A Navy Energy Vision for the 21st Century

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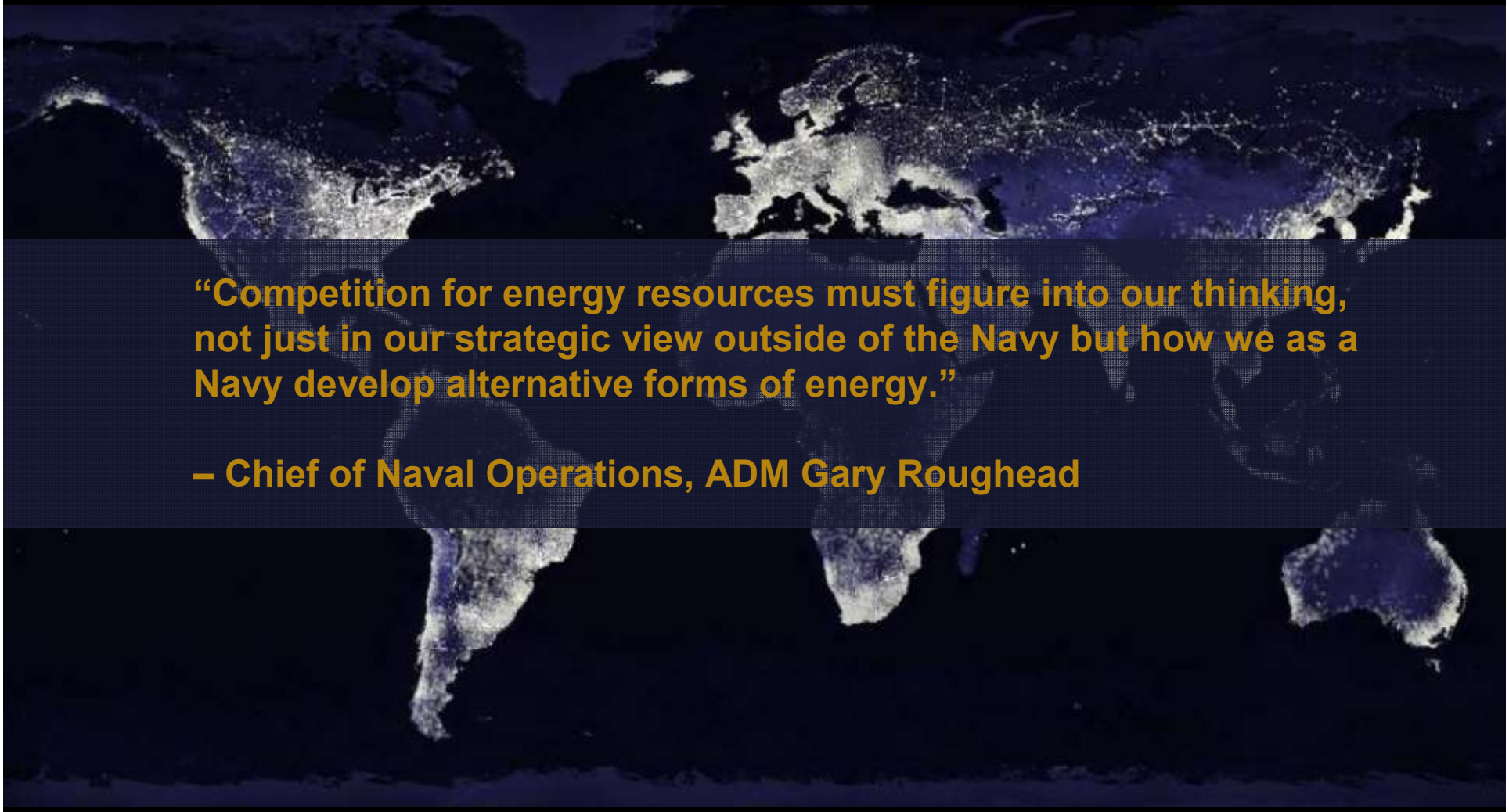
Global energy consumption is growing...

