

Lessons Learned: Comparing Options for Energy Assurance



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Outline



- Three example projects
 - MAGTFTC 29 Palms – PV and Cogen
 - NB Coronado – PV and Microturbines
 - NSY Portsmouth – Cogen Plant
- Motivation
- Expectations and Performance
- Lessons Learned

Introduction



- DoN Energy Assurance - Drivers
- 1999 Executive Order 13123

- NFESC Energy Programs Division
 - Supports NAVFAC Energy Program
 - <https://energy.navy.mil/>

- Alternative Financed Contracts



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Rochester, New York

MAGTFTC 29 Palms, CA



MAGTFTC 29 Palms

General Description of PV & Cogen



- 1.2 MW PV Array
 - Ribbon cutting November 2003
 - Active single-axis PV, up to 25%+ energy
 - Largest capacity federal PV array, 8,706 panels covering 6 acres
- 7.5 MW Cogen Plant
 - Fully operational February 2003
 - Natural gas-fired turbine, simple-cycle system, heat recovery HTHW heater

MAGTFTC 29 Palms Motivation for PV & Cogen



- Enhanced Reliability:

 - End-of-line outages

 - Alternate fuels – Solar PV & Natural gas Cogen

 - Backup fuel – Diesel Cogen

 - Cogen provides critical off-grid power needs

- \$4.5M rebate on PV from gas company

- 2001 California Energy Crisis

MAGTFTC 29 Palms Expectations and Performance



In 1st year M&V - No official results

- PV: On track per preliminary mo. reports
 - 2.16M kWh produced in 10 mo. thru July
 - 2.5M kWh guarantee
- Cogen: At full capacity
 - Elec: 50% summer, 95% winter
 - Heat: 100% summer, 50% winter

MAGTFTC 29 Palms Lessons Learned



1.2 MW PV Array

- Strong winds help to keep panels clean
- Bundling and incentives
- Need outside electrical source to operate inverters – Tie into Cogen

7.5MW Cogen Plant

- Team Effort
- Contractor Maintenance



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Navy Base Coronado, NRSW San Diego Skyline



NRSW

General Description



750 kW PV Array

- Ribbon cutting November 2002
- North Island NAS, San Diego, CA
- 3,078 fixed panels on two parking structures

120 kW Microturbine Plant

- Beneficial use of system in June 2002
- Naval Amphibious Base (NAB), San Diego
- Two 60 kW NG Microturbines with heat exchanger to preheat HTHW loop

NRSW

Motivation for PV & Microturbines



- Less reliance on grid - 2001 California Energy Crisis
 - 11x increase in ave. wholesale electric rate from \$29.71/mWh in 12/99 to \$376.99/mWh in 12/00
- \$3.375M rebate on PV from the CPUC
- New and innovative: Microturbine pilot project

NRSW

Expectations and Performance



750 kW PV System

- Meeting savings guarantee per 1st year M&V
- On-site real-time output display

120 kW Microturbine

- Under-performed in 1st year
- M&V report identified manufacturer defect
- No cost replacement, on track for 2nd year
- Replaces boiler plant in summer – DHW load

1 Million kWh Milestone Sunday, July 2003



NRSW

Lessons Learned



- 750 kW PV Array
 - Keep spare panels in stock
 - Regular cleaning to avoid output degradation.
 - Need space – capacity limited by # panels
 - Importance of bundling and incentives
- 120 kW Microturbine Plant
 - Noise level may impact location of microturbines
 - 100% use of recovered heat improved economics
 - NFESC testing indicates acceptable NO_x & CO



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Naval Shipyard Portsmouth Kittery, Maine



NSY Portsmouth General Description of Cogen



- Project #1: 5.2 MW Cogen
 - Construction complete Dec 2000
 - Natural gas turbine with 75,000 lb/hr heat recovery steam generator - single fuel

- Project #2: 5.5 MW Cogen,
 - Construction complete May 2004
 - Natural gas turbine with 75,000 lb/hr heat recovery steam generator - #2 fuel oil back-up.
 - Two 2 MW diesel generators and two 70,000 lb/hr dual-fuel steam boilers

NSY Portsmouth Motivation for Cogen



- Independent study defined preferred power plant
- Enhanced reliability, independence from grid
 - Storm outages, post 9/11, critical power needs
- Replaced 1940's steam power plant
- Contractor maintenance / Major overhaul
- Price fluctuations - Maine electricity deregulation

NSY Portsmouth Expectations & Performance

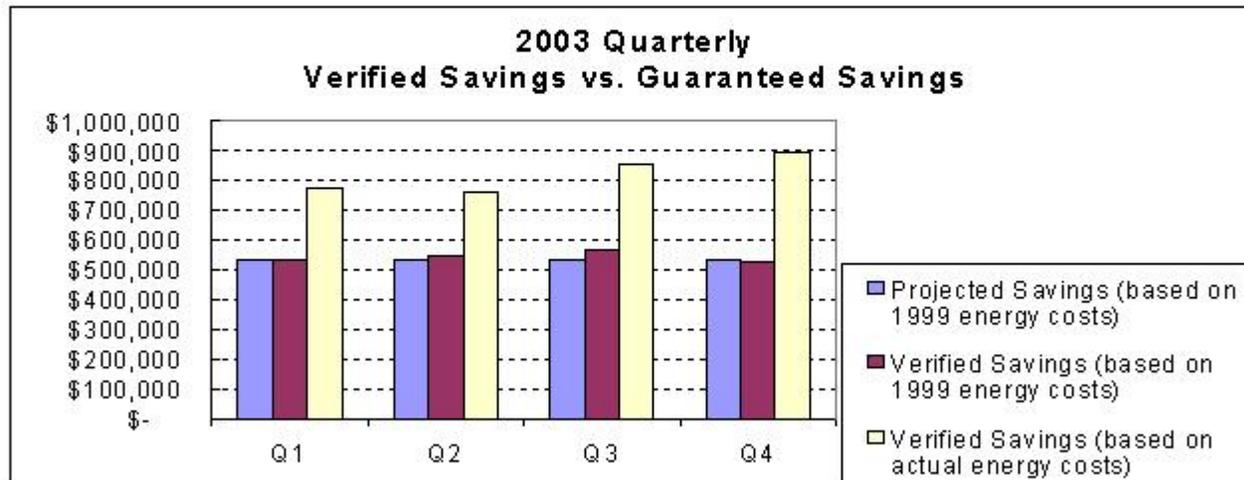


- Projects satisfy base electrical & heating needs
- Base can island
- Project 1 achievement of savings verified thru M&V

NSY Portsmouth Expectations & Performance



PNS TO #1



I:\PNS\TO 1\NM&V\Year 3 (2003)\Quarter 4\spreadsheets\Efficiency-verified vs predicted graph.xls\Performance

NSY Portsmouth Lessons Learned for Cogen



- Based on hindsight, Customer would have liked to have done an even larger project with additional work on compressed air systems.
- Project exceeds customer expectations in savings potential and relief of plant maintenance burden
- Complex project requires all levels be involved
- Need for dual fuel cogen in Project #2

My Calculations



	Ports. Cogen #1 / #2	29 Pa. Cogen	29 Pa. PV	NRSW PV	NRSW MicroT
\$/kW	1,887 / 1,967	2,154	9,120	10,294	5,519
Paybk.	5.5 / 11.7	2.8	27.9	33.8	8.5
Rebate			(16.4)	(19.0)	

Concluding Remarks



- DG and CHP are successful in alternative financed projects
- DG and CHP help meet DoN assurance needs