



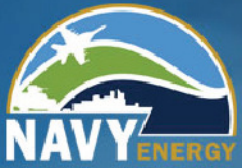
The Nexus Between Acquisition and Energy Studies at the Naval Postgraduate School

<http://nps.edu/energy>

ICEAA Workshop

March 2014

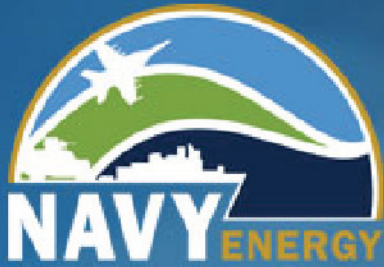




Agenda

- Bottom line up front (BLUF)
- EAG Background
- Current SECNAV Guidance and Requirements
- What has been accomplished
 - Curriculum Development and Delivery
 - Research
 - Outreach
- Next steps
 - Curriculum Development and Delivery
 - Research
 - Outreach





BLUF

The Energy Academic Group (EAG, <http://nps.edu/energy>) can support you with your energy issues

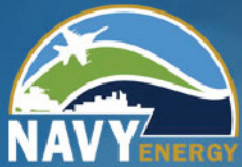
Curriculum Development and Delivery

- Masters -- 4 graduates, 12 currently enrolled
- Certificate -- 8 completed, 15 currently enrolled
- Seminars -- 32 Completed
- Executive Education -- 2 classes completed; 35 Flags/SES attended; Program formally embedded in Naval Flags curriculum; VERY strong support from ASN and OPNAV senior leadership
- **Research**
60+ theses, 40+ research projects
- **Outreach**
US Government (defense and nondefense), commercial firms, academic institutions

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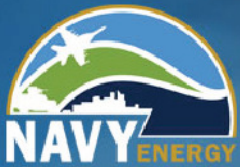
EAG Background

EAG charter May 2013



EAG mission *The overall objective for the EAG is to develop and maintain NPS as a Navy Center of Excellence for Energy Graduate Education and Research. The EAG will also actively explore educational and research partnerships across the full spectrum of Department of Defense (DOD) related organizations, Department of Energy (DOE), as well as other universities, industry, and non-profit sectors.*