Today

... to unprecedented levels



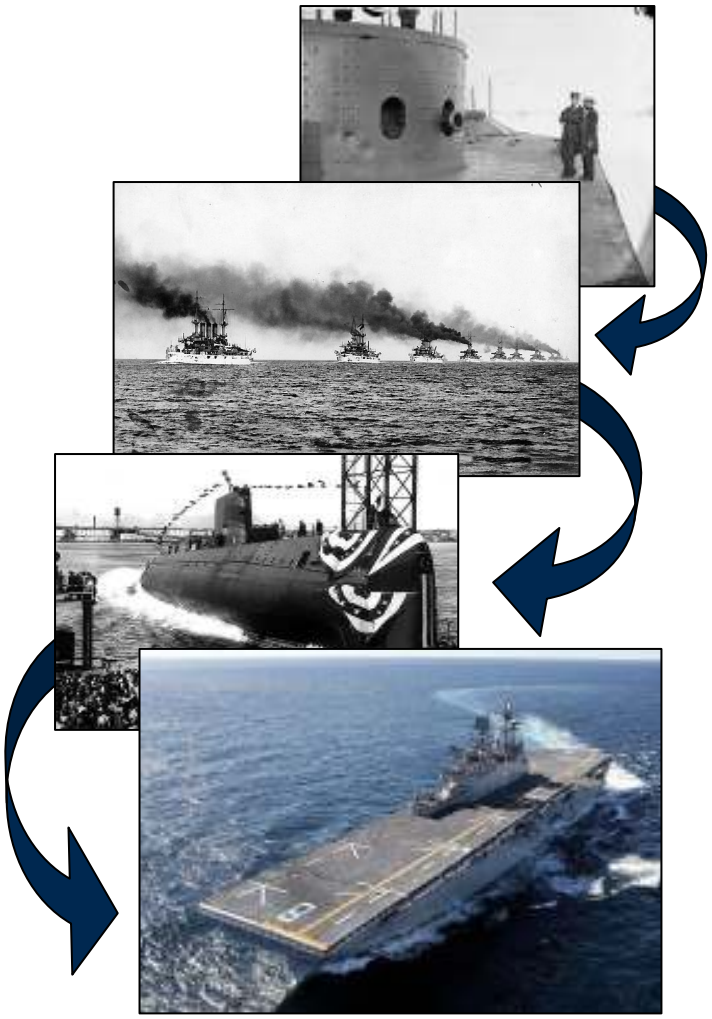
"Competition for energy resources must figure into our thinking, not just in our strategic view outside of the Navy but how we as a Navy develop alternative forms of energy."

– Chief of Naval Operations, ADM Gary Roughead

2030

Navy Leadership in Energy

- **The Navy has been a pioneer of technical advancements from conversion of sail to steam to coal, oil and finally nuclear**
- **In recent years the Navy has successfully pursued many energy initiatives:**
  - Alternative energy sources (China Lake geothermal)
  - Culture change (shipboard i-ENCON program)
  - Improved efficiencies (USS Makin Island APS)
- **The CNO directed Task Force Energy to create a strategy to guide future Navy energy policy and investments**



Toward a Navy Energy Vision for the 21st Century

Navy Energy Vision

CNO Guidance: Provide a Navy Energy Strategy that treats energy as a strategic resource

Ends	Ways		Means
Vision	Strategic Imperatives	Targets	Enablers
• A Navy that values energy as a strategic resource • A Navy that understands energy security as fundamental to executing the Navy mission afloat and ashore • A Navy resilient to any potential energy future	• Assure Mobility • Protect Critical Infrastructure • Lighten the Load • Expand Tactical Reach • Green Our Footprint	• Increase Alternatives Afloat • Sail the Great Green Fleet • Increase Alternative Energy Ashore • Reliable Power for Critical Infrastructure • Reduce Non-Tactical Petroleum Use • Increase Efficiency Afloat • Increase Efficiency Ashore • Energy Efficient Acquisition	• Leadership • Technology • Policy • Strategic Partnerships • Culture Change

Energy Security is having assured access to reliable and sustainable supplies of energy and the ability to protect and deliver sufficient energy to meet operational needs

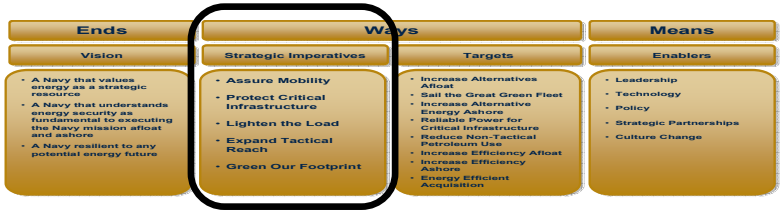
Ends: The Vision

- A Navy that values energy as a strategic resource
- A Navy that understands energy security as fundamental to executing the Navy mission afloat and ashore
- A Navy resilient to any potential energy future

