-Source Heat Pumps
    - Direct Digital Controls
    - Energy Recovery Ventilators
  - Variable Frequency Drives (Pumps, EC Motors)
  - High Efficiency Refrigeration (Compressors)

- **ESPC (investigated and shelved):**
  - Tri-Generation Systems
  - Utility Scale Photovoltaic Systems
  - Battery Storage Systems

- **SCADA/DDC (we’ve already got 88% AMI):**
  - Absolutely essential for efficient energy management!
Results – A Proven Track Record

- **2016** – SecNav Energy and Water Management Award –
  - best of the small shore installations

- **2015** – SecNav Energy and Water Management Award –
  - Gold Level of Achievement

- **2014** – SecNav Energy and Water Management Award –
  - Gold Level of Achievement

- **2013** – SecNav Energy and Water Management Award –
  - Gold Level of Achievement

- **2012** – SecNav Energy and Water Management Award –
  - Gold Level of Achievement

- **2011** – SecNav Energy and Water Management Award –
  - best of the small shore installations
eROI Scoring

Maximize Energy Return on Investment (eROI)

Portfolio Objective

Maximize Financial Benefits
- Maximize cost savings and cost avoidance
- Provide complimentary SRMe and BOS impacts and effects

Minimize Shore Energy Consumption
- Minimize energy consumption
- Maximize energy efficiency, carbon neutrality, and emissions reductions

Provide Reliable Energy to Critical Infrastructure
- Criticality of infrastructure
- Reliance on energy
- Frequency and duration of outages
- Incremental back up power

Achieve Regulatory Compliance and Stakeholder Expectations
- Meet legal and regulatory mandates
- Enhance the Quality of Life and Quality of Service for Navy
- Enhance Navy’s public perception

Develop Enabling Infrastructure
- Improve energy production and consumption data
- Develop flexible energy infrastructure
- Demonstrate and enable new energy technology adoption

Strategic Objectives

Key Drivers
The “Three-legged Stool” – Resiliency

• **Renewables:**
  – Passive Solar Hot Water
  – PV Carports

• **Micro-grid/Smart-grid:**
  – Power Generation
  – Advanced Metering Systems

• **Net Zero:**
  – Building Integrated Photovoltaic Systems (BIPV) – Building 61

• **Funding Sources (AF/NWCF/ECIP/ESPC):**
  – Some work; some don’t.
  – Timing is the key when seeking government funds – be ready to go!

• **Potential Partnerships (US/HN/NATO):**
  – Joint proposal for PV farm – looking to leverage economies of scale
The “Three-legged Stool” – Education/Awareness

• **Community Welcome Briefing (“INDOC”):**
  – Informs newcomers of community’s expectations regarding energy and water conservation practices at the installation

• **Bldg Energy Monitor (BEM) Program/Zone Inspection (ZI) Program:**
  – BEM responsibilities are collateral duty to service members
  – Actively engaged leadership with regular, on-site inspections of facilities, including energy and water issues

• **Public Affairs:**
  – Enthusiastic Public Affairs Office makes it easy to inform the community
  – Media sources include AFN, Navy publications, Energy Water Tips of the week using the installation’s “Plan of the Week” as the vehicle.
  – Message board when entering the base

• **Energy/Water Nexus:**
  – The connection between the two is not intuitive to the general public!
Changing Culture through Competitive Events –

- **Energy Biggest Loser (eBL):**
  - Conceived as a practical demonstration of the usefulness of AMI
  - Pitted one building’s occupants collectively vs the other’s (Biggest losers got pizza)
  - Evolved into a month-long regional competition between installations

- **Fuel For the Fleet (F³):**
  - Year-long competition between installations to reinforce cultural change
  - Readings taken monthly, quarterly and at year end
  - Competition began on 1 May 2017

Changing Culture by Impacting Behavior –

- **Notional Billing:**
  - activities don’t need to pay for energy/water bills ... so it’s “free”
  - Notional billing is intended to “hit ‘em in their pocketbooks” to drive home the impact of their actions

- **Name and Shame:**
  - Energy “hogs” are under scrutiny!
ENERGY ACTION MONTH

F3 (Fuel For the Fleet)

Don’t create extra heat for your A/C to handle!
Minimize summer use of curling irons, blow dryers, computers, TVs, and other electronic devices that heat up your house!

Beat the heat

Set it once: Thermostats are not gas throttles. Turning the thermostat way up or way down will not cool/heat the room any faster. Set it for 25°C and let it be.
NSA Souda Bay – Renewable Energy Projects

Solar Carport 210kW – 2012 (ECIP)

(B61) MWR OAC Net-Zero – 2016 (RMe)

(B56) NGIS Solar Hot Water – 2015 (RMe)

(B48) NGIS Building Integrated PV 40kW – 2016 (RMe)
NSA Souda Bay – Water Conservation
NSA Souda Bay – SEIP Workflow Diagram

Production Transmission Consumption → Data collection → Authoritative Reporting → Installation Rollup → Reports

- DUERS
- CIRCUITS
- INFADS
- GOALS
- EROI
- ENERGY PROJECT LIST (EPL)

Installation Energy Manager

Installation Master Meter

Facility Metering

Facility Data

Progress on All Goals

Forecast to Goals

Multi-Year Forecast