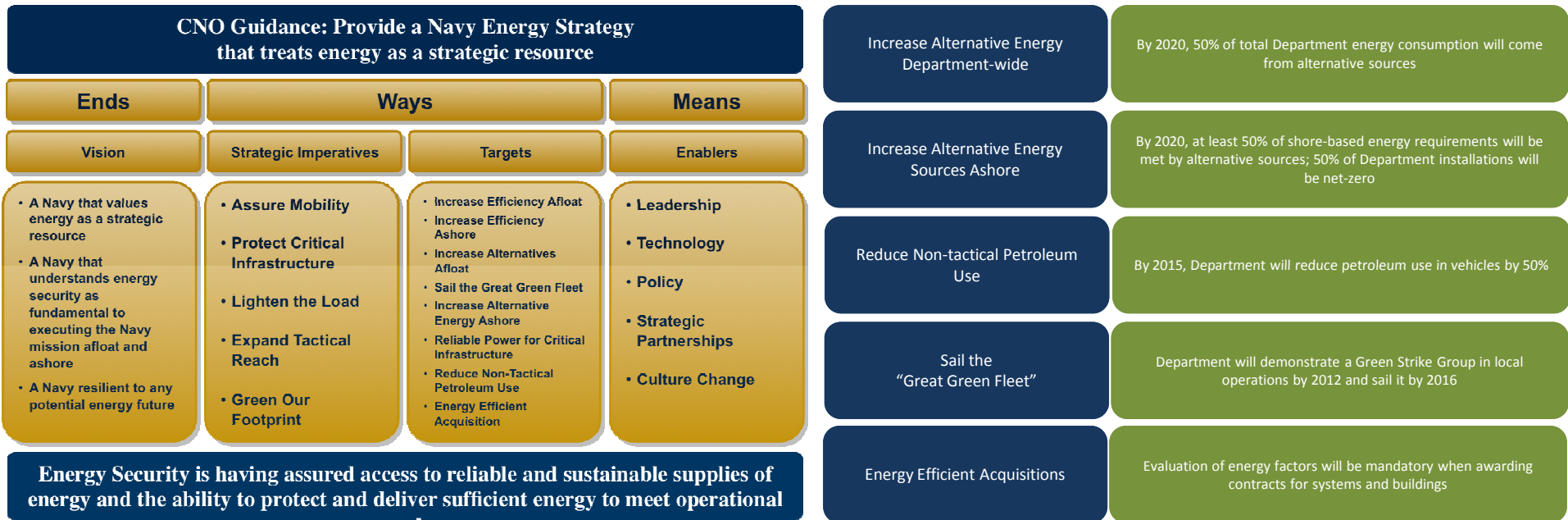




SECNAV Energy Guidance

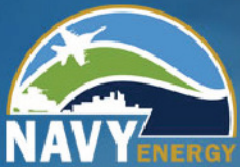
GOALS

VISION



← NPS is involved in EVERY aspect →

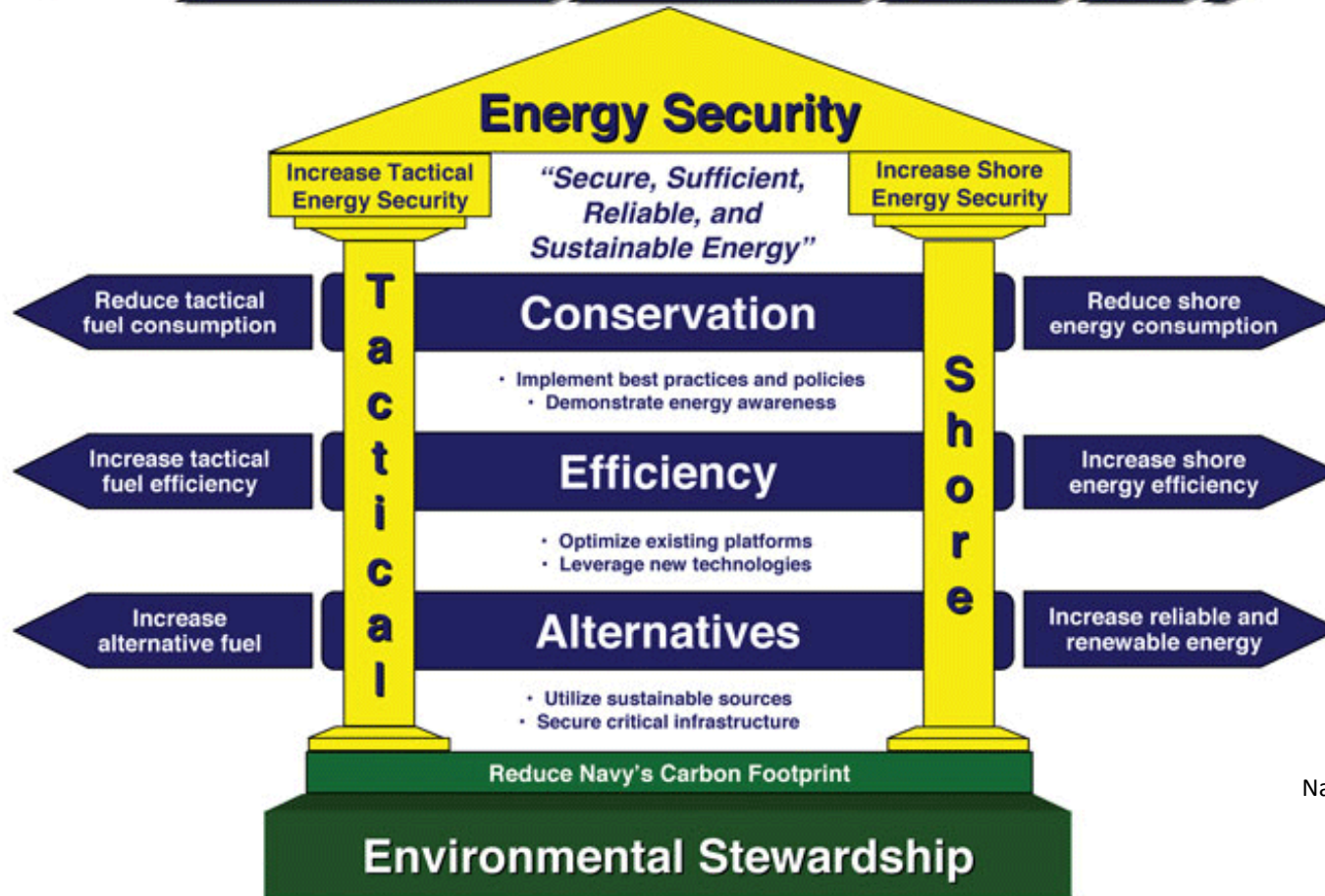




Navy Energy Guidance

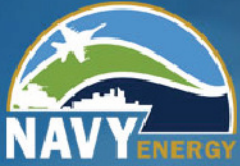


Navy Energy Strategy



Naval Energy – A Strategic Approach
Oct. 2009
SECNAV



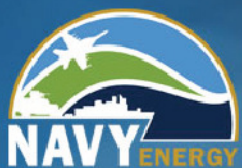


Accomplishments: May – December 2013

The next slides identify accomplishments since EAG was established, in each of three dimensions:

- Curriculum Development and Delivery
- Research
- Outreach





Curriculum Development and Delivery

- **Master's Degrees**

Department	CURRIC #	P-CODE
Operations Analysis	358	5603
Naval Mechanical Engineering	563	3213
Electrical and Computer Engineering	593	3113
Financial Management	838	5311

- **Certificates**

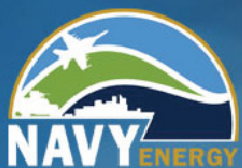
- Science and Technology
- Policy and Analysis

- **Seminar / Speaker's Series**

- NPS Faculty, Academics, National Labs, Industry

- **Executive Education** -- Naval Flag Officers, SES, E9s





Curriculum Development and Delivery— Students enrolled and graduated

Master's Degrees			
Dept	Students enrolled	Students graduated	FY14
OA	2	0	5
ME	2	0	0
ECE	1	0	3
FM	9	4 (June 2013)	5

Certificate (Only)

15 enrolled

8 completed

Seminar / Speaker's Series

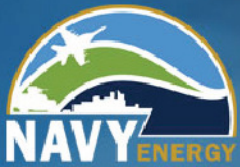
32 seminars with speakers from industry, government, and academia

Executive Education

FY13—2 classes; 35 Flags/SES attended

FY14 --Three classes scheduled. Program formally embedded in Naval Flags curriculum . Very strong support from ASN and OPNAV senior leadership.





USMC E20 Support—Completed Studies

<https://wiki.nps.edu/display/E2ONPS/NPS-E20+Research+Home>



NPS-E20 Research / NPS-E20 Research Home

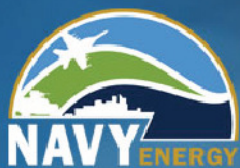