Ends: The Vision

- Protect access to energy sources for our Nation and our Allies
- Consider energy requirements in strategic planning
- Incorporate energy requirements in all phases of systems development and acquisition
- Employ energy efficiency as a force multiplier for enhanced combat capability and a reduced logistics tail
- Spearhead early testing and adoption of viable alternative energy sources
- Rapidly adopt energy efficient technology and operating procedures
- Partner closely with other Services, government, industry, and academia to strengthen energy security at Navy, Joint, and National levels
- Receive wide recognition for energy leadership
- Lead Federal efforts to reduce greenhouse gas emissions
- Maintain a long-term perspective regarding energy security

Ways: Strategic Imperatives for Energy



- **Assure Mobility**
- **Protect Critical Infrastructure**
- **Lighten the Load**
- **Expand Tactical Reach**
- **Green Our Footprint**

Ways: Energy Targets

- **Assure Mobility**
- **Protect Critical Infrastructure**

→

- **Increase Alternatives Afloat**
- **Sail the Great Green Fleet**
- **Increase Alternatives Ashore**
- **Reliable Power for Critical Infrastructure**
- **Reduce Non-Tactical Petroleum Use**

- **Lighten the Load**
- **Expand Tactical Reach**

→

- **Increase Efficiency Afloat**
- **Increase Efficiency Ashore**
- **Energy Efficient Acquisition**

- **Green Our Footprint**

→

- **Reduce Greenhouse Gas Emissions**

Ways: Alternative Energy Afloat

- **Although Navy consumes a large amount of fuel, it cannot move the market but can act as an early adopter to signal demand for biofuel development**
  - Alternatives currently under evaluation are derived from hydro-processed renewable non-food plant and algal feedstocks which could be supplied domestically
  - Achieving 50 percent alternatives afloat depends on a robust industry to provide an economical supply, an agile approval process to enable Navy procurement, and basic research into promising technologies
- **Investment in efficiency will reduce overall fuel consumption and increase percentage of alternatives**

By 2020, half of the Navy's total energy consumption afloat will come from alternative sources

Ways: Great Green Fleet

Fleet Composition






2012 Green Strike Group

- All ships and aircraft in demo group certified to run on 50/50 biofuel blend
- One destroyer will contain full load out of biofuel or fuel will be split among CG/DDG
- Carrier will contain one tank of aircraft biofuel
- CSG will feature fuel saving technologies, e.g. GT improvements, solid state lighting
- CSG will conduct exercise in local operations

2016 Great Green Fleet

- Each ship will contain full load out of biofuel
- Carrier will contain full load out of aircraft biofuel
- GGF will include at least one Destroyer featuring Hybrid Electric Drive
- CSG will feature additional fuel saving technologies
- CSG will go on deployment

By 2016, the Navy will sail the Great Green Fleet, a carrier strike group composed of nuclear ships, hybrid electric ships running biofuel, and aircraft flying on biofuel

Ways: Alternative Energy Ashore

- **Federal and DOD mandates require a significant increase in the use of alternative energy sources**
- **Navy shore community has already made notable achievements in renewable energy**
- **Such investments, along with advanced grid and energy storage technologies, will:**
  - Reduce reliance on the commercial grid
  - Increase resilience of supply
  - Reduce greenhouse gas emissions
  - Spur national energy innovation

By 2020, half of the Navy's total energy consumption ashore will come from alternative sources; the Navy will make half of its installations net-zero energy consumers

Ways: Critical Infrastructure

- **The loss of critical assets ashore, even temporarily, would seriously hinder Navy operations**
- **Many Navy critical assets and shore installations face vulnerabilities related to the commercial electrical grid**
  - Natural disaster
  - Accident
  - Physical and cyber attack
- **Installations must develop sufficient backup power systems and redundant power capacity to maintain mission effectiveness in the event of an outage**
- **The Navy will explore viable alternative energy solutions for backup and base power generation systems to protect critical infrastructure assets**

By 2020, all of the Navy's critical infrastructure will have reliable backup power systems and redundant power systems where viable