Watch Share Tools

Completed Studies

Added by Trawick, Lisa (CIV) (4291 karma), last edited by Hazard, Lois (CIV) (110 karma) on Feb 07, 2014 (view change)

NPS Student	Projected Graduation Date	Title	NPS Faculty	E20 POC
LT Crystal Miller, USN	June 2013	Alternative Energy Systems for Maritime Prepositioning Force Operations	Prof Andy Hernandez	Maj Brandon Newell
LT Matthew McClure, USN	June 2013	A Systems Engineering Feasibility Study of Scaled Geothermal Power	Prof Fernand Marquis	Maj Brandon Newell
LT Ryan Langham, USN	June 2013	Use of Radioisotope Thermoelectric Generators in USMC Expeditionary Unit Equipment	Prof Fernand Marquis	Maj Brandon Newell
LT Daniel Hogue, USN LTJG Sarah Gregory, USN	June 2013	MEMS-Based Waste Vibrational Energy Harvester	Prof Dragoslav Grbovic	Maj Brandon Newell
Capt Joshua Kapp, USMC	Sept 2013	Analysis of Advanced Battery Technology for USMC Expeditionary Tactical Information Systems	Prof Sebastian Osswald	Capt Anthony Ripley
SE Capstone Students	Sept 2013	SE CAPSTONE I	Prof Gene Paulo	Gayle Von Eckartsberg
LT Stephen Skahen, USN; LT Jason Maier, USN	Dec 2013	SE CAPSTONE II: Exploring the Reduction of Fuel Consumption for Ship-To-Shore Connectors of the Marine Expeditionary Brigade	Prof Gene Paulo	Gayle Von Eckartsberg
Capt Jason Ciarcia, USMC	Dec 2013	New Media, Technology Frames, and the Adoption of Sustainable Energy Technologies by the U.S. Marine Corps - Part I: Key Drivers of Marines' Willingness to Adopt Energy Efficient Technologies	Prof Kathryn Aten	Gayle Von Eckartsberg
LT Dan Eddy, USN LT Jonathan Greewald, USN MAJ Vinny Nguyen, USN	Dec 2013	New Media, Technology Frames, and the Adoption of Sustainable Energy Technologies by the U.S. Marine Corps - Part II: Use of Energy Efficient Technologies - USMC Perceptions to Adoption	Prof Kathryn Aten	Gayle Von Eckartsberg