Ways: Non-Tactical Vehicles

- **As the Navy looks to alternative liquid fuels for tactical platforms, the Department of the Navy is also dramatically reducing fossil fuel use by the non-tactical vehicle fleet by:**
  - Reducing the number of vehicles
  - Purchasing or leasing more efficient vehicles
  - Converting the majority of the fleet to alternative fuel vehicles
- **In addition to procuring alternative fuel vehicles, the Navy is committed to:**
  - Developing infrastructure and distribution systems to support them
  - Adapting policies which minimize barriers to using alternative fuel in the non-tactical vehicle fleet

By 2015, the Navy will cut in half the amount of petroleum used in its commercial vehicle fleet through phased adoption of hybrid, electric, and flex fuel vehicles

Ways: Efficiency Afloat

- **The Navy must aggressively pursue initiatives that increase fuel efficiency and reduce overall fuel consumption afloat while maintaining or enhancing our ability to fight**
- **Successful implementation of efficiency initiatives will rely on continuously improved technologies and policies adapted to ensure effective use**
  - Maritime
  - Aviation
  - Expeditionary
- **Expanding tactical reach through efficiency emphasizes the contribution of energy security to combat capability**

By 2020, the Navy will increase efficiency and reduce overall fuel consumption afloat by 15 percent

Ways: Efficiency Ashore

- **The shore community has decreased the energy consumption of its facilities over the past three decades in accordance with Federal and DOD mandates:**
  - Efficient building technologies
  - Repairs and modernization
  - Sustainable design principles
- **The Navy will seek to further reduce pressure on infrastructure and reduce backup generation requirements through:**
  - Energy awareness programs
  - Advanced data and control systems
  - Energy audits
  - Re-commissioning of energy systems
- **The Navy will continue to adopt leading-edge technologies at the right time, balancing maturity risk**

By 2020, the Navy will increase efficiency and reduce overall energy consumption ashore by 50 percent

Ways: Acquisition

- **Expanding tactical reach and lightening the load must be prominent aims of reforming how the Navy and DOD do business**
  - Develop and implement an energy KPP and energy figure of merit
  - Define and incorporate a fully burdened cost of fuel
  - Require high-performance buildings
  - Enforce energy efficiency requirements for the defense industry
- **The naval industrial base can lead the private sector in methods to lighten the load and increase the energy security of the Nation, while lowering our dependence on fossil fuels**

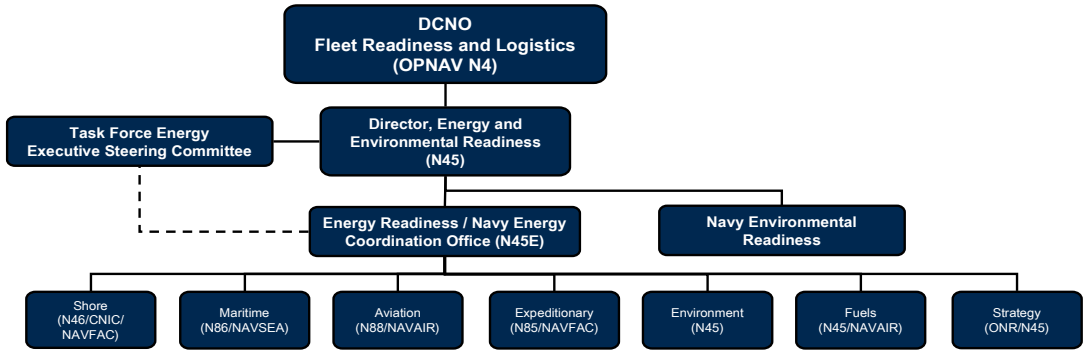
Evaluation of energy factors will be mandatory when awarding contracts for systems and buildings; industry will be held contractually accountable for meeting energy efficiency targets