USMC E20 Support—Current Studies

<https://wiki.nps.edu/display/E2ONPS/NPS-E20+Research+Home>



NPS-E20 Research / NPS-E20 Research Home

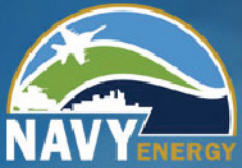
Watch Share Tools

Current Studies

Added by Wekell, Alexander (Alex) (CIV) (218 karma), last edited by Hazard, Lois (CIV) (110 karma) on Feb 20, 2014 (view change)

NPS Student	Projected Graduation Date	Title	NPS Faculty	E20 POC
Capt Matthew Morse, USMC	May 2014	Adaptation of the HOMER Energy Micropower Optimization Model for Marine Corps Logistics	Prof Dan Nussbaum	Capt Anthony Ripley
TBD	TBD	Graphene Research Roadmap in Support of US Marine Corps Expeditionary Energy	Prof Claudia Luhrs	Capt Anthony Ripley
Capt Matthew Morse, USMC	May 2014	Improving Cost/Benefit Assessment for Energy Initiatives using Robust Design	Prof Susan Sanchez	Shawn Charchan
LT Sian Stimpert, USN	June 2014	Lightening the Load of a USMC Rifle Platoon through Robotic Integration	Prof Andy Hernandez	Capt Anthony Ripley
Capt Stan Lapp, USMC; Capt Doug Columbus, USMC	June 2014	Development of Advanced High Efficiency, Low Cost Flexible Solar Cells for USMC Expeditionary Energy Applications	Prof Sherif Michael	Capt Anthony Ripley
LT Mark Beale, USN	June 2014	Improving Energy Efficiency of Diesel Generators by Optimizing Exhaust Duct Designs	Prof Sanjeev Sathe	Capt Anthony Ripley
LCDR Nomer Gatchalian, USN; LT Donald McIntyre, USN; and LCDR Matthew Reed, USN	June 2014	New Media, Technology Frames, and the Adoption of Sustainable Energy Technologies by the U.S. Marine Corps: Part III - Investigating Digital and Social Media and Energy Efficient Behavior	Prof Kathryn Aten	Gayle Von Eckartsberg
N/A	N/A	CERP ITX: Marine Behavior, Perceptions, Decisions, and Energy Management. Phase I	Prof Anita Salem and Prof Michael McCauley	Maj Anthony (Tony) McNair



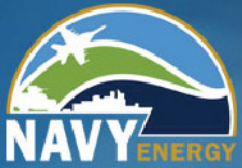


Naval Studies Program

<https://wiki.nps.edu/display/NSP/NPS+Studies+Pro>

- FY 14 Ongoing Energy projects
 - Developing New Paradigm for High Energy Density Capacitive Energy Storage
 - Alternative Fuel Usage Practices
 - Accelerating Navy Energy Culture Change
 - Reduction of Aviation Fuel Consumption Through Slot Management
- Next round – – Began with Requirements Fair at NPS earlier this week