Means: Enablers for the Vision

- Leadership
- Technology
- Policy
- Strategic Partnerships
- Culture Change

Enablers: Leadership

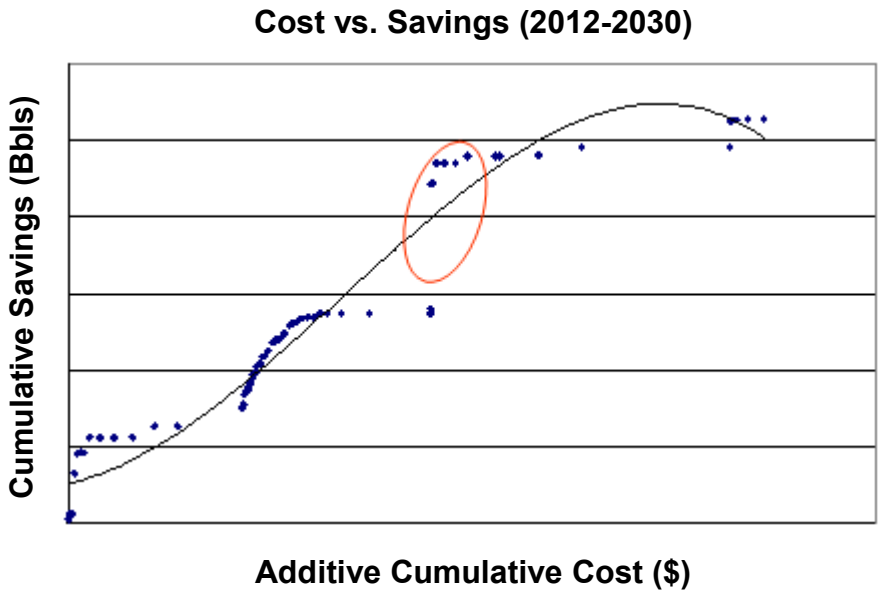
- Decisions that indicate a cardinal heading for all energy efforts ultimately rest with Navy leadership
- The CNO will maintain a Navy Director of Operational Energy responsible for overall leadership of Navy energy efforts afloat and ashore
- The Director will continue to report to a Senior Energy Council with high-level representation from across the Navy
- The Director and operational energy staff will work with stakeholders to ensure that energy considerations are seamlessly incorporated in the decision-making process
  - Resource sponsors
  - System commands
  - Fleet



Even as leadership changes, energy must remain a priority

Enablers: Technology

- Realizing the Energy Vision will require sustained Navy investment at all levels of technology development
- Although payback periods will vary, many investments will provide net savings to the Navy by lowering the total ownership cost of systems
- The Nation may benefit from Navy's investment in energy technologies which are likely to have civilian applications
  - Energy storage
  - Biofuels
- Proposed energy investments will be rigorously analyzed to provide the greatest possible return on investment in capability and in savings

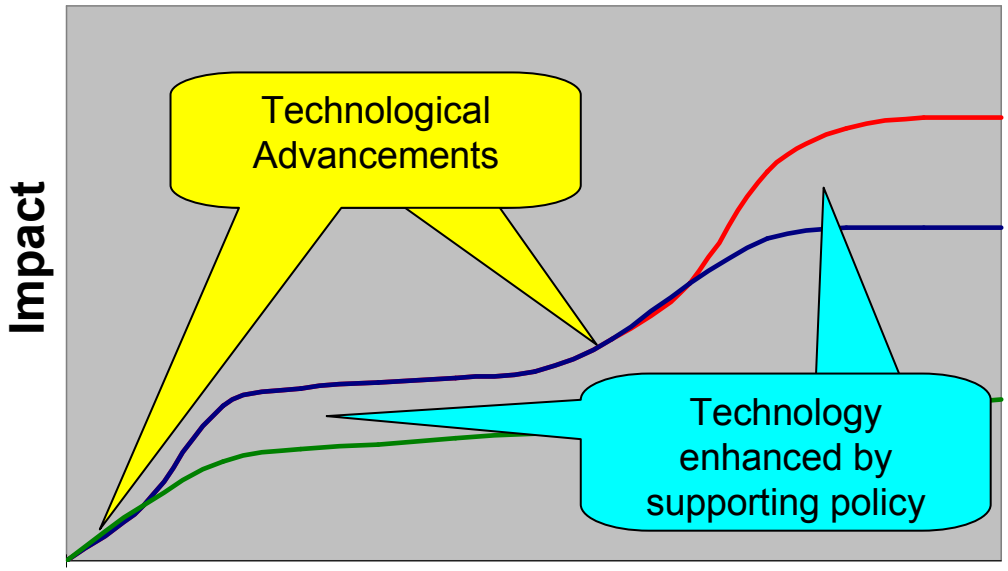


Some technologies will be evolutionary; others may be revolutionary

Enablers: Policy

- **Some of the most cost-effective energy initiatives will derive from policies that encourage energy efficient operations**
  - Best practices
  - Incentives
- **The Navy may have to adapt policy to ensure the full realization of advantages derived from new technologies**
- **Navy business processes will similarly reflect the high priority of energy**

The Value of Energy Awareness



Where a policy change will enhance energy security without negatively impacting readiness, the Navy will favor energy efficient operations

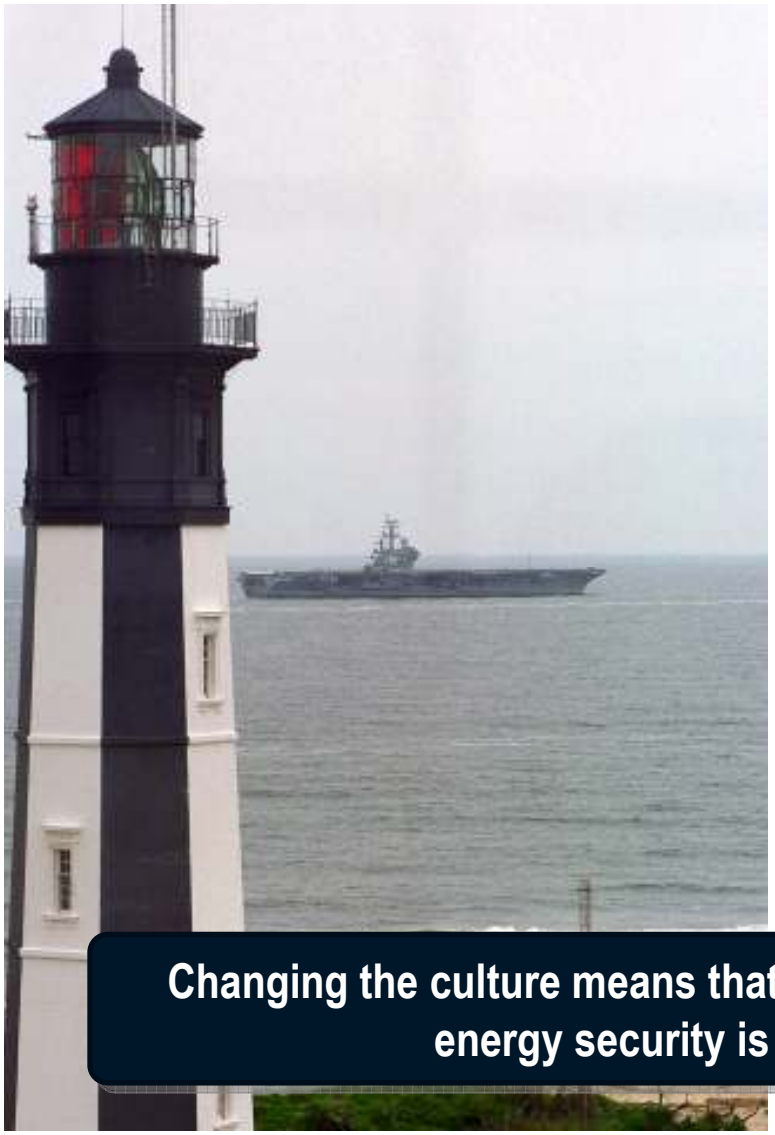
Enablers: Strategic Partnerships

In pursuing energy initiatives, the Navy will seek to leverage the knowledge and resources of inter-service, interagency, and international partners:

- Services
- Federal agencies
- State/local organizations
- Industry
- Utilities
- Non-profits
- Academia
- Allies

Strong collaboration on energy issues is essential to minimize redundancy in the face of constrained budgets and maximize return for the Nation and Allies

Enablers: Culture Change



- Although Navy leadership sets the course, realizing the Energy Vision requires the dedication of all members of the Navy organization
- Even the most efficient technologies and comprehensive policy support do not guarantee efficient operations
- Whether uniformed or civilian, officer or enlisted, every individual must contribute to a culture that values energy as a strategic resource
- Energy awareness training will ensure that every Sailor has the necessary knowledge to act

Changing the culture means that everyone, down to the deck plate, understands how energy security is fundamental to executing our mission

Final Thoughts

- **Successful implementation of the Energy Strategy and realization of the Energy Vision will depend on a variety of factors**
  - Future mission requirements
  - Force structure
  - Operating tempo
- **While today's fight is ongoing, and the character of tomorrow's is uncertain, the Navy must maintain the long-term perspective required for investing in a new energy posture**
- **Despite the challenges, the Navy is committed to an energy transformation that will provide strategic and operational advantages**

The Navy will serve as a model of energy security for the Nation