Faculty Research

FY13 Survey of 10 Faculty Research Projects

3 published papers

7 projects underway



Faculty Research Areas

Resource Curse in East Asia and the Pacific

Cost analysis

Heat Exchangers for Energy Recovery

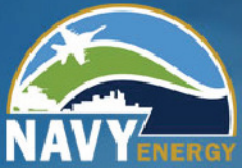
Pricing Contracts Under Uncertainty

Self-Sustaining Logistics Networks

DoD Energy Objectives

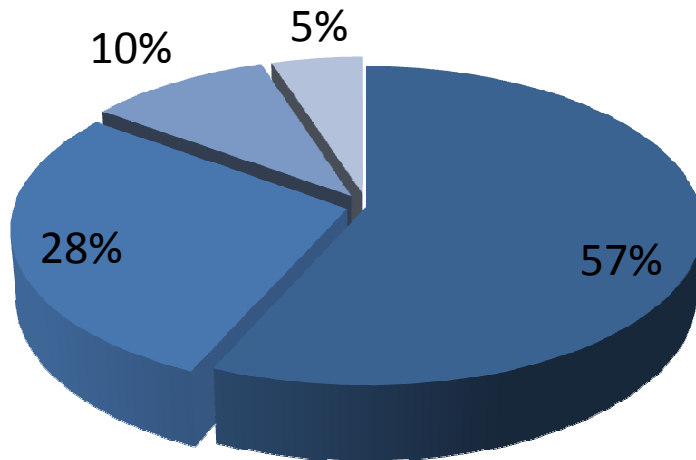
Petroleum Dependence





Student Research

FY13 Survey of 60 Energy Theses



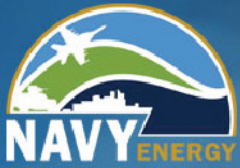
- Engineering & Applied Sciences (34)
- Operational & Information Sciences (17)
- Business & Public Policy (6)
- International Graduate Studies (3)



Thesis areas (sample)

- Hybrid electric grid
- Cost analysis
- Thermal storage
- Flexible solar cells
- Fuel distribution
- Resource burden
- Plug-in electric drive vehicles
- LED lighting
- Power transfer efficiency
- Graphene
- Energy manpower
- Aluminum AUV hull
- Supercapacitors
- Algae Hyperprocessed Renewable Diesel



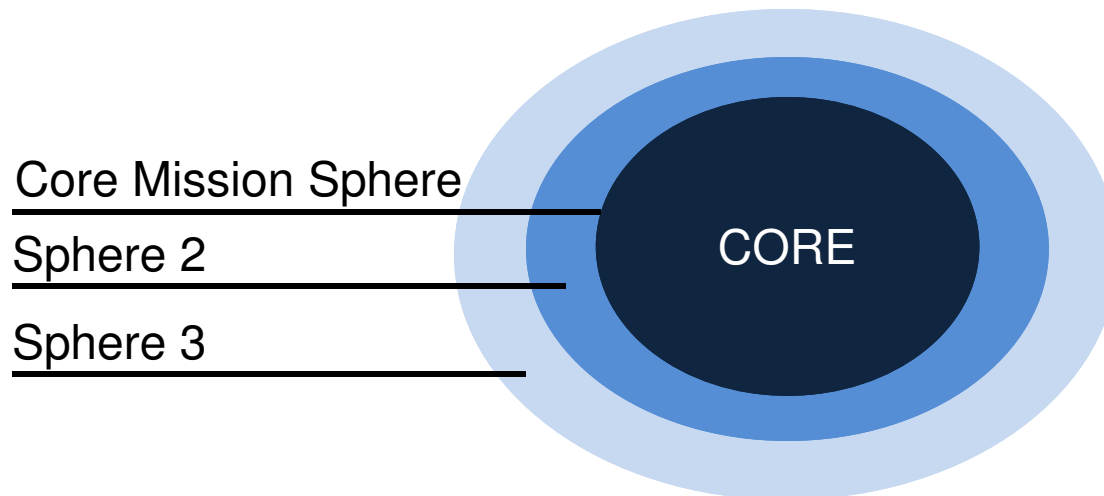


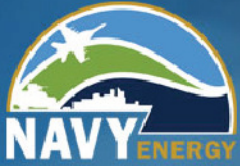
Outreach in Support of NPS's Core Mission

NPS's core mission is the **Graduate Degree Education** of U.S. Naval Officers

Sphere 2 is the **Reimbursable Research** performed at NPS which enriches the core mission by providing students and faculty the opportunity to apply their learning and expertise to real-world challenges

Sphere 3 is **Non-Degree Education** performed by NPS faculty which enriches the core mission by providing expanded teaching opportunities reaching a broader student demographic, which results in deeper knowledge, greater experience of practice, and improved, more dynamic academic rigor in the NPS classroom

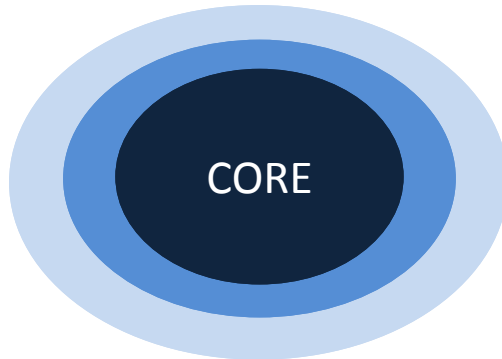




Outreach Overview

EAG has built relationships to provide...

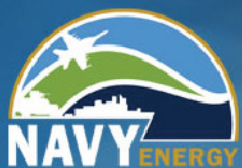
- Enhancement of NPS's core mission
 - ***Graduate Education*** of Naval officers
 - ***Faculty Research*** to support that mission
 - ***Non-degree Education*** programs to support that mission
- Awareness of NPS's capabilities
- Opportunities to work collaboratively



- ***USG Stakeholders***
 - USN and USMC
 - ONR / ONRG
 - DOE - HQ and NREL
 - OSD - OEPP
 - JCS J5
 - PACOM / PACFLT
 - NATO - HQ and NATO School
- ***US Academic Institutions***
 - USMA, NWC, USNA, NDU
 - UT Austin
 - SANDIA National Labs
- NPS Representative for OPNAV
N45 Navy Energy Training & Education Working Group

Outreach: Defense Seminar Series

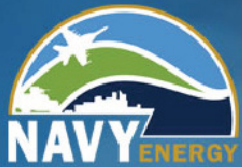




Outreach: Defense Seminar Series

- Academic Institutions—NPS, Stanford, CalTech, Bucknell
- Research Laboratories/Institutions--Lawrence Livermore, Sandia, Pacific Northwest National Labs, Monterey Bay Aquarium Research Institute, Electric Power Institute
- Industry / Private Sector
 - Rocky Mountain Institute, IBM Senior Research Division, Babcock & Wilcox, Tesla Motors, Yardney Technical Products, Pathfinder Partners
- Government
 - Director for Operational Energy, DOE
 - Director, Navy Energy Coordination Office (OPNAV N45E)





Next Steps

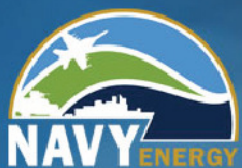
- **Curriculum Development and Delivery**

- Merge two N00F flag level courses, Leading Innovation and Executive Energy Education. Beta class—24-28 Feb—with two more classes to follow
- Curriculum reviews of all four master's degree programs. First scheduled is ECE, 22 – 23 Jan. 2014
- Seek demand signal for distance-learning component of curriculum
- Develop Energy Security Exec Ed courses for International Audience
- Develop short courses in Critical Energy Infrastructure Protection and Energy Security in the Supply Chain

- **Research**

- Complete FY 13/14 studies and prepare for FY 15 studies
 - N1 Studies Program (4), USMC E20 Studies Program (8), N45 Support, and OSD Operational Energy Program
- Continue structuring and development of NPS – wide energy research enterprise
- Support faculty research interests in, for example:
 - Operationalizing the energy technology gap for expeditionary ops and HA/DR missions
 - Operationalizing solar, wind and fuel cell solution
 - Collaborative research programs in Flexible Solar Cell Technology



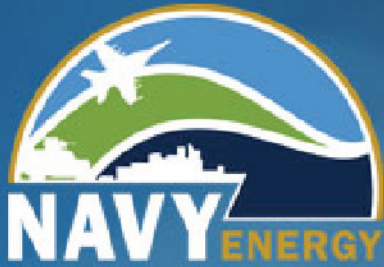


Next Steps (cont)

- **Outreach**

- Continue developing external relationships, with priority on
 - Other parts of Naval enterprise (e.g., ONR, N45, USNA, NWC, MARFORPAC – MEC)
 - OUSD AT&L – Coalition Warfare Program
 - USA and USAF curriculum and program collaboration
 - Other US Academic Institutions
 - NATO Energy Security initiatives
- Continue the Seminar / Speaker's Series





BLUF & QUESTIONS

<http://nps.edu/energy/>

The Energy Academic Group (EAG, <http://nps.edu/energy> can support you with your energy issues

Curriculum Development and Delivery

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